



**University of
Sunderland**

Jiang, Ting (2015) Creative Approaches and Techniques for New Glass Jewellery Design on the Theme of 'Harmony between Man and Nature'. Doctoral thesis, University of Sunderland.

Downloaded from: <http://sure.sunderland.ac.uk/id/eprint/6495/>

Usage guidelines

Please refer to the usage guidelines at <http://sure.sunderland.ac.uk/policies.html> or alternatively contact sure@sunderland.ac.uk.

Creative Approaches and Techniques for New Glass Jewellery Design on the Theme of 'Harmony between Man and Nature'

(Catherine) Ting Jiang

A thesis submitted in partial fulfilment of the requirements of the
University of Sunderland for the degree of Doctor of Philosophy

October 2015

Creative approaches and techniques for new glass jewellery designs on the theme of 'harmony between man and nature'

(Catherine) Ting Jiang — University of Sunderland (2015) Ph.D.

Abstract

This research aims to develop cross-cultural approaches to contemporary Western glass Jewellery design by using the Chinese philosophical notion of 'harmony between man and nature' on glass and metal jewellery.

By analysing the principle of 'harmony between man and nature', new approaches are developed. This is achieved by using cross-cultural practices, 3D prototyping techniques and glass studio practices to create glass jewellery designs.

The methodologies include: philosophical methodology and experimental research. Tacit knowledge drawn from previous experience is deployed to encourage experimentation with materials and the ways they are used in glass and jewellery practices. The research also utilises Chinese 'holistic approaches', such as 'harmony', 'balance', 'flexibility' and 'change' to glass and jewellery making and the resulting aesthetics provide new practical strategies and contemporary glass jewellery designs.

By analysing Chinese culture and traditions I have facilitated six case studies which explore philosophical understandings through studio practice including the following six philosophical approaches: 'Integration of Yin and Yang', 'Unification of Time and Space', 'Same Structure of Man and Nature', 'the Concept of Change', 'Self-cognition and External-cognition' and 'Combination of Subject and Object'.

Case studies are also used to examine personal approaches to studio practice using Chinese paintings and interpreting them into 3D designs and glass jewellery. Other studio techniques include: machine productions, 3D printing, water-jet cutting, hand making, silversmith, kiln casting and lampworking.

The resulting contemporary glass jewellery designs; informed by Chinese philosophy and traditions of 'harmony between man and nature' provide a different and innovative approach to the field of glass and jewellery design and offers a new contribution to knowledge.

Acknowledgements

This PhD research would not be possible without the support from my Director of Studies, Dr. Manny Ling. I am very grateful for his careful and patient guidance throughout my study.

I would also like to thank my co-supervisors from the National Glass Centre: Professor Sylva Petrova and Dr. Jeffrey Sarmiento for their guidance and support. Other individuals have also generously given their advice and technical support and I am grateful for the assistance of: Professor Kevin Petrie, Dr. Jack Dawson, Dr. Mike Collier, Shirley Wheeler, Robert Birch, Katherine Campbell-Legg, Dr Ayako Tani, Tim Betterton, Dr Mark Proctor, Jun Tang (唐俊) and Chris McHugh.

My research in China would not be possible without the assistance of numerous scholars, experts and academics. Namely they are: Professor Guang Yang (阳光), the Dean of Beijing Academy Chinese Traditional Painting and Calligraphy Institute; Professor Jinsong Zhang (张劲松), the Associate Dean in Guangxi Normal University for Nationalities; Professor Ning Lu (卢宁), the president of Academy Education of Guangxi Normal University and Ji Yuan Liu (刘绩元), the Dean of Li Jiang College and the head of propaganda of Guangxi Normal University. Special mentions also to Bin Ruan (阮斌), the head of Hanxing Investments Limited and Pingmeng Feng (冯平猛), the head of Yunnan Huaping Tourism Products Trade Company.

Finally, I am indebted to my parents Sulin Jiang (江苏林) and Ling Ruan (阮玲) and my husband Chris Reed, for their endless support, dedication and love. Their persistent efforts and drive helped me to focus on my studies and I am forever grateful.

Table of Contents

Abstract	2
Acknowledgements	3
List of Figures:	10
Chapter 1: Introduction	26
1.1 Harmony between man and nature	26
1.2 The jewellery design and glass art in Chinese education	27
1.3 Motivation	30
1.4 Cross cultural practice in my glass jewellery design	30
1.5 Cross disciplinary research in jewellery design and glass art	34
1.6 The Purpose of this Research	36
1.7 Main Research Questions	36
1.8 Research methodology and developing new approaches	37
1.8.1 Philosophical methodology	41
1.8.1.1 Contextual review	42
1.8.1.2 Interviews and study trips	43
1.8.2 Experimental research	43
1.8.2.1 Observing nature and then painting	45
1.8.2.2 Computer software visualization and size surveys.	46
1.8.2.3 Technical research	46
1.8.2.4 Applied experimental process to produce a series of jewellery	47
1.8.2.5 Exhibitions and analysis	48
1.9 The structures of this thesis.	48
Chapter 2: Contextual Review	50
2.1 Introduction	50
2.2 Scope of research	51
2.3 The development and emergence of contemporary jewellery design in China	55
2.3.1 The issues of contemporary Chinese jewellery design	57
2.3.1.1 Jewellery production problems	57
2.3.1.2 Problems with consumers' attitudes	58
2.3.1.3 Designer approach problems	60
2.3.1.4 Chinese designers' social position	61
2.3.1.5 Lack of high-end jewellery designers	62
2.3.1.6 Working environments limitations	63
2.3.1.7 Chinese jewellery design education and market requirements	64
2.3.1.8 Lack of laws to protect jewellery design.	66

2.3.2	The contemporary jewellery art in China	68
2.4	Contemporary Western jewellery design in different contexts	74
2.4.1	Materials	76
2.4.1.1	Precious materials	76
2.4.1.2	Non-precious materials	77
2.4.2	The Market	78
2.4.3	Production	81
2.5	Factors which affect the different design practices in Chinese and Western jewellery design	82
2.5.1	Different attitudes on jewellery	84
2.5.2	Aesthetic ideology	85
2.6	Philosophical contexts of 'harmony between man and nature'	89
2.6.1	Historical and philosophical context of 'harmony between man and nature'	89
2.6.2	The influence of 'harmony between man and nature' on Eastern and Western art	104
2.6.3	The influence of 'harmony between man and nature' on Chinese art	107
2.6.3.1	Calligraphy	107
2.6.3.2	Chinese painting	108
2.6.3.3	Chinese garden design	113
2.6.3.4	Chinese Craft	116
2.6.4	The influence of the philosophy of 'harmony between man and nature' on the aesthetic jewellery design	117
2.7	Practical based approaches to 'harmony between man and nature'	122
2.7.1	The principle of philosophy of 'harmony between man and nature' to create Chinese paintings	122
2.7.2	The principle of philosophy of 'harmony between man and nature' to design glass in my jewellery	124
2.7.3	Philosophical and practical analysis of 'harmony between man and nature' in six main philosophical points	126
2.7.3.1	'Integration of Yin and Yang (阴阳合一)'	126
2.7.3.2	'Unification of Time and Space (时空合一)'	129
2.7.3.3	'Same Structure of Man and Nature (天人同构)'	133
2.7.3.4	'The Concept of Change (变化)'	135
2.7.3.5	'Combination of Subject and Object (主客合一)'	139
2.7.3.6	'Self-cognition and External-cognition (内外合一)'	141
2.8	Summary	143
Chapter 3: Materials, Techniques and Experimentation		147
3.1	Introduction	147
3.2	Combination of hand-crafts and machine production	147
3.3	Material characteristics in glass jewellery design	151

3.3.1	Artists and glass factories	153
3.3.2	Jewellery making	153
3.3.3	Relationship between glass and silver	155
3.4	Chinese ink paintings	155
3.4.1	Interpretations of Chinese ink paintings a practice-based approach	156
3.4.2	Training and Chinese painting	158
3.5	Sketches of ideas and drawings	163
3.6	Digital techniques	169
3.6.1	My digital tools	170
3.6.2	The context of 3D modelling	170
3.6.3	AutoCAD—Orthographic views of jewellery	172
3.6.4	Rhinoceros—3D rendering of jewellery	174
3.6.4.1	The reason for choosing Rhinoceros.	174
3.6.4.2	Software technicalities	176
3.6.5	Netfabb Studio	179
3.7	3D Printing techniques	183
3.7.1	3D printing and glass firing	184
3.7.2	My 3D printing process for using the 3D printing service	186
3.7.3	3D printing service costs	187
3.8	Glass techniques	187
3.8.1	Fusing glass and Water-jet cutting	189
3.8.2	3D printing in kiln casting glass	195
3.8.3	Fire polishing	197
3.8.4	Lampworking	199
3.9	Silversmith techniques	201
3.9.1	The problem of glass setting	201
3.9.2	Double layers setting	204
3.9.3	Interchangeable setting	206
3.9.3.1	The flexible peg setting	207
3.9.3.2	Interchangeable surrounding setting	208
3.9.3.3	Interchangeable half surrounding setting	209
3.10	Summary	209
3.10.1	Technology	209
3.10.2	Combining materials	210
3.10.3	Software	211
3.10.4	Glass techniques	211
Chapter 4: Case Studies		212
4.1	Introduction	212
4.2	'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒)	213
4.2.1	Introduction	213
4.2.2	Objectives	214

4.2.3	Materials and process	214
4.2.4	The microwave kiln glass testing and evaluation of 'Ao Tu 凹凸'	220
4.2.5	Series testing of 'Concave and Convex' couple ring set ('Ao Tu 凹凸')	222
4.2.6	'Concave and Convex' couple ring set ('Ao Tu 凹凸') description	225
4.2.7	'Concave and Convex' couple ring set ('Ao Tu 凹凸') evaluation	226
4.2.7.1	'Integration of Yin and Yang'	227
4.2.7.2	Self-cognition and External-cognition	227
4.2.7.3	'The Concept of Change'	228
4.3	'Egg and Sperm' necklace ('卵子和精子' 项链)	230
4.3.1	Introduction	230
4.3.2	Objectives	230
4.3.3	Materials and process	231
4.3.4	The microwave kiln glass testing of the 'Egg and Sperm'	235
4.3.5	Description of technical features of the design	236
4.3.6	Evaluation of technical features of the design	237
4.3.7	The Egg 3D printing model with wax mould	240
4.3.8	Evaluation of the egg wax mould	242
4.3.9	Feedback on the 'Egg and Sperm' Necklace	242
4.3.10	'Egg and sperm' necklace description	245
4.3.11	'Egg and sperm' necklace evaluation	247
4.3.11.1	'Integration of Yin and Yang'	247
4.3.11.2	Self-cognition and External-cognition	248
4.3.11.3	'The Concept of Change'	249
4.4	'Button' brooch ('扣子' 胸针)	251
4.4.1	Introduction	251
4.4.2	Objectives	251
4.4.3	Materials and processes	251
4.4.4	The microwave kiln glass testing of the 'Button'	254
4.4.5	Trial 'Button' brooch one	257
4.4.5.1	Description of 'Button' brooch one	259
4.4.5.2	Evaluation of 'Button' brooch one	260
4.4.6	Trial 'Button' brooch two	261
4.4.7	Trail brooch pin, pin holder and protector one	264
4.4.7.1	Description of brooch pin, pin holder and protector one	264
4.4.7.2	Evaluation of brooch pin, pin holder and protector one	264
4.4.8	Trail brooch pin, pin holder and protector two	264
4.4.8.1	Description brooch pin, pin holder and protector two	265
4.4.8.2	Evaluation of brooch pin, pin holder and protector two	266

4.4.9	Series testing of 'Button' brooch	267
4.4.10	Apply 'Borrowed Landscape (借景)' method into 'Button' brooch	271
4.4.11	Description of 'Button' brooch design with 'Borrowed Landscape'	273
4.4.12	'Button' brooch description	275
4.4.13	'Button' brooch evaluation	277
4.4.13.1	'Integration of Yin and Yang'	278
4.4.13.2	'Self-cognition and External-cognition'	278
4.4.13.3	'The Concept of Change' Evaluation	279
4.5	'Pleated Skirt' necklace ('百褶裙' 项链)	281
4.5.1	Introduction	281
4.5.2	Objectives	282
4.5.3	Materials and processes	282
4.5.4	The sizes survey of 'Pleated Skirt' pendant.	286
4.5.5	Series testing of 'Pleated Skirt' necklace.	286
4.5.6	'Pleated Skirt' necklace description	294
4.5.7	'Pleated Skirt' necklace evaluation	296
4.5.7.1	'Unification of Time and Space'	296
4.5.7.2	'Self-cognition and External-cognition'	297
4.5.7.3	'The Concept of Change'	297
4.6	'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针)	299
4.6.1	Introduction	299
4.6.2	Objectives	301
4.6.3	Materials and processes	301
4.6.4	The sizes survey of 'Annual Ring and Fingerprint' brooch	303
4.6.5	Series testing of 'Annual Ring and Fingerprint' brooch	304
4.6.6	'Annual Ring and Fingerprint' brooch description	309
4.6.7	'Annual Ring and Fingerprint' brooch evaluation	310
4.6.7.1	'Same Structure of Man and Nature'	310
4.6.7.2	'Self-cognition and External-cognition'	311
4.6.7.3	'The Concept of Change'	311
4.6.8	'Annual Ring and the Edge of Dancing Skirt' earrings/rings	312
4.6.8.1	Introduction	312
4.6.8.2	Objectives	313
4.6.8.3	Materials and processes	313
4.6.8.4	The 'Annual Ring and the Edge of Dancing Skirt' earrings/rings description	317
4.6.8.5	The 'Annual Ring and the Edge of Dancing Skirt' earrings/rings evaluation	318
4.6.8.5.1	'Same Structure of Man and Nature'	319
4.6.8.5.2	'Self-cognition and External-cognition'	320

4.6.8.5.3	'The Concept of Change'	320
4.7	'Osmanthus' ring set ('桂花' 组戒)	322
4.7.1	Introduction	322
4.7.2	The Osmanthus plant	323
4.7.3	Objectives	323
4.7.3	Materials and processes	324
4.7.5	Series testing of 'Osmanthus' ring set	327
4.7.6	'Osmanthus' ring set description	337
4.7.7	'Osmanthus' ring set evaluation	337
4.7.7.1	'Self-cognition and External-cognition'	338
4.7.7.2	'Unification of Time and Space'	338
4.7.7.3	'Combination of Subject and Object'	338
4.7.7.4	'The Concept of Change'	339
4.8	Summary	340
4.8.1	Concept outcomes	340
4.8.2	Jewellery outcomes	342
4.8.3	Technical outcomes	343
Chapter 5: Conclusions		345
5.1	Contribution to knowledge and basis for originality	345
5.2	Outcomes	348
5.2.1	Conclusions relative to the research objectives 1	349
5.2.2	Conclusions relative to the research objectives 2	350
5.2.3	Conclusions relative to the research objectives 3	353
5.2.4	Limitations of the research project	354
5.3	Opportunities for further research	355
Appendix 1: Interviews with Philosophical Expert and Chinese Ink Painter, etc.		370
Appendix 2: Experiments with Glass Pieces in Microwave Kiln		374
Appendix 3: My Model Problems and Record for 3D Printing		423
Appendix 4: Shapeway Tips for 3D Printing		426
Appendix 5: Sizes Surveys of 'Pleated Skirt' Necklace		429
Appendix 6: Sizes Surveys of 'Annual Ring and Ringerprint' Brooch		431
Appendixes 7: Published Article		433
Appendixes 8: Exhibitions and Certificate		439
Appendixes 9: Feedback from My Solo Guilin Exhibition		443
Glossary of term:		446

List of Figures:

Fig. 1: Diagram illustrating the cross-cultural contexts of this research (Jiang, 2011).....	32
Fig. 2: The methodologies of this research (Jiang, 2014).	40
Fig. 3: The indirect progression method (Jiang, 2011).	42
Fig. 4: The personal holistic research glass jewellery production method (Jiang, 2012).	44
Fig. 5: The personal research method diagram (Jiang, 2013).....	47
Fig. 6: Dragonfly bead (Unknown).	54
Fig. 7: The faience and glass jewellery of Amarna period (1379–1362 B.C.) (Dubin, 1987, p.15).	54
Fig. 8: Larry Scott, 2001, glass beads (Lavin, 2008).	54
Fig. 9: The glass beads of Pandora, 2013 (http://www.pandora.net/zh-cn/).	54
Fig. 10: Chinese jewellery market sales (Unit: billion RMB) (Summarized from Xie and Su, 2010, p.48 and He, 2013).	56
Fig. 11: Ng Chun Wing (伍镇荣), 'Graceful Phoenix', 2014.	59
Fig. 12: Fei Liu (刘斐), 'Dawn Sculpture' ring, 2006, 18ct black gold with 12mm Tahitian pearl, red garnet, citrine, diamonds.	69
Fig. 13: Baobao Wan (万宝宝), 'Dragon d'Eau', 2009, Sapphire, Diamond, 18K Gold.	69
Fig. 14: Shirley Zhang (张雪莉), 'Dancing on the Flowers', 2012, gold, 1,002 coloured stones, 4,986 diamonds, jadeite cabochons and chalcedony cabochons.	70
Fig. 15: Rui Huo (霍睿), 2013, 'Amusement Trip (盎然之旅)', K-gold, natural and artificial crystal, glass and alloy.	72
Fig. 16: Xiaoqian Huang (黄肖倩), 'Play Water (戏水)', 2011, pearl, plastic beads, plastic tube, steel.	73
Fig. 17: Siting Zhou (周思婷), 2011, 'Lucid Flying', glass, pearl, copper and a variety of jewels (Peng, 2014, p,113).	73
Fig. 18: The diagram of contemporary jewellery design (Jiang, 2014).....	75

Fig. 19: Georg Spreng, 2009, 'White Blossom' necklace, Diamonds and 950-platinum (Harday, 2012, p.163).	76
Fig. 20: Charlotte De Syllas, 2009, 'Migration' Necklace, White jade and 18-carat white gold (Harday, 2012, p.166).	76
Fig. 21: Nan Nan Lui, 2007, paper, metal (Murphy, 2009 p.59).	77
Fig. 22: Swarovski-Spectacular Ruby Set (2014).	79
Fig. 23: Jacqueline Ryan, 2008, ring, Vitreous enamel and 18-carat gold (Harday, 2012, p.151).	86
Fig. 24: Hong Li 李宏, 2015, 'Eight Trigrams with Food 八卦与美食'	87
Fig. 25: The explanation diagram of the harmony between man and nature (Jiang, 2011).	89
Fig. 26: Diagram illustrating the notion of introspection and self restraint (Zhang, 2011, from interview material).	100
Fig. 27: Diagram showing the processes and development of the 'harmony between man and nature' for Western glass jewellery design (Framework borrowed from Ling' PhD, 2008, p.48).	103
Fig. 28: Isamu Noguchi, 1948, 'Drawing for Avatar', Ink on paper: 19 x 8.9 cm.	104
Fig. 29: Isamu Noguchi. <i>Avatar</i> , 1947 Georgia pink marble, 198.2 x 83.8 x 61cm. Kroller-Muller Muscum, Otterlo, The Ncherlands. (Munroe, 2009, p.150).....	105
Fig. 30: David Smith, 1950, 'The Letter', welded steel, 95.6 x 58.1 x 23.5 cm, Munson-Williams-Proctor Arts Institute, Utica, New York (Munroe, 2009, p.148).	106
Fig. 31: Gu Gan, 1991, 'World of Superme Bliss' (Barrass, 2002, p.183).	107
Fig. 32: Zhang Zeduan's (张择端) 'Peace Reigns over the River (清明上河图)' (Barnhart, 2002, p.106—107).....	109
Fig. 33: Huang Gongwang's (黄公望) 'Fuchun Mountains (富春山居图)' (Chinese Calligraphy Home, 2011).	110
Fig. 34: Guang Yang's (阳光) 'Spring Landscape (春雨春光)' (2010), 136cm x 68cm (Liu, 2010, p.7).....	112
Fig. 35: Lingering garden (留园) (A.D.1644—A.D.1911) in Suzhou gardens (苏州园林).....	114

Fig. 36: Villa Lante, Bagnaia: Fountain of the Moors (Mosser and Teysstot, 1991, p.95).....	115
Fig. 37: National Taiwan Craft Research Institute 'Yii' collection in Design Museum, UK (Faherty, 2011, p.188).	116
Fig. 38: Nora Fok, 2008–2009, 'Circles' neckpiece, knitted and knotted dyed nylon (Hardy, 2012, p.68).	118
Fig. 39: Helfried Kodre, top brooch, 2010, stainless steel, silver and gold, below brooch, 2009, lapis lazuli, silver and gold (Hardy, 2012, p.96).....	118
Fig. 40: Elodie Darwish, 'Pocket Clip Series', powder-coated stainless steel (Shaw, 2006, p.102).	119
Fig. 41: Christel Van Der Laan, 2004, 'Priceless Bangle', gold-plated stg silver, polypropylene swing tag ends (Ibid).....	119
Fig. 42: Stanley Lechtzin PusHere, 2006, bracelet, Selective-Laser-Sintered (SLS) glass-filled nylon, rubber O-rings (Ilse-Neuman et al, 2007, p.133).....	120
Fig. 43: Stefano Marchetti, 2006, necklace, plate glass, yellow gold, silver (Ibid, p.141).	120
Fig. 44: Francesco Pavan, 2000, brooch, plate glass, white gold (Ibid, p.159).	120
Fig. 45: Unknown, glass ring (Wu, 2014, p.29).....	121
Fig. 46: Katherine Vones, 2006, 'Earconch' Ear Ornament (http://www.kvones.com/gallery.html).	121
Fig. 47: Svatopluk Kasaly's necklace (http://svuv.cz/autor/Kasaly.html).	122
Fig. 48: Giovanni Corvaja, 2008, 'Fidelity' rings ('Golden fleece' collection), 18-carat gold (Hardy, 2012, p.52).	127
Fig. 49: The diagram of the 'yin and yang' (Jiang, 2011).	128
Fig. 50: Marketa Silena's work (Neuman 2007, p. 181).	129
Fig. 51: Kesheng Huang 黄格胜, 1985, One Hundreds of Miles Landscape in Li Jiang River 百里漓江图.....	130
Fig. 52: Diana East's work (National Glass Centre, 2005, p. 33).....	131
Fig. 53: Sunny Wang (王铃蓁), 2006, '3 Self', each is about 38 x 25 x 10cm, Hot Formed. (http://www.sunnywangglass.com/english/gallery.html)	132

Fig. 54: Jenny Llewellyn, 2007, 'Neckpiece', Silicone, phosphorescent pigment, light-gathering polycarbonate (Murphy, 2009, p.15)..... 136

Fig. 55: Sian Edwards, 'Salt Ring' (detail), fine silver, stg silver, salt, each 2 x 5 x 5 cm. Design Centre, Enmore. It gives the expression of a change process of the metal decaying (Spencer, 2005, p.113). 137

Fig. 56: Xu Beihong's (徐悲鸿) 'Eight Horses (八骏图)' painting (Song, 2014, p.14)..... 138

Fig. 57: Katy Hackney's 'Red Mirror' necklace, 2000, oxidized silver, cellulose acetate (Kowalski, 2008, p.175). 140

Fig. 58: Explanation diagram of Self-cognition and External-cognition in design (Jiang, 2013). 142

Fig. 59: The different cases studies used different techniques (Jiang, 2014). 149

Fig. 60–61: The silver part making in my 'Ao Tu 凹凸' couple ring set (Jiang, 2012). 150

Fig. 62: The basic raw materials type of glass and silver (Summarized from websites of Bullseye and Cooksongold, 2014). 154

Fig. 63: Paint on the glass (Jiang, 2011). 157

Fig. 64: Using glass to paint (Jiang, 2011). 157

Fig. 65: Paint with leaf (Jiang, 2011). 157

Fig. 66: Breeze on a sunny day and a raining day (Jiang, 2011)..... 159

Fig. 67: Strong wind on the beach and the flowers in the strong wind (Jiang, 2011)..... 160

Fig. 68: Birds, the foot prints in the snow and the passers-by in the strong wind (Jiang, 2011). 161

Fig. 69: Reflection of water (Jiang, 2011). 162

Fig. 70: The initial jewellery ideas developed from Longji 龙脊 Terrace (Jiang, 2011)..... 164

Fig. 71: The initial jewellery ideas develop from Chinese bronze (Jiang, 2011)..... 166

Fig. 72: The initial jewellery ideas developed from peach blossoms (Jiang, 2011). 168

Fig. 73: The advantages of CNC machining and 3D printing (Summarized from Libert, 2010 and Lennings, 2013). 171

Fig. 74: David Goodwin's ring..... 172

Fig. 75: The reflection of object in the three views (Mao, 1991, p.30).....	173
Fig. 76: The 3D jewellery models in the JewelCAD (Hafiludin, 2011).	175
Fig. 77–78: The unclosed line (Jiang, 2012).	176
Fig. 79–80: The excess line (Jiang, 2012).....	177
Fig. 81–82: The repeated line (Jiang, 2012).	177
Fig. 83–84: The mass line (Jiang, 2012).	178
Fig. 85–86: The thin gaps in 'sperm' 3D model (Jiang, 2012).	179
Fig. 87: The too thin and too long pin (Jiang, 2012).....	180
Fig. 88–89: The thin hole of pin stand (Jiang, 2012).....	180
Fig. 90–91: The thin walls in 3D model of 'Annual Ring and Fingerprint' of pendant and 'Egg and Sperm' necklace (Jiang, 2012).	181
Fig. 92: Lots of shells in 3D model of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).	181
Fig. 93: The model checking in Netfabb Studio (Jiang, 2012).....	182
Fig. 94: The 3D printing glass of the 'Ao Tu 凹凸' ring set (Jiang, 2012).....	184
Fig. 95: the 3D model of the top of 'Tu 凸' ring (Jiang, 2012).	185
Fig. 96: Large microwave kiln for glass pendants.	187
Fig. 97: Small pendant made in microwave kiln (Jiang, 2011).	188
Fig. 98: Water-jet cutting machine in Sunderland University (Jiang, 2012).....	190
Fig. 99: AutoCAD file in Water-jet cutting machine (Jiang, 2013).....	190
Fig. 100–101: Water-jet cutting section of the jewellery glass parts (Jiang, 2013).	190
Fig. 102: Cut glass pieces separately (Jiang, 2012).	191
Fig. 103: Chips off glass piece of 'Ao 凹' (Jiang, 2013).....	191
Fig. 104: Cut glass pieces with glass branch (Jiang, 2013).....	191
Fig. 105: Separate glass pieces with glass branch (Jiang, 2013).....	191
Fig. 106: The deflection of Water-jet cutting (Jiang, 2012).	192
Fig. 107: Hammer Banas frits to prepare for fusing glass sheet in the kiln (Jiang, 2012).....	192
Fig. 108: The Banas glass frits become small glass sheets after fusing (Jiang, 2012).....	192
Fig. 109: Fuse small Banas glass sheets from fig.108 become one big sheet (Jiang, 2012)....	193

Fig. 110: One big colourful Banas glass sheet after fusing from fig.109 (Jiang, 2012). 193

Fig. 111: The planning of fusing the Bullseye sheets in AutoCAD software (Jiang, 2012). 193

Fig. 112: Cut the 3 layers of different size of Bullseye sheets in different colours before fusing (Jiang, 2012). 194

Fig. 113: The 3 layers of different size of Bullseye sheets in different colours after fusing (Jiang, 2012). 194

Fig. 114: The different temperatures of fusing Bullseye glass and Banas glass (Jiang, 2012). 194

Fig. 115: 3D printing plastic 'Egg' to make 'Egg' mould putty (Jiang, 2012). 195

Fig. 116: Use 'Egg' mould putty to make 'Egg' wax (Jiang, 2012). 195

Fig. 117: Lost wax to get 'Egg' glass mould (Jiang, 2012). 195

Fig. 118: 'Egg' glass pieces after kiln firing (Jiang, 2012). 195

Fig. 119: Combining 3D printing and kiln casting to create 'egg' glass (Jiang, 2014). 196

Fig. 120: My glass grinder machine (Jiang, 2012). 197

Fig. 121: The grinder machine in University of Sunderland (Jiang, 2012). 197

Fig. 122: The hand grinding area in University of Sunderland (Jiang, 2012). 197

Fig. 123–124: The glass polishing machines in University of Sunderland (Jiang, 2012). 197

Fig. 125: The comparison of 'Fingerprint' glass pieces after polishing (Jiang, 2012). 198

Fig. 126: The distortion and uneven fire polishing of 'Fingerprint' glass pieces (Jiang, 2012). .. 198

Fig. 127: The 'Ao Tu 凹凸' glass pieces before fire polishing (Jiang, 2012). 199

Fig. 128: The expanded and shrunk 'Ao Tu 凹凸' glass pieces after heating (Jiang, 2012). 199

Fig. 129: Rope Trick, 14 inches high 14 inches wide 7 inches deep, flame worked glass rod (Dunham, 2002, p.33). 200

Fig. 130: The cracked Osmanthus flower glass by lampworking (Jiang, 2012). 200

Fig. 131: The Osmanthus flower glass pieces made in yellow Soda Lime glass and clear Borosilicate glass by lampworking (Jiang, 2012). 200

Fig. 132–133: Mohs' Scale of Hardness (Crowe, 2006, p.22). 202

Fig. 134, 135, 136: Bezel setting for crystal (Jiang, 2009). 203

Fig. 137–138: Double layers carved setting (Jiang, 2009). 204

Fig. 139: The glass metal for exhibition in Birmingham University (Jiang, 2011)	205
Fig. 140: Flexible peg setting in 'Egg and Sperm' necklace' ('精子和卵子' 项链) (Jiang, 2013).	206
Fig. 141: Flexible peg setting in 'Button' brooch ('扣子'胸针) (Jiang, 2013).	206
Fig. 142: Flexible peg setting in 'Osmanthus' ring set (Jiang, 2012).	206
Fig. 143: Interchangeable surrounding setting in 'Pleated skirt necklace' ('百褶裙' 项链) (Jiang, 2012).	207
Fig. 144: Interchangeable surrounding setting in 'Annual ring and fingerprint brooch' ('指纹与年轮' 胸针) (Jiang, 2013).	207
Fig. 145: Interchangeable half surrounding setting in 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒) (Jiang, 2012).	208
Fig. 146: The innovative interchangeable setting methods in different case studies (Jiang, 2014).	210
Fig. 147: The developing process of 'Concave and Convex' couple ring set (Jiang, 2014).	214
Fig. 148: Guanzhong Wu 吴冠中, 2007, 'Concave and Convex 凹凸' in 'Walk in 798' Exhibition.	215
Fig. 149: Meng You Wang 王孟友, 2008, 'Ao Tu Fantasia 凹凸幻想曲' Calligraphy.....	215
Fig. 150: 'Ao Tu 凹凸' Ink Painting (Jiang, 2011).	215
Fig. 151: '凹凸' shape sculpture in Ashburne House, the University of Sunderland (Anon, 2011).	216
Fig. 152: Raewyn Roberts, 'Aspects of Dislocation', set of six, cast glass, each 15 x 16cm (King, 2004, p.93).	216
Fig. 153: 'Ao Tu 凹凸' ring set ideas sketches (Jiang, 2011).	217
Fig. 154: 'Ao Tu 凹凸' ring set detail drawing (Jiang, 2011).	217
Fig. 155: 'Ao Tu 凹凸' ring set in orthographic view (Jiang, 2012).	218
Fig. 156: 'Ao Tu 凹凸' ring set detail form development (Jiang, 2012-2013).	218
Fig. 157: 'Ao Tu 凹凸' ring set detail rendering 1 (Round concave and convex) (Jiang, 2012).	219

Fig. 158: 'Ao Tu 凹凸' ring set detail rendering 2 (Plants on the top of glass) (Jiang, 2012). ... 219

Fig. 159: 'Ao Tu 凹凸' ring set detail rendering 3 (Plants in the bottom of glass) (Jiang, 2012).
..... 219

Fig. 160: 'Ao Tu 凹凸' ring set detail rendering 4 (Simple) (Jiang, 2013)..... 219

Fig. 161–162: Transparent 'Ao Tu 凹凸' with thick metal wires glass testing (Jiang, 2011). 220

Fig. 163–164: Opaque and transparent 'Ao Tu 凹凸' glass with thin metal wires testing (Jiang, 2011). 220

Fig. 165–166: Opaque and transparent 'Ao Tu 凹凸' glass with thick metal wires testing (Jiang, 2011). 220

Fig. 167–168: Banas blue 'Ao Tu 凹凸' glass testing in microwave kiln forming (Jiang, 2011).
..... 221

Fig. 169–170: Banas transparent 'Ao Tu 凹凸' glass testing in microwave kiln forming (Jiang, 2011). 221

Fig. 171: Solder each silver parts of 'Tu 凸' ring (Jiang, 2012)..... 223

Fig. 172: The silver ring parts of 'Tu 凸' ring after 3D printing (Jiang, 2012). 223

Fig. 173: The traditional claw setting of 'Tu 凸' ring silver parts (Jiang, 2012). 223

Fig. 174: The new interchangeable half surrounding setting of 'Tu 凸' ring silver parts (Jiang, 2012). 223

Fig. 175: The 'Ao Tu 凹凸' ring set (Jiang, 2012). 223

Fig. 176: The close size of 'Ao 凹' glass parts from water-jet cutting (Jiang, 2013). 224

Fig. 177: Shape the 'Tu 凸' glass parts (Jiang, 2013). 224

Fig. 178: Four colours of 'Au Tu 凹凸' glass pieces cut from water-jet (Jiang, 2013). 224

Fig. 179: Final four colours of 'Au Tu 凹凸' glass pieces after fire polishing (Jiang, 2013). 224

Fig. 180: The three characteristics associated with the 'Ao Tu 凹凸' couple ring set (Jiang, 2014).
..... 225

Fig. 181: The interchangeable 'Ao Tu 凹凸' couple ring set (Jiang, 2013). 226

Fig. 182: The developing process of 'Egg and Sperm' necklace (Jiang, 2014). 231

Fig. 183: Egg and sperm, ink painting series (Jiang, 2011). 232

Fig. 184–185: The egg and sperm initial earrings idea sketches (Jiang, 2011). 233

Fig. 186–187: The egg and sperm initial necklace idea sketches (Jiang, 2011). 234

Fig. 188: The egg and sperm initial brooch idea sketches (Jiang, 2011). 234

Fig. 189: The 'Egg and Sperm' necklace detail drawing (Jiang, 2011). 234

Fig. 190–191: The egg and sperm glass testing (Jiang, 2011). 235

Fig. 192–193: The egg absorbs the sperm glass testing (Jiang, 2011). 235

Fig. 194: The 'Egg and Sperm' necklace orthographic view (Jiang, 2012). 237

Fig. 195–196: The side rendering of 'Egg and Sperm' necklace (Jiang, 2012). 237

Fig. 197–198: The interlink part of sperm chain (Jiang, 2012). 238

Fig. 199–200: The 'Egg and Sperm' necklace 3D rendering (Jiang, 2012). 238

Fig. 201: The 'Egg and Sperm' necklace 3D rendering (Jiang, 2012). 239

Fig. 202: 3D printing silver sperm chains (Jiang, 2012). 239

Fig. 203: 3D printing silver sperm interlink rings (Jiang, 2012). 239

Fig. 204: Silver sperm error interlinks rings in 3D printing (Jiang, 2012). 239

Fig. 205: The white flexible plastic egg pendant (Jiang, 2012). 240

Fig. 206: Casting the white flexible plastic egg pendant into the mould putty (Jiang, 2012). 240

Fig. 207–208: Egg glass pendant mould by using lost wax method (Jiang, 2012). 241

Fig. 209: Put the egg glass pendant mould into the kiln with filling the splinters of glass (Jiang, 2012). 241

Fig. 210–211: Casting egg glass pieces in pink, blue and green (Jiang, 2012). 241

Fig. 212: Ting Jiang solo glass jewellery design exhibition 2013. 243

Fig. 213: 3D silver screw (Jiang, 2012). 244

Fig. 214: 3D silver screw nut (Jiang, 2012). 244

Fig. 215: The 3D model of the screw interlinks part of 'Egg and Sperm' necklace (Jiang, 2012).
..... 244

Fig. 216: The 3D model of the new solution interlinks part of 'Egg and Sperm' necklace (Jiang, 2013). 244

Fig. 217: The 3D printing of silver screw of 'Egg and Sperm' necklace (Jiang, 2012). 244

Fig. 218: The new silver interlinks of 'Egg and Sperm' necklace (Jiang, 2013).....	244
Fig. 219: Finished glass egg pendants in various colours (Jiang, 2012).	245
Fig. 220: The finished 'Egg and sperm' necklace (Jiang, 2013).	246
Fig. 221: The three characteristics associated with the 'Egg and Sperm' necklace (Jiang, 2014).	247
Fig. 222: The developing process of 'Button' brooch (Jiang, 2014).	252
Fig. 223: 'Button and Buttonhole' ink painting (Jiang, 2011).	252
Fig. 224: Initial 'Button' glass jewellery ideas sketches (Jiang, 2011).....	253
Fig. 225: Three wax buttons were craved by handcraft (Jiang, 2011).	255
Fig. 226: Button glass was made by microwave kiln forming (Jiang, 2011).....	255
Fig. 227: Shape the glass powder as the round circle (Jiang, 2011).	255
Fig. 228: The round shape glass after microwave fusing the glass powder (Jiang, 2011).	255
Fig. 229: Shape the glass frit and powder in a round shape (Jiang, 2011).	256
Fig. 230: The pentagon glass after fusing in the microwave kiln (Jiang, 2011).	256
Fig. 231: The pentagon glass under the lighting (Jiang, 2011).	256
Fig. 232: Fuse the round glass sheet with glass powder and silver leaf (Jiang, 2011).	257
Fig. 233: The round shape blue glass after microwave fusing (Jiang, 2011).....	257
Fig. 234: Silver clay making with basic silversmith skill for 'Buttonhole' (Jiang, 2011).....	257
Fig. 235: The clay button, handmade (Jiang, 2011).....	258
Fig. 236: Button mould made base on the button clay (Jiang, 2011).	258
Fig. 237: Banas glass put into the Button mould (Jiang, 2011).....	258
Fig. 238: Yellow button glass after fusing in the microwave kiln (Jiang, 2011).....	258
Fig. 239: 'Button' brooch one (Jiang, 2011).	259
Fig. 240: Problems concerning the first pieces of the 'Button' brooch (Manny Ling and Sylva Petrova's tutorial in 2011).	260
Fig. 241: The drawing of 'Button' brooch (Jiang, 2011).....	261
Fig. 242: The orthographic view of 'Button' brooch (Jiang, 2012).....	262
Fig. 243, 244, 245, 246: The different render of 'Button' brooch (Jiang, 2012).	263

Fig. 247: The brooch pin, pin holder and protector one (Jiang, 2012).	264
Fig. 248: Zhengdong Li 李正东, 2011, Chinese wooden trays stand for Shoushan stone (寿山石), jade and etc.	265
Fig. 249–250: The development of brooch pin, pin holder and protector (Jiang, 2012).	265
Fig. 251: The 3D printing of 'Button' brooch silver buttonhole (Jiang, 2012).	266
Fig. 252: The 3D printing of 'Button' brooch pin silver holder and protector (Jiang, 2012).	266
Fig. 253: The soldering of silver buttonhole with silver pin holder and protector (Jiang, 2012).	266
Fig. 254–255: The 3D printing of strong and flexible plastic 'Button' (Jiang, 2012).	267
Fig. 256: The Water-jet cutting of yellow 'Button' glass (Jiang, 2012).	267
Fig. 257: The piece of 'Button' brooch in Guilin Exhibition Hall in China (Jiang, 2013).	268
Fig. 258, 259, 260, 261: The development of 'Button' brooch screw shapes and screw nuts (Jiang, 2012–2013).	269
Fig. 262–263: The silver screw and plastic screw (Jiang, 2012–2013).	269
Fig. 264: The new 'Button' brooch screws (Jiang, 2013).	270
Fig. 265: The different colours and shapes of 'Button' glass (Jiang, 2013).	270
Fig. 266: The 'Borrow Landscape' of the 'Zhuo zheng Garden (拙政园)' in Suzhou Garden (Photography by Ting Jiang, 2003).	271
Fig. 267: The 360 map shows the distance between 'Suzhou Humble Administrator's Garden (拙政园)' and 'North Temple Pagoda (北寺塔)' (http://map.so.com/?k=拙政园中的塔&src=tab_www).	272
Fig. 268–269: Wang Qin (王沁) Arcadia II (partial) Cast Glass 9.8cm x 22.5cm x 32.5cm, 2013 (Zhou and Whiteley, 2014, p.188-189).	272
Fig. 270, 271, 272, 273: The different patterns of clothes used in the 'Button' brooch (Jiang, 2014).	273
Fig. 274: Yang Taiyang, 1977, <i>Guilin Elephant Trunk Hill</i>	274
Fig. 275, 276, 277: The various positions and movement of 'Button' brooch (Jiang, 2013).	275
Fig. 278: The glass button attached to a sweater using the screws only (Jiang, 2013).	275

Fig. 279, 280, 281, 282, 283: The final 'Button' Brooch in different colours and forms (Jiang, 2013).	276
Fig. 284: The three characteristics associated with the 'Button' brooch (Jiang, 2014).	277
Fig. 285: '100 Pleated Skirt' the real specific image from the tomb of 'Huang Sheng (黄昇)' in 'Fu Zhou (福州)', quoted from Chinese historical costumes (Huang, 2007, p.122).	281
Fig. 286: The developing process of 'Pleated Skirt' necklace (Jiang, 2014).	283
Fig. 287: 'Song Dynasty Pleated Skirt' ink painting (Jiang, 2012).	283
Fig. 288: 'Pleated Skirt' initial jewellery ideas sketch (Jiang, 2012).	284
Fig. 289: 'Pleated Skirt' necklace detail drawing (Jiang, 2012).	285
Fig. 290: 'Pleated Skirt' jewellery sizes survey (Jiang, 2012).	286
Fig. 291: The orthographic view of 'Pleated Skirt' necklace (Jiang, 2012).	287
Fig. 292: Claw setting silver part of 'Pleated Skirt' necklace (Jiang, 2012).	287
Fig. 293: Three circle tubes of 'Pleated Skirt' necklace (Jiang, 2012).	288
Fig. 294: Freeform tubes of 'Pleated Skirt' necklace (Jiang, 2012).	288
Fig. 295: Silver skirt box with the front opening skirt cap (Jiang, 2012).	288
Fig. 296: Silver skirt box with the back opening skirt cap (Jiang, 2012).	289
Fig. 297: Silver skirt box locker (Jiang, 2012).	289
Fig. 298: Silver skirt box and locker (Jiang, 2012).	290
Fig. 299: Silver skirt box with screws locker (Jiang, 2012).	290
Fig. 300: 'Pleated Skirt' necklace (Jiang, 2012).	291
Fig. 301–302: The pink and green 'Pleated Skirt' pendant (Jiang, 2012).	291
Fig. 303: 'Pleated Skirt' silver box necklace with three screws (Jiang, 2012).	292
Fig. 304: 'Pleated Skirt' silver box cap (Jiang, 2012).	292
Fig. 305: Drill three screws (Jiang, 2012).	293
Fig. 306: Screw out the screw hole by tap and die (Jiang, 2012).	293
Fig. 307–308: White strong flexible plastic skirt (Jiang, 2012).	293
Fig. 309: Glass skirt pieces from water-jet cutting (Jiang, 2012).	294
Fig. 310: Final glass skirt pieces in different colours (Jiang, 2013).	294

Fig. 311: Finished 'Pleated Skirt' necklace (Jiang, 2012). 295

Fig. 312: The three characteristics associated with the 'Pleated Skirt' necklace (Jiang, 2014). 296

Fig. 313: Xiang Shuan, 2011, the annual ring of a tree. 299

Fig. 314: Ting Jiang, 2014, *Fingerprint*. 299

Fig. 315: Annual ring and fingerprint ink painting (Jiang, 2012). 300

Fig. 316: Annual ring and fingerprint jewellery ideas sketches (Jiang, 2012). 300

Fig. 317: The developing process of 'Annual Ring and Fingerprint' brooch (Jiang, 2014). 301

Fig. 318: Drawing of the 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 302

Fig. 319: The orthographic view of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 302

Fig. 320: 'Annual Ring and Fingerprint' brooch sizes survey (Jiang, 2012). 303

Fig. 321: The normal form of 'Annual Ring and Fingerprint' brooch pin and protector (Jiang, 2012). 304

Fig. 322: The Chinese characteristic pin and protector of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 304

Fig. 323: The screw setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 304

Fig. 324: The flexible front interchangeable setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 304

Fig. 325: The bezel setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 305

Fig. 326: The final 3D rendering of 'Annual Ring and Fingerprint' brooch (Jiang, 2012). 305

Fig. 327: The blue strong flexible plastic piece of annual ring and fingerprint (Jiang, 2012). 305

Fig. 328: Soldering the annual ring and fingerprint with the pin holder and protector (Jiang, 2012). 306

Fig. 329–330: The finishing annual ring and fingerprint silver parts (Jiang, 2012). 306

Fig. 331: The wax and mould putty of fingerprint (Jiang, 2012). 306

Fig. 332: The casting of fingerprint with Banas glass in green and blue (Jiang, 2012). 306

Fig. 333–334: The fingerprint pattern paper covers on the fingerprint glass pieces (Jiang, 2012). 307

Fig. 335–336: Sandblasting fingerprint glass pieces in the sandblasting machine (Jiang, 2012).
 307

Fig. 337–338: The fingerprint glass piece after sandblasting (Jiang, 2012)..... 307

Fig. 339: The finished fingerprint glass pieces in different colours (Jiang, 2013)..... 308

Fig. 340: The finishing piece of 'Annual Ring and Fingerprint' brooch (Jiang, 2012)..... 309

Fig. 341: The three characteristics associated with the 'Annual Ring and Fingerprint' brooch and
 the 'Annual Ring and the Edge of Dancing Skirt' Earrings/Rings (Jiang, 2014). 310

Fig. 342: The dancing minority skirt..... 313

Fig. 343: The different technical production process of 'Annual Ring and the Edge of Dancing
 Skirt' earrings/rings (Jiang, 2014). 314

Fig. 344: 'Annual Ring and the Edge of Dancing Skirt' ink painting (Jiang, 2012). 314

Fig. 345: The annual ring and dancing skirt earring-ring orthographic view (Jiang, 2012). 315

Fig. 346: The first lock setting way of 'Annual Ring and Dancing Skirt' ring (Jiang, 2012). 315

Fig. 347–348: The 3D rendering of the 'Annual Ring and Dancing Skirt' earring-ring (Jiang, 2012).
 315

Fig. 349: The 3D printing of the 'Annual Ring and Dancing Skirt' ring (Jiang, 2012)..... 316

Fig.350, 351, 352: The 3D printing of the 'Annual Ring and the Edge of Dancing Skirt'
 earring-ring (Jiang, 2012)..... 316

Fig. 353: The water-jet cutting of the 'Annual Ring and Dancing Skirt' earring-ring glass pieces
 (Jiang, 2013). 317

Fig. 354: The final glass pieces of the 'Annual Ring and Dancing Skirt' earring-ring (Jiang, 2013).
 317

Fig. 355: The final 'Annual Ring and Dancing Skirt' earrings (Jiang, 2013)..... 318

Fig. 356: The final 'Annual Ring and Dancing Skirt' rings (Jiang, 2013)..... 319

Fig. 357: Osmanthus . (<http://www.china5080.com/articles/161173.html>)..... 323

Fig. 358: The developing process of 'Osmanthus' ring set (Jiang, 2014)..... 324

Fig. 359: Leaves of small bonsai (Jiang, 2012). 324

Fig. 360: Leaves ink painting (Jiang, 2012)..... 325

Fig. 361: The idea sketches of plant jewellery (Jiang, 2012)..... 326

Fig. 362: Leaves ring set sketches (Jiang, 2012)..... 326

Fig. 363: Osmanthus flower ring set sketches (Jiang, 2012)..... 326

Fig. 364: 'Osmanthus' ring set drawing (Jiang, 2012). 327

Fig. 365: 'Osmanthus' ring set orthographic view (Jiang, 2012)..... 328

Fig. 366: The line marks on the 'Osmanthus' ring set (Jiang, 2012)..... 328

Fig. 367: The natural hollow marks on the 'Osmanthus' ring set (Jiang, 2012)..... 328

Fig. 368: The open circle rings of the 'Osmanthus' ring set (Jiang, 2012). 329

Fig. 369: The screw stem of the 'Osmanthus' ring set (Jiang, 2012). 329

Fig. 370: Ayako Tani, 2011, 'I-Ro-Ha 50 Japanese Phonetic Symbols' (Tani, 2014, p.245)..... 329

Fig. 371, 372, 373: The three pieces of the glass 'Osmanthus' ring set to the only one piece of glass 'Osmanthus' ring set (Jiang, 2012)..... 330

Fig. 374: Finishing 'Osmanthus' ring set (Jiang, 2012). 330

Fig. 375, 376, 377: The four pieces of the 3D printing sliver parts of 'Osmanthus' ring set (Jiang, 2012). 331

Fig. 378: The nearly closed screw hole on the 3D printing sliver stem (Jiang, 2012)..... 332

Fig. 379: To drill the screw hole on the 3D printing sliver stem (Jiang, 2012)..... 332

Fig. 380: The drill pin broken inside the screw hole in the 3D printing sliver stem (Jiang, 2012). 332

Fig. 381: Screw hole on the Osmanthus stem (Jiang, 2012)..... 333

Fig. 382: Small hole on the Osmanthus stem (Jiang, 2012)..... 333

Fig. 383: Remade the screw hole on the Osmanthus stem by using the tap and die equipment (Jiang, 2012). 333

Fig. 384: The 3D printing of the Osmanthus in white strong flexible plastic (Jiang, 2012)..... 333

Fig. 385: The 3D printing of the different colours of strong flexible plastic Osmanthus earrings in normal form (Jiang, 2012). 333

Fig. 386, 387, 388: Using scissor to cut the glass from two petals to four petals when the glass was being fired (Jiang, 2013). 334

Fig. 389: Cooling down the pieces of glass Osmanthus flower (Jiang, 2013). 334

Fig. 390: The soda lime glass and borosilicate glass pieces of Osmanthus flower (Jiang, 2012–2013) 335

Fig. 391: Final four pieces of glass Osmanthus flower (Jiang, 2013)..... 335

Fig. 392, 393, 394: The final 'Osmanthus' ring set (Jiang, 2013). 336

Fig. 395: The four characteristics associated with the 'Osmanthus' ring set (Jiang, 2014) 337

Chapter 1: Introduction

This research applies the Chinese philosophical notion of 'harmony between man and nature' (Section 2.6.1) to create new artworks in contemporary Western glass jewellery design. Chinese philosophies and traditions of 'harmony between man and nature' are analysed and evaluated by developing new approaches to contemporary Western glass jewellery design. New forms of glass jewellery designs are developed using 3D prototyping techniques. Innovative combinations of Chinese ink paintings and digital glass jewellery prototypes, handcraft and machine productions; 3D printing, water-jet cutting, kiln casting, lampworking and silversmith techniques are also developed.

The cultural interchange of ideas and practice in Chinese and Western art was crucial to the development of the project. Chinese traditions and philosophies of 'harmony between man and nature' inspired new contemporary Western concepts of jewellery design. Glass and silver and methods associated with their production in jewellery, in particular were used to further explore important relationships in Chinese and Western design. Throughout it was important to maintain a link between the function (wear-ability) of the artworks and the aesthetic outcome.

1.1 Harmony between man and nature

'Harmony between man and nature', is the fundamental concept of classical Chinese philosophy and informs the ways most Chinese people live their lives.

“Harmony between man and nature’ is a mode of universal thinking and is one of the most important concepts from the ‘Book of Changes 易经’ (I-Ching) and philosophical ideology, but it is also an important concept of Chinese traditional culture” (Fu, 2011, p36). This philosophy has existed in every field of Chinese society for thousands of years and was first proposed by Zi Zhuang 庄子 (about 286 BC–369 BC) (Yi, 2006, p.212). He says, “The nature is the one source of all things and is not the private possession of one’s own ego. It is only the great man who is able to exhaust his principles” (Fung, 1952, p.492). This principle highlights the importance of the ‘self’ and one’s connection with nature. It emphasises the connection method and moderate thinking to deal with problems.

‘Harmony between man and nature’ emphasises the “sensing that all of nature is constantly trying to resolve itself into a harmonious whole, where opposites are held in balance and extremes reduced” (Barrass, 2002, p.185). Balance is needed between various elements in glass jewellery design and elements should be coordinated. “The different approaches to spatial perspective reflect different views of the relationship between man and his surroundings” (Chuang, 2003, p.67, British PhD).

1.2 The jewellery design and glass art in Chinese education

‘Harmony between man and nature’ is an important concept of art and design education in China. It can be found in the fields of calligraphy, painting and architecture, among others for thousands of years. Chuang’s PhD work (2003) suggests that “Chinese artists have a long history of embracing their surroundings in terms of architecture, music, lyrics, poetry, and landscape

painting, all devoted to achieving the philosophical idea of 'tian ren he yi 天人合一' —the unity of heaven (a multifaceted concept that encompasses nature) and man" (p.67).

In comparison, jewellery design and glass art are relatively quite a new area of study in China. Jewellery design courses have only been established in Chinese universities since 1997. "Chinese glass arts have development driven by Xiaowei Zhuang (庄小蔚) starting at 2000" (Wang, 2007, p.32). Glass art training were also set up in Chinese universities later in the year 2000. These two areas are in the initial stage of growth.

The 1980s and 1990s were an important period in the development of Chinese art and design... it can be said of this period is the Chinese contemporary design enlightenment period ... Chinese Academic Degree Committee of State Council, the State Education Commission promulgated the "Awards Doctoral, Master Degree and Training Post-graduate disciplines Contents". This 1990 Discipline Content about Arts and Crafts, Arts and Crafts Design ... Environment Art and Design, Industrial Production Design and so on, which were merged into Art and Design disciplines in 1997. This event can be regarded as the milestone of Chinese design education moving towards to the modern disciplinary system (Jin, 2007, p.3, Chinese PhD).

As Chinese Dr. Jin mentioned in her PhD thesis above, China's overall level development of Western approaches to art and design is still in its infancy. Seemingly, more attention is paid to technology imitating Western design ideas rather than creativity. "Education of Art and Design tends to pay more attention to techniques rather than design concepts for long periods" (Ibid, p.116). With China's reform and the economy opening up, Chinese society has seen a huge

change influenced by Western culture but complimented by Chinese culture. Arguably, with the emergence of the Western cultures, some Chinese traditions and values might disappear or reduced, such as construction, cultural heritage and traditional values. "The Western culture was important to introduce into China and it has accelerated the process of modernization and globalization but it also has brought many negative effects to the Chinese traditional culture" (Gao, 2007, p.20). With these two emerging areas of glass art and jewellery design in such an environment, they cannot escape from the effects of this. Furthermore, Chinese designers tend to follow the Confucian doctrine of being 'moderate'. This mentality often restricts Chinese designers with their design development. On the other hand, the West tends to pay more attention to the design of visual effects and often lack the 'moderate' thinking advocated by the balance between the various elements.

The Chinese mainland reformed and opened up since the 1980s and the art and design courses at Universities of China also began to develop. The philosophical theory of the harmony between man and nature has also been applied to various disciplines such as Chinese calligraphy, Chinese painting and Chinese garden design. However, this philosophical theory has not been explored in-depth in jewellery design as far as this research can gather, especially from the point of view of combining glass art and jewellery design across the two cultures. At present, there are no direct resources of glass jewellery research in both the UK and China from on-line date sources including:

the Electronic Theses Online Service (EThOS) (UK)

(<https://ethos.bl.uk/Logon.do?jsessionid=959B56331A681CAD11043E727F2DD450>), Wanfang Data (China) (<http://www.wanfangdata.com.cn/>) and Cnki (China) (<http://www.cnki.net/>). This research could be therefore considered to be unique and would be useful for other researchers.

1.3 Motivation

Having studied art and design in China for ten years and more than six years in the UK have provided me with a strong academic background and creative working experience under the influence of the two cultures. From the position of a Chinese designer living in the UK has naturally led me to explore influences from the East and West. The convergence of the two cultures on my design practice has impacted on the way that I work. With this acquired new knowledge and experience I was inspired to research into my Chinese philosophical perspectives and influences and explore how they can be applied to Western jewellery design. My designs can be described as the result of this cross-cultural practice.

The philosophy of 'harmony between man and nature' has significant importance in China and arguably, the characteristics are different from Western philosophical ideas. My motivations for this research come from the desire to explore this tradition and to bring Chinese traditional culture into contemporary Western technology and design in order to develop innovative new forms of glass jewellery.

1.4 Cross cultural practice in my glass jewellery design

Cross-cultural practices have always been prevalent in art and design. Practitioners such as the potter Bernard Leach (Cooper, 2003) and the

American Expressionists such as Franz Kline and Cy Twombly (Tenzer, 2010, p.203) are good examples of the Eastern influences on Western practitioners.

In 'Primitive Culture', Tylor defined culture as the "complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as member of society" (1871, p.1). In addition, technology is the physical expressions of the concept of material culture. According to this notion, technology and techniques also are part of culture.

Hence, I have combined notions of Chinese philosophy and Western technology and techniques into my research. From this cross-culture context, the Chinese philosophical notion of 'Harmony between man and nature' applies to contemporary glass jewellery design (Fig.1). My design ideas are influenced by the unity between the East and West, I have also analysed jewellery designs from Eastern and Western based countries, namely China, Europe and the UK. There are also additional designs that I have made specifically for this research that used Western techniques, methods and materials with Chinese philosophical notions to create jewellery design. As the diagram below illustrates (Fig.1), the combination of both Eastern and Western elements result in design works that can be described as 'cross-cultural'.

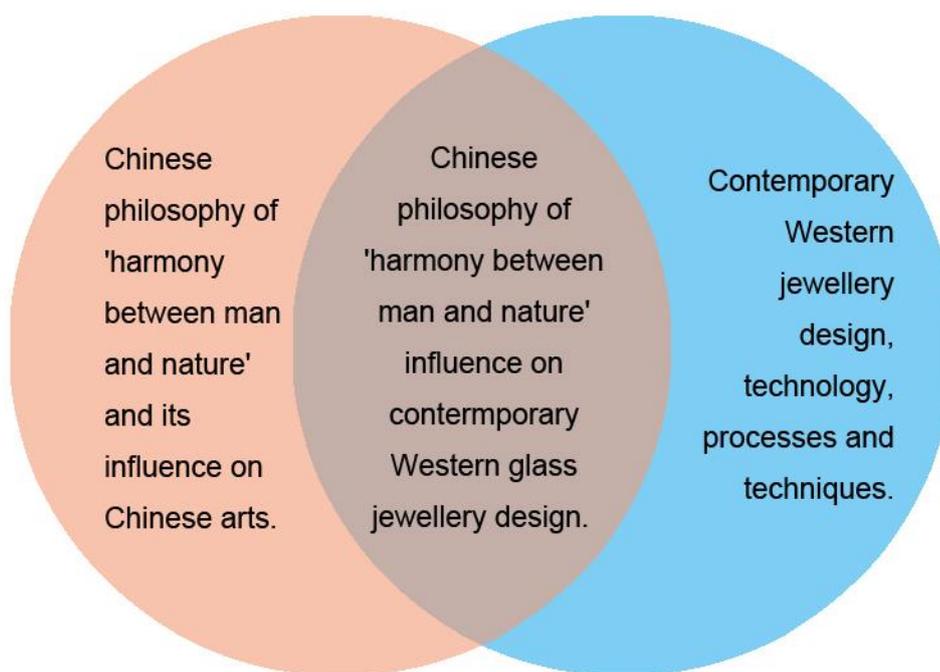


Fig. 1: Diagram illustrating the cross-cultural contexts of this research (Jiang, 2011).

The results of this cross-cultural practice have led to a body of work. The case studies for these works will be discussed in more detail in Chapter 4. The case studies are:

- 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒) (2011–2013),
- 'Egg and Sperm' necklace ('精子和卵子' 项链) (2011–2013),
- 'Button' brooch ('扣子' 胸针) (2011–2013),
- 'Pleated Skirt' necklace ('百褶裙' 项链) (2012–2013),
- 'Annual Ring and Fingerprint' brooch ('年轮与指纹' 胸针) (2012–2013) and 'Annual Ring and the Edge of Dancing Skirt' earrings/rings ('年轮与舞动的裙摆' 胸针) (2012–2013),
- 'Osmanthus' ring set ('桂花' 组戒) (2012–2013).

The six case studies above examined and evaluated through studio-based investigations, exploring ways that notions of Chinese philosophy can be translated from Chinese paintings into 3D designs of glass jewellery. The strategies deployed informed and developed six philosophical approaches that explore particular themes, they are:

- 'Integration of Yin and Yang 阴阳合一',
- 'Unification of Time and Space 时空合一',
- 'Same Structure of Man and Nature 天人同构',
- 'The Concept of Change 变化',
- 'Self-cognition and External-cognition 内外合一',
- 'Combination of Subject and Object 主客合一'

This research will show how each of the above philosophical themes have influenced my design. More details of this will be discussed in Chapter 4.

Arguably, Western technology plays a pivotal role in today's design. Within jewellery design techniques, Western silversmith and 3D prototype have been used extensively and for this research both techniques would be explored. In addition, Water-jet cutting, kiln casting, lampworking, microwave kiln were also used for glass making in this research. The new development of glass jewellery techniques is achieved by combining different techniques for different cases. The combination of Chinese philosophy and Western technology and techniques can be seen as a unique 'cross-cultural' approach to creative work and the details of how these techniques are used will be discussed in Chapter 3.

1.5 Cross disciplinary research in jewellery design and glass art

In China, glass art and jewellery design are two disciplines that have developed late due to historical and economic reasons. With China's reform and opening up to the world came a rapid economic development and in order to fulfil the market's demand, jewellery design has gradually become a discipline in some Chinese university's curriculum since 1997. Chunxiang Pu (朴春香) (2002, p.28), an academic from the China University of Geosciences explained:

“The Chinese mainland established jewellery design mostly to begin training specialized design talent since 1997. The first Chinese jewellery design competition (Chao Hong Ji Cup) was held by Gems and Jewellery Trade Association of China, China Arts and Crafts Association, Chao Hong Ji Co. Limited Company and China Gem Magazine in 1999. There are many creative, profound meanings and beautifully shaped works”.

Compared with the West, Chinese jewellery design is still in its early stages of development. Chinese jewellery design does not have the creative freedom compare to its Western counterparts and the design is controlled by the demand of the market. Design education in general has a shortage of teachers and limited funding. In addition, China has not specified any laws to protect the designs from plagiarising and blatant copying from other designers. There are still lots of problems in the contemporary Chinese jewellery market and education system which would take years to overcome (Chapter 2.3).

Similarly, the emergence of Chinese contemporary glass art is also relatively late compared to the West with the first new course of glass art established in 2000. Qin Wang (王沁) from the Shanghai University explained,

The United States initiated the movement of glass studios in the 1960s. Glass arts have rapidly developed due to its unique glass physics and technology, unlimited play potential and unique personality of artistic expression. It becomes an important branch of contemporary art and the impact diffuses to the extent of the whole of Europe. Whereas the development of Chinese glass arts started in 2000 driven by Xiaowei Zhuang (庄小蔚) et al (2007, p.32).

Glass jewellery design in comparison has an even shorter development than glass art and jewellery design. Through extensive research, it is difficult to find relevant information, so that glass jewellery concepts are seldom known or documented. In the choice of materials, glass as an emerging art material has morphological variations and allows a variety of qualities during the process in the kiln. In Lv Xue British PhD thesis, she explained that,

Since the early 1990's, coinciding with the emergence of China as a major economic power, new university departments have been established in Beijing, Shanghai and other major cities, devoted to glass as a creative medium; these have been operating since 2000. Of the sixteen Chinese academics educated in the West from the late 1990's, 37.5% are running the major studios in China. Therefore, the model of academic Chinese studio glass practice that they introduced is a predominantly Western one. Prior to this, modern Chinese glass was only produced in industry (2009, p.9).

As Xue described above, glass is considered as a production material in the Chinese industry so far, such as beer bottles; not art materials and are seldom used in the jewellery making.

1.6 The Purpose of this Research

The aims for this research are:

- To analyse and evaluate the Chinese philosophical notion of 'harmony between man and nature' and its traditions and integrate the findings into developing new approaches to contemporary Western glass jewellery design.
- To develop the principle of 'harmony between man and nature' as used in the Chinese traditions, and creating new cross-cultural contemporary Western glass jewellery designs appropriate for the Chinese market.
- To develop 3D prototyping techniques and refine processes of using metal and glass in order to explore the functions and applications of aesthetics, technical innovations and development to create new forms of jewellery design.

1.7 Main Research Questions

The main research questions are:

- How to apply aspects of Chinese philosophical notion of 'harmony between man and nature' to contemporary Western glass jewellery design?

- How might one develop and apply the principle of 'harmony between man and nature' as used in the Chinese traditions, and creating new cross-cultural contemporary Western glass jewellery design appropriate for the Chinese market?
- How might one develop innovative 3D prototyping techniques and cross cultural practices for jewellery design using metal and glass?

1.8 Research methodology and developing new approaches

This practice-based research uses multi-methods to achieve its research aims. Several PhDs such as Ling (2008), Xue (2009), Sarmiento (2011), Tani (2014), and Peng (2014) have used multi-methods in their research. Essentially, this research uses philosophical methodology to underpin and analyse the Chinese notion of 'harmony between man, human and nature' and how different themes can be developed and applied to the studio work via experimental studio methods. The use of painting, different materials (glass, white metal, silver, etc), computer software and 3D prototyping techniques were evaluated and that philosophically derived ideas of 'harmony between man and nature' were also tested out through experimental studio methods. The following diagram clearly identifies the methodologies used and the various methods and ways they are deployed throughout the research process (Fig.2).

Methodologies			
Methodologies	Methods	Content	Processes
Philosophical methodology This methodology is used to primarily analyse and establish the meaning of the Chinese philosophical notion of 'the harmony between man and nature'. It includes different methods to obtain information and to analyse them. These philosophical derived ideas are then applied to the studio work.	Contextual review	<ul style="list-style-type: none"> • Analysing the Chinese philosophy of 'harmony between man and nature'. • Evaluating contemporary Chinese jewellery design, the market, • Evaluating contemporary Western jewellery design. 	Analyses and reviews of concepts, philosophical focal points, mappings, drawing diagrams, taking notes, counting objects and photography.
	Interviews	Primary research involving interviewing Chinese philosophy experts and Chinese painters, craftsmen, jewellery experts and law experts.	<ul style="list-style-type: none"> • Recording evidence via photography and video. • Findings were then applied to studio work.
	Study trips	Visits were made to China: <ul style="list-style-type: none"> • The Palace Museum, • Shanghai Museum of Glass, • Lijiang Museum, • Dalian Modern Museum, • Guilin Museum, Guilin Art Gallery, • Guilin Huaqiao Gallery, • Contemporary Chinese jewellery shops. 	<ul style="list-style-type: none"> • Recording evidence via photography and video. • Findings were then applied to studio work.

		<p>Visits were also made in the UK:</p> <ul style="list-style-type: none"> • British Museum, • Museum of London, • Victoria Museum, Design Museum, • Tate Modern, • Birmingham City University Gallery, • Museum of the Jewellery Quarter, • Birmingham Autumn Fair, • Contemporary Western jewellery shops in UK. 	<ul style="list-style-type: none"> • Recording evidence via photography and video. • Findings were then applied to studio work
<p>Experimental research</p> <p>This primarily involves the studio-led practice, where various glass jewellery designs are created, analysed and evaluated.</p>	<p>Observing and painting from nature.</p>	<ul style="list-style-type: none"> • To practice my understanding of 'the harmony between man and nature through observing and painting from nature. • Developing concepts and evaluating the experiential engagement with materials, self-observation and interpretations of ideas. • Developing jewellery design idea. • Developing ways to store visual ideas, data and information. 	<p>Experiencing of the situation, notebook, Chinese ink painting, sketches, drawing, gouache/ water colour painting,</p>
	<p>Computer software visualization and surveys (size and wearability)</p>	<ul style="list-style-type: none"> • Experimenting with different software and investigating suitable combination and techniques for my jewellery design. • Transferring two-dimensional jewellery ideas from Chinese painting into 3D models. • Identifying suitable glass jewellery sizes for Western people in two case studies. 	<ul style="list-style-type: none"> • Using various software: AutoCAD, 3D Max, Jewel CAD, RhinoGold, Rhino, Mesh Lab, Netfabb Studio and Photoshop to develop various designs. • Paper-based questions and responses.

Technical research	Experiment with different technical approaches and processes.	Microwave kiln, 3D printing, water-jet cutting, kiln casting, lampworking and silversmith.
Experimental processes	<ul style="list-style-type: none"> • Applied experimental processes to develop my own jewellery design. • Testing by wearing the jewellery 	Developed personal holistic approaches and researched into glass jewellery design production process (see fig.6).
Produced a series of jewellery (case studies)	<ul style="list-style-type: none"> • 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒) (2011–2013), • 'Egg and Sperm' necklace ('精子和卵子' 项链) (2011–2013), • 'Button' brooch ('扣子' 胸针) (2011–2013), • 'Pleated Skirt' necklace ('百褶裙' 项链) (2012–2013), • 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针) (2012–2013) and 'Annual Ring and the Edge of Dancing Skirt' earrings/rings ('年轮与舞动的裙摆' 耳环/组戒) (2012–2013) • 'Osmanthus' ring set ('桂花' 组戒) (2012–2013) 	
Exhibitions	Exhibiting design works in different stages (Appendix 8), gained feedbacks from the exhibition; edited the jewellery pieces.	Paper, photography, video record, Photoshop and InDesign.
Analysis	Published an article in a Chinese journal, analysis and evaluate the outcomes.	Microsoft word, Photoshop and InDesign.

Fig. 2: The methodologies of this research (Jiang, 2014).

1.8.1 Philosophical methodology

The philosophical breadth of good art and design inquiry can be seen as a powerful methodological tool in itself with, if recognised, an already established philosophical cannon (Macleod and Holdridge, 2006, p.169).

Philosophical methodology is a 'classic' research methodology which has been strict, and is accepted and recognised in a wide range of research areas (Gray and Malins, 1993, p.11). It responds to context and ideas preparation, which uses being in doubt as a systematic process, to provide an argument supporting the solution in order to help my own judgement.

The multiple methods have been adopted to support this mode of enquiry, strategies include: contextual review, interviews and study trips to fully explore and analyse the concept of Chinese philosophy of 'harmony between man and nature' and to identify key areas for further investigation (Section 2.6 and 2.7). "Concepts of multi-method also suggest multi-media, not only in its information technology sense (multimedia/hypermedia), but its value in using and integrating different kinds of media to provide different kinds of sensory information" (Gray and Malins, 2004, p.121). The methods support the investigation broadly but were also chosen to get the most current and up to date information about the themes emerging from the research.

Using the table in fig 2, I have clarified the following research methods and processes:

1.8.1.1 Contextual review

A contextual review was undertaken. Books, journals, databases and internet searches were used to research aspects of Chinese philosophy and traditions as well as glass artists, jewellery design and other artworks which contain the Chinese philosophical notion of harmony between man and nature (Fig.3). This process is also complimented by analysing contemporary Chinese jewellery design and market, contemporary Western jewellery design concepts (Chapter 2). The literature surveyed included both English and Chinese texts (I also did all the translation).

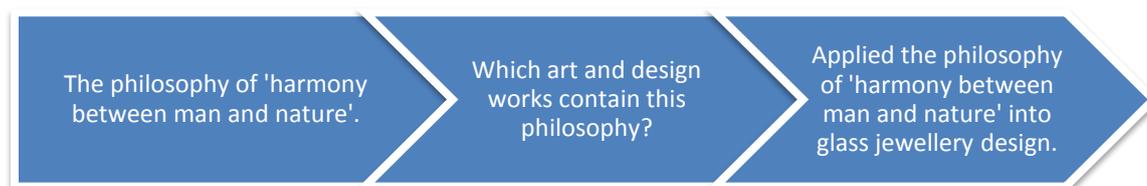


Fig. 3: The indirect progression method (Jiang, 2011).

Some Western artworks from Western artists and designers also combine elements of Chinese philosophy in their artworks. I have selected these kinds of Western artworks as examples to support the aims and objectives of the project (Chapter 2). An example of this is the British jewellery designer Jenny Llewellyn (2009) who was identified as one of the few artists suitable for the research (Section 2.7.3.4). Her neckpiece shows the Chinese philosophy of 'Change' as concept and it is evident in her practice.

1.8.1.2 Interviews and study trips

Interviews were undertaken with Chinese experts and scholars in China to gain important insights and understandings through undertaking research trips. Contemporary Chinese philosophers, painters, jewellery experts and academics were also visited and interviewed. I interviewed the Chinese landscape ink painters Guang Yang (阳光) to specifically ask him about how to transfer the notion of harmony between man and nature into his painting (Section 2.6.3.2). In visiting the jewellery expert Bin Ruan (阮斌), he was able to clarify the current market trends of contemporary jewellery design and manufacturing processes in China (Chapter 2.3.1). The interview with the Chinese philosopher Jinsong Zhang (张劲松) was also enlightening as we discussed in depth the impact of the harmony between man and nature on Chinese Art history (Section 2.6.1). Primary research was undertaken through visits to various relevant places in the UK and China (Fig.2 and appendix.1).

1.8.2 Experimental research

This research uses experimental research methods in the studio to investigate jewellery production techniques. Of particular interest in the research methods used by Ann Marie Shillito, a lecturer in Jewellery Design at Duncan of Jordanstone College of Art, where she explored “possible production techniques available to the small-scale jewellery business and concentrated on laser cutting refractory metals” (Malins, Gray, Bunnell and Wheeler, 1995, p.8). Her specific methods include: “contextual research (identified industrial uses), undertook technical research-tests of equipment and processes, use of computer software for design and manufacture, applied these experimental processes to own design methodology and produced a series of jewellery in response to and

embodying these technologies” (Ibid). The approaches adapted by Shillito are drawn upon for this project.

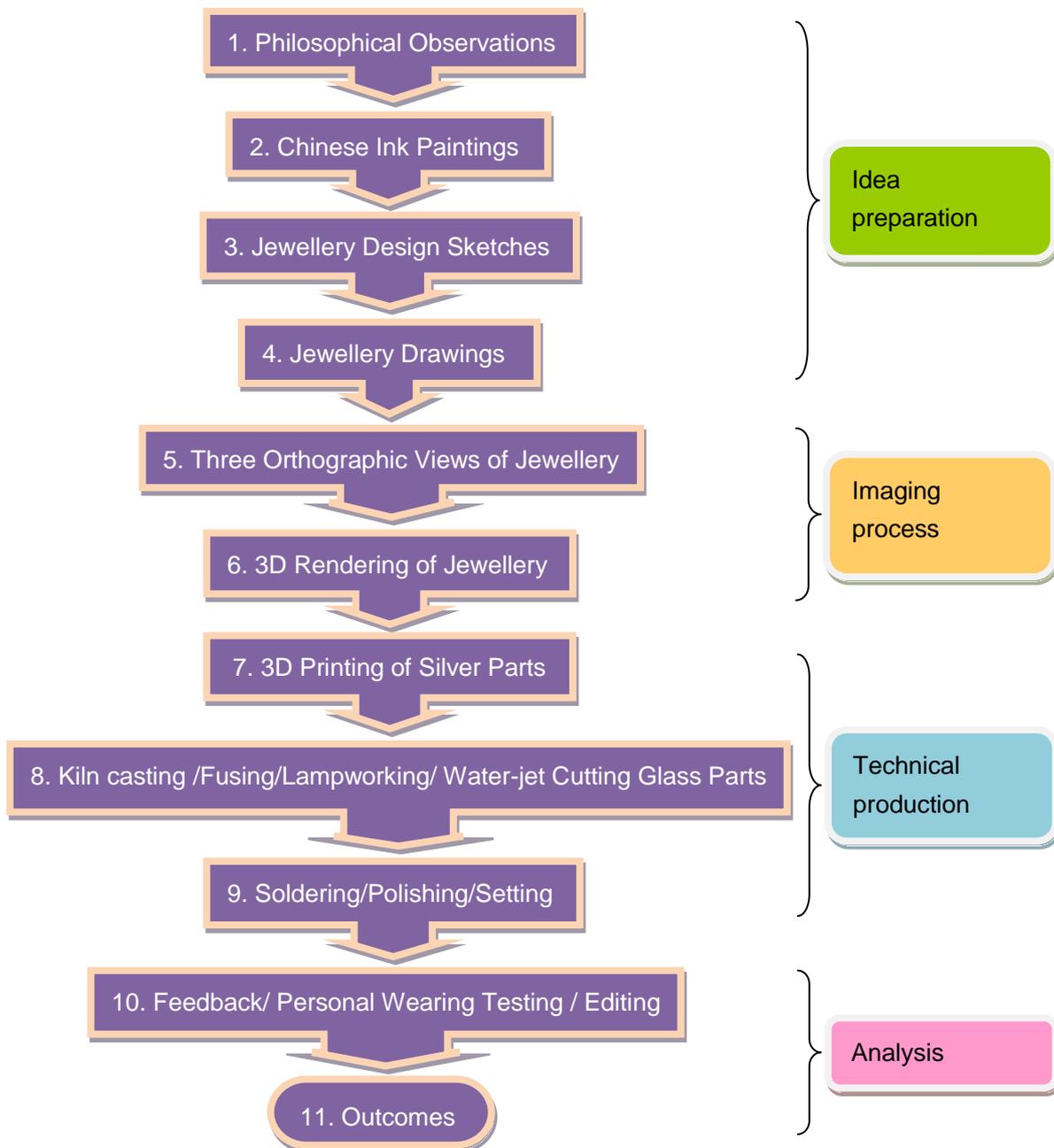


Fig. 4: The personal holistic research glass jewellery production method (Jiang, 2012).

This whole design process (Fig.4) can be summarized into five stages, with each one informing the next: ideas preparation, imaging process, technical production,

analysis and design outcomes. As with all art practices ideas do not develop in a linear fashion and while I have presented 'a guide' to inform the reader of the ways my ideas, which inform the research process and tend to develop, they are not prescriptive. My design practice develops at a highly personal and intuitive level and this is reflective of the topic of the research and has informed the methods throughout the timescale of this PhD.

1.8.2.1 Observing nature and then painting

The process used here is to observe nature and then to transfer my ideas into Chinese paintings. Further ideas are then developed from these paintings into jewellery designs.

Observing nature includes painting from the natural world, analysing Chinese philosophical concepts and experimenting with materials (silver, glass, plastic, stain steel, etc, see Appendix.2 for further detail).

The 'personal research methods' diagram above (Fig.4) shows my process in eleven steps. Steps 1-4 are the first stages, called '**idea preparation**'. The philosophical observations in step one begins by applying philosophy of 'harmony between man and nature' to inform the idea generation. This philosophically derived idea of 'harmony between man and nature' was tested out through studio-based investigations. Chinese ink paintings are then developed in the next stage. These processes show the use of philosophy of 'harmony between man and nature' in Chinese ink paintings. Analysis and reflections are then made and developed into Jewellery design sketches (step 3).

1.8.2.2 Computer software visualization and size surveys.

The next stage is to enter the 'imaging process' (step five and six). In these stages the work is more practically focused on elements like details, forms and scales by invention and selection. Previous experience and tacit knowledge greatly influenced this approach. Digital processes included the use of software such as AutoCAD, Rhinoceros and Netfabb Studio. Other software includes 3D Max, JewelCAD and RhinoGlod. The specific dimensions of jewellery are determined through three orthographic views by using CAD software. In addition, a survey is conducted to determine the size for some problematic jewellery piece. The jewellery design forms become the actual visual appearance through the use of Rhino 3D software, including adjustment and comparison of the details in interconnecting, patterns and morphology.

1.8.2.3 Technical research

The third stage is the 'technical production' (steps 7, 8 and 9). Techniques (Chapter 3) including 3D prototyping of digital glass jewellery are examined, to find a successful combination of machine production, 3D printing, water-jet cutting, the handmade, kiln casting, lampworking and silversmith. Testing different main equipments (microwave kiln, traditional kiln, Taurus III diamond ring saw, Glastar diamond star glass grinder, Dremel versatip soldering gas torch, Pioneer micro-flame jewellery welder, 3D printer) was also undertaken.

The next step is the 3D printing of silver, then production of the glass parts and then finally connecting the two parts together (See Chapter 3). Materials are also

considered and this is important due to the cost and expense of the precious metals (silver) and material productions (glass making).

1.8.2.4 Applied experimental process to produce a series of jewellery

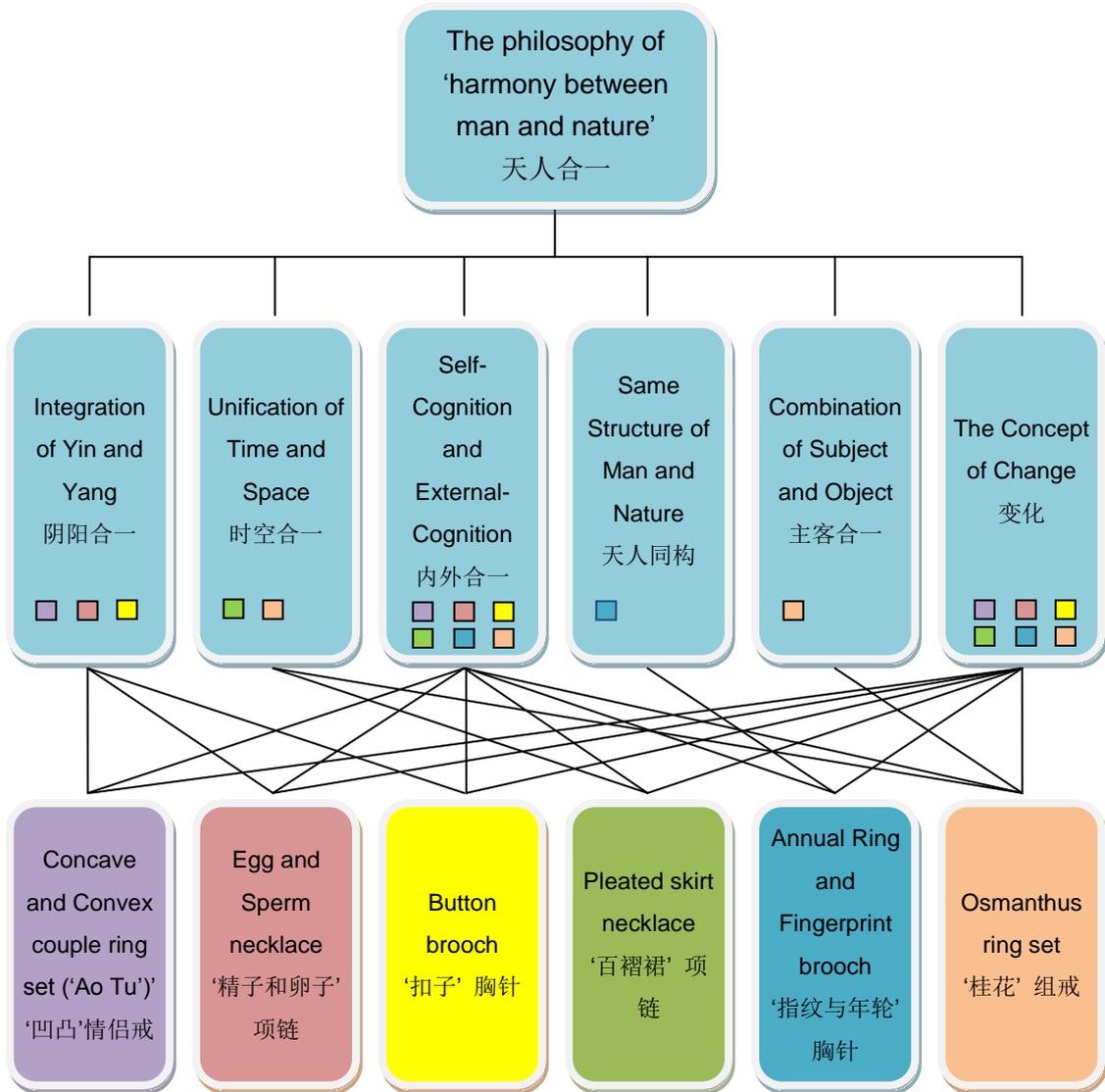


Fig. 5: The personal research method diagram (Jiang, 2013).

Diagram (Fig.5) illustrates the ways the case studies (Chapter 4) were informed by particular approaches associated with 'harmony between man and nature'. The six aspects of 'harmony between man and nature' are reflective of the six case studies included in the project. The diagram is also demonstrates the fluid nature of the research and that practice can inform multiple cases at different times in the research process. In fact, the interconnectedness of the case studies is demonstrative of the wholly connected concepts that embody the 'harmony between man and nature' and again, this concept of connectedness has informed the overall content and structure of the PhD.

1.8.2.5 Exhibitions and analysis

The final stage is to undertake in-depth analysis of the work (step 10 to 11). For example, the Exhibitions in China (Guilin Exhibition Hall, 2013) enable me to gather feedbacks about my work and research. The philosophers Ning Lu (卢宁) and Jiyuan Liu (刘绩元) both confirmed that my work shows, "The superb contemporary design process contains deep philosophy and essence of Oriental culture!" (Appendix 9) Some other feedbacks includes the jewellery expert Bin Ruan (阮斌) and craftsman Zhonglin Jiang (江忠林), where they both mentioned that the screw shapes on some of the designs should be less obvious (Section 4.3.9 and appendix 9). This information helped to develop my jewellery pieces.

1.9 The structures of this thesis.

In Chapter 2, the contextual review includes key examples of the emergence of contemporary Chinese jewellery design and sums up by clarifying different

aspects of the 'harmony between man and nature'. Taken forward from this chapter are the ways understandings can be applied to inform new approaches in the methodologies chapter.

Chapter 3 provides an overview of materials, recent technologies and the ways materials and technologies can be combined to develop creative approaches to take forward into the case studies.

Chapter 4, the case studies bring together understandings from the literature, and materials and processes to create six new designs, examining and analysing the ways harmony and nature inform the process and appear in the final outcome.

Chapter 5 summarises the thesis, presents all outcomes, key findings, artworks and other outcomes, it also includes areas for further research in the future.

Chapter 2: Contextual Review

2.1 Introduction

Electronic Theses Online Service (EThOS UK), Wanfang Data (China) and Cnki (China) surveys has shown that there is no existing research that explores the philosophical contexts of 'harmony between man and nature' in glass jewellery design, however, the idea of 'harmony between man and nature' has existed for thousands years in Chinese history. It has been used in various aspects of Chinese culture, economy and art, therefore historical research has revealed such practices exist in calligraphy, painting, architecture and more. Most literature concerning this area came from Chinese texts, which were then translated into English by myself. Aspects of the practices found in Chinese calligraphy and painting were used to 'translate' the context of 'harmony between man and nature' into Western 3D Jewellery Design.

There are many PhD theses where Chinese philosophy is applied into creative practices. For example, Yu Cheng Chuang's PhD (2003) applied the Chinese principle of 'Jingjie (境界)' into Land Art. Another PhD by Manny Ling "Calligraphy across Boundaries" (2008) explores the Chinese philosophy of 'Qi (气)', Western calligraphy and contemporary digital techniques. His PhD comprehensively investigates two-dimensional calligraphy and philosophical perspectives. In comparison, this PhD focuses on three-dimensional jewellery design where different philosophical theories were used to inform this approach and the resulting PhD.

The range of research in chapter 2.2 outlines some of the relevant research terminologies and the limitation of the research. The state and issue of contemporary Chinese jewellery design and some contemporary Chinese jewellery design are explored in section 2.3. The contemporary jewellery designs in the West are also explored from different contexts including materials, market and production in section 2.4. The section 2.5 covers some relative factors which affect the jewellery design practices between China and the West.

In section 2.6 of this chapter 'philosophical contexts' explain the 'harmony between man and nature's concepts and major components first. Then the influence of 'harmony between man and nature' on Eastern and Western art, and jewellery design are explained. Examples of some artists who have used aspects of this philosophy in their art works are also evaluated, the ways this philosophy works in the use of the art through an analysis of several cases is also elaborated.

Section 2.7 the 'practical context' describes how to use 'harmony between man and nature' as a guide and principle to create Chinese paintings. The use of materials under the influence of the philosophy of 'harmony between man and nature' is explained. A philosophical and practical analysis of 'harmony between man and nature' in jewellery design from the six perspectives listed in the introduction of Chapter 1.4 is also explained.

2.2 Scope of research

Primary research was conducted involving visits to museums, studios and artists, mainly in the UK and China. Books, journals, databases and Internet searches

have been used to research aspects of Chinese philosophy and traditions, glass artists and jewellery design. The study is theoretically informed around two main strands: one is to research the existing art and design works which show the philosophy of harmony between man and nature being used; the other is to analyse and evaluate existing jewellery and glass artworks.

The technical parts focus toward combining machine production and crafts. Their strengths are different but they complement each other. This PhD also developed 3D prototypes techniques, and refines the processes of using metal and glass, to explore the functions and applications of aesthetics and technical innovations in new forms of jewellery design.

The philosophy of harmony between man and nature has permeated all areas of Chinese society and it has a long history, playing a crucial role in the development of Chinese society. Its sphere of influence is very broad and far-reaching. Today, 'harmony between man and nature' is not only a philosophical notion but has been sublimated into a synonym of the most perfect and highest realm of art. People often use it to describe a high level of art or highly advanced skill. This study will concentrate on clarifying the use of harmony between man and nature from six perspectives set out in Chapter 1.4.

The influence of this philosophy in art and design is the main focus of this research, however, it is not exclusively limited to this and it will also look at some characteristics of the use of this philosophy in Chinese garden and the Chinese medical fields (Section 2.6.3.3 and 2.7.3.3).

Since philosophy and art both have an abstract character, the philosophy of harmony between man and nature has not been clearly defined by the

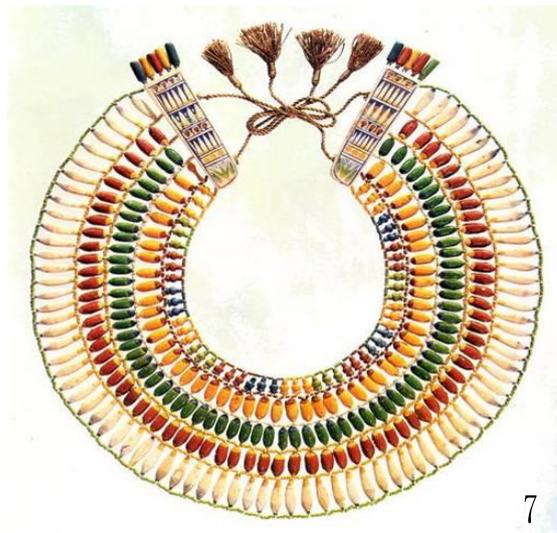
contemporary philosophical system. The struggle is how to use a modern academic methodology system to represent it, specifically to conduct philosophical analysis and assessment; to prove its application and influence in glass jewellery. Therefore, it is necessary to choose a relatively simple approach to understand this philosophy and a suitable method for quantification and description of focal points.

The philosophy of harmony between man and nature is a Chinese philosophy which is different from Western philosophy. The difference in Western and Chinese cultures has created different aesthetics. Hence, the question of how to apply this philosophy appropriately for contemporary Western glass jewellery is another task in this research.

Glass jewellery has many forms; it was considered which kind of glass jewellery should be the main focus of research. Research revealed that glass beads are one of the earliest forms of glass jewellery. The production of glass beads was evident early in glass jewellery. "The first glass jewellery is the dragonfly beads (770 B.C.–221 B.C.) in China" (Fig.6) (Dubin, 1987, p.15). The ancient technique of glass bead making was also very skilled compared with the modern production technique of glass beads. This ancient necklace in Fig.7 is a combination of glass and faience from the Amarna period dating back about 3400 years. Its highly skilled technology is comparable with today's jewellery making techniques.



6



7



8



9

Fig. 6: Dragonfly bead (Unknown).

Fig. 7: The faience and glass jewellery of Amarna period (1379–1362 B.C.) (Dubin, 1987, p.15).

Fig. 8: Larry Scott, 2001, glass beads (Lavin, 2008).

Fig. 9: The glass beads of Pandora, 2013 (<http://www.pandora.net/zh-cn/>).

Glass beads use different glass materials to create different sizes forming an oblate body. Nowadays the technology of making glass beads has developed and matured after several thousand years. The beads are in various forms with rich colours. For example, glass artist Larry Scott's works are typical examples to illustrate cotemporary glass beads (Fig.8). Commercially, Pandora is a very successful jewellery brand in the glass bead industry (Fig.9); it is an example of one of the main kinds of production in the contemporary Western jewellery market. It can be considered to be a representation of contemporary glass beads

in the jewellery market. Although glass beads are also a form of glass jewellery, they are not included in the main scope of this research because glass beads have had a relatively mature development over several thousand years from ancient to modern times. This study explores glass jewellery designs of which the form of glass beads is an exception.

2.3 The development and emergence of contemporary jewellery design in China

The development of the Chinese jewellery industry is quite recent compared with Western countries (Yu, 2010, p.1). Diamond, gold and other jewellery industry development was still relatively slow at the beginning of Chinese reform and the opening up of the economy. "In 1990, Chinese jewellery sales reached 20 billion RMB, of which gold jewellery sales accounted for more than 70% In 2002 Chinese jewellery sales reached 80 billion RMB. The purchasing of jewellery has become a mainstay of the jewellery market" (Xie and Su, 2010, p.48). With the deepening of reform, opening up of the economy and the achievement of the Government's plans with regard to 'Ninth Five', 'Tenth Five', 'Eleventh Five' etc, which are the ninth, tenth, eleventh plans of the Chinese government for society after the new Chinese built up so the country can reach its goals in different stages. Today's Chinese economy has rapidly developed.

China has been ranked as the second largest country in foreign trade for three consecutive years since 2009. China is the largest exporter and second largest importer in the world already. In 2012, from January to November, Chinese non-financial direct overseas investment was 62.5 billion dollars, with foreign projects contracting a business turnover of 102.4 billion dollars (Sun, 2013).

According to the US council on competitiveness in 2013 released by the 'Global Manufacturing Competitiveness Index', the results show that the number one place is still China which is known as the 'World Factory'. Since 2010 China has no doubt become the world's first manufacturing power. "Despite a recent slowdown in its economic growth, China has become the world's largest manufacturing nation—helping maintain its ranking from 2010 as the most competitive manufacturing nation in the world" (Giffi et al, 2013, p.31).

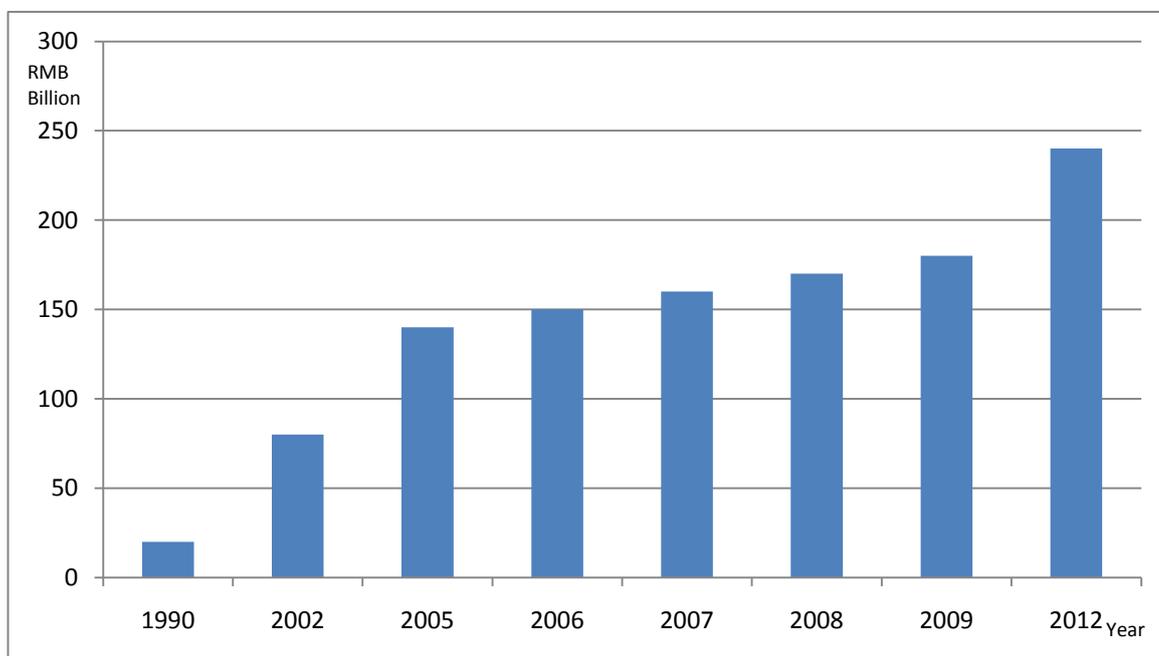


Fig. 10: Chinese jewellery market sales (Unit: billion RMB) (Summarized from Xie and Su, 2010, p.48 and He, 2013).

In the socialist market economy, the process of economic globalization in the Chinese jewellery industry has also seen a rapid development. "The domestic jewellery industry is growing at a rate of 15% of sustained development. Seven years ago, the Chinese jewellery industry annual sales were 14 billion RMB and China exported more than 50 billion dollars worth of jewellery, its sales were one of the highest in the world" (Mao, 2012, p.1). Jewellery has become more and

more popular and people continue to pay more attention to jewellery in China. According to the *China Jewellery Industry Association statistics*, in 2012 jewellery sales were 240 billion RMB, China would become the largest jewellery consumer market in 2020 (He, 2013).

In recent years, the number of Chinese people who have joined the ranks of jewellery production and purchasing in China has grown. China has become a precious jewellery sales market with one of the fastest growing markets in the world (Fig.10). "Chinese jewellery annual sales growth is about 60 billion RMB and had an increase of nearly 2 billion dollars of exports until last year" (Mao, 2012, p.1). China has become a major producer of jewellery in the world market.

2.3.1 The issues of contemporary Chinese jewellery design

The Chinese jewellery industry has made rapid progression. The industry is still in its infancy stage due to its late start and therefore faces many problems. The following analysis clarifies some of the major problems identified in the Chinese jewellery industry from several perspectives.

2.3.1.1 Jewellery production problems

The production of jewellery is in one format and craft art jewellery is relatively rare. Most jewellery is mass labour production of non-branded products in the contemporary Chinese jewellery market. Chunxiang Pu (朴春香) from the China University of Geosciences conducted a research on the *Comparison of the jewellery culture among China, Japan and Korea* proclaimed, "At present, consumers are tired of this 'Abrasive Jewellery'. They have started looking for contemporary jewellery with their own national cultural style" (2002, p.48).

Pipeline compression mouldings are typical features, it has no personality and hand crafted jewellery is seldom commissioned.

2.3.1.2 Problems with consumers' attitudes

The consumers' attitudes of traditional culture restrict Chinese peoples' understanding of jewellery design. Chinese customers often care more about the material value of the jewellery rather than the value of the design (Ruan, 2011, interview). They prefer practical fine crafted jewellery with complex ornamentation. For example, Chinese jewellery designer Mr. Ng Chun Wing (伍镇荣) works in Dai Sun Jewellery Company Ltd (大新珠宝有限公司) in Hong Kong. His 'Graceful Phoenix (彩凤来仪)' (Fig.11) was awarded the champion of the "JMA International Jewellery Design Competition 2014" (Starshine, 2014). This piece shows really high level of technical skills with complex forms and details by using precious materials. It could be argued that this reflects the attitudes of the market where, Chinese people tend to prefer more complicated craftwork with more complex manufacturing processes with more superior techniques. Chunxiang Pu (朴春香) adds "It is probably because in Chinese people's minds the jewellery increases in values as well as having a luxury decorative effect" (2002, p.48). This attitude indicates that purchased jewellery should have added value and demonstrate social status, worth and position.

Chinese designers are often limited and affected by Chinese traditional cultural values. Chinese traditional culture has become a form of 'shackles'; and to some extent, it restricts a designer's creativity. This notion is also expressed in the research conducted by the Chinese academic Ningxin Zou (邹宁馨) from the Beijing Institute of Fashion and Technology, "The changes in Chinese jewellery designs are passive in the traditional context and are in accordance with the

changes in the social environment, the production process, political and economic conditions” (2008, p.15). Chinese designers are hesitant to break through tradition and negate the trajectory of their predecessors. Therefore, it makes it hard to break the cycle with their designs (Lin, 2007, p.3). This results in the jewellery market being saturated with jewellerys which all look the same.



Fig. 11: Ng Chun Wing (伍镇荣), 'Graceful Phoenix', 2014.

Arguably, if Chinese traditional culture is put to good use it can become an endless source of inspiration for the designers since the Chinese features of design are different to other countries. It can promote and become the driving force of Chinese jewellery design. In a journal of Chifeng University, Chinese academic Lei Deng (邓蕾) suggests Chinese designers need to understand this dilemma as “It is the key to designing Chinese style jewellery with the times and internationalization” (2012, p.103). At present, Chinese jewellery designers and design education are beginning to realise and being aware of the heritage of Chinese traditional culture and its importance in design “but the overall products in the market are still stuck to the extent of being ossified using Chinese elements and Chinese symbols to represent traditional Chinese style. Even the Chinese element was also not very clearly defined” (Zou, 2008, p.15).

2.3.1.3 Designer approach problems

Chinese jewellery designers have not found the right design approach yet. The advocating of ‘Chinese style’ in their design still remains in the symbols of traditional Chinese elements. Most Chinese jewellery designers seem to be too dependent on Western mainstream designs. They have realized that blind imitation and plagiarism cannot meet market demand. It is almost as though only Chinese jewellery designs that have their style and character can flourish in the international market. Thus, all social sectors have started to encourage the design of a Chinese style. Thereby, the designer goes to another extreme in their development, where they would totally pursue the ‘Chinese style’ rather than their own ideas (Zou, 2008, p.23). Chinese style should be a concept, a guide and direction rather than a symbol of Chinese elements or patterns (Ibid, p.25). With regard to the multicultural elements as mainstream contemporary international trends, the question arises as to what extent Chinese jewellery

design should emphasise the 'Chinese style' of design while ignoring the blend and the sense of the designer? Arguably, the word 'culture' limits the designers to some extent. Once the designer focuses too much on the word 'culture', it potentially informs them of the trend to create a kind of design which they or the public may think is suitable or fits with this kind of culture. To some extent, this limits the designer's creative abilities. The question is whether or not a jewellery designer should remain in such a confined area, which restricts their work.

2.3.1.4 Chinese designers' social position

The social position of Chinese designers' is also not appropriate. Chinese designers are usually perceived to be senior craftsmen rather than designers. In a trade journal (2004), Hong Wang (王弘) wrote that, "A designer's position is not revered in the Chinese people's mentality. The biggest controversy is that the designer should listen to the experts or leaders in the industry, as certain past problems are yet to be resolved" (p.28). With the public neglecting design costs, the jewellery companies have reduced cost and most design fees remained at the level of labour costs. The price label also clearly shows that the jewellery production fees are a 'manual fee' rather than a 'design fee'. The 'Sanming Daily newspaper (三明日报)' published a relatively new article in 2011 that explains this situation:

A Customer, Mr Fan, recently bought jewellery to the value of 630 RMB (including a manual fee) in a jewellery store in Datian. When he purchased it, the merchants informed the complainant of 295 RMB/gram, a manual fee 20 RMB/g, the actual payment received and fund needed to be paid was a 10 RMB design cost, a total charge of 640 RMB. The operator said 640 RMB included the 10RMB design fees. Mr Fan

complained about the design fees and required them to refund the fees but was refused by the business (Liu, 2011).

Thus, in China most jewellery businesses generally only charge 'manual fees'. Although some businesses are aware of the need to charge a jewellery design fee, due to the limitations of the traditional concept of consumption, it is difficult to promote this idea. Sometimes, some merchants try to charge a jewellery design fee but it is still lower than the labour fee. Another reason is that people have no fundamental understanding of the concept of design and Chinese designers' social status is not respected. There is a concealed and unreported merchants' behaviour in this case but it also reflects weak consumer awareness of the importance of design.

2.3.1.5 Lack of high-end jewellery designers

High-end jewellery designers are scarce and the proliferation of low-end jewellery personnel provides an insight into the jewellery design industry at the present stage. There are numerous jewellery factories and companies that do not yet have their own jewellery designers since the development of the jewellery industry started relatively late in China. The lack of jewellery designers and the low technical level also need improving (Pu, 2002, p.49). Freelance designers who are limited by the pressures of trying to survive tend to be more concerned about improving their level of skills and forming products. Also, the businesses which are willing to engage in the design aspect tend to cater to market demand and often require the designers to obtain a design result in a very short time. Li Lin (林莉) from the Huazhong University of Science and Technology also says, "In addition to the above information of the consumers' pursuit of fashion, it is also related to the designers' psychology to meet the

market (Lin, 2007, p.3). This must not only cater to the public taste, but also entails creating very lucrative designs. Designers should be the leaders in trends but in China there is the unusual phenomenon that it is the designers who have to follow consumer trends (Ibid).

Corporate designers are also often constrained by their bosses, marketing needs and economic factors. They do not take design decisions, have authorship or good promotion prospects and they generally lack any critical evaluation system. Due to these reasons the passion and creativity of the designers are often diminished. As a consequence the enterprise managers complain that they cannot find good designers and good design companies. Conversely, designers also complain that they do not have a good design environment. Some Chinese jewellery companies have tried to hire Western designers in order to solve this problem but they often do not understand the market (Zhang, 2013, p.62). There is also a lack of design criticism, the growing surge in demand for design corresponding to immature designers and agencies. This also hinders the development of the jewellery design industry.

2.3.1.6 Working environments limitations

The designers' working environments also limit the development of jewellery design. On the one hand, most companies will not pay for the increased cost of design and they are also unwilling to bear the risk of new products, which cannot be sold. They usually prefer to sell existing products that are commercially viable (Lin, 2007, p.21–22). Although this can result in short-term benefits, it will inevitably lead to long-term trends that continue to provide merchants with increasingly slim profit margins and the space for development is becoming limited. Huamin Song (宋化旻) from the Beijing Institute of Fashion and

Technology confirms that, "...the enterprises which tend to get long-term development. They should be well aware that their own design style is where they can find the strength to survive" (2005, p.8). In the journal *Art Education*, Weizhu Zhang (张维柱) explains that in order to improve the market competitiveness of enterprises, first there is a need to have brand awareness. Only companies that have their own unique design have the core potential to enhance their competitiveness in the market and establish long-term development. The designers are becoming more and more impetuous with no brand awareness and because of the pressure for survival, social status, relative laws and other factors, most of them also only just seeing the short-term benefits that drive the industry (2013, p.62).

2.3.1.7 Chinese jewellery design education and market requirements

Chinese education in jewellery design cannot meet the requirements of the market. China's research and development investment is far less than Western countries which have also resulted in art and design education funding deficiencies. In the *International Business Daily*, Ji Shan Sun (孙继山) (2013) writes, "The investments account for only 1.7% of GDP in China, the developed countries are 2.5% to 3%; the Chinese technology transformation rate is only 20% which in developed countries is as high as 80%". Compare to their Western counterpart, Chinese jewellery design education started relatively late. About twenty years ago, the Beijing Institute of Fashion Technology took the lead in China to set up jewellery design as the backbone of the Decoration, Art and Design programme in undergraduate education in 1993 (Song, 2005, p.6) This programme can be considered to be the embryo of jewellery design in Chinese art and design education.

Chinese education also presents an unusual phenomenon: when a student and their parents choose a course, it often tends to be market-oriented—meaning that their choice depends on which course would have better career prospects and could earn their family more money. However, the market is changing and demand for professions in art and design would be relatively saturated in the market after they finish their four years of study. The same problem also arises in the university course setting. Both are in a tight market where not much more employment is required as many universities offer the same courses (Peng, 2007, p.27–28). There are serious overlapping sets of programs in art and design and a significant issue with a waste of resources.

In jewellery design, the establishment of this new subject in universities is led by market demands (Zhang, 2013, p.62). Since the creation of the jewellery design course at the Beijing Institute of Fashion Technology, other universities have also opened similar courses in China. In his *Investigation and Analysis of Chinese Jewellery Design Education Status*, Huamin Song (宋化旻) writes, “In the case of the Beijing Institute of Fashion Technology in 1993, seven students enrolled on this course, in 1996 there were 18 and in 2003 the enrolment soared to 83 people. Similarly, the Chinese University of Geosciences recruited students to the undergraduate academic structure in this area. Enrolment has remained relatively stable at around 50 people since then” (2005, p.14). Each university in this field has seen a gradual increase in student numbers. After 20 years of development, design professional studies have significantly progressed. However, with the increase in student enrolment, there has also been a shortage of lecturers, a declining quality of education and a vicious cycle of disjointed structure (Ibid, p.14).

On the other hand, due to the shortage of lecturers most educators are recruited from fresh graduates with very little commercial experience. This lack of commercial experience resulted in their students learning bad habits which get passed down (Peng, 2007, pp.27–28). The university trained jewellery designers are not well positioned to meet the requirements of commercial enterprises. They are often still at the level of craftsperson with good drawing skills but they lack the practical ability of research and development in jewellery making. In the journal *Art Education*, Werzhu Zhuang (张维柱) explains, “This brings confusion for student employment. They cannot demonstrate what they have learned from university into work because they can only work as a craftsman in terms of mechanical work; they lack independent thinking” (2013, p.62).

2.3.1.8 Lack of laws to protect jewellery design.

As China has not established any specific laws to protect design there is serious intellectual property infringement in the field of jewellery design. The ‘Patent Law’ was not implemented in China until 1984 (Lin, 2007, p.22). The lack of jewellery design copyright protection legislation has led to easily pirated jewellery. “Intellectual property infringement is very serious in the field of jewellery design” (Chen et al., 2013, p.75). So far, almost all of the jewellery products with original ideas and technologies originate from the West. China continues to introduce, imitate and plagiarise. Only famous brands have original jewellery company logos and the normal brands generally do not. The weak awareness of Intellectual Property Rights protection provides opportunities for people to plagiarise. This year, two sessions in the government sector also specifically discussed this issue.

In view of the current problems in the culture and arts industry, In the Henan delegation (河南代表团), Sen Zhou (周森) represented five others on strengthening the management of the arts and culture industry proposal...They recommended that national authorities strengthen supervision and management, particularly, the national functional departments should work together to strengthen inspection and gradually standardize the art of trading to develop national conditions and relatively comprehensive industrial management regulations (Jin, 2013).

Although many people have realized that blindly copying and imitating designs have seemingly caused the Chinese jewellery market to completely lose its personality, in order to avoid imitations in this field, China has to establish a law to protect design works. However, they have not identified a good way to solve this problem since with the creation of jewellery design is difficult to determine and the relative lack of awareness of the law and the burden of proof is very difficult.

Chinese jewellery design has developed in such a direction and environment. It involuntarily loses the concept that design should have basic freedom. In order to solve the list of problems in Chinese contemporary jewellery design, this research explores the existing controls on jewellery design and goes against the Chinese market trends and factors that determine the value of the materials used in jewellery design. Jewellery design itself should advocate restoration of freedom and value, and an understanding that the design should have control rights. It aims to inherit and carry forward Chinese traditional culture from a contemporary perspective with the integration of advanced Western concepts and technologies appropriate for contemporary Western jewellery design in order to free Chinese jewellery design and to inject new ideas. This research is in a unique position where it is rare to do glass and jewellery together from a new perspective and concept that integrates Chinese philosophy with contemporary

Western jewellery design. This makes a new form of Chinese jewellery design and potentially creates a new market, making it a fresh approach. The study comes before the Chinese jewellery market, which used to ignore the design value and was based on machine production as its main line. The jewellery designs create for this research uses philosophical notions that stemmed from Chinese philosophical thinking. The conceptual process is Chinese, but the final form of jewellery can be considered to be Western.

2.3.2 The contemporary jewellery art in China

In recently years, some contemporary Chinese jewellery designers have started making hand crafted jewellery. This growth is influenced by many of the designers returning to China from overseas studies in this area. Their experience has given them a different perspective of the cultures between East and West which can lead the way for Chinese jewellery designs to change and develop. The demand for private custom jewellery is becoming more and more popular in recent years.

Fei Liu (刘斐) is one of the pioneer of contemporary Chinese fine jewellery designs. He was born in Chengdu 成都, China who studied jewellery design in the School of Jewellery in Birmingham in the UK. He has won the “Lonmin Design Innovation Award 2011, 2009, International Jewellery London Editors Choice Award 2009, Goldsmiths’ Craftsmanship and Design Award 2008, 2006” in the UK (<http://www.feiliu.co.uk/awards>). The ‘Dawn Sculpture’ ring (Fig.12) was awarded the Goldsmiths’ 2006 Craftsmanship and Design awards in the UK. This piece represents a combination of “his Eastern heritage and Western

design practice” (Ibid), which keeps it wearable with strong and beautiful characteristics by handcrafting precious materials.

Baobao Wan (万宝宝) came from Beijing in China and studied overseas in America, Hong Kong and France. She graduated from Gemmological Institute of America in Hong Kong with a GIA graduate gemmologist degree in 2006 and built her Baobao Wan Fine Jewellery brand one year later

(<http://www.baobaowan.com/page/view/251.html>).

Her necklace of 'Dragon d'Eau' (Fig.13) is a typical jewellery piece of her artwork which maintains its wear-ability and remains exquisite as a fine piece of jewellery studio practice.



Fig. 12: Fei Liu (刘斐), 'Dawn Sculpture' ring, 2006, 18ct black gold with 12mm Tahitian pearl, red garnet, citrine, diamonds.



Fig. 13: Baobao Wan (万宝宝), 'Dragon d'Eau', 2009, Sapphire, Diamond, 18K Gold.



Fig. 14: Shirley Zhang (张雪莉), 'Dancing on the Flowers', 2012, gold, 1,002 coloured stones, 4,986 diamonds, jadeite cabochons and chalcedony cabochons.

Shirley Zhang (张雪莉) was selected as the new director of the International Coloured Gemstone Association in China in 2013 (China jewellery, 2013). She is a jewellery design expert and was certified by the British Gemological Institute. She is also the founder of the Meihe Jewellery Styling Research Centre (美合珠宝造型研究中心) and a visiting professor for National Gemmological Training Centre. She received an FGA gemmology degree and learns from western experienced jewellery professionals by becoming a full-time buyer for Chinese

jewellery import companies after she shut down her first jewellery company. Her 20 years jewellery career gave her the solid foundation to develop her own style of combining Western craftsmanship with oriental aesthetic standards. Her 'Dancing on the Flowers' (Fig.14) jewellery suite "was given a special award as the gift for '20 years' in the Chinese jewellery industry' at the 2012 NGTC (National Gems and Jewellery Technology Administrative Centre)" (Ibid). This piece is set with different cuts and sizes of coloured stones, diamonds, jadeite and chalcedony cabochons both manufactured and handmade. It also can be worn flexibly by disassembling and assembling it in various ways, which is a representing piece for her design concept.

Fei Liu (刘斐), Baobao Wan (万宝宝) and Shirley Zhang (张雪莉) are recognised as some of China's top contemporary fine jewellery designers. All of them have overseas studies experience in different ways, which give them a position to view the different cultures between the East and West. This is perhaps the main influences to their jewellery design. They all maintain jewellery designs combining the Eastern heritage and Western techniques, with wear-ability and individuality as the main focus.



Fig. 15: Rui Huo (霍睿), 2013, 'Amusement Trip (盎然之旅)', K-gold, natural and artificial crystal, glass and alloy.

Other than fine jewellery designers, there are several young jewellery designers that have started to use non-precious materials in their jewellery design. For example, Rui Huo (霍睿) is a Chinese contemporary jewellery designer working for CHJ and VENTI jewellery brand. Her 'Amusement Trip (盎然之旅)' (Fig.15) (<http://designer.525zb.com/rayray/work/3006>) uniquely combined jewellery with shoes by using non-precious materials crystal and glass as the main materials. This design shows dreamy and dramatic jewellery shoes. She is one of the pioneers of using non-precious materials as a single dominant market.

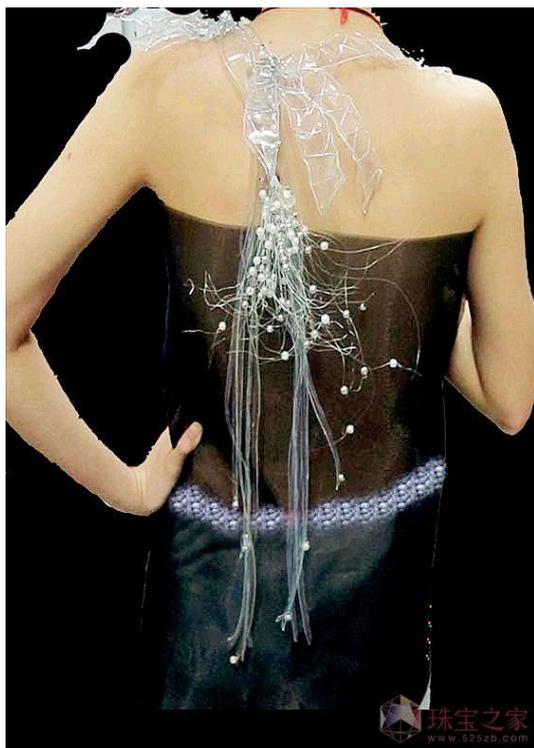


Fig. 16: Xiaoqian Huang (黄肖倩), 'Play Water (戏水)', 2011, pearl, plastic beads, plastic tube, steel.

Another example is Xiao Qian Huang (黄肖倩) where she uses plastic tube, plastic beads and steel to make a back ornament 'Play Water (戏水)' (Fig.16) which shows her inspiration from water with water drops (<http://designer.525zb.com/designerspaceshowproduct.aspx?productid=892&spaceid=118>). The light non-precious materials that are used can show the agility and the light soft feeling of the water and water drops.



Fig. 17: Siting Zhou (周思婷), 2011, 'Lucid Flying', glass, pearl, copper and a variety of jewels (Peng, 2014, p,113).

A jewellery student of the Beijing Institute of Fashion Technology Siting Zhou (周思婷) graduated in 2011, used glass as the main material combining it with pearl, copper and a variety of jewels for her jewellery art work 'Lucid Flying' (Fig.17). She used lampworking techniques by integrating microcosmic elements as inspiration to make her jewellery work (Peng, 2014, p.111—112, British PhD).

2.4 Contemporary Western jewellery design in different contexts

The concept of harmony between man and nature provides a preliminary solution to fully understand the impact of man and nature on glass jewellery design. It is necessary first of all to understand the important concepts in contemporary jewellery design and their related aesthetics.

Jewellery design in the West cuts across the field of arts, crafts and design creation. Many precious metals in jewellery creation can be used for the purpose of design activities. The value of jewellery is no longer limited to the value of the material. "Talented goldsmiths and jewellery designers and makers are creating individual pieces that are cherished as artworks far beyond the intrinsic value of the materials used" (Hardy, 2012, p.7). The meaning of contemporary jewellery design is becoming broader and deeper. Contemporary jewellery design is a practice-based design and is understood to be a process-based design activity. It is where the designer gives full play to their imagination and loses the entire design burden to make objects around the body with the aesthetic nature of covering social, aesthetic, cultural, creative activities. As jewellery maker Susan Cohn described:

Contemporary jewellery started as a movement among makers seeking to recode what jewellery is and how it can express value. In a decade when cultural resistance and artistic experimentation reshaped popular culture, jewellers sought to relieve jewellery of its deep economic imprint. They rebelled against jewellery's expected pleasures, its narrow conception as a luxury item given ceremoniously on special occasions (2012, p.34).

The Western contemporary jewellery design can be divided into design objects, cultures, materials, markets and produces many different categories. Each of these categories can potentially be divided into even further areas for investigation (Fig.18).

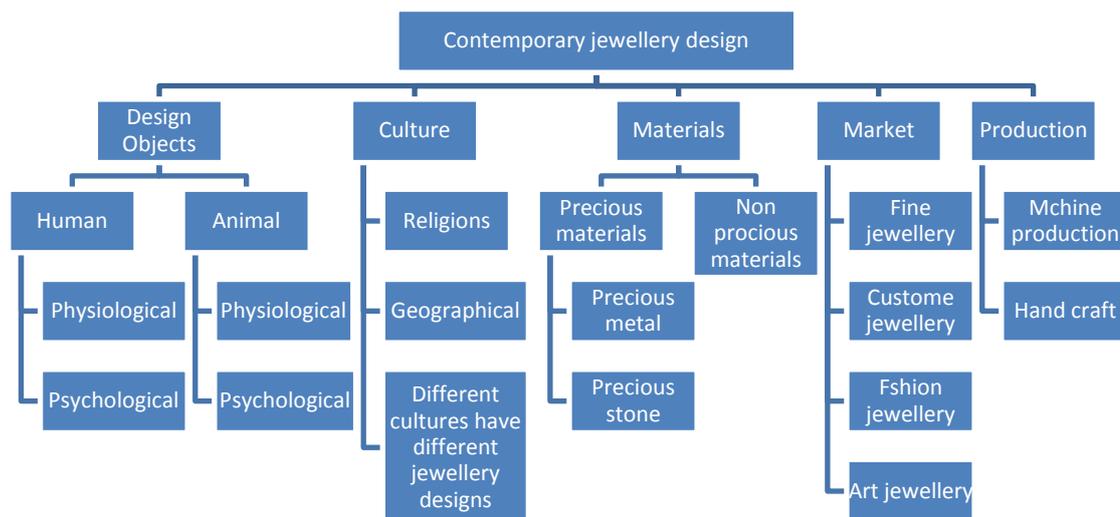


Fig. 18: The diagram of contemporary jewellery design (Jiang, 2014)

The diagram above (Fig.18) taxonomies some of the features of contemporary design and further details are identified for analysis and evaluation. This jewellery research combines precious materials and non-precious materials, while working with machine production and handcraft areas. This research also draws inspiration from the artists mentioned in this section, drawing upon the wear-ability of the design and the tensions this can elicit with the aesthetic features of the design, within the context of fine art and in particular, the focus of the thesis—the harmony between man and nature.

2.4.1 Materials

The use of materials within contemporary jewellery design can be divided into precious materials and non-precious. The precious materials include precious metals and precious stones; and non-precious materials can include glass, white metal and rubber.

2.4.1.1 Precious materials

Precious metals (Fig.19) are a class of non-ferrous metals. Master of Fine Arts at Columbia University Oppi Untracht says: "The precious metals most likely to be used by craftsmen are gold, silver and platinum" (1975, p.7). The main non-ferrous metals usually refer to gold, silver and platinum. The platinum group include "the light platinum group: rhodium, ruthenium and palladium whose specific gravity is 12 and the heavy platinum group, osmium, iridium and platinum, whose specific gravities are over 21" (Ibid, p.14). They are well known to be used in jewellery coins and other artworks since their prices are much more expensive than the price of common metals. They have a strong gloss and shining colours with high entomic value. Precious metals are expensive, have a beautiful appearance and have chemical stability characteristics. They not only have a strong



Fig. 19: Georg Spreng, 2009, 'White Blossom' necklace, Diamonds and 950-platinum (Harday, 2012, p.163).



Fig. 20: Charlotte De Syllas, 2009, 'Migration' Necklace, White jade and 18-carat white gold (Harday, 2012, p.166).

practical industrial use but also have a high appreciation value in terms of investment.

Precious stones (Fig.20) are the most beautiful and valuable natural mineral crystals from rocks. They are brightly coloured, with a crystal texture, delicate, shiny, hard and durable, they are also very rare. They have a beautiful lustre after polishing and can also produce jewellery and have other uses. The gemstones group are used in jewellery design in four main categories such as the British Jeweller and dealer Judith Crowe illustrates in the gemstone family tree (2006, p.46–47), they include: Apatite, Diopside, Tektites and Scapolite. Beryl, Chalcedony/Agate, Chrysoberyl, Corundum and Diamond which also belongs to the Apatite category. Feldspar, Fluorite and Garnet are members of Diopside. The Tektites category includes: Hematite, Hemimorphite, Iolite, Jade, Kyanite, Lapis Lazuli, Malachite, Opal, Peridot, Prehnite, Quartz and Rhodochrosite. Scapolite is composed of Sillimanite, Sphene, Spinel, Spodumene, Sugilite, Topaz, Tourmaline, Tugtupite, Turquoise, Zircon and Zoisite. Otherwise, there are a handful of organic matter materials, such as amber, pearl, coral and ivory. For the purpose of this research and due to the costs involved, only silver and gold are used.

2.4.1.2 Non-precious materials

Non-precious materials (Fig.21) are the other materials outside of precious materials, including resin, plastics, wood, rubber, stainless steel, glass, paper, fibres etc. These materials have surrounded us for a long time without us realizing



Fig. 21: Nan Nan Lui, 2007, paper, metal (Murphy, 2009 p.59).

their value, but today more and more people are using them for craft and jewellery making. They are cheap, have various materials and wide options in terms of usage. They are more affordable for the customer with various choices and they also increase the numbers of ways to create jewellery today. Kathie Murphy, the author of *Design and Make Non-precious Jewellery* explains:

Non-precious materials have been used from the time people first made a hole in a shell or wove feathers to be worn as decoration or as a talisman... Materials like iron and plastic were used in the past in costume jewellery to mimic expensive precious jewellery, but more often ended up having their own distinctive character. Even today the weight of sentimental and personal associations can lend a piece of jewellery greater worth for its wear/owner than can be measured by its sale value (2009, p.9).

2.4.2 The Market

The market can be divided into fine jewellery, costume jewellery, fashion jewellery and art jewellery. Fine jewellery is defined as using precious metals and stones such as gold, silver and precious stones. It is different from costume jewellery and fashion jewellery that uses cheap materials such as copper and tin. Fine jewellery is often more expensive than costume jewellery and fashion jewellery, the production process typically exhibits a higher level and usually lasts longer.



Fig. 22: Swarovski-Spectacular Ruby Set (2014).

The difference between costume jewellery and fashion jewellery began when these terms were first used. “Costume jewellery first became available in the 1930s however it didn’t become thought of as fashionable until the mid-1980s” (Simmons, 2014). Although costume jewellery was first available in the 1930s, the concept dates back to ancient civilizations. As design journalist Judith Miller says “The concept of non-precious ‘costume’ jewellery design dates back to ancient civilizations when people adorned themselves, advancements in material led to a greater diversity of affordable styles” (2007, p.9). Costume jewellery became popular in 1930, where Hollywood chose to use costume jewellery to clothe actors, the investment cost is much lower than in fine jewellery therefore one does not have to worry about it being lost or stolen. “A significant factor in the popularization of costume jewellery was Hollywood movies. The leading female stars of the 1940s and 1950s often wore and then

endorsed the pieces produced by a range of designers” (Tanenbaum, 2006). Costume jewellery is less expensive because its material is gold-plated instead of pure gold. Its value is much lower than the use of precious metals. Because rhinestones are very similar to diamonds, the use of one of the most common costume jewellery rhinestones instead of precious or semi-precious gems arose simultaneously. This form of costume jewellery is still available on the market today and there are some successful brands which are as good as fine jewellery. The crystal of Swarovski (Fig.22) costume jewellery is a typical example.

Fashion jewellery defined as jewellery design refers to a period of social and cultural impact. Due to time constraints, the designer must anticipate the changing tastes of consumers and design some individual jewellery to form pieces for special consumers. “Fashion is a phenomenon that individuals shape for themselves in the choices that they make and the uses to which they put garments and personal objects” (Cohn, 2012, p.216). A common feature of costume jewellery and fashion jewellery is that they both use relatively cheaper materials to create beautiful jewellery and the difference is that fashion jewellery is designed as an individual form for special chosen people in a specific period of time, so that it can afford more choice for special tastes.

Art jewellery is created more from the perspective of the jeweller. There is no target audience group to be concerned with. It is more the jeweller’s choice with their craft and studio practice base to make individual pieces for a particular person. “Studio jewellery is characterised by a concern for individuality. The individual maker produces the individual objects to be worn by individuals” (Game and Goring, 1998, p.5). The jeweller normally works on their own or with a couple of people in their studio. They make pieces of jewellery through developing ideas to obtain the final outcome.

2.4.3 Production

Looking at the mode of production, contemporary jewellery can be divided into the production of 'handicrafts' and 'pipeline machine production'. Handicrafts can find its origin in medieval workshops. In British and American Arts and Crafts movements "With occasional notable exceptions, it was not until the Arts and Crafts Movement of the nineteenth century and more particularly the Studio Crafts Movement of the twentieth century that the named individual potter, glassmaker and jeweller began to achieve comparable social status" (Ibid, p.6). Contrary to the pipeline machine production, it is the opposite with handicrafts. Pipeline machine production is mainly based on machine large-scale mass production.

This research into jewellery making tries to cross the borders of the jewellery categories in the contemporary jewellery market. It does not wish to be limited by the concept of jewellery categories. The research tries to merge the lines between them and create a combination with the advantages of each. In the production of the actual jewellery, it also tries to eliminate the limited ways between craft and machine production. Jewellery making has combined the advantages of crafts and machine production by using precious metals and non-precious materials.

2.5 Factors which affect the different design practices in Chinese and Western jewellery design

Chinese jewellery design should have a unique and mellow subtle expression. This perhaps is one of the most different aspects of Chinese design to Western design. Because there are such differences in the design aesthetic this can affect opinions of Eastern and Western standards of value. The frank and straightforward expression of Western jewellery design is often direct, whereas Oriental languages are more subtle and introverted and these differences also create a fundamentally different artistic language (Wei, 2008, p.28).

As the Chinese academic Yilin Wei (卫艺林) explained above, Eastern and Western cultures have long been recognised as different, with different histories, different values and generally very different social set-ups. One of these differences arguably is that Chinese culture can be subtle, perhaps even more modest than Western culture. Chinese people are nevertheless practical, while they are not necessarily logical thinkers; feelings often override rational thought. Another perhaps noticeable difference is the expressions of Chinese people—they seem more delicate with their approach. Chinese people arguably pay closer attention to so called spiritual, or 'inner life'. Chinese philosophy by extension also emphasizes subjective and individual experiences. It has been suggested that Chinese philosophy likes to use vague references, hints and even indirect ways to express itself as the Chinese academics Zhengqi Shan (单正齐) and Huibing Gan (甘会兵) from Shanxi Normal University mentioned:

Chinese philosophers think the object of philosophy is hard to express in the concept of language. Therefore, we cannot use the Western way to understand philosophy. While we have to

use the negative way or other revelation methods which can indirectly express the things we cannot express (p.12).

Chinese people deal with problems in a moderate way but it can be very subtle. Hence, Easterners sometimes use the vague way in dealing with the others. Generally Westerners are seen as using the opposite way of thinking in this regard which has a focus on rational thinking and rarely discusses things on purely emotional terms. Clear logical and very straightforward thinking can sometimes guide some Western thinkers.

Chinese philosophy it would seem from this evidence to appear opposite compared to Western cultures, which have a more clear definition but seems to lack subtleness. It is more implied, but by extension can appear to lack clarity. In contrast, Chinese philosophy seemingly lacks clarity however both of them can complement each other. As Harvard University Professor Ben-Ami Scharfstein et al says "The reason for the glaring omission of formal logic from what is otherwise a philosophical tradition as rich as those of India and the West may perhaps be found in the nature of classical Chinese" (1978, p.171).

The difference of the two mainstream cultures of the East and the West affect and penetrate each other with the development of technology, society and globalisation. The distance between them is being narrowed but they still have their individual features. China has accumulated the philosophy of Confucianism, Buddhism and Taoism during five thousand years of civilization. "The suggestive character of Chinese philosophy interlinked with the ideal of all Chinese art" (Shan and Gan, 2008, p.13). Confucianism and Buddhism have an emphasis on an inner awareness. Confucian poses that if you have a loving heart, you would be beautiful, if you do not have it, you are ugly. The Buddhists proposed the

concept of inner awareness—the aesthetics of 'integrated harmony'. For example, it means although something could appear beautiful on the outside, it could have inner ugliness; however there is also beauty within that ugliness. There is no perfection without flaws.

The dichotomy of these aesthetic philosophies assigned to make Chinese people more restrained, subtle and poetic in their aesthetic tastes. In Taoism, 'yin and yang' and 'virtual and real' emphasize a beauty of harmony of opposition and unity. This kind of beauty references the 'balance and imbalance', 'like and unlike'. Confucianism, Buddhism and Taoism are therefore the fundamental philosophies that built up Chinese traditional aesthetic ideas and the social psychology.

2.5.1 Different attitudes on jewellery

Jade and piercing jewellery are two typical kinds of jewellery that can represent the different attitude from Chinese and Westerners. Chinese academic Yilin Wei (卫艺林) suggests Chinese people feel that the beauty can absolutely resonate within their souls (2008, p.28). Jade is the most popular stone in China which attracts so little interest in the West. Conversely, piercing jewellery is popular in the West but isn't widely received by Chinese people.

The same piece of jewellery can be assessed very differently because of the different concepts and aesthetic points between the East and the West, while arguably incorporating both internal and external aspects. Chinese people tend to prefer the domination of the inner spirit—'spiritual awareness'. The Westerner aesthetic evaluation system runs from the outside to the inside. Easterners

generally appreciate aesthetics from internal to the external aspect, whereas Westerners seem to generally appreciate the external aspects more than the internal ones (Wei, 2008, p.28).

Even if Western and Eastern people like the same kind of material, the choice of material also has a very different place. For example, to make a comparison with the precious metal—gold, in the journal of *China Gems and Jades*, the Chinese academic Hong Liu (刘红) explains, “there are two features when Chinese people choose gold jewellery. First, gold should be pure gold, the purer the better. Second, the styles rarely change and type is very monotonous. If not the ‘Dragon and Phoenix’ it is the ‘Double happiness’ or ‘wealth, prosperity, fortune, longevity’, etc” (1998, p.26). Compared with the appearance of jewellery, Chinese people are generally more concerned about the purity of gold being 22K or 24K even though 10k-14k-18K gold is easier to manufacture. Western jewellery shops generally display gold in 10K and 14K. “There is no display of gold in 22K and 24K even 18K is really rare” (Ibid, p.27). Thus, arguably Western people are more concerned about the design of jewellery styles rather than the material itself compare to Chinese people. Especially, the rise of non-precious materials in contemporary jewellery design can better reflect this view.

2.5.2 Aesthetic ideology

The contrast to Western principles of aesthetics is rooted in the contrast to Western philosophical premises of power, authority, dominance, engagement, and control, whether of others or of nature. The art produced by such a culture is a visual and tactile expression of its values. The two cannot be separated.

Nor, on the other hand, are wabi and sabi usually separated in wabi-sabi art (Meng-hu, 2004).

As journalist Meng-hu explains above, Western culture determines the aesthetic ideology of the West. Their basic thinking did not leave the rule of the absolute concept of “number” and “positive” thinking. Their philosophical and aesthetic ideas are inseparable from natural emotional representations, rhythm, geometry, balance and other external understanding of the concept (Fig.23). This shows that Western aesthetic ideas are export-oriented. This idea has been affected for the purpose of performance and formed as its main purpose.



Fig. 23: Jacqueline Ryan, 2008, ring, Vitreous enamel and 18-carat gold (Harday, 2012, p.151).

It can be seen that Chinese jewellery design has not experienced any breakthrough in the past for a long time; one of the reasons as the Chinese academic Tianyou Yang (杨天佑) explains that can assist understanding this is the fear of Chinese ancestors (2008, p3). Predecessors' set systems that cannot be changed easily whereas Westerners' attitudes towards the past are essentially different. Western concepts are always trying to negate their predecessors so they can continue toward novel ideas, change and surprise, trying to update things to overthrow previous theoretical concepts. This is seen clearly in the development of modern science and technology in the West. However, traditional Chinese thinking is constantly affirmed, denying future generations. “Years of experience tell us that leaders and designers are easy in terms of ideological emancipation but the emancipation of millions of ordinary people is extremely difficult. Sometimes it is prohibitively difficult if you want to say something that is not found in ancestral classical words” (Ibid, p.3).

Whatever a person does, he or she has to see if there is a precedent. For Chinese jewellery design it is thus very difficult to carry out significant changes.

Therefore, most Chinese people tend to not accept change frequently of artistic context as people are in the West. In some ways, this can be described as the Chinese national characteristic. In the *Guangming Daily* (2010), Genyou Wu (吴根友) wrote that, "The traditional Confucian culture of 'ancestor worship' can be turned into a national culture of 'Roots' awareness after the transformation of contemporary society" (p.12). Chinese national characteristics decide Chinese people's aesthetics as being the pursuit of something eternal and stable.

In general, Chinese jewellery does not attach importance to its form. Its content is a traditional Chinese philosophy culture. This inherent culture in Chinese jewellery has a very strong spirit of harmony. It is difficult to be alienated as the



Fig. 24: Hong Li 李宏, 2015, 'Eight Trigrams with Food 八卦与美食'.

Chinese academic Yilin Wei (卫艺林) suggests, "From the Chinese philosophical point of view, it is in line with the Chinese traditional aesthetic concepts of being restrained, subtle and harmonious" (2008, p.16). Its manifested aesthetic style has a strong spiritual power and maintains strength. The Chinese person's understanding of jewellery design is most different between Chinese jewellery design and Western jewellery design. The understanding of Chinese jewellery design is still limited to its style. It is limited to changing the existing form of products.

These results in the contemporary Chinese jewellery market having a large amount of jewellery, but the designs look similar to each other. The lack of awareness of design concepts and form cannot lead to fundamental change. Chinese style also does not purely use symbolised Chinese elements in its design. "The Chinese style is a concept rather than a symbol" (Ibid, p.25). For example, jewellery designer Hong Li (李宏) is working in 'Giraffe' jewellery company in Hong Kong. His 'Eight Trigrams with Food (八卦与美食)' necklace (Fig.24) used the symbolised Chinese elements of the 'Eight Trigrams (八卦)' pattern as the jewellery form which seem too literate. The meaning of contemporary jewellery design is broader and deeper than Chinese people's traditional understanding. Just technology with paintings and craft that create art are not the same as design. Arguably any negative parts in the design should be removed when designing objects for the body, such as superfluous details as discussed in the section 2.3.1.2, jewellery design needs more than just complex forms to be well designed but the aesthetic should combine social aesthetic culture and creative activities.

Overall, "Eastern and Western cultures are still very different" (Ibid, p.12). However, in the same areas, people already know how to find a balance in culture to promote better development. With the development of globalisation, the jewellery industry will be more culturally infiltrated and have a mutual influence leading to the formation of a new generation of distinctive jewellery design.

2.6 Philosophical contexts of 'harmony between man and nature'

This section will clarify the different contexts related to the Chinese philosophical notion of harmony between man and nature.

2.6.1 Historical and philosophical context of 'harmony between man and nature'

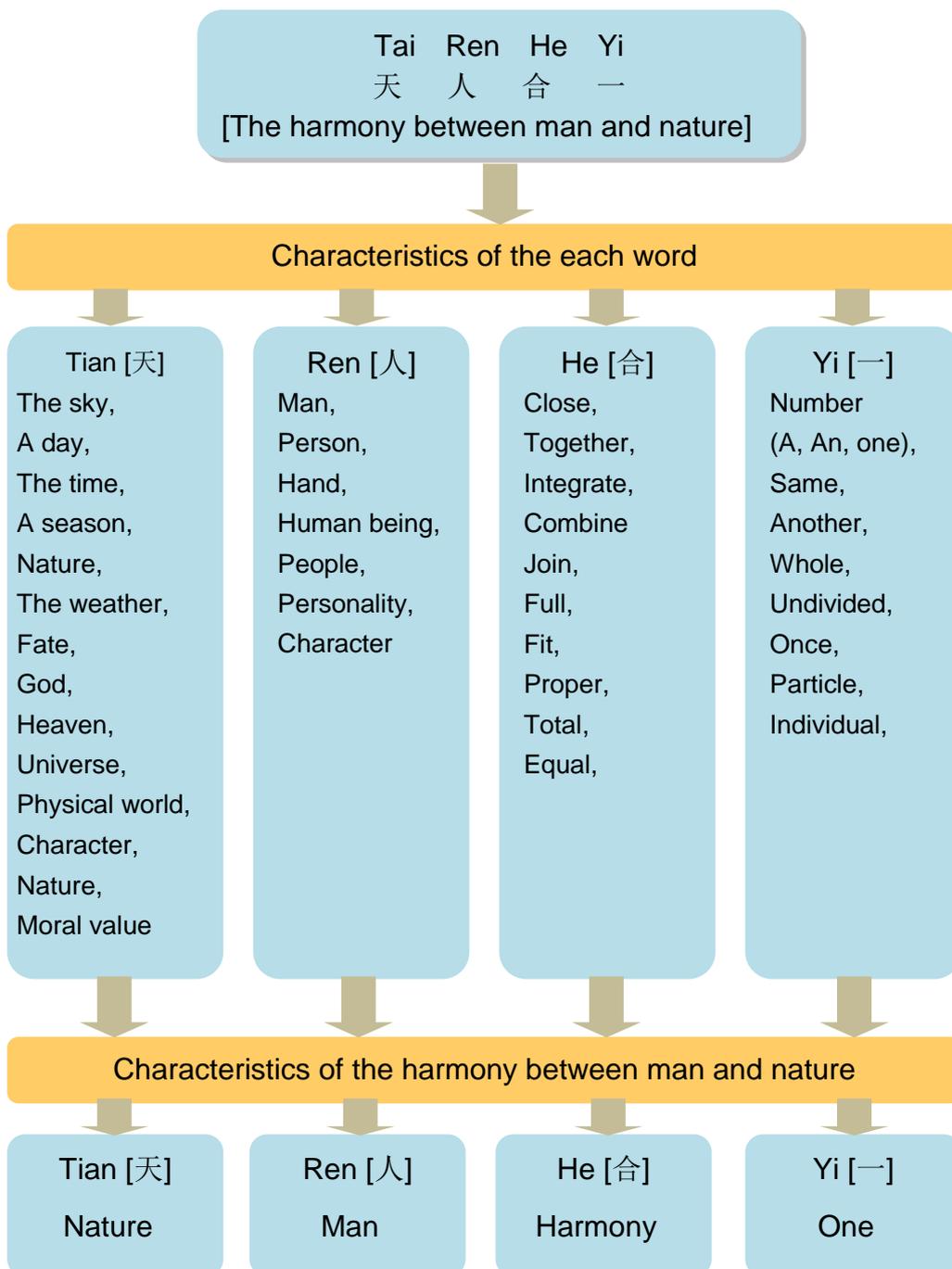


Fig. 25: The explanation diagram of the harmony between man and nature (Jiang, 2011).

To obtain a clear understanding of harmony between man and nature, first we should understand the meaning of each word in order to get a better grasp of the whole meaning. The meaning of the words are explained in the diagram below (Fig.25): 'Tian' (天) means nature, heaven, overhead etc. 'Ren' (人) means man, person, hand; 'He' (合) means proper, whole, council and 'Yi' (一) means one, single, individual. These characters conjure up the notion that the heaven and man are a harmonious whole, in effect, suggesting man and nature are joint as one.

Looking from the traditional Chinese philosophy perspective, Chinese people believe that 'Tian (天)' has several layers of meaning including the substance of nature, dominance of nature, the fate of nature, natural day and moral day. The substance of nature means that the sky exists in the ordinary day to correspond with the ground as seen in people's daily lives. The dominance of nature refers to God which has a religious concept. The fate of nature is referred to as 'luck'. The natural day has the same meaning as defined in contemporary natural sciences. The moral day refers to the Confucian respect for human moral standards. In summary, 'Tian (天)' is the rules and principles of the universe or also known as basic principles and laws. It is also called nature from a more abstract level. For example, there is an old Chinese traditional saying called 'As heaven's movement is ever vigorous, so must a gentleman ceaselessly strive along (天行健, 君子自强不息).' In their Chinese philosophical book (2008) the Chinese academics Shan and Gan described, "the nature of the sky is good, its movement is endless, so the gentleman supports like the sky's unending struggle as positive" (p.19). 'Nature (天)'—the law of the universe of all things, the law of the running world. "Tianchang Youdao (天长有道)" refers to the fact that everything in the universe has its own path which has a logic in its own

development and change. This notion also is further explained by Shan and Gan:

In the first volume of the 'New History of Chinese Philosophy', Feng explained the ancient Chinese philosophy of 'Tian 天' the meaning of which is grouped into five categories: (1) "The matter of nature is the ether which can be grey relative to the ground in daily life, what I now calls the sky. (2) "Dominate the sky" or "the will of Heaven", which is called the personification of religious supremacy of the will of God. (3) "Fate of the ether" means luck in the concept of civil society. (4) "Nature of the day" is the overall sense of the natural world. (5) "Righteous sky" or "Moral sky" stressed the sky as being the ultimate value of human moral life. It's the root of human moral life and moral laws can be traced back to this (2008, p.16).

In relative terms, what does 'ren (人)' mean in the philosophy of harmony between man and nature? Different people have different opinions and explanations. Associate Dean of Guangxi Normal University for Nationalities, Philosophy Professor Jinsong Zhang (张劲松) thinks 'ren (人)' have two layers of meaning for a specific person and his/her subjective thinking and the thinking ability of people (from my interview sources, 2011). From Heilongjiang University of Science and Technology, the Chinese academic Yanjiao Teng (滕艳娇) explains, "Man is made from nature" (2009, p.162). In Beijing University, Professor Xianlin Ji's (季羨林) opinion, "Man is a mortal being" (1993, p.11). From the point of view of each of these it can be understood that 'ren 人' is the meaning of humanity itself. It can be explained from both the physical and psychological aspects of people.

Among the many interpretations in the Chinese dictionary 'He (合)' can be understood as reasonable and consistent in the philosophy of harmony between

man and nature. Harmony between man and nature is ultimately reflected in the unity of man and nature. The prerequisite is to create a reasonable relationship of common ideology between man and nature. The necessary requirement is to abide by the laws of nature and act reasonably for the development of human survival. So in this context, 'He (合)' means proper and harmony.

'Yi (一)' usually means number. In the harmony between man and nature 'Yi (一)' means a whole which is man and nature integrated as one. The layout of each word and its meaning is summarized in Fig.25.

Traditional Chinese people generally see harmony as something that can be obtained in a mutual encounter. Nature and man are originally a concept of mutual opposites in ancient Chinese thinking. Nature is the highest category and Supreme Being. In society and throughout the world, there exists a kind of group who know how to think. This group is called man. "'Tian (天)' is a type of nature which has morality and is inextricably linked with humans. The core of harmony between man and natural 'Tian (天)' is by following the rules of nature. This meaning of 'Tian (天)' does not mean 'nature'. It refers to the authentic laws of nature" (Teng, 2009, p.162). People living on earth and man himself are born from the earth. Man belongs to nature. He is a part of nature. The relationship between man and nature are inseparable. The 'harmony between man and nature' is the highest integration category of man learning how to live in accordance with nature.

It is only when humankind grasps the laws of nature can they then find themselves and understand the meaning of man properly through this harmonious process. In most ancient times, there is the concept of fear, respect and what is in accordance with nature so that it can make us respect,

understand and get to know nature. "By understanding the laws of nature combined with our human thinking, man's ideas and concepts can make the meaning of our human existence relate to the significance of the presence of nature" (Zhang, 2011, Appendix 1). This also is the significance of our human existence to reflect our rule of the understanding field. It shows the basic connotation of man's existence.

Therefore, nature exists as man exists. The significance of mankind's existence depends on understanding the meaning of their own existence during the process of understanding nature. Ancient Chinese philosophy embodies the idea of such harmony between man and nature. This philosophy is constantly infiltrated into every era of Chinese history. "In Chinese philosophy the leading idea is the blend of subject and object which means harmony between man and nature" (Shan and Gan, 2008, p.9). The formal concept of the main area of Chinese philosophy is constantly changing but its core purpose is still 'harmony between man and nature'. This idea is permeated within Chinese philosophy.

The principle of 'harmony between man and nature' is the fundamental concept of classical Chinese philosophy. It is also the lead and principle lines of Chinese philosophy. It is one of the most basic ways of thinking for Chinese people. "Harmony between man and nature' is a mode of universal thinking. It is one of the most important concepts of the 'Book of Changes' (I-Ching) and philosophical ideology, but it is also an important concept of Chinese traditional culture" (Fu, 2011, p.36). This philosophy has existed in every field of Chinese society for thousands of years. The 'harmony between man and nature' was first proposed by Zi Zhuang (庄子) (about 286 B.C.–369 B.C.) (Yi, 2006, p.212). As Zhuang says, "The nature is the one source of all things, and is not the private possession of one's own ego. It is only the great man who is able to exhaust its

principles" (Fung, 1952, p.492). From Fung's observation, one can deduce that this principle highlights the importance of the 'self' and one's connection with nature. It emphasises the use of the connection method to deal with its problem. The principles of harmony between man and nature are based on the relationship between man and nature in the centre to consider the problems between the universe and human life. It is a way of thinking, a worldview and involves cosmology.

'Harmony between man and nature' is the dominant ideology in Chinese philosophy. "Chinese philosophy, by contrast with Western thinking, has from the start emphasized immanence and unity. Where Western dualism led to an opposition between man and nature, Chinese monism led to a harmony between the two" (China Culture, 2005). It is one of the main differences with Western philosophy. This philosophy was first proposed by Zi Zhuang (庄子) during the Spring and Autumn period (770–221B.C.). Then Zhongshu Dong (董仲舒) developed it as a philosophical system of 'harmony between man and nature' in order to build on the core and the subject of Chinese philosophy and traditional culture. It advocates that there is no clear distinction between man and his surroundings. Man and his surroundings should be in mutual communication and in a harmonious state.

The theory that man is an integral part of nature first originated in the Spring and Autumn, and Warring States (春秋战国) periods (770–221BC). With the elaboration of Dong Zhongshu (董仲舒) in the Han Dynasty (汉朝) (206BC–220AD), the theory was summarized and clearly presented by the Confucian School of idealists in the Song (宋) (960–1279) and Ming (明) (1368–1644) dynasties (Ibid).

Man and nature are essentially interlinked so everything should follow the rules of nature being balanced and harmonious. It believes that nature and man are not in a relationship between subject and object but are part of one whole entity, distorted and original, the lowest and the highest level of relationship (Wang, 2010, p.83). There are three main views to support this idea: Taoism, Confucianism and Buddhism.

Confucian emphasises the cultivation of '(仁) benevolence' that people should pay attention to a harmonious relationship between people, such as committing to being humble, care for the young and so on. People innately have moral value and principles by nature. This harmony of man and nature is a natural unity without being self-conscious. "Mencius's position is, on the contrary, that human beings, unlike animals, are innately moral" (Scharfstein et al, 1978, p.172). This refers particularly to the concept that human inherent qualities are derived from nature. The inherent qualities of nature and man are the same. Nature is the original moral value and principle. The Confucianism masterpiece of 'Three-Character Scripture (三字经)' says: "No one is born evil. It is their habits that separate them" (Wang, A.D.1223–1296). This means that everyone is born good and kind but they change as they grow up. Their environment and habits they acquire will mean they develop good or bad characteristics. In addition, Mencius (孟子) and Xunzi (荀子) think: "Everyone can become a sage through effort. The only difference is Mencius (孟子) stresses people's inner moral conscience and Xunzi (荀子) emphasises the constraints of external forces" (Pu, 2012, p.21, Chinese PhD). If people can maintain an effort or constraints of external forces towards goodness and avoid the various effects of the negative factors, they would be able to feel the relationship between man and nature and harmony with nature. Most people can improve their moral virtues in order to

reach the realm of saints. This is the process of 'harmony between man and nature'.

Buddhist philosophy is against the knowledge that the object of knowledge is a limited thing; the highest Buddhahood cannot be grasped through knowledge. The highest Buddhahood is actually the realm of harmony between man and nature... This is like salt dissolved in water. Although the specific salt is invisible it is still present throughout the water, it is fully integrated with the water... (Shan and Gan, 2008, p.10).

From the Buddhist point of view, human nature has always been the Buddha, "not only do humans have a Buddhist nature; things also have a Buddhist nature" (Bai, 2003, p.81). Just because they are infatuated with the secular concept and desire without even realizing it, once they are awakened to these ideas and desires they understand they are not true, human nature will naturally become evident, this is also reached in the final state of Buddha. "As long as there is sudden enlightenment and release, Buddha is man, man is also Buddha" (Ibid, p.80). Buddhism stresses the epiphany, the sudden enlightenment of 'Zen (禅)', the realization of the original truth that the essence of everything—the original good condition, is by exclusion of misleading phenomena ugliness and darkness. "Chinese Buddhism is actually a pursuit of the realm of 'harmony between man and nature'" (Ibid, p.80). Therefore, Buddhism is a pursuit of the realm of grasping the original through thorough understanding.

In the Taoist view, the 'Tian (天)' is nature and people are part of nature. People should follow the role of the world—'Tao (道)' to develop. Nature and man are originally unified. As Dr. Changguo Pu (蒲创国) described: "Natural law' is the core of Taoism, people are just one thing in the world among millions of others.

People do not have privilege beyond the things above. It advocates that people should return to a natural state by removing boundaries” (2012, p.110, Chinese PhD). However, as people develop a variety of laws, institutions and ethics, people lose their original nature, and become incompatible with nature. People should exclude such shackles to liberate humanity in order to harmonise with nature. Hence, “Taoists are in unity with the thinking of the universal laws of the universe (Tian Dao 天道) and the order of human society (Ren Dao 人道)” (Bai, 2003, p.73). This is the spiritual realm of ‘all things are as one with me’ and the natural feeling of expression.

In the materialistic view, the material world is always moving; thinking reflects existence, so thinking should also constantly change with time. Awareness of the law of the universe in Chinese philosophy reflects people’s understanding of the laws of the universe and nature which involves the main factors of world constitution in ancient Chinese philosophy, such as the theory of the five elements. These elements are metal, wood, water, fire and earth. They are invisible when they morph into each other giving birth to their development. Chinese Han Dynasty philosopher Zhongsu Dong (董仲舒) (B.C.179–B.C.104) develops this idea with ‘Yin Yang Wu Xing (阴阳五行)’ and other descendants inherited and developed it. This philosophy has been the core and essence of the Chinese nation for five thousand years. Dong suggests, “The harmonies of the human spirit and the spirit of nature have become the ultimate goal of Chinese art” (De, 1960, p.252).

This reflects one kind of understanding of the natural world, for a higher level of understanding between the five elements, there are more abstract concepts of the Yin and yang; Yin and Yang are more abstract and beyond the five elements of things. The understanding of nature can be embodied in the whole process of

understanding these abstract phenomena, but how are they embodied in man? Jinglin He (何婧琳) analyses the book 'Guan Zi (管子)' that mentions the performance of yin/yang and the five elements in the relationship between man and nature: "The confluence of ideas between Yin and Yang and the five elements reflects the ideology of 'Man adjusts himself to fit into nature and then is born through nature'. It also highlights the confluence of the initial ideology of 'telepathy between man and nature (天人感应)' with 'Yin Yang Wu Xing (阴阳五行)'" (2009, p.23). Chinese people tend to use the understanding of this kind of phenomenon to reflect a pursuit of our own, especially a pursuit of the humanities and social aspects. For example, in Chinese society, there is an idea of a mutual harmony, it talks about the five elements mutual generation and restriction, emphasising the harmonious interaction of Yin and Yang and mutual adaptation, and Yin and Yang are also reflected in the course of the pursuit of harmony and performance.

The understanding of nature can simply be said that man holds the highest presence. It enables us to produce a kind of awe of nature. Nature is the highest independent existence of man. That is man should respect and fear nature because that is the highest presence.

'Harmony between man and nature' is an idea of aesthetics and adjusts the basic aspects of society. It is derived for the areas of social development and sets the standard of social life. For example, in ancient Chinese society, the social order is regulated by: "the three cardinal guides and the five constant virtues (三纲五常)", this philosophy is a reflection of adjusting social relations. They are nature being relative to man and also an independent supreme being. "Wu Chang (五常). These are the Confucian virtues of benevolence, righteousness, propriety in demeanour, wisdom and good faith (jen 仁, I 义, li

礼, chih 智 and hsin 信)” (Fung, 1952, p.27). That is, we should adhere to these basic points in daily life. There is a kind of element of basic human living within nature (Fig.23).

The 'harmony between man and nature' is the guidance of the existence of lifestyle. It is emphasized in Chinese society. Specifically the lifestyles of people, man and man; man and events should be in harmony. The idea of going back to nature and respect for nature, where is especially reflected in the philosophy of “Lao Zhuang” (Laozi 老子 and Zhuangzi 庄子). 'Tian (天)' here is nature. “Buddhism provided a natural inspiration to—or confirmation for—artists in the process of discovering how exciting art could become when freed from the restraints of materialism” (Baas and Jacob, 2004, p.29). The process of interaction and integration between man and nature establishes a complete 'harmony between man and nature'. A return to nature and respect for nature means everything in life should be in accordance with nature, follow the laws of nature and respect it, so as to achieve harmony and unity between man and nature. This is the highest existence to guide people, to act as a social guide and virtues then our personal inner experience constitutes such a process in the Chinese philosophy of harmony between man and nature. This process, in fact the core of harmony between man and nature, is like a concentric circle. It is shown in 'The explanation diagram of introspection and self-restraint' (Fig.26).

The manifestations of 'harmony between man and nature' are constantly externalized; the core of it, is man. To reach 'harmony between man and nature' as shown in the Fig.26, it has to be achieved through an iterative process from internalization to externalization. This process is seen by man internalizing his surroundings—an introspection and self-restraint process.

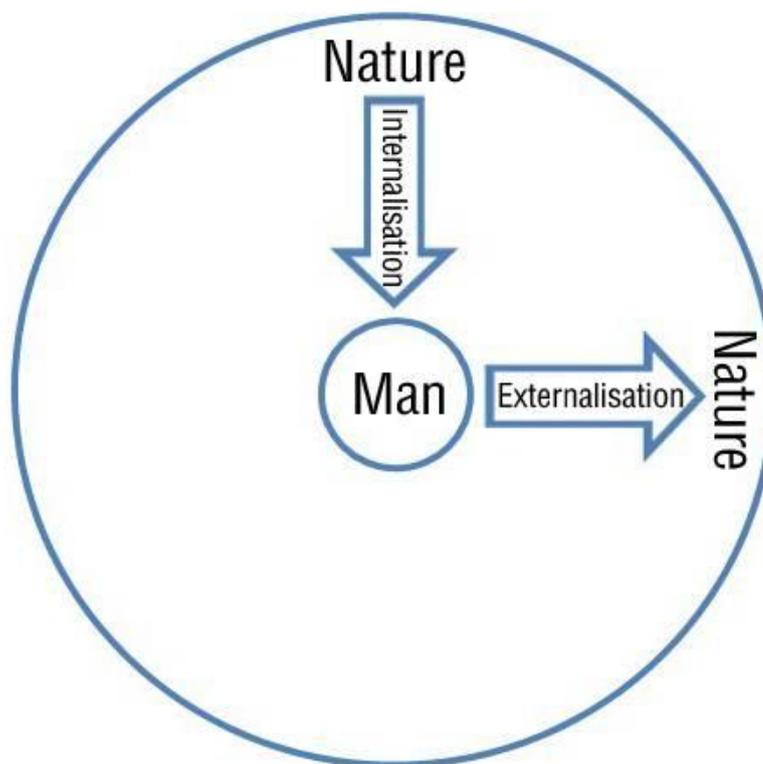


Fig. 26: Diagram illustrating the notion of introspection and self restraint (Zhang, 2011, from interview material).

In short, the Chinese philosophy Professor Junsong Zhang (张劲松) says harmony between man and nature includes: “Firstly, nature is a great world, man is a small world. Man is part of nature. Nature is the highest living force and creativity. Nature and man form the original unity. Secondly, nature is the primitive aspect of moral values and principles. People have moral values through nature. Third, Human nature has always been the Buddha, finally, all things are always moving” (2011, from interview material). The characteristic of this philosophical principle is to pay attention to the harmony and unity of all objects and grasp an overall and balanced understanding.

This philosophy seems to be in contrast with some of the Western cultures which are separate from man and nature. It appears that throughout history, Western

people have a completely different concept and life comprehension when it comes to nature. "So God created man in his own image, in the image of God created he him; male and female created he them" (King James Bible, 1998, p.5). In the Bible it is said that God uses clay to make man, the whole universe of nature exists for humans. Although they also believe that people are a part of nature, it is the most essential part of nature. Humans overcome nature. The Chinese academics Mingzheng Qiu and Liyuan Zhu defined this Chinese philosophical notion of 'Harmony between man and nature':

Confucianism and Taoism emphasized the aesthetic relationships between man and nature from different angles. Beauty and aesthetic activities are the unification between man and nature, man and the natural world in harmony are reflected in the aesthetic... they regarded 'harmony between man and nature' as the root of beauty and art, emphasizing that the aesthetic sense of the people should be consistent with nature, achieving unification of aesthetic matter and oneself, spirit and objects in the aesthetic process... This philosophy is the reason why ancient Chinese aesthetics portray a different national identity with Western aesthetics (2004, p.114).

The concept of harmony between man and nature can be used as an important origin of Chinese modern art concept which is evolving as the Chinese academic Donli Xie (谢冬莉) describes, "Chinese artistic spirit is historical, abstract, multi-layered. If you use one sentence to summarize the spirit of Chinese art it is 'harmony between man and nature'" (2010, p.92). On the one hand, the creation of art is closely linked to organic products between artists and the creation of objects which cannot be divorced from the description of people and surrounding things. It essentially cannot eliminate man and man, man and nature, man and

the constraints of social relations in large areas. The theory of harmony between man and nature can enhance the artist's purposeful creative process.

On the other hand, specifically explaining the relationship between "man and nature" is also a real relationship between man and his surroundings. "The artistic spirit characteristic of 'harmony between man and nature' is using people's heart as a reference; asking for themselves and through their own heart inner freedom to play with the world in order to achieve social harmony and harmony with the world" (Xie, 2010, p.92). Nature is infinite which can be regarded as including ethnic and social groups, the natural environment; man is the reality of limited space and the environment which seems to involve the individual, family or small groups. "The artistic spirit of 'harmony between man and nature' emphasizes the relationship between the dynamic roles of people's hearts with artistic activity" (Ibid). The idea of harmony between man and nature was regarded as classic since ancient times. This is because it is the ideal of the Chinese people and also is a rule to guide people's behaviour.

'Tian (天)' can be understood as respect for the laws of nature. For example, following design principles, materials characteristics and functions, etc in design. 'Man' aims to improved personal cultivation; he emphasizes self-improvement and competition with himself. Designers not only continue to enhance their skills but also improve their morality. 'Harmony' stresses a combination of the internal and external which combine internal cognition (self-awareness) and external cognition (surroundings). 'One' is constantly emphasized in that self-reflection should be improved in order to reach harmony between the inside and the outside world.

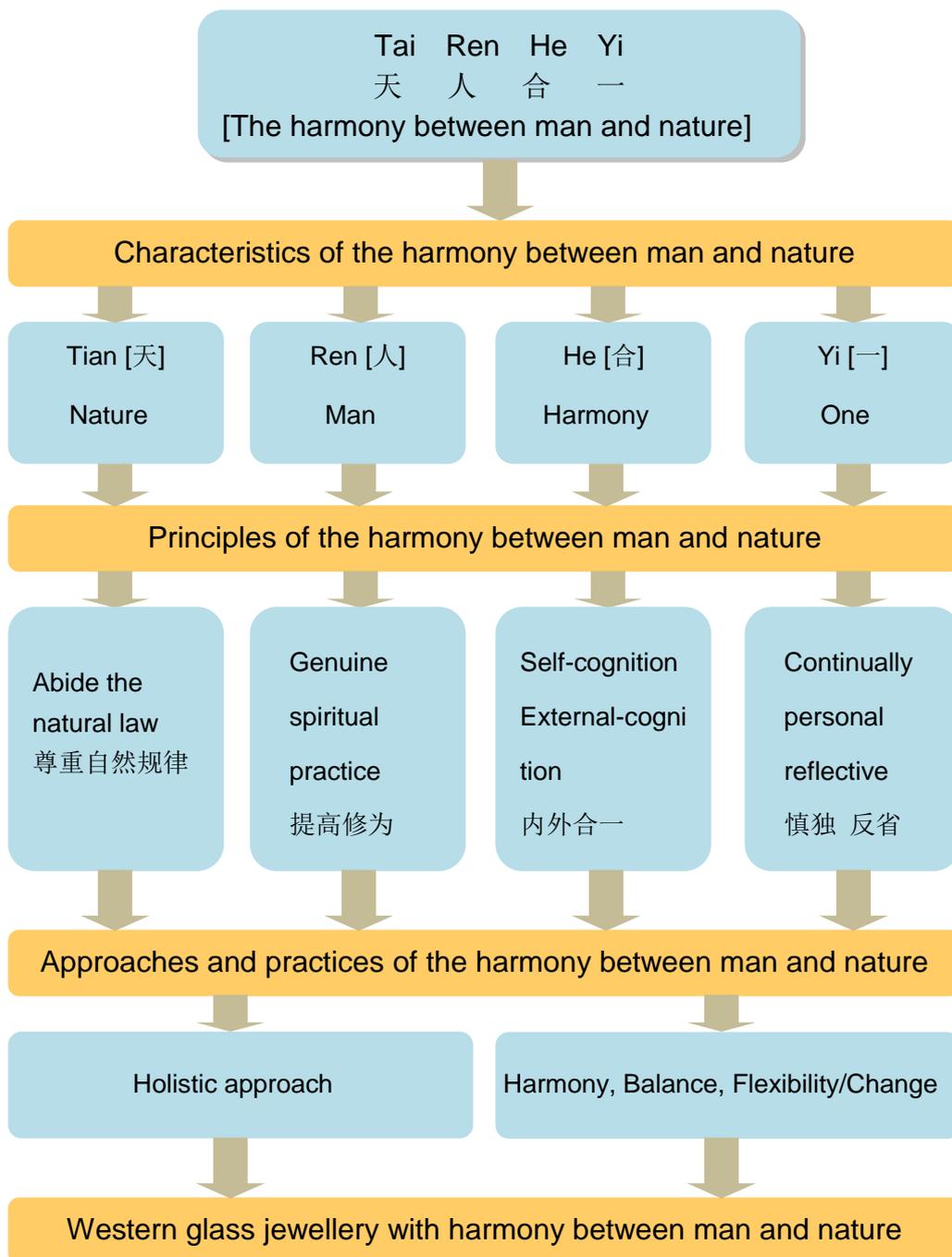


Fig. 27: Diagram showing the processes and development of the 'harmony between man and nature' for Western glass jewellery design (Framework borrowed from Ling' PhD, 2008, p.48).

This approach emphasizes a holistic approach to constantly grasp the problem from an overall perspective in balance. Another is to flexible grasp the relationship between the elements and the law of change in order to achieve the purpose of harmony (Fig.27).

2.6.2 The influence of 'harmony between man and nature' on Eastern and Western art

This 'harmonious relation between man and nature' is to achieve basic design skills and a deep understanding of aesthetic, material features and relative technique skills. On this basis, the perfect coordination of a variety of factors can apply to works including the 'harmony between man and nature'. The modern interpretation of Chinese 'harmony between man and nature' now also follows the other relative aesthetic principles.



For example, the Japanese American sculptor and designer Isamu Noguchi's sculptures share similar philosophy and approaches to this research. He follows the principle of ink to drawing, using a tracing method to create a similar shape, and then strictly transfers the two-dimensional form of the painting into three-dimensional sculpture. It is possible that inspiration for this came from studying technique with famous Chinese painter Qi Baishi (齐白石) in the 1930s. He cuts the marble as biomorphic shape sculpture conveying the spirit of biomorphic, not just the shape of biomorphic. 'Harmony between man and nature' must be based on the relative knowledge of designs that can be achieved. The American Asian art historian Dr. Alexandra Munroe explains,

Fig. 28: Isamu Noguchi, 1948, 'Drawing for Avatar', Ink on paper: 19 x 8.9 cm. The Isamu Noguchi Foundation and Garden Museum, New York (Munroe, 2009, p.150).



Fig. 29: Isamu Noguchi.
Avatar, 1947 Georgia
pink marble, 198.2 x
83.8 x 61cm.
Kroller-Muller Museum,
Otterlo, The Netherlands.
(Munroe, 2009, p.150)

But his subsequent ink-and-brush studies of these sculptures articulate a fascinating structural similarity between his method of slotting the flat stone shapes together and the interlocking of brushstrokes in calligraphy (Fig.28). These calligraphic reinterpretations of the stone sculptures also incorporated certain South Asian elements, however. For example, Noguchi's title for one of his slotted-stone sculptures, *Avatar* (Fig.29), indicates an association between the phallic hooks of this work and the Hindu myth of the avatar or incarnation of the deity Vishnu in the form of a gigantic boar (Munroe, 2009 p.150).

From any other perspective, the 'harmony between man and nature' principle is not static in the field of art. Relatively, different audiences have different perceptions.

One of the principles of 'Yin and Yang' in 'harmony between man and nature' is the 'positive and negative relativity'. For example, different artists and designers have their own style, but this style is not always agreed or accepted by everyone. The style is only relative to people who like this style. This kind of audience will have resonance. This resonance is 'positive relativity'. Another relativity of the designer is to design for different customers based on customer's requirements, and this is the 'negative relativity'. When designer's design the product to match the customer's wishes, it can be said 'harmony between man and nature' is between designers and customers.

Other than Eastern artists and designers, Western artists and designers also use 'harmony between man and nature' in their artworks but are perhaps not fully aware of it. For example, the American artist David Smith has learnt techniques of ink strokes and applied them to the three-dimensional welded steel sculptures. He realized the potential of calligraphic form to dissolve the

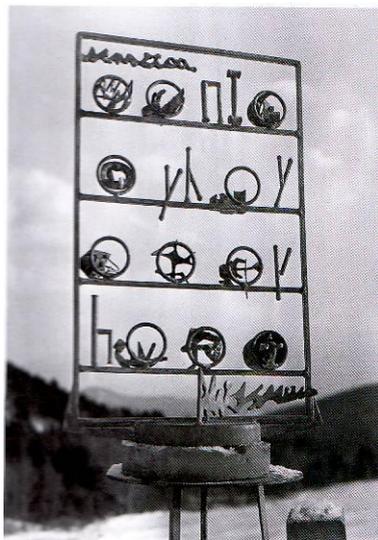


Fig. 30: David Smith, 1950, 'The Letter', welded steel, 95.6 x 58.1 x 23.5 cm, Munson-Williams-Proctor Arts Institute, Utica, New York (Munroe, 2009, p.148).

mass and volume of sculpture by means of welded steel "writing" in such works as 'The Letter' (Fig.30) in which he distributed strokes of steel across a vertical page like frame of open space...He envisioned a poetic relationship between brush—driven ink and welded steel.

As my material already possesses strength akin to the Japanese power-stroke intent, I take delight in using steel as a fluid (Munroe, 2009, p.149–150).

From 1950 'The Letter' to the 1951 'Hudson River Landscape' and then in 1957 'O Drawing', this development is the true reflection of 'harmony between man and nature'. In 1950 'The Letter' is a preliminary attempt to imagine the writing of calligraphy in three-dimensional welded steel pipe sculpture, welded steel pipe instead of using calligraphic brush strokes. 1951 "Hudson River Landscape" is more use of the curve, but still clumsy, not smooth. When developing the 1957 "O Drawing", his work saw a huge improvement in quality. The work flowing lines pause and transition in rhythm, as if at once. After seven years of development, he himself acquired more understanding of ink work; the first use of liquid steel is much closer to the writing of steel with the softness of the brush. The more he understood ink work the more closer he was to making steel with softness of the brush by using liquid steel.

2.6.3 The influence of 'harmony between man and nature' on Chinese art

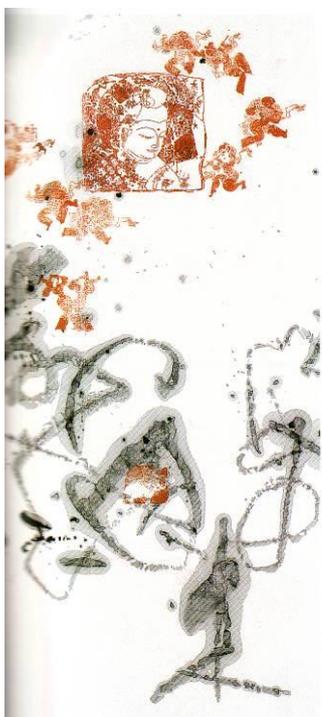


Fig. 31: Gu Gan, 1991, 'World of Superme Bliss' (Barrass, 2002, p.183).

This philosophy has been used in all aspects of Chinese society, astronomy, medicine, architecture and other aspects of history for thousands of years.

The harmony of the human spirit and the spirit of nature has become the ultimate goal of Chinese art (De, 1960, p.252).

2.6.3.1 Calligraphy

In the arts, this philosophy was mainly used in Chinese calligraphy, painting and architecture throughout Chinese history. An example is the modern calligrapher Gu Gan (古干) who uses this philosophy in his calligraphy (Fig.31). This notion is further explained by the author Gordon Barrass:

As Gu Guan further explored his own outlook on life in the late 1980s, he was increasingly drawn to the traditional Chinese view that 'nature and humans are but one', sensing that all of nature is constantly trying to resolve itself into a harmonious whole, where opposites are held in balance and extremes reduced (2002, p.185).

This shows the philosophy of 'harmony between man and nature' emphasized in art that is to find a balance between opposites and reduce an extreme from one of them and harmoniously integrate them into overall beauty.

2.6.3.2 Chinese painting

Western sketching and painting tend to show a sense of volume, light and shadow. They pay more attention to making things look three-dimensional. Chinese drawings tend to show the spiritual connotation through the lines drawn. As Dr. Man Yee Sandy Ng's PhD research (2005) describes the differences in Chinese and Western paintings, Chinese paintings usually are made in a two-dimensional perspective.

Western painting tends to show issues of society, history and life. Chinese painting tends to depict the individual, the fragment and the sensation. Their differences have a lot to do with individuality, mentality, custom, region, weather and different environments of their ethnicity (Ng, 2005, p.81, British PhD).

Chinese philosophy of the 'harmony between man and nature' is the most basic concept and principle of Chinese painting (Yang, 2011, Appendix.1). This can be seen as one of the most different factors with contemporary Western art. It was used in painting mostly as harmonious state based on spiritual, not an intense on physical concepts.

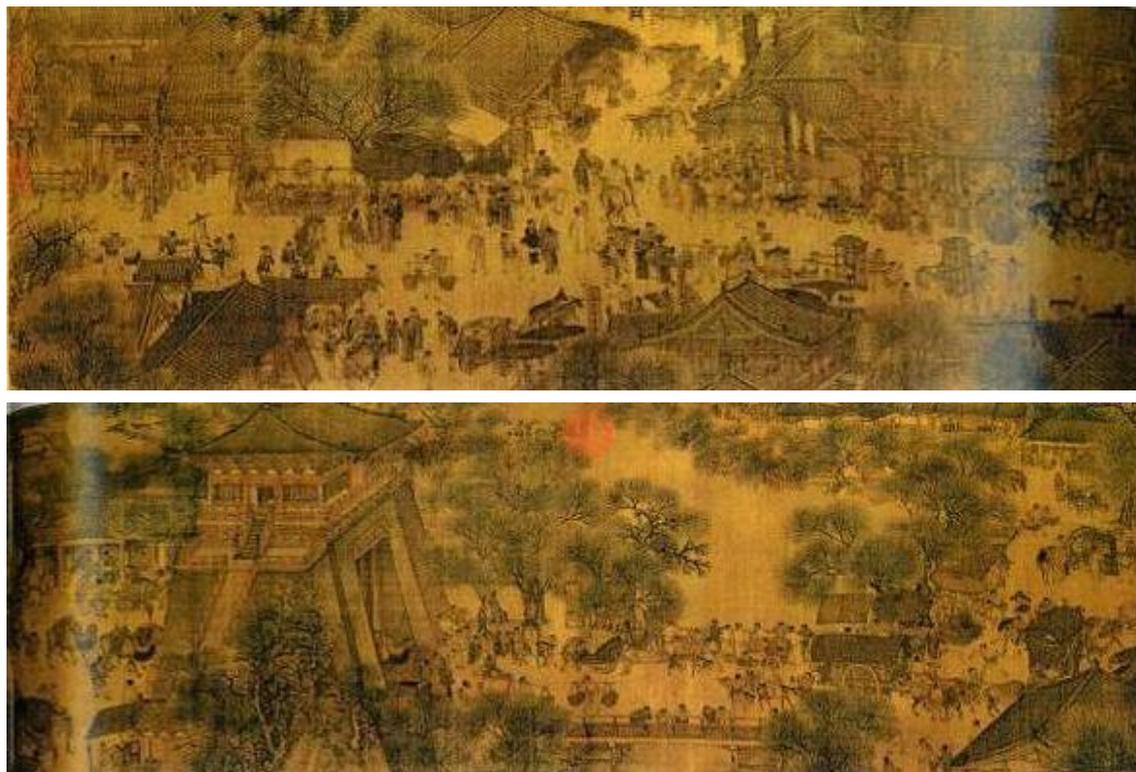


Fig. 32: Zhang Zeduan's (张择端) 'Peace Reigns over the River (清明上河图)' (Barnhart, 2002, p.106—107).

The complexity of the 'Peace Reigns over the River (清明上河图)' (Fig.32) has extensive scenes and rich characterization to reflect the Confucian ideology of 'harmony between man and nature'. This ancient genre painting is the painter Zhang Zeduan's (张择端) monumental work in the Northern Song Dynasty (北宋) (A.D.960–A.D.1127). The painting is like a documentary to show the historic features about the Capital of Bianliang (汴梁) for the audience in the Northern Song Dynasty. "The scroll remains a vivid image of daily life in eleventh-century China and a panorama across which one's eyes pan like a moving camera" (Barnhart, 2002, p.104). It reflected people's living standard and is throughout a "harmonious and stable" scene. There are over 550 people, 20 ships and 20 carriages and everywhere depicts a scene of prosperity. The picture also portrays various activities of different social classes of people which followed the feudal society of the "three cardinal guides and five permanent members (三纲五

常)". "It is above all an image of commerce and the virtual epitome of realism in Chinese painting" (Ibid, p.104). In terms of aesthetic ideology in the painting, it integrates the social character, bridges, rivers, trees, ships and other natural landscapes; it embodies the harmony of the ideology of Confucian 'harmony between man and nature'.



Fig. 33: Huang Gongwang's (黄公望) 'Fuchun Mountains (富春山居图)' (Chinese Calligraphy Home, 2011).

The Yuan Dynasty painter Huang Gongwang (黄公望) draws 'Fuchun Mountains (富春山居图)' (Fig.33) also showing this philosophy from the Buddhist perspective. It stresses that people preclude desire and distractions and thoroughly master real essence in full comprehension (Section 2.6.1). "The purpose is to create harmony between man and nature, to purify people and avoid the expansion of secular desire and move toward an 'unbiased' return to the spiritual home. This is exemplified in the work of the painter Huang Gongwang" (Li, 2008, p.175). This painting started in A.D.1347, the painting

mentioned in the text that he painstakingly observes and tries to ascertain how to paint it in a time-consuming three to four years that it took to complete. The content of approximately 80% of the painting is of Tonglu Fuchun River (桐庐富春江) views, 20% of Fuyang (富阳) views. It is a very large painting; the width is 32cm, the length 688.3cm on six sheets joined together in the form of a scroll depicting the beautiful scenery on both sides of the Fuchun River (富春江) at the beginning of autumn (Chinese Calligraphy Home, 2011). The painter used his own deep understanding and painting skills to create this cross-strait landscape in incredible harmony through his observation of scenery from different periods, places and angles. It reflects the painter's pursuit of the wonderful spiritual home through his spiritual insight.

Chinese landscape painting theory has gradually developed since the Tang Dynasty (唐朝) (A.D.618–A.D.907). Landscape painting has been regarded as the crowning art among several Chinese forms of painting in China because it can best embody the 'Dao (道)' theory which can be said to be the harmony between man and nature. "Chinese traditional painting focuses on the universe based on the creation of the 'Dao' spirit as image" (Chen, 2011, p.29). It never imitates objects in reality as the final goal but always tends to contain the artistic spirit as a standard. The Taoist glorification of nature opened a new vista to artists and imbued them with a new sense of freedom. The harmony of the human spirit and the spirit of nature became the ultimate goal of Chinese art. "Dao (道)' is the highest realm of beauty, only when you truly understand the spirit guide of Chinese arts—'Dao (道)', you can understand the nature of artistic beauty of Chinese traditional painting" (Ibid).



Fig. 34: Guang Yang's (阳光) 'Spring Landscape (春雨春光)' (2010), 136cm x 68cm (Liu, 2010, p.7).

The Taoist's ideology of 'harmony between man and nature' is embodied in the contemporary famous Chinese ink painter Guang Yang's (阳光) 'Spring Landscape (春雨春光)' (Fig.34). It describes a landscape, layers of mountains plunging straight down to the waterfall, shrouded in clouds, peaceful farmhouse, gurgling water and boats coming to shore. These seemingly cluttered scenes

through a combination of organic harmony create a spring peaceful artistic conception. "The beauty of 'Tao (道)' is not sensory stimulation, which is unostentatious, 'simple as beauty' in Taoism" (Liu, 2010, p.6). The painting also reflects the Taoist advocated time-space unification and unity of subjective and objective aspects in the ideology of 'harmony between man and nature'. 'Spring Landscape' integrate the artist's feeling of love of his hometown Guilin's landscape by these seemingly plain natural elements together, so that the viewer of a painting can be found in a kind of 'feeling and setting happily blended, forgetting both yourself and the external world', the highest spiritual realm of 'harmony between man and nature'. All of those reflect Taoist ideology of the harmonious combination of man and nature in 'things and I are one'.

2.6.3.3 Chinese garden design

The Chinese garden is permeated with the philosophy of 'harmony between man and nature' from its bud to establishment until improving, emphasizing its coherence. Ancient Chinese garden design is its physical form. It respects the development of natural laws and adapts to it, rather than against it. "The Chinese garden designer knows how to respect nature and learns from nature from the beginning" (Chen, 2007, p.1).

The Chinese classical garden is a natural landscape style of garden created by writers, painters and gardeners. The basic characteristic of Chinese garden art is to pursue natural interests. The form of different types of buildings is created for admiring the view and cultural tastes. The plants match the freedom of the landscape layout. The road loop twists and turns to reach the perfect harmonious realm of integration of the natural environment, aesthetic appeal

and ideal beauty. It has rich natural landscape garden art space. It is not just for living but can also be a beautiful landscape in which you can explore. Suzhou gardens (苏州园林) are a typical example of the existing Chinese classical garden design with the philosophy of harmony between man and nature. It applies to the natural laws in garden design. Although it is man-made, it has the same purpose as nature.



Fig. 35: Linger garden (留园) (A.D.1644–A.D.1911) in Suzhou gardens (苏州园林) (Ting Jiang, 2003).

A typical classical Chinese garden of 'Linger' garden (留园) (Fig.35) was built in A.D.1644 which is part of Suzhou gardens (苏州园林). Italian Mannerist is a typical classical Western garden built in 17 century (Fig.36). It's easy to see the difference between these two gardens when comparing them. Along with the transformation of nature, one of the biggest differences between Chinese and Western classical garden design is whether to highlight the natural landscape or architecture. Westerners tend to focus on the performance of a human-controlled, orderly, rational nature, pattern-combed artificial garden.

According to Dr. Xiangqiang Chen (陈相强) who graduated in Landscape Ecology from Zhejiang University from China, Chinese traditional architectures and gardens focus on the display of pure natural beauty, completely flexible natural architecture and gardening practices (2007, p.14, Chinese PhD). They can be set up independently according to requirements. It can also combine corridors and walls to become courtyard groups. Building spaces can have twists and turns of change and be richly colourful.



Fig. 36: Villa Lante, Bagnaia: Fountain of the Moors (Mosser and Teyssot, 1991, p.95).

Confucian advocates the ideology of harmony between man and nature in coordination and harmonisation with architecture, nature and the social environment in dealing with the relationship between architecture, people and the environment. The general methods of Chinese traditional architecture are in turning big elements into small ones. It is very suitable for the Chinese garden layout and the needs of the concept of landscape design of 'landscape as the main, building as secondary'. This idea also has heritage in contemporary Chinese garden design.

2.6.3.4 Chinese Craft

In the National Taiwan Craft Research Institute the creative the Yii collection (Fig.37) used an integrated approach between ceramic and glass, patterns between simplicity and detail to achieve seamless results. Top to bottom, from inside to outside the change is natural. The three craft works can be viewed independently as well as one combined piece. As mediated by British artist Anna Faherty:

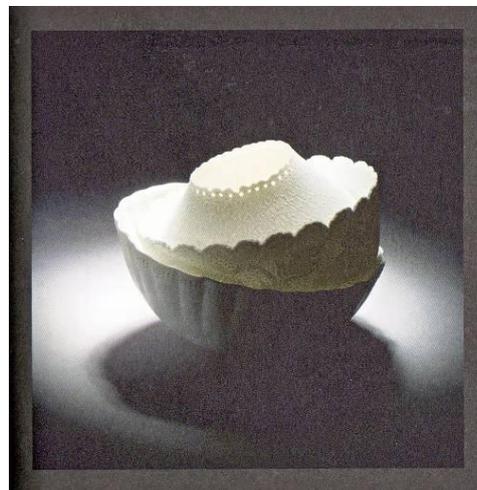


Fig. 37: National Taiwan Craft Research Institute 'Yii' collection in Design Museum, UK (Faherty, 2011, p.188).

The first Yii collection draws on the intuitive wisdom of ancient culture, where a focus is placed on skilful craftsmanship and manufacturing processes deeply rooted in a harmonious relation between man and nature. The pieces include 'embroidered lace' porcelain bowls, a silkworm-cocooned stool and Starbucks coffee cups made from basketwork, ceramics and blown glass (2011, p.188).

It looks like the growth of the trees, by the thick branches to the nascent bud, with no abrupt place. This fusion is a manifestation of 'harmony between man and nature'. The combination of glass and ceramic is also similar to the combination of different materials deployed throughout the thesis.

2.6.4 The influence of the philosophy of 'harmony between man and nature' on the aesthetic jewellery design

In order to understand contemporary jewellery design, there are two aspects to explain with regard to the influence of the philosophy of 'harmony between man and nature' in contemporary jewellery design. First, the kind of jewellery design incorporating the philosophy of 'harmony between man and nature' will be introduced. Second, a comparison will be made between jewellery designs which have the influence of the philosophy of 'harmony between man and nature' with those that do not incorporate this.

What kind of jewellery design is in line with the philosophy of harmony between man and nature? How can harmony between man and jewellery be achieved? The relationship between man and jewellery can also be resolved in the concentric circles of the relationship between man and nature. They are designed through the feelings of surrounding things to design the jewellery. This is the process of man's internal nature and then man has different feelings during the period of wearing jewellery, such as poorly designed parts that need to be modified, jewellery also has sentimental value and psychological protective effects. They are endowed with meaning by man. This is the process of man externalising nature.

Jewellery is designed around the human body from an appearance and functionality perspective. In my opinion jewellery is best when it meets both the physical and psychological needs of the wearer. Physically wearing jewellery should conform to the shape and range of motion of the body's natural requirements in order to be comfortable to wear. Secondly jewellery is most



Fig. 38: Nora Fok, 2008–2009, 'Circles' neckpiece, knitted and knotted dyed nylon (Hardy, 2012, p.68).

used for decoration and memory. It is almost a necessity to meet aesthetic requirements to meet the psychological needs of people. Chinese glass accessory design combines artistry and practical function (Wu, 2014, p.27). Some Western designers also used this approach in their art work. The following examples can demonstrate this and most chosen are Western since it can be evaluated more efficiently how to apply this philosophy into contemporary western jewellery design.

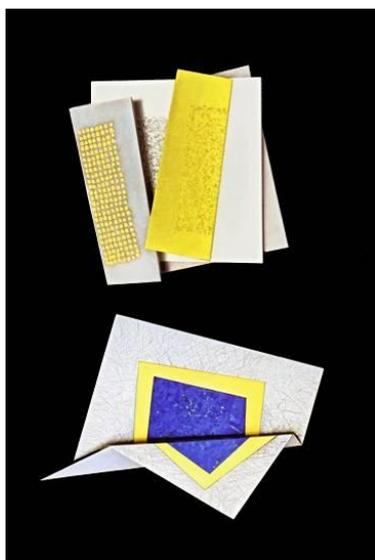


Fig. 39: Helfried Kodre, top brooch, 2010, stainless steel, silver and gold, below brooch, 2009, lapis lazuli, silver and gold (Hardy, 2012, p.96).

Nora Fok is from Hong Kong and works in the UK. Her 'circles' neckpiece (Fig.38) is a successful example of bulky jewellery in the choice of materials. She uses lightweight dyed nylon woven into different sizes to form a colourful mesh circle; there is a different layout arrangement to form a dreamy effect. The use of a black background is in stark contrast with colourful jewellery and plays a contrasting role. It makes the large piece of necklace light as it is made from knitted nylon. If metal components in this design were used, it would be very heavy, wearing it would be very inconvenient.

The Austrian designer, Helfried Kodre (Fig.39) applied a paper folding effect to his brooch design. This is an example of feeling their surrounding elements from

the inside to the outside. Gold, silver and lapis lazuli nicely show up the book paper texture and folder feeling from their co-ordination of texture and colours.

The Australian designer, Elodie Darwish's 'Pocket Clip Series' (Fig.40) is designed in an innovative way which is easy to wear. It combines the functionality of a clip and decoration. There are several simple coloured designs for the audience offering several choices. This design work arguably is a successful process whereby the designer internalises nature as inspiration.

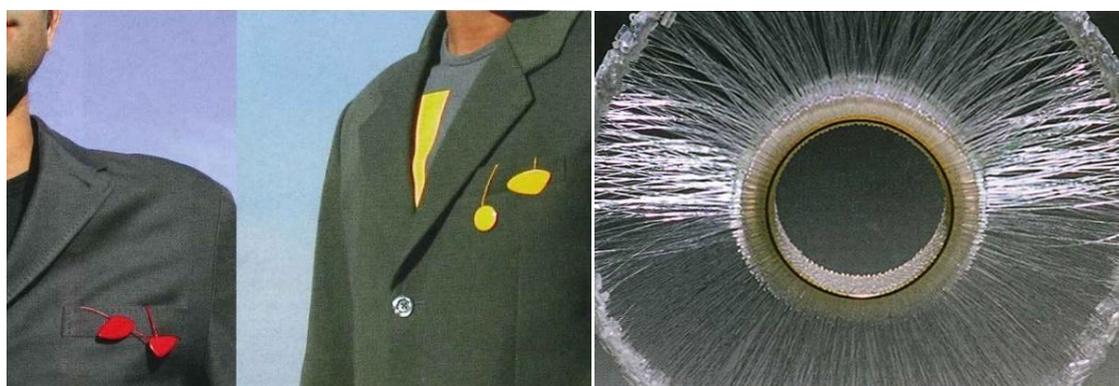


Fig. 40: Elodie Darwish, 'Pocket Clip Series', powder-coated stainless steel (Shaw, 2006, p.102).

Fig. 41: Christel Van Der Laan, 2004, 'Priceless Bangle', gold-plated stg silver, polypropylene swing tag ends (Ibid).

Christel Van Der Laan is also an Australian designer. Her polypropylene swing tag ends with the 'Priceless Bangle' (Fig.41) of the material used, that makes the generally solid stiff bangle light and smart, it moves with the wind.

Compared with the list of jewellery design, there are some opposite examples. They might not necessarily have Eastern influences that contain the comfortable wearable function in jewellery. American designer Stanley Lechtzin's work 'PusHere Bracelet' (Fig.42) uses materials of Selective-Laser-Sintered, (SLS)

glass-filled nylon, rubber O-rings. As pictured, the bracelet is very big and chunky and it is not ergonomic. When people move, it could easily cause damage to the body. This does not meet the purpose of comfortable to wear jewellery in accordance with the philosophy of harmony between man and nature. Due to the glass pieces being very large and easily damaged, it cannot be worn for long.



Fig. 42: Stanley Lechtzin PusHere, 2006, bracelet, Selective-Laser-Sintered (SLS) glass-filled nylon, rubber O-rings (Ilse-Neuman et al, 2007, p.133).

Fig. 43: Stefano Marchetti, 2006, necklace, plate glass, yellow gold, silver (Ibid, p.141).

Fig. 44: Francesco Pavan, 2000, brooch, plate glass, white gold (Ibid, p.159).

Italian designer, Stefano Marchetti's necklace (Fig.43) uses bare rectangular glass angular designs. The cross-dimensional multi-piece glass design and single-line connection is extremely unstable. Fellow Western designer, Francesco Pave's brooch design (Fig.44) has two materials; plate glass and white gold also appear separately. Two objects seem like two parallel lines, they disjoint but also connect. Both of them have rectangular glass pieces that are angular and mechanical, can be easily damaged and the angular glass design

can cause harm to the human body. These three-dimensional designs are extremely unstable and very unsuitable for wearing. Arguably, some of these kinds of designs are typical manifestations of Western culture separating man from nature.

Some other pieces of jewellery design might not have wear-ability in mind where they were conceived. It could be argued that the designers are more concerned with the concept behind the pieces or the materials used rather than wear-ability. Such as the picture 45 shows the designer more concerned with the materials and German jewellery artist Katherine Vones's 'Earconch' ear ornament (Fig.46) more concerned the ideas of ornament.



Fig. 45: Unknown, glass ring (Wu, 2014, p.29).

Fig. 46: Katherine Vones, 2006, 'Earconch' Ear Ornament (<http://www.kvones.com/gallery.html>).

The Czech Republic glass artist Svatopluk Kasaly's work (Figs.47) is another example for artist more concerned with the different ways of wearing jewellery by using glass and metal as materials. The artist sets discs and lenses of clear cut glass and slightly tinted glass with a partially etched or matt surface, into fittings of rhodium-based metal with a silvery and gold surface. He later expands the

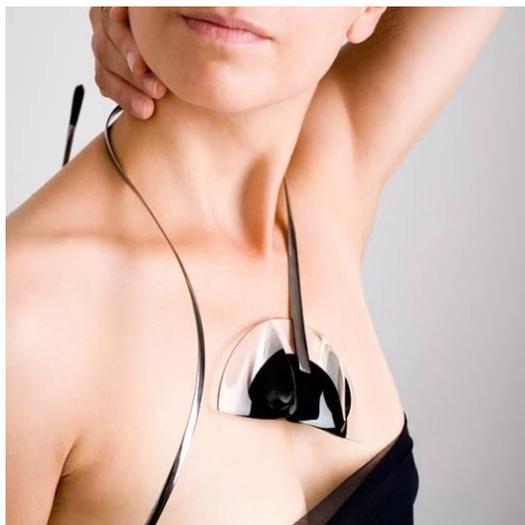


Fig. 47: Svatopluk Kasaly's necklace
(<http://svuv.cz/autor/Kasaly.html>).

traditional necklace and bracelet typology by anatomically shaped jewellery resembling large sculptures which are wound around the neck and continue down the back to the waist (Evans et al., 2005, p. 23).

Whether wearing jewellery or an ornament, Chinese style seems biased in favour of being two dimensional and has a curving decorative style. There is rarely a three-dimensional sense of strong sharp lines in jewellery. This matches Chinese people's aesthetics of moderation, which is in contrast to some Western jewellery designs.

2.7 Practical based approaches to 'harmony between man and nature'

2.7.1 The principle of philosophy of 'harmony between man and nature' to create Chinese paintings

Thus indicating that the 'Book of Changes' according to the way of 'moderate thinking' is philosophical principles of the subjectivity presumption. Therefore, the ideological principle of "neutrality" can also be known, the way of moderate thinking works (Ju, 2001, p.161).

The above notion by Chinese philosopher Xi Ju (荀彧) can be demonstrated though my work. The philosophy of 'harmony between man and nature' was

used in my paintings and they were mostly executed in a state of harmony. This can be described as a 'moderate' activity and not 'intense' or 'forced'.

Moderate thinking is an advocate of Confucian, meaning 'enforcement of being neutral'. In this instance, 'neutral' does not mean being in the middle, nor it is to find the middle of two extremes, but it is to find the most suitable one. The intended meaning is actually to deal with the problem and not to go to extremes, but to find the most suitable method of handling a particular problem (Kong, B.C.483–402).

To achieve 'harmony between man and nature' is not going to extremes but to find the most appropriate way to deal with the problem. The principle of 'harmony between man and nature' in painting is embodied in the form of basic painting techniques of composition and some paintings were used to express the Chinese people's state of mind. It emphasizes the unity of opposites, such as the principle of 'Yin and Yang'. These approaches are different from Western contemporary art approaches; which appear to take a more intense and conflicting approach, rather than a harmonious one.

Chinese painting, from the incomplete expressions of curvaceous beauty, gradually developed into the third period of simplistic and timely expression. We could clearly conclude that there are two principles: on the one hand it is related to the environment and mentality, while painting materials and techniques are also relevant (Ng, 2005, p.81, British PhD).

In Ng's PhD research (2005) he describes the differences in Chinese and Western paintings as a key difference between Chinese and Western paintings having a lot to do with traditional customs, religion and environmental factors

among other things. It should also be noted that Western paintings seemingly often reflect issues of society, history and life, while Chinese paintings seem to reflect the individual artist. Chinese painting is usually not based on physical concepts, but it is spiritually based. It emphasizes towards holistic approach and harmony and it is this approach that is applied to my jewellery designs.

2.7.2 The principle of philosophy of 'harmony between man and nature' to design glass in my jewellery

Abiding by the principle of aesthetics and practises in glass jewellery design are one of the ways to achieve harmony between man and nature. It is by nature dependent on different materials and characteristics to give different designs. A better understanding of material characteristic is the foundation to find the most suitable design solution. For example, glass is organic, free, colourful, malleable, transparent, and flexible and has strong refraction of light characteristics. Due to the lower melting point of glass, the design production is easier. To fire a number of works of art, glass is not difficult and they can be designed in accordance with the needs to create a variety of textured effects, especially in light refraction, reflection or transmission. Transparent glass is the best to show the refraction and the changing of glass inside. In her book 'Wearing Glass', Yvonne Kulagowski (2005) describes glass characteristics as:

Glass by its very nature invites wonder; it can be transparent, translucent or opaque; lustred, sandblasted or metal leafed; colour can be solid or applied as an outer or inner layer depending on the ultimate, desired effect. Whether cut, cast or blown its very fragility fascinates and entices me as designer, inviting a very different response to that of a semi precious stone, acrylic or metal (p.16).

In addition, it has to be mentioned silver is another important material used in this research. Silver is a well-known precious metal. Silver has a metallic lustre, opaque and a solid-state. "Today, for the most part, silver is a by-product in the refinement of gold, lead, copper, or zinc ores, with which it is most frequently associated in nature" (Untracht, 1975, p.11).

In comparison to other precious stones, glass has some advantages which the other precious stones and metals do not have. Glass is relatively easier to shape, can be colourful, changeable and has strong refraction. In this research, coloured resin was not used because it does not have the same qualities of glass—it is denser, unnatural and looks relatively cheap.

Due to the rise of contemporary glass art recently, non-precious materials began to occupy important position in jewellery design; glass has its own plasticity and its uniqueness. However, glass has the disadvantages of being fragile, with lower melting point and is relatively heavy. These shortcomings become crucial and it is one of the reasons that it does not have a presence in the jewellery showroom. This research has explored various ideas in which some of these problems are analysed and these are discussed further in Section 3.3.

The principle of harmony between man and nature can be recognised from ancient times and it suggests that personal and holistic development based on abiding the natural law of nature, as Chinese Professor. Mu Qian (钱穆) said: "It can be said that since the spirit of Chinese culture and tradition, people have been noted that does not violate heaven, not contrary to nature, but also with natural integration of the fate from ancient time" (1992, p.94). In the use of design this can be understood to foster strengths and circumvent weakness. It can be reflected in the use of materials in both abiding characteristics of glass

and silver to optimise the design. The materials and design can be well integrated.

2.7.3 Philosophical and practical analysis of 'harmony between man and nature' in six main philosophical points

2.7.3.1 'Integration of Yin and Yang (阴阳合一)'

The concept of Yin and Yang appears as early as the Chinese Oracle (17 century B.C.–11 century B.C.); Yin means the weather is overcast; Yang is used for place names. The original meaning of Yin and Yang is to illustrate the direction of front or back and dark or light. The Chinese academic, historian and writer Qichao Liang (梁启超) writes:

Yin refers to the shadows, which are sun-protected areas, or refers to hazy weather; Yang refers to the bright side that is able to see the place of the sun, it can also be expressed as warm and clear. Yin and Yang words appear in the 'The Book of Odes 诗经', it says the original meaning of natural phenomena is more profound and mysterious (1982, p.349).

In ancient Chinese tradition and culture; 'Yin and Yang' and the balance of life prevails in all aspects of Chinese lives. According to this view everything is inter-dependent, not separated. There is no one thing or form that can exist independently of the whole, but each one has a connection between things within the overall environment—in a state of harmony in which everything is unified as a whole in the world. A binary compound of Yin and Yang shows an apparent "duality" of things.



Fig. 48: Giovanni Corvaja, 2008, 'Fidelity' rings ('Golden fleece' collection), 18-carat gold (Hardy, 2012, p.52).

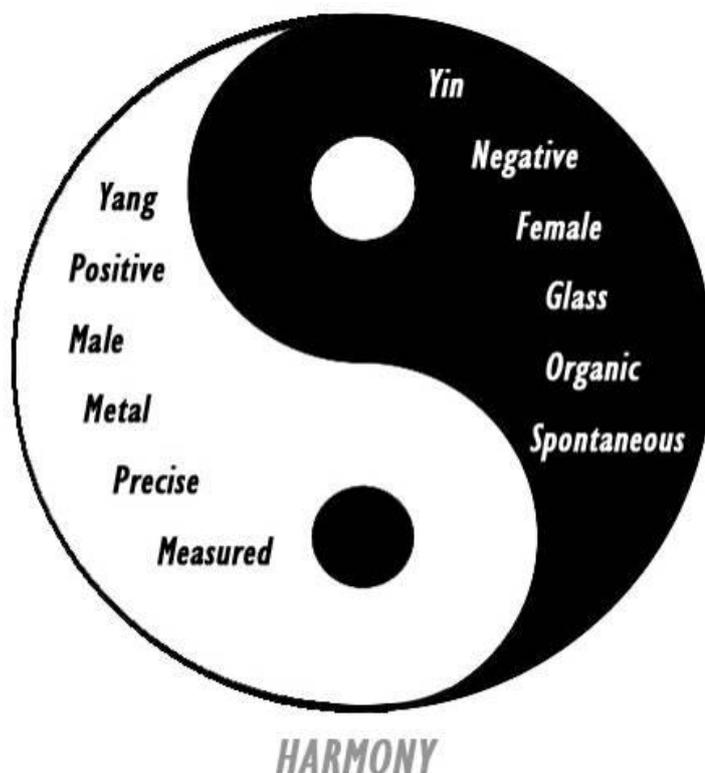
Even in ancient times there were other attempts to explain the phenomena of the universe through the theory of 'Yin and Yang', that is, the two forces which represent, respectively, female and male, darkness and light, soft and hard, inactivity and activity, etc. The interactions of these were generally supposed by later Chinese thinkers to produce universal phenomena (Fung, 1952, p. 32).

Another approach is to use the same material showing Yin and Yang in two extremely opposite ways such as in Giovanni Corvaja's 'Fidelity' rings (Fig.48). He is an Italian designer and his work uses one material which is gold to make a plush texture on the outside and a bulky metal texture on the inside. Although there is only one kind of material, it also provides the effect of Yin and Yang.

The idea of Yin and Yang is a manifestation of the use of contrasting jewellery forms or materials for the design of rigid materials with soft materials. The use of two opposing textures gives contrasts to the materials. When two very different materials are placed together, it will form a strong textural contrast, the hard material is harder, and the soft is softer. For example in this research using metal and glass, the glass appears to be more reflective, the metal appears stronger.

As the diagram above illustrates (Fig.49), 'Yin and Yang' seemingly has the concept of opposites. It seems to have opposing connotations to one another, but by extension they are mutually exclusive, and mutually complement each other. Their sum is equal to the unity of opposites as a whole.

Fig. 49: The diagram of the 'yin and yang' (Jiang, 2011).



The transfer of the concept of 'Yin and Yang' into jewellery design forms is one of the main focuses for practical analysis in this research. In using glass and metal, these two kinds of material can be described to have 'Yin' and 'Yang' properties. Glass can be described as 'Yin'—it is organic, free, malleable and transparent. It has flexible characteristics which can be described as feminine. Metal on the other hand can be described as 'Yang'—the metallic lustre, opaque and solid state suggests masculine characteristics. The combination of these two materials represents well the harmonic concept of 'Yin' and 'Yang' when they are used together. These two kinds of very different contrasting materials contradict each other but can be combined in a harmonious way to fully embody the philosophy of Yin and Yang.



Fig. 50: Marketa Silena's work (Neuman 2007, p. 181).

This notion can be found in Czech Republic glass artist Marketa Silena's work (Fig.50). Her work uses natural non-sculpted glass. The glass shows the imperfect nature of spontaneous organic human qualities, while the metal is given a more refined craftsmanship, such as precision machinery. The glass reveals softness and the metal hardness. The use of different materials and forms create a binary contrast of contradictions.

2.7.3.2 'Unification of Time and Space (时空合一)'

Time is the process or experience of all things and is constantly changing and developing. Space exists in the form of substance relative to time. It is expressed as length, width, height in a three-dimensional form. "In philosophy, 'time' and 'space' are composed of two basic forms of movement of material existence. Time refers to continuity and order of material movement processes. Space refers to material existence" (Wang, 2007, p.6). This time and space exist in the Chinese and Western painting is quite different as Chinese philosophy Professor Anxian Lou (罗安宪) analyses:

Western paintings highlight the painter's unique observation and understanding of the world. It is the painter's vision, how the artist views things and from a specific point of view. So Western painting uses a focus perspective theory. Chinese paintings do not focus on the images themselves but focus on the images' department, spirit and expression. The artist cannot focus from a certain angle or some specific ways, there are limitations from any one angle or side. They cannot fully display the images' rhythm, vitality and spirit. Therefore, Chinese painting uses a casual perspective (1998, p.30).

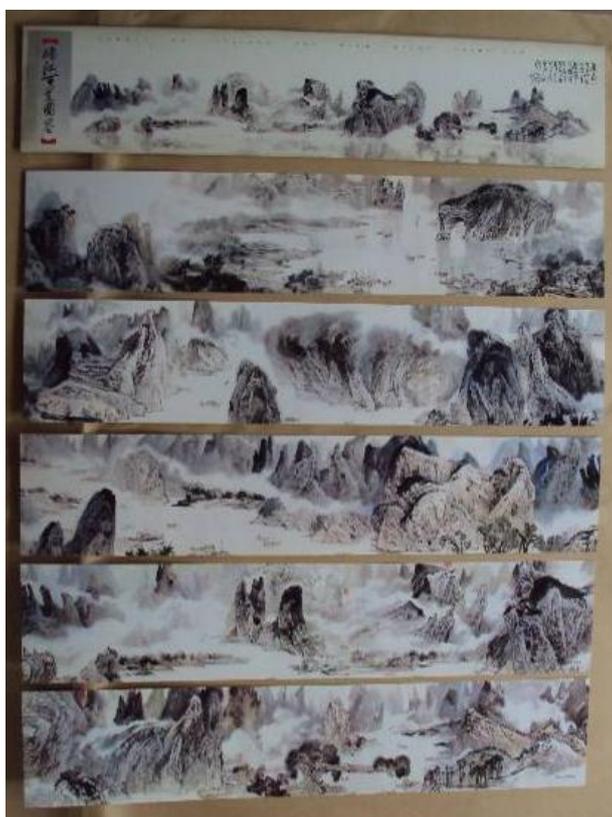


Fig. 51: Kesheng Huang 黄格胜, 1985, One Hundreds of Miles Landscape in Li Jiang River 百里漓江图.

However, there are different perspectives with regard to Eastern and Western understandings of 'time and space'. Doris Lessing said: "Literature is an art of time, painting is an art of space" (Mitchell, 1984). Professor Chengjin Leng (冷成金) suggests: "this is not suitable for Chinese poetry and painting. In Chinese academia it is generally believed that our ancient poetry often has a 'Unification of Time and Space' feature, this feature is specifically described as 'time-led space' and 'close the space as time'" (2011, p.141), Herein,

painting can also contain time and space as Chinese traditional painting (Fig.51) tends to record different characters and scenery from different aspects of time and space.

Chinese painting describes objects and shows life through a scattered perspective theory. It expresses the way nature is supported by the artist's heart to view things. Relatively, conventional Western painting uses a method of focus perspective theory to imitate nature. Artists use their eyes to view objects and paint nature which is seen through their eyes. The 'Unification of Time and Space' can be conveyed in a design that can be understood as the result of how the designer uses the characters of time and space to consider the object from horizontal and vertical points of view. This unification can also be understood as a kind of thinking mode which will be presented in the form of an organic combination of elements in time and space.



Fig. 52: Diana East's work (National Glass Centre, 2005, p. 33).

UK based bead artist Diana East's glass beadwork (Fig.52) shows two 1980s style television glass beads necklaces. From the time span, they are a comparison of the television broadcast contents from a previous period to a later period; from the space cross, they embody the different visions of the TV show from different periods. Two necklaces are shown together to reflect across time and space. The different glass beads of the TV antenna, TV button and the face in the TV provide the illusion of the TV still being on. If there was only one necklace, it could not portray the distance across time and space.



Fig. 53: Sunny Wang (王鈴蓁), 2006, '3 Self', each is about 38 x 25 x 10cm, Hot Formed.
(<http://www.sunnywangglass.com/english/gallery.html>)

In addition to the external presentation of the image of glass, it can also be seen as the 'Unification of Time and Space' from the intrinsic characteristic of the material itself. The Taiwan glass artist Sunny Wang (王鈴蓁) (who received her PhD in glass art in Australia) created the glass work '3 Self' (Fig.53), the formation of glass itself has the qualities of time and space (2006). The forming processes of glass from the solid—liquid—solid which creates the form of an

intrinsic flow of bubbles being moved and then fixed in the last moment. The formed glass is stationary seen from the outside but the intrinsic images of glass are flowing and perceived as time and space imagery. The contemporary Chinese glass artist Qin Wang (王沁) said: "Glass art can be viewed inside its body. It creates time imagery which is measured by the motion of substance form. This matter is found by a variety of real objects and the amount of actual air body shapes but they are not fleeting. They are fixed in the inner space of glass. It is visible and perceptible" (2007, p.6).

2.7.3.3 'Same Structure of Man and Nature (天人同构)'

'Same Structure of Man and Nature' tends to express that man and nature are one—both similar in structure. Man is a microcosm of the outside world, both of them are interrelated. "Man is a microcosm of the natural universe, a copy of the form of nature that has made people's temperament, senses and morals" (Luo, 1998, p.28). Nature is the fundamental source of beauty. Only when you observe the laws of nature and recognize the natural way can you find out the true meaning of beauty. The true meaning of beauty comes from people's observation of nature. Once the aesthetic sense and experience of subject fits with the truth of the natural world, it can reach the "primitive artistic beauty and aesthetic destination unity in the concept of 'harmony between man and nature' " (Zhang, 2010, p.100).

The unification of man and nature represents the harmony between man and nature and is applied in medicine, too. The advanced unification of man and nature corresponds to the structure of the human body that can be found in nature, the human body is like a microcosm of nature. It emphasizes the

unification of man and nature. The 'Same Structure of Man and Nature' is the most superficial aspect in the harmony between man and nature that is mentioned in the 'Huangdi Neijing (黄帝内经)' medicine book.

The sky is round and the ground is square, relatively man has a round head and square feet. The sky has the sun and moon, relatively man has two eyes. The ground has nine states, man has nine orifices... Nature has Yin and Yang, man has a husband or wife. The year has 365 days, man has 365 joints... (Xia and Guo, 2011, p.103).

The 'Huangdi Neijing (黄帝内经)' medicine book has described the application of the 'Same Structure of Man and Nature'. It considers that the structure of the human body reflects the structure of the outside world. These unique anthropomorphic analytical methods form a philosophy and ideologies without separating man and nature. This idea inspired me to look for any two things that match man and nature which have not been mentioned by anyone else.

Chinese people's ideology always has an isomorphic thinking of 'Same Structure of Man and Nature'. "The 'isomorphism of man and nature', this depth of cultural awareness makes ancient Chinese science and aesthetics inherently and intrinsically linked" (Zhang, 2010, p.99). Their subconscious believes that man and nature are made of the same material. Chinese people are used to viewing things from an anthropomorphic perspective, not Western people's scientific perspective. They always think man and nature are similar and have similar qualities, which are made of 'Qi'. "Qi is the basic material of all things; it runs through Chinese philosophy" (Luo, 1998, p.28). This stresses natural existence and man's existence as unity.

Hence, the ultimate pursuit of Chinese art is a natural mind and natural formation. This does not mean that Chinese art does not pay attention to people's subjectivity. In fact, the pursuit of nature does not deny artistic creativity and expression, only with a mechanical replication of nature. On the contrary, our subjective consciousness is the essential guarantee to achieve the final goal of art—nature. As Chinese philosophy Professor Anxian Luo (罗安宪) said:

The pursuit of nature does not mean that the performance of Chinese art does not advocate people's subjective feelings... Chinese art emphasizes the expression of subjective feelings; it also must make subjective emotional images with the objective images fuse together (1998, p.29).

This kind of integration is natural, not artificial. It tends to pursue seamless processing that can reflect the truth of objects. In the design, it can be understood as not to be in conflict and confrontation as the main form of visual effects and stresses the pursuit of overall integration. Even if there is a conflict, it also presents the application of the contrast amongst the whole, it is not obtrusive.

2.7.3.4 'The Concept of Change (变化)'

When discussing 'the Concept of Change', one has to mention 'The Book of Changes'. This is one of the most ancient texts in Chinese literature, the first of five important books in China. "It advanced the concept of movement and change to contemplation, perspective and understanding of the universe and social life. This concept is the foundation of the Chinese traditional view of things. The basic concept is 'change', not 'constant', to treat 'change' as normal. It

confirms the value of 'change' (Yang and Hu, 2011, p.59). "The Book of Changes' takes the form of analogies to understand the world—the relationship between heaven, earth and man. It forms a whole system of thought from a macro understanding and grasps the matter of the world. As Chinese academic Liqun Wu (吴立群) said the 'Book of Changes' reflects the thought of unity between heaven, earth and man which is the concept of the harmony between man and nature (2008, p.137).

'The Book of Changes' is about evolution. Everything is developing with change in the world. Everything is following the change of time and space to change. There is no man or thing that does not change in the world. The change can be viewed from several different perspectives. Worldly things are interrelated, things do not exist separately. When one thing happens, it leads to another occurrence. It is like food chains in the animal world which are interlocking. If one person changes, it will cause related people and things to subsequently change. It just seems like we are living in a huge network. If we apply 'the Concept of Change' in design, it means to view things from a change perspective. In a word,



Fig. 54: Jenny Llewellyn, 2007, 'Neckpiece', Silicone, phosphorescent pigment, light-gathering polycarbonate (Murphy, 2009, p.15).

all things are in constant motion. People usually say that stillness is when things appear to be in a resting state in front of people, it is a relative stillness. Namely it is stationary in terms of relative motion.

When the theory of change is applied in time and space, it represents the change of everything being changed following the change of time and space. Time and space are changing, things also change. For example, there are two ways of representation in the expression of design. One is from the British jewellery

designer, Jenny Llewellyn's neckpiece (Fig.54) which shows the change of things from different time and space perspectives on the one object. The other is to use a set of objects or multiple things to express the change of one thing from different time and space, as shown in British designer, Sian Edwards's work (Fig.55). He used four silver utensils to show the metal form changes in the metal decay process between the different stages. This change exquisitely shows the decaying change process.



Fig. 55: Sian Edwards, 'Salt Ring' (detail), fine silver, stg silver, salt, each 2 x 5 x 5 cm. Design Centre, Enmore. It gives the expression of a change process of the metal decaying (Spencer, 2005, p.113).

Moreover, things can be developed in the process of mutual generation and restriction to reinforce or counteract each other. There is only a relative and no absolute, and all things reinforce or counteract each other. There is no absolute best and worst, only a relative best and worst. All things have to get a point of reference. Design is subjective and therefore has no absolutes. It nevertheless, has to please the target audience.

The changes in all things have their rules that can be found. Once one grasps the law of the development of things, you can grasp the rules of change—the unchanged law. Another is to grasp the ways of things develop and change, including the change of design inspiration in objects and the change of design techniques. For example, the famous Chinese painter Xu Beihong's (徐悲鸿)

'Eight Horses (八骏图)' (Fig.56), the horse is an object for painting, Chinese artists would record the law of regular exercise and dynamic expression of each horse in the different period and then apply this to a painting (Song, 2014, p.14). This reflects the change of horses' activity. It means to record the changes of the design inspiration objects' activity; it also includes the other changes in thinking, psychological aspects, and physiological aspects and so on. With regard to the design methods, it can be understood as the flexible use of related materials, technologies and techniques etc. Simply put, depending on the each design requirement, use different approaches, techniques and materials.



Fig. 56: Xu Beihong's (徐悲鸿) 'Eight Horses (八骏图)' painting (Song, 2014, p.14).

In addition, changes also reflect the use of two opposites for conversion in the design in order to show change—'motion' performance. Design techniques have several typical patterns of change including: Yin and Yang, movement and rest, light and darkness and so on.

2.7.3.5 'Combination of Subject and Object (主客合一)'

The 'Combination of Subject and Object' can be embodied as a blended scenario, which is the emotional aspect and scenery in art creation. The blended scenario means an integration of emotion and scenery. That is the main (creator of emotion) and object (external image)—a fusion of the artistic expression. "Chinese traditional culture reputed that man and nature, feeling and scenery, subject and object, mind and future, inside and outside are indivisible roots are seamless elements that contribute to a sense of harmony or unity" (Zhang, 2010, p.99). The creation of Chinese art emphasizes the feeling the creator should express by the scenery. The variety of forms of the scenery can show the differences in the creator's emotions. Therefore, Chinese art emphasizes combining emotions in the scenery; the senses should be expressed in the scenery (Luo, 1998, p.29). However, that does not mean that the author can simply create natural objects, or randomly put them together with the creator's personal subjective ideas. It is the organic unity of subjective and objective and is "the objective natural beauty and subjective mental beauty together to achieve the high level of harmony" (Chen, 2011, p.17).

The establishment of subject and object is the process of creators finding their subjective spiritual symbols in the natural world. Once the creator's feeling reaches the particular point when the emotions collide, the scenery could spark fire inside the creator, the scenery is not real scenery before the creator. It is scenery which covers all of his/her personal feelings. The creator's thoughts, feelings, interests, etc., can be emotionally expressed in a specific artistic form (Luo, 1998, p.31).

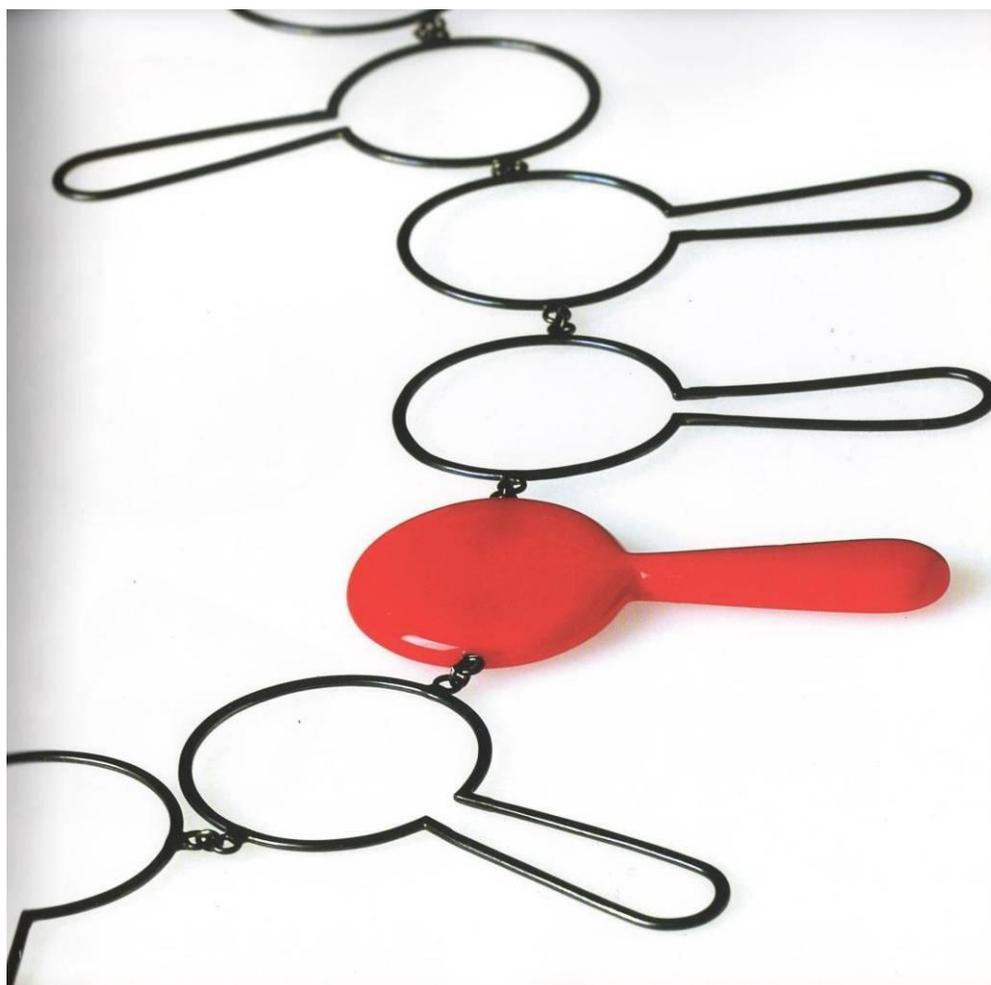


Fig. 57: Katy Hackney's 'Red Mirror' necklace, 2000, oxidized silver, cellulose acetate (Kowalski, 2008, p.175).

Otherwise, the application of a 'Combination of Subject and Object' in design practices can be expressed in major and minor parts in composition, colour matching, insubstantiality and substantiality, two dimensional and three dimensional, shapes, etc. How does the artist make the minor parts support the major elements in jewellery design? This is similar with the Western design approach of 'Exotic'. The British jewellery designer Katy Hackney's Red Mirror necklace (Fig.57) is a typical example. "Her work is a study in contrasts... Other pieces, like her "Red Mirror" necklace, are made up of a series of repetitive

shapes outlined in oxidized silver, with one 'filled in' with opaque, hand-polished cellulose acetate" (Kowalski, 2008, p.174). She applied the 'contrast' approach from the colour, insubstantiality and substantiality and two-dimensional and three dimensional into one piece of necklace with a strong visual impact. In the colour matching, a series of black units highlight the single red piece. A series of outlined repetitive shapes give prominence to an entity. The unique three-dimensional shape stands out in a series of flattened shapes in the contrast between two-dimensional and three- dimensional perspectives.

2.7.3.6 'Self-cognition and External-cognition (内外合一)'

'Self-cognition and External-cognition' can be understood as the integration of human psychology and surrounding elements, a process of continual self-introspection from internalization to externalization in a cycle (Fig.26, section.2.6.1) (Zhang, 2011, Appendix.1). If scientific analysis used to explain what 'Self-cognition and External-cognition' is in art, it can be explained as the sensory artistic integration of inner artistic feelings from the creator soul and surrounding elements? It is a fusion of spiritual experience and art from the creator internalizing their surrounding elements and externalizing these findings in their art works (Fig.58). The 'self' refers to the internalization process of the creator who gains a spiritual experience derived from external elements and artistic fusion. 'External' refers to the externalization process of the creator conducting their spiritual feelings and artistic fusion into the actual art form.

"'Self-cognition and External-cognition' are the basic requirement of Chinese martial arts. In martial arts, 'self' refers to the heart, spiritual aspects, thought, breathing etc, it means the inner mind activities and breathing. 'External' refers

to the hands, eyes, body, footwork and other external physical activity” (Li, 2002, p.89). Manny Ling’s PhD also mentioned internal (skill, graphic, form, line, marks etc) and external (inner self development, cultivation of self-being) in Calligraphy (2008, p.10). The ‘internal’ and ‘external’ aspects of the design approach can be explained as ‘self’, the understanding and the application of the design concept. ‘Self’ is also related to Chi 气 “it inevitably reflects a vitality of spirit that is the essence of life itself” (Ling, 2008, p.42, British PhD). In this aspect, my research ‘self-cognition’ includes the idea preparation, jewellery idea developments and analysis. ‘External’ refers to expressions, the use and development of relative various elements, techniques and technologies.

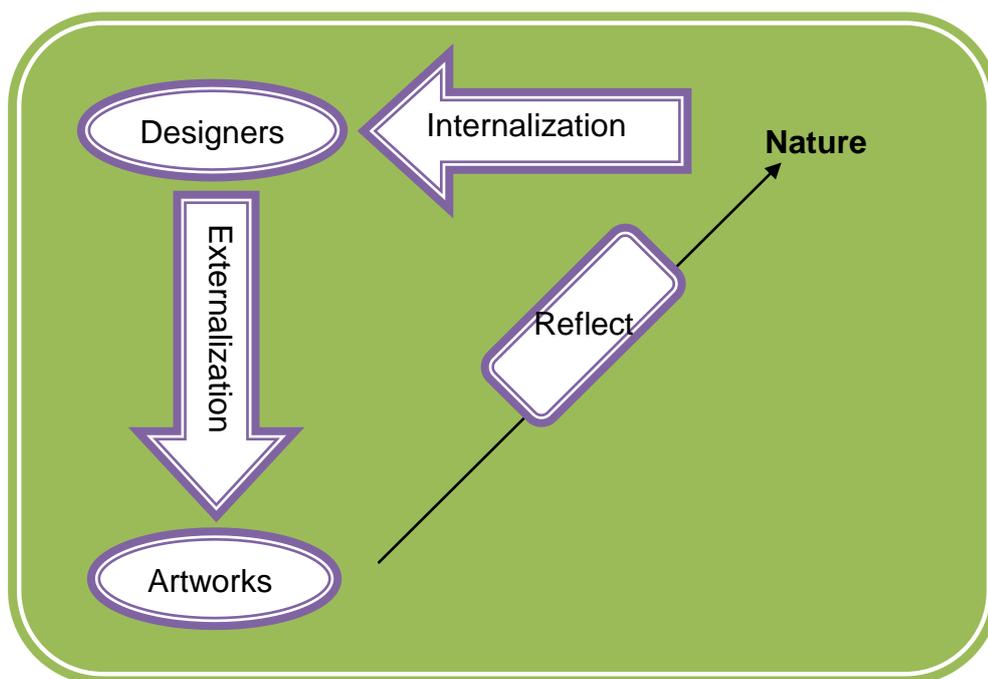


Fig. 58: Explanation diagram of Self-cognition and External-cognition in design (Jiang, 2013).

My research shows the investigation of different elements, techniques to develop new techniques of combining handmade with mechanical production in interchangeable digital glass jewellery. Integration of both is also a reflection of

unity. Chinese Professor Chengjin Leng (冷成金) analyses the relationship of time and space in art:

Since there is no value in the pursuit of going beyond cognition in Chinese culture, it does not agree with the concept of the transcendentalist setting but the pursuit of the introverted beyond, keen to be perceived and it can grasp the reality of the experience of the world to find value and significance (2011, p.142).

The process of continual self-introspection is the self-improving process. It is a continual improving of self-process from the inherent knowledge, upbringing, education and other personal overall qualities. "The accumulation of internal self-improvement can be manifested in the external form" (People Tianjing Windows, 2010). This process is a continuation of the spiral rising cycle from the inside to the outside and then from the outside to the inside process. This process is introverted beyond the process of the creator. It is the creator's self-internal beyond process.

2.8 Summary

In this chapter, the scope of research provides a clear research area to focus on. Viewing the contemporary Chinese jewellery design in different areas through market, customers, designers, working environments, educations and copyright issues provide a clearer overview of the problems contemporary Chinese jewellery design face and the main points facing artist, historians and theoreticians in this debate.

The comprehensive overview of artists and designers whose work addresses many of these issues through their practice provides context and visual indicators of the concepts and forms which inform the practical components of this project.

Contemporary Western jewellery design can be explored in different contexts from design objects, cultures, materials, market and production. Analysing contemporary Western jewellery is one of the areas focused on in the remainder of the thesis, in particular its position in the global market. The ways jewellery research crosses borders and engages with a variety of theories and debates including economic value were demonstrated. This cross cultural and hybrid market, it was shown, has yet to be fully examined. In fact it is very much an emerging area in glass jewellery design in China.

As demonstrated there are clear aesthetic advantages in combining hand crafted and machine production methods as well as using precious materials and non-precious materials. These mixed approaches are becoming more common, but perhaps a gap are the ways these combinations can (a) produce new techniques and (b) inform the conceptual development of studio based glass jewellery design in the West and in China.

After reviewing the contemporary jewellery design from China and West, there are clearly some factors which affect jewellery design practices between both cultures. A clear finding is the different attitude regarding precious materials. Most Chinese people appear to be concerned with the materials value rather than the jewellery design. They also seem to prefer the more complicated form which in their minds eye demonstrates a higher capability in terms of technique.

The exploration of the philosophical context of 'harmony between man and nature' provide depth understanding to develop its principle into jewellery design practice which include 'holistic approach, harmony, balance, flexibility and change'.

While many Eastern and Western artists and designers use this philosophy in their art works without knowledge, this section enables greater clarity and focus to pick out and evaluate where, when and how these concepts emerge and importantly how they can be applied to interpret their artworks and other. Several artistic processes were examined in this section including calligraphy, painting, architecture, sculpture, ceramic and jewellery.

Further philosophical focal points were investigated and facilitated after analysing art works in this philosophy. They found the development of six philosophical points in my jewellery research practices which facilitate and offers further structure for the case studies in next stages. The six philosophical focus points are:

- (i) 'Integration of Yin and Yang (阴阳调和)'
- (ii) 'Unification of Time and Space (时空合一)'
- (iii) 'Same Structure of Man and Nature (天人同构)'
- (iv) 'The Concept of Change (变化)'
- (v) 'Combination of Subject and Object (主客合一)'
- (vi) 'Self-cognition and External-cognition (内外合一)'

These themes provide greater understandings and facilitate in identifying clearer and more focused paths to investigate the very broad and complex theories associated with harmony between man and nature.

Through creating my paintings within a relaxed and non-forced nature, I was able to maintain a moderate thinking mode, which is an advocate of the Confucianism meaning 'enforcement of being neutral'. This is reflected in 'harmony between man and nature' and emphasises the unity and usefulness in opposites. Glass has advantages (shapes easily, colourful, changeable and strong refraction) and disadvantages (fragile, heavy and lower melting point) as a material in jewellery design. The principle of harmony between man and nature in the use of design can be understood to foster strengths and circumvent weaknesses. Through extensive practice, I have developed the idea of 'Interchangeable' in glass jewellery design.

Chapter 3: Materials, Techniques and Experimentation

3.1 Introduction

In this section I will discuss the ways novel methods of combining machinery made jewellery and hand-crafted jewellery have strengthened the jewellery design and enhanced the aesthetic characteristics of the individual materials and the final design as a whole. I use the 'The personal holistic research glass jewellery production method' diagram (Fig.4 in section.1.8.2) to frame my practice, in particular glass and jewellery design. I examine the ways the process of Chinese ink painting can be transferred from a two dimensional medium into a three dimensional form, with substance, weight and mass associated with sculpture. The general cycle goes: idea preparation; imagining and deciding formal characteristics; technical production; then analysis. Different techniques have different characteristics and these will inform the design process throughout its life cycle. The techniques include: ink painting; digital technologies; 3D printing; production technologies; and the combination of hand and machine production.

3.2 Combination of hand-crafts and machine production

Postmodernism has been claimed by many to be difficult to reach an informed consensus as to what it precisely represents in the art world. It is often defined as something which is indefinable. "There is no single point at which postmodernism springs into being, and it is hard to find a contemporary approach to art that does not share ideas with much earlier twentieth-century work" (Ward, 2003, p.38). Reflecting on Glenn Ward's work, Postmodernism

arose as a response to the monotony and seriousness of modern art which was also criticised in design circles as placing too much emphasis on the function of design rather than its aesthetic qualities (Ibid, p.39–40). The other extreme arguably can be found in Postmodernism which ignored function too much in design and the objects made had no everyday function, as British designer Jasper Morison said:

“It would be ridiculous if everyone kept looking for a beautiful new form. It can be more interesting to look at what is already there and apply it in a different way...For me it's a reaction, a reaction to noticing how much better most normal things are than most design things. I think design is in danger of becoming something false and out of tune with real life, when it could be doing something worthwhile” (Parsons, 2009, p.62).

Many people design just to make people remember their name, thus it is nothing more than getting noticed in their mind (Ibid). Once the design becomes the tool to be famous, it is more about starting something new in order to be different, not the design itself. This often leads to designing many things which lose their function and become visual pollution.

To achieve 'good design' arguably there needs to be a balance between the function and the aesthetic features of the product. This is a permanent and ongoing debate in the art and design world, and is something which will always preoccupy designers. “‘Super Normal’ is a reminder of more genuine motives for designing something.” (Ibid)

The Chinese philosophy of harmony between man and nature emphasized that the balance to grasp the essence of things and develop the ability to maintain an

impartial comprehensive handle of the problem. This is an important feature of my design philosophy to maintain a balance between form and function.

Case Studies	Glass Techniques	Silver Techniques
'Concave and Convex' Couple Ring Set ('Ao Tu') ('凹凸'情侣戒)	Fusing glass, Water-jet Cutting, Handcraft and Fire Polishing	3D Printing and Silversmith.
'Egg and Sperm' Necklace ('精子和卵子' 项链)	3D Printing on the egg plastic, Kiln forming, Handcraft and Fire Polishing	3D Printing and Silversmith.
'Button' Brooch ('扣子' 胸针)	Fusing glass, Water-jet Cutting, Handcraft and Fire Polishing	3D Printing and Silversmith.
'Pleated Skirt' Necklace ('百褶裙' 项链)	Fusing glass, Water-jet Cutting, Handcraft and Fire Polishing	3D Printing, Silversmith and Tap and Die.
'Annual Ring and Fingerprint' Brooch ('指纹与年轮' 胸针)	Fusing glass, Water-jet Cutting, Sandblasting, Handcraft and Fire Polishing	3D Printing and Silversmith.
'Annual Ring and the Edge of Dancing Skirt' Earrings—Rings ('指纹与舞动的裙摆' 耳环—戒指)	Fusing glass, Water-jet Cutting, Handcraft and Fire Polishing	Handcraft.
'Osmanthus' Ring Set ('桂花' 组戒)	Lampworking	3D Printing, Silversmith and Tap and Die.

Fig. 59: The different cases studies used different techniques (Jiang, 2014).

Traditional jewellery design relies on the precious metals and stones and respectively produces mainly in crafts and machine production. Although they are not mutually exclusive to each other, rarely blending them infiltrating in contemporary jewellery making. Traditional jewellery often makes jewellery mainly based on handcrafts or machine production.

I use hand-craft and machine techniques as complimentary to each other. I try to achieve a balance between the two. My different case studies have different solutions of combining the techniques between hand-craft and machine production (Fig.59). Designers and craftsmen know materials characteristics more deeply through production process and the feeling of directly touching traditional processes and materials. Traditional craft jewellery making can impact upon the aesthetic features of the artwork giving it a more organic, natural and humane feeling, preventing it from having a mechanized production feeling. A downside of craft making is the time it takes to create a single work. Hand making alone makes it more difficult to realise complex and aspiring ideas and forms which challenge the norm.



Fig. 60–61: The silver part making in my 'Ao Tu 凹凸' couple ring set (Jiang, 2012).

Machine production is much quicker and also enables new and exciting forms, sculptures and ideas to be realised in addition to developing and refining new materials. 3D printing has arguably helped an object to retain a feeling of the handmade. However, 3D printing can still never retain the knowledge of the human hand, which has life and learned experience. Even sophisticated technology needs the hand to 'finish it off'. For example, the silver part making in my case study of 'Ao Tu (凹凸)' ring set (Fig.60–61). For me combining machine production and handicrafts are essential to my practice in a practical and sensorial context.

3.3 *Material characteristics in glass jewellery design*

Glass can be a beautiful counterpart to gemstones and becomes a part of jewellery. Glass has as broad an appeal as expensive gems have. In Rome, glass jewellery became ubiquitous in society and not just the Roman nobility liked it. Rome, Germany and the Rhineland became the centres of glass manufacturing and glass jewellery; it began to appear in the whole of Europe and was even found as far away as China in Asia (Coffey, 2009, p.10). Glass furnaces are used to produce very popular glass costume jewellery in the Czech Republic which started in the 8th century (Ibid). More and more Western artists prefer to use glass as their material; however Chinese traditional concepts limit the development of this new material.

Glass now has the widest range of applications in industry and in the home. Now glass is designed to be bulletproof or even as spacecraft heat shields. The technological advancements in the chemistry of glass in the twentieth century are huge. Nevertheless the ways in which the making of glass and its material characteristics are used in artistic design remain an understudied area. This

study is interested in glass by changing the forms of use in the design to avoid the glass breaking during the using process. Professor Dan Klein and Antique Dealer Ward Lloyd explain:

Chemically glass is a generic term for a substance manufactured from an endless number of recipes. Although most glassware contains the same basic ingredients, the term glass does not refer to a specific chemical compound, since different types of glass have a different chemical composition and exhibit different chemical and physical properties (Klein and Lloyd, 1997, p.9).

Glass is made from a mixture of silica: a mix of sand, lime and an alkali such as soda or potash. An unusual feature of glass compared to some other materials, is the change of viscosity from a cold, rigid solid into a hot liquid. Glass differs from metal as metal can sometimes flow and remain in a liquid state even at freezing temperatures. However at high temperatures glass will obtain a quality like paste, rather than liquid. Various stages of the heating of glass provide a variety of forms which when cooled suddenly will retain their shape.

Accordingly, glass material is more suitable for 'thermoforming techniques' than other materials (Ibid, 1997, p.9). Thermoforming refers to the cooling of the molten glass through a homogeneous manufacturing method. Compared to other materials such as metal glass generally lacks the crystalline structure normally associated with solids, but glass will retain the rather random molecular structure of liquid. Since glass cools and gradually hardens until stiff, there are no crystals which create interlocking patterns in the hardening process. This is why glass is so fragile and has to be slowly annealed. The manufacturing

process therefore requires a cooling system that is uniform to reduce stress on the glass caused by uneven cooling (Ibid).

3.3.1 Artists and glass factories

Glass making has two key aspects: how to apply the glass raw materials and how to apply the various tools and techniques (Cummings, 2008, p.20). Glass artisans usually made their own raw materials before contemporary exclusive glass factories were established in the 1970s. One of the first and most well known contemporary glass factories is, 'American Bullseye Glass' built in 1974 (<http://www.bullseyeglass.com/history.html>). Czech Republic Banas Glass Factory is another example built in 2002 (<http://www.banasglass.com/aboutfirm.htm>). Other examples are the German Friedrich Glass Factory built in 1985 (http://www.kuglercolors.de/english/default_e.htm) and the New Zealand Gaffer Glass Factory built in 1993 (<http://www.gafferglass.com/>). They all have their own standard criterion in their production methods. The factories raw materials include frit and powder, rods and stringer, confetti, dichroic, and sheet and billets. Bullseye glass and Banas glass have been used in this research.

3.3.2 Jewellery making

Similarly, jewellery raw materials such as wires, bezel strips, tubes and sheets were developed in the 1940s. An American company Rio Grande was the first of the jewellery making materials suppliers (<http://www.riogrande.com/Landing/about-us>). Then the British company, Palmer Metals (<http://www.palmermetals.co.uk/about.html>) and Cooksongold (<http://www.cooksongold.com/aboutus/>) was built in the 1990s. The Australian Company Sunsetcrystals was built in 2007 (<http://www.sunsetcrystals.com.au/>).

Basic Raw Materials Form	Glass	Basic Raw Materials Form	Silver
Frit and powder		Clay	
Rods and stringer		Round/D/Square Wire	
Confetti		Bezel strip	
Dichroic		Tube	
Sheet		Sheet	
Billets		Grain	

Fig. 62: The basic raw materials type of glass and silver (Summarized from websites of Bullseye and Cooksongold, 2014).

3.3.3 Relationship between glass and silver

Silver as a raw material has similar characteristics to glass for example, clay; wire; bezel stripe; tube; sheet and grain. I use the Cooksongold brand of silver in my first testing stage. Its raw materials are clay, wire and sheet. 3D printing can be used instead of almost every step of using the raw materials in jewellery. The pervious diagram I have created, (Fig.62) is a comparison of the contemporary different forms of basic raw material of glass and silver. The diagram has been selected from the Bullseye glass website and Cooksongold website.

3.4 Chinese ink paintings

Chinese paintings are done in such a way that they train in both the techniques and patience of the artist and have a focus on calming the mind and spirit. The entire body and mind of the artist become focused and great works and ideas come through.

The starting point for my practice can come from many sources of personal experience, even photographs or pictures. The ideas develop from following the practical process of expressing my feelings, passions and general observations. I reflect on my observations and thinking about external things and then transfer this into creative works. These creative results have much in common with the original sources and abide by natural rules to reach a harmonious balance that can be understood as the integration of 'Self-cognition and External-cognition'. The whole Chinese painting is not only philosophical observation; it also helps spiritual meditation to investigate the initial design ideas by developing the painting process.

It is well established that brush, ink, Xuan paper and ink stone are the unique traditional Chinese tools known as the 'four treasures' used for painting and calligraphy. Xuan paper is predominately produced in the Anhui province Xuan Zhou city (安徽省宣州市). A feature of the paper is its high absorbency. "Once painted, because of the nature of the Xuan paper and ink, it has to be completed at one go, it is impossible to make any alterations of wrong strokes" (Xue 2009, p.205, British PhD Thesis). The paper records the different characteristics and the 'personality' of the brush marks by the degree of the blending of ink with water. The movement of the brush can produce different random variations. The quality of the marks depends on skill and the character of the brush combined with the, ink, Xuan paper and ink stones. It has been said that this combination reflects the character of 'harmony between man and nature' (Gao, 2006, p.160).

3.4.1 Interpretations of Chinese ink paintings a practice-based approach

I explore 'point, lines and surface' through my ink painting. I experiment with the composition of objects and also the different expressive marks using dry and wet brushes, dark ink and light ink as well as different gestures. The mark making, for me is a type of interactive performance. In the performance I experiment with other materials such as salt, glass, leaves etc (Fig.63–65) and the ways these tactile materials can produce dynamic results on the Xuan paper. The wet brush has more water and requires a balance between the amount of time the brush is held to the surface and the amount of ink on the brush tip. The dry brush has less water (Ji and Guan, 2007, p.148).

The key difference between dark ink and light ink is the ways the water can penetrate the Xuan paper, producing different effects. The Wet and Dry brush also impact upon the effect. I use different sizes of Dry and Wet strokes, with various amounts of water, with isolating speeds to create different blooming effects, light and dark tones, which express spiritual relationships between features such as wind and shade.

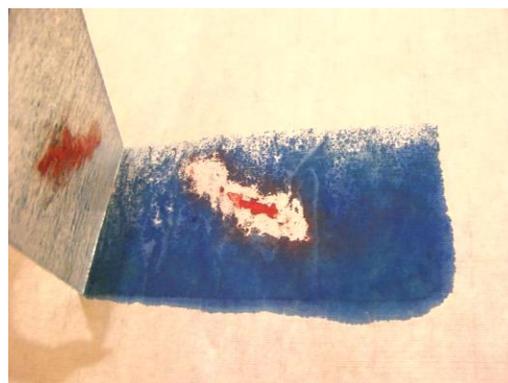


Fig. 63: Paint on the glass (Jiang, 2011).

Fig. 64: Using glass to paint (Jiang, 2011).

Fig. 65: Paint with leaf (Jiang, 2011).

This painting process is often pre-prepared. This process involves me becoming very self-aware and conscious of my breathing and body. I also need to become very conscious of features external to me and importantly my bodily relationship to them (Section 2.7.3.6). This particular process for me can be described as dynamic or even 'alive' and it helps me to translate into the Xuan paper some of the conscious properties I experience between man and nature.

3.4.2 Training and Chinese painting

These processes seem to suggest a directness of approach and the marks rely on the artist's 'self' and it should be entirely personal, fluid and spontaneous—hence, allowing for chance and 'accident' that might occur as part of this process (Ling, 2008, p.55, British PhD Thesis).

Chinese painting not only provides skills in the application of ink. It provides awareness of the value of patience and calmness for the spirit. Chinese painting is not just a painting practice; it is also a spiritual practice. When the entire human body and mind can find peaceful time meditate ideas often surface by apparent 'accident'. This kind of 'accident' is much more than mere spontaneity. Ideas surface through the accumulation of experiences and time. It is a refined skill; learning the art of stillness so that new ideas and the solving of older problems can come to the surface and the individual has the clarity to see and seize them. In my work to investigate this phenomenon I have undertaken around 150 pieces of drawing practice. I will discuss these key examples below.



Fig. 66: Breeze on a sunny day and a raining day (Jiang, 2011).

The 'Wind' series (2011) was conducted in 12 drawings in 2011 (Fig.66–68). These first four drawings convey my feeling of a breeze on a sunny day and a wet wind on the rainy day. The left hand two pictures and right hand two pictures are in contrast to show the different feelings (Fig.66). The far left picture uses dry brush strokes to describe the breeze. This creates feelings of a dry, soft breeze on the skin on the sunny day. The far right picture applied wet brush strokes, and then sprinkled salt in the wet part before it dried. The ink spread and it created a 'blooming effect' and this reflects clouds and moist feelings of a rainy storm on a rainy day.



Fig. 67: Strong wind on the beach and the flowers in the strong wind (Jiang, 2011).

These four drawings (Fig.67) describe strong wind on the beach and the flowers in the strong wind. Each of the two drawings on the left and right describe the strong wind on Seaburn beach and the flowers in the strong wind. I used the dark ink, wet brush and dry brush to show the waves and wind are intertwined, the images reflect the flips of the waves slapping on the rocks on the shore in Seaburn's blustery beach. The roadside and garden flowers were plucked by the wind and scattered around the beachside.



Fig. 68: Birds, the foot prints in the snow and the passers-by in the strong wind (Jiang, 2011).

The left corner of the two pictures (Fig.68) depicts my interpretation of birds that are flying upwards and against the wind. The left lower corner picture depicts the foot prints in the snow in the wind. The right one depicts passers-by walking upwind. They all combined the dark ink and dry brush to represent the manic feeling of strong wind.

The whole series of 'wind' drawings create my interpretation of seven different expressions of wind. This includes the breeze on a sunny or rainy day, strong wind on the beach and flowers, birds, foot prints in the snow and passers-by in strong winds. In this series one of the main features of Sunderland's weather is expressed, that feature being 'wind'. Wind has created many different feelings throughout my years living and studying in Sunderland. For instance I encounter

wind almost every time I go to University or generally spend time with friends in the town centre. Sometimes it blows softly on my face; sometimes it is stormy, sometimes gentle and often strong.

Sunderland's wind can be strong enough to sometimes stop people in their tracks or blows them in another direction, especially in winter. This is an environment very different from my hometown and is something that as an artist, who explores their relationship with the environment, was a natural and almost compulsory element to explore further. The contrast of the winds strengths are represented in the ratio of the painting, the majority being strong winds.

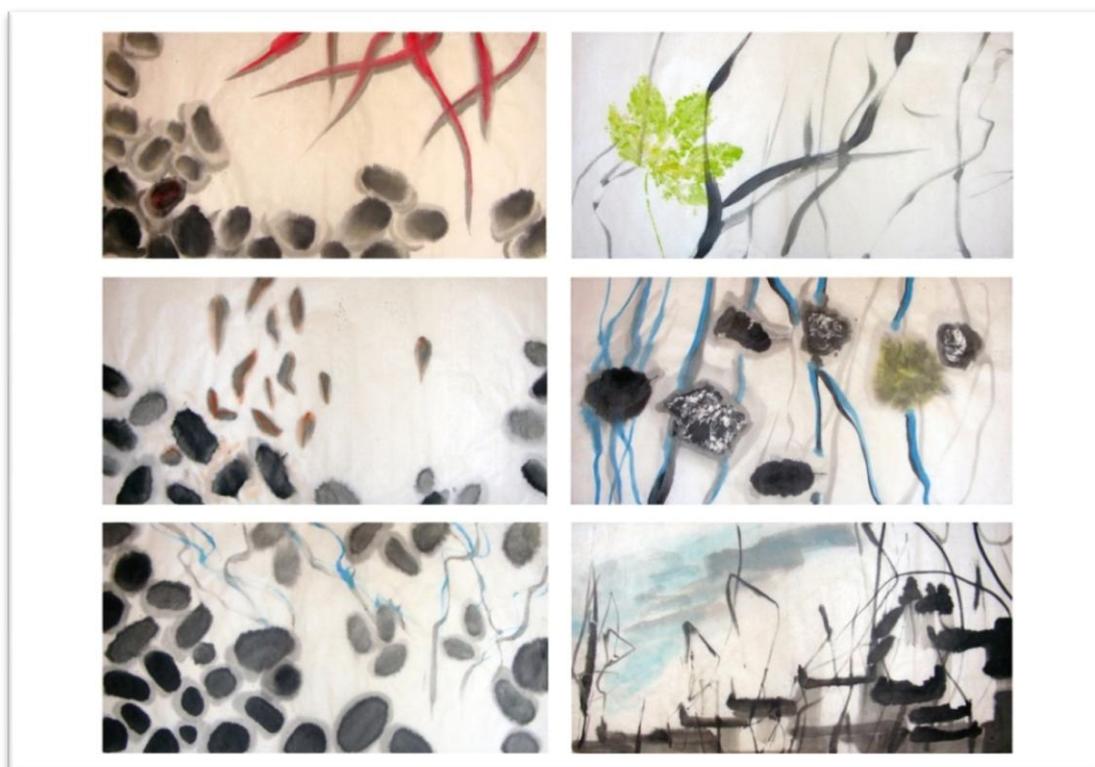


Fig. 69: Reflection of water (Jiang, 2011).

Another series is 'reflection of water' (2011) and was composed of six different drawings (Fig.69). The three on the left describe the water's surface looking at

the bottom from different angles. Six of them have used the wet brush with soft lines to show the feeling of reflection. The upper two on the right are painted with actual different leaves (Fig.69) to express the reflection of water with leaves floating on water. The lower right picture combines the wet brush and dry brush shows the plants growing in the water, half underneath (wet brush) and half above (dry brush), showing the reflection of both sides. They show a sense of movement but yet remain very still.

These Chinese paintings use the approaches of 'self-cognition and external-cognition' to help investigate the initial jewellery ideas. Throughout my drawings I am constantly influenced by my environment and my perception and understanding of my bodily relationship and engagement with the elements in my environment. In order to explore this more fully I often engage in meditations using traditional Chinese approaches.

3.5 *Sketches of ideas and drawings*

This section discusses some of the initial ideas developed from look at the Chinese ancient bronze, flowers and terraces and integrates the 'harmony between man and nature' into my ink painting before the final ideas. Creating concepts by observation and analysis of nature, apply my philosophy into paintings. The paintings have the 'harmony between man and nature' inside. They are three key initial examples to examine, analyze and discuss from Chinese ink painting into the jewellery sketches.



Fig. 70: The initial jewellery ideas developed from Longji 龙脊 Terrace (Jiang, 2011).

This idea (Fig.70) comes from my hometown landscape, the Longji (龙脊) Terraced Fields from Guilin (桂林), China. The fields are on a slope that leads from the riverside to the mountain top. They represent stairs and are around 600-800 meters above sea level (People's Daily Online, 2006). The long light and dark green shaded stair shaped hills beautifully match the blue skies and yellow sun above them, the view is vast and breathtaking and the image has stayed in my mind for years. I took this image to help inspire me to create the above painting; this then gave me inspiration to transfer it over to my initial jewellery designs. The designs and paintings I have drawn can resemble running water in a mountainside lake or clouds separated by sunlight in an almost clear blue sky, as well as the Longji Terraced Fields.



Fig. 71: The initial jewellery ideas develop from Chinese bronze (Jiang, 2011).

This next picture (Fig.71) comes from the Chinese ritual Bronze vases. They were drawn to represent the characters and patterns of the Chinese ritual bronze vases. It looks like the ancient Chinese word 'ma 马' meaning 'horse', as such the image itself is drawn in the shape of a horse. Their strong, heavy and block-like shape made them ideal for drawing as different Chinese characters. From this drawing I was inspired to create new jewellery. The shape is handy in making different objects, like earrings and necklaces because they can be used as both solid and hollow objects, they're also given special meanings from other perspectives because they can be used to represent different Chinese words and have a very 'Asian' feel to them.



Fig. 72: The initial jewellery ideas developed from peach blossoms (Jiang, 2011).

Fig.72 shows the peach blossom which is similar in appearance to the Japanese Sakura Flower. It is bright, pink and quite feminine. My home town of Guilin (桂林) also celebrates a festival for this flower in the Spring time so it is quite celebrated for its beauty. The centre of the flower inspired me to make jewellery designs out of it because it can work in a variety of ways. It can be used as a ring, necklace or other kinds of jewellery because the main attraction from the flowers come from the petals, however that's not to say the centre does not add to the beauty but it can be interchangeable.

3.6 Digital techniques

Nowadays computer-aided design and manufacturing has been widely applied to jewellery design. Contemporary digital software has been used in rapid prototype design, such as AutoCAD, 3dsMax, Cult 3D, Rhinoceros, Solidworks, Nervous-System etc. The professional jewellery design softwares are JewelCAD, RhinoGold, 3Design, Digital Goldsmith, JewelSmith, ArtCAM, Jewelspace. (Zhang, 2009, p.25) The software can simulate the real jewellery design and render the three-dimensional models from multiple angles. More realistic computer programs designed for observation and examination are now readily available. 3D visualization rendering allows designers to more accurately grasp the size and detail of design, and can more easily make changes and transformation. Technology can reduce the materials waste and the uncertainty in the production process. More importantly, certain technologies can complete some complex production which cannot be achieved by hand making.

3.6.1 My digital tools

I use AutoCAD, Rhinoceros, Netfabb Studio, Photoshop and InDesign software to develop my jewellery. I have a BA in Environment Art and Design and experience using AutoCAD, 3D Max and Photoshop software in Architecture design. AutoCAD can show the size and structure in jewellery clearly, but 3D Max is designed for 3D design, not production design. Rhinoceros is also quite similar to 3D Max but it is more suitable for production design. The advantage of using Rhinoceros is that it can clearly show what the jewellery design will appear like on screen. Netfabb Studio software was also used to adjust and compensate aspects of Rhinoceros to meet the demands of 3D printing. Photoshop and InDesign were used for the photographs, posters, booklets, etc in my jewellery design exhibition and other post-processing requirements.

3.6.2 The context of 3D modelling

3D modelling work is based on 3D computer software which cannot be represented in a real 3D environment. This has evolved from the CNC machine which started its life as the NC (numerical controlled) machine created in 1949 and was first displayed in 1952. The NC became the CNC (Computer Numerical Control) in 1957 (Libert, 2010). CNC system has been used in various productions for about 50 years which included jewellery commercial production. This system is similarly with the 3D printing (Hideo Kodama invented the 3D printer in 1981). CNC manufacturing system and 3D printing are the representative contemporary 3D manufacturing systems. The different is that the CNC manufacturing system produces a 3D model into a wax, and then made the

final product by lost wax method. However, the 3D printing can print the final product directly without the step of lost waxing. The CNC system is essentially the 'negative' of what a 3D printer is. This means that 3D printers are used to take materials and create different works of art or products while a CNC machine will take a block of a certain material and subtract parts of the block to form its product. “Hideo Kodama of Nagoya Municipal Industrial Research Institute was the first to publish an account of a functional photopolymer rapid prototyping system (Kodama 1981)” (Beaman, 1997 p.26). 3D printer made the expensive 3D modelling work more affordable.

Category	Advantages of CNC machining	Advantages of 3D printing
1	Free choice of material	Print the final product directly
2	Free choice of resolution	Easy to use: few required preparations
3	High surface quality	Price independent of part complexity
4	High accuracy	No limit on part complexity
5	Price independent of size and volume	Price per part independent of batch size
6	Low cost of ownership (both for machine and supplies)	Easy to switch to a next part (flexibility)

Fig. 73: The advantages of CNC machining and 3D printing (Summarized from Libert, 2010 and Lennings, 2013).

I chose 3D printing as my main production method compared to CNC system after comparing their disadvantages and advantages (Fig.73). Since 3D Printing

is mostly considered an easier and to some a more efficient method. 3D printing is faster for two reasons, firstly the 3D files take much less time to render and secondly, the work itself is done in rapid time compared to the CNC machine. Another huge advantage of the 3D printers is that a CNC machine requires an operator to be focused on the work and keep a close eye on the products being made, making sure no damage happens among the products or machine itself, while the 3D printers themselves can be left to work on their own, with less risk of damaging products. With all that in mind the CNC rewards the artist or producer by being able to create products that are better engineered. However, it was decided that 3D printing is the best process for my practice.

3.6.3 AutoCAD—Orthographic views of jewellery



Fig. 74: David Goodwin's ring.

In recent years, the exploring of manufacture and application of computer-aided design and manufacture (CAD CAM) had some notable results in jewellery design, such as British designer David Goodwin's ring (Fig.74) (Mansell, 2008, p.7). These kinds of results encourage the continual exploration of the infinite possibility of new technologies, which compared with traditional handcrafting techniques, are much more efficient. Other examples of CAD CAM work are Jinks McGrath, Andrew Lamb and Dana Buscaglia works which show the possibilities of technology enhanced design compared to the hand.

I use AutoCAD software as one of the main software's for glass jewellery design. Its role is to adjust and record the size of specific detail of the jewellery and view the structure.

AutoCAD is produced by the American Autodesk company in two-dimensional drawings, detailed drawings, design documentation and basic three-dimensional design-aided design software. It has become widely popular for international mapping software and is widely used in building design, product design and mechanical design. I also use AutoCAD software to draw three orthographic views of jewellery to facilitate the design. The role of the software is to construct, adjust and record the size and specific details of the structure and overall jewellery view.

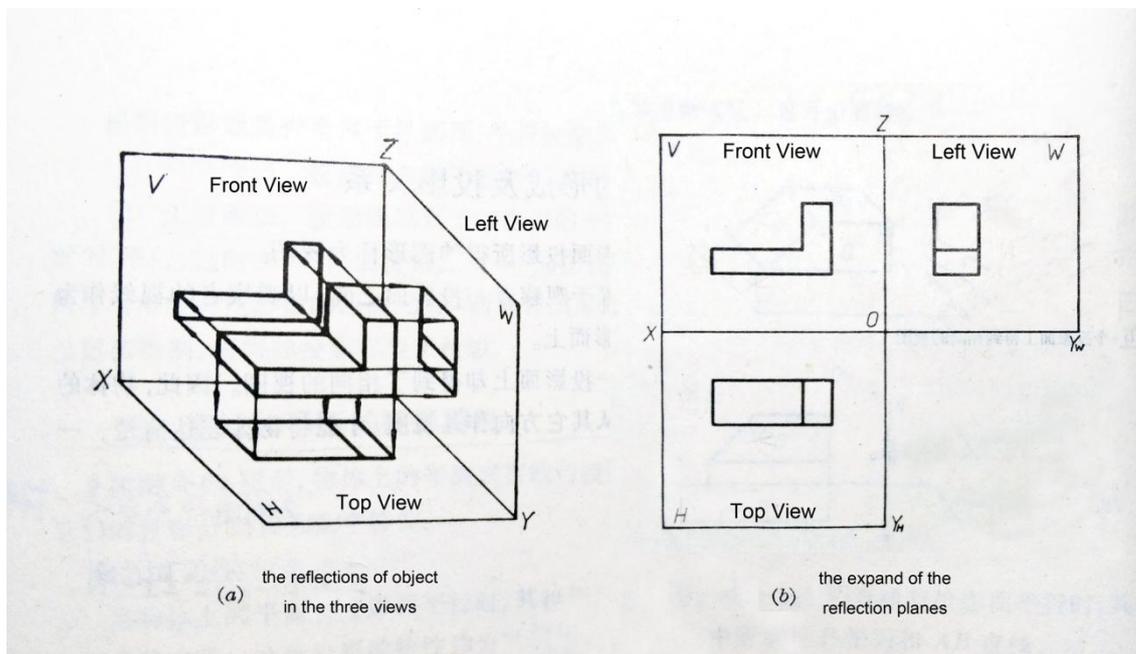


Fig. 75: The reflection of object in the three views (Mao, 1991, p.30).

Three orthographic views are able to accurately reflect the length, width and height of the real jewellery pieces, the three basic views of the front, top and left. This is an abstract expression of the object geometry. The three views are created from observation drawings and the human eye is fixed at a point. An object has six sides and can be drawn from six different views.

Three orthographic views are known as front view, top view and left view (Fig.75). One view can only reflect the shape of an object from one angle and it is not the overall shape of the structure. Three views are results of from three different orientations of the projected objects, the basic structure of the object can be a complete expression.

3.6.4 Rhinoceros—3D rendering of jewellery

3.6.4.1 The reason for choosing Rhinoceros.

In contemporary 3D software, the obvious difference of professional jewellery design software compared with the normal 3D software is that professional jewellery software comes with some common jewellery 3D models which are usually used in mass production for jewellery. These models of professional jewellery design software such as JewelCAD (Fig.76) can build models in the computer for mass production much faster than using the normal 3D software. These kinds of software have been used in the mass production for jewellery design and are quite popular. Normal 3D software does not have these features but the overall functionalities are similar.

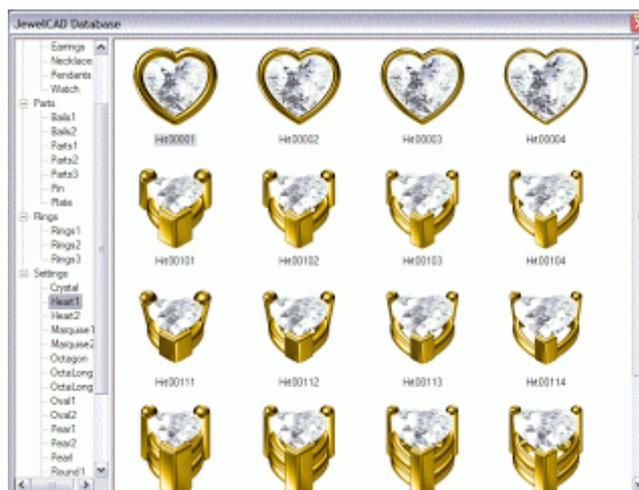


Fig. 76: The 3D jewellery models in the JewelCAD (Hafiludin, 2011).

My practice creates bespoke, couture and fresh designs rarely needs to use jewellery design software. For the first step I used JewelCAD and then I found out it is not necessary. Since Rhinoceros has powerful modelling capabilities for product design and my unique jewellery design do not need to use the common jewellery 3D models. Hence, I chose 3D software Rhinoceros.

Jewelry designers can use Rhinoceros for both the creation of technical drawings/layouts and the building of 3-dimensional models for the purpose of visualization. By using a 3-dimensional modelling approach to design, the designer can participate in the creative process to a greater degree than ever before (Buscaglia, 2009, abstract).

I found Rhinoceros to be an efficient and safe way to design jewellery. Details are clearer and each part of the design can be managed. Rhinoceros physical simulation model can supply more realistic visual effects to designers and help to set and adjust the final dimensions and details sizes in AutoCAD. This technology also allows the designer to add, subtract and edit their models how they like, allowing them to perfect their work before making the official solid

product (Buscaglia, 2009). These features of the software enable me to design a fully balanced object more quickly and simply than without the aid of the software.

3.6.4.2 Software technicalities

Users may need to imagine the object in 3D, picking out shapes and defining functions. I have imported my jewellery sketches into Rhinoceros and built up my jewellery models based on them. There are still some problems during the jewellery models building process including an unclosed line, excess lines, repeated lines and mass lines.

(i) Unclosed line

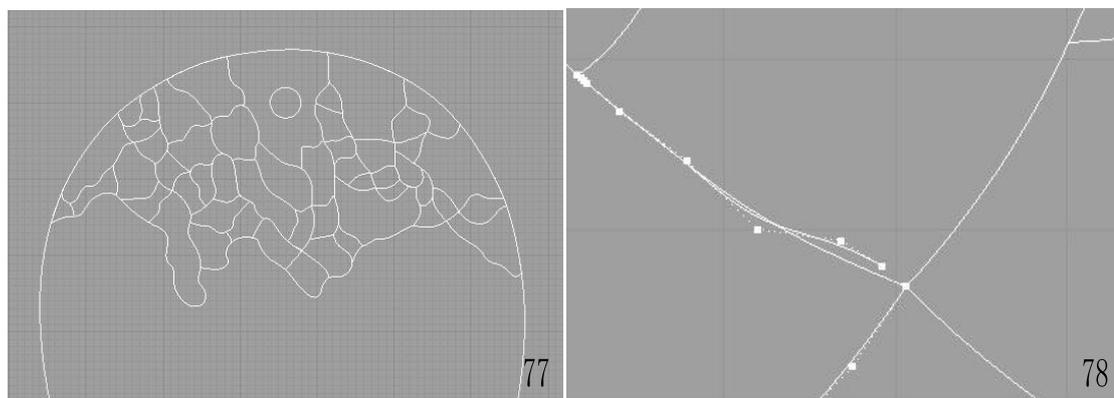


Fig. 77–78: The unclosed line (Jiang, 2012).

In the image (Fig.78) it can be seen that line has not closed. There are gaps in the model. It is difficult to zoom in because there is no indication of where the gap is (Fig.77). This model would miss a surface because the line has not closed.

(ii) Excess lines

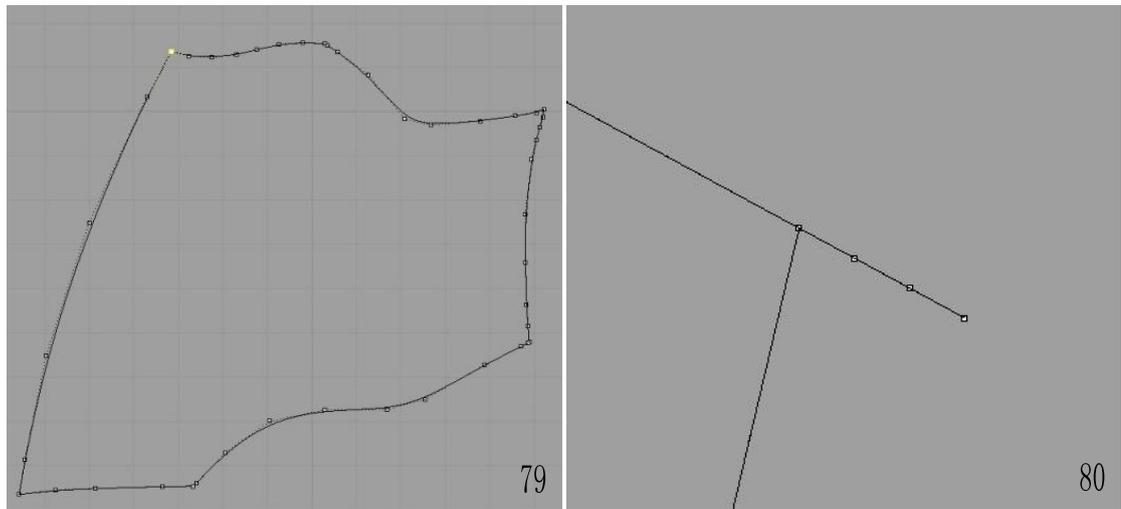


Fig. 79–80: The excess line (Jiang, 2012).

This image (Fig.80) shows that the line is too long, instead of stopping at its destination, it continues. It is difficult to spot this mistake without zooming in because there is no indication of where the longer line is (Fig.79).

(iii) Repeated lines

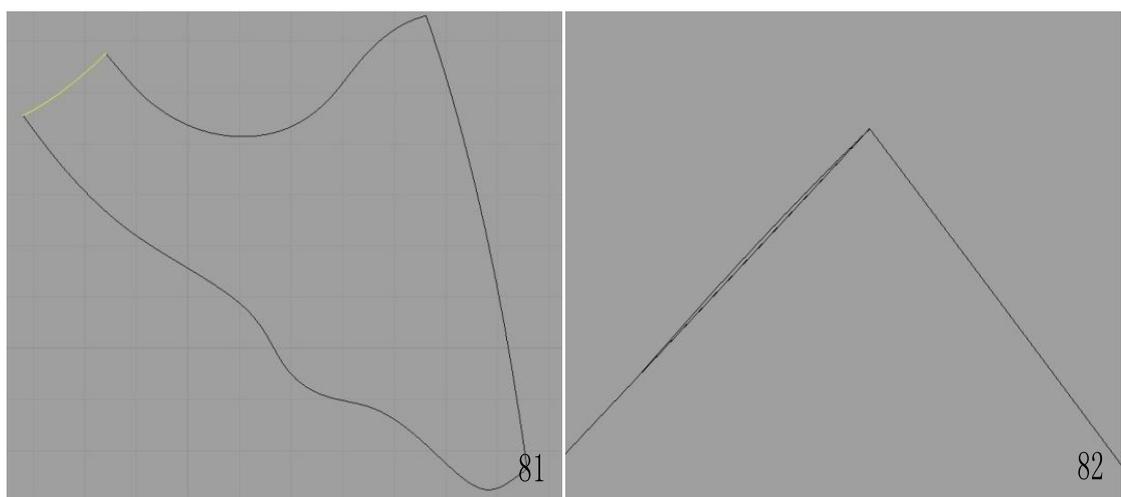


Fig. 81–82: The repeated line (Jiang, 2012).

In this image (Fig.82) it can be seen that there are two lines that connect to the same destination. Yet again it is difficult to spot without zooming in (Fig.81).

(iv) Messy line

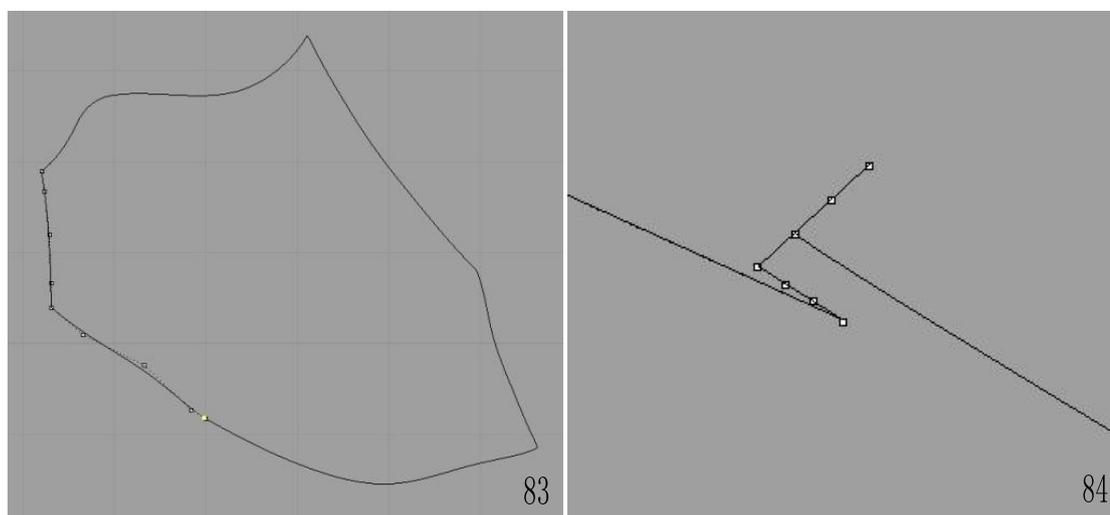


Fig. 83–84: The mass line (Jiang, 2012).

There are some messy lines in this image (Fig.84) that cannot be spotted without zooming in (Fig.83). All these problems often need to be zoomed in to over ten times. If these faults are not rectified the 3D model will not be able to print.

The building up of models in Rhinoceros is usually used for visual renderings before the innovation of 3D printing techniques. This process of rendering would not require the sizes of models to be accurate. Now, if using the model in the Rhinoceros for 3D printing, the size of model must be the same as the real one. The size requirement is much higher than it is when it's just used for to see on the screen. Since the materials and lighting are just there to make the final picture closer to the real one, these are used only for the final object as they only increase the size of file and reduce the speed of 3D printing. Removing materials

and lightings are really necessary before 3D printing. It does not always transcribe well to export STereo Lithography files (STL). These files are often problematic in 3D printing (Hoskins, 2013, p.39). To accommodate the problem with STL files I use other auxiliary software—Netfabb Studio.

3.6.5 Netfabb Studio

Netfabb Studio software is used for checking the 3D model problems from Rhinoceros before it is processed into 3D printing. There are some typical examples shown below:

(i) Thin Gaps

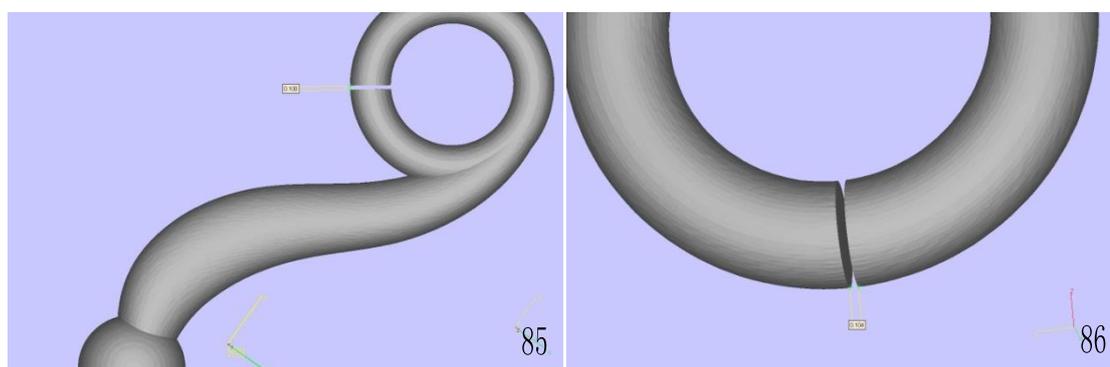


Fig. 85–86: The thin gaps in 'sperm' 3D model (Jiang, 2012).

This size of the gaps (Fig.85–86) is too narrow for 3D printing in silver. It would be closed after printing.

(ii) Too thin and too long



Fig. 87: The too thin and too long pin (Jiang, 2012).

This pin model (Fig.87) is too thin and too long for 3D printing in silver. It would bend after 3D printing, due to the material being too soft.

(iii) Thin Hole

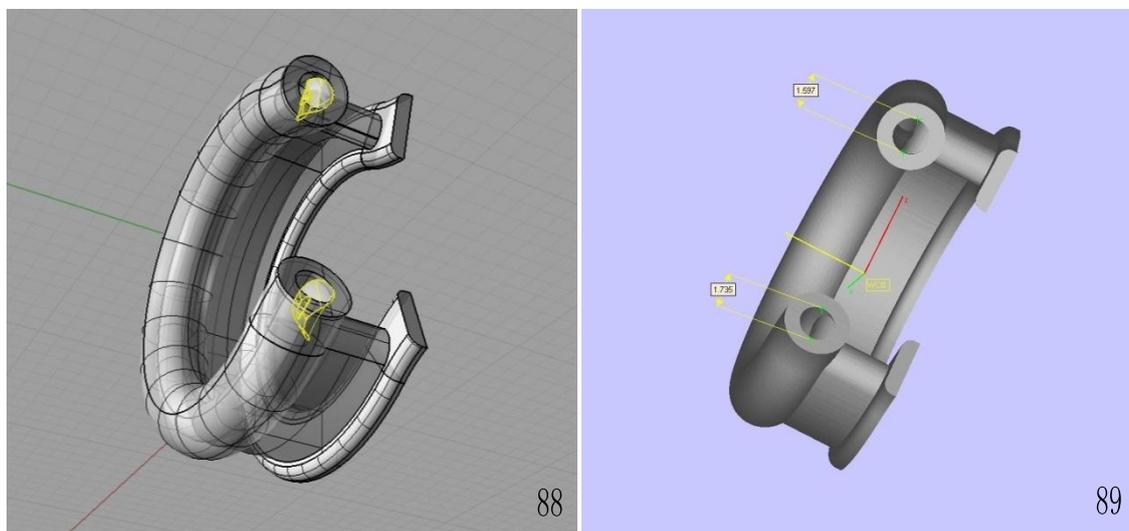


Fig. 88–89: The thin hole of pin stand (Jiang, 2012).

The holes of this pin stand model (Fig.88–89) are too thin and too long for 3D printing in silver. It is impossible to hollow out in 3D printing.

(iv) Thin walls

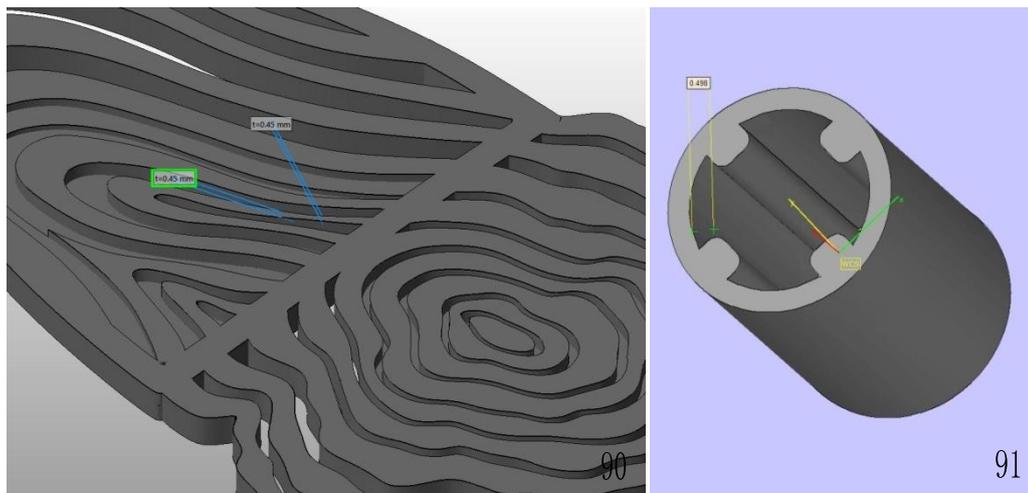


Fig. 90–91: The thin walls in 3D model of 'Annual Ring and Fingerprint' of pendant and 'Egg and Sperm' necklace (Jiang, 2012).

The walls of 'Annual Ring and Fingerprint' pendant (Fig.90) and 'Egg and Sperm' necklace (Fig.91) are too thin for 3D printing in blue strong and flexible plastic and silver.

(v) Shells

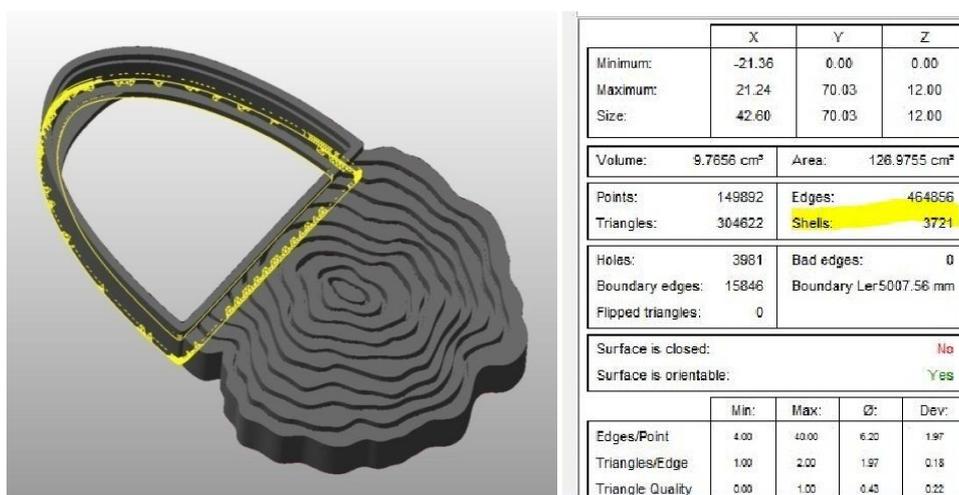


Fig. 92: Lots of shells in 3D model of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

There are more than 3000 shells in my 3D model silver part of 'Annual Ring and Fingerprint' brooch (Fig.92).

	X	Y	Z
Minimum:	-34.80	-12.00	-13.90
Maximum:	34.00	20.00	25.00
Size:	68.80	32.00	38.90

Volume:	10.8908 cm ³	Area:	327.6950 cm ²
Points:	150918	Edges:	633568
Triangles:	358868	Shells:	57803
Holes:	58533	Bad edges:	0
Boundary edges:	190532	Boundary:	137692.56 mm
Flipped triangles:	0		

Surface is closed:	No
Surface is orientable:	Yes

	Min:	Max:	Ø:	Dev:
Edges/Point	3.00	124.00	8.40	7.30
Triangles/Edge	1.00	2.00	1.70	0.46
Triangle Quality	0.00	1.00	0.75	0.21

Fig. 93: The model checking in Netfabb Studio (Jiang, 2012).

The software Netfabb can also check how many edges, border edges, flipped triangles, invalid orientation, shells, holes and the unclosed surfaces in the model (Fig.93). As a result most problems which would cause errors in printing can be identified, as anything invalid would affect the final 3D printing result.

3.7 3D Printing techniques

The first 3D printing machine which could actually turn the 3D file into a 3D additive printed object was the 3D Systems Stereolithography SLA 1, in 1986 (Hull, 2011, p.20). 3D printing was then still a new technology. Most 3D printing technology is housed in universities and used for academic research, as it is still developing (Hoskins, 2013, p.29). 3D printing frees people from the traditional complex producing of the computer model to actually create objects without specific tools and knowledge.

There are now four main technologies for 3D printing available, including Stereo Lithography (SLA), Fused Deposition Modeling (FDM), Layered Object Manufacture (LOM), Direct Metal Laser Sintering (DMLS), Power Binder 3D and Digital Light Processing. Each machine has different methods of making 3D designs, with FDM the method being the most popular (Hoskins, 2013, p44-56).

There are some main contemporary companies with a 3D printing service that specialise production through 3D printing machines in the market. They help the artist and designers to make their ideas a reality such as Shapeways.

Shapeways is the world's largest Marketplace for 3D objects. It is easily accessible through their website and allows the choice of 25 different printing materials (<http://www.shapeways.com/materials?li=nav>). It has software that automatically assesses CAD software and will let the user know if it is suitable for creating and provides prices. They have over 6,000 independent designers, printed over 1,000,000 3D works and has well known 3D print designer Bathsheba Grossman as part of their team (Hoskins, 2013, p.53) (Lipson, 2012, p.53–55).

There are other companies which provide various services ranging from helping the discovery of new ideas to 3D printing. These companies include: iMaterialise, 3T RPD, Metropolitan Works, Digital Manufacturing Centre (DMC) at the Bartlett, and Centre for Fine Print Research (CFPR) (Hoskins, 2013, p.54–56).

3.7.1 3D printing and glass firing

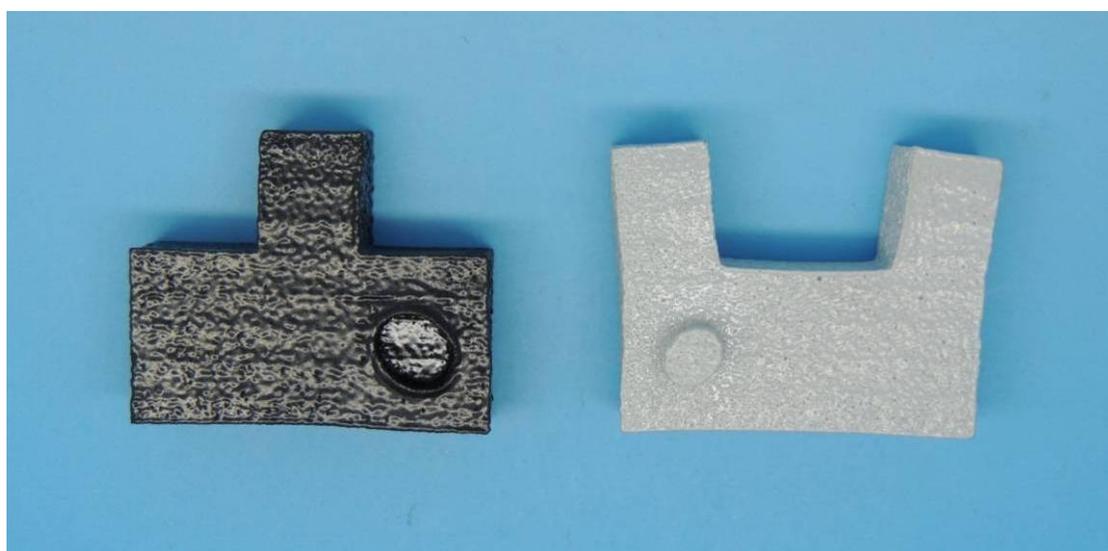


Fig. 94: The 3D printing glass of the 'Ao Tu 凹凸' ring set (Jiang, 2012).

With the continuous development of 3D printing technology and now the prices of 3D printer are declining, more and more materials are available for 3D printing. The Shapeway website for example, has more than 20 different materials available for 3D printing. They include Strong and Flexible Plastic, Alumide (Brittle Nylon Plastic), Detail Plastic (Acrylic based Polymer), Frosted Detail Plastic (UV-cured Acrylic Plastic), Steel, Sterling Silver, Brass, Bronze, Elasto Plastic, Full Colour Sandstone, Ceramics and Gold (Ibid). Nevertheless, 3D printing cannot print all kinds of material so far. I have experimented with 3D

printing to make my jewellery part of the glass into the 'Ao Tu 凹凸' ring set case study. The sizes of glass pieces are smaller than the 3D files which were the original 3D design models in the computer. The results were mixed: The glass shrank and deformed after 3D printing (Fig.94). To solve this problem, I have combined handcrafting with water-jet cutting in glass making (See chapter 4). In the future further testing and experimenting are necessary to provide the required results.

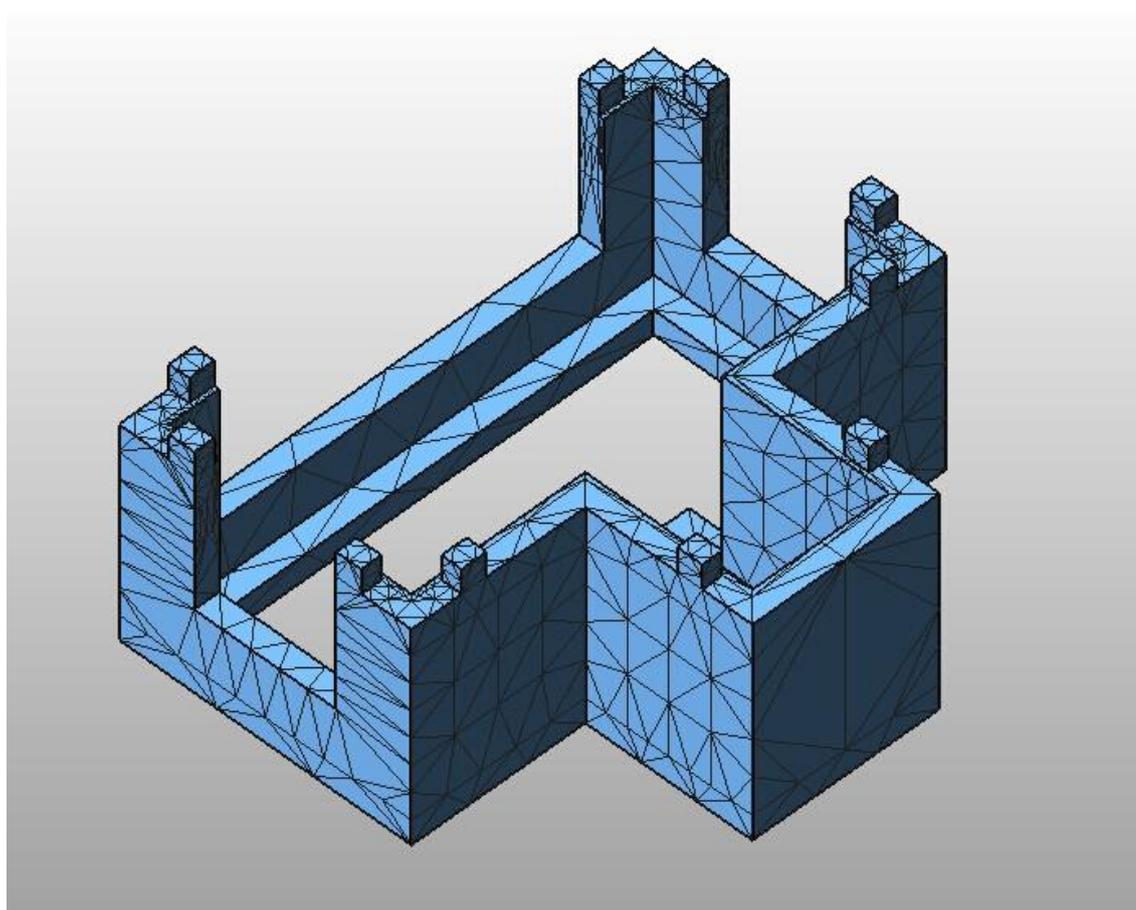


Fig. 95: the 3D model of the top of 'Tu 凸' ring (Jiang, 2012).

The STL file format is one of the standard file formats and which connects the 3D design software and the 3D printer. The STL file uses large-scale triangles to

simulate the surface of the object (Fig.95). The triangles are smaller than the surface of the model and have a higher resolution, the shape of the final 3D printing object would be better. Obviously, if the number of triangles is too low it will affect the accuracy of the final shape of the results.

In order to determine the amount of triangles or polygons that are necessary in 3D model, extensive trials were carried out. In general, the amount of polygons in a model determines the accuracy and quality of the printed result. However, too many polygons would slow down the printing process and would not necessarily improve the result as the printer cannot cater for the amount of detail. The capacity of the 3D printer and the computer determines what kind of models can be produced realistically. The 'Ao To' ring set, for example, has about 1,000,000 polygons but the 3D printer will run much faster if the polygons are less than 100,000. Hence, at the beginning of the research, there were many trials and errors but it was an invaluable learning process. The record of all my model problems of 3D printing can found in appendix 3.

3.7.2 My 3D printing process for using the 3D printing service

The STL files are uploaded to Shapeways. The website has the facility to examine any issues with printing. Depending on the material there may be an issue and the design will be modified. For example the thickness of silver must be at least 0.6mm thick (Appendix 4). After checking the print time is 2–4 weeks. If it arrives and is defective the model is posted back for amendments. This process can take approx.4–8 weeks.

To create optimal thickness the models are thicker than the final product to all for the silver polishing process in the 3D printing service. Sometimes, the items can

be polished too thinly and uneven. They also do not know which part of the items should be polished and which parts should not. To rectify this I have to amend the pieces when they arrive with additional soldering and polishing. Otherwise, for some specific cases even if the model does not have any wrong, it will also cause some errors (See fig.204 in section 4.3.6).

3.7.3 3D printing service costs

Silver is higher in cost compared to plastic. Fees are worked out on each model's requirement. I upload each piece separately. The most expensive silver parts are the sperm chains in the 'Eggs and Sperm necklace' case study. They cost about £600 for 3D printing in silver.

3.8 Glass techniques

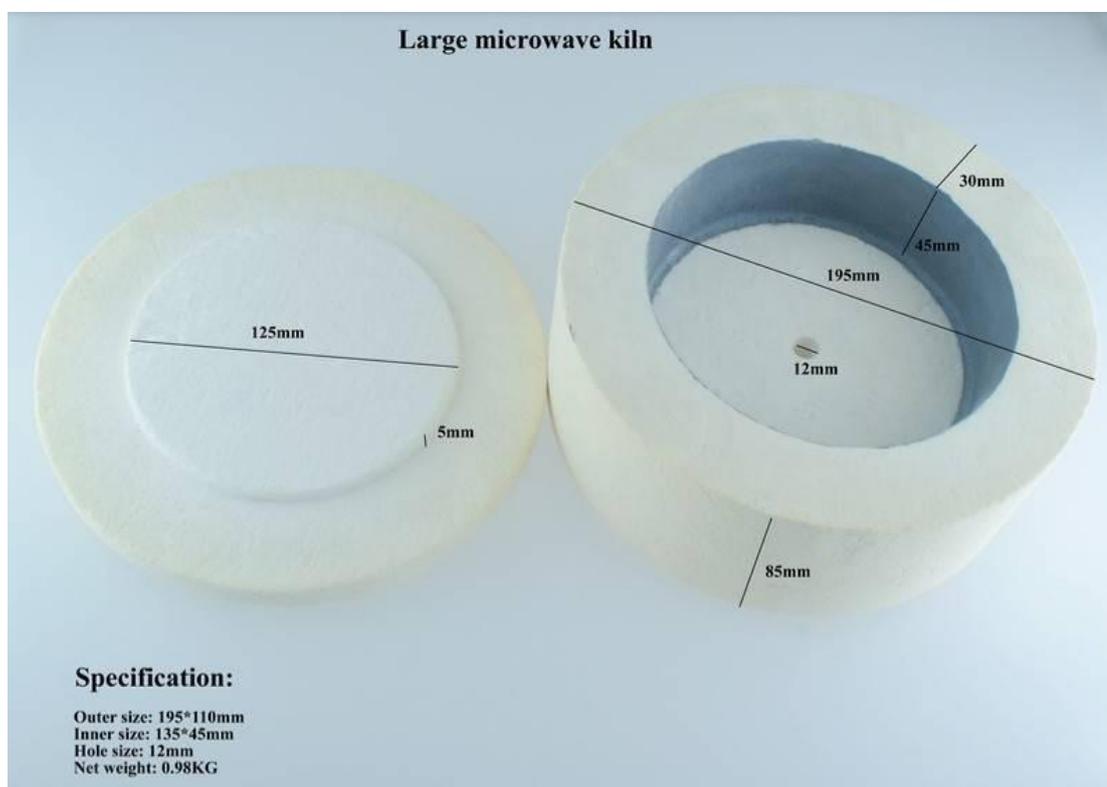


Fig. 96: Large microwave kiln for glass pendants.

Traditional glass making has to heat for at least a few hours or few days by using the traditional kiln. No matter what the size of the glass is they all need a long time to heat. Microwave kilns are an efficient method to make glass; it only takes a few minutes to reach the melting point of glass compared to the hours of the traditional kiln. This method was developed by Dr Alena Matejkova from Czech Republic (2011).



Fig. 97: Small pendant made in microwave kiln (Jiang, 2011).

Due to the limited size of the microwave in the contemporary market, the maximum microwave kiln (Fig.96) for glass pendants outer diameter is 19.5cm and the height is 11cm. The inner diameter is 13.5cm and the height is 4.5cm. This limits the size of the glass object which is a maximum of 12cm diameter and

height 4cm, including the mould. The temperature controlling of microwave kiln is also not as accurate as a traditional kiln. However, for small objects (glass pieces or pendants) (Fig.97) the microwave kiln is convenient, saving time and costs.

The Microwave kilns (Appendix.2) temperature is more difficult to control in the heating requiring more experiments. My experiments included fusing glass with other materials (Frit, Stringers, Powder, Dichroic Confetti, Millefiori). I also tried to integrate glass with unusual materials (Thinfire Kiln Paper, Chinese Paper with Ink Painting, Silver, Copper, and Gold Cerne Relief Outliner). I used objects to facilitate the firing (Fibre Paper and Fibre Rop). I recycled the fibre paper I used. Interestingly I found that Fibre Paper can make the glass surface smoother from fusing glass.

3.8.1 Fusing glass and Water-jet cutting

Recent use of digitally programmed water-jet cutting produces accurate contours that can form images. Combining image transfer techniques with kiln-forming processes provides possibilities for visual depth and richness (Sarmiento, 2012, p.64, British PhD).

In this section I will discuss the ways I began to investigate the relationship between glass techniques and 3D printing. Water-jet cutting was found to use computers to control the water-jet (Fig.98). 3D printing also uses computers, they both used CAD. I wanted to further explore the relationship between 3D printing silver and water-jet cutting glass. I used four case studies in Chapter 4 to explore this relationship:

- 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒),

- 'Button' brooch ('扣子' 胸针),
- 'Pleated Skirt' necklace ('百褶裙' 项链)
- 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针); 'Annual Ring and the Edge of Dancing Skirt' earrings-rings ('年轮与舞动的裙摆' 耳环-戒指)



Fig. 98: Water-jet cutting machine in Sunderland University (Jiang, 2012).

Fig. 99: AutoCAD file in Water-jet cutting machine (Jiang, 2013).

Fig. 100–101: Water-jet cutting section of the jewellery glass parts (Jiang, 2013).

The images above (Fig.98–101) show the main process of water-jet cutting the glass parts for these four case studies. I have designed and measured the different glass forms and sizes in AutoCAD to prepare the water-jet cutting for my four cases studies (Fig.99). Water-jet cutting technology cutting the glass sheet (Fig.100) is based on the drawing of DWG file in the AutoCAD software

but can only cut one side of the glass. Water-jet cutting technology enables an easier and faster production of complex glass shapes (Fig.101). There are rubs between the pinpoint of Water-jet cutting machine and glass once starting and finishing cutting. These rubs easily cause the defects of the glass pieces if cutting them separately (Fig.102). Chips and cracks are caused by sudden changes in direction and speed (Fig.103). To reduce this, I have to join a glass branch (Fig.104) between each shape and then separate them later by hand (Fig.105).



Fig. 102: Cut glass pieces separately (Jiang, 2012).

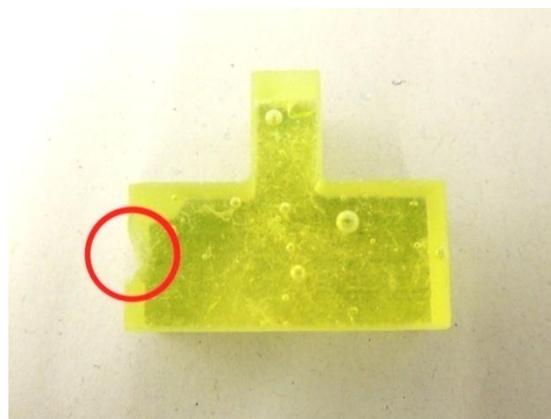


Fig. 103: Chips off glass piece of 'Ao 凹' (Jiang, 2013).



Fig. 104: Cut glass pieces with glass branch (Jiang, 2013).

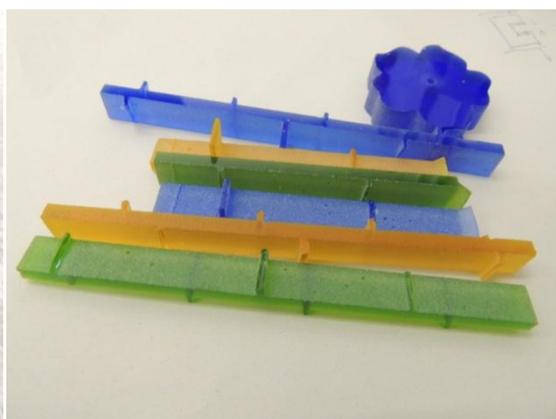
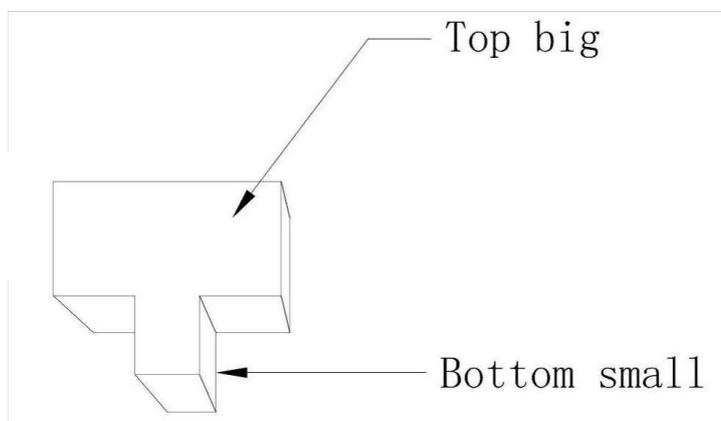


Fig. 105: Separate glass pieces with glass branch (Jiang, 2013).

Water-jet cutting machines are not designed for jewellery making. The cutting pinpoint is not accurate enough. Furthermore, the cutting pinpoint of the water-jet machine is easily deflated during the process (Fig.106), especially when it cuts the thicker glass pieces. These issues are resolved through post-processing polishing. Through several experiments I found that the thickness of the glass should be optimally 6.5cm with a minimum of 0.3cm and the water-jet pinpoint size should be 0.76mm with a glass sheet at least 80 mm x 100 mm.

Fig. 106: The deflection of Water-jet cutting (Jiang, 2012).



Water-jet cutting techniques need to be combined with the fusing glass techniques, this is because the water-jet cutting is based on the glass sheets which have been fused already before cutting (Fig.107–110).



Fig. 107: Hammer Banas frits to prepare for fusing glass sheet in the kiln (Jiang, 2012).



Fig. 108: The Banas glass frits become small glass sheets after fusing (Jiang, 2012).



Fig. 109: Fuse small Banas glass sheets from fig.108 become one big sheet (Jiang, 2012).

Fig. 110: One big colourful Banas glass sheet after fusing from fig.109 (Jiang, 2012).

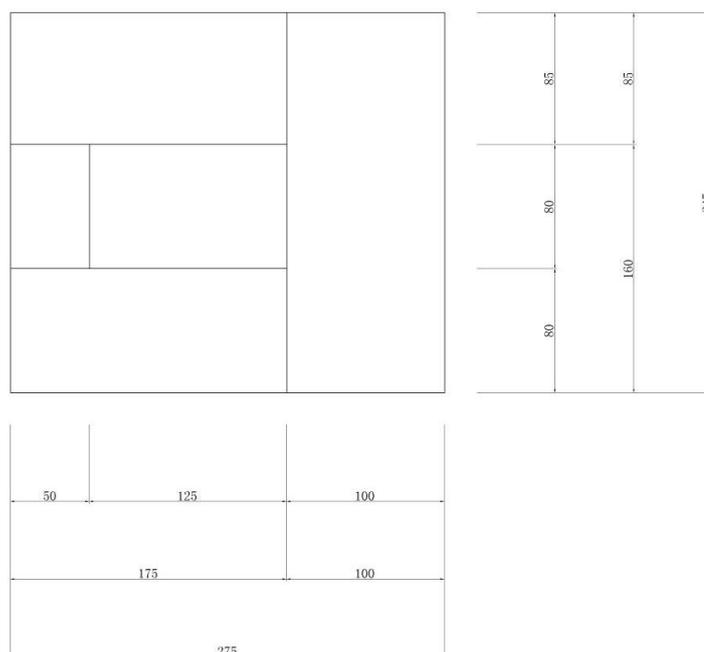


Fig. 111: The planning of fusing the Bullseye sheets in AutoCAD software (Jiang, 2012).

Due to the limited thickness of each glass sheet all calculations must be made beforehand (height, width, thickness) and also the amount of sheets I need (Fig.111). The fusing of several glass pieces achieves the desired thickness of the object by a layering method (Fig.112–113).



Fig. 112: Cut the 3 layers of different size of Bullseye sheets in different colours before fusing (Jiang, 2012).

Fig. 113: The 3 layers of different size of Bullseye sheets in different colours after fusing (Jiang, 2012).

I use Bullseye glass and Banas glass in the fusing glass for Water-jet cutting. They are two different kinds of glass and have different fusing temperature processes (Fig.114).

Bullseye glass fusing temperature		Banas glass fusing temperature	
120/h-677	45min	120/h-820	3hours
222/h-804	10min	100/h-475	2hours
Full (999/h) -483	2hours 30 min	25/h -440	pass (0 min)
50/h-427	pass (0min)	50/h-390	pass (0min)
90/h-371	pass (0min)	50/h-30	off

Fig. 114: The different temperatures of fusing Bullseye glass and Banas glass (Jiang, 2012).

3.8.2 3D printing in kiln casting glass

Kiln casting has a long history in glass making and is widely used by contemporary glass artist. The traditional kiln casting process usually has three main steps:

- i. Mould making (See GOT for detail explanation).
- ii. Inverted casting (Ibid).
- iii. Model polishing (Section 3.8.3).



Fig. 115: 3D printing plastic 'Egg' to make 'Egg' mould putty (Jiang, 2012).

Fig. 116: Use 'Egg' mould putty to make 'Egg' wax (Jiang, 2012).

Fig. 117: Lost wax to get 'Egg' glass mould (Jiang, 2012).

Fig. 118: 'Egg' glass pieces after kiln firing (Jiang, 2012).

One method of forming a mould is called 'lost wax' (GOT) method. The kiln casting method (GOT) is best to create the complex surface of 'egg and sperm' (Chapter 4). Traditional model making methods are generally carved by hand with clay but this is not accurate enough for my work. I experimented with 3D printing techniques to create the egg shape with mould putty. A more detailed description of this process can be found in my case study (Section 4.3.7). Briefly, the process can be described as:

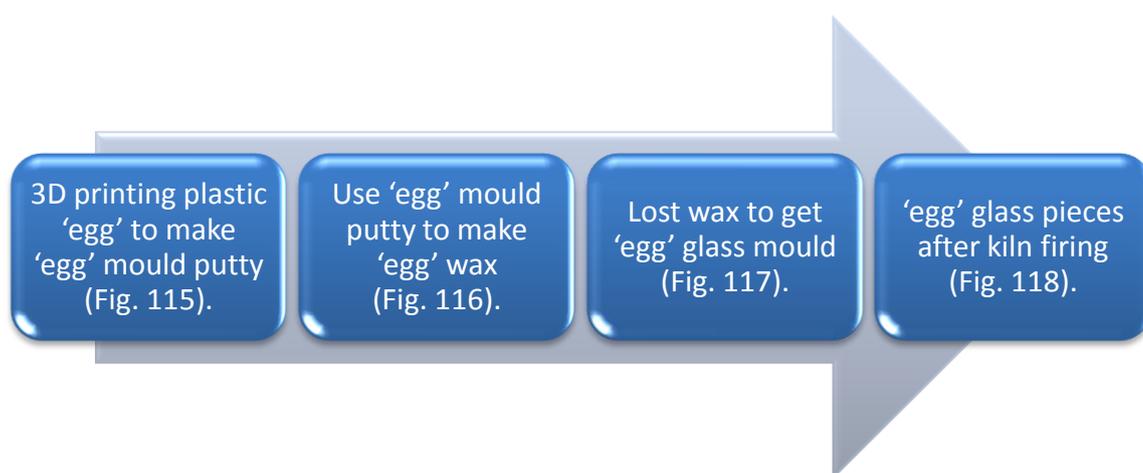


Fig. 119: Combining 3D printing and kiln casting to create 'egg' glass (Jiang, 2014).

For my research, I have established an innovative process combining 3D printing, kiln casting glass with mould putty to create glass for jewellery design (Fig. 115–118). The above process (Fig.119) is more accurate, convenient and efficient than handmade with the gel flux method.

3.8.3 Fire polishing

Polishing was the next problem I faced. Many complex forms (curve shape, concave and convex shape and so on) of glass polishing are hard to achieve by traditional polishing methods. The glass pieces can crack easily when you are not careful during the polishing process and its surface also causes different effects of polishing in one piece since it may be uneven or unbalanced.



Fig. 120: My glass grinder machine (Jiang, 2012).

Fig. 121: The grinder machine in University of Sunderland (Jiang, 2012).

Fig. 122: The hand grinding area in University of Sunderland (Jiang, 2012).

Fig. 123–124: The glass polishing machines in University of Sunderland (Jiang, 2012).

Normally polishing glass is achieved in few steps. ① Grinding glass with Silicon Carbide powder (120girt) by machine grinder (Fig.120–121), ② Grinding glass with Silicon Carbide powder from 120girt, 300girt to 600girt by hand (Fig.122), ③ Grinding glass with Pumice powder by polishing machine (Fig.123), ④ Grinding glass with Cerium Oxide powder by polishing machine (Fig.124).



Fig. 125: The comparison of 'Fingerprint' glass pieces after polishing (Jiang, 2012).



Fig. 126: The distortion and uneven fire polishing of 'Fingerprint' glass pieces (Jiang, 2012).

I found fire polishing (GOT) the most effective as it can polish complex shapes and the results are also shinier. The right one of Banas 'Fingerprint' glass piece after fire polishing is shinier than the left one of Banas 'Fingerprint' glass after normal polishing method (Fig.125). Fire polishing needs careful control of temperatures and through trial and error the most effective temperatures for the Bullseye glass was 720 °C and the Banas glass was 680 °C. Fluctuating temperatures can cause distortion or an uneven finish (Fig.126).

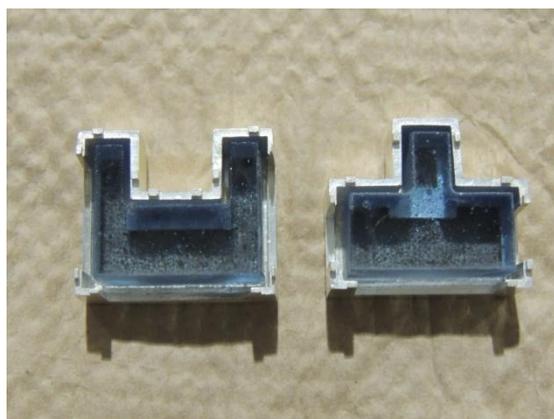


Fig. 127: The 'Ao Tu 凹凸' glass pieces before fire polishing (Jiang, 2012).

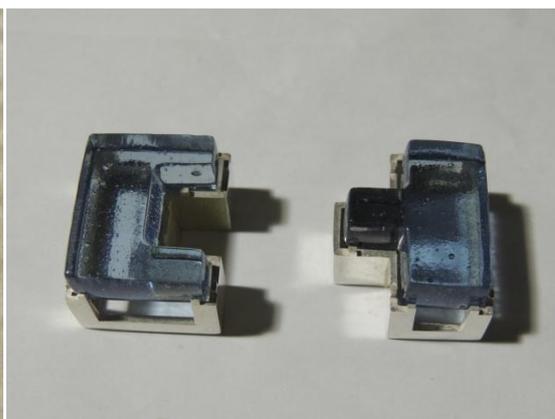


Fig. 128: The expanded and shrunk 'Ao Tu 凹凸' glass pieces after heating (Jiang, 2012).

However the glass shape and size will always change due to the heating and softening of the surface (Fig.127–128). To correctly join the glass to the silver these changes have to be predicted intuitively thought out. I had to make the glass slightly smaller and slightly thicker before fire polishing.

3.8.4 Lampworking

Lampworking is suitable for making small solid glass works and it is generally used for making glass beads and some glass sculptures. Soda lime glass and borosilicate are the two main types of glass in the use of contemporary lamp-working. Soda lime glass is the most popular glass in contemporary lamp-working. It is also known as 'soft' glass which is usually coloured based and used for making glass beads. If the lamp-working is used in big glass sculptures it usually shows in the form of a stencil and uses the borosilicate which is also known as 'hard' glass and is transparent by artists, such as Rope Trick's work (Fig.129).

The difference between them is that soda lime glass' melting point is lower than borosilicate glass. Soda lime glass expands more than borosilicate glass when they have been heated compared with cooling them. This feature leads to soda lime glass cracking more easily than borosilicate glass when the temperature rises during the heating process. For example, if one part of soda lime glass cools down too quickly, that part would be solid immediately and then cause cracking.



Fig. 129: Rope Trick, 14 inches high 14 inches wide 7 inches deep, flame worked glass rod (Dunham, 2002, p.33).

This situation often happens when I use the soda lime glass in my lampworking (Fig.130). Borosilicate glass is much more resilient than soda lime glass in this part since it has a flexible structure.



Fig. 130: The cracked Osmanthus flower glass by lampworking (Jiang, 2012).



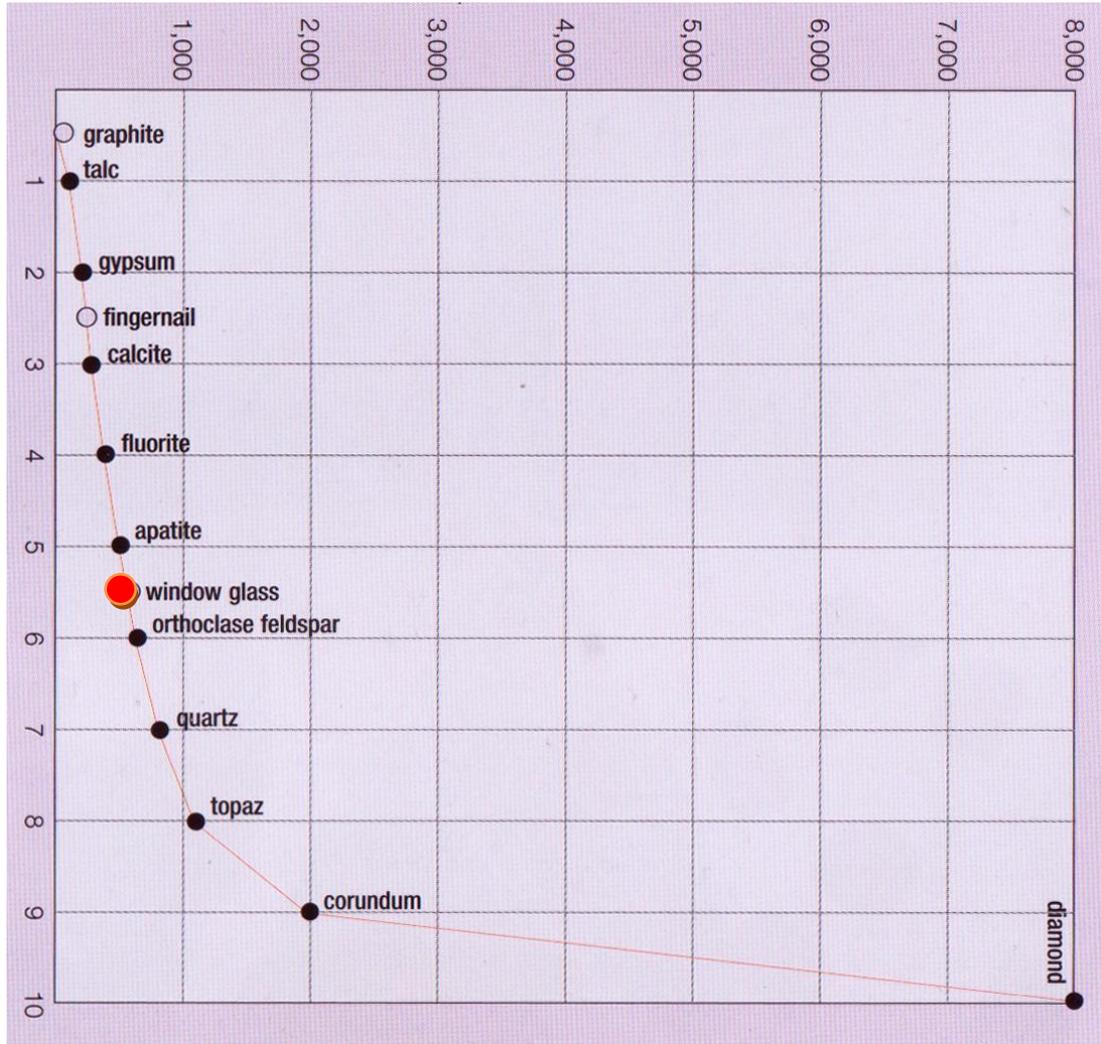
Fig. 131: The Osmanthus flower glass pieces made in yellow Soda Lime glass and clear Borosilicate glass by lampworking (Jiang, 2012).

I used the characteristics of lampworking technology to create the Osmanthus flower glass piece in my case study of the 'Osmanthus' ring set. Since the size requirement is similar to the size of glass beads. Soda lime glass and borosilicate glass have both been used in this case to make the glass pieces. Soda lime glass has been used to make the colourful Osmanthus glass and borosilicate glass has been used to make the transparent Osmanthus glass (Fig.131).

3.9 Silversmith techniques

3.9.1 The problem of glass setting

The biggest difference of glass jewellery design compared to metal is its fragility and its low melting point. Glass can be scratched and damaged during the general stone setting (GOT) process. Achieving a good combination of glass and metal has been a difficult challenge. Stone setting is one of the essential techniques for making jewellery; attaching the gemstones to the metal casting. The main purpose of stone setting is to inlay the stone stably. The process can also enhance the beauty of gemstones from their cut, clarity and colour. Jewellery manufacturers use a variety of methods to setting gemstone jewellery products. It is generally based on the proportion and cutting of the gemstone, some of them are well known and used all over the world. There are Claw setting, Bezel setting, Tension setting, Channel setting, Pave setting, Invisible setting, Burnish/ Flush setting, Bar setting, Bead setting and Cluster setting (Swiss Gemological Laboratory).



Mohs' Scale of Hardness	
1.	talc
2.	gypsum
3.	calcite
4.	fluorite
5.	apatite
5.5	GLASS
6.	feldspar
7.	quartz
8.	topaz
9.	corundum
10	diamond

(Diagram summaries from Crowe 2008, p.22)

Fig. 132–133: Mohs' Scale of Hardness (Crowe, 2006, p.22).

All of these techniques require pressing the stone in order to make the metal part hold it. The Bezel setting for crystal (Fig.134–136) uses thin metal strip soldering as a wrap to hold the stone in the place with proper balance and angles. It has to press metal all the way around the stone edge for holding it in place. This setting can protect the edge of the stone so it is mostly used for the fragile gemstones such as opal (Swiss Gemological Laboratory). Although glass jewellery setting also often use this bezel setting in contemporary glass jewellery design but if glass is broken during the wearing process it would be hard to replace it.



Fig. 134, 135, 136: Bezel setting for crystal (Jiang, 2009).

Bezel setting cannot avoid the glass being fragile. Some of those setting methods even have some requirement for the hardness and size of the stone. For instance, flush setting required the diameter of stone to be smaller than 25mm, Mohs' scale of hardness at least 6.5 (Li, Luo and Lai, 2011, p.69). The glass hardness is 5.5 in the Moh's hardness scale (Fig.132–133) (Crowe, 2006, p.22). It is obvious that glass is not suitable for this setting method since its hardness is much lower than a gemstone.

3.9.2 Double layers setting



Fig. 137–138: Double layers carved setting (Jiang, 2009).

Contemporary glass jewellery is advocating the use of big pieces of glass 3–8cm approx. From my MA study, I have developed a novel way of double layers a setting to inlay tiny pieces of glass (Fig.137–138). This method is achieved by the traditional hand making, making glass pieces first and then making the metal part to set the glass pieces.



Fig. 139: The glass metal for exhibition in Birmingham University (Jiang, 2011)

I found my double layering method more suitable for glass size 1–2 cm. After this, it cracks easily (Fig.139). The traditional claw and bezel setting can be used for the glass setting but the glass can easily be scratched and damaged, making it inefficient.

3.9.3 Interchangeable setting

In order to achieve the better integration of materials and design, it is important to solve the issue of fragility and the heaviness of glass. Through extensive practice, I developed the idea of 'Interchangeable'. By encasing 'interchangeable' glass pieces in silver, it solves the drawbacks of fragile glass as broken pieces can be replaced. It also allows different glass to be used for different occasions. This highlights the colourful and morphological nature of glass. Thus, the entire design can foster strengths and circumvent weakness. This embodied the 'harmony between man and nature' in a way that is not contrary to nature, but also can show harmony with nature.

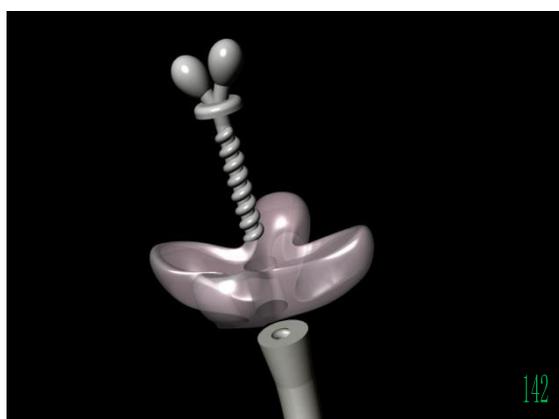
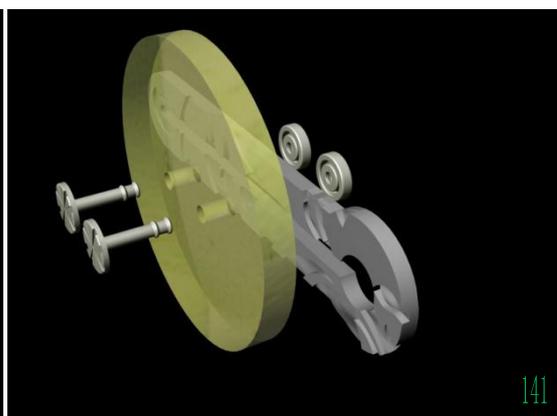
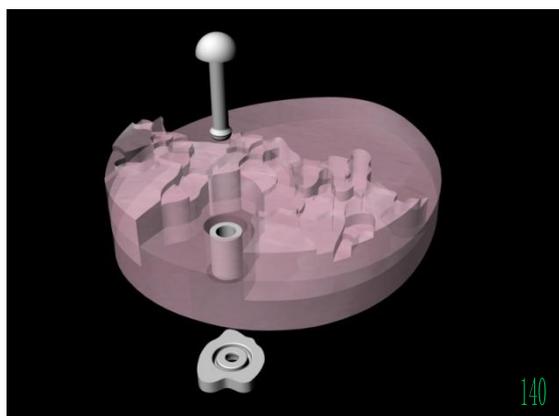


Fig. 140: Flexible peg setting in "Egg and Sperm" necklace ('精子和卵子' 项链) (Jiang, 2013).

Fig. 141: Flexible peg setting in 'Button' brooch ('扣子' 胸针) (Jiang, 2013).

Fig. 142: Flexible peg setting in 'Osmanthus' ring set (Jiang, 2012).

Due to the fragile and expansion of glass pieces new glass setting strategies have been developed. They are flexible and can make parts replaceable and suitable for setting bigger than 2cm pieces of glass. They are: flexible peg setting, interchangeable half surrounding and interchangeable surrounding setting.

3.9.3.1 The flexible peg setting

The flexible peg setting is to drill one or two holes on the glass and use the metal to go through the glass holes to set the glass pieces. In this way the minimum size of the glass piece should be at least 2 cm. The forms of the glass and metal are unlimited. Different cases have different solutions depending on the designs. This method has been used in my three cases study of 'Egg and Sperm' necklace ('精子和卵子' 项链) (Fig.140), 'Button' brooch ('扣子' 胸针) (Fig.141) and 'Osmanthus' ring set ('桂花' 组戒) (Fig.142).

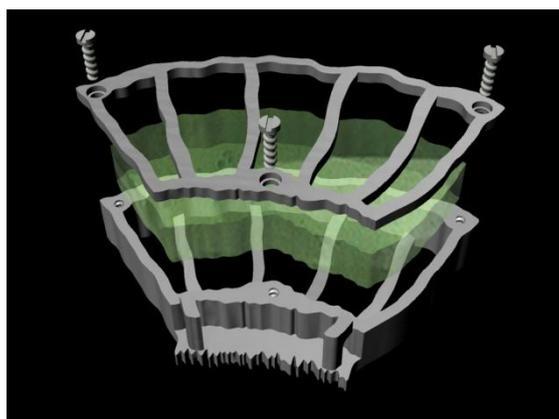


Fig. 143: Interchangeable surrounding setting in 'Pleated skirt necklace' ('百褶裙' 项链) (Jiang, 2012).

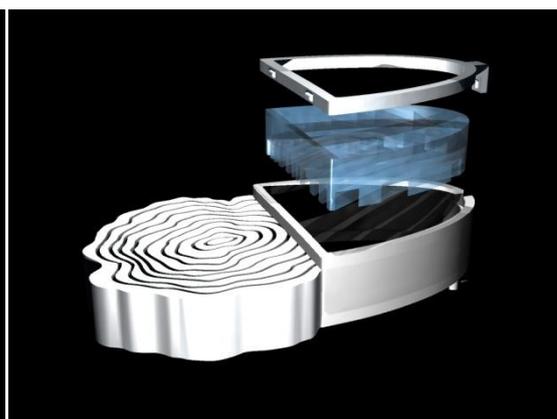


Fig. 144: Interchangeable surrounding setting in 'Annual ring and fingerprint brooch' ('指纹与年轮' 胸针) (Jiang, 2013).

3.9.3.2 Interchangeable surrounding setting

Interchangeable surrounding setting uses a metal strip to wrap around the glass piece to hold it in place which is quite similar with the traditional Bezel setting. Then one side uses an open-able metal cap to cover it. The side of glass piece is invisible and the shapes of glass are unlimited and it also can have lots of different solutions depending on the design. This method has been used in my two cases study of 'Pleated Skirt' necklace ('百褶裙' 项链) (Fig.143) and 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针) (Fig.144).

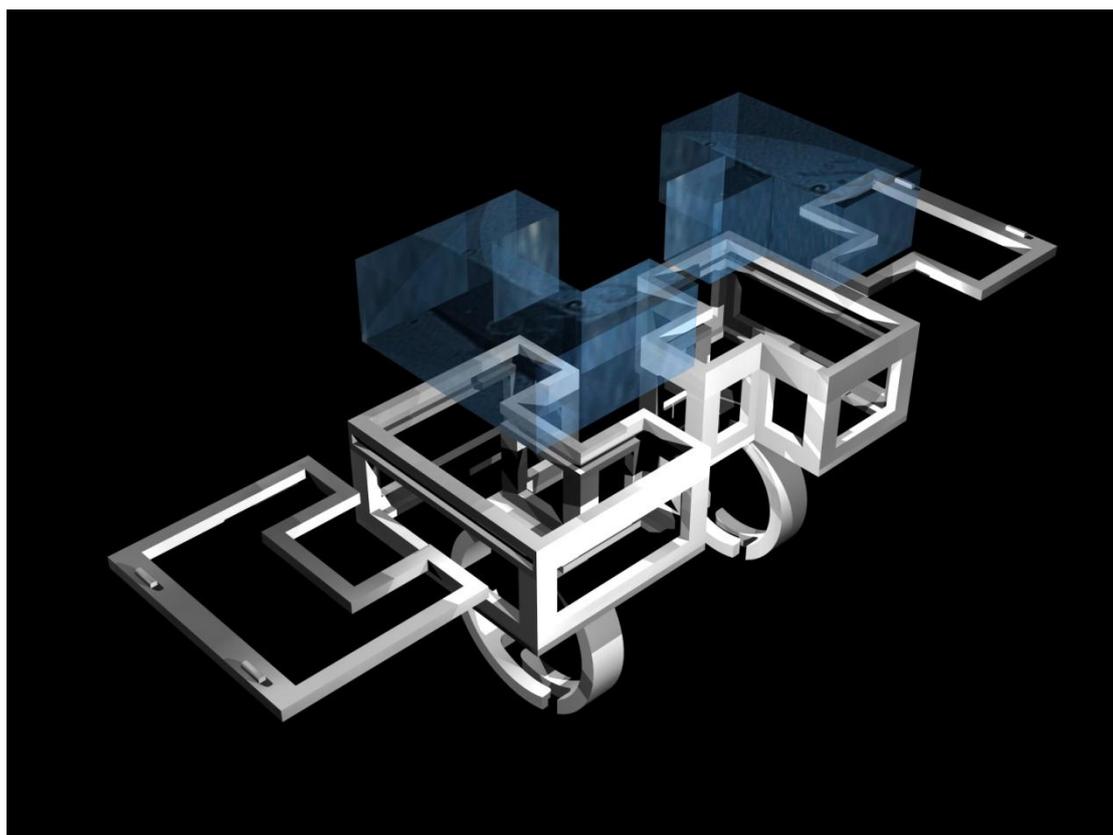


Fig. 145: Interchangeable half surrounding setting in 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸' 情侣戒) (Jiang, 2012).

3.9.3.3 Interchangeable half surrounding setting

Interchangeable half surrounding setting uses a metal strip that wraps around the edge of the glass piece to hold it in place as a box. Then one side uses an open-able metal cap to cover it. All sides of glass piece are visible and the shapes of glass are unlimited and it also can have lots of different solutions depending on the design. This method has been used in my cases study of 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒) (Fig.145).

3.10 Summary

Chinese ink painting provides a greater media to mediate the inspiration with the ideas sketches and drawings during the idea preparation period. The technical production tests give me more experiences and a deeper understanding of the nature of glass material and also give me different experiences from using the various techniques, equipments and software.

3.10.1 Technology

Advancement in modern technology enables more efficient production processes. The 3D printing technique is the most typical representative. Greater range of shapes and forms can be created with 3D printing, water-jet cutting, microwaves kiln forming, fire polishing advancement in technologies. Simulated design provides production cost effective means of production and greater quality of the final object. Production speed has increased dramatically

compared to only hand crafting jewellery. A combination of different techniques from machine and handmade productions provide more production possibilities and enhance the production qualities, such as combining 3D printing with kiln casting (Section 3.8.2) and combination of 3D printing with silversmith (Section 3.2). This innovative way can achieve complementary advantages for each other.

3.10.2 Combining materials

Case Studies	The flexible peg setting	Interchangeable surrounding setting	Interchangeable half surrounding setting
'Concave and Convex' Couple Ring Set ('Ao Tu') ('凹凸'情侣戒)			√
'Egg and Sperm' Necklace ('精子和卵子' 项链)	√		
'Button' Brooch ('扣子' 胸针)	√		
'Pleated Skirt' Necklace ('百褶裙' 项链)		√	
'Annual Ring and Fingerprint' Brooch ('指纹与年轮' 胸针)		√	
'Osmanthus' Ring Set ('桂花' 组戒)	√		

Fig. 146: The innovative interchangeable setting methods in different case studies (Jiang, 2014).

The following list demonstrates how combining different materials was advantageous to my jewellery.

- i. The malleable characteristic of glass compared to other materials provided a huge range of design possibilities.
- ii. Combining different materials can enhance their characters from being compared to each other, such as silver and glass.
- iii. New methods of setting glass and silver need further attention.
- iv. The new strategies (flexible peg setting, interchangeable half surrounding and interchangeable surrounding setting) of making parts replaceable were found to be efficient and effective (Fig.146).

3.10.3 Software

A combination of software of AutoCAD, Rhinoceros, Netfabb Studio is necessary to achieve the detail and degree of precision in many contemporary jewellery designs and practices.

3.10.4 Glass techniques

This list discusses various glass techniques and what they are best used for.

- i. A balance between the size of the kiln and the time necessary to fire an artwork needs to be taken into consideration.
- ii. Microwave kiln has increased dramatically in speed, convenience, lower costs for small objects and glass making compared to the traditional kiln (Section 3.8).
- iii. There are many possibilities in combining 3D printing, water-jet cutting, lampworking and kiln forming techniques.
- iv. Fire polishing is an effective method for polishing complex shapes, such as an oval. Its quality is shinier than normal polishing (Section 3.8.3).

Chapter 4: Case Studies

4.1 Introduction

This chapter presents six case studies:

- 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒),
- 'Egg and Sperm' necklace ('精子和卵子' 项链),
- 'Button' brooch ('扣子' 胸针),
- 'Pleated Skirt' necklace ('百褶裙' 项链),
- 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针)
- 'Osmanthus' ring set ('桂花' 组戒).

The case studies aim to analyse and evaluate different expressive features of the Chinese philosophy of 'harmony between man and nature' in contemporary glass jewellery design. There are six broad philosophical principles in which the case studies focus them are:

- 'Integration of Yin and Yang 阴阳合一',
- 'Unification of Time and Space 时空合一',
- 'Same Structure of Man and Nature 天人同构',
- 'The Concept of Change 变化',
- 'Self-cognition and External-cognition 内外合一',
- 'Combination of Subject and Object 主客合一'.

The studio based methods discussed in section 1.8.2 (Fig.4 the personal holistic research glass jewellery production method and Fig.5 my personal research method diagram) are used to frame the investigation. The philosophical

approach is drawn principally from the Chinese tradition, e.g. 'Holistic approach', 'Harmony', 'Balance', 'Flexibility/Change' (See fig.27 in section 2.6.1). This section is also informed by philosophical and historical perspectives in glass jewellery making. For different characteristics and issues specific to case study, there are different specific solutions. The case studies were carried out from 2010 to 2013, and each case study informed the next and thereon after.

4.2 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒)

4.2.1 Introduction

The 'Integration of Yin and Yang' is the basic expression of a relationship between two elements in the philosophy of 'harmony between man and nature'. Yin and Yang are both in conflict and complementary to each other. 'Integration of Yin and Yang' can be achieved by attempting to regulate the Yin and Yang.

Concepts associated with 'harmony between man and nature' have sometimes been described as difficult to understand. Some of the concepts of 'Yin and Yang' can facilitate clarity and understandings of the 'harmony between man and nature'. Yin and Yang were developed by the Chinese ancients to describe a kind of abstract properties of two opposite and complementary elements in the universe. It is the unity of opposites and philosophical thinking law, as famous Chinese philosopher Yulan Fung (冯友兰) describes:

"The constant (principle) of Heaven and Earth is the succession of the Yin and Yang. The Yang is Heaven's beneficent power, while the Yin is Heaven's chastising power..." (Fung, 1952, p.29)

The regulating of Yin and Yang aims to achieve balance in one's life in the Chinese tradition. The original male—Yang, positive and female, negative—Yin characters (Zhou, 2003, p.93-94) will be used in this study. These concepts are in a basic sense, representations of conflict and harmony.

4.2.2 Objectives

To create new concave and convex glass shapes with interchangeable half surrounding setting. To use Chinese calligraphy 'Ao Tu 凹凸' to examine ways of expressing 'Yin and Yang' and the principle of 'Change' through my contemporary jewellery practice.

4.2.3 Materials and process

Different colours of Banas and Bullseye glass are used to make the interchangeable 'Ao Tu 凹凸' shape glass parts. The silver (925) is used for the ring structure. The process involved in creating the rings includes:

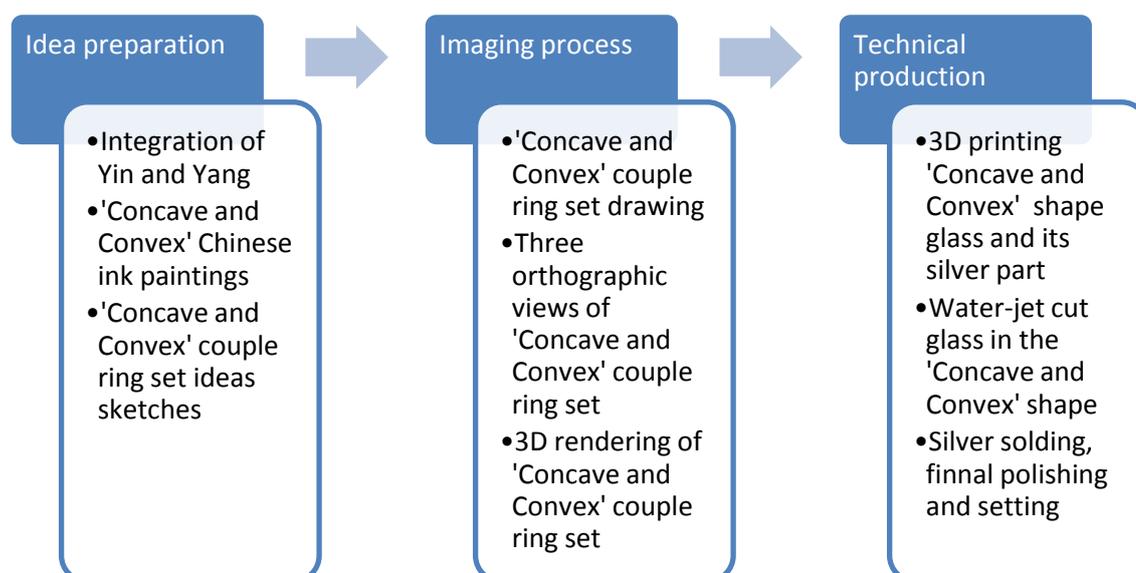


Fig. 147: The developing process of 'Concave and Convex' couple ring set (Jiang, 2014).



Fig. 148: Guanzhong Wu 吴冠中, 2007, 'Concave and Convex 凹凸' in 'Walk in 798' Exhibition.

Fig. 149: Meng You Wang 王孟友, 2008, 'Ao Tu Fantasia 凹凸幻想曲' Calligraphy.

Fig. 150: 'Ao Tu 凹凸' Ink Painting (Jiang, 2011).

The inspiration for the 'Ao Tu' painting comes from Chinese calligraphy. The 'Ao Tu' ink painting explores these relationships between Yin and Yang (Fig.150). The Chinese calligraphy words, concave and convex, are represented by the symbols '凹' and '凸'. These hieroglyphs come from an ancient time where stone was used to draw different shapes by Chinese ancestors. These words have been used in various Chinese calligraphy art works, famous Chinese painter and Professor Guan Zhong Wu (吴冠中) (Fig.148) and Chinese artist, designer and Professor Meng You Wang's (王孟友) '凹凸 Fantasia' (Fig.149).



Fig. 151: '凹凸' shape sculpture in Ashburne House, the University of Sunderland (Anon, 2011).



Fig. 152: Raewyn Roberts, 'Aspects of Dislocation', set of six, cast glass, each 15 x 16cm (King, 2004, p.93).

These shapes were also used in some Western sculptures. Coincidentally they can be found in the grounds of Ashburne House at the University of Sunderland (Artist unknown, 2011) (Fig.151). The New Zealand glass artist Raewyn Roberts's cast glass work set of six 'Aspects of Dislocation' (Fig.152) is quite similar to my 'Ao Tu 凹凸' glass artwork but the intention and background are very different.

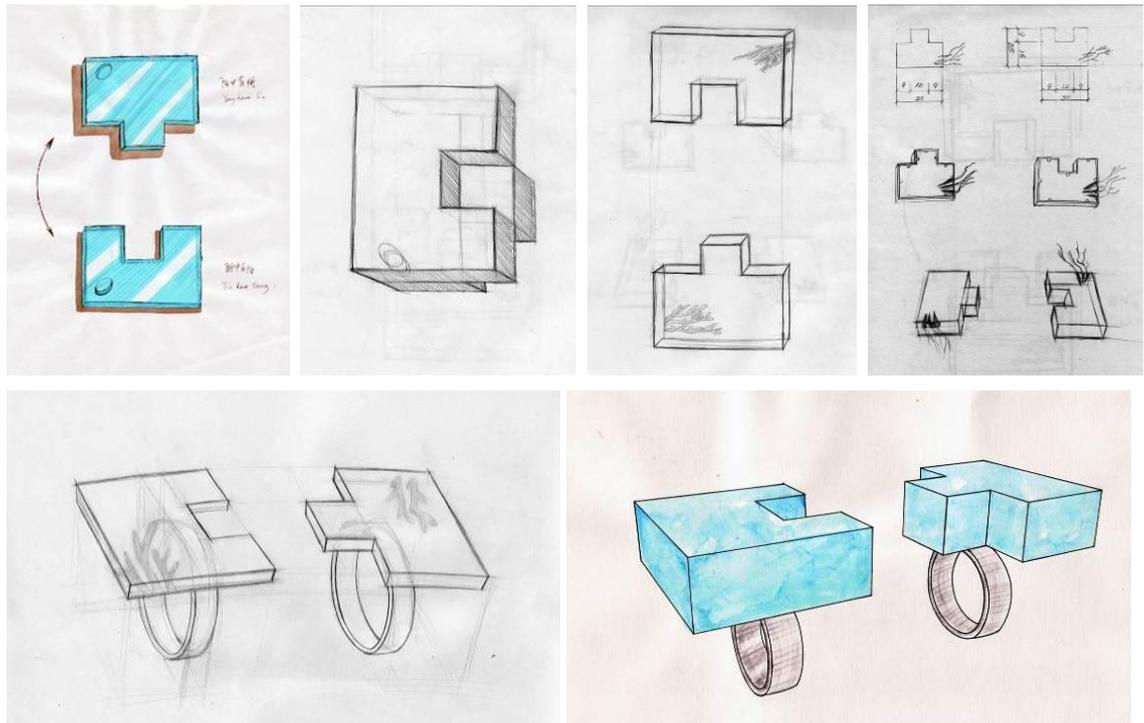


Fig. 153: 'Ao Tu 凹凸' ring set ideas sketches (Jiang, 2011).



Fig. 154: 'Ao Tu 凹凸' ring set detail drawing (Jiang, 2011).

I developed my initial '凹凸' jewellery ideas (Fig.153) from my ink Chinese painting (Fig.150). The 'Ao Tu 凹凸' ring set ideas were taken further in detailed jewellery drawings (Fig.154). Size and measurements were considered from various viewpoints in AutoCAD software (Section 3.6.3). These views helped the design stages (Section 3.6.4). As can be seen in the view point the shape was complex and many features needed close attention (Fig.155–156), such as removing the plant shapes inside the glass from 'A' to 'B' in fig.156. This decision was influenced by the Western concept of 'less is more'.

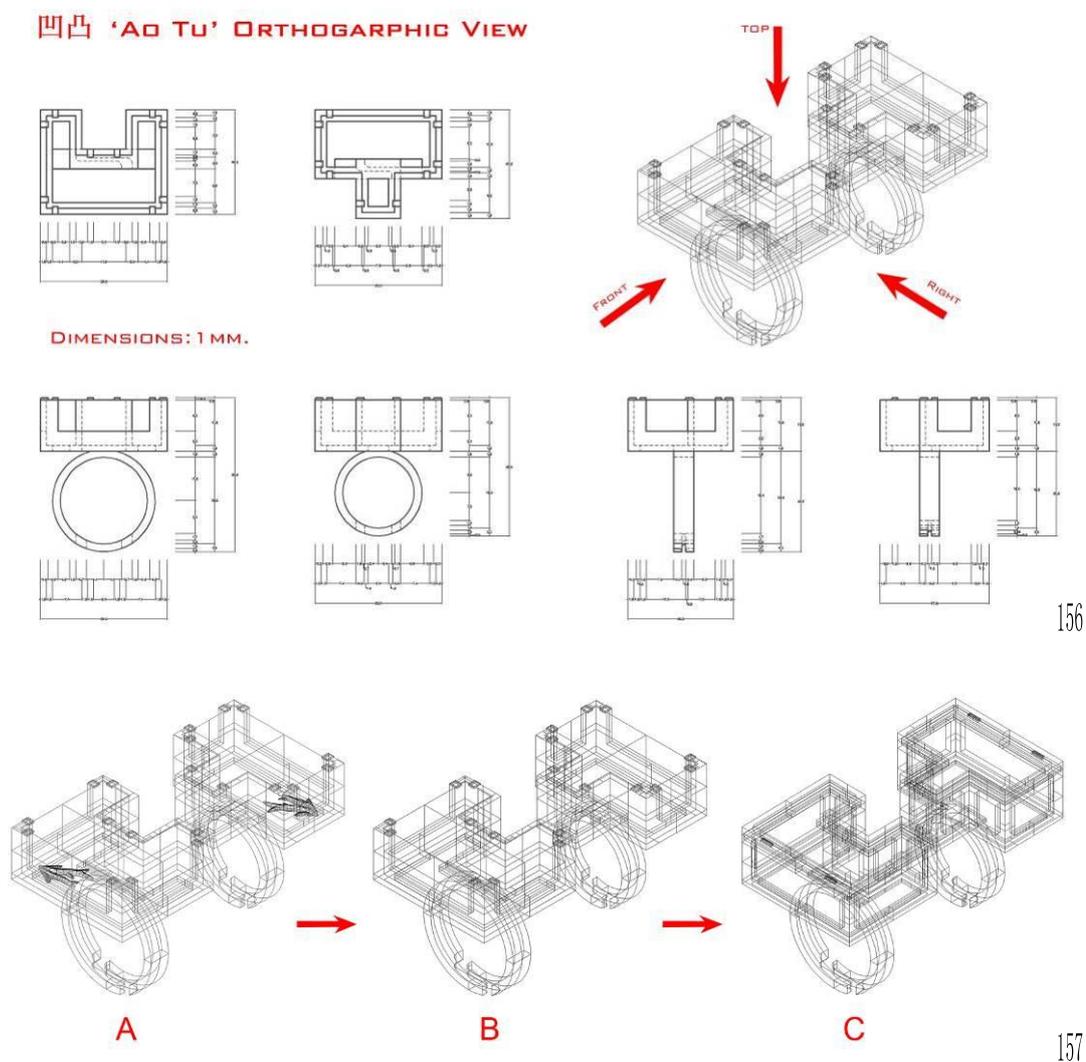


Fig. 155: 'Ao Tu 凹凸' ring set in orthographic view (Jiang, 2012).

Fig. 156: 'Ao Tu 凹凸' ring set detail form development (Jiang, 2012-2013).

Using Rhinoceros software (Section 3.6.4), I have developed a 3D visual of 'Ao Tu 凹凸' ring set. The four different rendered pictures (Fig.157–160) show different ideas for the final ring sets. These renderings clearly show how the final work looks. This clarity is essential for the design process. The 3D printing of the silver part has been printed by Shapeways based on the STL file.

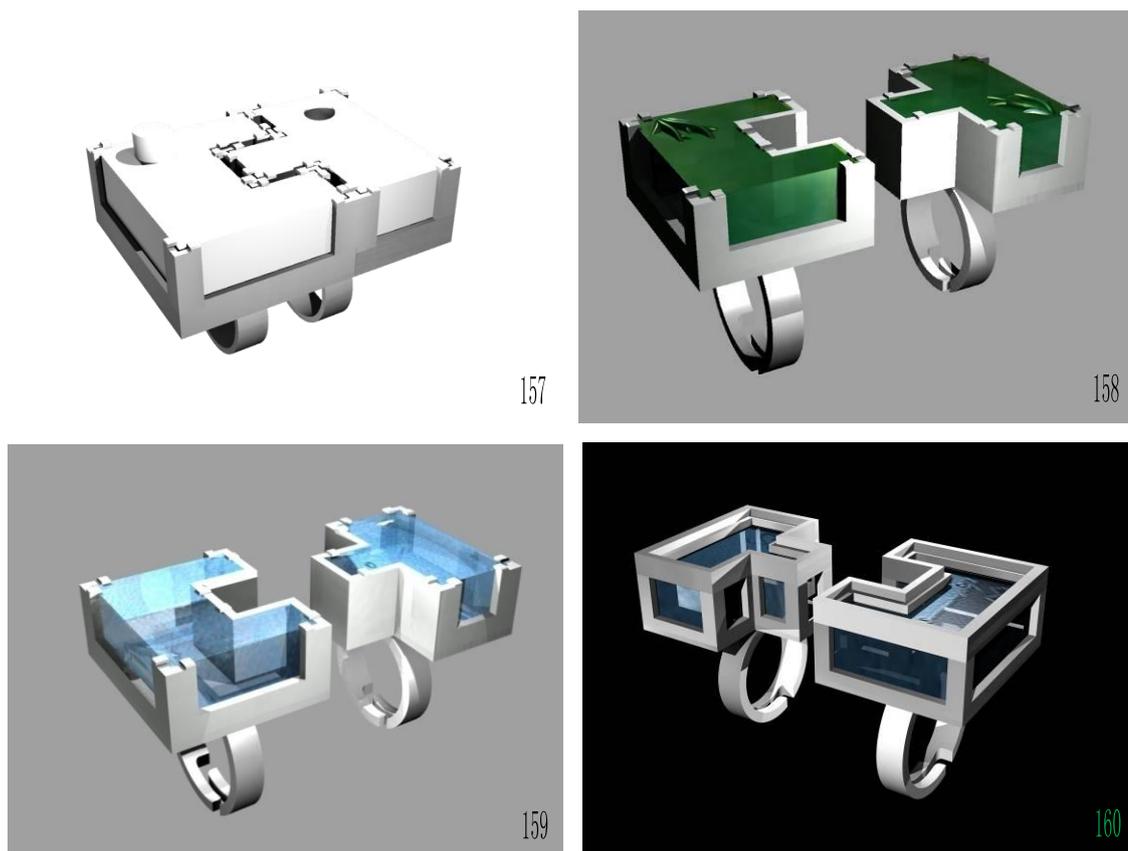


Fig. 157: 'Ao Tu 凹凸' ring set detail rendering 1 (Round concave and convex) (Jiang, 2012).

Fig. 158: 'Ao Tu 凹凸' ring set detail rendering 2 (Plants on the top of glass) (Jiang, 2012).

Fig. 159: 'Ao Tu 凹凸' ring set detail rendering 3 (Plants in the bottom of glass) (Jiang, 2012).

Fig. 160: 'Ao Tu 凹凸' ring set detail rendering 4 (Simple) (Jiang, 2013).

I examined various methods (Section 3.8) for making the glass parts and undertook a series of glass testing in a microwave kiln. Three couple sets of '凹凸' were tested (Fig.161–166) in the microwave fusing different forms and

colours. I tested the combination of opaque glass and transparent glass with metal wires by Bullseye glass sheet and powder (Appendix 2).

4.2.4 The microwave kiln glass testing and evaluation of 'Ao Tu 凹凸'

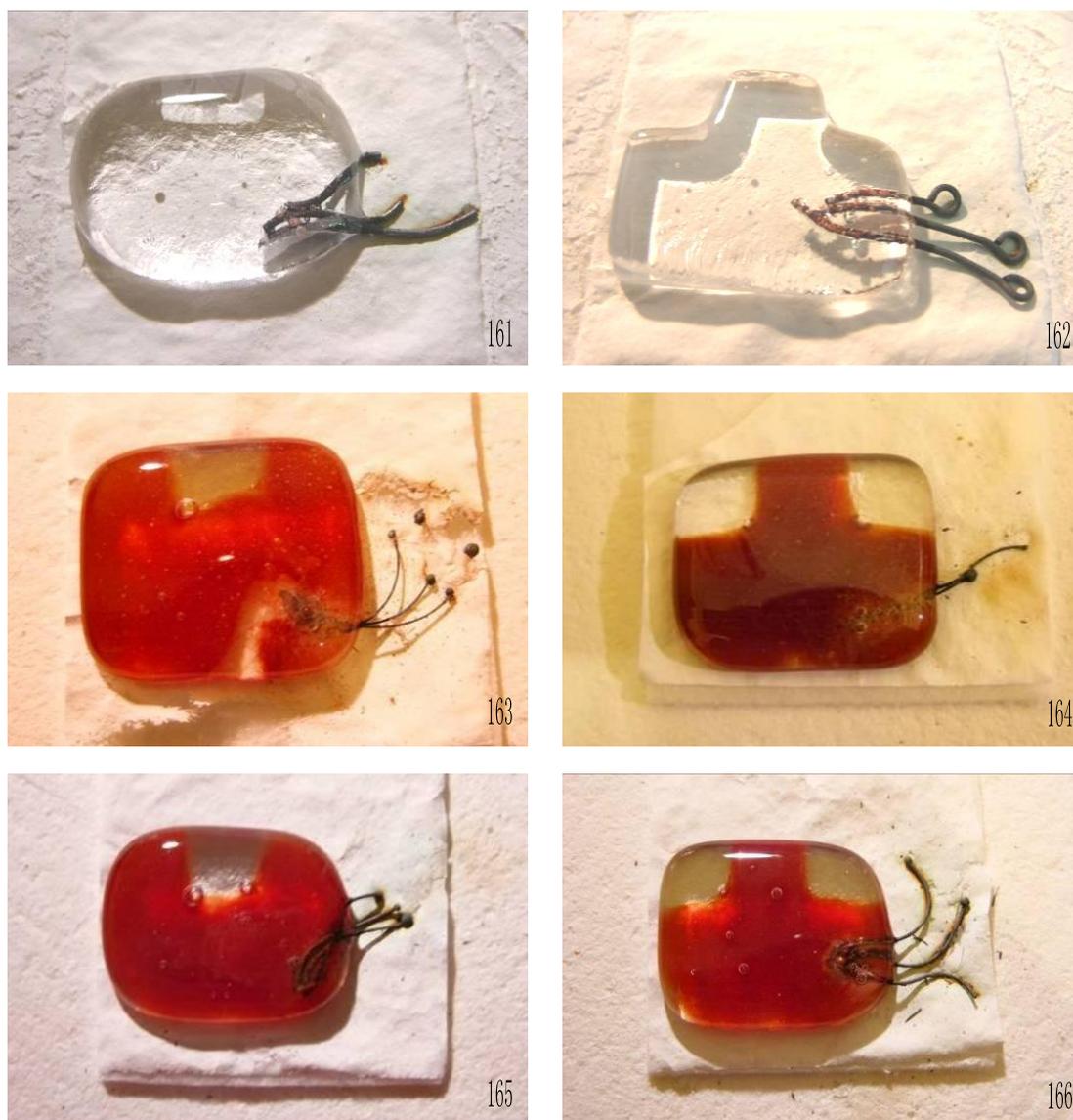


Fig. 161–162: Transparent 'Ao Tu 凹凸' with thick metal wires glass testing (Jiang, 2011).

Fig. 163–164: Opaque and transparent 'Ao Tu 凹凸' glass with thin metal wires testing (Jiang, 2011).

Fig. 165–166: Opaque and transparent 'Ao Tu 凹凸' glass with thick metal wires testing (Jiang, 2011).

Two sets of Banas glass were tested in the 'Ao Tu 凹凸' project with a plant shape inside the glass in microwave kiln forming (Fig.167–170). The glass making had three different forms: Geometry-Non Organic, Organic-Rural and Polychromy (Sylva Petrova, 2012 tutorial).

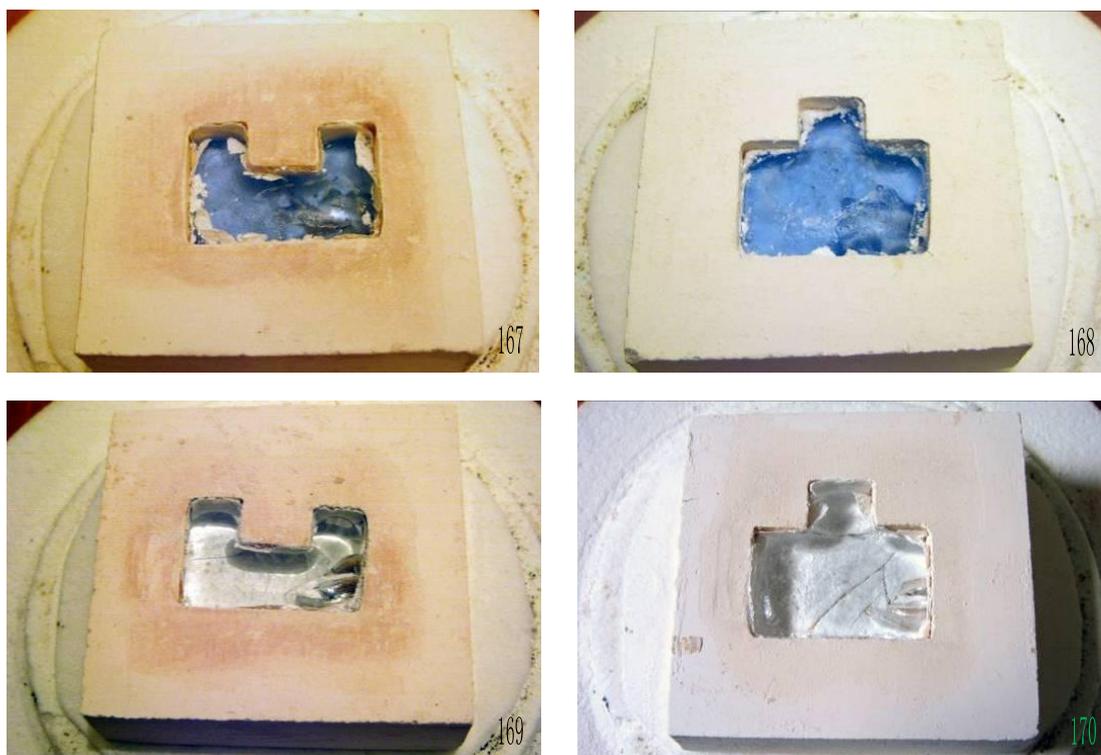


Fig. 167–168: Banas blue 'Ao Tu 凹凸' glass testing in microwave kiln forming (Jiang, 2011).

Fig. 169–170: Banas transparent 'Ao Tu 凹凸' glass testing in microwave kiln forming (Jiang, 2011).

From these experiments, the following observations and findings were made:

- i. The combination of opaque and transparent Bullseye glass (Fig.163–168) can make the concave and convex shape inside the glass and show the contrast between different colours. Using the opaque powder can make the piece appear more spontaneous. However, the opaque glass cannot show the strong light reflection through the glass. The edge of the shape is not really straight and it is hard to get the exact size, as this piece required.

- ii. The metal was fused with glass in a new way: half of the metal inside the glass and half outside (Fig.161–166). Fusing the glass with metal can show the relationship between two materials, their different characters and contrast between the two textures.
- iii. Banas glasses in microwave kiln forming made the small plant hollow shape detail inside the glass piece shows its spontaneity (Fig.167–170). Some plaster chips stuck inside the gaps of the pattern glass because of their small scale.
- iv. From the aesthetics perspective, the form of glass making should stay in one Geometric shape, either an Organic or Polychromic category, not between them (Sylva Petrova, 2012 tutorial). The forms of these glass tests look like they do not belong to any of these categories and are not reaching a level of aesthetic quality.

4.2.5 Series testing of 'Concave and Convex' couple ring set ('Ao Tu 凹凸')

A second series of tests were undertaken to combine 3D printing in silver with silversmith techniques. In order to solve some problems in machine production that I mentioned in section 3.2 by hand crafts, I have printed the silver parts separately (Fig.172–173) and then soldered them together (Fig.171) for final polishing.

A third series of tests were undertaken to adopt new silver setting techniques. The setting of the ring was a key examination. The ring set was the first time it was used in the project and called the claw setting (Fig.175). Then I used this traditional unchangeable claw setting (GOT) as an inspiration (Fig.173) to create a completely new setting, which I have called the 'Interchangeable half surrounding' (Section 3.9.3) (Fig.174).



Fig. 171: Solder each silver parts of 'Tu 凸' ring (Jiang, 2012).



Fig. 172: The silver ring parts of 'Tu 凸' ring after 3D printing (Jiang, 2012).

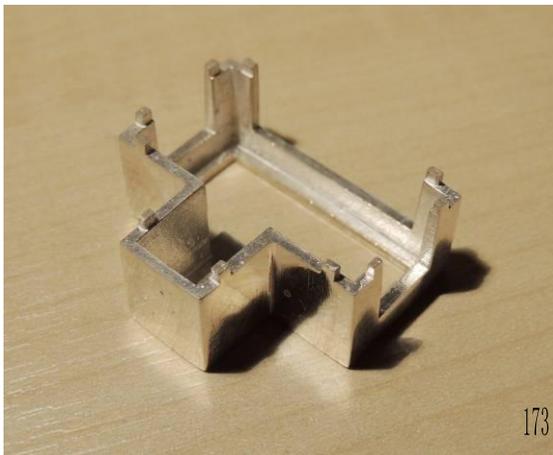


Fig. 173: The traditional claw setting of 'Tu 凸' ring silver parts (Jiang, 2012).



Fig. 174: The new interchangeable half surrounding setting of 'Tu 凸' ring silver parts (Jiang, 2012).



Fig. 175: The 'Ao Tu 凹凸' ring set (Jiang, 2012).

A fourth series of tests examined water-jet cutting glass after the final pieces of silver parts were 3D printed. These series of experiments examines the closed sizes of glass parts for the final pieces through water-jet cutting (Fig.176).

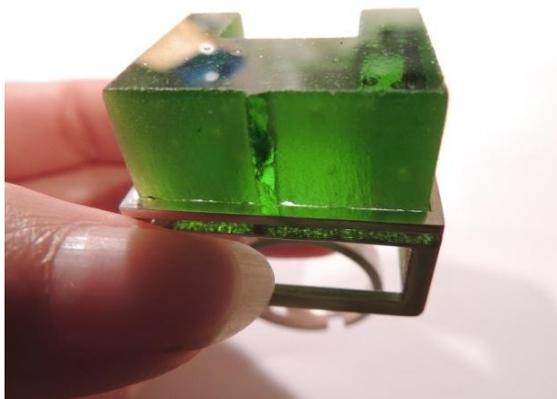


Fig. 176: The close size of 'Ao 凹' glass parts from water-jet cutting (Jiang, 2013).

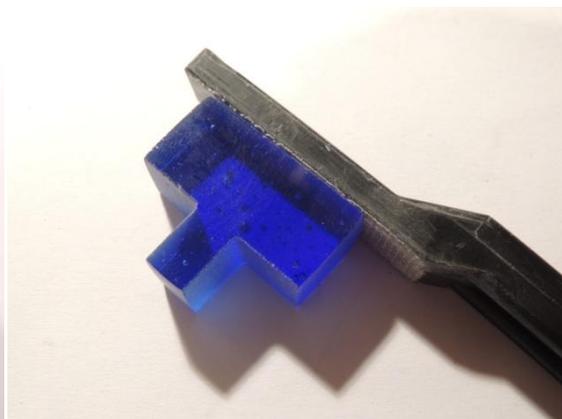


Fig. 177: Shape the 'Tu 凸' glass parts (Jiang, 2013).

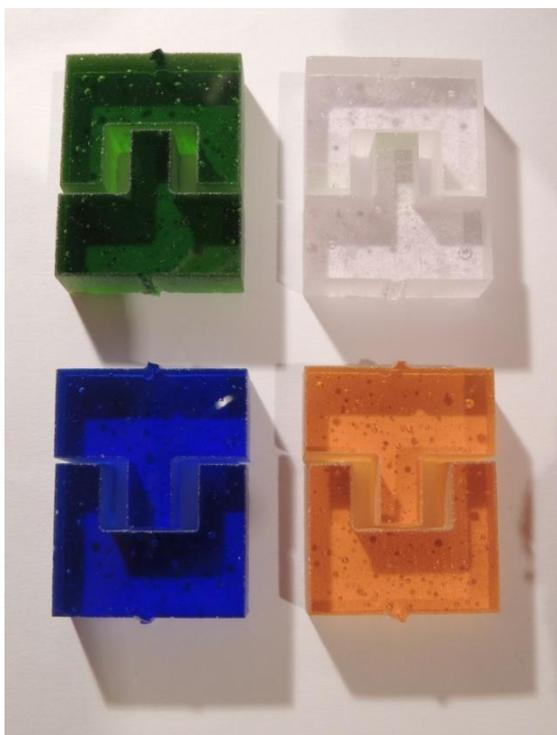


Fig. 178: Four colours of 'Au Tu 凹凸' glass pieces cut from water-jet (Jiang, 2013).



Fig. 179: Final four colours of 'Au Tu 凹凸' glass pieces after fire polishing (Jiang, 2013).

Four colours of equal size were water-jet cut for preparing the final pieces 'Ao Tu 凹凸' (Fig.178). They were put into the traditional kiln for fire polishing afterwards I achieved the right size from shaping and grinding them (Fig.177). The optimal fire temperature (Section 3.8.3) was found through making minor adjustments throughout the process. The final four coloured glass pieces were completed after fire polishing (Fig.179).

4.2.6 'Concave and Convex' couple ring set ('Ao Tu 凹凸') description

The final rings can be described as having these qualities:

- i. 'Concave and Convex' couple ring set designed for a couple to use. The rings come in a pair, one for man '凹 Ao' and one for woman '凸 Tu'.
- ii. There are several colours 'Ao Tu 凹凸' shapes glass which can be replaced in the open-able silver box.
- iii. The ring shape is a simple geometric shape which enhances the aesthetic qualities.

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	√
Unification of Time and Space	
Self-cognition and External-cognition	√
Same Structure of Man and Nature	
Combination of Subject and Object	
The Concept of Change	√

Fig. 180: The three characteristics associated with the 'Ao Tu 凹凸' couple ring set (Jiang, 2014).



Fig. 181: The interchangeable 'Ao Tu 凹凸' couple ring set (Jiang, 2013).

4.2.7 'Concave and Convex' couple ring set ('Ao Tu 凹凸') evaluation

The 'Concave and Convex' couple ring set (Fig.181) examines three of the six characteristics of harmony between man and nature to achieve the first research aim (section 1.6) identified in the diagram Fig.180. These three Chinese philosophical focus points have been clarified in sections 2.7.3.1, 2.7.3.4 and 2.7.3.6 and they are: 'Integration of Yin and Yang', 'Self-cognition and External-cognition', 'the Concept of Change'.

4.2.7.1 'Integration of Yin and Yang'

The inspiration of 'Ao Tu 凹凸' couple ring set found that the Chinese words which are hieroglyphs are based on the understanding of what Yin and Yang means (Section.2.7.3.1). The Chinese words 'Ao Tu 凹凸' came from ancient Chinese people who would draw concave and convex stone shapes to describe different meanings. These words can directly show the character of integration of Yin (concave) and Yang (convex). The rings can therefore be described as having the qualities of Yin and Yang:

- i. It conveys expressions of the original male—Yang and female—Yin characters in the Chinese language.
- ii. The rings were developed from the Chinese characters 'Ao Tu 凹凸' which is the 'Ao 凹' (Yin) and 'Tu 凸' (Yang) characters in the Chinese language.
- iii. The two shapes of 'Ao Tu 凹凸' ring complement each other and can be combined into one, which illustrates the 'Integration of Yin and Yang'.
- iv. The two rings were designed for a couple: one for woman and one for man. This feature is also symbolic of the 'Integration of Yin and Yang'.

4.2.7.2 Self-cognition and External-cognition

In order to develop the Chinese traditional culture, keeping the Chinese calligraphy and the meaning of word are important to maintain. The 'Ao Tu 凹凸' words were used to show the Yin and Yang characteristics and also to maintain the understanding of Chinese traditional culture in jewellery design.

- i. The 'Ao Tu 凹凸' characters have strong symbolic awareness of Yin and Yang meanings in the Chinese language.

- ii. The self-awareness goes through the whole design process between my design and environmental resources including idea, material, technique, etc. For example, in order to make the Chinese tradition appropriate for creating new contemporary Western glass jewellery designs, the form of the jewellery in this research will remove the superfluous details as discussed in section 2.5.2 and by keeping it simple it can follow the Western concept of 'less is more' to remove the plant shape inside the glass in Fig.156 in section 4.2.3. This also is an externalization process (Section 2.7.3.6).
- iii. The tacit learning develops design processes, such as combining 3D printing with water-jet cutting techniques and developing interchangeable half surrounding setting methods (Section 4.2.5).

4.2.7.3 'The Concept of Change'

The qualities of 'change' are expressed in these rings. The following list goes into further detail:

- i. This piece provides more choice for the wearer by the interchangeable design.
- i. It also gives the designer an ongoing opportunity. The rings can be designed in various ways by changing the ways it is worn.
- ii. Various colours give the wearer different feelings and opportunities to match their clothes.

The groups from Visual Art Department of Guilin Tourism College gave this feedback: "Concave and Convex' couple ring set ('Ao Tu 凹凸') shows the contemporary minimalist and is vivid, in line with the aesthetics of the contemporary Chinese young people" (Appendix.9). According to feedback from different exhibitions from China and the UK, it appears as though the feedback

from Chinese audiences can identify the meaning and the three characteristics of 'harmony between man and nature' easier. The simple form, various colours and interchangeable functional designs are also appropriate for the Western aesthetics and can appeal to both Eastern and Western audiences which can demonstrate that the design can achieve the second research aim in section 1.6.

This couple ring set design process shows it developing 3D prototype techniques and refined processes by comprehensive successful combinations of Chinese ink painting, jewellery idea sketches, jewellery drawing, the orthographic view by using AutoCAD, 3D rendering by using Rhinoceros, 3D printing, water-jet cutting and silversmith techniques based on testing different raw materials making them in different ways. This outcome can demonstrate that it achieved the third research aim in section 1.6.

4.3 'Egg and Sperm' necklace ('卵子和精子' 项链)

4.3.1 Introduction

The first series of trials examines the basic principles of man, woman and the concept of birth. The combination of sperm (Yang) and egg (Yin) process indicates the unity between Yin and Yang. As researcher from the Institute of Basic Theory of Traditional Chinese Medicine, Xiaoye Chen (陈小野) says, "Life form theory mentioned human life is inseparable from the Yin and yang" (2011, p.104). The beginning of female and male could be found within the theme of birth—sperm and the egg, this idea gave the initial inspiration for my necklace.

The 'Egg and Sperm' necklace case study aims to create new ways to expressly integrate features of the egg and sperm, using a primarily interchangeable design. The harmony of Yin and Yang is a cyclical movement represented by the proliferation of life. In this project, glass and silver represented the materials contract of Yin and Yang characters compared to each other as discussed in section 2.7.3.1. Glass is organic, malleable and transparent enough to make the 'egg' part which seems to have 'Yin' characters. The silver is metallic lustre, opaque and solid making it suitable for the 'sperm' parts which shows 'Yang' characters.

4.3.2 Objectives

To create new glass egg shapes and silver sperm shapes to examine ways of expressing Yin and Yang characteristics through my contemporary jewellery practice.

4.3.3 Materials and process

For this necklace, Banas glass in pink, blue and green are used to make the pendant. White metal, such as silver (925) is used for the chain, the clasp and interlinking parts. Other materials include white flexible plastic for the initial testing. The processes involved are illustrated as below:

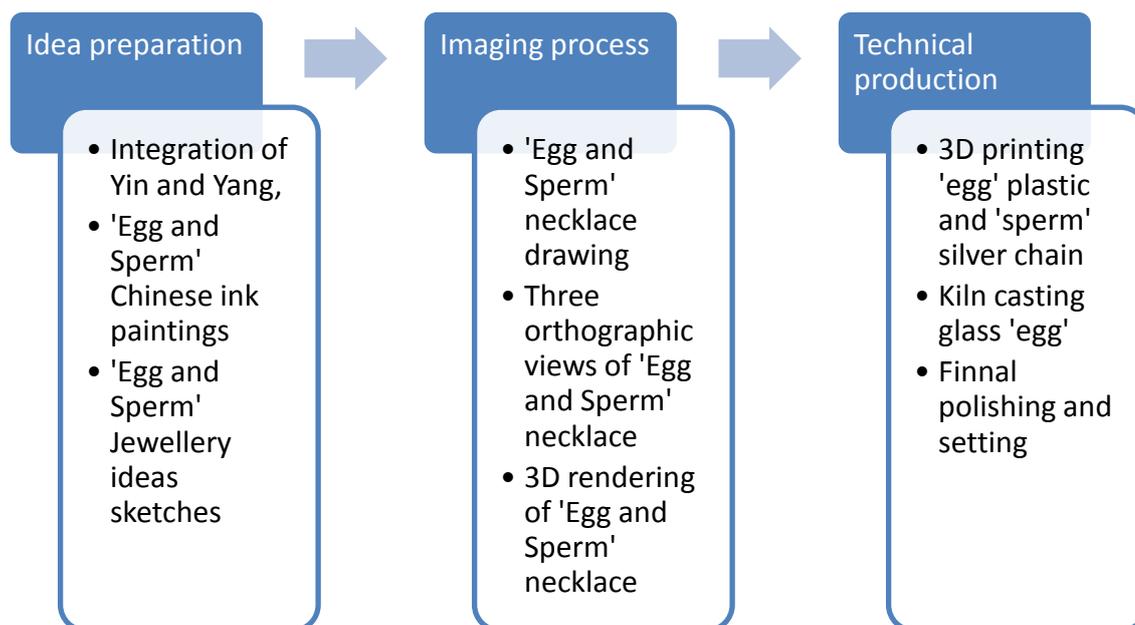


Fig. 182: The developing process of 'Egg and Sperm' necklace (Jiang, 2014).

After the 'Au Tu' ring set the 'Egg and Sperm' necklace was developed with similar processes (Fig.182). Firstly, I have translated the 'notion' of fertilization of human itself. The Chinese ink paintings from the 'egg and sperm' series explore these features and factors in a number of ways (Fig.183). After the initial painting and sketches, the 3D visual was rendered in 3D software Rhinoceros. The 'sperm' interlink necklace was 3D printed. Here, one of the 'sperm' interlinked rings had a mistake during the printing where it had cracked. The white plastic 'egg' pendant had been 3D printed separately. I used a mould to help develop the glass part of the 'egg'.

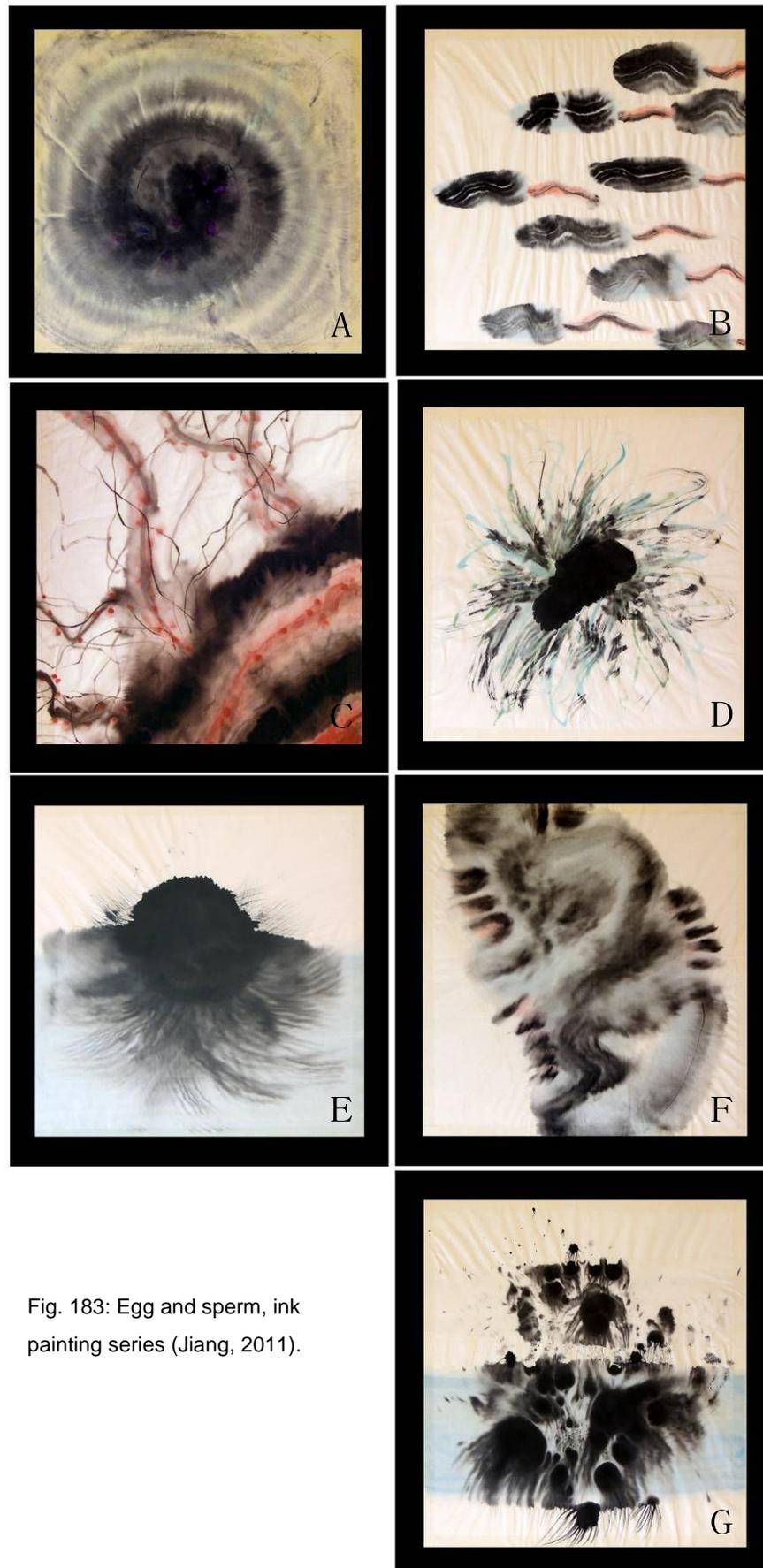


Fig. 183: Egg and sperm, ink painting series (Jiang, 2011).

The paintings above depict my thinking behind the design for the necklace. The egg is (Fig.183 'A') attracted to the sperm (Fig. 183 'B') and is depicted swimming towards it. The sperm then inlay into the egg (Fig. 183 'C') and the egg absorbs the sperm (Fig. 183 'D'). It gradually forms an embryo (Fig. 183 'E'). The foetus has been maturely formed (Fig. 183 'F') and some of the embryo is aborted (Fig. 183 'G').

The ink paintings convey the cycle of becoming pregnant. The ink abstracts this process to create something beautiful and alluring while at the same time appears alien and somewhat dangerous. This dichotomy and dual meanings created through the ink paintings facilitated the next stage of the design process, which is the jewellery idea sketches (Fig.184–188).

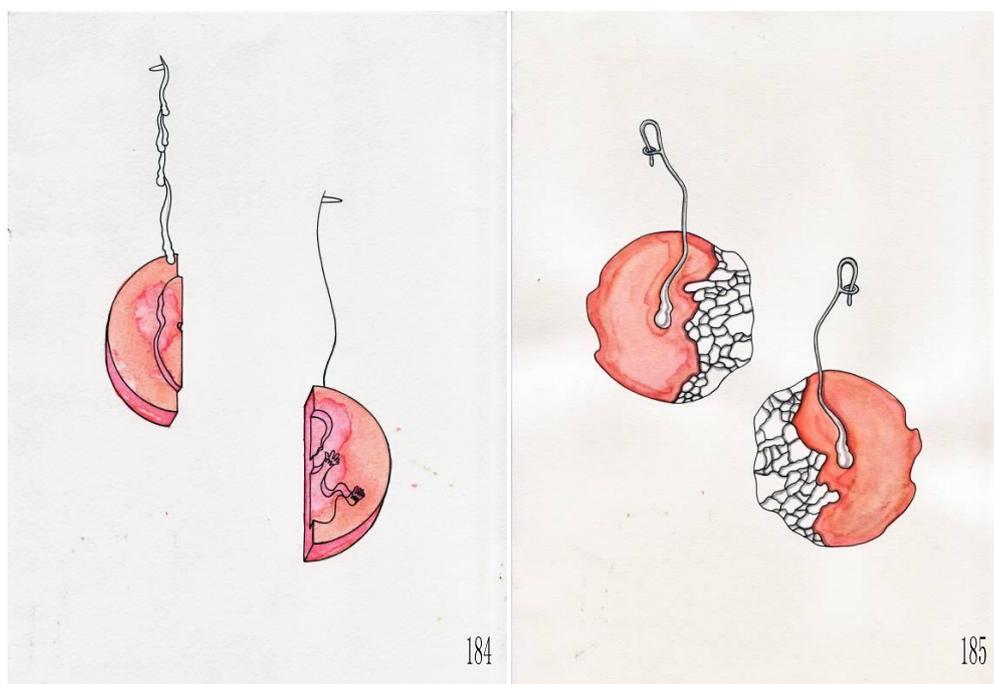


Fig. 184–185: The egg and sperm initial earrings idea sketches (Jiang, 2011).

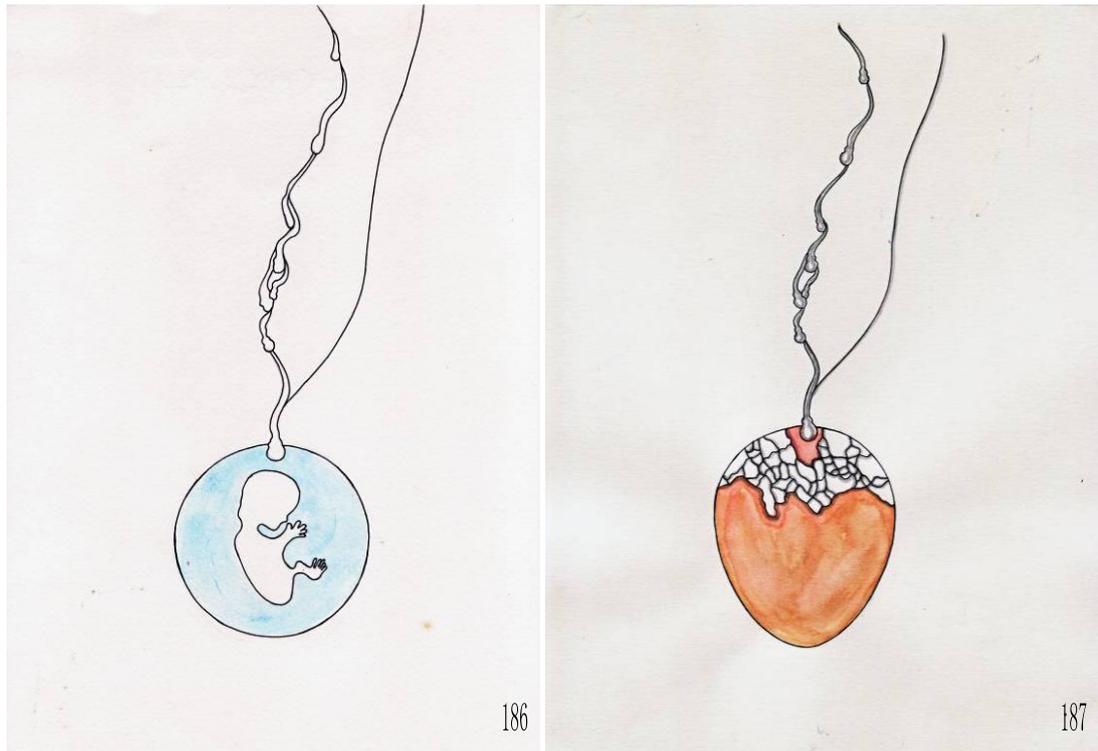


Fig. 186–187: The egg and sperm initial necklace idea sketches (Jiang, 2011).



Fig. 188: The egg and sperm initial brooch idea sketches (Jiang, 2011).

Fig. 189: The 'Egg and Sperm' necklace detail drawing (Jiang, 2011).

Trials of earrings (Fig.184–185), necklace (Fig.186–187), sperm brooch (Fig.188) and the detail of necklace drawing (Fig.189) are important parts of the artistic process. There is a noted move during the artistic process from the fluid ink works to the far more controlled, particular details of the computer worked designs.

4.3.4 The microwave kiln glass testing of the 'Egg and Sperm'

These two glass tests are similar to those in section 4.2 using a microwave kiln (Appendix. 2).

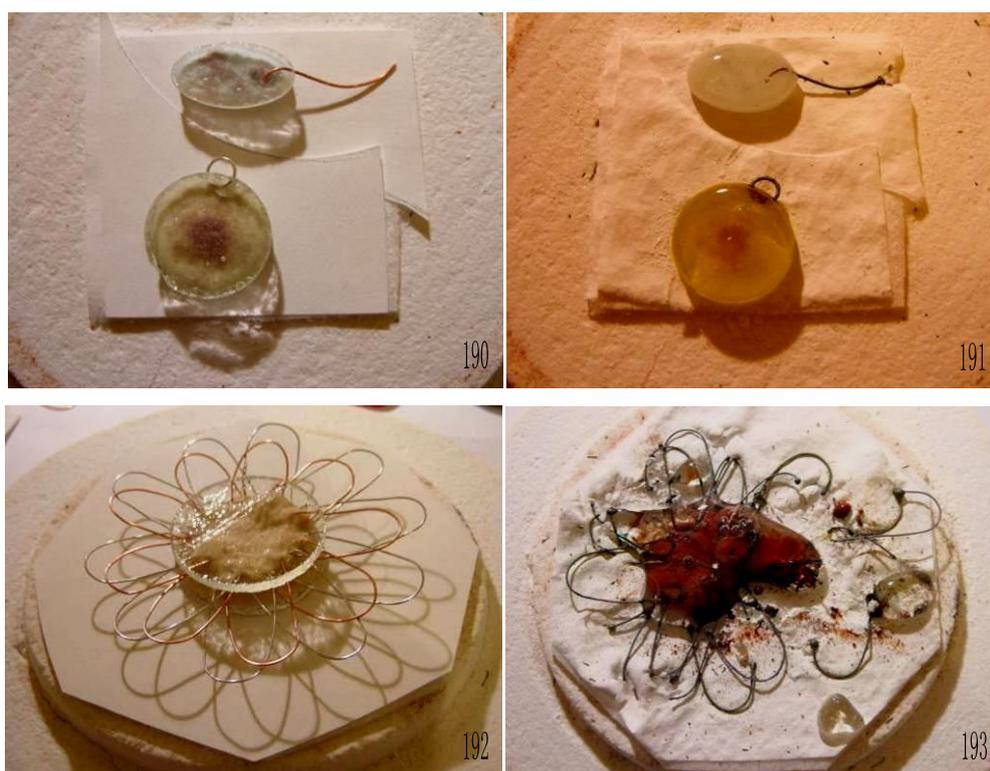


Fig. 190–191: The egg and sperm glass testing (Jiang, 2011).

Fig. 192–193: The egg absorbs the sperm glass testing (Jiang, 2011).

Initially, I made the egg and sperm glass shapes (Fig.190–191) as in the ink painting (Fig.183 'A'–'B'), the egg absorbs sperm as in the ink painting (Fig. 183 'D'). They were formed in microwave kiln by the Bullseye glass sheets and powders; and silver and copper wires (Fig.192–193) (for more detail see appendix 2). One wire can be fused inside the glass (Fig. 190–191) but not too many wires (Fig. 192–193).

4.3.5 Description of technical features of the design

The technical features of this design can be described as having these qualities:

- i. The oval egg shape was important to maintain (Fig.194).
- ii. The side thickness shape of the egg glass piece should be sloping downwards (Fig.195).
- iii. New chains were developed rather than a normal round chain (Fig.198).
- iv. Rhinoceros software was used.
- v. Three different colours were used.
- vi. 3D printing of sperm silver chains (Fig.202) and the sperm interlink rings (Fig.203) were printed out using the exported STL file.
- vii. The white flexible plastic egg pendant (Fig.205) has been separately printed out with the sperm silver chains using the exported STL file of the 'Egg and Sperm' necklace created in Rhinoceros.

'EGG AND SPERM' ORTHOGARPHIC VIEW

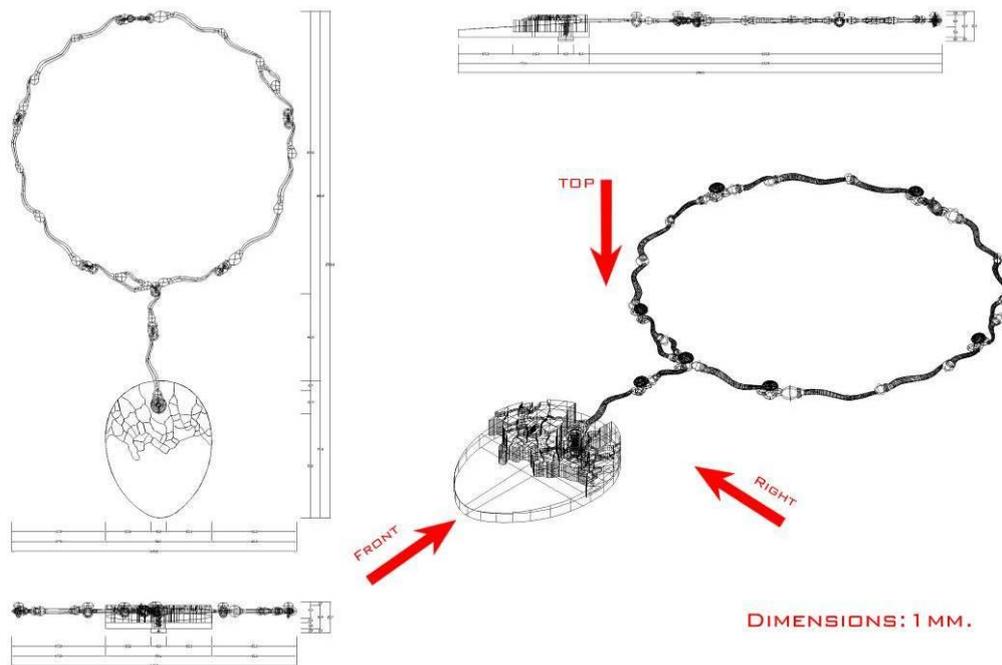


Fig. 194: The 'Egg and Sperm' necklace orthographic view (Jiang, 2012).

4.3.6 Evaluation of technical features of the design

The evaluation of technical features of the design is described below:

- i. The expressions of life and birth were enhanced with the oval design.
- ii. The refraction of light is increased through the sloping process (Fig.195). The piece looks lighter and sits more comfortably on the wearer compared to fig.196.

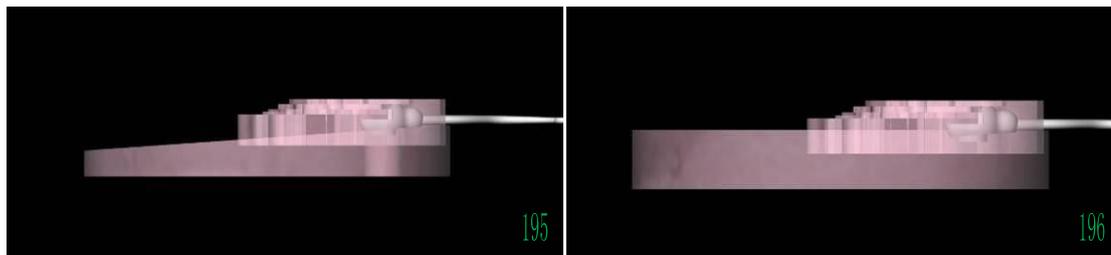


Fig. 195–196: The side rendering of 'Egg and Sperm' necklace (Jiang, 2012).

- iii The new chain shapes mimics the sperm shape and incorporates the chain into the overall design. This has aided the in the overall unity and expression of the final form (Fig.197–198).

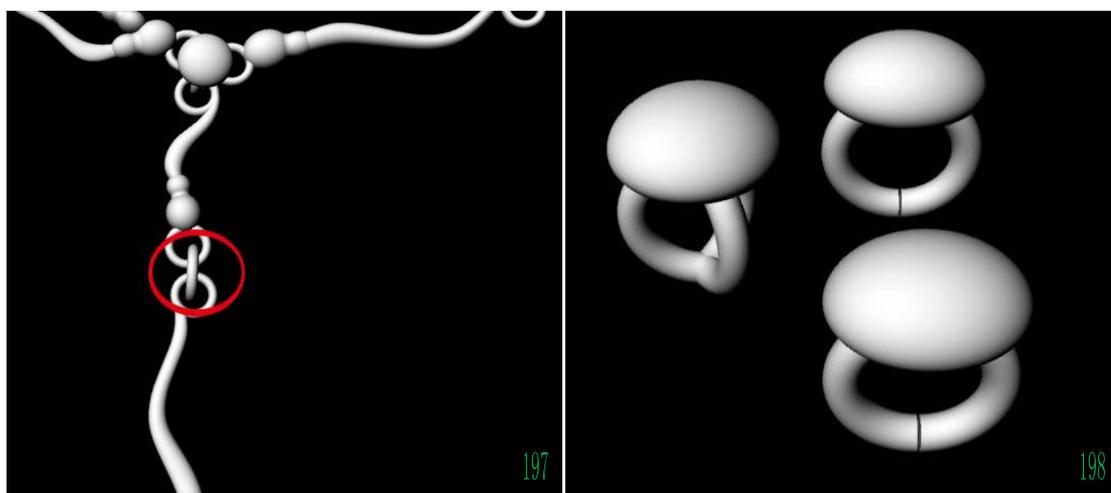


Fig. 197–198: The interlink part of sperm chain (Jiang, 2012).

- iv The 3D software Rhinoceros helped to render the design to a professional standard.
- v The interchangeable design of the necklace allows different coloured glass pendant to be used (Fig.199–201).

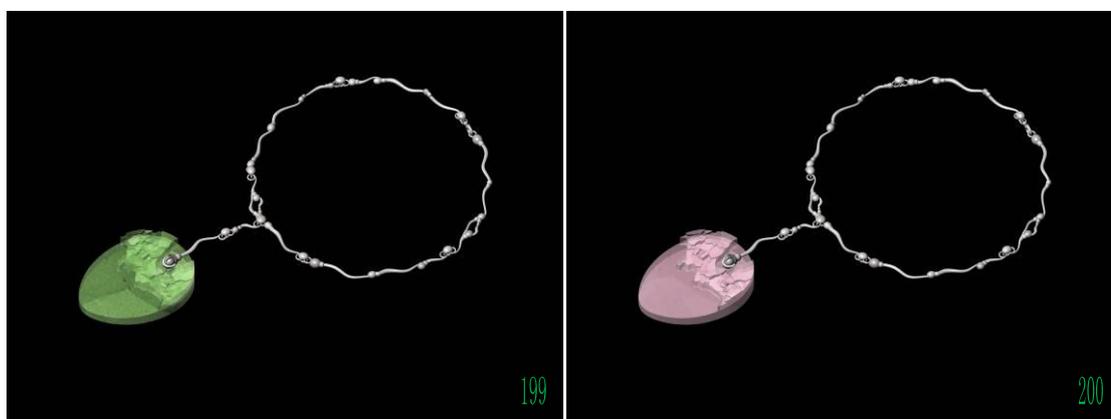


Fig. 199–200: The 'Egg and Sperm' necklace 3D rendering (Jiang, 2012).

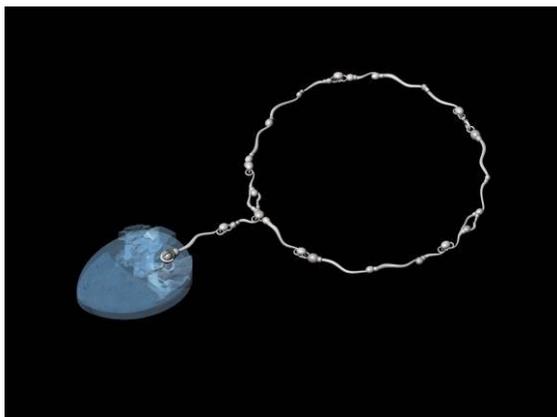


Fig. 201: The 'Egg and Sperm' necklace 3D rendering (Jiang, 2012).

- vi In this case there was a printing error on one of the designs (Fig.204). As discussed (Section 3.7.2) this is a common problem with 3D printing.
- vii This design created several new opportunities for combining 3D printing and kiln forming to make more accurate moulds (Fig.205–206), than has previously been possible.



Fig. 202: 3D printing silver sperm chains (Jiang, 2012).

Fig. 203: 3D printing silver sperm interlink rings (Jiang, 2012).

Fig. 204: Silver sperm error interlinks rings in 3D printing (Jiang, 2012).

4.3.7 The Egg 3D printing model with wax mould



Fig. 205: The white flexible plastic egg pendant (Jiang, 2012).



Fig. 206: Casting the white flexible plastic egg pendant into the mould putty (Jiang, 2012).

The process of making the 'egg' glass by combining 3D printing and lost wax method:

- i. The white plastic egg model (Fig.205) made from 3D printing base on the egg 3D rendering (Fig.199–201).
- ii. The egg putty mould (Fig.206) was used to make the egg white wax, using the lost wax method (GOT) (Fig.207–208).
- iii. Glass grain was poured into two flowerpots through the top (Fig.209).
- iv. Three pieces of coloured egg glass were created (pink, blue and green) (Fig.210–211).
- v. Unleaded Banas glass was used.



Fig. 207–208: Egg glass pendant mould by using lost wax method (Jiang, 2012).

Fig. 209: Put the egg glass pendant mould into the kiln with filling the splinters of glass (Jiang, 2012).

Fig. 210–211: Casting egg glass pieces in pink, blue and green (Jiang, 2012).

4.3.8 Evaluation of the egg wax mould

The evaluation of the egg wax mould can be described as these qualities:

- i. The egg mould can be reused and became an important symbolic feature of my design work.
- ii. The glass flowed more freely after melting and pouring from the top into the egg shape.
- iii. Fewer bubbles appeared inside the mould.
- iv. The selection of colours and the ways they interchanged and complimented each other were important for the expression of Yin and Yang and associated characteristics, in this work.
- v. The shiny and strong reflective characteristics of Banas glass facilitated the final expression of the artwork. The shiny features draw the viewer in and the reflections are similar to some of the ink drawing characteristics. The final result is a piece with alluring features with high reflective qualities of the glass.

4.3.9 Feedback on the 'Egg and Sperm' Necklace

In 2013 I had a solo glass jewellery exhibition in Guilin Exhibition Hall in China. The Chinese jewellery expert Bin Ruan (阮斌) and Chinese craftsman Zhonglin Jiang (江忠林) visited the show and I took the opportunity to interview and elicit feedback on the design of the interlinking parts (Fig.212). They were questioned on the topic of interlinking parts, using the machinery screw in front of the jewellery pieces. They both said that the screw shape should be less obvious and should complement the overall look of the design (Fig.213) (Appendix.9).



Fig. 212: Ting Jiang solo glass jewellery design exhibition 2013.

My own wearing experience of the jewellery also conveys this position. The corner nut (Fig.214) was an issue, as it could snag and become loose or caught in certain fabrics. The screw shape (Fig.215) was changed (Fig.216) using 3D modelling and new silver interlinks were created (Fig.217 original, fig.218 new design).

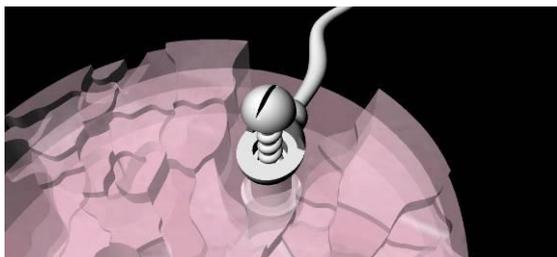


Fig. 213: 3D silver screw (Jiang, 2012).

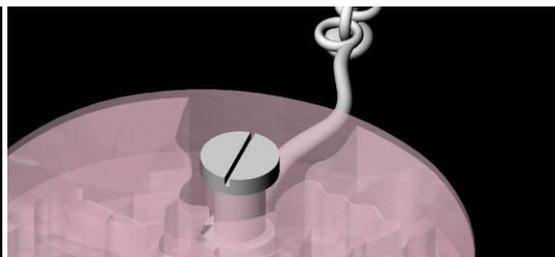


Fig. 214: 3D silver screw nut (Jiang, 2012).



Fig. 215: The 3D model of the screw interlinks part of 'Egg and Sperm' necklace (Jiang, 2012).

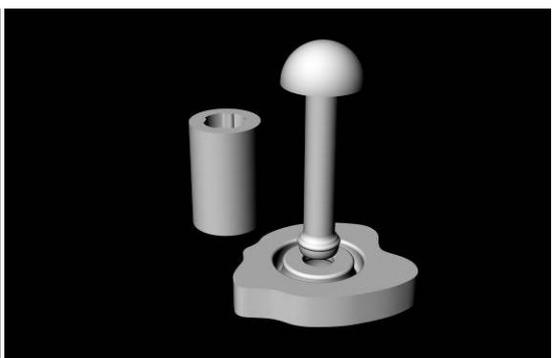


Fig. 216: The 3D model of the new solution interlinks part of 'Egg and Sperm' necklace



Fig. 217: The 3D printing of silver screw of 'Egg and Sperm' necklace (Jiang, 2012).



Fig. 218: The new silver interlinks of 'Egg and Sperm' necklace (Jiang, 2013).



Fig. 219: Finished glass egg pendants in various colours (Jiang, 2012).

4.3.10 'Egg and sperm' necklace description

The final design for the 'Egg and Sperm' necklace features the following characteristics:

- i. The interchangeable design is the unique selling point for this necklace.
- ii. Several colours can be replaced.
- iii. The surface of the egg has a complex texture. The textures enhance the gloss and the aesthetic qualities of the piece convey the gradual embryo theme.



Fig. 220: The finished 'Egg and sperm' necklace (Jiang, 2013).

4.3.11 'Egg and sperm' necklace evaluation

This final 'Egg and sperm' necklace (Fig.220) with its three coloured egg glass (Fig.219) also examined three of the six characteristics of harmony between man and nature (Fig.221) to achieve the first research aim (section 1.6). These three Chinese philosophical focus points: the 'Integration of Yin and Yang', the 'Self-cognition and External-cognition' and 'the Concept of Change' have also been clarified in section 2.7.3.1, 2.7.3.4 and 2.7.3.6:

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	√
Unification of Time and Space	
Self-cognition and External-cognition	√
Same Structure of Man and Nature	
Combination of Subject and Object	
The Concept of Change	√

Fig. 221: The three characteristics associated with the 'Egg and Sperm' necklace (Jiang, 2014).

4.3.11.1 'Integration of Yin and Yang'

This list explains how the theme of Yin and Yang was integrated into the 'Egg and Sperm' necklace:

- i. The combination of sperm and egg is arguably a very symbolic design feature in itself.
- ii. The egg shaped glass which has the Yin character theme compared to the sperm shape silver which has themes of the Yang character was developed.
- iii. This theme was an important and powerful way to investigate features of Yin and Yang through the process of making contemporary glass jewellery.
- iv. The shape, form and pattern of the 'Egg and Sperm' necklace show the movement process of gradually forming an embryo in my ink painting (Fig.183 'A' –'E' in section 4.3.3) which embodies the integration of the Yin and Yang.
- v. The egg glass pendant and the sperm silver chain also shows the contrast of the two material characteristics of Yin—glass and Yang—silver (section 2.7.3.1).

4.3.11.2 Self-cognition and External-cognition

'Self-Cognition and External Cognition' are an important part of Chinese philosophy. The following list describes where these themes can be found in the 'Egg and Sperm' necklace:

- i. The design is reflective of self-awareness of 'the Concept of Yin and Yang' and 'Changes' as understood through Chinese philosophy.
- ii. This process shows the dialogue between me and the resources necessary to create the artworks, including ideas, materials and techniques. There is also an acute awareness of feedback while making the piece and the ways the artworks evolves as a result. For example, redesigning the interlink parts by receiving feedback from the Chinese jewellery expert Bin Ruan (阮斌) and Chinese craftsman Zhonglin Jiang (江忠林) (Section 4.3.9).
- iii. The tacit learning of the design development process, such as combining 3D printing with the lost wax method in kiln casting and developing the flexible

peg setting (Section 4.3.7 and 4.3.9), were an increasing feature in the studio based investigations and the ways I was becoming increasingly aware of the ways tacit and somewhat intuitive decisions impacted upon the artworks development.

4.3.11.3 'The Concept of Change'

'The Concept of Change' can show change in a variety of forms, including both positive and negative. The list that follows shows how this concept exists in the 'Egg and Sperm' necklace:

- i. The thick to thin design of the transparent 'egg' glass created alluring qualities, which have different reflection from light.
- ii. The complete texture surface to the flat surface of the transparent 'egg' glass is the more reflective light changing than a flat surface of the whole piece.
- iii. The flexible peg setting of interchangeable design also enhances the design quality which enables wearers to trigger their interest.
- iv. Different colours can be replaced which also enhance 'the Concept of Change'.

The groups from the Visual Art Department of Guilin Tourism College have said this work has rich and profound spiritual connotations. They also noted that the contemporary minimalist, vivid, features in line with the aesthetics of the contemporary Chinese young people that were found in the "Concave and Convex' couple ring set ('Ao Tu 凹凸') is also present in the 'Sperm and Egg' necklace. They said, "Her work embodies the combination of Yin and Yang well and is consistent with the Chinese Book of Changes doctrine. They think these two works also to some extent reflect the Western views of nature" (Appendix.9). Their feedback shows that the Chinese audience can recognise themes in the

'Egg and Sperm' necklace and more importantly the ways in which it contains the philosophy of 'harmony between man and nature'. There are elements of ways it shows influence from Western culture which can demonstrate that the design can achieve the second research aim (Section 1.6).

The 'Egg and Sperm' necklace design creates new forms of 'egg' glass and 'sperm' chain in a new interchangeable wearing way. This design process is also similar with the 'Concave and Convex' couple ring set ('Ao Tu') (Section 4.2), by combining the similar elements and techniques such as Chinese ink painting, jewellery idea sketches, jewellery drawings, etc. In the technical production, 3D printing, kiln casting, silversmith techniques were successfully combined based on testing different raw materials made in different ways. This outcome can demonstrate that it achieved the third research aim (Section 1.6).

4.4 'Button' brooch (‘扣子’ 胸针)

4.4.1 Introduction

The most basic elements of Yin and Yang are the integration of conflict and harmony (Section 4.2.1). The most advanced elements of Yin and Yang are 'naturalness and spontaneity', where any intense conflicts are not apparent. Harmony is a process where any intense conflicts are reconciled and dissipated. The button and buttonhole are complementary objects found in our daily lives but serve different functions.

4.4.2 Objectives

The 'Button' brooch aims to investigate the integration of opposing complementary objects, to show this kind of 'naturalness and spontaneity' in harmony between Yin and Yang. The 'button' and the 'buttonhole' are two opposing yet complementary objects found in everyday life. This case study aims to explore the harmony between 'button' Yang character and 'buttonhole' Yin character in the daily life.

4.4.3 Materials and processes

The processes involved include using Bullseye glass and Banas glass in different colours to make the 'button' and silver (925), stainless steel is used for making the 'buttonhole'. Other materials include flexible plastic for the initial testing. The following diagram illustrates the processes involved:

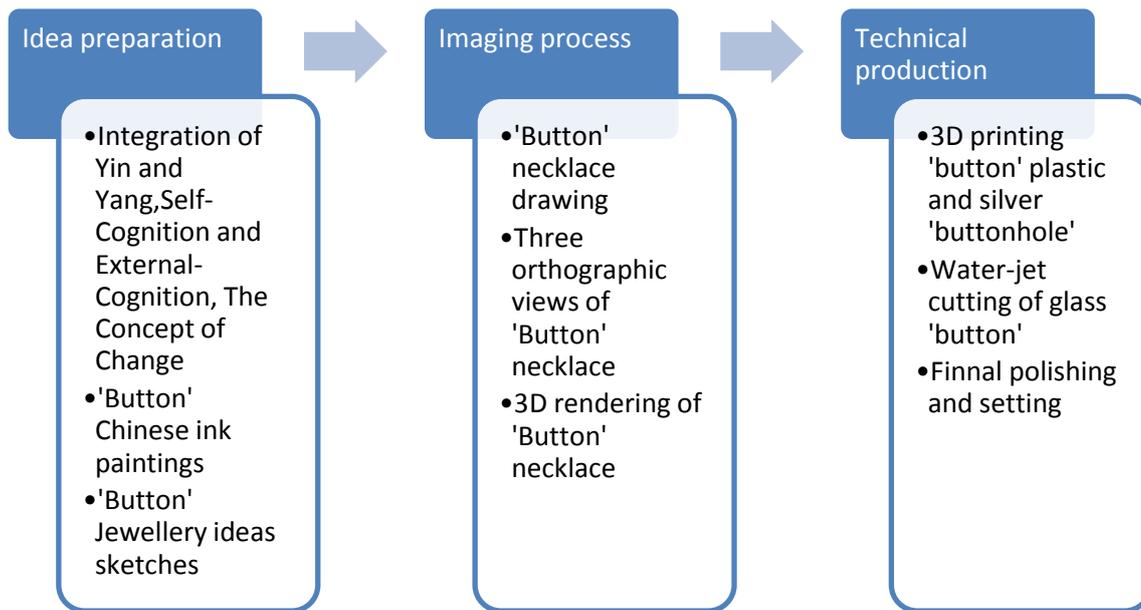


Fig. 222: The developing process of 'Button' brooch (Jiang, 2014).

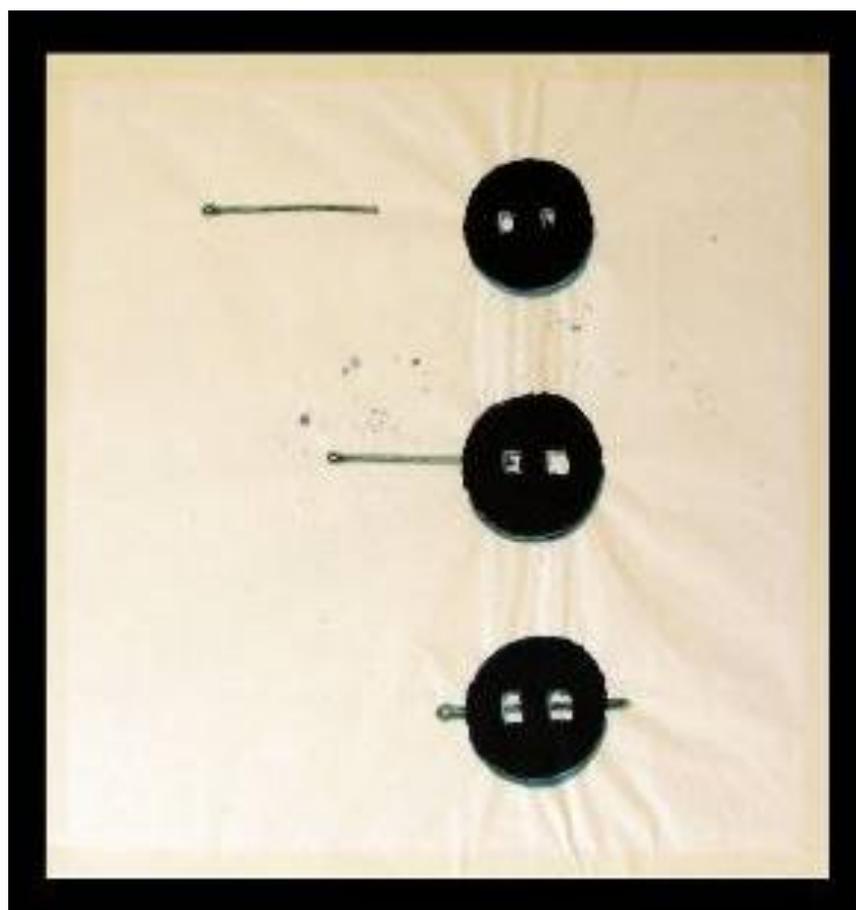


Fig. 223: 'Button and Buttonhole' ink painting (Jiang, 2011).

The inspiration of 'button and buttonhole' ink painting come from the movement of button and buttonhole in daily life from wearing clothes (Fig.223). The three sets of button and buttonhole in the painting show their unclosed to closed state from the top to the bottom. This ink painting explores the relationships between 'Button' and 'Buttonhole' and developed the ideas of button and buttonhole's daily movement and the jewellery idea sketches of 'button' are based on moveable parts along the 'buttonhole' track (Fig.224).

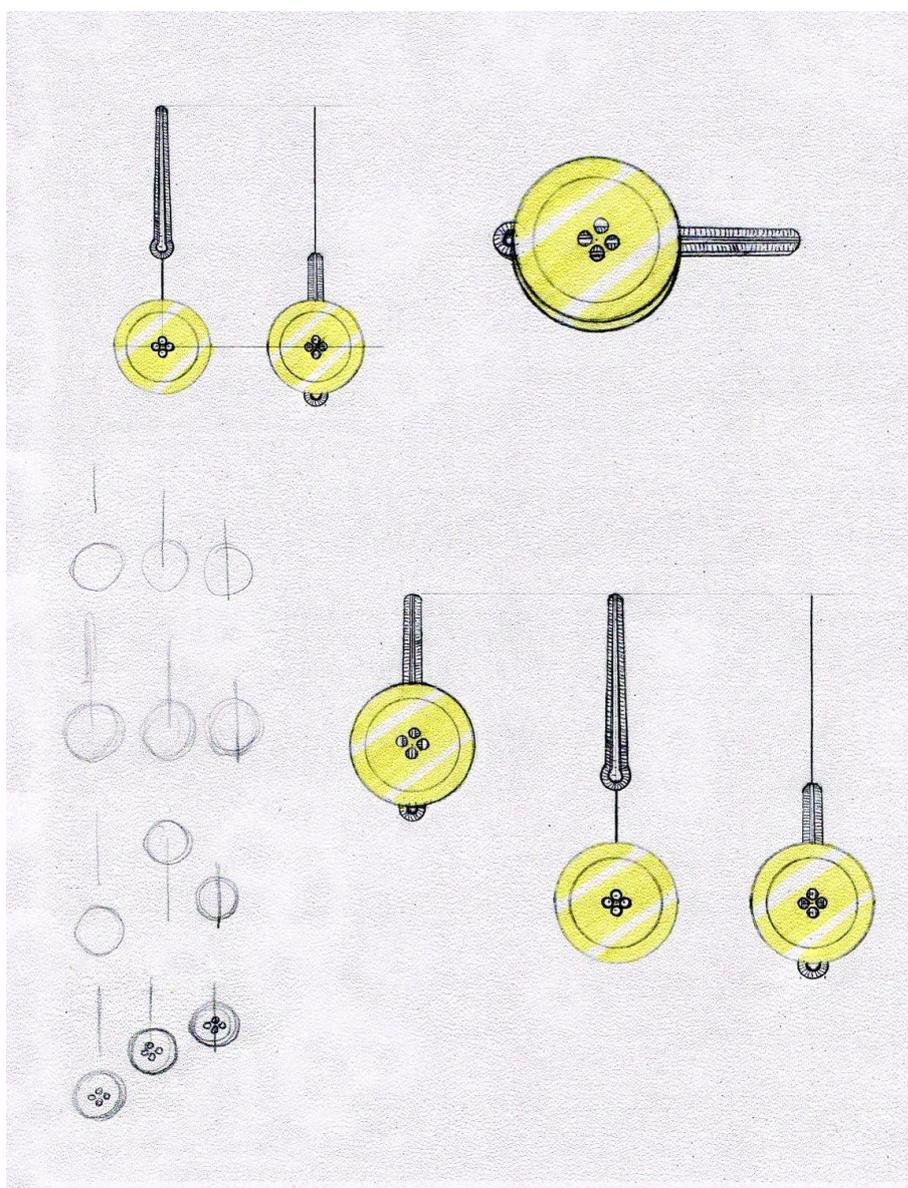


Fig. 224: Initial 'Button' glass jewellery ideas sketches (Jiang, 2011).

The first 'Button' brooch piece was made from kiln-forming Banas glass, silver clay with handmade silversmith techniques. I was not satisfied with the first design so I wrote down different methods to fix the problems (Section 4.4.5). A lot of things were edited to improve the design of the brooch. After careful consideration, a 3D Rhinoceros model of the buttonhole was developed and exported to three STL files, before 3D printing. The button was 3D printed in flexible plastic to test the size of the finished product. Water-jet cutting techniques were also used to develop the final glass pieces through various testing to get right size and different shapes of them. A variety of screws were developed to ensure they were the right size to fit inside the hole of the 'button' glass piece. Finally, once all the components parts were designed and tested, I cut many coloured glass pieces into different shapes and sizes for the 'Button' brooch through water-jet cutting.

4.4.4 The microwave kiln glass testing of the 'Button'

Similar to the processes carried out for the work in 'Concave and Convex' couple ring set ('Ao Tu 凹凸') and 'Egg and Sperm' necklace, I have conducted 17 glass tests by using the microwave kiln (For more detail see appendix.2). Some of the typical examples are shown below:



Fig. 225: Three wax buttons were craved by handcraft (Jiang, 2011).

Fig. 226: Button glass was made by microwave kiln forming (Jiang, 2011).

In order to create the button shape, three wax buttons (bottom of the image 225) were carved based on the sample deep black plastic button (top of the image 225). A mould was created by using the lost wax method and Bullseye glass frit with a microwave kiln. These glass button pieces (Fig.226) unfortunately do not have the four holes due to the expansion of the material and the size of the button and the holes are too small.



Fig. 227: Shape the glass powder as the round circle (Jiang, 2011).



Fig. 228: The round shape glass after microwave fusing the glass powder (Jiang, 2011).

Further experiments were made to create a round shape glass button. Bullseye glass powder was formed into a round disc shape (Fig.227). This is then fused using the microwave kiln. Unfortunately, this method produces inaccurate results (Fig.228).

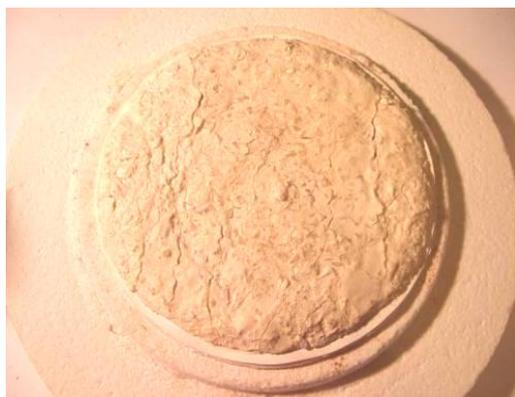


Fig. 229: Shape the glass frit and powder in a round shape (Jiang, 2011).



Fig. 230: The pentagon glass after fusing in the microwave kiln (Jiang, 2011).



Fig. 231: The pentagon glass under the lighting (Jiang, 2011).

A further experiment was made by mixing the glass frit and powder together into a round shape and fused together in the microwave kiln (Fig.229). Although the shape is still not accurate (Fig.230), it nevertheless produced a glass piece with interesting texture inside, particularly when viewed against the light (Fig.231).



Fig. 232: Fuse the round glass sheet with glass powder and silver leaf (Jiang, 2011).



Fig. 233: The round shape blue glass after microwave fusing (Jiang, 2011).

In order to create a more accurate shape, a blue round glass sheet with glass powder was used (Fig.232). Once fused, the round glass piece was more accurate compare to before but due to the high heat, the silver leaves disappear completely (Fig.233).

4.4.5 Trial 'Button' brooch one



Fig. 234: Silver clay making with basic silversmith skill for 'Buttonhole' (Jiang, 2011).

In this piece, I try to test different techniques to make the silver part since the former jewellery pieces only use silversmith techniques. Silver clay is easier shape and harder to get finer shapes than the general silver raw materials, such

as sheet, tube and bezel stip. Therefore, combining the silver clay with the silversmith technique it is more likely to avoid their weaknesses and strengthen their strengths. Silver clay and silversmith have been used to make this buttonhole (Fig.234).

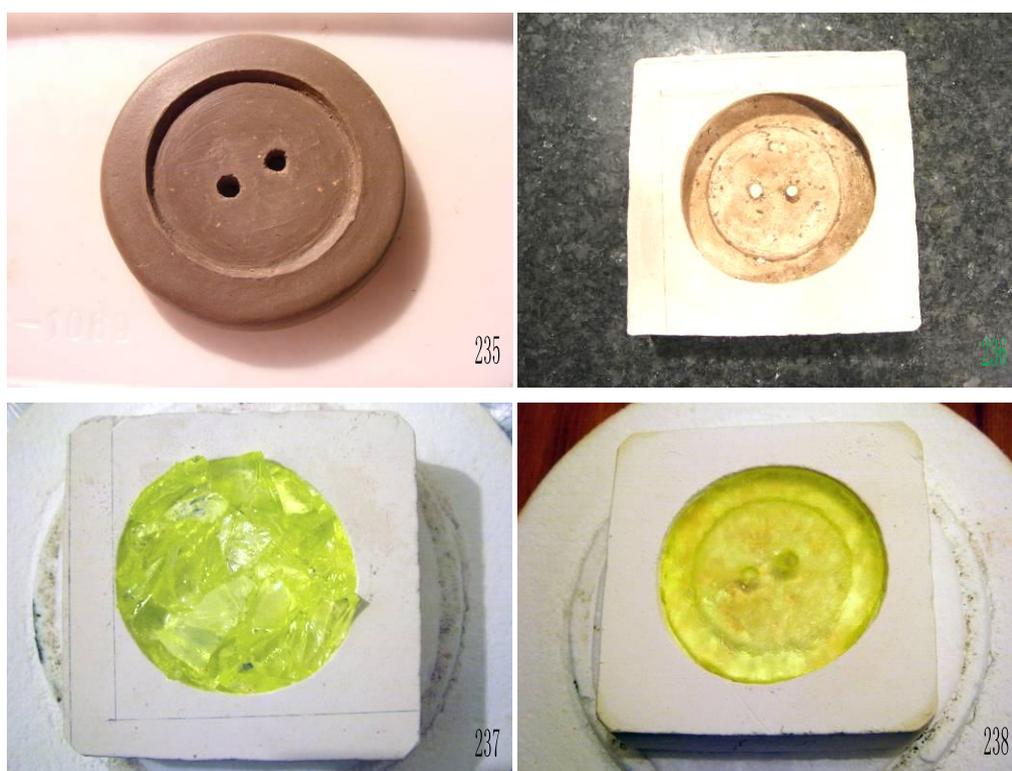


Fig. 235: The clay button, handmade (Jiang, 2011).

Fig. 236: Button mould made base on the button clay (Jiang, 2011).

Fig. 237: Banas glass put into the Button mould (Jiang, 2011).

Fig. 238: Yellow button glass after fusing in the microwave kiln (Jiang, 2011).

As with the former button glass pieces test examples, I chose to combine the lost wax method and microwave kiln forming to make the glass part of the first 'Button' brooch (Fig.239). Since the first method (Section 4.4.4, fig.226) might succeed if I increase the button size. It is difficult to get the finer shape for only using the glass powder and glass frit (Section 4.4.4, fig.228, 231). Although fusing the glass sheet and glass powder can get a finer button shape, it is hard

to drill two holes that close to each other. This is because it would easily cause the glass sheet to brake.

Hence, this first 'Button' brooch (Fig.239) was made with kiln-forming Banas glass in microwave kiln (Fig.235–238) with handmade. Afterwards, the clay button (Fig.235) was made by hand to create the mould (Fig.236). A yellow glass button (Fig.238) was created by microwave kiln forming the Banas glass (Fig.237).



Fig. 239: 'Button' brooch one (Jiang, 2011).

4.4.5.1 Description of 'Button' brooch one

The glass button can move along the silver buttonhole's track and is interchangeable by the piece of silver holding the nut, bolts and glass together. The glass has been polished with some texture in the middle of the back. From the side the glass appears bulging and the shape is uneven (Fig. 239).

4.4.5.2 Evaluation of 'Button' brooch one

The silver part of the button hole is too long and the silver protrudes from the side of the silver buttonhole. More polishing is needed to balance the weight of the glass piece with the silver. To reduce the effect of the bulging glass from the side view the piece needs to be grinded down further.

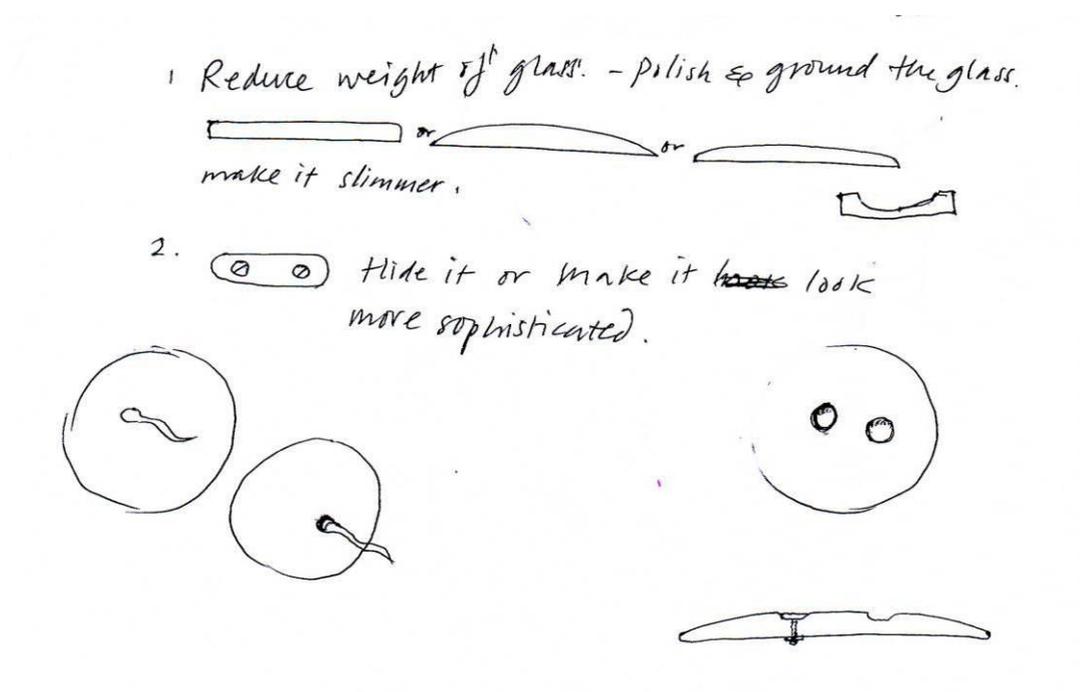


Fig. 240: Problems concerning the first pieces of the 'Button' brooch (Manny Ling and Sylva Petrova's tutorial in 2011).

The side view of glass shape should be uniform in profile and the piece of silver which hold the nut, bolts and glass should be hidden to make it look aesthetically more sophisticated (Fig.240). The interchangeable format of this piece makes it difficult to replace the glass and a simpler solution needs to be sought.

4.4.6 Trial 'Button' brooch two

More specific details were considered (Fig.241). The buttonhole size, the pin hold stand and protector (Section 4.4.7–4.4.8) and the screw shapes (Section 4.4.9) using Rhinoceros software.

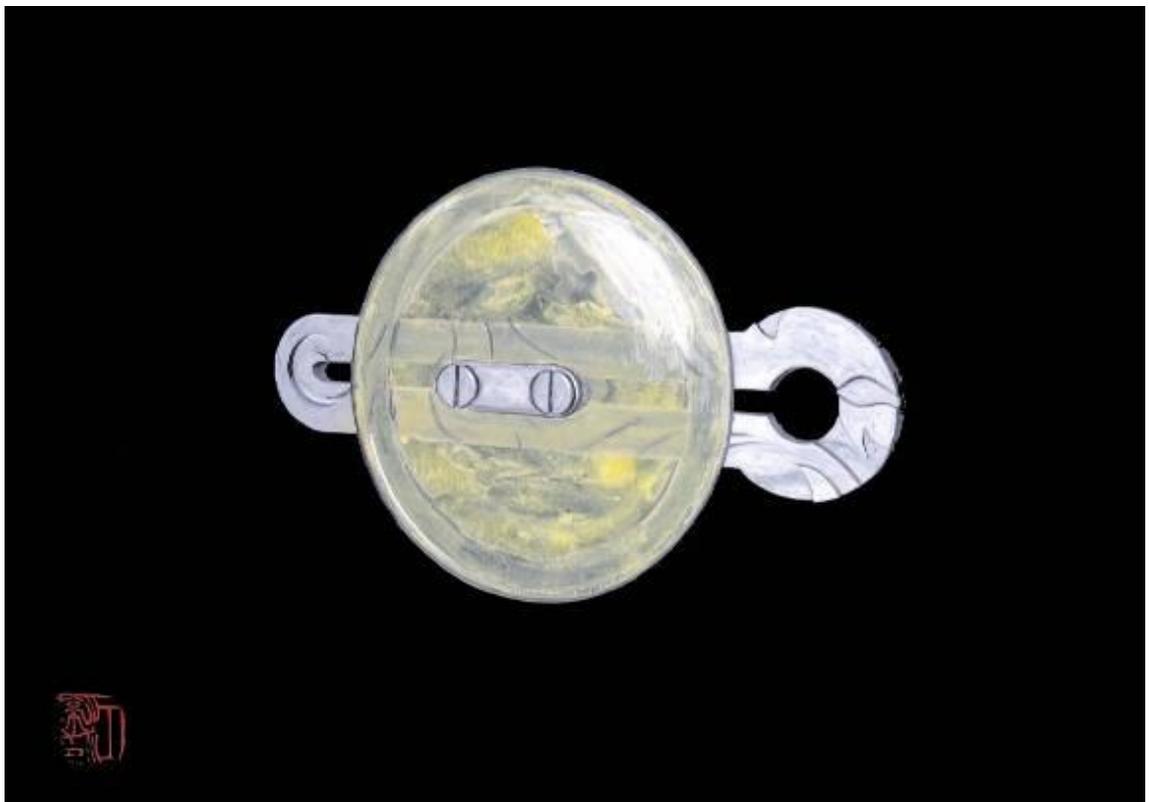


Fig. 241: The drawing of 'Button' brooch (Jiang, 2011).

'BUTTON B' ORTHOGRAPHIC VIEW

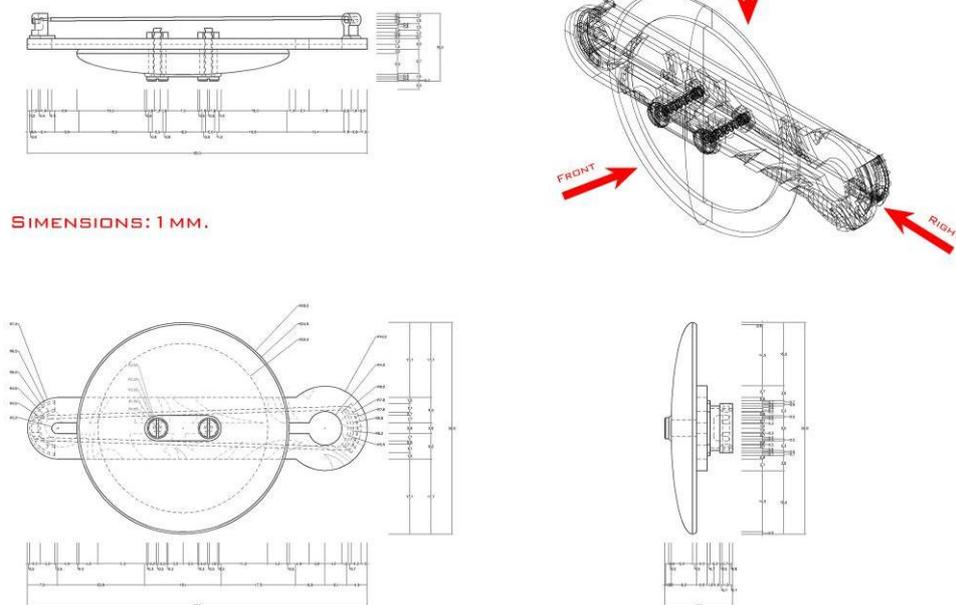


Fig. 242: The orthographic view of 'Button' brooch (Jiang, 2012).

The description of technical features of the design and the specifications discussed in Chapter 3 were measured and processed in the same way as case study one and two (Section 4.2 and 4.3) (Fig.242).

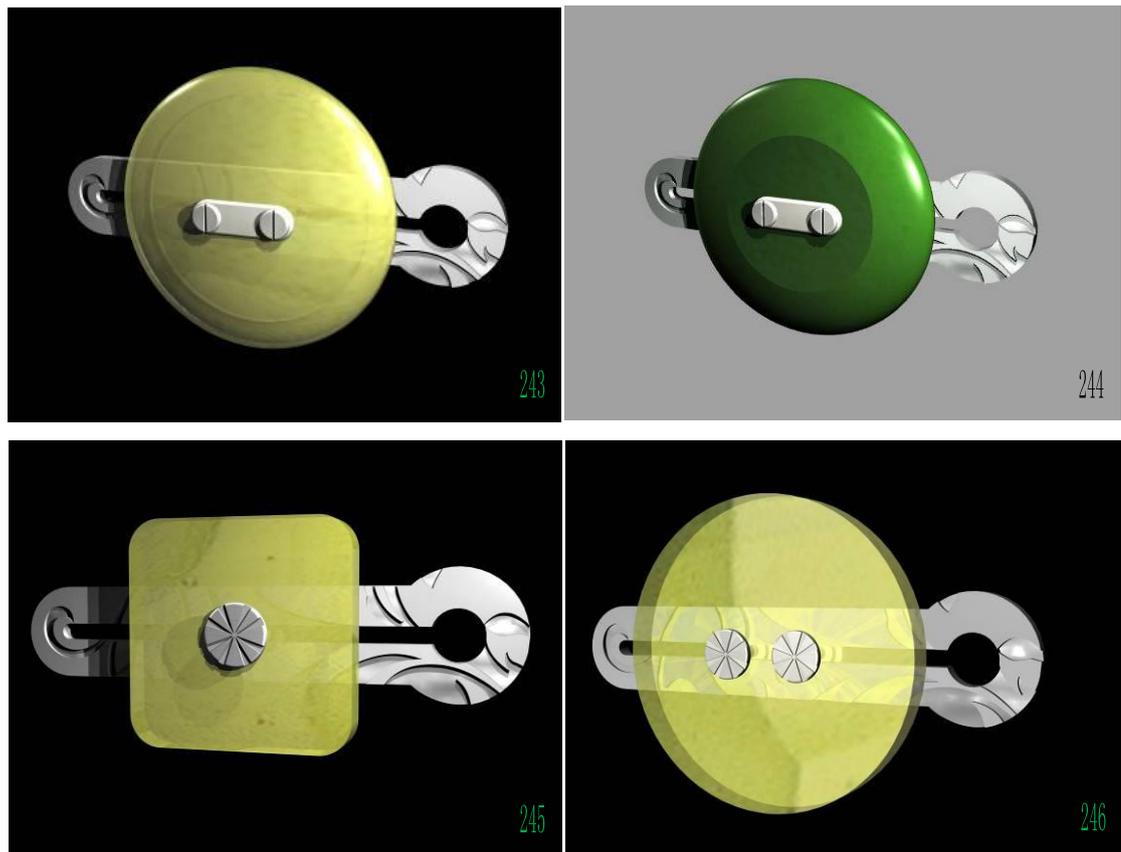


Fig. 243, 244, 245, 246: The different render of 'Button' brooch (Jiang, 2012).

The whole 'Button' brooch 3D visual has been created in Rhinoceros (Fig.243–246). In addition to the evaluation of button one in the last section, this second 'Button' brooch considered five things:

- i. Determined the right size for the silver buttonhole.
- ii. Carved fine pattern on the silver buttonhole.
- iii. Developed new pin, pin holder and protector to fit with the intention of the final design.
- iv. Use the screw instead of silver nut and bolts which allows the glass to be replaced more easily. Deleted the piece of silver or use finer shape of it.
- v. The side view of the glass button experimented with rectangular or eyebrow form.

4.4.7 Trail brooch pin, pin holder and protector one

4.4.7.1 Description of brooch pin, pin holder and protector one

The brooch pin, pin holder and protector were originally designed into the standard model (Fig.247). This single pin only stands on one side of the buttonhole.

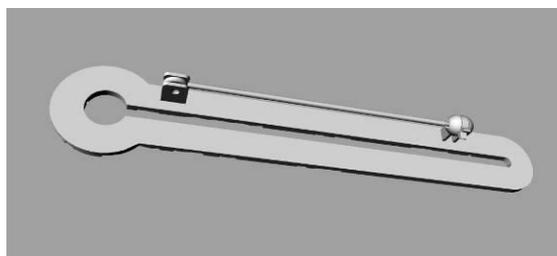


Fig. 247: The brooch pin, pin holder and protector one (Jiang, 2012).

4.4.7.2 Evaluation of brooch pin, pin holder and protector one

The below list shows what problems occurred with the original design, protector one and why it was discarded:

- i. The form was too general and appeared stylised. This did not fit with the intention of the final design. I have made the size of the brooch shorter with a new form in order to match the final design.
- ii. The single pin was too weak to hold the piece. To solve this problem, I have made the size of the pin shorter according to the size of the whole piece and used double stainless steel pins instead of the single silver pin.

4.4.8 Trail brooch pin, pin holder and protector two

New models were developed (Fig.249–250). These pieces were inspired by contemporary Chinese wood craftsman Zhengdong Li's (李正东) (2011) Chinese word carvings of characters (Fig.248).

Fig. 248: Zhengdong Li 李正东, 2011,
Chinese wooden trays stand for
Shoushan stone (寿山石), jade and etc.



4.4.8.1 Description brooch pin, pin holder and protector two

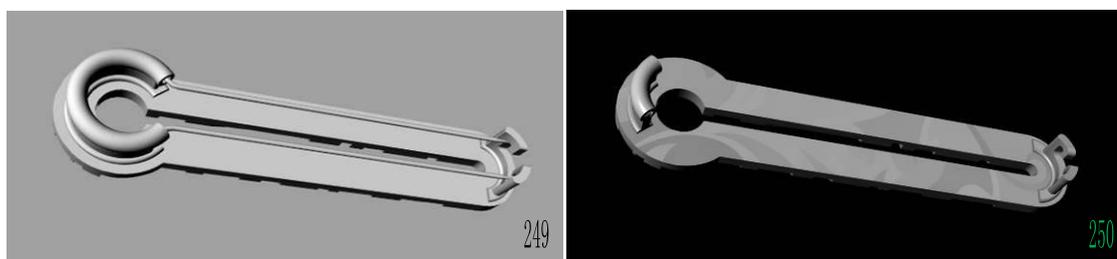


Fig. 249–250: The development of brooch pin, pin holder and protector (Jiang, 2012).

Below is a description of how the new brooch pin, pin holder and protector two were made:

- i. A 'C' shaped form with a pin on the end.
- ii. After 3D printing, the artwork was soldered (Fig.253): the silver buttonhole (Fig.251) with the silver pin holder and silver pin protector (Fig.252).
- iii. The artwork was exported in the same way as case study one and two, section 4.2 and 4.3 (Fig.250).



Fig. 251: The 3D printing of 'Button' brooch silver buttonhole (Jiang, 2012).



Fig. 252: The 3D printing of 'Button' brooch pin silver holder and protector (Jiang, 2012).



Fig. 253: The soldering of silver buttonhole with silver pin holder and protector (Jiang, 2012).

4.4.8.2 Evaluation of brooch pin, pin holder and protector two

The following list evaluates the brooch pin, pin holder and protector two:

- i. The 'C' shape tube to hold the pin is long way to go through. 3D printing would block the tube (Fig.249).
- ii. The blocked tube would weigh too much and throw the artwork off balance.
- iii. A new 'C' shape pin holder was created around the pin protector's curve (Fig.250) and maintains a Chinese traditional wood carving character.

4.4.9 Series testing of 'Button' brooch

The 3D printer printed the 'Button' into violet purple flexible plastic in order to test its size and create the look of the final product. The purple button has the right diameter but it is too thick since on the side it is shaped like an eyebrow (Fig.254–255) and not simple enough to be aesthetically pleasing. Water-jet cutting was used to cut the button shape of glass pieces into different sizes (Fig.256). The side of these new yellow glass pieces have a rectangular shape which was discussed in section 4.4.5.2 (See fig.240).

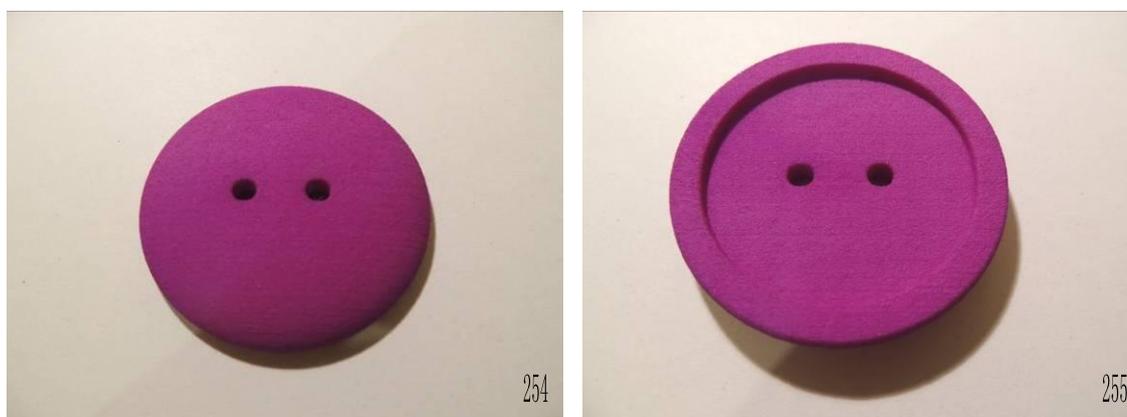


Fig. 254–255: The 3D printing of strong and flexible plastic 'Button' (Jiang, 2012).



Fig. 256: The Water-jet cutting of yellow 'Button' glass (Jiang, 2012).

In 'egg and sperm' necklace the screw shapes were tested and evaluated (Section 4.3). Similarly the screw shape silver pins of 'Button' brooch (Fig.257) were enhanced. After receiving feedback from my solo glass jewellery exhibition in Guilin Exhibition Hall in China, the original screw (Fig.258) was changed into Fig.259–261. This however was inapplicable to this project: If the screw was changed into the press lock, the screw nut would not get lost, but the thickness of the glass is not sufficient.



Fig. 257: The piece of 'Button' brooch in Guilin Exhibition Hall in China (Jiang, 2013).

A solution was to change the top pattern (Fig.259) and keep the screw stick (Fig.258) characters, and then change the sharp shape of the screw nut into a round shape. This prevents the screw nut from moving and can work with the

varying thickness of the glass piece (Fig.260). New flower bud shapes were then developed (Fig.261).

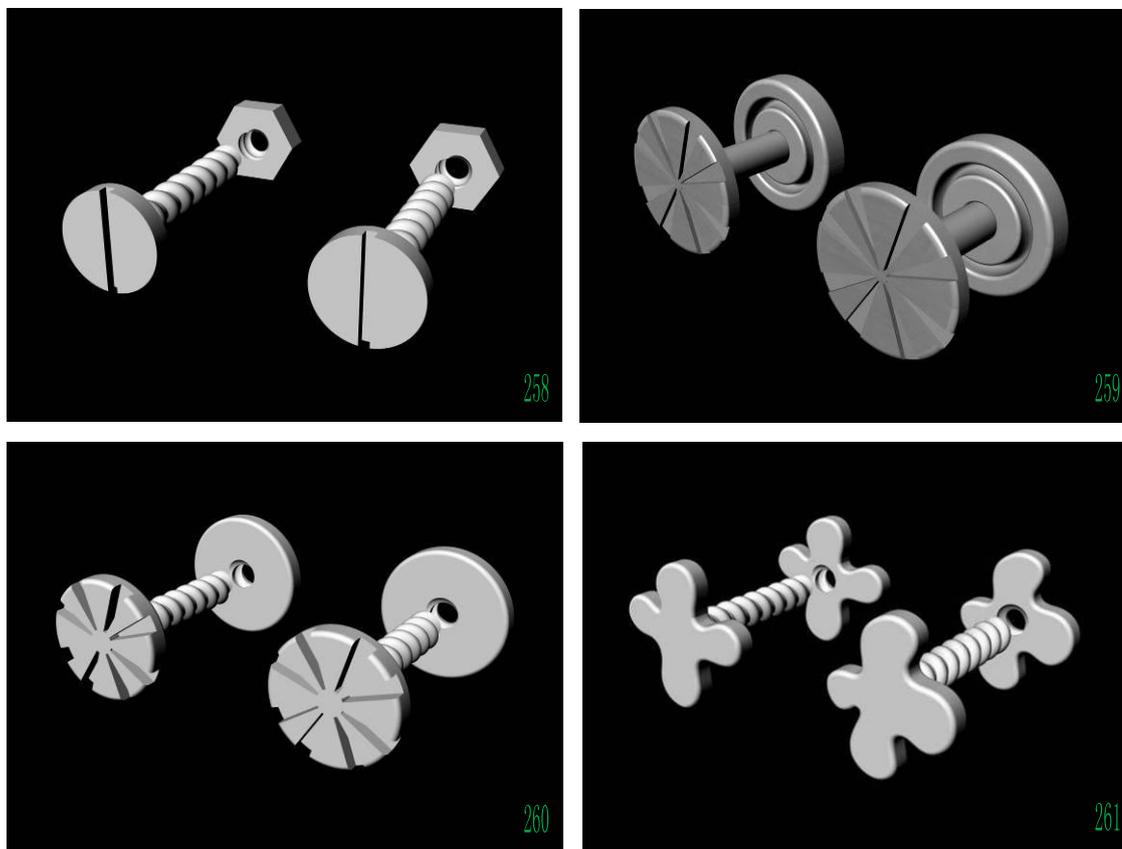


Fig. 258, 259, 260, 261: The development of 'Button' brooch screw shapes and screw nuts (Jiang, 2012–2013).



Fig. 262–263: The silver screw and plastic screw (Jiang, 2012–2013).

Above are examples of the different screws. The silver screw (Fig.262) was modified to create the white strong and flexible plastic press lock (Fig.263). New silver screws were created in the final designs below (Fig.264). After my solo exhibition in Guilin, China (2013), new coloured buttons were created (Fig.265).



Fig. 264: The new 'Button' brooch screws (Jiang, 2013).



Fig. 265: The different colours and shapes of 'Button' glass (Jiang, 2013).

4.4.10 Apply 'Borrowed Landscape (借景)' method into 'Button' brooch



Fig. 266: The 'Borrow Landscape' of the 'Zhuo zheng Garden (拙政园)' in Suzhou Garden (Photography by Ting Jiang, 2003).

The 'Borrowed Landscape (借景)' is one of the typical traditional design methods and techniques in Chinese classical gardens. "Consciously 'borrow' the inside and outside the garden landscape into the visual range of the garden" (Shen, 2011, p.1). This method deals with the relationship of different landscapes and uses different ways of 'borrowing' to connect the different landscape between outside

and inside. For example, Suzhou Humble Administrator's Garden (拙政园) is the most typical example of the 'Borrow Landscape' in surviving famous Chinese classical gardens. Suzhou Humble Administrator's Garden (拙政园) borrowed the North Temple Pagoda (北寺塔) into its garden scenery which the North Temple Pagoda (北寺塔) not located inside the garden (Fig.266). The North Temple Pagoda is far from the Suzhou Humble Administrator's Garden (拙政园) about 2.6 km as the map shows below (Fig.267). 'A' is Suzhou Humble Administrator's Garden (拙政园); 'B' is North Temple Pagoda (北寺塔).



Fig. 267: The 360 map shows the distance between 'Suzhou Humble Administrator's Garden (拙政园)' and 'North Temple Pagoda (北寺塔)' (http://map.so.com/?k=拙政园中的塔&src=tab_www).

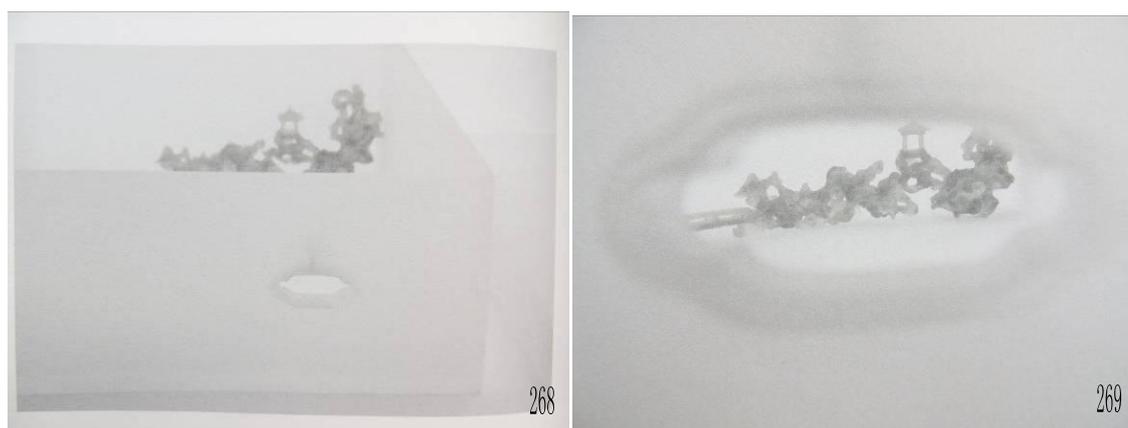


Fig. 268–269: Wang Qin (王沁) Arcadia II (partial) Cast Glass 9.8cm x 22.5cm x 32.5cm, 2013 (Zhou and Whiteley, 2014, p.188-189).

Another example can be found in Chinese glass artist Wang Qin's (王沁) glass art work. He also applied the 'Borrow Landscape' method into his glass work of 'Arcadia II (2013)' (Fig.268–269). He casts a tiny Chinese garden landscape which can be viewed from a small window in a big glass box similarly used as the 'Borrow Landscape' method in traditional Chinese garden design.

4.4.11 Description of 'Button' brooch design with 'Borrowed Landscape'

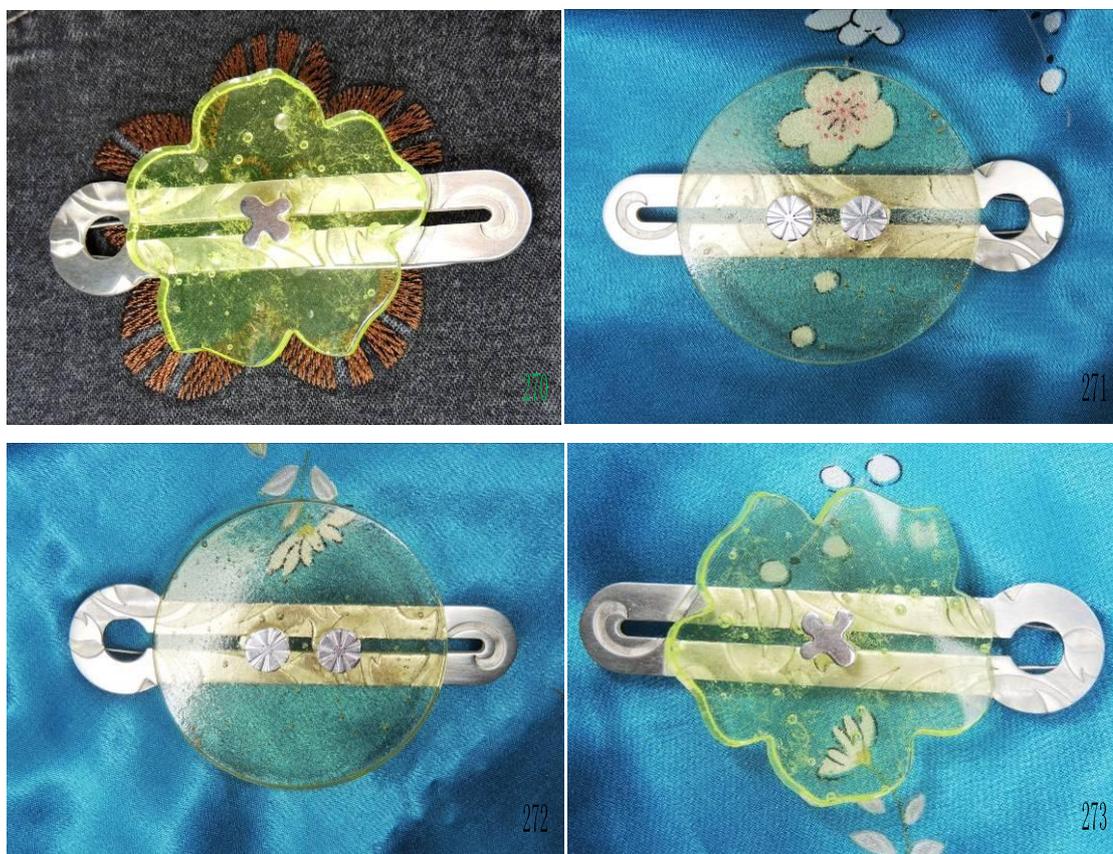


Fig. 270, 271, 272, 273: The different patterns of clothes used in the 'Button' brooch (Jiang, 2014).

My 'Button' brooch used this 'borrow' method to connect the pattern from clothes to the glass button, which enhance the interests and relationship between jewellery and clothes. The transparent glass of the brooch is metaphorically similar to a window pane of a house, with the house becoming symbolic of the clothes on the wearer. Different patterns of clothes can be seen through the brooch and impact upon the design of the jewellery. This ever-changing feature of the design conveys some of the meanings between the harmony of man and nature, and the ways this relationship is symbiotic (Fig.270–273).

Chinese ink paintings are painted in a very particular way, close-up, medium shot and far view, as Chinese academic Jian Yan (严健) mentioned:

Chinese landscape painting views the object from a macro to a micro perspective. There are three ways of doing this high-reaching, far-reaching and flat-reaching. They are a special framing law and experience in the Chinese landscape ink painting (2003, p.7).



Fig. 274: Yang Taiyang, 1977, *Guilin Elephant Trunk Hill*.

The famous Chinese ink painter Yang Tai Yang's (阳太阳) 'Guilin Elephant Trunk Hill' is an example (Fig.274). The red and black lush tree is closest in the foreground, the middle ground depicts the 'Elephant Trunk Hill' and in the far distance is the tower and hill. This combination of perspectives in a single painting is typical of this style of Chinese painting.

There are similar relationships to be found in terms of perspective in the 'Button' brooch design. The glass remains in the foreground, the silver in the middle and the clothes (as seen through the glass) create the far distance perspective (Fig.270–273). The 'Button' brooch with the silver screw, glass and then silver can also create a similar perspective, without the background details shown by the clothes.

4.4.12 'Button' brooch description

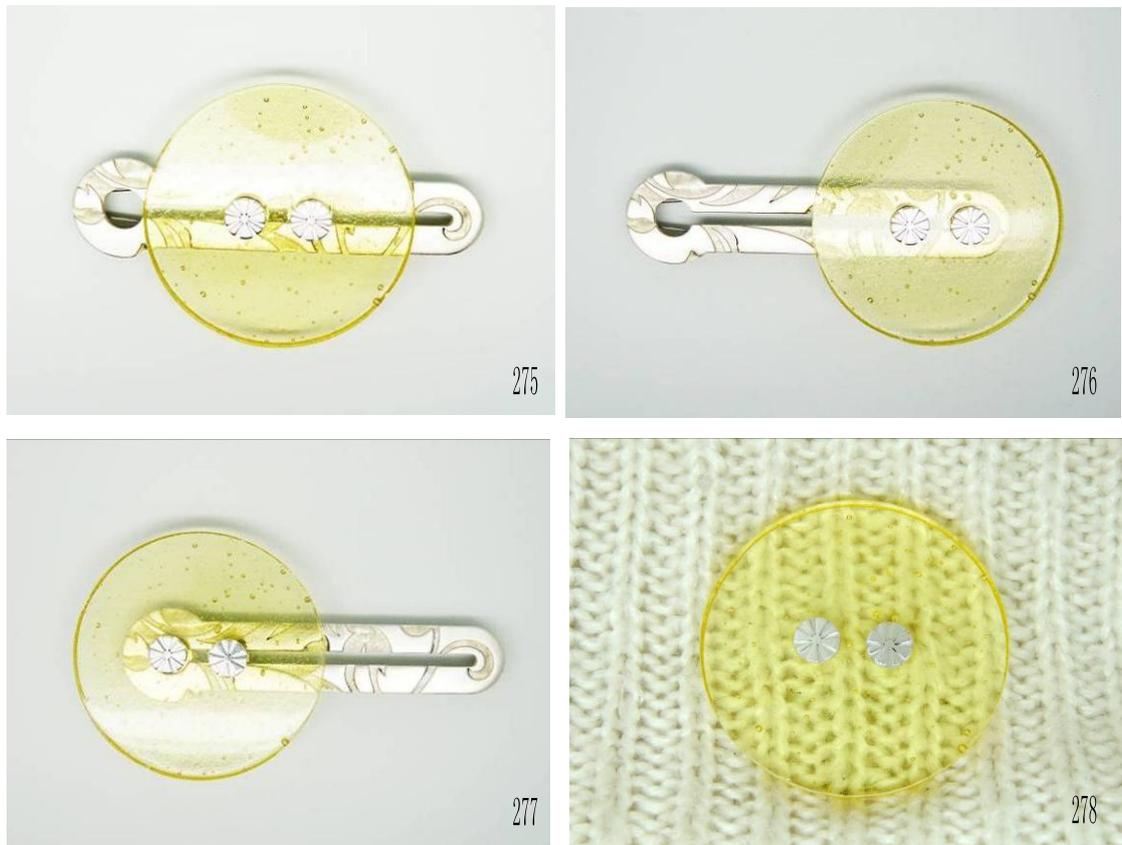


Fig. 275, 276, 277: The various positions and movement of 'Button' brooch (Jiang, 2013).

Fig. 278: The glass button attached to a sweater using the screws only (Jiang, 2013).

This list describes the 'Button' brooch in detail, including its themes, design ideas and how it is worn:

- i. The notion of 'Change' is examined in a very practical way in the Button case study, through the various perspectives created by the button and the buttonhole.
- ii. The glass button moves and follows the path through the silver from top to bottom (Fig.275–277).
- iii. The button can also move in the button hole and creates a similar appearance to the movement created by the ink paintings (Fig.223 in section 4.4.3).



Fig. 279, 280, 281, 282, 283: The final 'Button' Brooch in different colours and forms (Jiang, 2013).

- iv The glass button can also be worn without the silver brooch part (Fig.278).
- v The design of the button allows the glass pieces to be interchangeable and movable and it is not limited by shape and size. The photos show the final 'Button' brooch and the different colours and forms (Fig.279–283).

4.4.13 'Button' brooch evaluation

The final 'Button' brooch (Fig.279–283) is also examined using three of the six characteristics of harmony between man and nature to achieve the first research aim (section 1.6) as in case study one and two (Fig.284). These three Chinese philosophical focus points have been clarified in sections 2.7.3.1, 2.7.3.4 and 2.7.3.6.

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	√
Unification of Time and Space	
Self-cognition and External-cognition	√
Same Structure of Man and Nature	
Combination of Subject and Object	
The Concept of Change	√

Fig. 284: The three characteristics associated with the 'Button' brooch (Jiang, 2014).

4.4.13.1 'Integration of Yin and Yang'

The idea of “a binary compound of Yin and Yang shows an apparent ‘duality’ of things” (Section 2.7.3.1) has been conveyed into my ‘Button’ brooch design. Button and buttonhole were found in my daily life which shows Yin and Yang characters of a binary compound of two duality things.

- i. The button conveys the dissipated Yang character and the buttonhole conveys the un-conflicting Yin character.
- ii. The button and buttonhole were typical examples that represent the ‘naturalness and spontaneity’ of the most advanced elements of Yin and Yang.
- iii. Harmony is a process where the button and buttonhole coordinates each other to serve their function.

4.4.13.2 'Self-cognition and External-cognition'

In Fig.33, Gongwang Huang's (黄公望) paintings in section 2.6.3.2 inspired me to eliminate distractions around the design, looking at them from a 'Zen (禅)' perspective. I would still my heart, carefully observing my surroundings in different places from different angles and different periods. Everything can become the origin of the design resources, even small humble daily necessities such as buttons and buttonholes can be used as design elements. They often give me fresh inspiration to find a new and different perspective through personal understanding and creative fusion into jewellery design.

- i. This design was conducted by an investigation and understanding of the concept of Yin and Yang, and Change.

- ii. The design reflects my self-awareness on the function, aesthetic and techniques during the design developing process which is the externalization process as discussed in section 2.7.3.6.
- iii. This whole design process shows the internalization process (Section 2.7.3.6) how my surroundings affect my design including the inspiration elements of button and buttonhole, the 'Borrow Landscape' method of Chinese garden design and Chinese ink painting.

4.4.13.3 'The Concept of Change' Evaluation

The brooch can be described as having the qualities of 'Change':

- i. Examining the physicality of change through the movement of the brooch facilitated in creating new designs, forms and combinations in contemporary jewellery design.
- ii. The path created by the silver and the ways the brooch moves is reminiscent of man moving through life and through the landscape.
- iii. The concept of life is enhanced by the fact that the brooch can turn on an axis and creates a dynamic form which is constantly responding to the wearer and their movements.
- iv. The design of the brooch is enhanced through removing the silver brooch, the 'foreground' of the brooch is highlighted in itself.
- v. The final designs contribute to contemporary notions of change with a particular focus on movement.

The groups from The Visual Art Department of Guilin Tourism College mention: "It is very interesting idea. If you can apply the characteristic of glass more profusely, it may also have more unexpected results" (Appendixes 9). This feedback also assisted the development of the design, inspiring me to cut more

various buttons in different colours and shapes (Fig.265 in section 4.4.9) in order to enhance the various choices for this design. However, in order to achieve the second aim in section 1.6, the design still maintains its shape is simple and keeping its size bigger than general jewellery size by influencing Western design environments which is not what the Chinese audience expects, in order to go against the traditional Chinese thinking which seems to prefer complex patterns as discusses in the section 2.3.1.2. This can also show that I am looking for a 'balance' which is one of the principles of 'harmony between man and nature' (Fig.27 in section 2.6.1) between Chinese and Western culture is a part of this design.

The 'Button' brooch design create new forms of 'button' glass and 'buttonhole' silver in various performance ways. This design process is also similar with the 'Concave and Convex' couple ring set ('Ao Tu') (Section 4.2) and the 'Egg and Sperm' necklace (Section 4.3). It also develops 3D prototype techniques and a comprehensive successful combination of the elements and techniques found in those designs. Through this development of 3D prototyping techniques and the refine processes using metal and glass together with the same intent as the previously mentioned case studies, this outcome can demonstrate the ways it achieved the research's third aim (Section 1.6).

4.5 'Pleated Skirt' necklace ('百褶裙' 项链)

4.5.1 Introduction

The pleated skirt seeks to examine the ways that 'Time and Space' as understood in Chinese philosophy are interrelated to each other.

The 'Pleated Skirt' necklace analyses the connections between time and space and their mutual relationship to each other. 'Unification of Time and Space' is the philosophy of harmony between man and nature embodied in three-dimensional space. Space-time unification means designers use inspiration from different time and space. Designers often have inspiration from a wide range of sources and have frequently examined concepts associated with time and space as discussed in Section 2.7.3.2.



Fig. 285: '100 Pleated Skirt' the real specific image from the tomb of 'Huang Sheng (黄昇)' in 'Fu Zhou (福州)', quoted from Chinese historical costumes (Huang, 2007, p.122).

The pleated skirt is an examination of some of these principals through my own artistic engagement. Time changes by moving through space and vice versa. Pleated skirt also has historical references to the Song Dynasty (Fig.285) where a pleated skirt was found in the tomb of Huang Sheng (黄昇) in Fu Zhou (福州) (Huang, 2007, p.122). The 'Pleated Skirt' necklace shows the

connection of time from the Song Dynasty to the present. The pleated skirt form of the Song Dynasty is a reference to the contemporary form of the modern

pleated skirt. They are startlingly similar to each other even thousands years of history.

In Chinese social culture the pleated skirts have evolved from a combination of skirt and pants to just wearing a skirt. This was of particular interest for women and the ways their social status has changed (e.g. voting, expression through fashion and equal education). Fashion in particular is evidence of a change from ancient China to more modern ideas and liberations. The role of women in society changed soon after, which is important for the society's development and harmony. However, women in China are still not totally equal to men since lots of people still follow the feudal idea of viewing sons as better than daughters. My overseas study has strengthened my perspective on this.

4.5.2 Objectives

The main objective of this project is to explore the notion of 'Time and Space' by creating a new piece of work based on the concept of creating new skirt glass shapes and uses these shapes to examine ways that the characteristic of 'Time and Space' comes through in my contemporary jewellery design.

4.5.3 Materials and processes

The materials used for this work are including Banas glass and Bullseye glass in different colours, silver (925) and white flexible plastic. The processes involved can be explained by the following diagram:

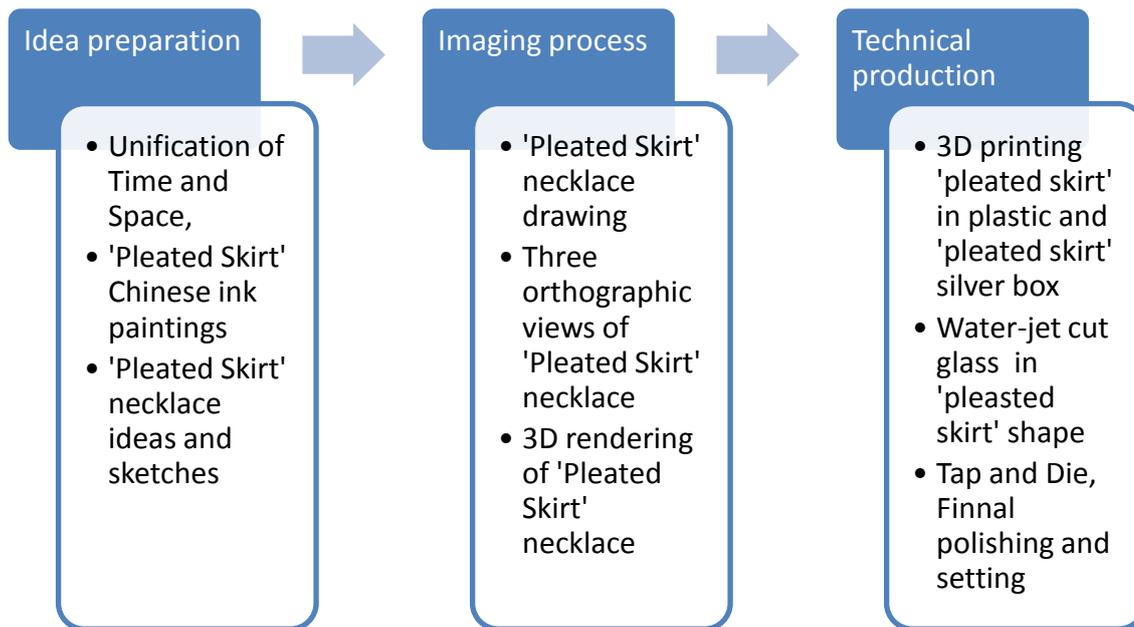


Fig. 286: The developing process of 'Pleated Skirt' necklace (Jiang, 2014).



Fig. 287: 'Song Dynasty Pleated Skirt' ink painting (Jiang, 2012).

Refining and fusing the same characters of pleated skirt from Song Dynasty into my skirt designs conveys the 'Unification of Time and Space'. I developed the idea of a skirt for different body parts, first making drawings of how it would look. Upon finishing my drawings I assumed that some of these would be too heavy and uncomfortable as glass pieces. It was then decided that this design would work best as a necklace. I soon decided to make the glass pieces of the skirt interchangeable, so different coloured glass can be placed for different styles.

Using AutoCAD and Rhinoceros, details of the skirt were then developed. A 'claw setting' was developed for the skirt part of the necklace. However, it was discovered that the glass pieces would be too small and complicated for this kind of design so I sought out more simple methods to make this piece work. This led to the idea of changing it to a silver skirt box instead. For holding the glass in place I would need screws that are easy to remove screws. Here, I came across several problems; I would need to tap holes into parts of the skirt. I used a tap and die set to resolve this problem. Further details on this process are discussed in section 4.5.5.



Fig. 288: 'Pleated Skirt' initial jewellery ideas sketch (Jiang, 2012).

The process (Fig.286) began in the same ways as case study 1, 2, 3 by Chinese ink paintings (Fig.287), then jewellery idea sketches (Fig.288) using the neck and the hand as the forms to design the piece. Due to the weight of glass these

forms are best suited to light and flexible materials, not glass. The new jewellery drawing (Fig.289) was then developed.

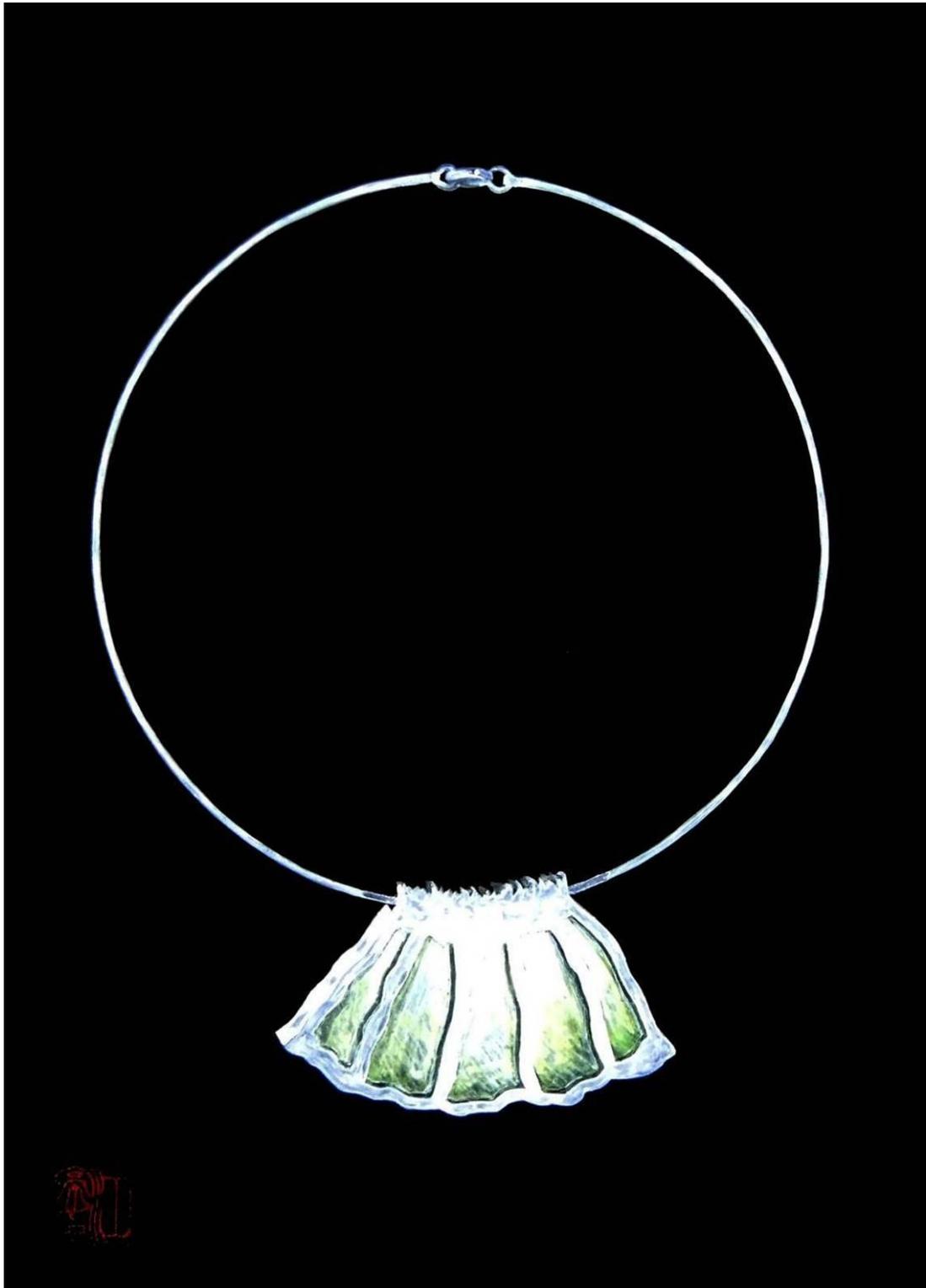


Fig. 289: 'Pleated Skirt' necklace detail drawing (Jiang, 2012).

4.5.4 The sizes survey of 'Pleated Skirt' pendant.

The glass sizes	Numbers of people	Percent
6 cm	29	48.3%
7 cm	13	21.7%
8 cm	11	18.3%
9 cm	1	1.7%
10 cm	1	1.7%
11 cm	2	3.3%
12 cm	0	0%
13 cm	3	5%

Fig. 290: 'Pleated Skirt' jewellery sizes survey (Jiang, 2012).

This new jewellery drawing Fig.289 practicality reduced the size of the 'Pleated Skirt' to the size of a pendant. In order to get a right size for this piece, I have conducted a survey of sixty local women in a nail shop (Appendix.5). A small survey was undertaken (Fig.290) which examined the collars of 60 women. It was found that most people preferred the size of 6 cm for this skirt piece. The size of the 'Pleated skirt' necklace design is based on it.

4.5.5 Series testing of 'Pleated Skirt' necklace.

The exact proportion, size and detail of 'Pleated Skirt' necklace were developed in the Orthographic view in AutoCAD (Fig.291) and Rhinoceros.

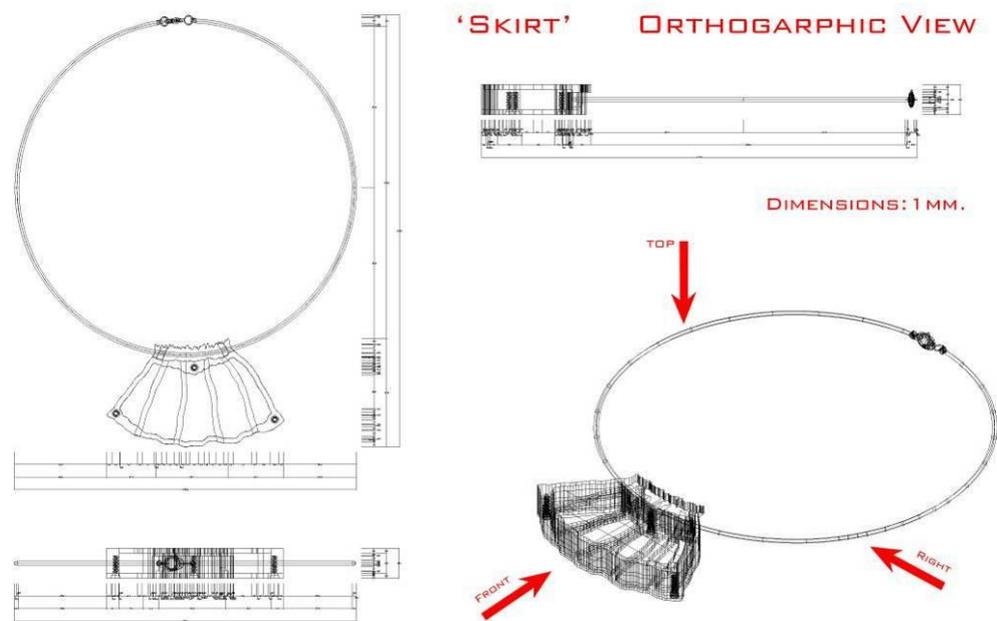


Fig. 291: The orthographic view of 'Pleated Skirt' necklace (Jiang, 2012).

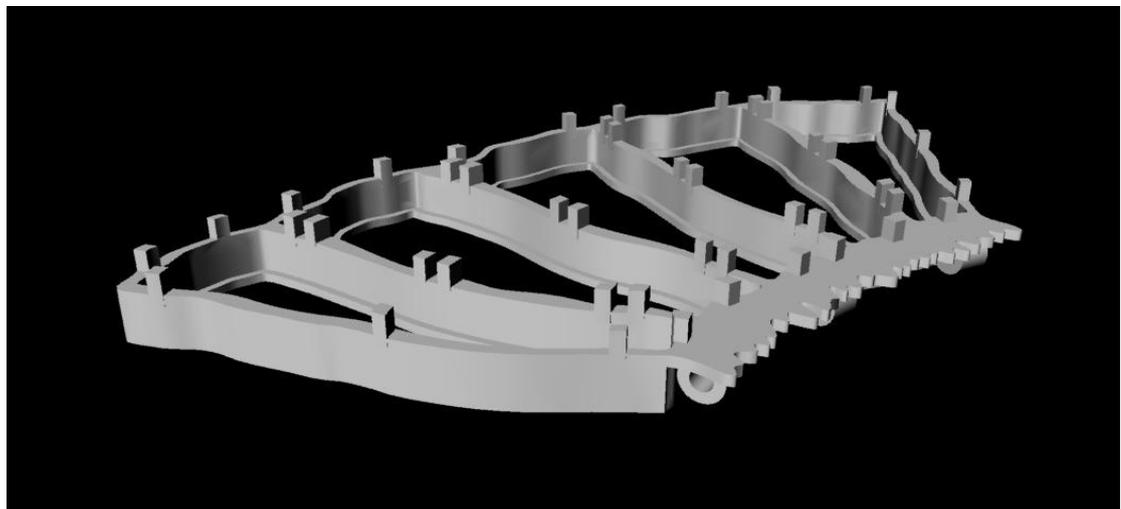


Fig. 292: Claw setting silver part of 'Pleated Skirt' necklace (Jiang, 2012).

Five settings were created for the glass in a pleated skirt shape. A traditional claw setting was used (Fig.292). However this was changed due the small scale and ridged setting of the final piece.

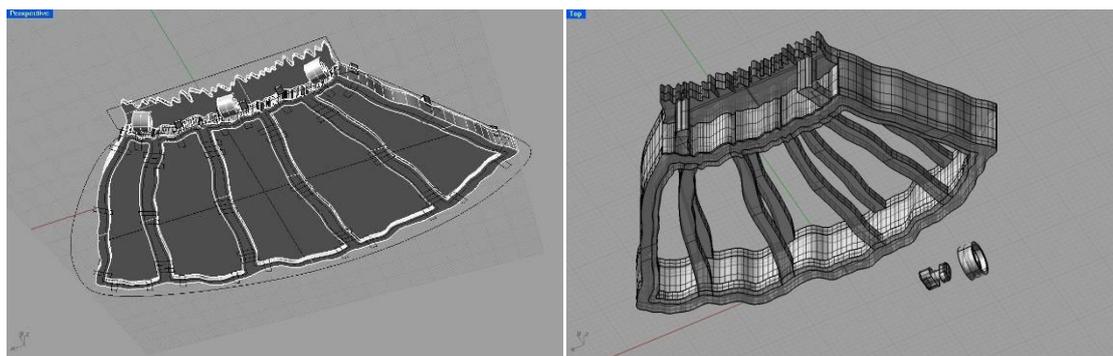


Fig. 293: Three circle tubes of 'Pleated Skirt' necklace (Jiang, 2012).

Fig. 294: Freeform tubes of 'Pleated Skirt' necklace (Jiang, 2012).

Circular tubes also did not connect fully to the silver pleat in the design. The pleat design was changed to create a box fitting. A single piece of pleat shaped glass was used to fit inside the skirt box. The circle tubes (Fig.293) were changed to freeform tubes (Fig.294). The most effective way to set the glass in the circle was assessed. The lock was set to the back to enhance the design and to not interrupt the eye flow around the piece through a displeasing interlink (Fig. 295–296).

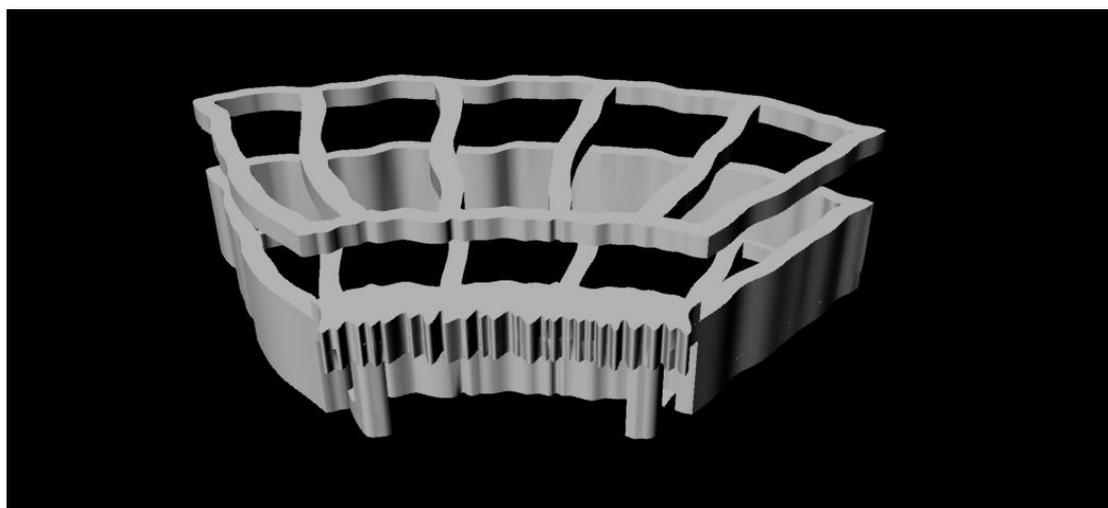


Fig. 295: Silver skirt box with the front opening skirt cap (Jiang, 2012).

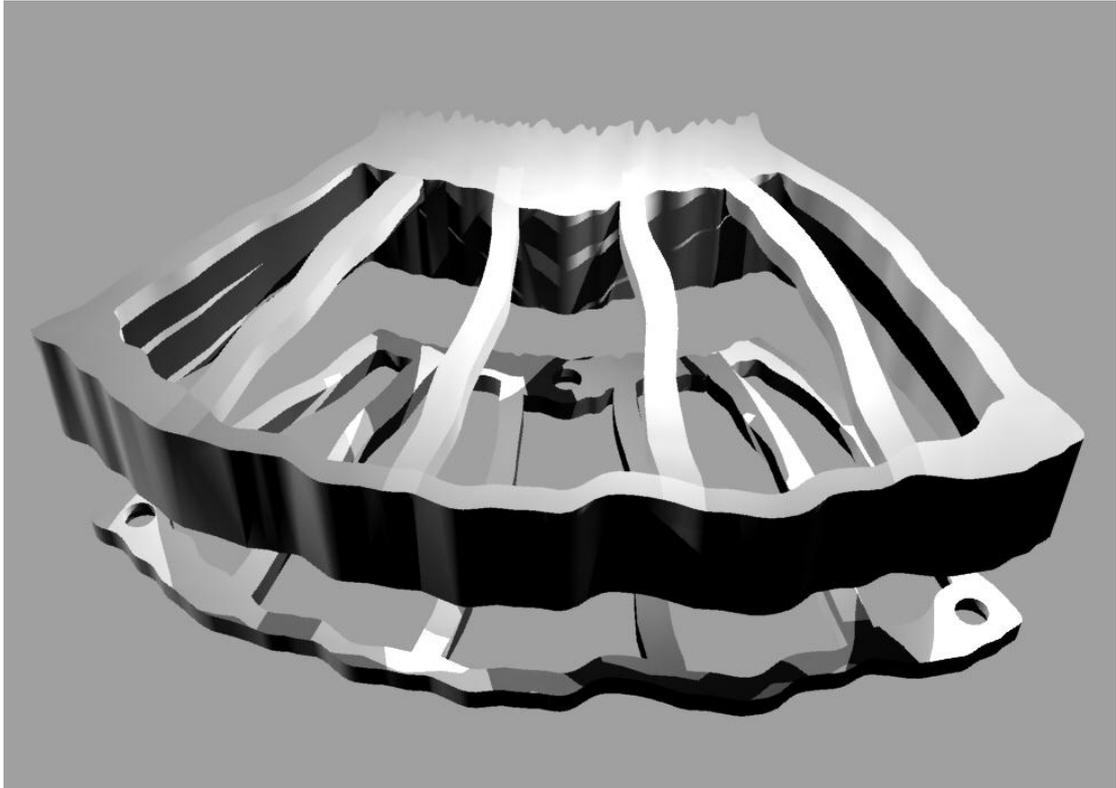


Fig. 296: Silver skirt box with the back opening skirt cap (Jiang, 2012).

Two considerations for the lock of the box were examined (Fig.297–298). This was dependant on the size of the screw, as it had to fit into the corners of the skirt shape (Fig.299).

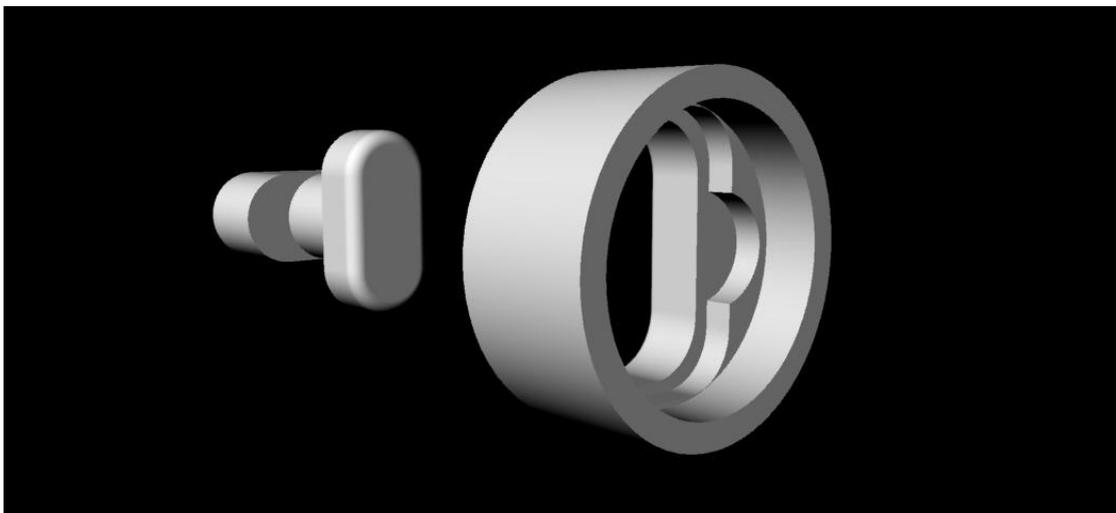


Fig. 297: Silver skirt box locker (Jiang, 2012).

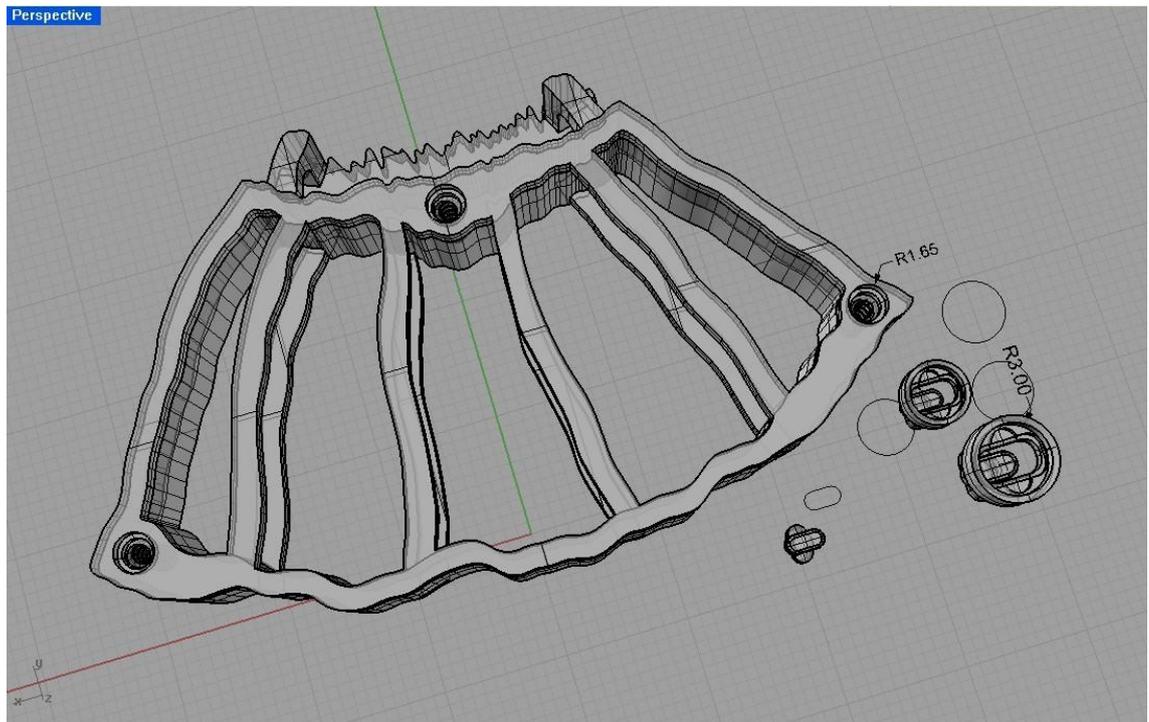


Fig. 298: Silver skirt box and locker (Jiang, 2012).

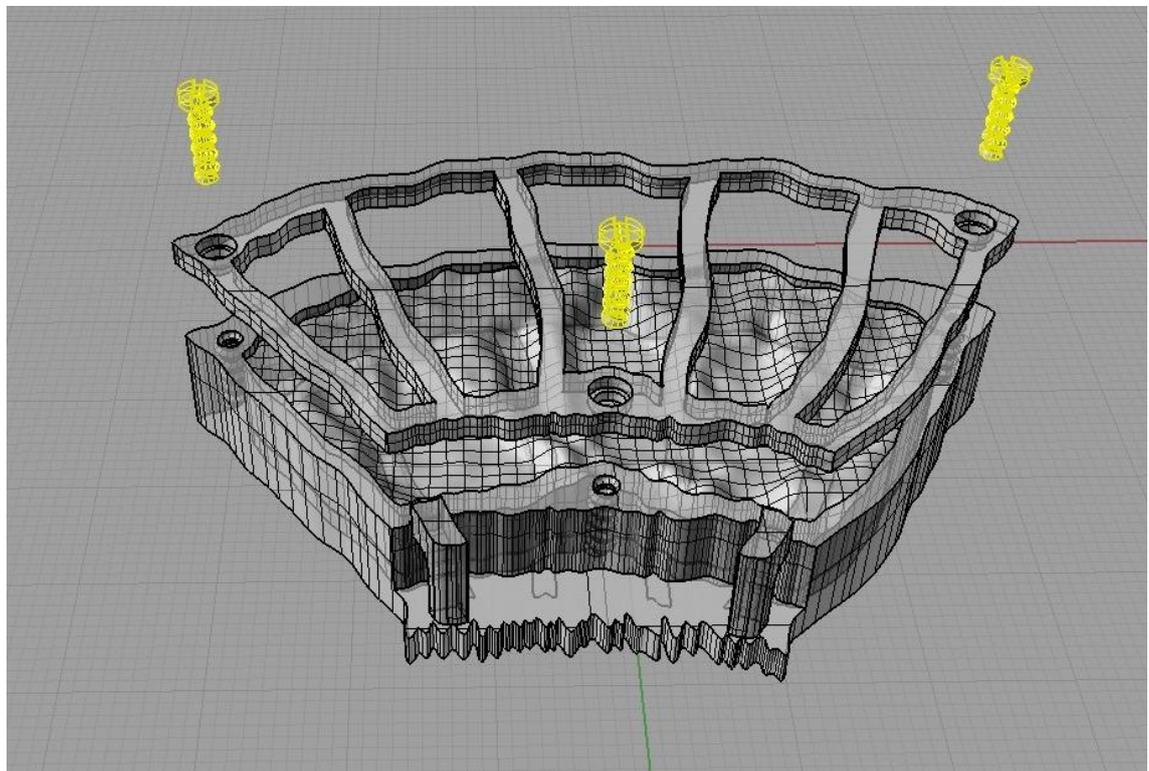


Fig. 299: Silver skirt box with screws locker (Jiang, 2012).

'Pleated Skirt' was rendered in Rhinoceros similar to those found in Section 4.2, 4.3 and 4.4 (Fig.300–302). This skirt model is the actual size of 7cm wide including (6cm width glass) and shows the final result. The drawing below shows the skirt model in actual size (7cm) including the glass (6cm).



Fig. 300: 'Pleated Skirt' necklace (Jiang, 2012).

Fig. 301–302: The pink and green 'Pleated Skirt' pendant (Jiang, 2012).

The 3D Rhinoceros model (Fig.301–302) was exported into three STL files for separate silver 3D printing. Some parts did not print as expected (Fig.303–304). The shape of the screw hole was too small and not deep enough (Fig. 303). The shape of the pleat also meant that the cap was not flat and could not fix correctly to the surface (Fig. 304).

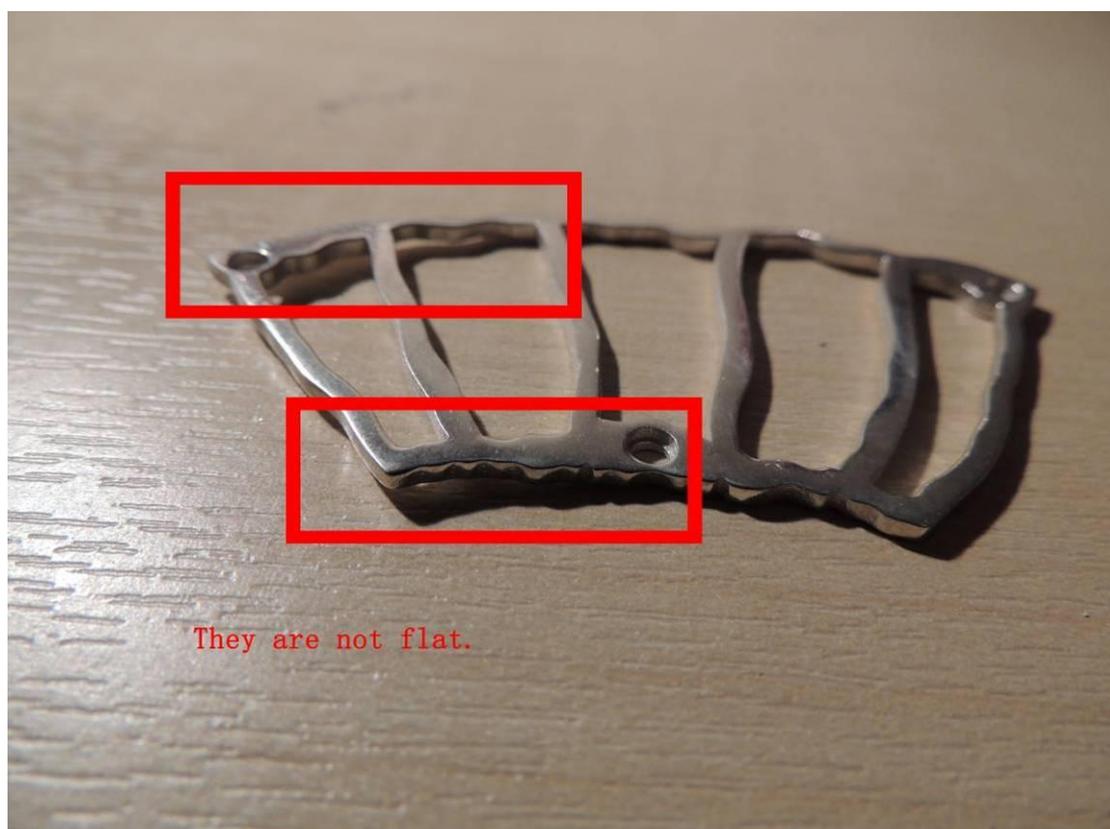
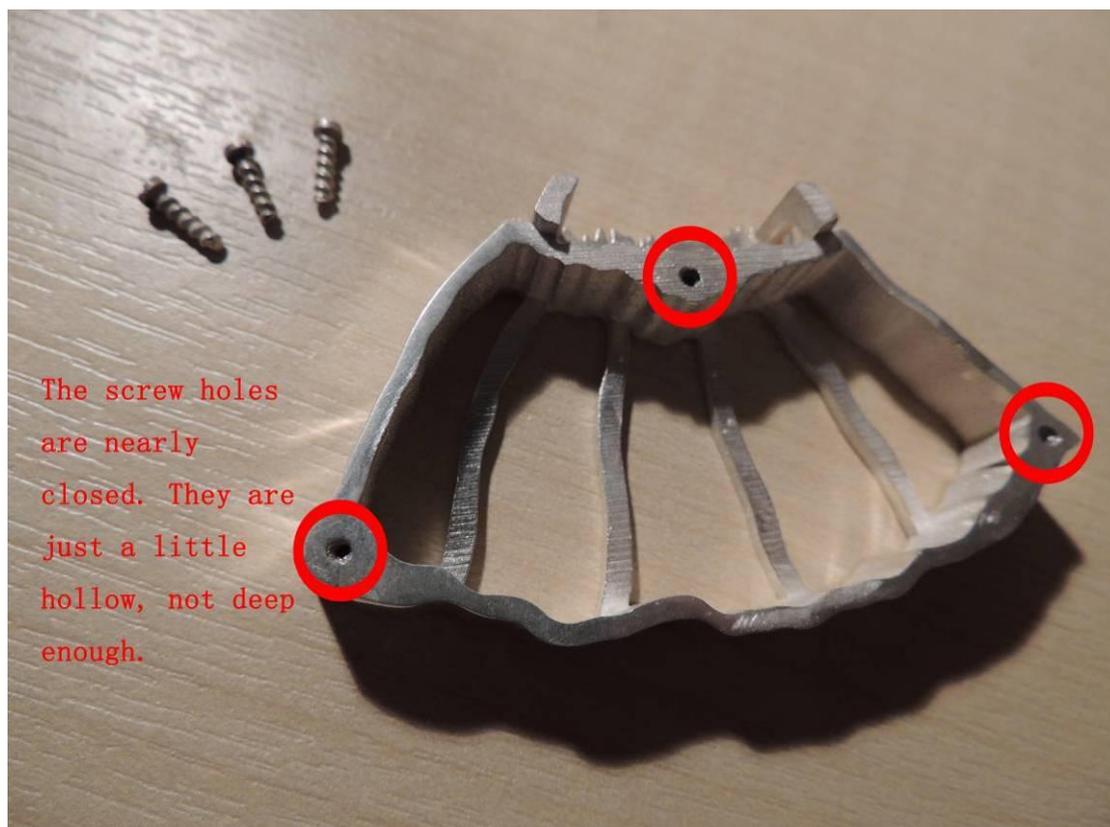


Fig. 303: 'Pleated Skirt' silver box necklace with three screws (Jiang, 2012).

Fig. 304: 'Pleated Skirt' silver box cap (Jiang, 2012).

This was due to the printing being unable to cope with the small specifications and measurements. Tap and die equipment was used to render and fix the holes. A small hole was drilled before using the tap and die (Fig.305) and then I used the tap and die to screw out the screw hole (Fig.306). To bend the 'Pleated Skirt' silver box cap (Fig.304), I made it flat to match the surface of the 'Pleated Skirt' silver box.



Fig. 305: Drill three screws (Jiang, 2012).



Fig. 306: Screw out the screw hole by tap and die (Jiang, 2012).

The 3D printer then printed the white strong flexible plastic skirt to test the real size of this pendant (Fig.307–308).



Fig. 307–308: White strong flexible plastic skirt (Jiang, 2012).

Water-jet cutting was used to create the optimum size for the rest of the designs (Fig.309). The final results after shaping and fire polishing can be seen in figure (Fig.310).



Fig. 309: Glass skirt pieces from water-jet cutting (Jiang, 2012).



Fig. 310: Final glass skirt pieces in different colours (Jiang, 2013).

4.5.6 'Pleated Skirt' necklace description

The final design for the 'Pleated Skirt' necklace features the following characteristics:

- i. Pleated Skirt is an interchangeable silver framed locket.
- ii. There are several colours which can be placed within the locket.
- iii. The chain is a simple crescent shape which enhances the aesthetic qualities of the pendant.



Fig. 311: Finished 'Pleated Skirt' necklace (Jiang, 2012).

4.5.7 'Pleated Skirt' necklace evaluation

This final 'Pleated Skirt' necklace (Fig.311) examined three of the six characteristics of harmony between man and nature identified in the diagram Fig.312 to achieve the first research aim (Section 1.6). These three Chinese philosophical focal points have been clarified in sections 2.7.3.2, 2.7.3.4 and 2.7.3.6.

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	
Unification of Time and Space	√
Self-cognition and External-cognition	√
Same Structure of Man and Nature	
Combination of Subject and Object	
The Concept of Change	√

Fig. 312: The three characteristics associated with the 'Pleated Skirt' necklace (Jiang, 2014).

4.5.7.1 'Unification of Time and Space'

The 'Pleated Skirt' takes the idea of fusing the form of an artefact from the Song Dynasty and taking it into a modern design context:

- i. The design shows the connection between time and space through the actual form of pleated skirt from Song Dynasty to the modern pleated skirt.

- ii. Fusing characteristics of pleated skirt between Song Dynasty and the modern pleated skirt to show the same characters in them.
- iii. The Song Dynasty pleated skirt and modern pleated skirt have been used in a way that shows the span of time from the Song Dynasty to the modern time. Their skirt forms in a way that show their space exists.

4.5.7.2 'Self-cognition and External-cognition'

The notion of 'Self-cognition and External-cognition' was discussed in section 2.7.3.6. From the 'Pleated Skirt' project, one can denote that:

- i. The original design impetus arose out of a very reflective and self-aware time on the part of the designer using the theory of 'space-time' unification to find the commonality from time and space.
- ii. The community process between designers with the environmental resources which are the cycle process of internalization and externalization. They include the idea and technique in the whole design process development, such as the locket development (Fig. 295–299 in section 4.5.5).
- iii. The locket pendant has strong symbolic qualities whereby we put our most precious gifts in a pendant locket and keep them close to us at all times. A constant reminder of what is most important in our worlds.

4.5.7.3 'The Concept of Change'

'The Concept of Change' suggests 'everything is developing with change in the world' and it is evident from the 'Pleated Skirt' project that some of these ideas have been achieved:

- i. A common feature and theme enable the piece to change itself and the designer and wearer can create new materials, textures and patterns.
- ii. The choices provided by the interchangeable design are symbolic of changes through time and space and the ways we can interact with the world.
- iii. Colours successfully give the wearer a fresh look and feeling that can match their clothes and can enhance their looks in various ways.

Further feedback of the work was provided by a mechanical engineer Zhengbo Liu (刘振波): "Your work shows lots of Chinese elements which is very good. If your work can show some Chinese Taiji (太极) symbols and Chinese brush, ink-stick, ink-stone and paper which is called the 'Four Treasure of the Study (文房四宝)' that would be great" (Appendix.9). His feedback demonstrates that even a Chinese person who does not have any art and design background can tell my work has examples of Chinese elements. Arguably, this can define the use of Chinese philosophy in the Western glass jewellery design and can be accepted by the Chinese public, which achieve the second research aim (Section 1.6).

The 'Pleated Skirt' necklace design creates new forms of 'skirt' glass and an interchangeable silver framed locket through the process of developing 3D prototype techniques and comprehensive successful combinations of the techniques and elements found in the previous case studies including the 'Concave and Convex' couple ring set ('Ao Tu') (Section 4.2), 'Egg and Sperm' necklace (Section 4.3) and 'Button' brooch (Section 4.4). In addition, tap and die techniques were also used in this work. This outcome can demonstrate that it achieved the third research aim seen in section 1.6.

4.6 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针)

4.6.1 Introduction



Fig. 313: Xiang Shuan, 2011, the annual ring of a tree.



Fig. 314: Ting Jiang, 2014, *Fingerprint*.

In the Chinese Medical Canon of 'Huang Di Nei Jing 黄帝内经'(B.C.770-221), it states that 'Same Structure of Man and Nature' is the fundamental of the philosophy of harmony between man and nature. In Chinese philosophy the structure of the human body reflects the structure of the world. Chinese philosophy also says that man and nature have similar characteristics as discussed in section 2.7.3.3. For example, I have found the annual ring of trees (Fig.313) and human fingerprints (Fig.314) are very similar in their appearance. Annual rings in addition to age also record rainfall, temperature changes, forest fires and other surrounding environment. Correspondingly, the human fingerprint's unique, hereditary and invariance can be used in evidence for many things. "By 246 BCE, Chinese officials pressed their fingerprints into the clay seals used to seal documents. With the advent of silk and paper in China, parties

to a legal contract impressed their handprints on the document” (Reinaud, 1845, p.42). The annual ring and fingerprint are the matching elements from the human’s body to the natural world.



Fig. 315: Annual ring and fingerprint ink painting (Jiang, 2012).

This brooch uses the principle of ‘Same Structure of Man and Nature’ as the source for my inspiration starting from my ink painting (Fig.315). The annual rings found in trees and fingerprints both have natural formation of the special arrangement of the flow line and texture. They have the same common characters which can infer the evidences for the relative events by observations of each ones texture.

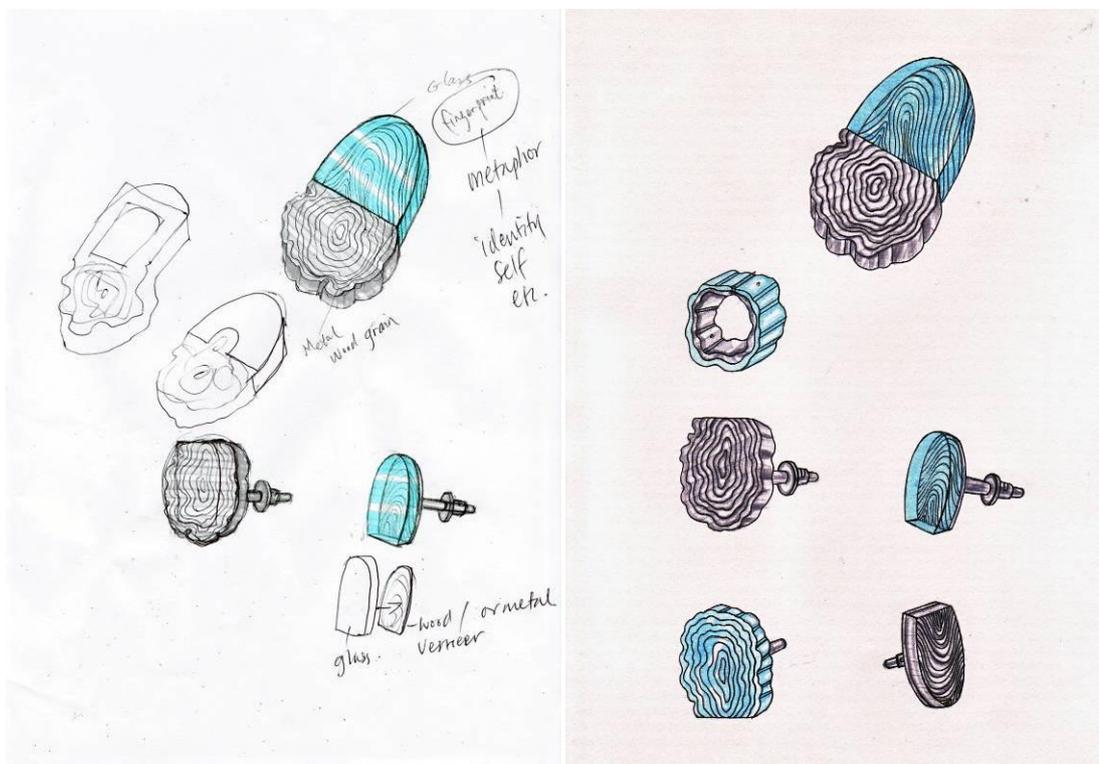


Fig. 316: Annual ring and fingerprint jewellery ideas sketches (Jiang, 2012).

This relationship between man and nature (fingerprint and annual rings) was used for this contemporary brooch design (Fig.316). The design also included a brooch, ring, earrings and cufflinks.

4.6.2 Objectives

To create new fingerprint glass patterns and shapes and to use these patterns and shapes to examine the characteristics of 'Same Structure of Man and Nature' through my contemporary jewellery design.

4.6.3 Materials and processes

The different colours of Banas glass and Bullseye glass were used for making the fingerprint glass. Silver (925) was used for making the annual ring part. Other materials include flexible plastic and stainless steel. The processes can be illustrated by the diagram below:

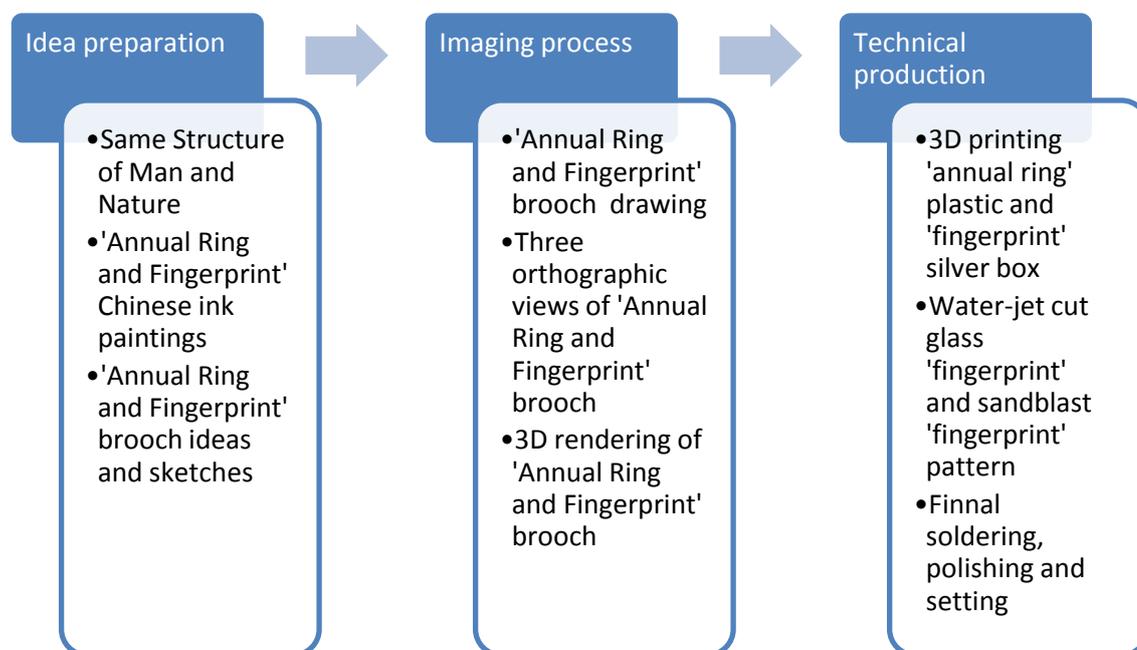


Fig. 317: The developing process of 'Annual Ring and Fingerprint' brooch (Jiang, 2014).



Fig. 318: Drawing of the 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

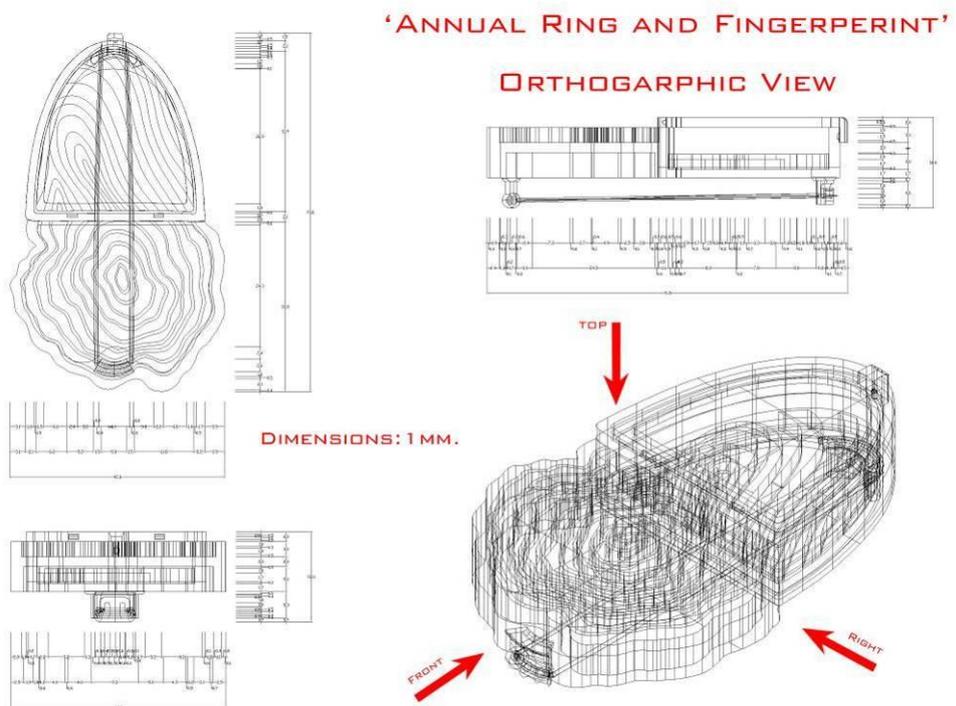


Fig. 319: The orthographic view of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

This design is based on both the human fingerprint (man) and the annual rings of trees (nature) represent the structure of man and nature. I then went on to develop the 'Annual Ring and Fingerprint' brooch. This design is the annual ring for the silver part and human fingerprint for the glass part which give a pattern contrast between the two materials. The design developed (Fig.317) in the same ways as case studies 1,2,3,4 (Section 4.2, 4.3, 4.4, 4.5). The 'Annual Ring and Fingerprint' brooch drawing (Fig.318) and the orthographic view (Fig.319) have been developed. In this case study, additional design work included 'the Edge of the Dancing Skirt Earring-Ring'. Initially, I was looking to have the ring be two glass pieces holding a silver piece in the middle; this idea was then developed to be three different glass pieces without the silver setting. Additional technique used included sand-blasting the glass.

4.6.4 The sizes survey of 'Annual Ring and Fingerprint' brooch

The glass sizes	Numbers of women	Percent	Numbers of men	Percent
7 cm	29	48.3%	28	47%
8 cm	16	26.7%	18	30%
9 cm	12	20%	6	10%
10 cm	1	1.7%	5	8%
11 cm	2	3.3%	3	5%

Fig. 320: 'Annual Ring and Fingerprint' brooch sizes survey (Jiang, 2012).

Size surveys were undertaken with sixty local women and men in a similar way as case study 4 (Section 4.5.4) (Appendix.6). It was found that most people like this brooch in 7 cm, irrespective of their gender (Fig. 320).

4.6.5 Series testing of 'Annual Ring and Fingerprint' brooch

The design of the pin of the 'Annual Ring and Fingerprint' brooch is similar to the process of the pin of 'Button' brooch case study mentioned in (Section 4.4.7–4.4.8). The standard form (Fig.321) draws up Chinese characteristics (Fig.322).

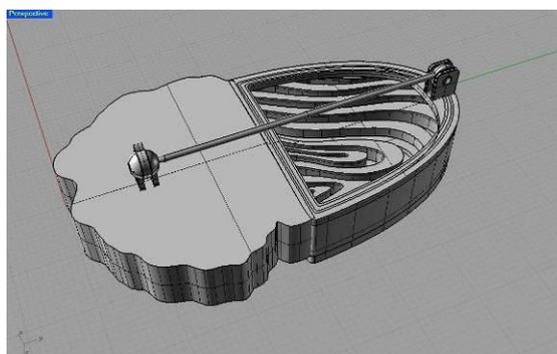


Fig. 321: The normal form of 'Annual Ring and Fingerprint' brooch pin and protector (Jiang, 2012).

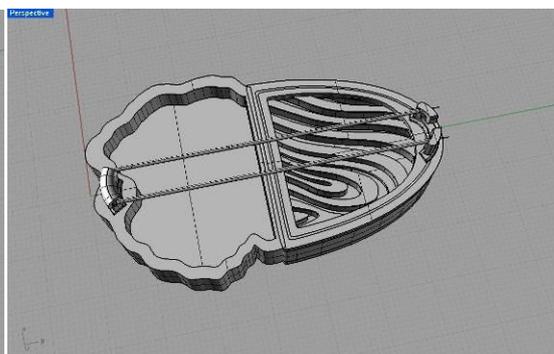


Fig. 322: The Chinese characteristic pin and protector of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

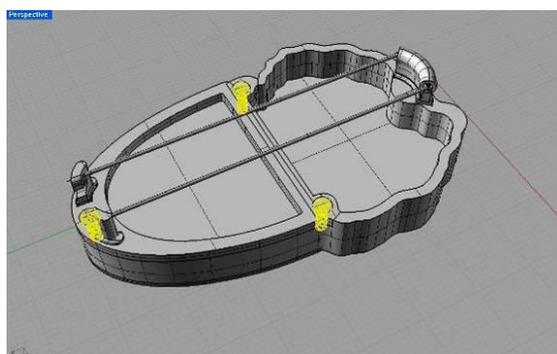


Fig. 323: The screw setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

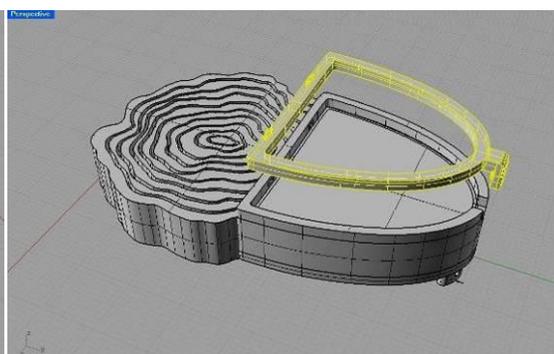


Fig. 324: The flexible front interchangeable setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

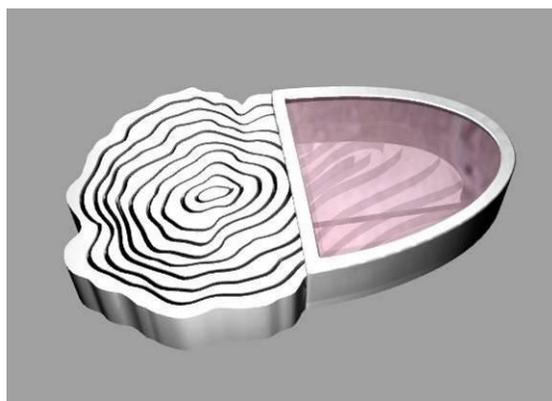


Fig. 325: The bezel setting of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

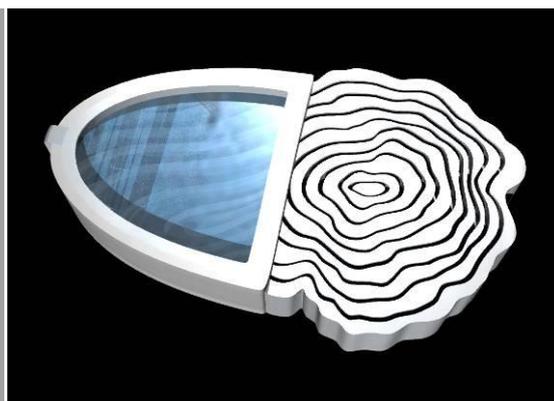


Fig. 326: The final 3D rendering of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).



Fig. 327: The blue strong flexible plastic piece of annual ring and fingerprint (Jiang, 2012).

The 'Concave and Convex' couple ring set ('Ao Tu 凹凸') and 'Pleated Skirt' design rationale (Section 4.2, 4.5) also inspired this piece.

The first design set the glass piece with the traditional bezel setting method.

The bezel setting method (Section 3.9.1) was used (Fig.325). A flexible screw like 'Pleated Skirt' necklace was

used. It was found that the screw setting was too complex for this design as the brooch pin, pin holder and pin protector are all in the way of the screws (Fig.323). If the screw was at the front it would be aesthetically displeasing. Interchangeable surrounding setting (Section 3.9.3.2) was used for this design (Fig.324). The blue strong flexible plastic piece of annual ring and fingerprint was printed out for testing the actual size (Fig.327). Rhinoceros software was used for 3D rendering and printing (Fig.326).



Fig. 328: Soldering the annual ring and fingerprint with the pin holder and protector (Jiang, 2012).

Fig. 329–330: The finishing annual ring and fingerprint silver parts (Jiang, 2012).

Soldering was used and basic silversmith skills (Fig.328). The final pieces were shaped and polished (Fig.329–330).



Fig. 331: The wax and mould putty of fingerprint (Jiang, 2012).



Fig. 332: The casting of fingerprint with Banas glass in green and blue (Jiang, 2012).

To create the fingerprint piece kiln-form glass and lost wax method were used (Fig.331–332). However, the lost wax method loses detail in the process and it proved more difficult to achieve the finer detail of a fingerprint. Eventually, sandblasting proved to be the best method to achieve the finer details.

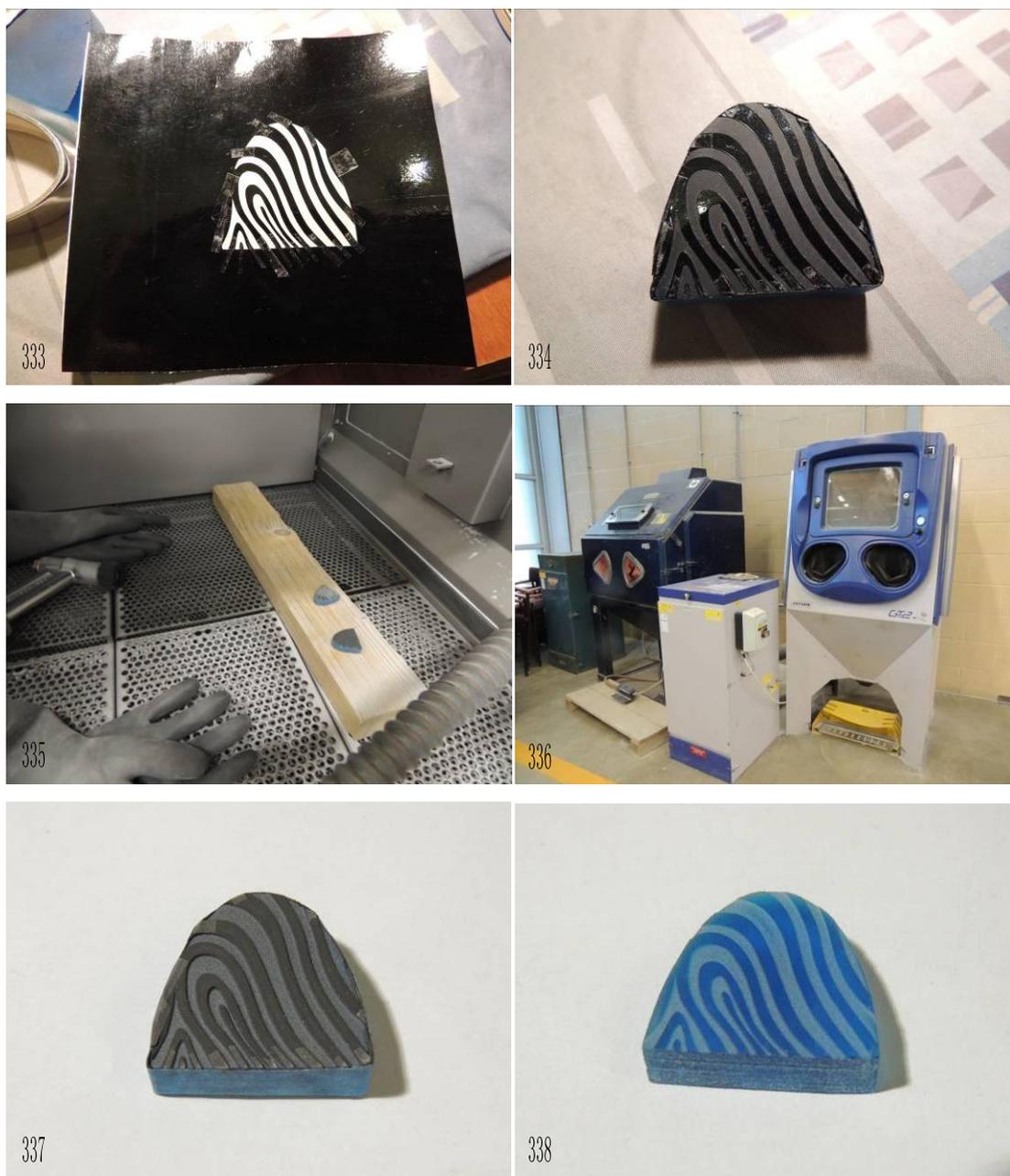


Fig. 333–334: The fingerprint pattern paper covers on the fingerprint glass pieces (Jiang, 2012).

Fig. 335–336: Sandblasting fingerprint glass pieces in the sandblasting machine (Jiang, 2012).

Fig. 337–338: The fingerprint glass piece after sandblasting (Jiang, 2012).

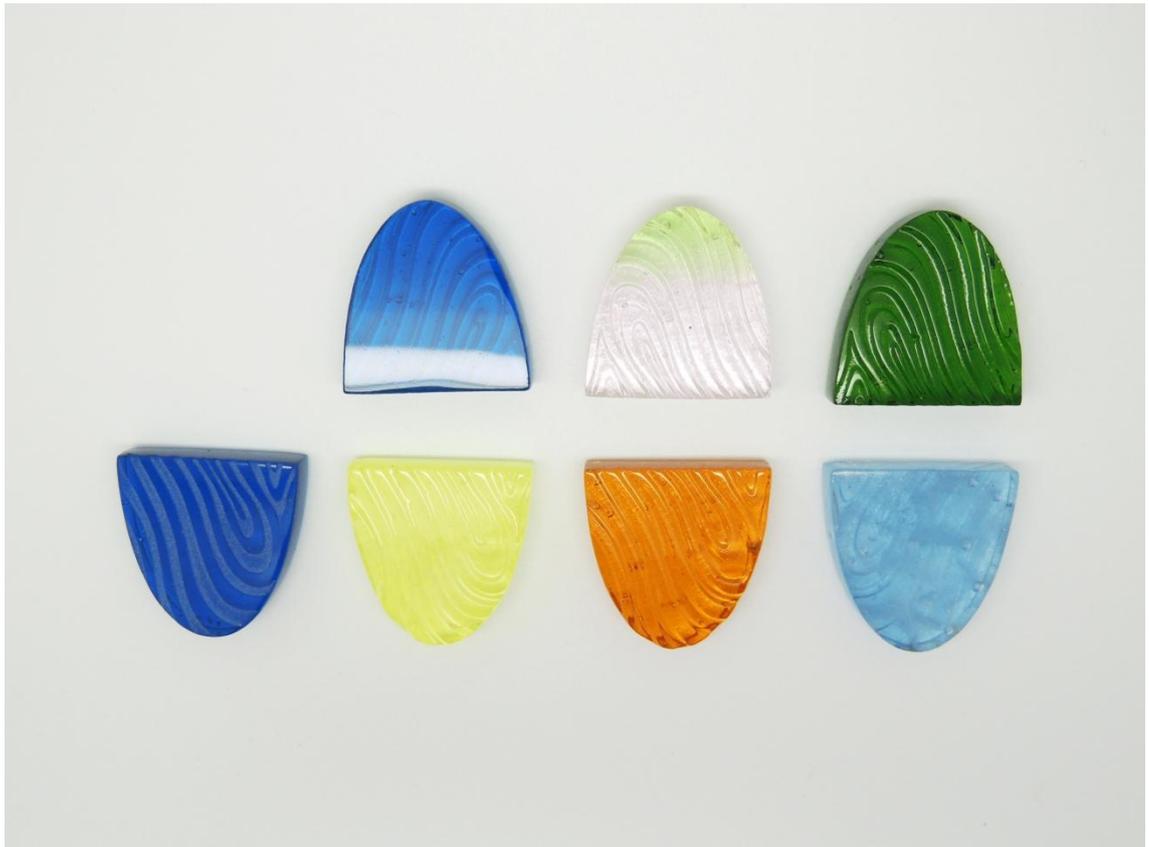


Fig. 339: The finished fingerprint glass pieces in different colours (Jiang, 2013).

Firstly, I measured and draw the fingerprint pattern in AutoCAD and cut the fingerprint shape of the glass by water-jet. Secondly, the fingerprint pattern mask (Fig.333) to cover this glass was printed (Fig.334) and sandblast (Fig.335–336). Once optimal depth of the pattern is achieved (Fig.337), the mask can be removed (Fig.338). The last step is to fire polish the glass to a smooth finish (Fig.339).



Fig. 340: The finishing piece of 'Annual Ring and Fingerprint' brooch (Jiang, 2012).

4.6.6 'Annual Ring and Fingerprint' brooch description

Design ideas, textures and qualities of the 'Annual Ring and Fingerprint' brooch are described below:

- i. The two textures in the design are an artistic and enhanced representation of the 'Same Structure of Man and Nature'.
- ii. The interchangeable design is an important part of my design concept and again enables the wearer to make choices and the piece to change and grow with the wearer.
- iii. The qualities of reflection and transparency contrast with the silver and annual ring pattern.

4.6.7 'Annual Ring and Fingerprint' brooch evaluation

This final 'Annual Ring and Fingerprint' brooch (Fig.340) examined three of the six characteristics of harmony between man and nature identified in the diagram Fig.341 to achieve the first research aim (Section 1.6). These three Chinese philosophical focus points 'Same Structure of Man and Nature', 'Self-cognition and External-cognition' and 'the Concept of Change' (Sections 2.7.3.3, 2.7.3.4 and 2.7.3.6) are identified to be the essential elements from this piece of work.

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	
Unification of Time and Space	
Self-cognition and External-cognition	√
Same Structure of Man and Nature	√
Combination of Subject and Object	
The Concept of Change	√

Fig. 341: The three characteristics associated with the 'Annual Ring and Fingerprint' brooch and the 'Annual Ring and the Edge of Dancing Skirt' Earrings/Rings (Jiang, 2014).

4.6.7.1 'Same Structure of Man and Nature'

The 'Annual Ring and Fingerprint' brooch takes the idea of the 'Same Structure of Man and Nature' into a modern jewellery design context:

- i. The double texture was a success in creating relationships between the human hand and the tree. They encourage haptic and touch sensations in addition to creating an unusual and alluring form.
- ii. Reflection and transparency create the contrast of patterns between two different materials which enhance the connection characters between them, reflecting the notion of 'same structure between man and nature'.

4.6.7.2 'Self-cognition and External-cognition'

This project can be described as having the notion of 'Self-cognition and External-cognition' qualities:

- i. This design shows my understanding of the concept of the 'Same Structure of Man and Nature'; idea and techniques develop which are the progress of communication between my self-awareness and my environment.
- ii. The jewellery also connects the wearer's awareness of the similar characters between man and nature through the jewellery patterns and their choices.

4.6.7.3 'The Concept of Change'

'The Concept of Change' can be found in this piece, the following list explains how:

- i. Choices enable the wearer to interchange different pieces by their taste and environment.
- ii. Colours enhance the form and the flow of the line and patterns, there is also contrast which connects the wearer and the piece.
- iii. The interchangeable design also gave a further development opportunity for designer and wearer including new materials, textures and patterns.

Feedback from the groups from The Visual Art Department of Guilin Tourism College said: "Ting Jiang's work is an organic combination of Chinese traditional culture and philosophy, geographical ethnic elements and contemporary Western designs" (Appendix.9). This feedback also demonstrates that this brooch design can show organic combinations from the Chinese philosophy and Western design which match the goal from the second research aim in section 1.6.

The 'Annual Ring and Fingerprint' brooch design create new forms of the 'fingerprint' glass and the 'annual ring' interchangeable silver framed locker. The elements and techniques of previous case studies from this thesis were also used in the idea preparation, imaging process and technical production (Fig.4 in section 1.8.2). The 3D printing, water-jet cutting, sandblasting, silversmith techniques were successfully combined in development, which based on its microwave kiln forming tests and the former case studies: the 'Concave and Convex' couple ring set ('Ao Tu') (Section 4.2), 'Egg and Sperm' necklace (Section 4.3), 'Button' brooch (Section 4.4), 'Pleated Skirt' necklace (Section 4.5). This outcome can demonstrates that it achieved the third research aim as seen in Section 1.6.

4.6.8 'Annual Ring and the Edge of Dancing Skirt' earrings/rings

4.6.8.1 Introduction

The 'Annual Ring and the Edge of the Dancing Skirt' earring/ring uses the 'Same Structure of Man and Nature' and the 'Change' as the main theory based on the 'Annual Ring and Fingerprint' brooch.

The annual ring embodies nature and the edge of the minority skirt belongs to man. The edge of the dancing minority skirt (Fig.342) also has a similar flow-line pattern with the annual ring. The annual ring and fingerprint have other matching elements found from mixing the human body with its natural surroundings and then developing these ideas into the 'Edge of the Dancing Skirt' earrings-rings.

4.6.8.2 Objectives

To create the new 'Annual Ring and the Edge of Dancing Skirt' glass shape and to use these shapes to examine the characteristics of 'Same Structure of Man and Nature' through my contemporary jewellery design.



Fig. 342: The dancing minority skirt.

4.6.8.3 Materials and processes

The materials used in this project are similar with the 'annual ring and fingerprint' brooch include Bullseye glass in different colours, silver (925), plastic and stainless steel. The processes of this 'Annual Ring and the Edge of the Dancing Skirt' earring/ring was developed based on the same idea preparation and imaging process of 'Annual Ring and Fingerprint' brooch (Section 4.6.3, fig.317). There is one more Chinese ink painting (Fig.344) and the technical production is slightly different (Fig.343).

Different Technical Production
Silversmith is used to make stainless steel wires
Water-jet cut glass into the 'Annual Ring and the Edge of Dancing Skirt' shape
Final polishing and setting

Fig. 343: The different technical production process of 'Annual Ring and the Edge of Dancing Skirt' earrings/rings (Jiang, 2014).



Fig. 344: 'Annual Ring and the Edge of Dancing Skirt' ink painting (Jiang, 2012).

The Orthographic views in AutoCAD (Fig.345) are developed base on the Ink painting (Fig.315 in section 4.6.1 and Fig.344) and ring ideas sketches see section 4.6.1 (see Fig.316).

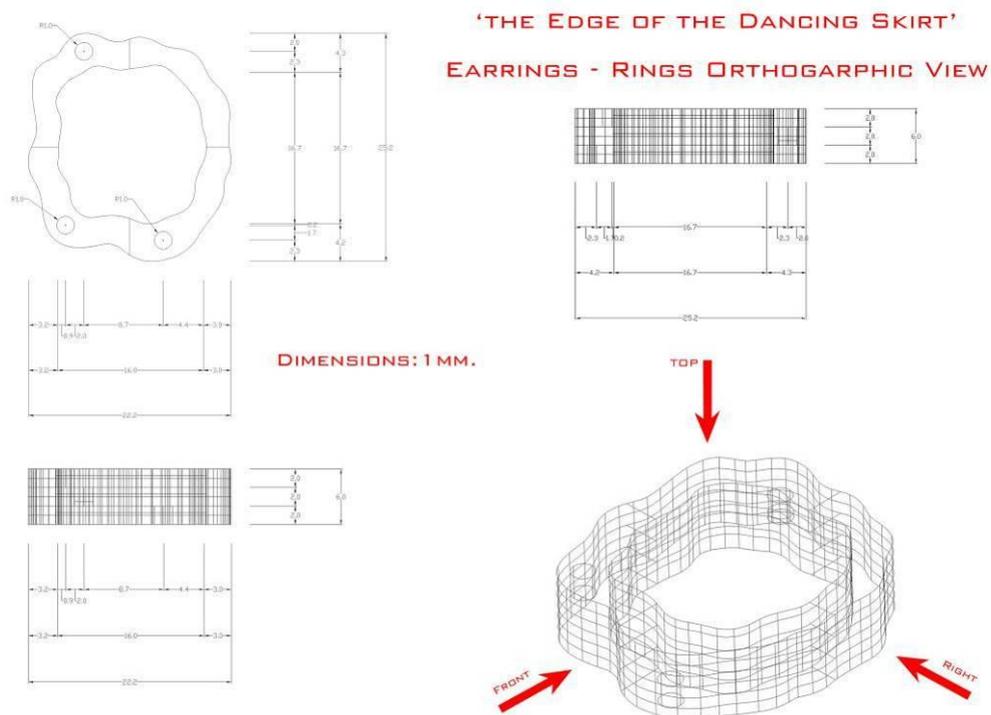


Fig. 345: The annual ring and dancing skirt earring-ring orthographic view (Jiang, 2012).

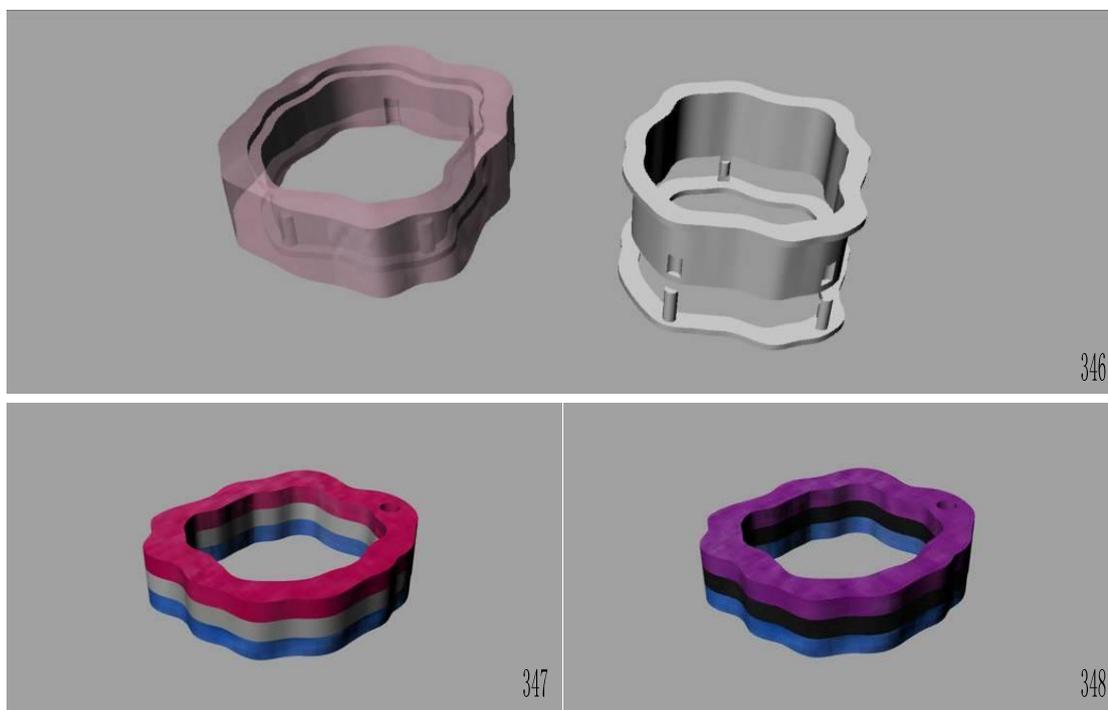


Fig. 346: The first lock setting way of 'Annual Ring and Dancing Skirt' ring (Jiang, 2012).

Fig. 347–348: The 3D rendering of the 'Annual Ring and Dancing Skirt' earring-ring (Jiang, 2012).

Two models were designed, the first (Fig.346) had two silver parts locking the glass piece in the middle. The second, created three separate pieces of equal thickness to create flexibility and changeable features. The silver was removed to reduce weight, and to enable the ring and earring to interchange (Fig.347–348). Four 3D visual rendering of the 'Annual Ring and Dancing Skirt' earring-ring created new colours and flexibly and can join together.

3D printing in plastic 'annual ring' with its setting parts (Fig.349) and the 'Annual ring and Dancing Skirt' earring-ring models (Fig.350–352) was undertaken.



Fig. 349: The 3D printing of the 'Annual Ring and Dancing Skirt' ring (Jiang, 2012).

Fig.350, 351, 352: The 3D printing of the 'Annual Ring and the Edge of Dancing Skirt' earring-ring (Jiang, 2012).



Fig. 353: The water-jet cutting of the 'Annual Ring and Dancing Skirt' earring-ring glass pieces (Jiang, 2013).



Fig. 354: The final glass pieces of the 'Annual Ring and Dancing Skirt' earring-ring (Jiang, 2013).

Water-jet and Auto CAD were used and the glasses were in several colours (Fig.353). Grinding and shaping created the optimal thickness. The pieces were finally fire polished. Four pieces in the colours of blue, orange, green and yellow were created (Fig.354).

4.6.8.4 The 'Annual Ring and the Edge of Dancing Skirt' earrings/rings description

A short description of this piece is below:

- i. All of the pieces are interchangeable.
- ii. The pieces have a unique flow line
- iii. There are different colours used.

4.6.8.5 The 'Annual Ring and the Edge of Dancing Skirt' earrings/rings evaluation

This final 'Annual Ring and Edge of Dancing Skirt' earrings-rings (Fig.355–356) also examined three of the six characteristics of harmony between man and nature same as 'Annual Ring and Fingerprint' brooch identified in the diagram Fig.341 (Section 4.6.7) to achieve the first research aim (Section 1.6). They are 'Self-cognition and External-cognition', 'Same Structure of Man and Nature' and 'the Concept of Change'. These three Chinese philosophical focal points have been clarified in section 2.7.3.3, 2.7.3.4 and 2.7.3.6.



Fig. 355: The final 'Annual Ring and Dancing Skirt' earrings (Jiang, 2013).



Fig. 356: The final 'Annual Ring and Dancing Skirt' rings (Jiang, 2013).

4.6.8.5.1 'Same Structure of Man and Nature'

The 'Same Structure of Man and Nature' is a key part of my designs with this piece being no exception. The following list discusses how this theme is implemented in this design:

- i. Similar to 'Annual Ring and Fingerprint' brooch, this was also a success in creating a relationship between the human clothes (skirt) and the tree. They encourage the awareness of the connection between man and nature.
- ii. The flow of the lines and the ways the lines connect which fused the characteristic of the edge of dancing skirt and the annual ring in the design yet are different in creating new haptic sensations, making the wearer very aware of the piece they are wearing.

4.6.8.5.2 'Self-cognition and External-cognition'

The below list discusses the notion of 'Self-cognition and External-cognition' and how they are applied in this jewellery piece:

- i. My understanding of the concept of the 'Same Structure of Man and Nature' in different forms, the idea and techniques developed demonstrate the communication between myself and my environment.
- ii. The jewellery can be used as earrings and rings, this unique function can make them more aware of the connection between different things in their environment.
- iii. The wearer is encouraged to 'experiment' with the piece making the jewellery dynamic rather than something just worn to decorate.

4.6.8.5.3 'The Concept of Change'

Another big theme found in my work is 'the Concept of Change', the list below shows how it is featured in this piece:

- i. The vast number of sequences and choices the wearer has with these pieces creates a harmony between jewellery pieces which is normally mutually exclusive.
- ii. The wearer is encouraged to see connections between finger, earrings and other parts of the body that are normally not considered before.
- iii. The colours are representative, but the simplicity of the primary colours enhances the form. The contrasts are striking and also facilitate making the piece stand out and yet remain connected to the wearer.

Art and design student Mengyuan Huang (黄梦圆) from the Visual Art Department of Guilin Tourism College said: "Her jewellery design can be split to replace the glass part in the structure. The decorative glass can be replaced in different colours according to the mood of the wearer's preference. A flexible multi-type can meet the taste of young people" (Appendix.9). This feedback shows the earring/ring design can appeal to the younger generation and that the new design outcome achieved the second research aim (Section 1.6).

The 'Annual Ring and the Edge of Dancing Skirt' earrings/rings design process shows the ways it develops 3D prototype techniques and refine process by successfully combining elements and techniques found in the previous case studies of this thesis. This outcome demonstrates it achieved the previously mentioned third research aim, found in section 1.6.

4.7 'Osmanthus' ring set ('桂花' 组戒)

4.7.1 Introduction

As discussed in section 2.7.3.4 change, growth and development are everywhere. 'Change' is organised by laws and rules in nature. This 'Osmanthus' ring set uses the theory of 'Change' found in the principle of 'harmony between man and nature'. The natural change of the form of the Yii collection (Fig.37 in section.2.6.3.4) also influences the change of the flower forms life cycle, in the 'Osmanthus' ring set. It uses the characteristics of Osmanthus flower as inspiration and describes the growth of a natural life cycle from bud to blossom.

The 'Combination of Subject and Object' in the 'harmony between man and nature' (Section 2.7.3.5) is also being used in this 'Osmanthus' ring set design. The subject is the object and the object is also the subject. A more concrete manifestation can be found in Chinese painting, which is referred to as a 'fusion of setting and feeling'. To clarify this, the landscape and particular scenes provide subjective as well as objective representations. Designers can use this concept in their practice to reconcile, objective representations with the ways in which they see their worlds.

The 'Osmanthus' ring set, took inspiration from the Osmanthus flower which is the city flower of Guilin, my hometown in China. Osmanthus tree and flowers are a symbol of Guilin. The design inspiration came from being away from home for such a long time. This plant encapsulates the longing for home (family and friends) after studying in the UK for about seven years. The Osmanthus reproduction cycle reflects the years of change and time of change but also

reflects the view of the feelings of different moments. The form of Osmanthus' growth circle from bud to blossom is set into a three ring set. It shows my memory of each flower grouping up from a flower stem and emotion of love for my home town. My jewellery design of the 'Osmanthus' ring set also reflects the Taoist ideology, which integrates my love for my hometown Guilin in a similar way as Chinese ink painter Guang Yang (阳光) often reflects in his work (Fig.34 in section 2.6.3.2). I have used fresh light colours as main colours, which gain influence from the Taoist view 'simple as beauty'.

4.7.2 The Osmanthus plant

The landscape and sceneries of Guilin are unique. "Guilin's scenery is the best in the world" (Liao and Lu, 2002, p.60). Notably, there are lots of Osmanthus trees surrounding the whole city. During the Osmanthus' blooming season, the fragrance surrounds every area of the city. The name Guilin actually comes from the Osmanthus plant and translates to 'Osmanthus Trees become Forest'. Normally the Osmanthus cluster has 3-5 flowers growing under the axils of a leaf (Fig.357). Each small flower has four pieces growing as cymose shape, yellow or white in colour and is extremely fragrant (Garden Design Branch of Chinese Reconnaissance and Design Association, 2003, p.105).

4.7.3 Objectives

To create new Osmanthus glass shapes and to use these shapes to examine ways that the characteristic of 'Unification of Time and Space', 'Combination of



Fig. 357: Osmanthus .
(<http://www.china5080.com/articles/161173.html>)

Subject and Object' and 'the Concept of Change' through my 'Osmanthus' ring set design.

4.7.3 Materials and processes

The materials used in this project include Soda Lime glass and Borosilicate glass in different colours, silver (925) and plastic. The design processes can be illustrated as below:

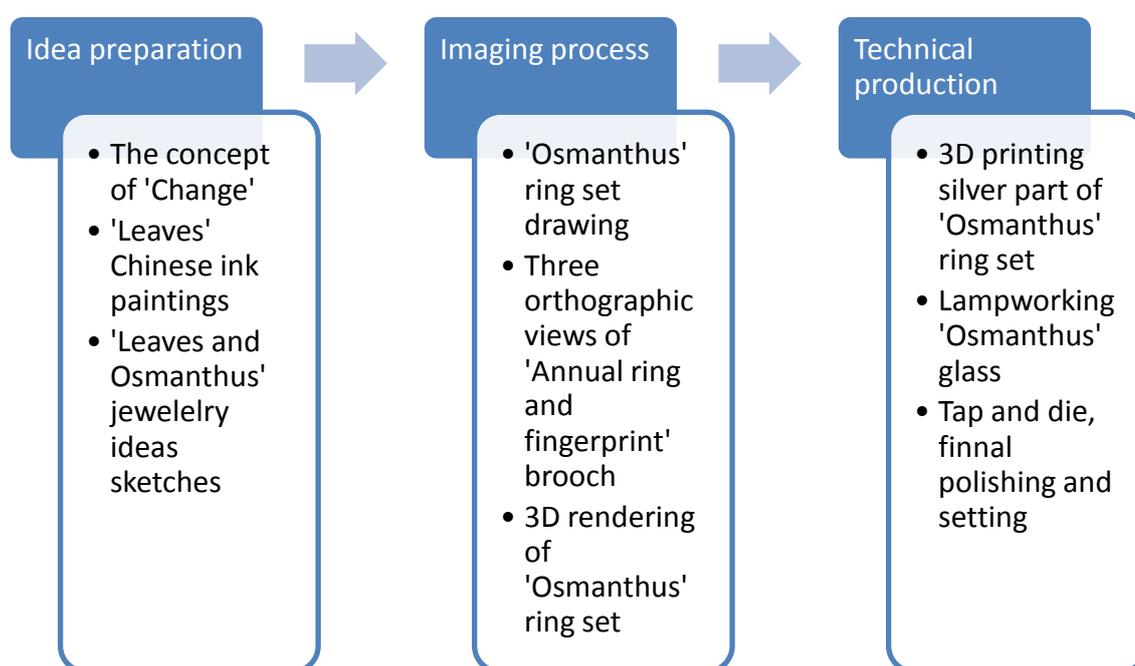


Fig. 358: The developing process of 'Osmanthus' ring set (Jiang, 2014).



Fig. 359: Leaves of small bonsai (Jiang, 2012).

The 'Osmanthus' ring set follows 'the Concept of Change' and the 'Combination of Subject and Object'. For this ring, I came up with the idea of making three different rings and each with a different flower. All three rings combined on the same finger will create one single ring design. The 3D

model of this ring was built in Rhinoceros. Here the glass parts are used as the ring's flowers while the silver part is the ring and flowers stem. I initially wanted the flowers to be interchangeable but this process was too difficult to develop.



Fig. 360: Leaves ink painting (Jiang, 2012).

Daily ink painting (Fig.360) was conducted of a small bonsai (Fig.359). Also, plant jewellery sketches (Fig.361–362) were also developed. A combination of homesickness and an appreciation of form made the decision to use an Osmanthus plant as symbolic of these feelings.



Fig. 361: The idea sketches of plant jewellery (Jiang, 2012).

The ring was designed with five small flowers to create a maximum design effect. One glass flower with four other buds showing different stages of growth was designed. The leaves (Fig.362) informed the flower ring set (Fig.363). The design process followed a natural cycle representing seed, buds, leaves and blossoms.

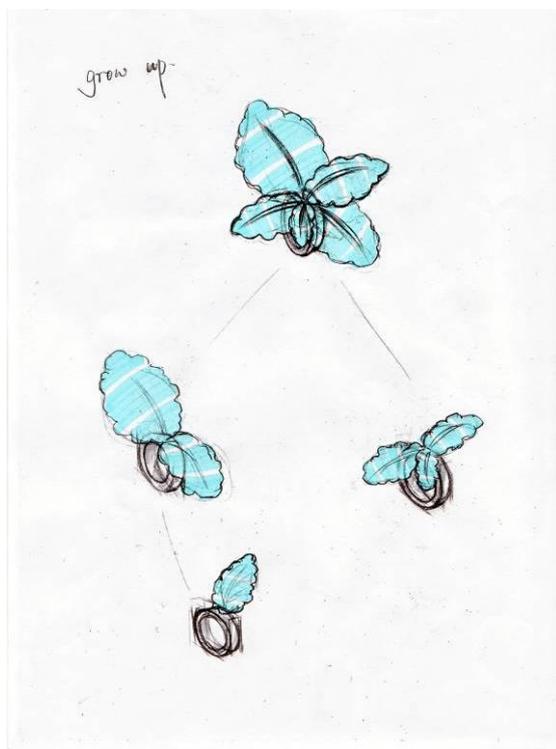


Fig. 362: Leaves ring set sketches (Jiang, 2012).

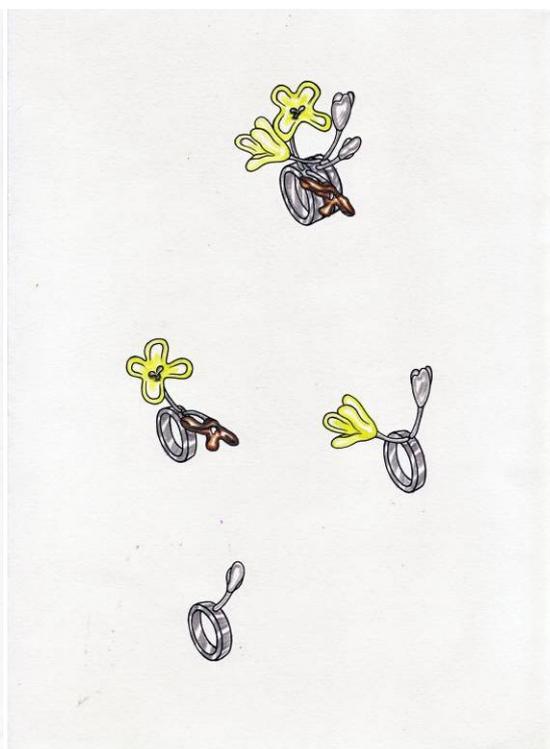


Fig. 363: Osmanthus flower ring set sketches (Jiang, 2012).

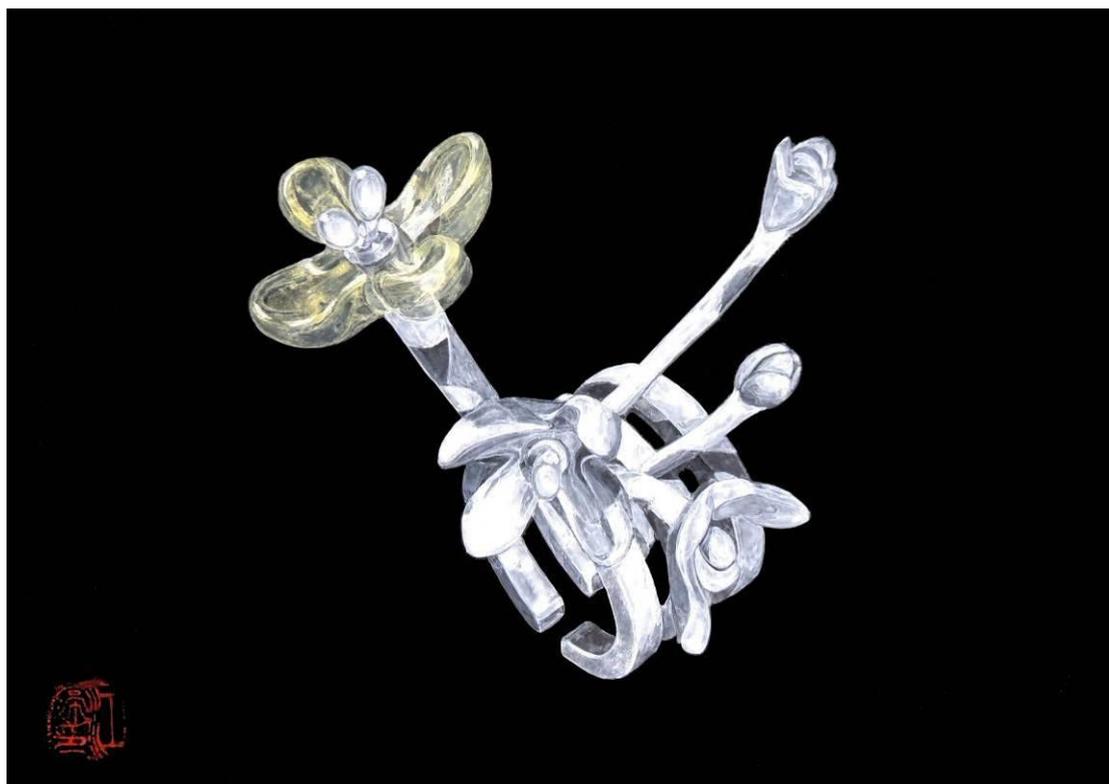


Fig. 364: 'Osmanthus' ring set drawing (Jiang, 2012).

4.7.5 Series testing of 'Osmanthus' ring set

The 'Osmanthus' drawing designs of the ring set (Fig.364) show the natural growth cycle of the Osmanthus flower embodies the growth process of the external form, from bud, to blossom and then withers. This process of growth reflects the constant cycle of life. AutoCAD and Rhinoceros were used to create the final specifications and final designs (Fig.365).

New marks were created to guide and set positions in the software more easily. Ring marks designed for setting positions were line marks (Fig.366) they were made into more natural hollow marks (Fig.367). These marks are invisible when

you are wearing them in the group set. These guide marks were helpful for the wearer to wear in the right position but cannot be seen in the final ring.

'OSMANTHUS' ORTHOGARPHIC VIEW

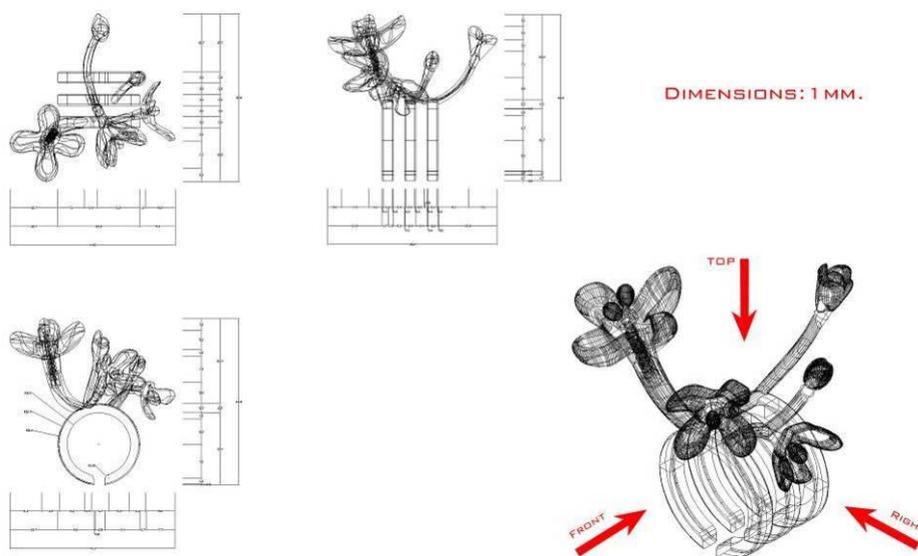


Fig. 365: 'Osmanthus' ring set orthographic view (Jiang, 2012).

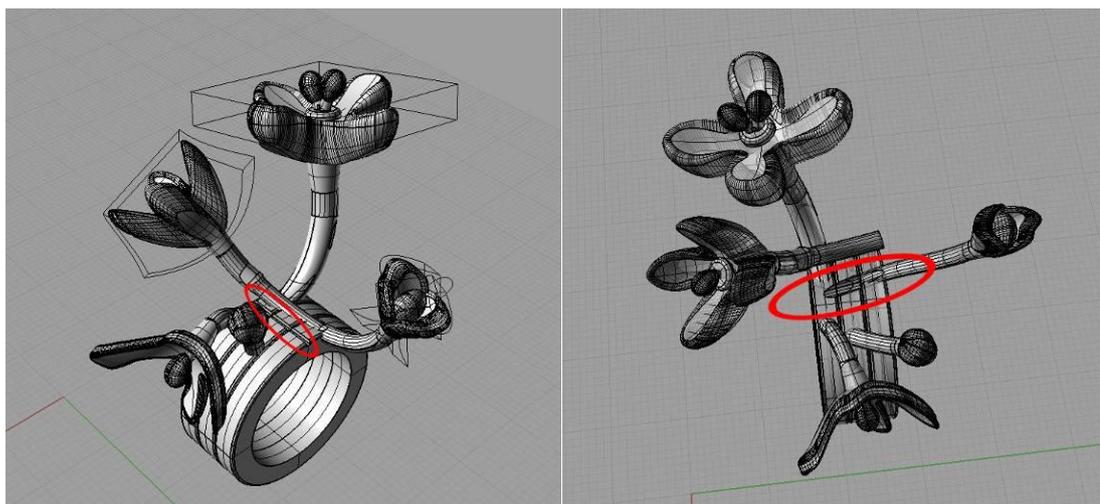


Fig. 367: The line marks on the 'Osmanthus' ring set (Jiang, 2012).

Fig. 366: The natural hollow marks on the 'Osmanthus' ring set (Jiang, 2012).

Flexible peg settings were used (Section 3.9.3.1) and the thickness and shape of the screw stem was made more accurate (Fig.369). The original close circle rings were changed to open circle rings (Fig.368).

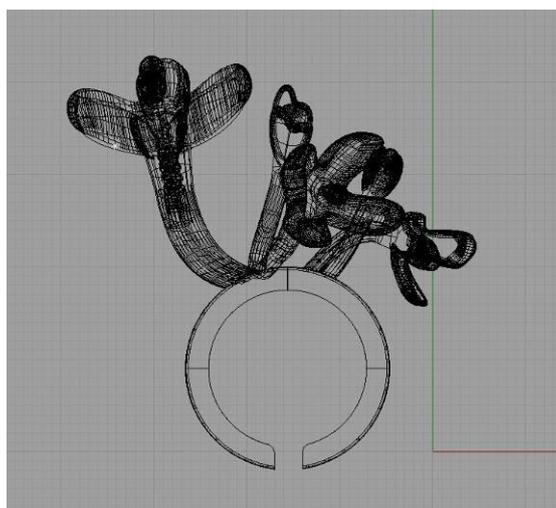


Fig. 368: The open circle rings of the 'Osmanthus' ring set (Jiang, 2012).

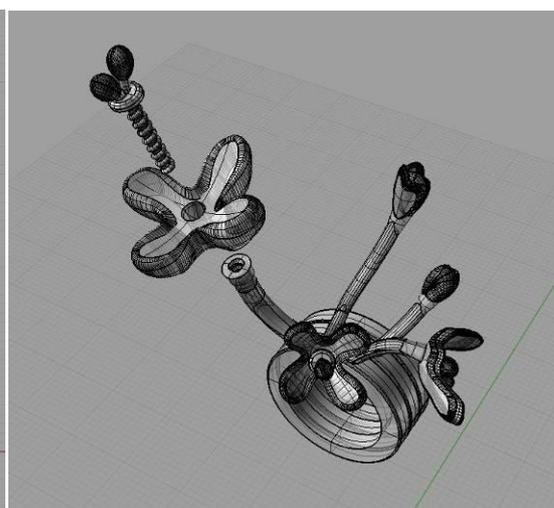


Fig. 369: The screw stem of the 'Osmanthus' ring set (Jiang, 2012).



Fig. 370: Ayako Tani, 2011, 'I-Ro-Ha 50 Japanese Phonetic Symbols' (Tani, 2014, p.245).

An exotic method to make the flowers stand out (Fig.373) (A similar method used by PhD researcher Ayako Tani's 'I-Ro-Ha' in Fig.370) which also represents the principle of combining subject and object in the aesthetic performance was used. Colours and perspective are used to highlight the artworks change and development, from material contrast and colour contrast perspective. This approach

also highlights the blossom period in the Osmanthus flower growth stages rather than the original two pieces (Fig.371–372).

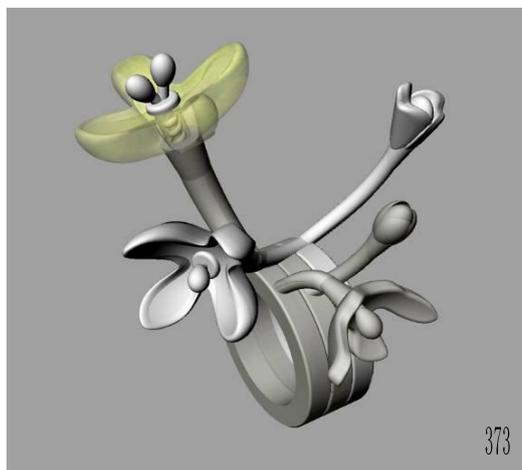
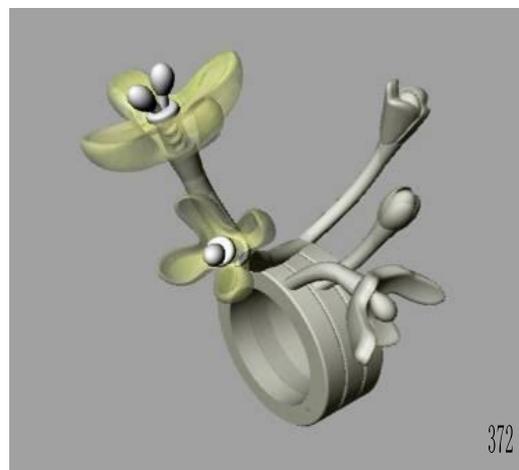
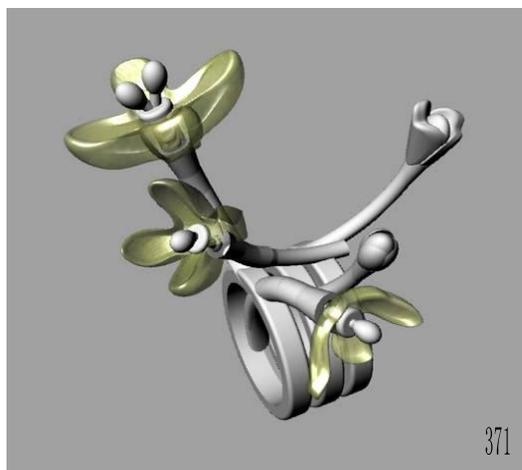


Fig. 371, 372, 373: The three pieces of the glass 'Osmanthus' ring set to the only one piece of glass 'Osmanthus' ring set (Jiang, 2012).

The final design was undertaken in Rhinoceros software (Fig.374) and 3D printed silver parts on four STL files were used (Fig.375–377).



Fig. 374: Finishing 'Osmanthus' ring set (Jiang, 2012).



Fig. 375, 376, 377: The four pieces of the 3D printing silver parts of 'Osmanthus' ring set (Jiang, 2012).

The screw hole on the printed stem was nearly closed (Fig.378), which is similar to the problems encountered in the 'Pleated Skirt' necklace (Fig.303 in section 4.5). The piece was reprinted (Fig.381–382) due to the drill pin becoming stuck in the screw stem (Fig.379–380). The screw hole and stick were remade by using tap and die tools (Fig.383).



Fig. 378: The nearly closed screw hole on the 3D printing silver stem (Jiang, 2012).

Fig. 379: To drill the screw hole on the 3D printing silver stem (Jiang, 2012).

Fig. 380: The drill pin broken inside the screw hole in the 3D printing silver stem (Jiang, 2012).

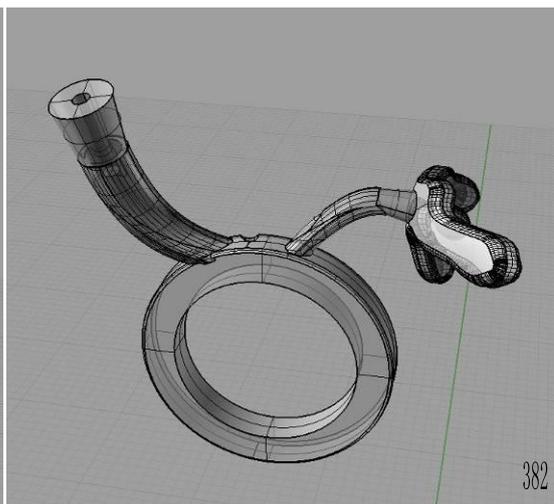
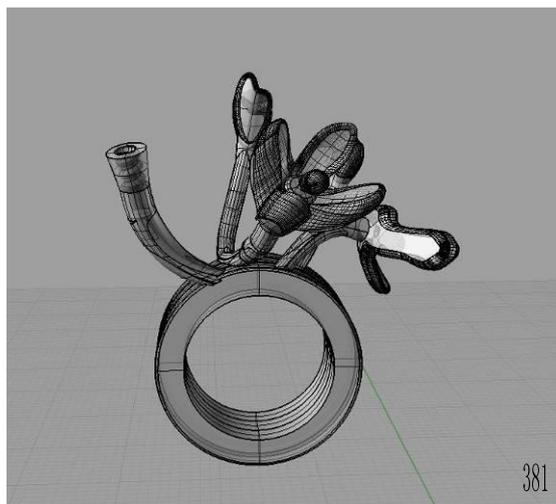


Fig. 381: Screw hole on the Osmanthus stem (Jiang, 2012).

Fig. 382: Small hole on the Osmanthus stem (Jiang, 2012).

Fig. 383: Remade the screw hole on the Osmanthus stem by using the tap and die equipment (Jiang, 2012).

3D printing was used to make the Osmanthus flower using white strong flexible plastic (Fig.384). This tested the actual size and used for the sample of glass making. Different forms and colours were also printed (Fig.385).



Fig. 384: The 3D printing of the Osmanthus in white strong flexible plastic (Jiang, 2012).

Fig. 385: The 3D printing of the different colours of strong flexible plastic Osmanthus earrings in normal form (Jiang, 2012).

As found in former practical experiments, kiln casting is not suitable for making glass pieces smaller than 3cm (Fig.167–170 in section 4.2.4 and fig. 225–226 in section 4.4.4), especially since they have lots of detailed patterns (Fig.126 in section 3.8.3 and fig.332 in section 4.6.5). Water-jet cutting can only cut the 2D patterns on the glass and its characters are not suitable for this case study. Lampworking is suitable for making small scale 3D complicate shapes in glass making. Hence, lampworking is the most suitable process for making the glass pieces of a blossomed Osmanthus flower. The method cut the glass from two petals to four. Scissors was used when the glass was being fired (Fig.386–388). They were put into vermiculite (GOT) granules to cool slowly before annealing in the kiln (Fig.389).

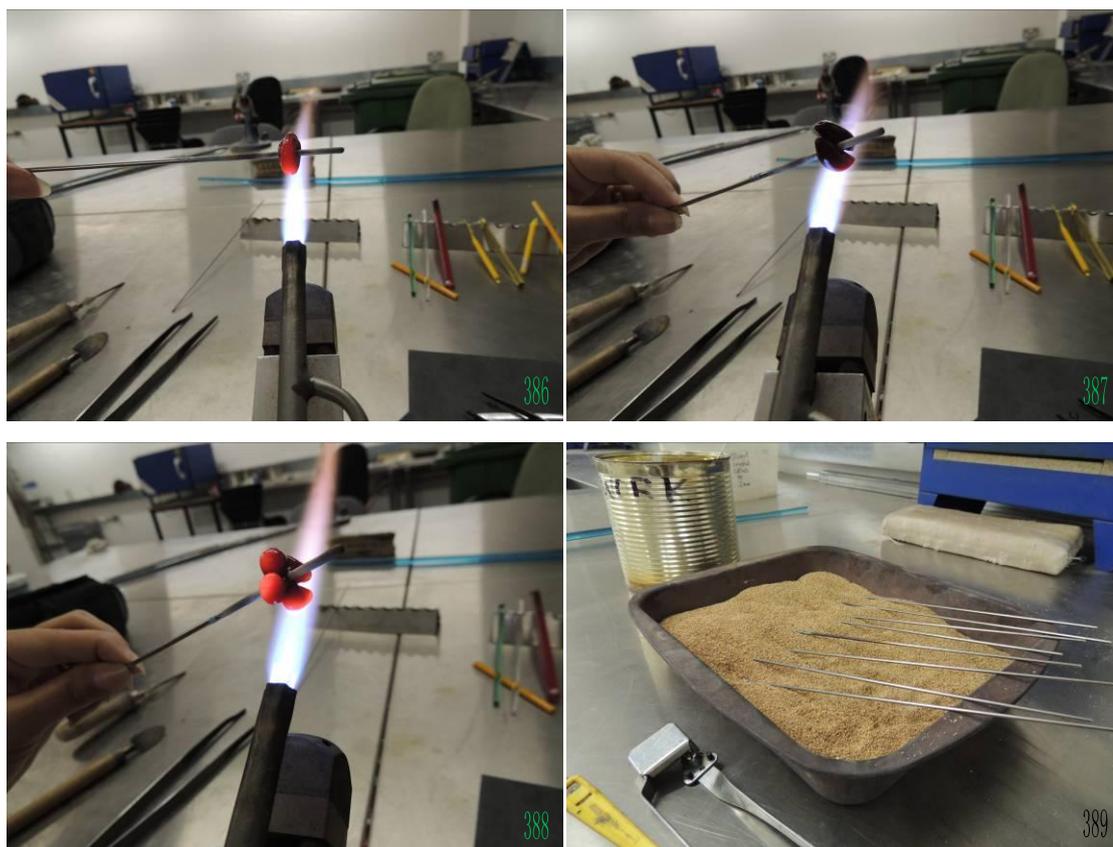


Fig. 386, 387, 388: Using scissor to cut the glass from two petals to four petals when the glass was being fired (Jiang, 2013).

Fig. 389: Cooling down the pieces of glass Osmanthus flower (Jiang, 2013).

There are some glass pieces of Osmanthus flower made by colourful soda lime glass and the transparent borosilicate glass (Fig.390). The four colours of yellow, red, transparent and white become the interchangeable glass group for final 'Osmanthus' ring set (Fig.391).



Fig. 390: The soda lime glass and borosilicate glass pieces of Osmanthus flower (Jiang, 2012–2013)

Fig. 391: Final four pieces of glass Osmanthus flower (Jiang, 2013).



Fig. 392, 393, 394: The final 'Osmanthus' ring set (Jiang, 2013).

4.7.6 'Osmanthus' ring set description

The list below briefly describes the 'Osmanthus' ring set:

- i. This ring set is composed of three rings and one can wear them together or separately (Fig.392–394).
- ii. The design is unique with one glass flower and four other buds showing different stages of growth.
- iii. The glass Osmanthus flower can also be changed into different colours or other materials.

4.7.7 'Osmanthus' ring set evaluation

Philosophy of harmony between man and nature	Strands
Integration of Yin and Yang	
Unification of Time and Space	√
Self-cognition and External-cognition	√
Same Structure of Man and Nature	
Combination of Subject and Object	√
The Concept of Change	√

Fig. 395: The four characteristics associated with the 'Osmanthus' ring set (Jiang, 2014)

This final 'Osmanthus' ring set (Fig.392–394) examined four of the six characteristics of harmony between man and nature identified in the diagram

Fig.395 to achieve the first research aim (section 1.6). The four Chinese philosophical focus points 'Unification of Time and Space', 'Self-cognition and External-cognition', 'Combination of Subject and Object' and 'the Concept of Change' have been clarified in sections 2.7.3.2, 2.7.3.4, 2.7.3.5 and 2.7.3.6.

4.7.7.1 'Self-cognition and External-cognition'

The original design's impetus arose out of a very reflective and self-aware time on how I responded to my emotional and environmental surrounding.

4.7.7.2 'Unification of Time and Space'

The following list shows how the notion of 'Unification of Time and Space' theme exists in the 'Osmanthus' ring design:

- i. The piece shows the connection between time and space through the actual form of Osmanthus life circle from bud to the blossom.
- ii. The piece created a different character of Osmanthus forms in different flowering stages.
- iii. The Osmanthus bud in its different states shows the span of time from early flowering stage to the withered period.

4.7.7.3 'Combination of Subject and Object'

By combining subject with object a design is given more meaning and more 'life'.

The list below goes into brief detail about this:

- i. The flower and the personal relationship it represents.

- ii. An exotic method used shows the principle of combining subject and object in the aesthetic performance of 'Osmanthus' ring set.

4.7.7.4 'The Concept of Change'

As discussed in a previous case study, 'the Concept of Change' is a big theme in my designs. Below describes how this concept can be found in this particular piece:

- i. The form evokes sensations of change and natural beauty. A common feature and theme enables the piece to change itself and the designer and wearer can create new shapes and forms.
- ii. The three rings can be worn together or separately highlighting the functional change, which enhances the wear-ability.

Guilin Exhibition Hall curator Shiming Xie (谢世明), accountant Xianglian Zeng (曾香莲) and officer Ying Hou (候莹) gave the feedback: "The works used extremely bright colours. They are very harmonious and just like nature are vivid with life. It is easy to see that you have a solid foundation in the art and design field" (Appendix.9). Their feedback also demonstrates this ring set design can show organic combinations from the Chinese philosophy and Western design which match the goal from the second research aim in section 1.6.

The 'Osmanthus' ring set design process creates new forms of 'Osmanthus' glass and the interchangeable 'Osmanthus' silver stem. Like the previous case studies of this thesis, this process develops 3D prototype techniques based on successful integration of Chinese ink painting, jewellery ideas sketches, jewellery drawing, the orthographic view by using AutoCAD, 3D rendering by using Rhinoceros in the idea preparation and imaging process. The combination

of 3D printing, lampworking, silversmith techniques based on my MA jewellery making experiment and the former case studies (Section 4.2, 4.3, 4.4, 4.5 and 4.6). This outcome can demonstrate it achieved the research third aim in section 1.6.

4.8 Summary

This chapter describes my six case studies which convey the philosophy of harmony between man and nature in contemporary Western glass jewellery design from six perspectives.

4.8.1 Concept outcomes

Six philosophical main points of 'harmony between man and nature' (Section 4.1) have been used in different case studies. These jewellery design processes and outcomes show the Chinese philosophy of 'harmony between man and nature' can be applied into Western glass jewellery in different ways. Holistic, harmony, balance, flexibility and change as thematic approaches have been used to handle the whole design and to assess the successes of each of the artworks and also the ways in which they were made. The concepts were used in a very straightforward and practical way. This approach enabled a direct evaluation of the ways in which the jewellery piece did/did not convey some of the expressive features associated with, holistic, harmony, balance, flexibility and change. The focus on the jewellery design and methods might assist to make these very complex and abstract terms, draw from Chinese philosophy more tangible and offer concrete ways of deploying these themes in contemporary glass jewellery

designs.

The whole design process also can demonstrate the principles of 'harmony between man and nature' (Fig.27 in section 2.6.1) including 'holistic approach', 'harmony', 'balance' and 'flexibility/change' which have been used through each case study. All of the design elements have been associated, mapped, arranged and built up following them. The whole design process of each case study itself is a 'holistic approach' process that constantly engages with the problems and how to overcome them, e.g. Fig.147 in section 4.2.3.

'Flexibility' enables understandings of the relationship between the elements. For example, the 'flexible' combinations of Chinese garden design 'borrowed landscape' methods and Chinese ink painting methods into 'Button' brooch design is a good example of this approach (section 4.4.10 and 4.4.11).

'Change' embraces the ways in which ideas change and develop through engagement with materials. For instance, developing the earring also can use as rings in different colours (Fig.355–356) as shown in the 'Annual Ring and the Edge of Dancing Skirt' earrings/rings (Section 4.6.8.5).

'Balance' is a key feature in the design and in Chinese philosophy, history and even contemporary life, and an emergent feature to judge the success of the artwork. For example, the initial ideas (Fig.288 in section 4.5.3) of 'Pleated Skirt' necklace developing into new jewellery drawings (Fig.289 in section 4.5.3) which shows the 'balance' between aesthetic and function, materials and design. In order to get the right size to fit the contemporary Western jewellery design, the size survey (Fig.290 in section 4.5.4) took from contemporary Western people can show ways to 'balance' aesthetics and function. The size for this design is

contrast to the Chinese traditional jewellery sizes, which is generally preferably small, practical and wearable in size.

'Harmony' is the final design goal to be achieved from the aesthetic perspective. The final stage of the evaluation and is indicated through examining the ways the design and the wearer interest with each other. For example, an exotic method has been used to show the Western contrast inside the 'harmony' performance between the two different materials of glass and silver in the aesthetic perspective (Fig.371–373 in section 4.7.5).

4.8.2 Jewellery outcomes

The new jewellery forms created offer new and contemporary designs to the field of glass jewellery. The forms are bold and distinctive with equally complimentary and dynamic colours and settings. Each of the shapes express features of my own design aesthetics but equally they were importantly drawn from aspects of Chinese culture and traditions. The subtle references (e.g. the ethnic minority dancers skirts) has facilitated in making the designs appear fresh and timely. The pieces do not stand out as obviously being 'Chinese', but are rather highly bespoke artworks, making bold and elegant statement pieces in contemporary art and design.

The interchangeable feature was an important outcome in all of the designs. The vast number of sequences and choices of wear with my jewellery creates a harmony between jewellery pieces and the wearer. The wearers are encouraged to see connections between jewellery pieces with their interests (different materials or colours), bodies (The connection between fingers and ears in the 'Annual Ring and the Edge of Dancing Skirt' earrings/rings see fig.351–352 in

section 4.6.8.3, 355–356 in section 4.6.8.5) and clothes (Relationship between jewellery and clothes in 'Button' brooch design see section 4.4.11).

New jewellery drawings contain Chinese ink painting methods of water-and-ink rendering and Western water-colour painting. This is an important process to convey and develop the details of jewellery ideas into real life through all the case studies. This is an approach which has not been fully explored before and was a key additional outcome to the methods and tools developed.

4.8.3 Technical outcomes

The development of 3D visuals shows different ideas of the final product by combining different software including AutoCAD, Rhinoceros and Netfabb Studio for my 'imaging processes and 'technical production'. New ways of testing glass by using the microwave kiln was developed. Combining machine production and handcrafting can strengthen the final artwork, and can be an advantage in the making process, through offering opportunities to experiment and be innovative rather than follow a set design. This was a feature in all of the other case studies.

New combinations of 3D printing with water-jet cutting, kiln forming, lampworking, silversmith techniques in different case studies prove the flexibility of applying techniques to fit in different jewellery designs is important. For instance, successfully combining the 3D printing, kiln forming and silversmith into 'Egg and Sperm' necklace, the 3D printing, lampworking and silversmith into 'Osmanthus' ring set and the 3D printing, water-jet cutting and silversmith into the rest of the case studies. The other techniques also include successful combinations of sandblasting into 'Annualring and Fingerprint' brooch and tap and die into 'Pleated Skirt' necklace and 'Osmanthus' ring set. These combinations and the

ways they contribute to the design process have never before been made so transparent and replicable in previous research. This project is timely in this case as more and more designers and artists are combining (and developing new) technical processes to achieve their artistic vision.

The creation of new interchangeable settings: the flexible peg setting, interchangeable surrounding setting, and the interchangeable half surrounding setting are crucial outcomes for this project. In every case, the setting have never before been developed or tested. New flexible peg settings can have various forms to match different jewellery designs, such as 'Egg and Sperm' necklace, 'Button' brooch and 'Osmanthus' ring set. New interchangeable surrounding setting has been successfully used into the 'Pleated Skirt' necklace and 'Annual Ring and Fingerprint' brooch. New interchangeable half surrounding setting has been successfully developed in my 'Concave and Convex' couple ring set ('Ao Tu 凹凸').

By encasing 'interchangeable' glass pieces in silver, it solves the drawbacks of the fragility of glass as broken pieces can be replaced. It also allows different glass to be used for different occasions. This highlights the colourful and morphological nature of glass. This shows the use of materials in both abiding characteristics of glass and silver to optimise the design. The materials and design can be well integrated. These new designs will feature in my future practice as a glass jewellery designer.

Chapter 5: Conclusions

5.1 Contribution to knowledge and basis for originality

This cross culture research has provided important new understandings of the Western designs and theory of contemporary glass jewellery, drawing upon terms and debates from Chinese philosophy. This project extends contemporary jewellery design and glass art.

Interdisciplinary research combines the two areas of glass and jewellery. These new forms of glass jewellery design are in a unique position in the Chinese market. The new combinations of glass production have not been explored to this degree before, especially within the Chinese market.

Undertaking several thorough evaluations and analysis, through studio based investigations, enabled the investigation of themes and concepts under the overall heading of the philosophy between man and nature (Section 3.4). Some key concerns were found to be important to this PhD and the researcher's practice. The continual refinement through experimenting with materials also enhanced the researcher's artistic skills so that the intentions of the design became clearer.

Observing Chinese philosophy and investigating the theme of harmony between man and nature through the processes of traditional painting and the translating these into contemporary jewellery design were the primary methods developed through this project.

The novel approaches and application of some theories are not exhaustive yet they make a vital contribution to a vast and under-researched field. Several key

factors were considered in the design stages: 'holistic approach', 'harmony', 'balance', 'flexibility' and 'change'. The Holistic approach manages the whole research project and adjusts every relative element in balance to reach the harmonious outcome. The jewellery design shows the ways in which the wearer can have flexibility, and addresses the concept of 'change' in a very practical way. The combined stages of studio practice informed by literature and theory have provided new studio based methods for jewellery design.

- i The indirect progression method (Fig.3 in section 1.8.1.1)
- ii The personal holistic research glass jewellery production method (Fig.4 in section 1.8.2)

What has been achieved are a series of practical studio investigations which develop, in different ways, new techniques informed by philosophical understandings from Chinese culture and history. These new techniques have created wholly new forms in contemporary jewellery design and are also underpinned by several key principles in Chinese philosophy:

- i. Combinations of Chinese ink paintings and digital glass jewellery prototypes.
- ii. Combination of machine productions and handcrafted: 3D printing and water-jet cutting, kiln casting, lampworking and silversmith techniques were new ways of developing new designs (Chapter 3) in jewellery production. These possibilities enable the creation of lots of complex and previously unachievable forms.
- iii. Fire polishing was found to be effective in creating a reflective surface on the complex shapes and forms of glass.
- iv. A balance between the size of the kiln and the time necessary to fire an artwork needs to be taken into full account.

Flexibly combining various techniques (Chapter 3) can enhance the outcome of jewellery design (Chapter 4).

- New methods of setting glass and silver need further attention including flexible peg setting, interchangeable half surrounding and interchangeable surrounding setting. The new strategies of making parts replaceable were found to be efficient and effective.

The researcher's personal perspective: being Chinese, living in the UK, a professional designer/artist, educated in the UK and China, as well as having direct experiential contact with Western and Eastern cultures, histories and traditions provided key knowledge and experience throughout the project. New methods of working were found based on the researcher's prior knowledge and skills, for example flexible 3D prototyping (Section 3.6), use of microwave kiln and the water-jet cutter (Section 3.8). Previous experience enabled a degree of confidence in working with mixed materials and an array of processes and procedures that many artists are unfamiliar with. This extensive experience made an important contribution to understanding of materials in jewellery design, namely that there is not necessarily a hierarchy of materials in jewellery design. Something made out of, found or even 'throw away' materials can be as aesthetically pleasing and therefore as valuable than something made in a precious metal, as evidence in case studies see fig.327 in section 4.6.5, fig.350–352 in section 4.6.8.3 and fig.384–385 in section 4.7.5.

The new approaches, extensive appendices including systematic research in the use of materials and related information can be used as reference for other practitioners and interested people to develop their own practical methods. With new cross cultural research processes developed the overall feature is

described as the Chinese philosophy of 'harmony between man and nature' and the ways features like this are applied to Western jewellery design.

Academic understandings of jewellery and glass designs are improved through paper publications (Appendix 7) and exhibitions (Appendix 8, 9). They show the process of the research development. They are not only an important part of this project but also cover the academic aspect of contemporary Chinese glass jewellery design. Glass jewellery design teaching and research are relatively new in China; hence this research will be a pioneer in this regard. The body of literature brought together in this PhD thesis also provides important references and information for new research to be undertaken in the field.

5.2 Outcomes

This project adopted a designer's perspective to examine the three objectives:

- To analyse and evaluate the Chinese philosophy of 'harmony between man and nature' and its traditions and integrate outcomes into developing new approaches to contemporary Western glass jewellery design.
- To develop the principle of 'harmony between man and nature' as used in Chinese traditions making them appropriate for creating new contemporary Western glass jewellery designs in Chinese market with cultural differences.
- To develop 3D prototype techniques and refine processes of using metal and glass in order to explore the functions and applications of aesthetics, developing technical innovations in new forms of jewellery design.

5.2.1 Conclusions relative to the research objectives 1

A review of literature in the history and theory of Chinese jewellery design and Western jewellery design (Section 2.3, 2.4 and 2.5) with a particular focus on 'the harmony between man and nature' (Section 2.6 and 2.7) enabled the researcher to develop new perspectives on the ways Chinese philosophical and design principals can be adapted to create innovative and technically challenging jewellery designs. The review and study trips enabled the researcher to locate her practice within the context of theory and practitioners from both Chinese and Western ideas and designs. Key outcomes of contemporary Chinese jewellery design emerged from the review in section 2.3.

Key diagrams (Fig.18 in section 2.4) began to explore some of the features of contemporary jewellery design and to pick out further details for analysis and evaluation. Key features were:

- i. Cultural differences between China and the West (Section 2.5).
- ii. Combining precious and non-precious materials (Section 2.4.1).
- iii. Exploring and testing boundaries between fine jewellery, costume jewellery, fashion jewellery and art jewellery (Section 2.4.2).
- iv. Working with hand crafting and machine production (Section 2.4.3).

Philosophical reading undertaken in section 2.6 and 2.7 provided the researcher with new understandings of Chinese philosophy and presented ways that some of these features further explored and examined features of the contemporary Western jewellery design. The researcher reminds the reader of the six concepts taken forward to the studio based investigations:

- 'Integration of Yin and Yang (阴阳调和)' (Section 2.7.3.1)
- 'Unification of Time and Space (时空合一)' (Section 2.7.3.2)
- 'Same Structure of Man and Nature (天人同构)' (Section 2.7.3.3)
- 'The Concept of Change (变化)' (Section 2.7.3.4)
- 'Combination of Subject and Object (主客合一)' (Section 2.7.3.5)
- 'Self-cognition and External-cognition (内外合一)' (Section 2.7.3.6)

In section 2.6, I have developed ways that 'harmony and nature' in a Chinese context might be adapted and integrated with Western contemporary jewellery design (Section 2.4). Diagrams, interviews, field work and practice enabled comparative investigations and experimentation into this largely under researched area. The literature review and interviews with Chinese philosophy experts (Section 2.6.1) (Appendix 2) and ink painting artists (Section 2.6.3) (Appendix 2) through study trips to China enabled greater understandings of the Chinese philosophy of 'harmony between man and nature' and the concerns of its influence on art and design. Without the direct and experiential understanding of spending time with artists, important contributing factors relating to the project would have been missed.

5.2.2 Conclusions relative to the research objectives 2

In order to avoid some of the problems of contemporary Chinese jewellery design in section 2.3, Specific solutions were developed. A series of studio based investigations were undertaken. Each of the investigations enabled certain features of harmony and nature to be examined through my own practice. Adopting the convention of case studies enabled an iterative process of examination and analysis which facilitated the refinement of the design process

as well as applications of theory to the designs. The inclusion of an analysis of the design process as well as the artwork provided a holistic and in-depth analysis of the features and factors associated with 'harmony and nature' important to the researcher and her practice. The key findings are set out in a way which enables other researchers, artists, theorists to adopt the researcher's process and to build upon her findings. The key emergent features of the design process were:

- i. Combination of hand crafting and machine production in the jewellery design process (Section 3.2).
- ii. The mix of precious, non-precious and new techniques in combination with some of the more traditional jewellery processes developed new techniques (Chapter 3 and 4), such as 3D printing with silversmith techniques (Section 4.2.5, 4.4.8, 4.6.5) and 3D printing in kiln casting glass (Section 3.8.2).
- iii. The adaptation of Chinese philosophy in the design process enabled the researcher to experiment and create wholly new designs and forms otherwise unachievable (Six cases studies in Chapter 4).
- iv. New tried and tested techniques were developed for use firstly by the researcher in her own practice and secondly by other contemporary jewellery designers.
- v. A degree of freedom within the design process was created which is only emerging in Chinese design practice, section 2.3.1.1–2.3.1.3.
- vi. The visual outcomes contribute to a new 'Chinese style' which has a focus on concept as well as design, moving forward from traditional Chinese patterns (Section 2.3.1.3).

The crucial finding of principle of 'harmony between man and nature' was developed including 'holistic approach', 'balance', 'flexibility', 'change' and 'harmony' (Fig.27 in section 2.6.1).

A 'holistic approach' constantly engages with the problems from an overall perspective. 'Flexibly' enables understandings of the relationship between the elements. 'Change' embraces the ways in which ideas change and develop through engagement with materials. 'Balance' is a key feature in the design and in Chinese philosophy, history and even contemporary life, and an emergent feature to judge the success of the artwork. 'Harmony' is the final design goal to be achieved from the aesthetic perspective.

The investigations provide evidence as to the ways themes and concepts could be adapted and applied to create dynamic and inspiring new artworks in their own right, as well as provide a complete body of work in the form of a PhD thesis.

- i. The personal holistic research glass jewellery production method (Fig.4 in section 1.8.2) provides a new five stage progressing method in jewellery idea development and production.
- ii. The indirect progression method (Fig.3 in section 1.8.1.1) investigated philosophical contexts of 'harmony between man and nature' (Section 2.6) within the researcher practice.
- iii. Using traditional Chinese ink paintings and drawing underlying the philosophical thinking and informed contemporary jewellery making (Section 3.4 and Chapter 4).

5.2.3 Conclusions relative to the research objectives 3

For this research, new techniques of digital glass jewellery were created. The six case studies (reminded below) enabled practical and aesthetic features of the design and development process to be developed, analysed and evaluated.

- 'Concave and Convex' couple ring set ('Ao Tu') ('凹凸'情侣戒) (Section 4.2)
- 'Egg and Sperm' necklace ('精子和卵子' 项链) (Section 4.3)
- 'Button' brooch ('扣子' 胸针) (Section 4.4)
- 'Pleated Skirt' necklace ('百褶裙' 项链) (Section 4.5)
- 'Annual Ring and Fingerprint' brooch ('指纹与年轮' 胸针) (Section 4.6)
- 'Annual Ring and the Edge of Dancing Skirt' earrings/rings ('年轮与舞动的裙摆' 胸针) (Section 4.6.8)
- 'Osmanthus' ring set ('桂花' 组戒) (Section 4.7)

The combination of many materials and techniques enabled a wholly creative and an experimental cycle of production to be undertaken. This led to largely unhindered creative thoughts and feelings to be harnessed into the design process. The results of which created several new design techniques and crucially new aesthetic understandings and interpretations of contemporary glass jewellery. Key outcomes from the integration of 3D techniques and 3D printing included:

- i. Greater range of shapes and forms can be created with advancement of silver and plastic in 3D printing (Six cases studies in Chapter 4).
- ii. Simulated designs provide cost effective means of production and greater quality of the final object (Chapter 3 and 4).

- iii. Production speed has increased dramatically compared to hand crafted jewellery. A combination of hand crafting and machine production can strengthen the final designs (Chapter 3 and 4).
- iv. A combination of software is necessary to achieve the detail and degree of precision in many contemporary jewellery designs and practices (Section 3.6).
- v. Flexibly combining various techniques in different ways including 3D printing, water-jet cutting, kiln casting, lampworking and silversmith can achieve various possible for the new complex forms for the jewellery design (Chapter 4).

The primary contribution lies in the creation of new and replaceable jewellery setting methods (Section.3.9.3), and have developed new solutions addressing several problems in glass settings (Section 3.9.1), they are:

- i. Flexible peg setting.
- ii. Interchangeable half surrounding.
- iii. Interchangeable surrounding setting.

5.2.4 Limitations of the research project

The Chinese philosophy of harmony between man and nature is a very deep and broad philosophy, with a long and highly complex history. Consequently, the full extent to which these theories and debates can be used to enhance Western culture, as well as creating new ideas and expressions for use in jewellery practice is only just beginning.

Recognising that this is an emerging and very broad field, the fact that Chinese philosophy is widely regarded to have 'fuzzy' (Xie, 1986, p.106) and incomplete concepts proved difficult for the researcher to fully fit into Western thoughts and concepts. Notwithstanding these largely unquantifiable concepts are considered a virtue in Chinese philosophy. It was the boundaries between some Western and Eastern concepts and an acknowledgement of the tensions within this area which are used to underpin this thesis.

In the same strand it proved difficult to translate Chinese concepts into the English language directly and this must be acknowledged in any future research into the area. Often it is a problem of language and culture combined that can hinder the understandings and values of eastern concepts in largely Western theories and debates.

This research developed new approaches from the point of view of an artist and designer. The technical methods developed offer a contribution to this field as well as technical approaches. 3D printing skills were adapted into the researchers overall practice and consequently some of the technical skills could be improved, such as the thickness of the metal or the use of materials. There were times when the facilities of the workshops constrained the design process. Nevertheless, this can be easily rectified with more practical experience and more refined making processes.

5.3 Opportunities for further research

This research has analysed and applied some of the principles of harmony between man and nature, from a cross cultural perspective into Western design.

It is felt that there is potential to develop some of the themes identified in this research, notably the growing Chinese jewellery market and how design and creativity can have a place in this.

New possibilities and experiments have emerged in the area of flexible plastic and glass, knitting and glass as well as other metals. New forms are also possible in the glass making process. There are also possibilities in the hand crafting and machine production, to develop new techniques using glass powder, sandblasted glass, the interlace setting of glass and metal; the silver enamel with multiple glass.

As an art and design educator in China, this research will enhance the teaching philosophy of integrating Chinese and Western culture into the jewellery design area in the future. Chinese art and design education should guide students to be more concerned with creative thinking and to record, explore and review the design ideas and developing their skills rather than only be concerned with the outcome.

Finally, as an extension of this research, I will be exhibiting new work at the Guilin Museum in China. New experiments with various forms of coloured glass and combinations of different materials with digital media and technology will be used. As I continue to develop my own creative practice, I will take a balanced approach between art jewellery and commercial jewellery and to continue to develop new approaches and ideas for contemporary jewellery pieces.

Reference:

Baas, Jacquelynn and Jane Jacob, Mary (2004), *Buddha Mind in Contemporary Art*, University of California Press.

白晨曦: 《天人合一: 从哲学到建筑—基于传统哲学观的中国建筑文化研究》, 中国社会科学院研究生院 2003 年 6 月 2 日。

Bai, Chenxi (2003) *Harmony between Man and Nature: From the Philosophy to the Architecture—the Research of Chinese Architecture Culture base on the Traditional Chinese philosophy*. Graduate School of Chinese Academy of Social Sciences.

Barnhart, Richard M (2002) *Three Thousand Years of Chinese Painting*. New Haven, Conn.; London: Yale University Press.

Barrass, Gordon S (2002) *The Art of Calligraphy in Modern China*, London: British Museum.

Beaman, J. Joseph (1997) *Rapid Prototyping in Europe and Japan*. Rapid Prototyping Association of the Society of Manufacturing Engineers.

Buscaglia, Dana (2009) *Rhino for jewelry*. Amazon.uk, Ltd.

陈清华: 《静思的智慧—传统中国画意境美探究》浙江师范大学美术学院 2011 年 3 月。

Chen, Qinghua (2011) *Among the Wisdom—Traditional Chinese Painting the Beauty of Artistic Conception Explored*. Fine Art College of Zhejiang Normal University.

陈雯雯、桑林、鲍陶然和董科: 《珠宝首饰设计的知识产权保护探析》, 载于《知识产权》, 中国知识产权研究会 2013 年第 5 期。

Chen, Wenwen, Sang, Lin, Bao, Taoran, Dong, Ke (2013) 'The Analysis of the Protection of Jewellery Design Intellectual Property Rights', *Intellectual Property Rights*, No.5. China Intellectual Property Society.

陈相强: 《关于中国园林与生态园林的新思维与实践研究》, 浙江大学 2007 年 12 月。

Chen, Xiangqiang (2007) *Studies on New Ideas and Practice of Chinese Garden and Ecological Landscape Architecture*. Zhe Jiang University. [Chinese PhD Thesis].

陈小野: 《人生有形, 不离阴阳》, 载于《现代中西医结合杂志》, 中国中西医结合学会河北分会, 中华中医药学会 2011 年第 36 期。

Chen, Xiaoye (2011) Human Life Is Inseparable from the Yin and Yang. *Modern Journal of Integrated Traditional Chinese and Western Medicine*, No.36. Hebei Branch of China Association of Chinese Medicine and Western Medicine, China Associate for Traditional Chinese Medicine.

China Culture (2005) *Harmony of Man with Nature*. [Internet]. Available from: <http://www.chinaculture.org/gb/en_madeinchina/2005-10/18/content_74584.htm>. [6 July 2009].

中国珠宝行业网: 《颁奖典礼精彩谢幕, 精工佳作赢领芳华》, 载于中国珠宝行业网 2013 年 1 月 17 日。

China jewellery (2013) *The Award Ceremony with Skilful Artwork*. [Internet]. Available from: <http://biz.ifeng.com/zhubaowang/zhubaohangye/tebiezhuanti/2012sssizzds/detail_2013_01/17/545035_0.shtml>. [8 January 2013].

中国书法家园: 黄公望《富春山居图》, 2011 年 6 月 2 日。

Chinese Calligraphy Home, (2011) *Huang Gongwang's Fuchun Mountains*. [Internet]. Available from: <<http://www.eshufa.com/html/22/n-18822.html>>. [28 November 2011].

Chuang, Yu-Cheng (2003) *An Examination of the Chinese Principle of Jingjie and Western Idea of the Picturesque as Parallel Influences on Site-Specificity in Land Art*. Goldsmiths College, University of London. [British PhD Thesis].

Coffey, Yvonne (2009) *Glass Jewellery*. London: A & C Black.

Cohn, Susan (2012) *Unexpected Pleasures: the Art and Design of Contemporary Jewelry*. Skira Rizzoli.

Cooper, Emmanuel. (2003). *Bernard Leach Life & Work*. New Haven: Yale University Press.

Crowe, Judith (2006) *The Jeweller's Directory of Gemstones: a Complete Guide to Appraising and Using Precious Stones, from Cut and Colour to Shape and setting*. London, A & C Black Publishers.

Cummings, K. (2008) Continuity and change in glass history. in: Garfoot, S. (ed.) *Glass Routes: From Wolverhampton to China*. England: University of Wolverhampton.

De, Bary (1960) *Sources of Chinese tradition, vol. 1*, New York: Columbia press.

邓蕾:《传统纹样与现代首饰设计》, 载于《赤峰学院学报(自然科学版)》第 28 卷第 2 期(下)》, 赤峰学院 2012 年 2 月。

Deng, Lei (2012) 'Traditional Patterns and contemporary jewellery design', *Journal of Chifeng University (Natural Science Edition)* 28, No.2. Chifeng University.

Dubin, Lois Sherr (1987) *The History of Beads: from 30,000 B.C. to the Present*. London: Thames and Hudson.

Dunham, Bandhu Scott (2002) *Formed of Fire: Selection in Contemporary Lampworked Glass*. Prescott, Ariz.: Salusa Glassworks.

Evans, Elena; Gutteridge, Claire; Hazelden, Anna; Worre Marie and Holm, Hastrup (2005) *Wearing Glass, 27 Fishes*, UK.

Faherty, Anna (2011) *Brit Insurance Designs of the year*, Design Museum.

付易昌：《图说易经全书 2800 例》，长沙：湖南美术出版社 2011。

Fu, Yichang (2011) *Illustrated 2800 cases explore of the 'book of Change'*, Changsha: Hunan Fine Arts Publishing House.

Fung, Yu-Lan (1952) *History of Chinese Philosophy II*, Princeton University Press.

Game, Amanda; Goring, Elizabethc (1998) *Jewellery Moves: Ornament for the 21st Century*. Edinburgh: National Museums of Scotland.

中国勘察设计协会园林设计分会编著：《风景园林设计资料集—园林植物种植设计》，中国建筑工业出版社出版 2003 年 12 月第一版。

Garden Design Branch of Chinese Reconnaissance and Design Association (2003) *Landscape Design Data Set — Garden Plants Planting Design*, Chinese Building Industry Press.

高波：《我国优秀传统文化的遗失与青年价值观研究》，哈尔滨工程大学 2007 年 6 月。

Gao, Bo (2007) *The Research of Loss Chinese Traditional Culture and the Values of Youth People*. Harbin Engineering University.

Giffi, A. Craig; Roth, V. Aleda; Gangula, Bharath; Chaudhuri, Atanu; McDougale, Jack; Hanley, Tim and Drew, Michelle (2013) *2013 Global Manufacturing Competitiveness Index*. Council on Competitiveness.

Gray, Carole; Malins, Julian (1993) *Research Procedures / Methodology for Artists and Designers*. The Robert Gordon University.

Gray, Carole; Malins, Julian (2004) *Visualizing Research: A Guide to the Research Process in Art and Design*. Aldershot: Ashgate.

Hafiludin (2011). Build in database—JewelCAD 5.1. [Internet]. Available from: <<http://www.studio3-jewelcad.net/2011/09/build-in-database-jewelcad-51.html>>.

[21 February 2013].

Hardy, Joanna (2012) *Collect contemporary jewelry*. Thames & Hudson Ltd.

何婧琳: 《<素问>“运气七篇”源流的研究》, 中国中医科学院中国医史文献研究所 2009 年 5 月。

He, Jinglin (2009) *Study on the Origins and Courses of Seven Articles of Yun-qi in SUWEN*. China Academy of Traditional Chinese Medicine Institute of History and Literature.

和讯: 《2013 年中国珠宝销售额保守估计将突破 3000 亿元》, 载于和讯财经新闻网 2013 年 8 月 7 日。

He, Xun (2013) *The Conservative Estimate of Chinese Jewellery Sales will Exceed 300 Billion RMB in 2013*. [Internet].

Available from: <<http://henan.hexun.com/2013-08-07/156887686.html>> [8 September 2013].

Holdridge, Lin and Macleod, Katy (2006) *Thinking through art: reflections on art as research*. London: Routledge.

Hoskins, Steve (2013) *3D printing for artists, designers and makers*. London: Bloomsbury.

黄士龙: 《中国服饰史略》, 上海文艺大一印刷有限公司 2007 年。

Huang, Shi Long, (2007) *A Brief History of Chinese Fashion*, the Shanghai Literature and Art Da Yi Printing Co., Ltd.

Ilse-Neuman, Ursula; Page, Jutta-Annette; Holzach, Cornelia (2007) *Glasswear: glass in contemporary jewelry*. Arnoldsche.

纪敏、关志鹏: 《透析沈周作品中的“干湿”用笔》, 载于《牡丹江大学学报》第 16 卷第 9 期, 牡丹江大学 2007 年 9 月。

Ji, Min and Guan, Zhipeng (2007) Analyzing the 'Dry and Wet' Brushstrokes in Shen Zhou's Work. *Journal of Mudanjiang University*. Vol. 16 No.9. Mudanjiang University.

季羨林: 《“天人合一”新解》, 载于《传统文化与现代化》国务院古籍整理出版规划小组 1993 年 01 期。

Ji, Xianlin (1993) The New Explanation of 'Harmony between Man and Nature'. *Chinese Culture: Tradition and Modernization*. The States Council of Ancient Books Publishing Planning Group.

季羨林: 《钱穆的天人合一观中国文化对人类的伟大贡献》, 载于《中国气功科学》中国气功科学研究会 1996 年第 5 期。

Ji, Xianlin (1996) The Great Contributions to Humanity of Qian Mu's View of Harmony between Man and Nature. *Chinese Qigong Science*. No. 5. China Qigong Science Research Council.

金银: 《20 世纪 80 年代之后中国设计艺术理论发展研究》, 武汉理工大学 2007 年 10 月。
Jin, Yin (2007) *the Development of Chinese Art and Design Theory after the 1980s*. Wuhan University of Technology. [Chinese PhD Thesis].

金勇: 《人大代表热议文化产业创新发展: 如何从“中国制造”走向“中国智造”》, 载于《中国妇女报》第 A03 版 女界之声, 中华妇女联合会 2013 年 3 月 16 日。

Jin, Yong (2013) "Deputies Discussed Cultural Industry Innovation and Development: How 'Made in China' become to 'Design in China'", *Chinese Women's Daily*, Match. China Women's Federation.

鞠曦: 《易道元贞》, 中国文联出版社 2001 年。

Ju, Xi (2001) *The Way of the Changes Yuan Zhen*, The Publishing House of the China Literary Federation.

King, Gerry (2004) Beside the Tasman Sea. *Craft Art International* No.62. Sydney: Craft Arts Magazine.

King James Version (1998) *Book of Genesis*, Orange Street Press.

Klein, Dan; Lloyd, Ward (1997) *The history of glass*. London: Tiger Books.

孔伋: 《中庸》, 公元前 483—公元前 402 年, 载于古诗文网。

Kong, Ji, (B.C.483—402) *Moderate*. [Internet]. Available from: <<http://so.gushiwen.org/guwen/book.aspx?b=中庸>>. [16 June 2012].

Kowalski, Carissa (2008) *Jewelry Design*. Cologne; London: Daab.

Kulagowski, Yvonne (2005) *Wearing glass: contemporary jewellery and body adornment, Contemporary Attitudes glass jewellery and adornment*, National Glass Centre

Lavin, Cyndi (2008) Larry Scott beads. [Internet]. Available from: <<http://www.blisstree.com/2008/06/19/beauty-shopping/larry-scott-beads/>>. [5 May 2010].

冷成金: 《论化时间为空间的诗词之美》, 载于《中国人民大学学报》第 4 期, 中国人民大学 2011 年。

Leng, Chengjin (2011) The Fascination of Chinese Classical Poetry in Transforming Time into Space. *Journal of Renming University of China*, No. 4. Renming University of China.

Lennings, Lex (2013) *Digital Manufacturing: 3D printing and CNC machining*. [Internet]. Available from: <<http://www.tctmagazine.com/additive-manufacturing/digital-manufacturing-3d-printing-and-cnc-machining/>>. [25 June 2013–30 July 2013].

李举子、罗理婷、赖旺：《宝石镶嵌技法》，上海人民出版社 2011 年 3 月。
Li, Juzi; Luo, Liting and Lai, Wang. (2011) *Gemstones Setting Techniques*. Shanghai Renmin Publisher.

李润生：《多视角美术赏析》，人民美术出版社 2008 年。
Li, Runsheng (2008) *Multi-View Art Appreciation*. People's Fine Arts Publishing House.

李淑慧：《南拳“内外合一”剖析》，载于《武汉体育学院学报》第 36 卷第 4 期。武汉体育学院 2002 年 7 月。
Li, Suhui (2002) Inner and Outer Integration of Southern-style Boxing *Journal of Wuhan Institute of Physical Education, Vol.36, No. 4*. Wuhan Institute of Physical Education.

廖国一、陆军：《独秀峰南宋“桂林山水甲天下”石刻的发现及其旅游价值》，载于《广西地方志》2002 年 05 期，广西壮族自治区通志馆。
Liao, Guoyi and Lu, Jun (2002) The Discovery of the 'Guilin Scenery Is the Best in the World' Stone in the Duxiu Peak and Its Tourist Value. *Guangxi's Local Records, No.5*. Annals of the Guangxi Zhuang Autonomous Region Museum.

梁启超：《阴阳五行说之来历【A】，古史辨：第五册【M】》上海：上海古籍出版社 1982。
Liang, Qichao (1982) The Origins of Yin and Yang [A]. *Debate on Ancient History: Volume V [M]*. Shanghai: Shanghai Ancient Books Publishing House.

Libert, Jeff (2010) *The Invention of CNC Machining*. [Internet]. Available from: <<http://machinist.org/uncategorized/the-invention-of-cnc-machining/>>. [25 June 2013].

林莉：《珠宝设计的知识产权保护研究》，华中科技大学 2007 年 5 月 15 日。
Lin, Li (2007) *Study of Intellectual Property Protection on Jewellery Design*. Huazhong University of Science and Technology.

Ling, Manny Man Kin (2008) *Calligraphy across Boundaries*. The University of Sunderland. [British PhD Thesis].

Lipson, H (2012). *Fabricated the New World of 3D Printing*. N.J.: Hoboken.

刘丁级：《买首饰，怎么多出设计费》，载于《三明日报》20111222 期第 B2 版：生意经，三明报社出版，2011 年 12 月 22 日。

Liu, Dingji (2011) 'Buy jewellery, why charge the design fee?', *Sanming Daily*, December, No.20111222. Sanming Newspaper Publisher.

刘红:《中西方首饰消费差异》,载于《中国宝玉石 No.5》,国资委中国中材集团 1998 年 5 月 15 日。

Liu, Hong (1998) Different Between Jewelry Consume in China and in the West. *China Gems & Jades*, No, 5. SAC China National Materials Group Corporation Ltd.

刘振虎:《时代风格当代最具学术价值和市场潜力的画家阳光》,吉林大学出版社,2010 年 12 月。

Liu, Zhenghu (2010) *Era style: the contemporary painter of highest academic value and market potential Guang Yand*. Jilin University Press.

罗安宪:《'天人同构'与中国传统美学精神》,载于《宝鸡文理学院学报(社会科学版)》总 18 卷第 4 期,宝鸡文理学院 1998 年 12 月。

Luo Anxian (1998) The 'Same Structure of Man and Nature' and the Chinese Traditional Aesthetics. *Journal of Baoji University of Arts and Science (Social Sciences Edition) Vol.18 No.4*. Baoji University of Arts and Science.

Malins, Julian; Gray, Carole; Bunnell, Katies and Wheeler, Eleanor (1995) *Appropriate Research Methodologies for Artist, Designers & Craftpersons: Research as a Learning Process*. The Robert Gordon University.

Mansell, Amanda (2008) *Adorn: New Jewellery*. London: Laurence King.

毛晨筠:《珠宝行业管理系统的设计与实现》,电子科技大学 2012 年 5 月。

Mao, Chenjun (2012) *Jewellery industry management system design and implementation*. University of Electronic Science and Technology of China.

毛之颖:《机械制图》,高等教育出版社 1991 年 10 月。

Mao, Zhiying (1991) *Mechanical Drawing*. Higher Education Press.

Matejkova, Alena. *The development micro-wave kiln casting of glass*. Teresa de Almeida. Aveiro University, Portugal. (PARALLELS AND CONNECTIONS An international ceramics and glass research conference 2011)

Meng-hu (2004) *Wabi and Sabi: the Aesthetics of Solitude*. [Internet]. Available from: <www.hermitary.com/solitude/wabisabi.html> [6 August 2013].

Miller, Judith (2007) *Costume Jewellery*. Dorling Kindersley Limited.

Mitchell, W.J.T. (1984) *The Politics of Genre: Space and Time in Lessing's Laocoon*.

[Internet]. Available from:

<<http://www.jstor.org/discover/10.2307/2928540?uid=3738032&uid=2&uid=4&sid=21104632773637>>. [7 May 2013].

Mosser, Monique; Teyssot, Georges (1991) *The history of garden design: the Western tradition from the Renaissance to the present day*. London: Thames and Hudson.

Munroe, Alexandra (2009) *The Third Mind: American Artists Contemplate Asia, 1860–1969*, New York: Guggenheim Museum; London: Thames & Hudson.

Murphy, Kathie (2009) *Design & Make Non-precious Jewellery: Methods and Techniques*. A & C Black Publishers.

National Glass Centre (2005) *Wearing Glass: Contemporary Jewellery and Body Adornment*. 27fishes.

Ng, Man Yee Sandy (2005) *Lin Fengmian (1900–1991): Figure Painting and Hybrid Modernity in Twentieth Century Chinese art*, School of Oriental and African Studies, University of London. [British PhD Thesis].

Parsons, Tim (2009) *Thinking, objects: contemporary approaches to product design*. Lausanne : AVA Academia.

彭亮：《中国当代设计教育反思—制造大国的设计教育现状及存在问题》，载于《装饰》05期，清华大学 2007 年。

Peng, Liang (2007) 'Reflection on China Contemporary Design Education', *Art & Design*, No.5. Tsinghua University.

Peng, Yi (2014) *Cross Cultural Lampworking for Glass Art: the Integration, Development and demonstration of Chinese and Western Lampworking Approaches, Materials and Techniques for Creative Use*. University of Sunderland. [British PhD Thesis].

People's Daily Online (2006) *Plant rice on scenic terraces*. [Internet]. Available from: <http://english.people.com.cn/200606/06/eng20060606_271397.html>. [7 July 2011].

天津视窗：《注重自然与内在修养“天人合一”是书法最高境界—专访天津女书法家郑少英》，载于人民网 2010 年 9 月 23 日。

People Tianjing Windows (2010) *Focusing on nature and inner cultivation 'harmony between man and nature' is the highest realm of calligraphy—interview with Tianjin female calligrapher Shaoying Zheng*. [Internet]. Available from:

<<http://www.022net.com/channel/zsy/>>. [19 October 2010].

蒲创国：《“天人合一”正义》，上海师范大学 2012 年 5 月 26 日。

Pu, Chuangguo (2012) *The Justice of 'Harmony between Man and Nature'*. Shanghai Normal University. [Chinese PhD Thesis].

朴春香：《中、日、韩珠宝首饰文化的对比研究》，中国地质大学 2002 年 6 月。

Pu, Chunxiang (2002) *Comparison of the Jewelry Culture among China, Japan and Korea*. China University of Geosciences.

钱穆：《中国文化对人类未来可有的贡献》，载于《中国文化》第四期，三联书店 1992 年。

Qian, Mu (1992) *Chinese Culture Contributes to the Future of Humanity. No.4 Chinese Culture*, p.94, San Lian bookstore.

Qiu, Mingzheng and Zhu, Liyuan (2004) *The Aesthetics Small Dictionary*, Shanghai Dictionary Publishing House.

Reinaud, Joseph Toussaint (1845). *Relation des voyages faits par les Arabes et les Persans dans l'Inde et a la Chine dans le IX Siecle... I*. Paris: Imprimerie royale.

Sarmiento, Jeffrey R. (2012) *Graphic Glass: Development of creative approaches to expressions of ethnicity*. The University of Sunderland. [British PhD Thesis].

Scharfstein, Ben Ami; Biderman, S; Daor, D; Alon, I (1978) *Philosophy East, Philosophy West: A Critical Comparison of Indian, Chinese, Islamic and European Philosophy*. Blackwell.

单正齐、甘会兵：《听冯友兰讲中国哲学》，陕西师范大学出版社 2008 年 10 月。

Shan, Zhengqi and Gan, Huibing (2008) *Listen to Youlan Feng Speaking the Chinese philosophy*. Shanxi Normal University.

Shaw, Elizabeth (2006) *Contemporary Wearables. Craft Art International No.67*. Sydney: Craft Arts Magazine.

沈涛：《古典园林借景手法的意境创造》，载于《安徽农业科学》第 25 期，安徽农业科学院出版 2011 年。

Shen, Tao (2011) *Artistic Conception Creation of Classical Gardens by the Way of Scenery Borrowing. Journal of Anhui Agricultural Sciences No.25*. Anhui Academy of Agricultural Sciences.

Simmons, Pamela (2014) *What is the Difference between Costume & Fine Jewelry?* [Internet]. Available from:

<<http://everydaylife.globalpost.com/difference-between-costume-fine-jewelry-20775.html>>. [24 April 2014].

Starshine: 《JMA 国际珠宝设计比赛 2014 结果公布》，载于珠宝之家网 2014 年 12 月 3 日。
Starshine (2014) *The Competition of International Jewellery Design in 2014*. [Internet].
Available from: <<http://www.525zb.com/Channel/201412/03/40866.html>> [18 March 2014].

宋化旻: 《国内首饰设计高等教育现状调查及分析》，北京服装学院 2005 年 3 月 5 日。
Song, Huamin (2005) *The Investigation and Analysis of Chinese Jewellery Design Education Status*. The Beijing Institute of Fashion Technology.

宋磊: 《马年新春 重看徐悲鸿的马》，载于《长江日报》第 14 版，湖北省中共武汉市委 2014 年 2 月 18 日。
Song, Lei (2014) Horse New Year Re-see the Beihong Xu's Horse. *Changjiang River Daily*. Hubei Provincial CPC Wuhan Municipal.

Spencer, Jan (2005) Tafe NSW Art & Design Prize 2004. *Craft Art International No.64*. Sydney: Craft Arts Magazine.

孙继山: 《“中国制造”的底气何来?》，载于《国际商报》第 A01 版，国际商报社 2013 年 1 月 15 日。
Sun, Ji Shan (2013) 'Made in China' Emboldened? *International Business Daily*. China Academic Journal Electronic Publishing-House.

Swiss Gemological Laboratory. *Setting & Finishing Guide- Stone Setting Methods*. [Internet].
Available from:
<<http://www.swissgemlab.com/EducationPages/EducationDetailPage.aspx?pcid=341&AspxAutoDetectCookieSupport=1>>. [19 June 2014].

Tanenbaum, C (2006) *Fabulous Fakes: A Passion for Vintage Costume Jewelry*. Artisan Publishers.

Tani, Ayako (2013) *Multi-dimensional Line-drawing with Glass though a Development of Lampworking*. University of Sunderland. [British PhD Thesis].

腾艳娇: 《中国传统哲学中的“天人合一”思想》，载于《今日科苑》，黑龙江科技学院 2009 年 19 月 23 日。
Teng, Yanjiao (2009) *The Harmony between Man and Nature of Chinese Traditional Philosophy. Modern Science*. Heilongjiang University of Science and Technology.

Tenzer, M (2010) *Analytical and Cross-Cultural Studies in World Music*. New York: Oxford University Press inc.

Tylor, Edward (1871) *Primitive Culture*. New York: J.P. Putnam's Sons. Volume 1.

Untracht, Oppi, (1975) *Metal Techniques for Craftsmen A Basic Manual on the Methods of Forming and Decorating Metals*, Robert Hale Limited.

王弘：《内地设计师地位有过高？香港的一半，美国的三分之一》，载于《新材料装饰》期刊，陕西奥雷文化发展有限责任公司 2004 年 7 月 6 日。

Wang, Hong (2004) 'Half of the H.K and 1/3 of the United States', *New Decoration*, July. Shanxi Aurelio Cultural Development Co., Ltd.

王会方《“天人合一”——从风水理论到环境美学》《美与时代（上）》2010 年 11 月 15 日。河南省美学学会；郑州大学美学研究所。

Wang, Huifang (2010) "Harmony between man and nature"—from the Feng Shui theory to environmental aesthetics. *Beauty & Times*. Aesthetics Institute of Zhengzhou University; Aesthetics Institute of Henan Province.

王沁：《现代玻璃艺术形式意味的研究》，上海大学 2007 年 6 月。

Wang, Qin (2007) *The Research of Contemporary Glass Art Form Meanings*. Shanghai University.

王应麟：《三字经全文》宋代，载于第一范文网。

Wang, Yinglin (A.D.1223—1296) *Three Character Classic Full Text*. [Internet]. Available from: <http://www.diyifanwen.com/tool/sanzijing/> [12 October 2011].

Ward, Glenn (2003) *Discover Postmodernism: Flash*. London: Hodder Education.

卫艺林：《首饰“中国风”的演变及发展探究》，北京服装学院 2008 年 12 月 1 日。

Wei, Yilin (2008) Exploration about the Development of Chinese Jewellery. Beijing Institute of Fashion Technology.

吴根友：《祖宗崇拜与上帝崇拜》，载于《光明日报》，中央宣传部出版 2010 年 8 月 30 日。

Wu, Genyou (2010) 'Ancestor Worship and the Worship of God', *Guangming Daily*. Propaganda Department of the CPC Central Committee.

吴立群：《从<易经>之‘易’看‘天人合一’的和谐观》，载于《船山学刊》第 2 期（复总第 68 期），湖南省社会科学界联合会 2008 年。

Wu, Liqun (2008) Analyse the Harmony Concept of Harmony between Man and Nature from the Concept of 'Variation' in the "Book of Changes". *Chuanshan Journal* No.2 (rest.tot No.68) Social Sciences Federation of Hunan Province.

吴欧红：《玻璃饰品设计》，清华大学出版社 2014 年 3 月。

Wu, Ouhong (2014) *Glass Accessories Design*. Tsinghua University Press.

谢冬莉：《浅析中国艺术精神之意境—天人合一》，载于《安徽文学（下半月）》第 9 期，安徽省文联 2010 年。

Xie, Dongli (2010) 'The Analysis of the Chinese Artistic spirit of Yi Jing—the Harmony between Man and Nature', *An Hui Literature (the second half of month) No.9*. Anhui Federation of Literary and Art Circles.

谢燕、苏文：《中国珠宝市场发育现状及前景展望》，载于《中国市场》第 9 期（总第 568 期），中国物流采购联合会 2010 年。

Xie, Yan and Su, Wen (2010) 'The Status and Development Prospects of the Contemporary Chinese Jewellery Market', *Chinese Market*, No.9. China Federation of Logistics & Purchasing.

谢幼田：《从老子宇宙观谈中国哲学思维的模糊性》，载于《求索》1986 年 03 期，四川省社会科学院。

Xie, Youtian (1986) 'Talk about the Fuzziness of Chinese Philosophical Thinking from the Lao Zi Cosmology', *Seeker*, No.3. Sichuan Academy of Social Sciences.

Xue, Lv (2009) *The Investigation into the Development of Glass as an Expressive Medium in China through Direct Contact with Western Methods of Making Decoration and Forming*, University of Wolverhampton. [British PhD Thesis].

严健：《手绘景园》，百通集团，新疆科技卫生出版社(K)。2003 年 10 月。

Yan, Jian (2003) *Hand-painted Garden*. Baitong Group, Xinjiang Science and Technology Publishing House.

杨晖、胡艺丹：《试论<易经>的‘变易’观念》，载于《船山学刊》第 1 期（复总第 79 期）。湖南省社会科学界联合会 2011 年。

Yang, Hui and Hu, Yidan (2011) Analyse the Concept of 'Variation' in the "Book of Changes". *Chuanshan Journal* No.1 (rest.tot No.79) Social Sciences Federation of Hunan Province.

杨天佑：《解放思想必须克服祖宗崇拜》，载于《同舟共济》第 6 期，政协广东省委员会出版 2008 年。

Yang, Tianyou (2008) 'Emancipate the Mind Must Overcome Ancestor Worship', *Tongzhou Gongji*, No.6. CPPCC Guangdong Provincial Committee.

易中天：《破门而入—美学的问题与历史》，上海：复旦大学出版社 2006。

Yi, Zhongtian (2006) *Break Down the Door—Aesthetic Problem and History*, Shanghai: Fudan Univeisity Press.

于静：《后现代主义设计影响下的首饰艺术研究》，南京艺术学院 2010 年。

Yu, Jing (2010) *Jewellery art research under the influence of post-modernist design*. Nanjing University of the Arts.

张鹏飞：《论中国绘画‘天人同构’生命理念的审美悟化》，载于《濮阳职业技术学院学报》第23卷第2期，濮阳职业技术学院2010年4月。

Zhang, Pengfei (2010) The Aesthetic Enlightenment of the 'Same Structure of Man and Nature' in Chinese Painting. *Journal of Puyang Vocational and Technical College, Vol.23, No.2*. Puyang Vocational and Technical College.

张维柱：《根据市场谈中国珠宝首饰品设计教育现状》，载于《美术教育研究》，时代出版传媒股份有限公司、安徽省科学教育研究会2013年5月25日。

Zhang, Weizhu (2013) 'According to Market Talk about Chinese Jewellery Design Education Status', *Art Education*, May. Time Publishing & Media Co., Ltd and Anhui Science Education Research Association.

周武，理查德怀特里：《透器透气-2014 杭州国际当代玻璃艺术展》，中国美术学院出版社2014年1月。

Zhou, Wu and Whiteley, Richard (2014) Breathing through Transparence International Contemporary Glass Art Exhibition. China Academy of Art Press.

邹宁馨：《首饰“中国风”的演变及发展探究》，北京服装学院2008年12月8日。

Zou, Ningxin (2008) *Exploration about the Development of Chinese Jewellery*. Beijing Institute of Fashion Technology.

Appendix 1: Interviews with Philosophical Expert and Chinese Ink Painter, etc.

Category	Content
Who	Jinsong Zhang 张劲松
Profile	Associate Dean of Guangxi Normal University for Nationalities in Chongzuo in China. He got a Doctorate and Post doctorate degree studying Chinese Philosophy in Wuhan University.
When	08/2011
Where	Guilin, China.中国桂林
Findings	<p>1. The Chinese philosophy of 'harmony between man and nature' is the most important area of philosophical categories and concepts. It is the lead principle of Chinese philosophy and has been used in all areas of Chinese society.</p> <p>2. Chinese philosophy of the 'harmony between man and nature' reflected in the philosophy of understanding of the laws of the universe and to this understanding as our supreme being, to be in awe of nature. Chinese philosophy of the 'harmony between man and nature' advocated the aesthetic ideas that the basic categories of social adjustment (social development category and living standard), guides the existence of mans lifestyle.</p> <p>3. Ancient Chinese philosophy of the 'harmony between man and nature' is slightly different with the modern Chinese philosophy of 'harmony between man and nature', but they both have the same theme.</p> <p>4. To understand Chinese philosophy of the 'harmony between man and nature': from the ontological point of view, nature is the highest law, people make nature externalization to produce a nature law; from a cognition point of view, nature itself is a kind of law, principle and discipline, through their own law demonstrates their existence; from value point of view, value is the value of social existence, from the truth, goodness and beauty of perspective, emphasis goodness between the ordinary people, goodness is the core of the society but also the core of China to promote the ideal society; from the inner heart angle, people's own fear of nature and the people with their own brain of the subjective of</p>

	<p>objective existence have mutual responsibility.</p> <p>5. Characteristics of Chinese philosophy of the 'harmony between man and nature': nature and man are constantly evolving with each other; the nature is domination and the first position; continues to deal with the relationship between man and nature in order to achieve the highest ethical personal inner continuous existence.</p> <p>6. To achieve Chinese philosophy of the 'harmony between man and nature' is to continuously improve the personal cultivation. When personal cultivation increases, the ability to grasp Chinese philosophy of the 'harmony between man and nature' also increases.</p> <p>7. The use of Chinese philosophy of the 'harmony between man and nature' philosophy in design should respect the laws of nature, to enhance the artist's personal inner experience, continually reflected the ideas of using 'harmony between man and nature' in their works, advocating harmony between man and nature. It also should grasp the role of natural art beauty.</p>
Who	Zhengdong Li 李正东
Profile	Wood craftsman.
When	08/2011
Where	Wood Carving workshop in Guilin, China. 中国桂林
Findings	Contemporary wood craftsman carves the Wooden tray stand for stone and jade.
Who	Guang Yang (Taiyang Yang) 阳光 (阳太阳)
Profile	<p>Guang Yang who is a famous Chinese artist, most notable for his paintings. He is Dean of the Traditional Chinese Painting and Calligraphy Academy, Visiting professor at Bei Jing Foreign Studies University, Associate Dean of Guilin Art Gallery, Vice Chairman of Guilin Artist Association, Standing Director of Guangxi Fine Arts Association, Standing Member of CPPCC Guilin Municipal Committee, A member of Chinese Artists Association, A National First Class Painter.</p> <p>Guang Yang's father Taiyang Yang is one of a most famous Chinese artist who created 'Li Jiang School'. He was once honoured as 'People's artist' after 'Baishi Qi'. There are only two artist awards 'People's artist' after the founding of new China. "He is Dean of Guangxi College of Art, Painting and Calligraphy of Guangxi, Guilin Chinese Painting Academy, Councilman of Chinese Artist Association, Honorary President of Guanxi Art Association, Vice Chairman of CPPCC Guangxi Municipal Committee.</p>

	<p>He studied in Japan in 1935. His oil paintings appeared in the "Japan Pediatric Art Exhibition" with the other master paintings of the world, such as Matisse, Rodin, and Picasso and so on. He has been known as "China's Boast". In 1937 he joined National Writers Association, found Chu Yang Fine Art Institute. He also was a Dean over there. Meanwhile he was a professor in Guilin Art College and Guangzhou Art College." (Wu 2005, p.1) "In 1957, he and Baoshi Fu led Chinese Artists Delegation to exchange visit with Eastern Europe, Romania, Czechoslovakia and Soviet Union and so on. He was invited to hold a personal exhibition by Japan, United States, and Canada and so on. He was also invited to visit Taiwan for 100 days, where he did a touring exhibition seven times." (Ibid) I wanted to interview him as well. Unfortunately he passed away at 100 years old in the last year. However I also got some information about him from his son.</p>
When	09/2011
Where	Beijing , China.中国北京
Findings	<ol style="list-style-type: none"> 1. Chinese philosophy of the 'harmony between man and nature' is the most basic concept of Chinese painting and the spirit of Chinese traditional culture. This philosophy is reflected in Guang Yang and his father Taiyang Yang's paintings. 2. Chinese philosophy of the 'harmony between man and nature' was used in painting mostly as harmony state, mainly in 'moderate' thinking and not so intense. 3. The painting principle of Chinese philosophy of the 'harmony between man and nature' embodied in the form of basic painting techniques of composition and some painting on the use to express the Chinese people's state of mind. It emphasizes the unity of opposites, such as the 'Yin and Yang', which is different from Western contemporary art and modern art is an intense, conflicted state. It is not based on physical concepts, but is spiritual-based.
Who	Guilin Jingsheng Glass Co., Ltd.
When	09/2011
Where	Guilin, China.中国桂林
Findings	The mass production of contemporary glass beer bottle in China.
Who	Pingmeng Feng 冯平猛
Profile	Head of Yunnan Huaping Tourism Products Trade Company. Jewellery Artist makes and sells jewellery for 30 years.
When	2/3/2013
Where	Lijiang, China.中国丽江

Findings	Contemporary Chinese jewellery designer's work and a view of contemporary Chinese jewellery market.
Who	Bin Ruan 阮斌
Profile	Head of Hanxing Investments Limited, art appraiser and art broker running jewellery business for 30 years. He graduated from Jade Identification Training of Forbidden City and Tsinghua University art appreciation and management of advanced studies.
When	21/2/2013
Where	Dalian, China. 中国大连
Findings	A view of contemporary Chinese jewellery market.
Who	Ling Ruan 阮玲
Profile	A judge in Guilin Intermediate People's Court more than 30 years.
When	1/2/2013 to 30/2/2013
Where	Guilin, China. 中国桂林
Findings	Relative information of Chinese Copyright Law.
Who	Jun Tang 唐俊
Profile	A Lecturer in law of Guilin University of Electronic Technology.
When	1/2/2013 to 30/2/2013
Where	Guilin, China. 中国桂林
Findings	Relative information of Chinese Copyright Law. A view of copyright Found all available online thesis of the Chinese art and design PhD thesis from the Chinese thesis database.

Appendix 2: Experiments with Glass Pieces in Microwave Kiln



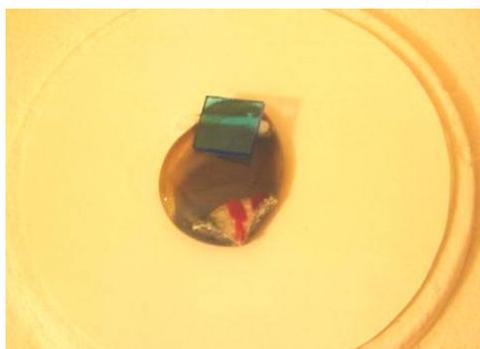
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter =D	Temperature	Time Minute	Result	Other Materials
1	Pendant	Khaki Transparent Glass	L:2 cm W:2 cm H:0.3cm	High 800w	8 M	Round Shape.	I have not used the Fibre Paper because the bottom is rough. I also tried to put the Thinfire Kiln Paper inside.
		Blue Frit 1408-01 Yellow + White Frit 220-02 Peak Green Powder 141-08					
		Peak Green Stringers	D:0.1cm				
		Transparent Glass (scalene triangle)	H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
2	Pendant	Khaki Opaque Glass	L:4 cm W:2 cm H:0.3cm	High 800w	6 M	The edge is smooth. The hole is not closed. If I want to keep the hole suitable, it might take 5 minutes.	Reheat
		Vermilion + white Confetti Glass (scalene square) Blue Frit 1408-01 Yellow + white Powder 220-02					
		Khaki half Transparent Glass	L:3.5cm W:2 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
3	Pendant	Khaki Opaque Glass	L:3.5cm W:2 cm H:0.3cm	High 800w	5 M	The edge is smooth, the bottom of the inside into the slope (domestic shape).	
		Dark Green Dichroic Confetti Glass (scalene triangle) Blue Frit 1408-01 Peak Green Powder 141-08					
		Transparent Glass (scalene triangle)	H:0.3cm				



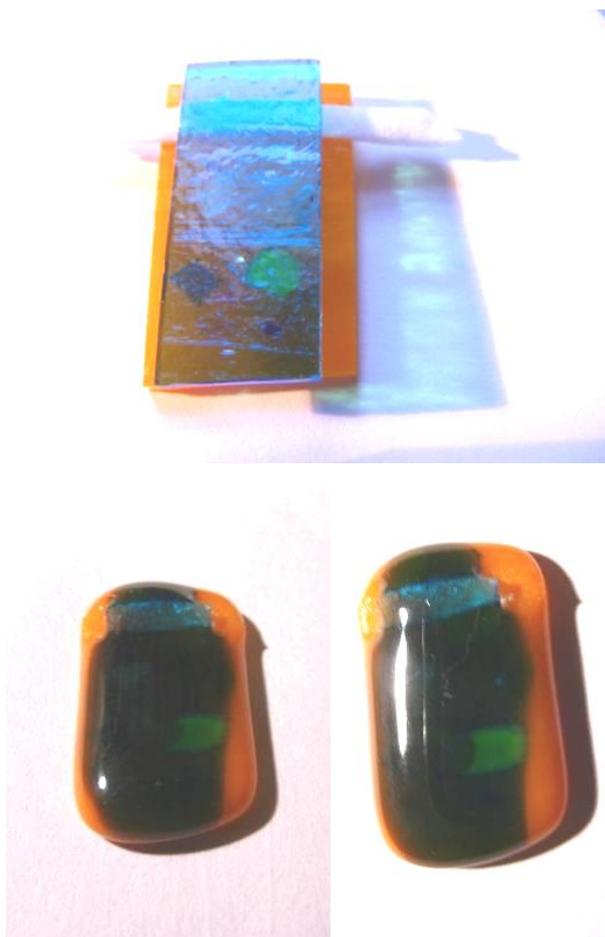
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
4	Pendant	Grey Opaque Glass	L:3.5cm W:1.5 cm H:0.3cm	High 800w	5 M	Pendant has broken since put the paper inside and the top glass is not long enough.	Drawing on the Thinfire Kiln Paper and put it inside.
		Khaki half Transpare nt Glass	L:3.5cm W:2 cm H:0.3cm				
		Blue transpare nt glass	L:2.5cm W:2 cm H:0.3cm	Second time heat it tends to fix broken parts and cover the hole.	It can cover the hole, but not appropriately because it has been heated a little too long.		



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
5	Pendant	Transparent Glass	L:3 cm W:2 cm H:0.3cm	High 800w	4 M	The edge of the square shapes is smooth. Chinese paper with ink painting shrinks together inside of the glass like a black bubble. The hole closed well.	Put Chinese paper with ink painting on it between two pieces glass.
		Vermilion Confetti Glass (scalene triangle)					
		Transparent Glass	L:3 cm W:2 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
6	Pendant	Grey Opaque Glass	L:3.5cm W:1.5 cm H:0.3cm	High 800w	5 M	The edge is smooth. The square shape became oval. The hole is unclosed. If I want to keep the hole closed, I should adjust the temperature.	
		Vermilion + White Confetti Glass (scalene shape) Millefiori					
		Blue transparent glass	L:3.5cm W:1.5 cm H:0.3cm	Second time heat it tends to fix broken part and cover the hole.	It can cover the hole. Because it has been heated a little too long. The best way is to prevent heat second time.		



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
7	Pendant	Orange Opaque Glass	L:1.7 cm W:1.5 cm H:0.3cm	High 800w M-High 620w	3 M 5 M	The edge is smooth. The hole is not closed well. If I want to keep the hole closed, I should adjust the temperature.	
		Blue + Lemon Yellow + White Confetti Glass (scalene shape) + Millefiori					
		Blue Transparent Glass	L:1.8 cm W:1.2 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
8	Pendant	Orange Opaque Glass	L:1.7 cm W:1.5 cm H:0.3cm	High 800w M-High 620w	4 M 2.5 M	Square shape became oval. The edge is smooth. The hole is not closed well. If I want to keep the hole closed, I should adjust the temperature.	
		Blue + Lemon Yellow + White + Green + Red Confetti Glass (scalene shape) + Millefiori					
		Transparent Glass	L:1.7 cm W:1.5 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
9	Pendant	Blue Opaque Glass	L:3.5cm W:2.5 cm H:0.3cm	High 800w M-High 620w	5 M 1 M	Square shape is not changing. The edge is smooth. The hole is unclosed. If I want to keep the hole closed, I still should adjust the temperature.	The circle silver did not change the shape and colour. It shows silver can be used inside of small fusing glass. Cerne Relief Outliner is not really clear.
		Lemon Yellow + White Frit 220-02 + Circle shape Silver + Cerne Relief Outliner	Silver D: 0.7cm				
		Transparent Glass	L:3.5 cm W:2.5 cm H:0.3 cm				



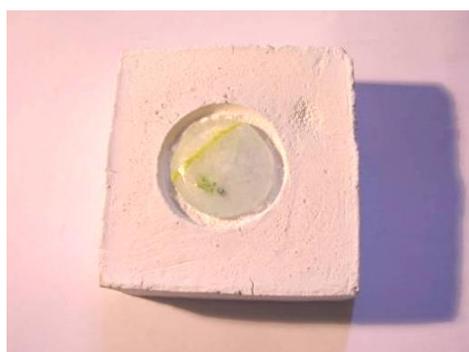
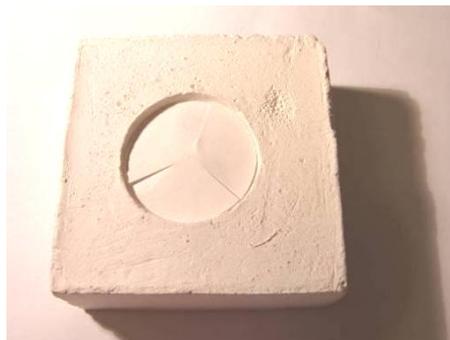
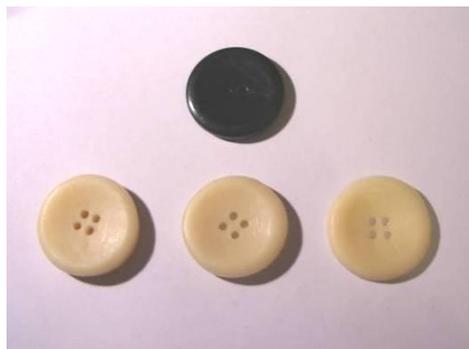
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
10	Pendant	White Opaque Glass	L:3.5cm W:2.5 cm H:0.3cm	High 800w M-High 620w M-Low 140w	5 M 1 M 1.5M	Square shape is not changing. The edge is smooth. The hole is not closed well. If I want to keep the hole closed, still should adjust the temperature.	The shape and colour of the silver circle has changed a little. It shows silver cannot touch Thinfire paper. Cerne Relief Outliner is not really clear.
		Lemon Yellow + White Frit 220-02 + Circle shape Silver + Cerne Relief Outliner	Silver D: 0.7cm				
		Transparent Glass	L:3.5 cm W:2.5 cm H:0.3 cm				



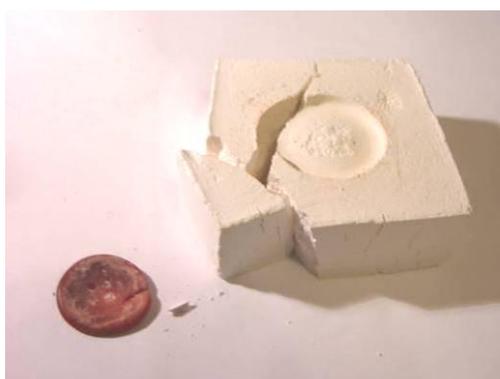
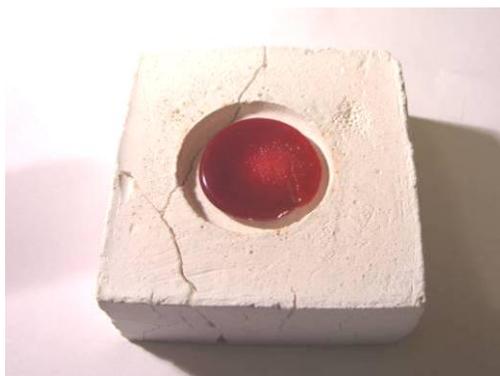
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
11	Pendant	Blue Opaque Glass	L:3.5cm W:2.5 cm H:0.3cm	High 800w M-High 620w	5 M 1 M	Square shape is not changing. The edge is smooth. The hole is closed.	The silver circle has changed a little, because part of the silver is out of the glass exposing it to oxygen. This show silver cannot be out of the glass. Cerne Relief Outliner is not really fluent.
		Lemon Yellow + White Frit 220-02 + Circle shape Silver + Cerne Relief Outliner	Silver D: 0.7cm				
		Transparent Glass	L:3.5 cm W:2.5 cm H:0.3 cm				



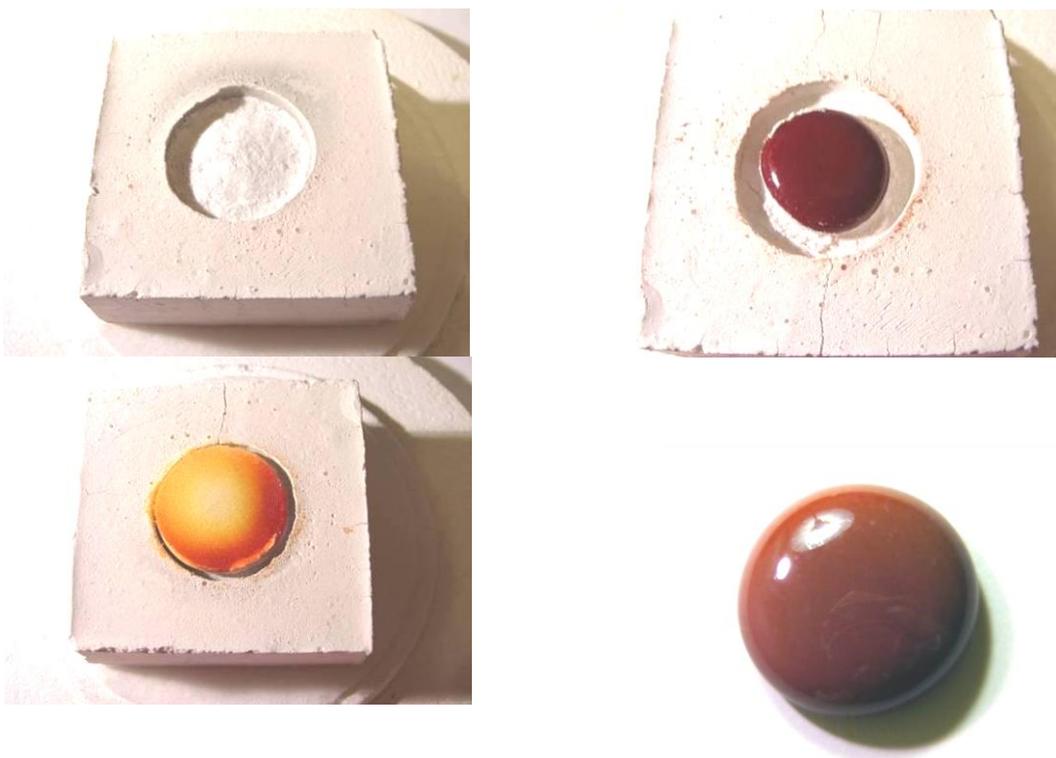
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
12	Pendant	White Opaque Glass	L:3.5cm W:2.5 cm H:0.3cm	High 800w M-High 620w M-Low 140w	5 M 1 M 1.5M	Square shape is not changing. The edge is smooth. The hole is not closed.	The shape and colour of the silver circle is changing. It shows silver cannot be out of glass area. Cerne Relief Outliner is not really clear.
		Lemon Yellow + White Frit 220-02 + Circle shape Silver + Cerne Relief Outliner	Silver D: 0.7cm				
		Transparent Glass	L:3.5 cm W:2.5 cm H:0.3 cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
13	Button	Clear Frit-001101-0002F	Medium	High 800w M-High 620w	13 M 1 M	Frit melt, but shrink to Diamete r: 2.3cm.	Lost wax to make a button mould. The edge of the glass is little rough since it have not touch the Thinfire Kiln paper.
		Blue Frit 1408-01 Dark Green Dichroic Confetti Glass (scalene triangle)	Button mould D: 3.4 cm				
		Peak Green Stringers	D: 0.1cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
14	Button	Garnet Red Trans Powder 1322-0008	Button mould D: 3.4 cm	High 800w M-High 620w	6 M 5 M	Frit is not totally melted, but shrinks to Diameter: 2.7cm	The surface is really rough because I did not use Thinfire Kiln paper.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
15	Button	Garnet Red Trans Powder 1322-0008	Button mould D: 3.4 cm	High 800w	19 M	When heated at 8 Minutes, frit is not totally melted, but exact size of the mould. Frit sinter at 9 Minutes, but it is not totally melted. When it cools down about 1 hour later, reheat it about 10 Minutes to melt. It shrink to Diameter: 2.1cm	Heat the Thinfire Kiln paper until it becomes Thinkfire Kiln paper powder first. Then put the powder in the Button mould. Make sure powder cover the Button shape surface. The surface of Button is smooth after heating.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
16	Button	Garnet Red Trans Powder 1322-0008	D: 3.8 cm	High 800w M-High 620w	4 M 1 M	The glass powder totally melted. It shrank to Diameter: 2.1cm. There is a concave on the surface since the dry glass powder surface is not enough flat.	Try to use dry glass powder to cover the concave button shape.



17.



18.

Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
17	Form Repair Button 15,16	Garnet Red Trans Powder 1322-0008		High 800w	5 M	The glass powder totally melted. It shrank to Diameter: 2 cm.	
18	Form Repair Button 13,14			High 800w	6 M	White one shrank to Diameter: 2.3 cm; Red one shrank to Diameter: 1.9 cm.	



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
19	Button	Garnet Red Trans Powder 1322-0008	D: 3.8 cm	High 800w	6 M	The glass powder totally melted. It shrank to Diameter: 2 cm. It is too small.	There is a tiny mark on the edge of glass, since the Thinfire Kiln paper was heated to stick the edge of the glass.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
20	Button	Garnet Red Trans Powder 1322-0008	D: 3.8 cm	High 800w	4 M	The glass powder totally melted. It shrank to Diameter: 2.4 cm. The shape is not round enough.	



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
21	Button	Garnet Red Trans Powder 1322-0008	D: 4.8 cm	High 800w	4 M	The glass powder totally melted. It shrank to Diameter: 3 cm. There is no concave and holes on the top.	



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
22	Button	Garnet Red Trans Powder 1322-0008	D: 4.8 cm	High 800w	4 M	The glass powder totally melted. It shrank to Diameter: 3 cm. The shape is hard to control by using dry powder directly.	



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
23	Button	Garnet Red Trans Powder 1322-0008	D:5.2 cm	High 800w	5 M	The glass powder totally melted. It shrank to Diameter: 3.5~3.7 cm. There is a concave on the top of glass. But the shape is not enough rounds.	



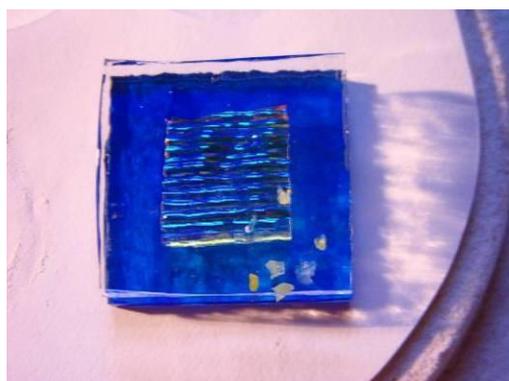
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
24	Button	Garnet Red Trans Powder 1322-0008	D:5.2 cm	High 800w	5 M	The glass powder totally melted. It shrank to Diameter: 3.5~3.7 cm. There is a concave on the top of glass. The shape better, but it still needs to develop.	Try to use water to mix glass powder. The Thinfire Kiln paper stuck on the edge of the glass during heating. If I want to solve this problem I might not dry it first. I should not drop the glass plate in the microwave. Because the glass would unevenly heat.



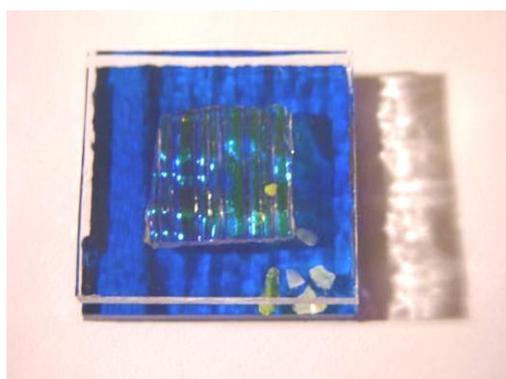
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
25	Pendant	Orange Transparent Glass	L:6 cm W:2 cm H:0.3cm	High 800w M-High 620w	5 M 1 M	The edge is smooth. The hole is closed well.	Use 3mm Fibre Rop for bails in Kiln Fusing Glass.
		Yellow + White Frit 220-02 Lemon Yellow + Red + Clear Stringers Millefiori					
		Clear Transparent Glass	L:3.3cm W:2.2 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
26	Button	Garnet Red Trans Powder 1322-0008	D:5.2 cm	High 800w M-High 620w	5 M 1 M	The glass powder totally melted. It shrank to Diameter: 3.3~3.7 cm. There is concave on the top of glass. The shape is better, but it still needs to develop.	Wait Thinfire Kiln paper to dry for one night after using water to mix glass powder. The Thinfire Kiln paper also sticks on the edge of the glass during heating. But more regularly.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
27	Pendant	Blue Transparent Glass	L:3.2 cm W:3.2 cm H:0.3cm	High 800w	6 M	The edge is smooth and consistent.	
		Yellow + White Frit 220-02 Dichroic Glass Kiln Fusing					
		Clear Transparent Glass	L:3.2 cm W:3.2 cm H:0.3cm				



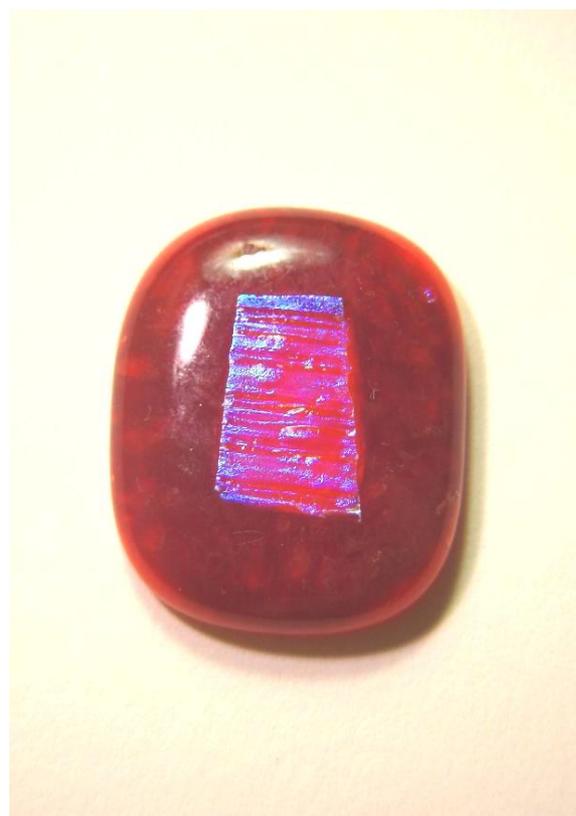
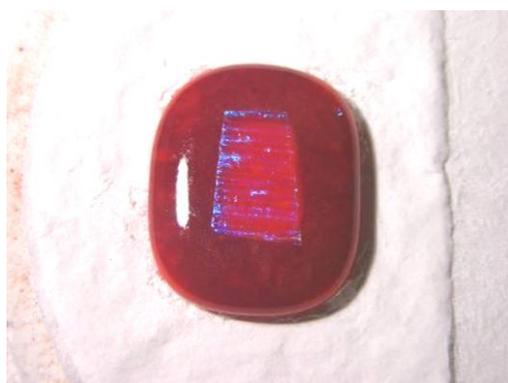
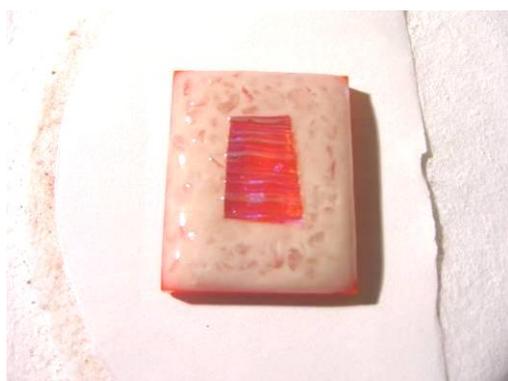
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
28	Pendant	Blue Transparent Glass	L:3.2 cm W:3.2 cm H:0.3cm	High 800w	6 M	The edge is smooth and consistent. It is similar as last one.	
		Yellow + White Frit 220-02 Dichroic Glass Kiln Fusing					
		Clear Transparent Glass	L:3.2 cm W:3.2 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter =D	Temperature	Time Minute	Result	Other Materials
29	Button	Garnet Red Trans Powder 1322-0008 Medium Clear-0011 01-0002F	D:9.5cm	High 800w	8 M	The glass powder totally melted. It shrank to Diameter: 6.9~7.5 cm. There is a little concave on the top of glass. The shape is irregularly.	Wait for Thinfire Kiln paper to dry for one night after using water to mix glass powder and frit. The Thinfire Kiln paper also sticks on the edge of the glass during heating. If I want to solve these problems I might put glass powder on the regular glass sheets. In this way, I might also be able to prevent the paper sticking on the glass.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
30	Pendant	Orange Opaque Glass	L:3 cm W:2.4 cm H:0.3cm	High 800w	6 M	The edge is smooth. The shape is rectangular.	To mix water and powder and put them on the glass sheet. But do not put too much water and drop it on the paper by doing it this way I can solve the shape and paper problem.
		Garnet Red Trans Powder 1322-0008					
		Blue Frit 1408-01					



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
31	Pendant	Orange Opaque Glass	L:3 cm W:2.4 cm H:0.3cm	High 800w	6 M	The edge is smooth. The shape is rectangular, but the corner is more rounded than last one.	Tested putting glass in the middle of the mixing glass powder and water. The mixing glass material is hard to make higher than the middle pieces.
		Dichroic glass					
		Garnet Red Trans Powder 1322-0008					



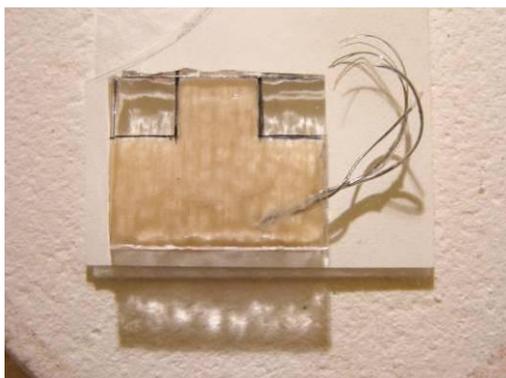
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
32	Button	Broken Clear Circle Transparent Glass	D: 6 cm	High 800w	8 M	The edge is smooth.	Tested mixing the glass powder and water on the edge of the glass sheet circle. By doing it this way I could make a glossy concave shape on the top of the glass successfully. I can make two holes in the middle of this piece of glass circle by using Glass Centre machine. Since the machine is too big. I might try to use Dremel to solve this problem.
		Garnet Red Trans Powder 1322-0008					



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
33	Button x 2	Clear Circle Transparent Glass	D: 1.5 cm x2	High 800w	5 M	The edge is smooth. There is no concave shape. Since small pieces of glass heat too long.	
		Red Transparent Powder 1122-0008 Powder Frit Reactive Ice Clear (Bullseye 90COE 001009-0008)					



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
34	Egg Pendant	Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm	High 800w	6 M	The edge is smooth. The wire is too thin. It is dirty after heating. By tying three wires together it might working.	Put Garnet Red Trans Powder as '凹' shape between two pieces glass.
		Garnet Red Trans Powder 1322-0008					
		Silver Tiger Tail Beading Wire	D:0.045 cm				
		Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm				



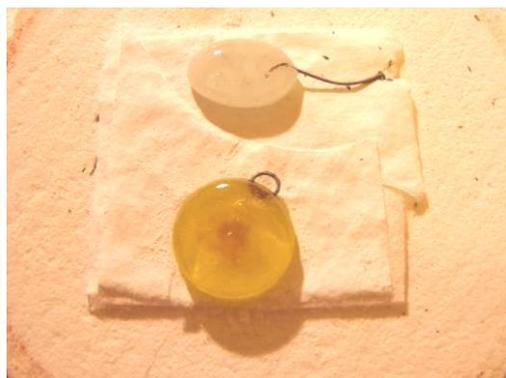
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
35	☐ Sperm Pendant	Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm	High 800w	6 M	The edge is smooth. The wire also is too thin. It is also dirty after heating. Do not tighten the wires together they will break.	Put Garnet Red Trans Powder as '☐' shape between two pieces glass.
		Garnet Red Trans Powder 1322-0008					
		Silver Tiger Tail Beading Wire	D:0.045 cm				
		Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm				



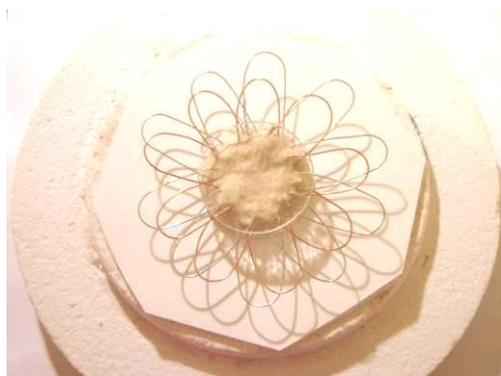
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
36	Egg Pendant	Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm	High 800w	6 M	The edge is smooth. The copper wire also is thin. But it is better than last wire. It is also dirty after heating.	Put Garnet Red Trans Powder as '凹' shape between two pieces glass.
		Garnet Red Trans Powder 1322-0008					
		Copper Wire	D:0.05 cm				
		Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
37	☐ Sperm Pendant	Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm	High 800w	6 M	The edge is smooth. The copper wire is thin. Put the copper wire separate it would not burn together. It also dirty after heating.	Put Garnet Red Trans Powder as '☐' shape between two pieces glass.
		Garnet Red Trans Powder 1322-0008					
		Copper Wire	D:0.05 cm				
		Clear Transparent Glass	L:3 cm W:2.5 cm H:0.3cm				



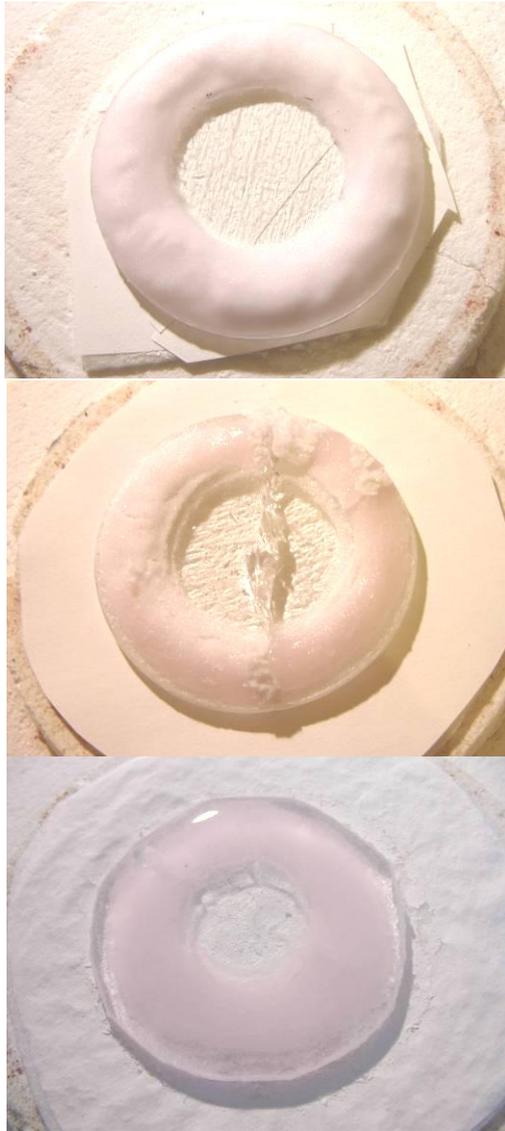
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
38	Egg and Sperm Pendant	White Opaque Olive Glass and Clear Circle Transparent Glass	Olive D: 2 cm, 1.3 cm Circle D: 2 cm H:0.3cm	High 800w	5 M	The edges are smooth. If the copper have same sizes with silver wire, the copper wire is stronger than silver ring. They are also dirty after heating.	Put silver ring and copper wire between two pieces glass of each group.
		COE90 Powder Frit Lt Aqua Blue Transparent 1408-0008F; 90COE Powder Frit Neo-Lavender Shift 001442-0008; 90COE Powder Yellow 001120-0008					
		Copper Wire	D:0.05 cm				
		Silver Wire	D:0.05 cm				
		Clear Olive Glass and Clear Circle Transparent Glass	Olive D: 2 cm, 1.3 cm Circle D: 2 cm H:0.3cm				



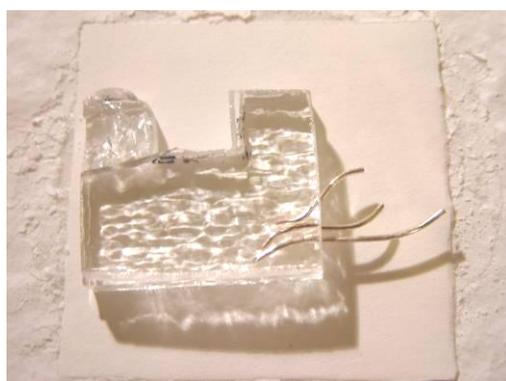
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
39	Egg and Sperm Pendant	Clear Circle Transparent Glass	D:3.5 cm H:0.3cm	High 800w	5 M	The glass is broken. Wire jump everywhere. This is not successful testing.	
		Garnet Red Trans Powder 1322-0008					
		Copper Wire	D:0.05 cm				
		Silver Wire	D:0.05 cm				
		Clear Circle Transparent Glass	D:3.5 cm H:0.3cm				



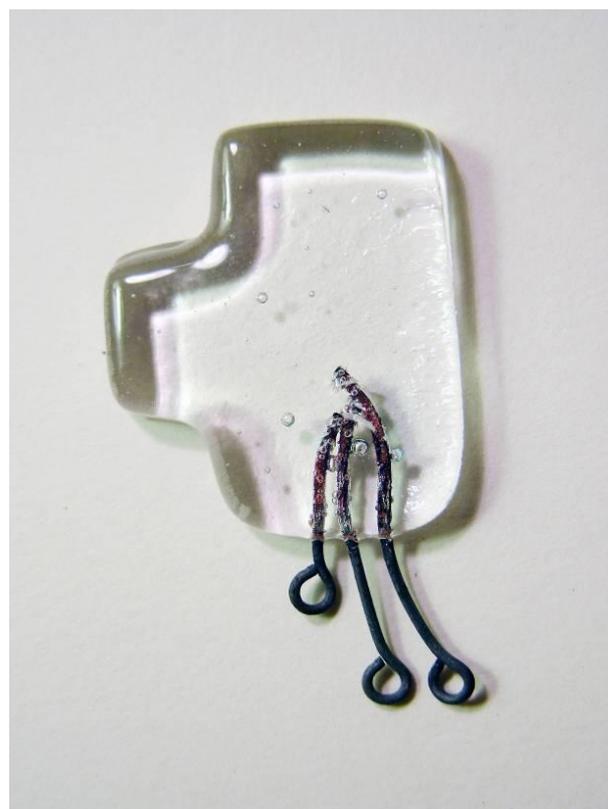
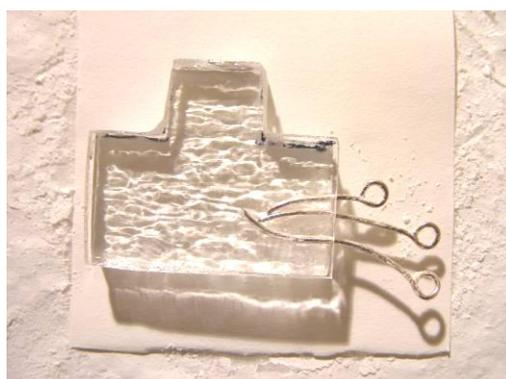
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
40	Button	Blue Circle Transparent Glass	D: 6 cm	High 800w	6 M	The edge is smooth. I cannot see the silver leaf after heating.	Silver Leaf.
		Aqua Blue Tint (wet powder) 90COE 001808-0008					



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
41	Button	Circle Transparent Glass	D: 6.4 cm	High 800w	6.4 M	Button broken.	
		Erbium Pink Tint 90 COE 001821-0008 (wet powder)		Reheat High 800w	7M	The edge is not smooth.	



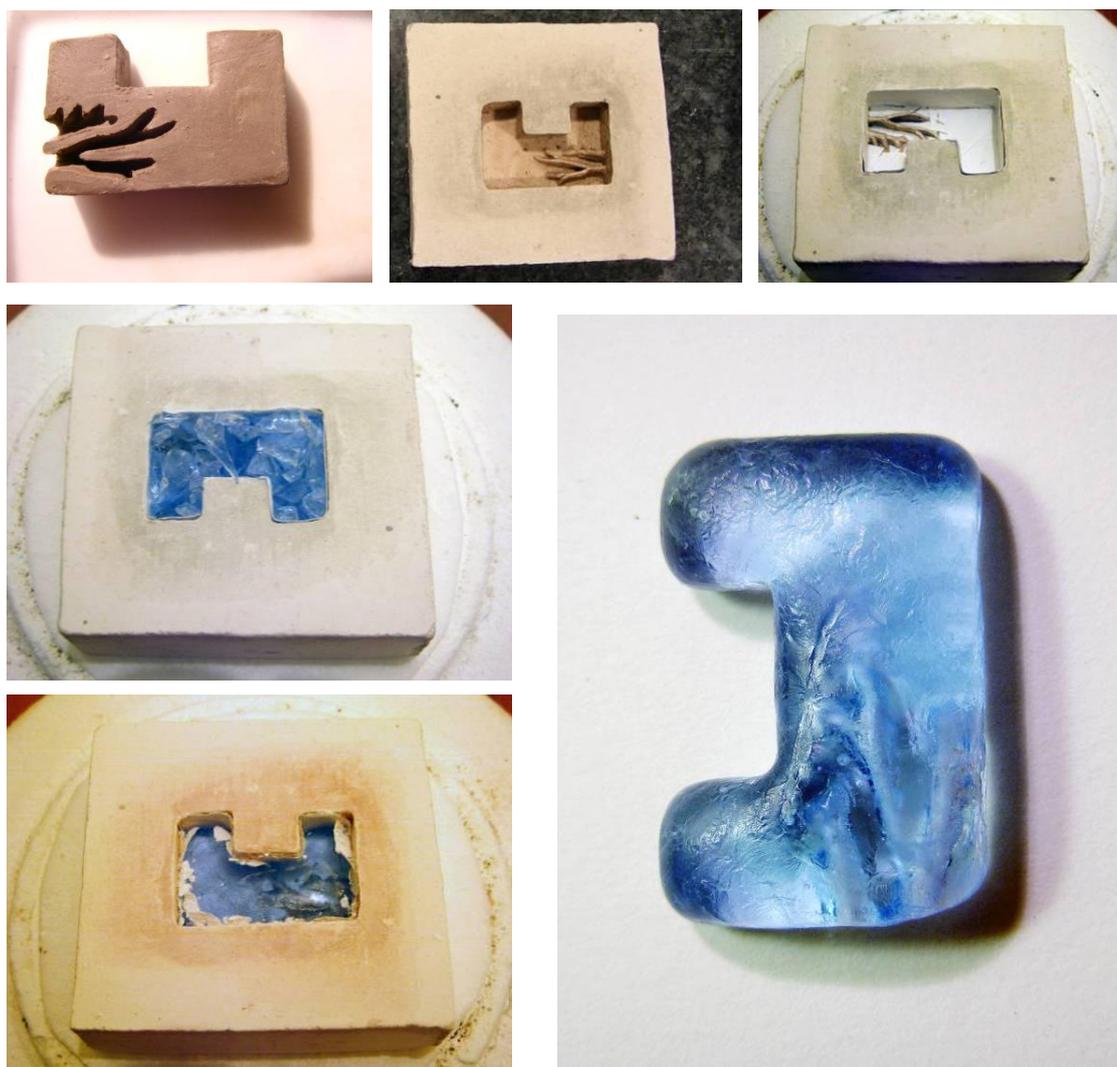
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
42	Egg Pendant	Clear Concavo Shape Transparent Glass	L:3 cm W:2.5 cm H:0.3cm (-1.2x0.9)	High 800w	6 M	The shape is totally changed, since heated too long. Silver became black.	
		Silver Plated Wire	D:0.08 cm				
		Clear Concavo Shape Transparent Glass	L:3 cm W:2.5 cm H:0.3cm (-1.2x0.9)				



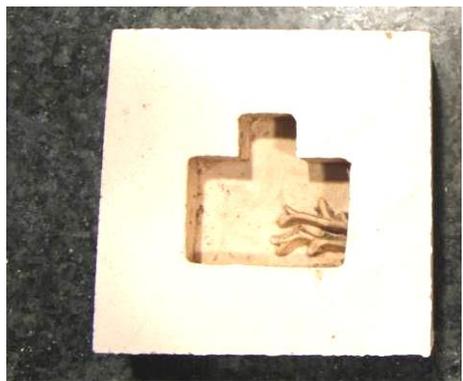
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
43	♂ sperm Pendant	Clear Concavo Shape Transparent Glass	L:3 cm W:2.5 cm H:0.3cm (-1.2x0.9x2)	High 800w	5 M	The shape is fine. Silver become black.	
		Silver Plated Wire	D: 0.08 cm				
		Clear Concavo Shape Transparent Glass	L:3 cm W:2.5 cm H:0.3cm (-1.2x0.9x2)				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
44	Button	Yellow Effect Transparent Banas Glass 805	D:5.5 cm	High 800w	20 M	The shape is fine.	Put the Fibre Paper powder inside of the mould.



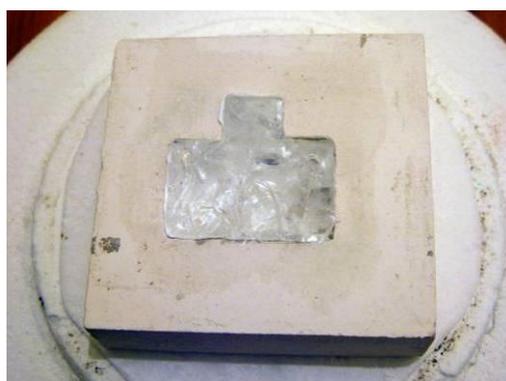
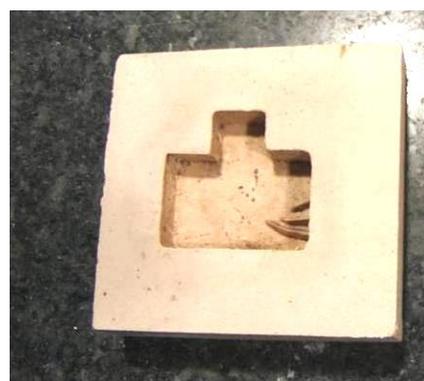
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
45	☐ Egg Pendant	Light Blue Effect Clear Concavo Shape Banas Glass 812	L:3.3 cm W:2.1 cm H:0.7cm (-1.3x0.8)	High 800w	15 M	The shape is fine.	Put the Fibre Paper inside of the mould.



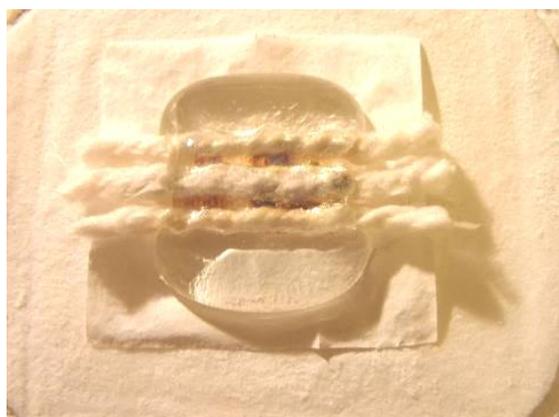
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
46	☐ Sperm Pendant	Light Blue Effect Clear Convex Shape Banas Glass 812	L:3.5cm W:3cm H:0.7cm (-1x0.8x2)	High 800w	15 M	The shape is little out of the shape on the corner.	Put the Fibre Paper stick inside of the mould.



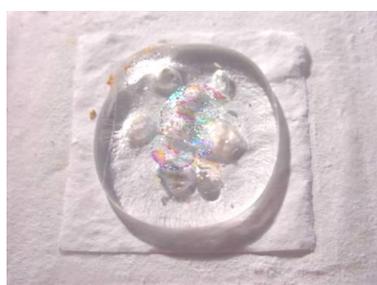
Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
47	凹 Egg Pendant	Clear Crystal Concavo Shape Banas Glass 100	L:3.3 cm W:2.1 cm H:0.7cm (-1.3x0.8)	High 800w	11 M	A little glass on the corner is not totally melted. Since heating is not enough.	Put the Fibre Paper inside of the mould.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
48	凸 Sperm Pendant	Clear Crystal Concavo Shape Banas Glass 100	L:3.5cm W:3cm H:0.7cm (-1x0.8x2)	High 800w	12 M	The shape is fine.	Put the Fibre Paper stick inside of the mould.



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
49	Pendant	Tekta Clear Glass 90COE 001100-0380F	L:3.4cm W:2.95 cm H:0.3cm	High 800w	6 M	Square shape is not changing. The edge is smooth. The hole is not closed fluently.	Use 3mm Fibre Rop for bails the middle of the pendant. Silver Leaf and Cerne Relief Outliner shrink together.
		Silver Leaf + Cerne Relief Outliner					
		Tekta Clear Glass 90COE 001100-0380F	L:3.4 cm W:2.95 cm H:0.3 cm				



Number	Category	Glass	Size (cm) Length=L Width=W Height=H Diameter=D	Temperature	Time Minute	Result	Other Materials
50	Pendant	Tekta Clear Glass 90COE 001100-0380F	L:3.4cm W:2.95 cm H:0.3cm	High 800w	7.5 M	The edge is smooth. The hole is unclosed. If I want to keep the hole closed, I should adjust the temperature.	Gold Leaf and Silver melt disappearing.
		Gold Leaf + Silver Leaf					
		Tekta Clear Glass 90COE 001100-0380F	L:3.4cm W:2.95 cm H:0.3cm	Reheat High 800w	8 M	The square shape became more around. The corner is not smooth.	Use 3mm Fibre Rop for bails concave behind.
		Clear Granite Ripple Teal Transimits:-Teal Reflects:-Lt Pink Reflected fires to:-Golden Pinkish Hue	L:1.3cm W:0.9 cm H:0.3cm				

Appendix 3: My Model Problems and Record for 3D

Printing

1. Necklace Egg and Sperm 13 B Middle Connection Screw in Silver Glossy.
Reason: Multiple parts in a single STL, Additional information: 2 parts
Reason: Thin walls. Additional information: 0.4 mm.
Screw 3 B in Silver Glossy. Reason: Multiple parts in a single STL, Additional information: 2 parts
Necklace Egg and Sperm 13 B Middle Connection Screw in Silver Glossy
Flower Screw 2 A and B in Silver Glossy. Reason: Multiple parts in a single STL. Additional information: 2 parts ('Egg and Sperm' necklace screw and 'Button' screw) 15/5/2013
2. Screw 3 in Silver Glossy. Reason: Multiple parts in a single STL. Additional information: 4 parts
Flower Screw in Silver Glossy. Reason: Multiple parts in a single STL. Additional information: 4 parts
Necklace Egg and Sperm 13 B Middle Connection in Silver Glossy. Reason: Multiple parts in a single STL. Additional information: 3 parts. ('Egg and Sperm' necklace screw and Button screw) 6/5/2013
3. Annual ring and fingerprint pendant 3 in Royal Blue Strong and Flexible Polished. Reason: Thin walls. Additional information: Minimum wall thickness must be 0.7 mm. (Annual ring and fingerprint pendant 3) 30/11/2012
4. Osmanthus earring 1 b in Hot Pink Strong and Flexible. Reason: Thin walls. Additional information: Minimum wire thickness of 0.8 mm
Osmanthus earring 1 a in Hot Pink Strong and Flexible. Reason: Thin walls. Additional information: Minimum wire thickness must be 0.9 mm
Osmanthus earring 2 a in Royal Blue Strong and Flexible. Reason: Thin walls. Additional information: Minimum wall thickness must be 0.7 mm
Osmanthus earring 2 b in Royal Blue Strong and Flexible. Reason: Thin walls. Additional information: Minimum wall thickness must be 0.7 mm (Osmanthus earring) 26/11/2012

5. Annual ring glass 4 i 1 x \$ 10.01 in Black Elasto Plastic: Bounding box sum is less then 110mm. Min Size 1.5x1.5x1.5mm AND x+y+z must add up to at least 110mm. (Annual ring glass part) 18/7/2012
6. Meshlab save as STL. This issue has to do with different 'dialects' of STL and we are working on a fix. ('Ao Tu' model 2) 22/5/2012
7. Impossible to hollow out. (Button pin stand 1) 10/5/2012
8. Small detail - minimal 0.3mm. ('Egg and sperm' necklace jump ring and middle chain in Silver Glossy). 25/4/2012
9. Minimal thickness needed is 1 a 1,2mm (Button hole 4)
To thick and long (pin 1) 20/3/2012
10. The Glass printing process is very sensitive to heat and cooling down. Most glass models deform a little. (Ao) 29/2/2012
11. Thin walls : min thickness is 1.5mm (Button Hole in Alumide) 13/2/2012
12. Mesh Medic could not fix/unify your product in time (凹凸 metal part) 1/2/2012
13. Multiple Parts (skirt necklace screw 10, sperm screw 4, sperm screw nut 2, sperm chain A 2, sperm chain C 2, sperm chain D 2, sperm chain B 2, jump ring 3, middle chain 3 A, middle chain 3 B) 23/4/2012
14. Multiple parts in a single STL: 3 parts 1 file (skirt necklace screw 9)
Interlocking parts (sperm screw setting 3, sperm chain D 1, sperm chain C 1, sperm chain B 1, sperm chain A 1, middle chain) Multiple parts in a single STL: 2 parts 1 file (sperm screw 3) 19/4/2012
15. Mesh Medic could not fix/unify your product in time (egg 4) 16/4/2012
16. A lot of shells ('Annual Ring and Fingerprint' brooch 3) 29/3/2012
17. Too thin and to long (Button pin 3, annual ring and fingerprint pin)
Interlocking parts (Button hole 5, 'Annual Ring and Fingerprint' brooch 2) 28/3/2012
18. '凹凸' ring. The silver ring shape of '凸' is not really round, it is slightly crooked and both of the top parts of the ring are not polished enough. Since it is hard to polish to reach the corner in 3D print. The polished details have

some flaws; it would be in the best interest to polish this to perfection for a full effect. Reprint. 25/3/2012

19. Too thin for its size (pin). The relation between the thickness and size is 1:30 so the model should thicken up the model to at least 2mm – 2.5 mm to make it printable. 22/3/2012
 20. Thin walls : Minimal thickness needed is 1 a 1,2mm (Button hole 4)
Too thick and long (pin) 20/3/2012 (the minimum wall thickness for Silver is indeed 0.6mm at least. But this really depends on the model itself, as for the structure of the model).
 21. Printed in Silver Glossy models '凹凸' which are some oxidation spots on the models and the rings on the models aren't completely round. 15/3/2012
 22. Multiple parts in a single STL: impossible to print and cast if you want a design like this it would be best if you order everything separate: 3 parts 1 file (Button hole 3) 5/3/2012
 23. Shells, holes, boundary edges, flipped triangles. (Button hole) 21/2/2012
 24. Thin walls: too thin and fragile will break in depowering (凹凸 Antique Bronze Glossy) 14/2/2012
 25. Thin walls: min thickness is 1.5mm (Button Hole in Alumide) 13/2/2012
 26. Triangles, shells, holes, boundary edges, surface is unclosed, surface is Orientale (凹凸 metal part) 2/2/2012
- '凹凸' design has too many polygons to process it. Only can accept designs with a maximum of 1 000 000 polygons. The model should reduce the number of polygons to below 100 000, this way the product will process much faster. Furthermore a lot of the modifiers, things such as lighting effects and shading might make a product look a lot better in the digital world but do not add to the design's beauty with regards to 3D printing. The maximum amount of detail that shapeway can produce is 0.1mm, this means that you can print out very detailed characters and very fine details. Michelangelo's with his chisel had a maximum detail of .25mm, after all.
27. Screwdriver would not stick to the screw nut, this must be 0.3 mm on each side (The two screws) 17/1/2012

Appendix 4: Shapeway Tips for 3D Printing

<https://www.shapeways.com/materials?li=nav>

The minimum wall thickness for our different materials are:

White Strong and Flexible = 0.7 mm But we advise you to use at least 1 or 2 mm, depending on the size of the area.

White, Transparent and Black detail = 1 mm

Stainless Steel = 3 mm

Full Color Sandstone = 3 mm

Milky White Matte Glass = 3 mm

Alumide = 1.5 mm

Silver = 0.6 mm

Frosted Detail = 0.5 mm

Frosted Ultra Detail = 0.3 mm

Glazed Ceramics = 3 mm

The difference between "Antique Bronze Glossy" and "Gold Plated Glossy" is the finish; the original material is "Stainless Steel"

Design rules

Now that we know what we are looking at, it's time to know where we want to go to. Here is a list summing up the critical points of stl. If your model passes this list, it's most likely printable.

Rules which are checked in the Shapeways upload filter:

- Triangles below 1.000.000
- 0 Holes
- 0 Border edges
- 0 Invalid orientations
- Minimum length of 0,2cm x 0,2cm x 0,2cm
- Maximum length of 49cm x 39 cm x 20 cm
- Positive Volume (the amount of space, measured in cubic units, that an object or substance occupies)
- Closed Surface
- Orientable Surface

Preferred:

- Amount of loose pieces in a stl is equal to the amount of shell.

<http://www.shapeways.com/design-rules/silver>

Silver design rules

The basics...

- Wall thickness minimum: **0.6 mm**
- Detail thickness minimum: **0.3 mm**
- Maximum height: **30 mm** for smaller items (like rings), **20 mm** for bigger items (like bracelets)
- Maximum length and width: **150 mm x 150 mm**
- You can expect accuracy of **+/- 25 micrometre** (.025 mm)
- Note: To start, we are not allowing any movable or interlocking parts*. As we learn more about the process, this may change so please stay tuned.

Details on your designs

- Embossing: **max 1:1 height to width ratio** -- height of the embossed detail may not be higher than the wall of the detail
- Engraving: **max 1:1 depth to width ratio** -- depth of the engraved detail may not be greater than the wall of the engraved detail.
- Distance between holes must be greater than **0.6 mm**.

Examples

good embossing **bad embossing** **good engraving** **bad engraving**



height to width of embossed detail is 1 to 1

the details are much taller than they are wide

depth to width of engraved detail is 1 to 1

detail sinks much more deeper than it is wide

Hollow models

- Hollow parts need openings so we can get out the support material, and so we can insert casting plaster
- If you have one hole, opening needs to be greater than **4 mm** in diameter
- If you have multiple holes, each hole must be greater than **2 mm** in diameter.

Wire frames and mesh designs

- Wires on wire frames must be over **0.8 mm** thick.

Wire frame models are difficult to print and are also fragile in silver. Since silver is less strong than steel, the product will deform when wearing the piece if the wire-surface is too thin. It might also snap in the manufacturing process.

Examples



Duann made a ring with **0.7mm** thick wires and one of the wires broke. So, the wires need to be **0.8 mm** or thicker.

Ring-specific design rules

- **The Ring band** (the part that goes around the finger) needs to be **1 mm thick** to avoid deformation when wearing. Since silver is a weaker material, ring shank that are too thin may deform or even break.
- **Prongs for holding stones** cannot be too long without anything connecting them. This connecting beam is to prevent the wax from breaking away. Also, with thin and long prongs, the product will not be able to hold big stones.

Examples



Duann sent in a ring that has a 0.8 mm band. When he wore the ring the sides snapped. Ring bands need to be at least **1 mm** thick



Prongs for holding stones are too long and not connected, these prongs will break

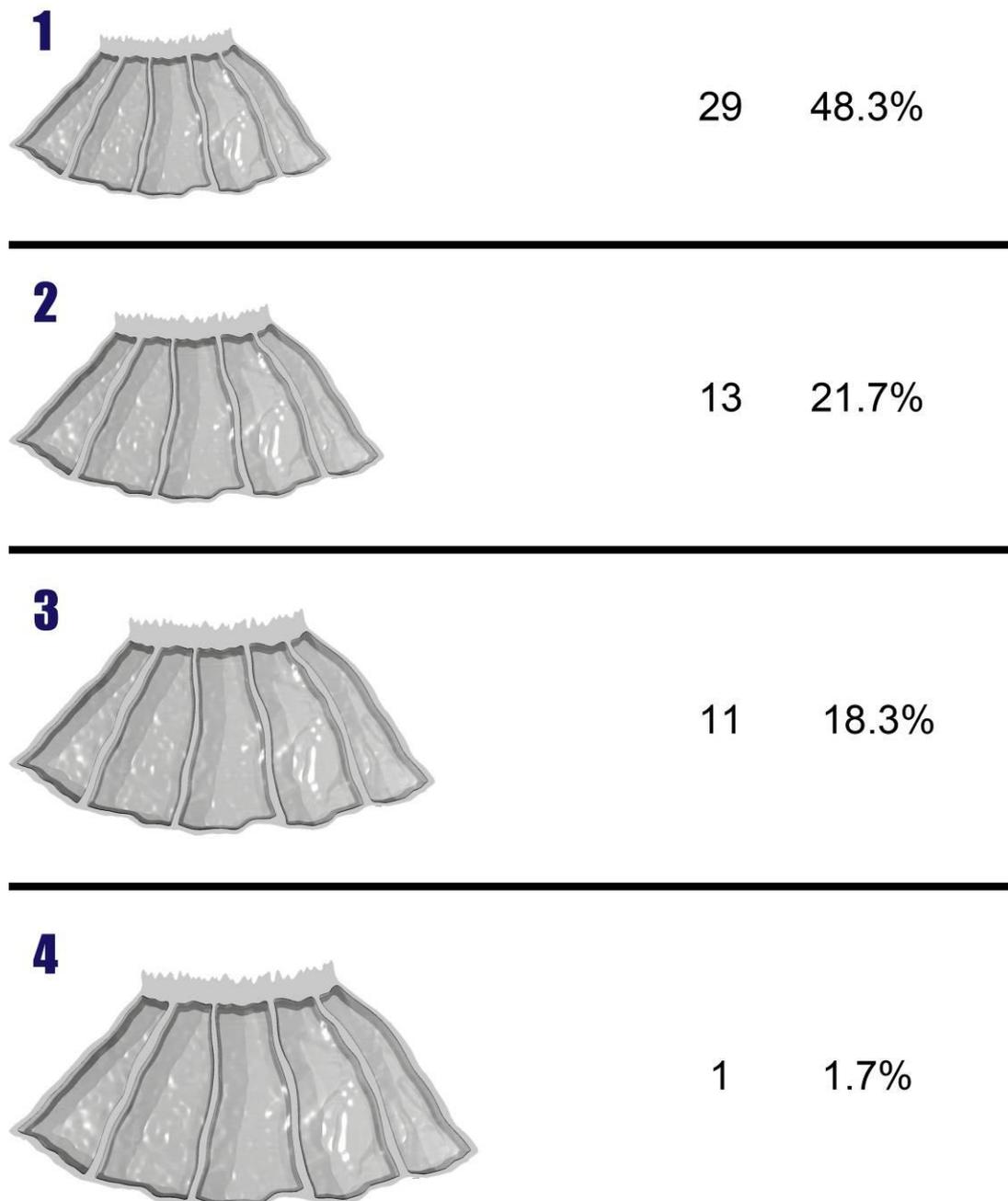


Prongs for holding stones are designed well

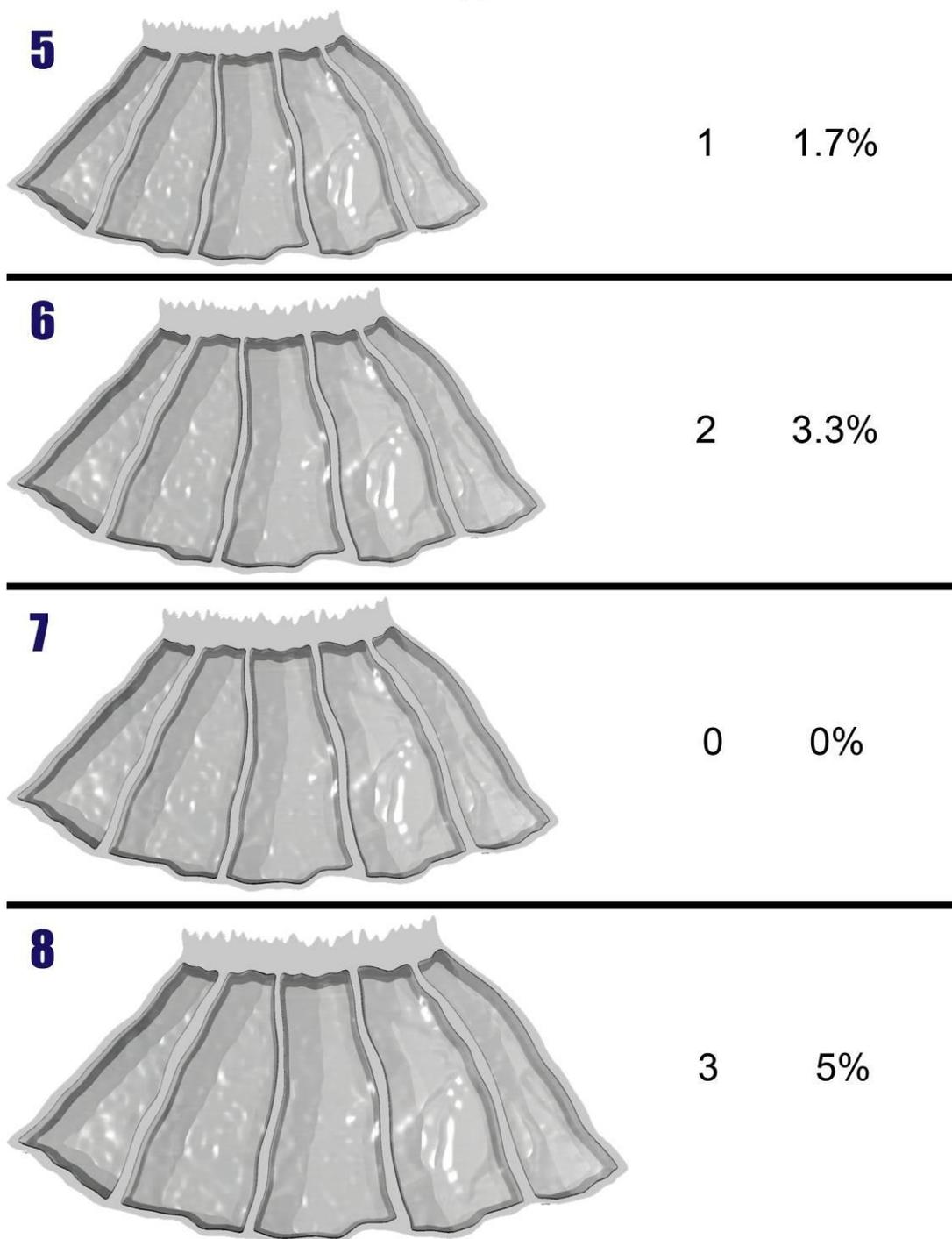
Appendix 5: Sizes Surveys of 'Pleated Skirt' Necklace

The sizes surveys of the 'Pleated Skirt' from female office workers. The pictures show the real sizes of the jewellery piece.

Sizes Survey - Office Worker (60)

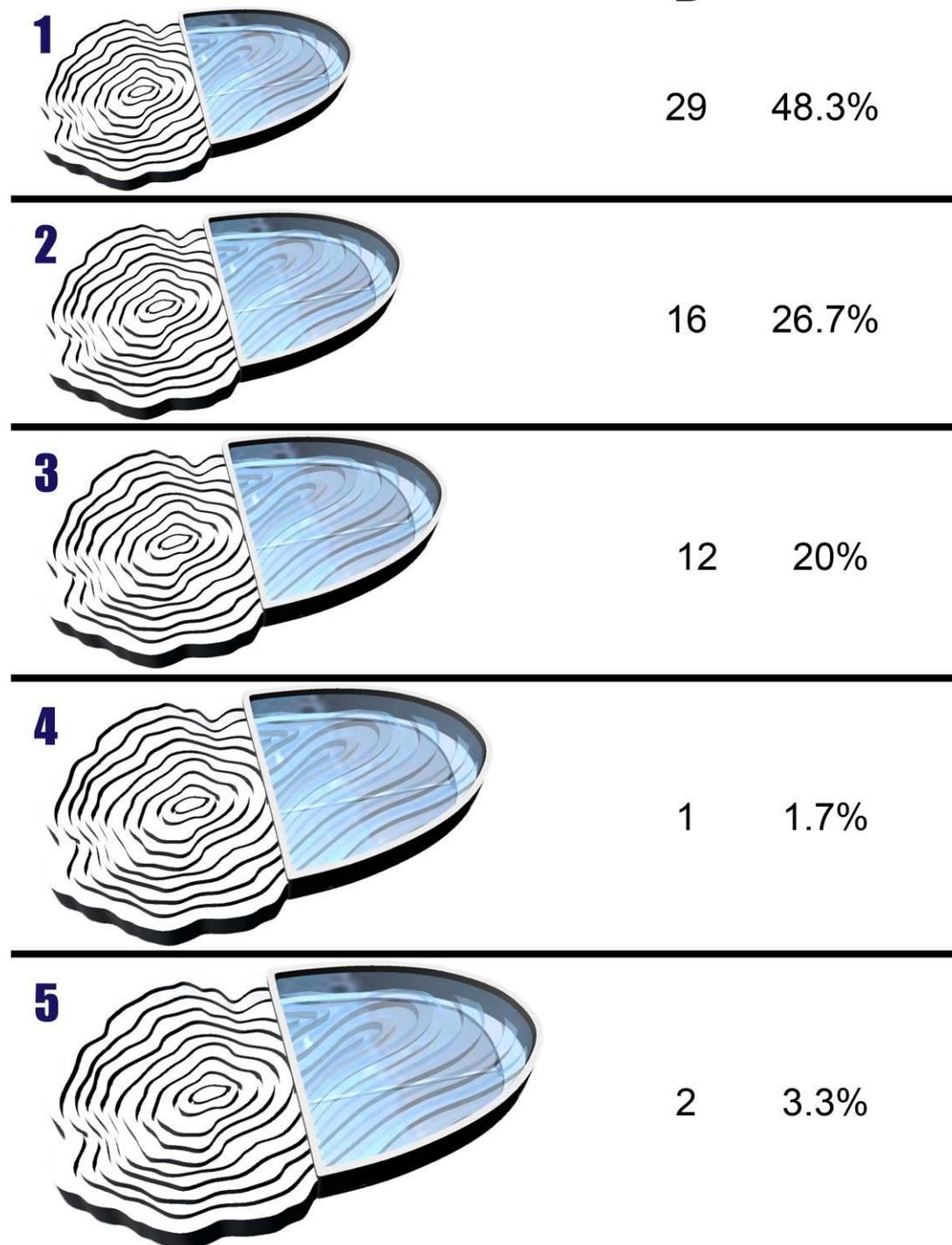


Sizes Survey - Office Worker (60)



Appendix 6: Sizes Surveys of 'Annual Ring and Ringerprint' Brooch

Sizes Survey - Female (60)



The sizes surveys of 'Annual Ring and Fingerprint' brooch from man and woman. The pictures show the real sizes of the jewellery piece.

Sizes Survey - Male (60)



28 47%



18 30%



6 10%



5 8%



3 5%

Appendix 7: Published Article

The certification of an article of “the New Approach of Application of ‘Harmony between Man and Nature’ in Glass Jewellery Design” was published in the Chinese article ‘*Guangxi Normal University for Nationalities Journal*’ (2013).

用稿通知书

尊敬的江婷同志：

您好！您寄来的论文《天人合一的思想与玻璃首饰设计的方法创新》经审阅，可以采用。拟定于我刊2013年第5期（即2013年10月25日出版）上发表

特此通知。

您的稿件除正文外还应包含如下内容：邮编；详细地址；单位；联系电话；电子邮箱；作者简介（性别、出生年、籍贯、学历、职称和研究方向）；投稿日期；参考文献类型（文后参考文献需用顺序号“[1][2]……”在文内相应位置标出，并标上参考文献所在页码）；文章所属中图分类号等。如有缺项请补充完整。本刊对所有稿件有删改权，来稿一律文责自负。

编辑部联系方式：

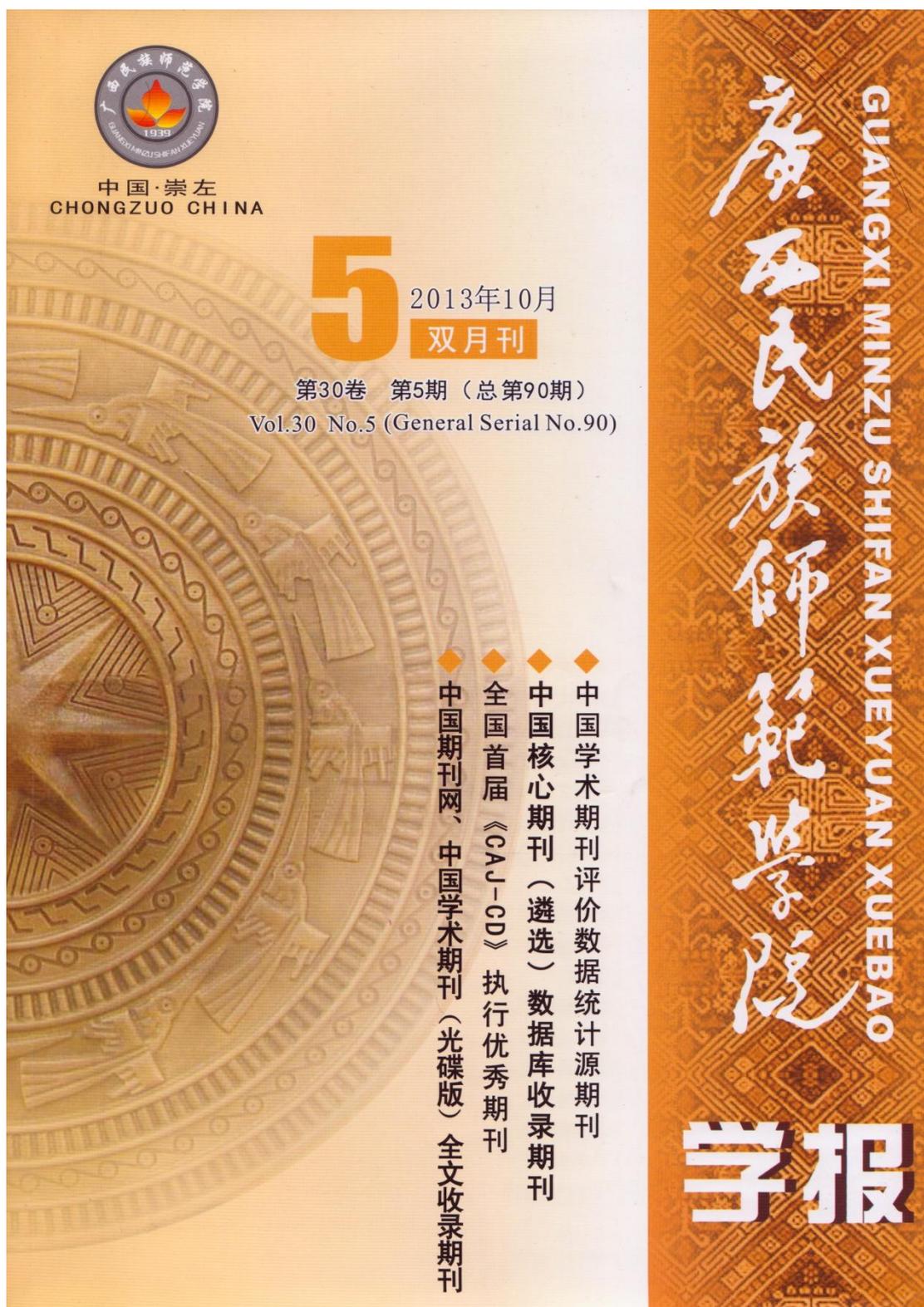
地址：广西崇左市城南区丽川路1号 广西民族师范学院学报编辑部

邮编：532200 E-mail: nnszxb@163.com

稿件查询电话：0771-7870549（办）李老師

广西民族师范学院学报编辑部

2013年10月9日



玻璃首饰设计中“天人合一”的思想的运用

江婷

(英国桑德兰大学 艺术与设计传媒学院)

摘要:“天人合一”是中国传统文化的精髓,是中华民族五千来的思想核心与精神实质。它强调人与自然的和谐统一。这一哲学理论作为中国当代艺术与设计不可或缺的一个重要的哲学指导思想,它已被运用在很多艺术领域中。它强调在审美的过程中与自然的浑然一体,追求和谐的审美境界。通过个案分析,评价已有的“天人合一”哲学思想在现代玻璃首饰领域的运用情况,论证怎样运用“天人合一”思想与现代西方技术相结合设计现代玻璃首饰。

关键词:“天人合一”;玻璃首饰设计;珠宝设计

中图分类号: F768.7

文献标识码: A

文章编号: 1674-8891 (2013) 05-0148-03

The Philosophy of Harmony between Man and Nature in Glass Jewelry Design

JING Ting

(Faculty of Arts, Design and Media, University of Sunderland)

Abstract: The philosophy of 'Harmony between Man and Nature' is the essence of the Chinese traditional culture which emphasizing the harmonious unification of man and nature. This philosophy is an important guiding philosophical ideology in the contemporary Chinese art and design field. It emphasizes the harmonious unity just like nature itself- the highest quality of art during the aesthetic process in order to pursue the harmonious aesthetic realm. This research analyses and evaluates the existing Chinese paintings etc. which are using the philosophy of 'Harmony between Man and Nature'. It is indirect proof of how this philosophy combines the contemporary western techniques applied into new glass jewelry design.

Key words: Harmony between Man and Nature, glass jewelry design, jewelry design

前言

“天人合一”哲学思想是中国古典哲学的基本概念,是中国哲学的核心思想和中国人最基本的思维方式之一。其存在于书法、绘画、建筑等各个领域已有数千年的历史,至今仍然具有非常重要的作用。“天人合一”思想在艺术与设计中也一个非常重要的指导思想。在英国庄博士在风景艺术研究中同样指出:“空间透视的不同的方法反映了人与环境之间关系的不同观点。中国艺术家致力于实现“天人合一”(一个多层面的概念,包括人和自然)的境界围绕环境、建筑、音乐、诗词歌赋、山水画等方面有着悠久的历史。”然而,这一理论尚未在新形式的当代玻璃首饰设计中探讨过。因此,这是一个相对较新的领域。研究以“天人合一”的哲学思想为指导,旨在传承和发扬中国的传统文化,结合当代西方的先进珠宝设计技术发展创新,设计除玻璃珠以外的新形式的玻璃首饰。使“天人合一”思想适用于当代西方玻璃首饰设计的跨文化研究。“天人合一”讲究的是一种全局观,运用在玻璃首饰设计中可以把握对相关各个元素间的平衡并协调地融于一体。

一、研究目的

1. 分析和评估“天人合一”的哲学原理在中国传统中

的运用,并将这一原理发展创新;

2. 如何将“天人合一”的哲学原理融合在西方的玻璃首饰设计中;

3. 运用当代3D等技术,采用金属和玻璃等材料,以新的形式探索玻璃首饰设计在美学与技术创新上的功能和应用。

二、主要的研究问题

1. 把中国传统中“天人合一”的哲学理念运用到当代西方的玻璃首饰中是否可行?

2. 怎样使中国传统中“天人合一”的哲学理念更好的融合到西方的玻璃首饰设计中?

3. 如何采用金属和玻璃这两种材料为基础,在珠宝设计中发展创新技术与跨文化的研究?

三、研究方法

大量的文献调查表明,迄今为止,没有发现将“天人合一”的哲学思想运用到玻璃首饰设计中的研究文献存在。但是“天人合一”这一哲学思想已经存在于中国文化、经济和艺术各个方面有几千年的历史。因此,运用历史性研究方法可以从已存在于书法、绘画、建筑等领域的

收稿日期: 2013-09-03

作者简介: 江婷(1982-),女,江苏连云港人,英国桑德兰大学玻璃首饰设计博士生,研究方向:当代西方玻璃首饰设计。

- 148 -

2013年第5期

江婷 玻璃首饰设计中“天人合一”的思想的运用

10月25日出版

艺术作品中找到运用“天人合一”哲学思想的经验。运用哲学间接论证的方法,借鉴已有的原型,把这一理论转化到当代西方的3D珠宝设计中。这里有三个主要的实现方法:

1. 历史性研究方法和文献回顾:从博物馆、图书馆、互联网等各种渠道收集运用中国“天人合一”的哲学思想在艺术领域的相关资料,包括中英文文本,以此为基础分析和评价他们的作品和运用的方法。许多中国古代艺术家、当代的艺术家及设计师均运用过这一原理在他们的艺术作品中。此外,有较少的西方艺术作品也体现了这一理念。

2. 哲学方法:“天人合一”哲学思想在玻璃首饰中包含阴阳合一,时空合一,天人同构,变化,内外合一,主客合一原理的运用。

3. 实践方法:创新的结合中国水墨画和数字电脑玻璃首饰设计,机器制作和手工艺相结合,融合3D打印技术,玻璃的水切割、窑、烧拉制作技术和制银技术。运用潜在性学习的方法去探索材料的试验,包括表面、颜色和质地、美学和技术创新的功能和应用。

中国的美学为当代艺术实践提供了新的方法和可行的途径。所以,该研究受中国文化和传统的影响并以中国美学为参照物,而不是重复已有的历史。他们也许有延续,因为他们都有同一个根。在实践中,以“天人合一”这一哲学原理为灵感的出发点,进行中国画的创作,然后把其运用到3D玻璃首饰设计中。这种方法如图1所示。



图1

四、个案分析

“天人合一”这一哲学原理涵盖的内容是比较多的,表现的形式也是多样化的。‘凹凸’情侣戒、‘精子和卵子’

项链、‘扣子’胸针、‘宋代百褶裙’项链、‘指纹与年轮’胸针、‘桂花’组戒,分别从“天人合一”哲学思想中的“阴阳合一”、“时空合一”、“天人同构”、“变化”、“主客合一”、“内外合一”为原点从不同的角度交叉论证如何进行当代的西方珠宝设计。

(一)“阴阳合一”的个案

怎样运用“天人合一”理论到首饰设计上,可以从阴阳合一开始阐述。阴阳既冲突又互补,阴阳合一可以从阴阳调和来解析。‘凹凸’情侣戒以阴阳合一为出发点,灵感来源于中国的文字‘凹’和‘凸’。这对象形文字来自远古时代的人们运用绘画的形式对不同形状的描述。它强烈的体现了中国文字中男性与女性的特点。这对情侣戒指由两个戒指组

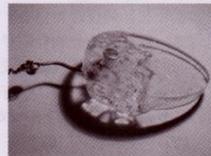


图2



图3

成,凹形戒指为男士佩戴,凸形戒指为女士佩戴。阴阳合一最基本的可以从男性和女性来说,而最直接的体现就是生命自身孕育的过程,卵子和精子的结合过程本身就是一个阴阳合一的过程。把这一过程运用到中国水墨画‘卵子和精子’系列当中,然后在此基础上设计‘卵子和精子’项链(如图2)。此项链采用可换式设计,精子形项链配有三个不同颜色的玻璃卵子吊坠,可根据个人喜好更换。吊坠从厚到薄的设计,很好的利用了透明玻璃对光线折射的规律。精子和卵子的结合本身就是阴阳合一的过程——人类生命繁衍的周期运动。

最基本的阴阳调和是有冲突的调和,最高级的阴阳调和是自然的流露,看不见强烈的冲突。调和是一个过程,强烈的冲突在达到调和的过程中已经被减化掉了。呈现在人们面前的就是一个和谐的结果。而最高级的阴阳合一是世界上任意二元两极互补物体的融合。如衣服上的扣子,扣子和扣眼被作为设计元素,扣子和扣眼是日常生活中最不起眼的二元两级互补的物体。玻璃扣子采用可换式设计,由中心两点固定,可任意移动和更换,并且其形状及大小不受限制。

(二)“时空合一”的个案

时间和空间不是独立的,而是相互关联的,可变的,任何一方的变化都包含着对方的变化,是统一的整体。‘百褶裙’项链(如图3)运用时空合一的原理,从时间和空间的存在上找共通点。从时间上的变化,由古代至现代;到空间上的跨度,把宋代和现代百褶裙两者融合,体现了相同的裙子在中国社会历史长河中,随着妇女地位的提高,不同时期有不同的用途,这一变化过程,体现了当今社会文明的提高。这条项链同样采用可换式设计,由三个银制螺丝固定,避免了玻璃易碎的特质,并可任意更换其它材料。

(三)“天人同构”的个案

‘年轮与指纹’胸针以天人同构的原理,即人体的结构体现了天地的机构,强调人的存在与自然的存在统一性,去寻找人与自然所具有的相似处。年轮与指纹两者都是天然形成的特殊排列的流线纹理,同样具有通过对纹理的观察,可以推断出相关事件的佐证,把这两种具有潜在联系和共性的纹理相结合,并运用在胸针设计中是天人同构的一种体现。此胸针同样采用可换式设计,可根据个人不同的喜好更换指纹玻璃或其它材料。同时,下方透明玻璃折射出指纹的图案,很好的体现了透明玻璃特质的运用,与上方银制年轮纹案形成对比。

(四)“主客合一”的个案

‘桂花’戒指运用桂花的元素及“天人合一”中变化的理论描述了桂花由花蕊—花开—盛开—凋谢—枯萎的自然生命循环生长的规律。设计了一组‘桂花’戒指,这组戒指由三个组成,可分开戴,也可一起戴。为了突出盛开的桂花运用了特异的手法进行设计。同时,玻璃桂花可以更换为多种颜色和其它材料。主客合一的哲学理论同样被运用到了该设计中。主客合一就是主客二元的完全融合,主体即为客体,客体即为主体,主体的客体化和客体的主体化。其在中国国画艺术上的具体的体现就是情景交融,情(主体)中有景(客体),景(客体)中有情(主体)的主客二元你中有我,我中有你的交融状态。在设计上可理解为自然客观的物象与设计师主观意向的交融一体。‘桂花’戒指,设计师以桂林市市花桂花作为设计的灵感,来源于其思乡情切,这里体现了设计师思乡的情,而桂花自然繁衍过程便是自然客观物象的‘景’之所在。桂花的繁衍循环同时体现了岁月的更替,时光的变迁,又体现了景中的情,使之寓情于景,而景又融于情中的交融状态。

内外合一在艺术设计上可体现为心手合一。心之所想与手之所动相契合,眼到即手到。内即设计师对外在事物的感官反映和认识过程(设计师的内在知识、修养等相关各方面要素的综合积累)。外即外在的表现形式(各种技法和技术的设计实现)。整个内外合一的过程是由内向外,再由外向内的循环往复的融合过程。六个案例研究都是由内(设计师的感悟)到外(设计技术的实物实现);再由外(设计实物测试)到内(设计自省)的过程来实现。

运用“天人合一”的哲学理念在此研究的绘画中大多体现出和谐的状态。这可以被描述为一个‘融合’的活动,而不是‘激烈’或‘冲突’的呈现。鞠曦曾在《易道元贞》中提到“《周易》以‘中’道为主体性推定的哲学原理。是故,‘允执其中’的思想原理可以知也,中庸之道所以行也。”

由此可以推断出,要实现“天人合一”这种境界就是不要走极端,而是要找到最适合的方式处理问题。中庸思想也是实现“天人合一”的一种途径。“天人合一”在绘画中的原理,形式基本体现在国画的构图等一些绘画技法的运用上,表达了中国人的思想状态,强调对立统一,如‘阴阳合一’,它不同于西方当代艺术和现代艺术是一种激烈、冲突的状态。它不是以物理概念为主的,而是以精神层面为主。它强调使用全局分析的方法对整体和谐调控和把握。这种方法同样也适用于该研究的珠宝设计。

- 150 -

五、“天人合一”在玻璃首饰设计中应用的原则

在玻璃首饰设计中,遵循既美观又实用的原则是实现“天人合一”的一种方式。从材料上说,即针对不同的材料和特性有不同的设计。了解材料的特性是找到最适合设计的基础。因此在玻璃首饰设计里,首先需要了解玻璃的特性是什么?

例如玻璃具有有机的、容易成形、色彩斑斓、透明、灵活和具有较强折射光的特性。由于玻璃的熔点较低,可塑性强,可以根据设计的需要熔成各种不同的样式,尤其是在对光线的折射、反射或投射,显示玻璃内部光线折射的不断变化最好的是透明玻璃。

康考斯基在2005年出版的书中曾提到玻璃的特性“玻璃本身就是自然的奇迹,它透明、半透明或不透明,光泽度、喷砂或薄金属片,颜色是以固体形态取决于最终的外侧表面或内侧层的熔合效果。无论是切割、铸造或吹,它都很脆弱。但是它仍令我这个设计师着迷和诱惑,与半宝石、丙烯酸树脂或金属非常的不同。它不像其他的手工艺学科,玻璃艺术家有一个热情的痴迷于他们的材料,往往将其推到了极限。从戴安娜霍布森的细腻、微妙的熔融玻璃容器丹尼里的堆放的家具和巨大的玻璃墙。”

由于西方当代玻璃艺术的兴起和非金属材料在珠宝设计中开始占据重要地位的背景下,玻璃有其自身具有的可塑性和独特性。然而,玻璃具有易碎的缺点,笨重和高温易熔,尤其在珠宝设计领域,这些缺点使其被排斥在珠宝殿堂的大门之外。怎样解决玻璃这些缺点便成为实现“天人合一”在玻璃首饰设计中的一个任务。在玻璃首饰的设计中,为扬长避短,规避弱点。可以将一些具有较好延展性的金属(如银、铝等)作为辅助材料,又能优化设计,使材料与设计能很好的融为一体。如开发“可互换”的设计。通过可换式设计,避免了玻璃易碎的特点,可以根据个人喜好更换不同样式的玻璃,不同的玻璃可以用于不同的场合。而且凸显了玻璃丰富多彩的颜色和形态的特质。因此,整个设计可以扬长避短,体现了“天人合一”提倡的不违反自然,又能与自然和谐相处。

六、结束语

综上所述,“天人合一”是中国传统文化的精髓,是中华民族五千来的思想核心与精神实质。它强调在审美的过程中与自然的浑然一体,追求和谐的审美境界。运用中国“天人合一”的哲学思想及文化传统,并结合当代西方的设计理念和新技术,在设计方法和技术上创新发展。采用金属和玻璃等材料,在美学与技术上以新的形式探索新形式的珠宝设计。运用“天人合一”思想与现代西方技术相结合设计玻璃首饰,可以使玻璃首饰更具魅力。

责任编辑:李凡生

封面设计
覃小圆

重要声明

本刊已许可中国学术期刊(光盘版)电子杂志社在中国知网及其系列数据库产品中以数字化方式复制、汇编、发行、信息网络传播本刊全文。该社著作权使用费与本刊稿酬一并支付。作者向本刊提交文章发表的行为即视为同意我刊上述声明。

广西民族师范学院学报

JOURNAL OF GUANGXI NORMAL UNIVERSITY FOR NATIONALITIES

双月刊, 1998年创刊

Bimonthly Started in 1998

2013年10月25日出版 第30卷 第5期 (总第90卷)

Vol. 30 Oct. 2013 No. 5 (General Serial No. 90)

主管 广西民族师范学院

Director: Guangxi Normal University for Nationalities

主办 广西民族师范学院

Sponsor: Guangxi Normal University for Nationalities

主编 易忠

Editor-in-Chief: Yi Zhong

副主编 韦日平(执行)

Associate Editor-in-Chief: WEI Riping (Implement)

编辑出版 广西民族师范学院学报编辑部

Editor & Publisher: Editorial Dept. of Journal of Guangxi Normal University for Nationalities

编辑部地址 广西崇左市丽川路1号

Address: No. 1, Lichuan Road, Chongzuo City, Guangxi, China

邮政编码 532200

Postcode: 532200

印刷 南宁桂通连印务有限责任公司

Printing House: Nanning Guitong Printing co., Ltd

发行 广西民族师范学院学报编辑部

Distributor: Editorial Dept. of Journal of Guangxi Normal University for Nationalities

发行范围 国内外公开发行

Distribution: Public

电子信箱 nnszxb@163.com

E-mail: nnszxb@163.com

电话 0771-7870836

Tel: 0771-7870836

刊号: ISSN 1674-8891
CN 45-1378/G4

定价: 12元



Appendix 8: Exhibitions and Certificate

The glass metal for exhibition in Birmingham University in UK. (Jiang 2011)



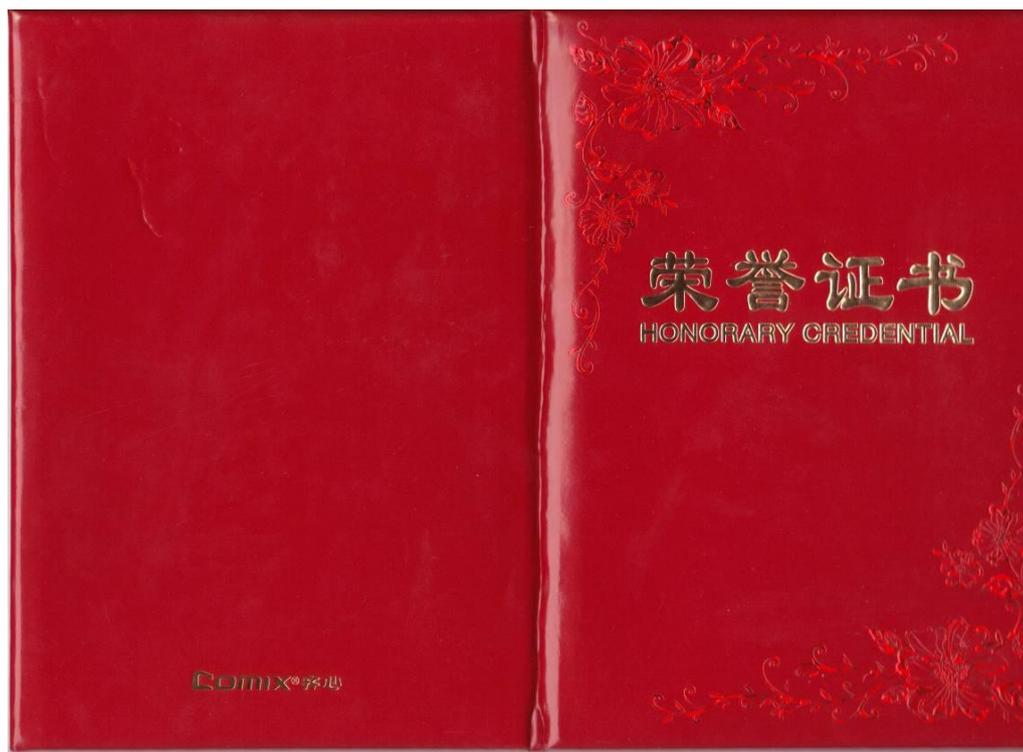
The Customs House Gallery Exhibition in UK. (2012)



The certificate of my solo Guilin Exhibition in China (2013).







Appendix 9: Feedback from My Solo Guilin Exhibition

I have done a solo glass jewellery design exhibition in Guilin Exhibition Hall in China (2013). There are more than one hundred people who visited my solo glass jewellery exhibition. I just picked up some typical feedback from experts and the other audiences in the exhibition showing as below.

Who	Profile	Feedbacks
Ning Lu 卢宁	Dean of Academy Education of Guangxi Normal University. Two Master degrees and one PhD philosophy degree in Japan during 1980s.	The superb contemporary process design contains deep philosophy and essence of Oriental culture!
Jiyuan Liu 刘绩元	Dean of Li Jiang College and the head of propaganda of Guangxi Normal University. Graduated from Guangxi Normal University in the 1980s got philosophy degree.	
Jinsong Zhang 张劲松	Associate Dean of Guangxi Normal University for Nationalities in Chongzuo in China. He got a Doctorate and Post doctorate degree studying Chinese Philosophy in Wuhan University.	The works show you are really good at applying the philosophy of 'harmony between man and nature' inside the glass jewellery design. The special ideas gave people really fresh feelings.
Jianhua Wei 韦剑华	Associate professor/ senior craft artist/ the head of Visual Art Department of Guilin Tourism College. Got Fine Art Degree from Guangxi Normal University Fine Art Academy.	Ting Jiang's work is an organic combination of Chinese traditional culture and philosophy,
Hanru Luo 罗汉儒	Secretary of the CPC in the Visual Art apartment of The Department of Art and Design of Guilin Tourism College. He participated in the program of the ceramics subproject of the 'special tourism products development' of scientific research and technology development projects and the research program of the 'Teaching Research and Practice of the Designer for Tourism Craft Creation in Guangxi Zhuang Autonomous region.	geographical ethnic elements and contemporary Western designs. Her work has rich and profound spiritual connotations, such as 'Concave and Convex'

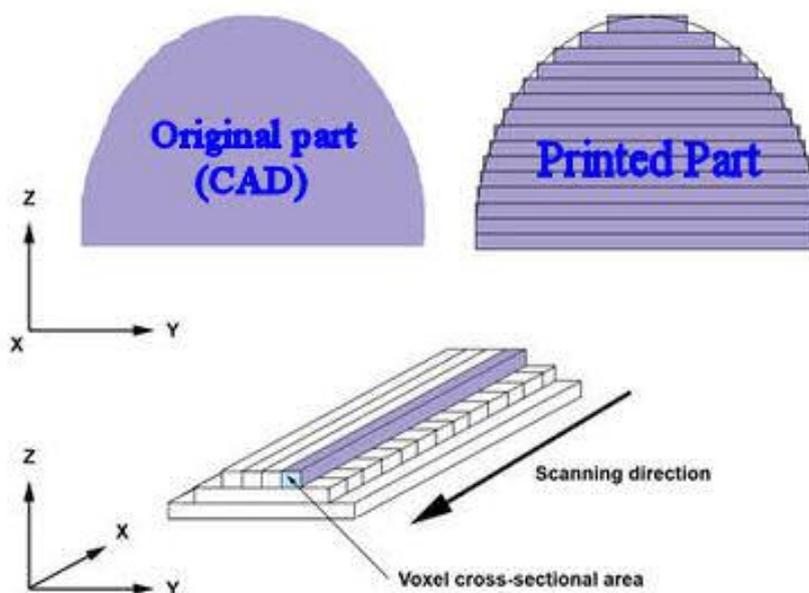
Xiaoyu Liang 梁晓宇	A medium lecturer in visual art apartment of Guilin Tourism College in Decoration Art Design. Got degree from Central China Normal University.	couple ring set ('Ao Tu 凹凸') and 'sperm and egg' necklace works, both of them not only show up the
Jiebin Chen 陈洁斌	A lecturer in visual art apartment of Guilin Tourism College. Graduated from Guangxi Art College for dyeing and weaving in 1985. Her works of 'National Collaboration, Together Prosperity' been selected for the 'China – ASEAN Youth Artwork Creation Contest'.	contemporary minimalist, vivid, in line with the aesthetics of the contemporary Chinese young people. Her work embodies the combination of Yin and Yang well and is
Weihua Zeng 曾卫华	A lecturer in visual art apartment of Guilin Tourism College. Graduated from Guangxi Art College for Sculpture in 1989. Her work of 'Mother and Child' won the national second prize and permanent collection in the China (Dongyang) International Wood Carving Art Competition 2002.	consistent with the Chinese Book of Changes doctrine. We think these two works also to some extent reflects the Western views of nature.
Peng Hu 胡澎	A lecturer in visual art department of Guilin Tourism College. Graduated BA in Ceramics from the Department of Fine Arts of Jiangxi Jingdezhen Ceramic Institute in 1998. Studied Master in Sichuan Academy of Fine Arts. Participates in the program of the ceramics subproject of the 'special tourism products development' of scientific research and technology development projects in Guangxi Zhuang Autonomous Region.	It is a very interesting idea. If you can apply the characteristic of glass more profusely, it may also have more unexpected results.
Bin Ruan 阮斌	Art appraiser, art broker and jade jewellery businessman run jade business for 30 years. He graduated from Jade Identification Training of Forbidden City and Tsinghua University art appreciation and management of advanced studies.	The works are great elegant and beautiful. There are a lot Chinese elements with special techniques inside your jewellery designs. If the
Zhonglin Jiang 江忠林	Worked in Guilin Tourist Company. He used to make some crafts work.	screws interlink part of jewellery can be changed as the other shape that would be perfect.
Shiming Xie 谢世明	The Curator of Guilin Exhibition Hall	The works used extremely bright colours. They are very harmonious and just

<p>Xianglian Zeng 曾香莲</p>	<p>An accountant in the Li Jiang College of Guangxi Normal University.</p>	<p>like nature itself is vivid with life. It is easy to see that you have a solid foundation in the art and design field.</p>
<p>Mengyuan Huang 黄梦圆</p>	<p>A student representation in visual art apartment of Guilin Tourism College in Decoration Art Design.</p>	<p>Ting Jiang's jewellery design uses silver and glass as the main material. Her jewellery design can be split to replace the glass part in the structure. The decorative glass can be replaced in different colours according to the mood of the wearer's preference. A flexible multi-type can meet the tastes of young people.</p>
<p>Zhengbo Liu 刘振波</p>	<p>A Mechanical Engineer. He was a vice president in Guilin Line Equipment Factory.</p>	<p>Your work shows lots of Chinese elements which is very good. If your work can show some Chinese Taiji symbols and Chinese Brush, ink-stick, ink-stone and paper which called the 'Four Treasure of the Study' that would be great.</p>
<p>Ying Hou 侯莹</p>	<p>An officer in Guilin Water Company.</p>	<p>The works look like nature itself with vivid life—highest quality (of art).</p>

(Catherine) Ting Jiang Email: Catherine52w@hotmail.com

Glossary of term:

The **3D printing process** is the first to build 3D models by computer-aided design (CAD) or another computer modelling software, and then separates the 3D model into drill sections, layer by layer 'partitions' to guide the drill printer to print. The printer uses a liquid, powder or flake material to create layers in the cross-sections. It is printed by taking the cross-section information through the file (see the below picture) and then bonds the cross section of the layers together in various ways to create the object. This technique can almost create any shape in 3D.



3D model slicing.

FDM machines use the process of extracting thin plastic strands one piece at a time until the model is complete. (Hoskins 2013, p.44) Other than being among the most popular machines, they are also the cheapest priced. (Lipson and Kurman, 2013, p.68)

Among the oldest 3D printing methods are SLA machines which create solid objects from liquid plastic. The plastic hardens into the solid object when exposed to the machines laser, this process is repeated layer by layer until the project is finished. (Website No.19)

LOM machines are another of the earliest 3D printing technologies, manufactured in 1991. Here objects are created through the use of a laser and thin sheets of materials. The sheets are first covered in a heat sensitive adhesive then placed in position on top of each other creating a multi-level object. Once this is done the laser will cut out the shape of the object, creating a solid three dimensional design. (Website No.20)

The DMLS machine creates a solid object formed by metal powders which are then added up layer by layer to form the finished product. (Hoskins, 2013, p. 51)

iMaterialise specialize in working with artists and designers. Handles both larger specialist works and smaller scale work. Use many materials including ceramics, metals and plastic. It is part of the Belgium Company 'Materialise' who handle 3D works that are engineering, medical and industrial. (Hoskins, 2013, p.53-54)

Mould making: The mould is usually made of plaster or plaster mixture. The model is made from solid material such as clay, wax and metal.

Inverted casting: A process of casting, the mould is inverted after the outer surfaces have hardened so as to drain off the molten metal, glass and so on at the centre. The model is formed from the mould and then melts the glass materials into the mould to take on the inner shape of the mould.

'Lost wax' method: The mould is created by steaming or burning away the wax model by the streaming pot. Glass is then poured into the mould and the fired in the kiln. After that, the glass piece is polished and the final glass object would come out.

Kiln casting: Creating glass objects that take on the interior shape of a mould through the appropriate firing program. It is based on creating pieces from fragmented glass or a single block inside the mould, or in a reservoir on top of it. If fragmented pieces of glass are used, they melt and fuse together more or less completely to take on the inner shape of the mould. (Beveridge, Domenech and Pascual, 2005, p.104)

Fire polish: A method for polishing the glass in the kiln by controlling the temperature which should in the place of after fusing before slumping, to melt the surface of the glass become smoothes, polished surface.

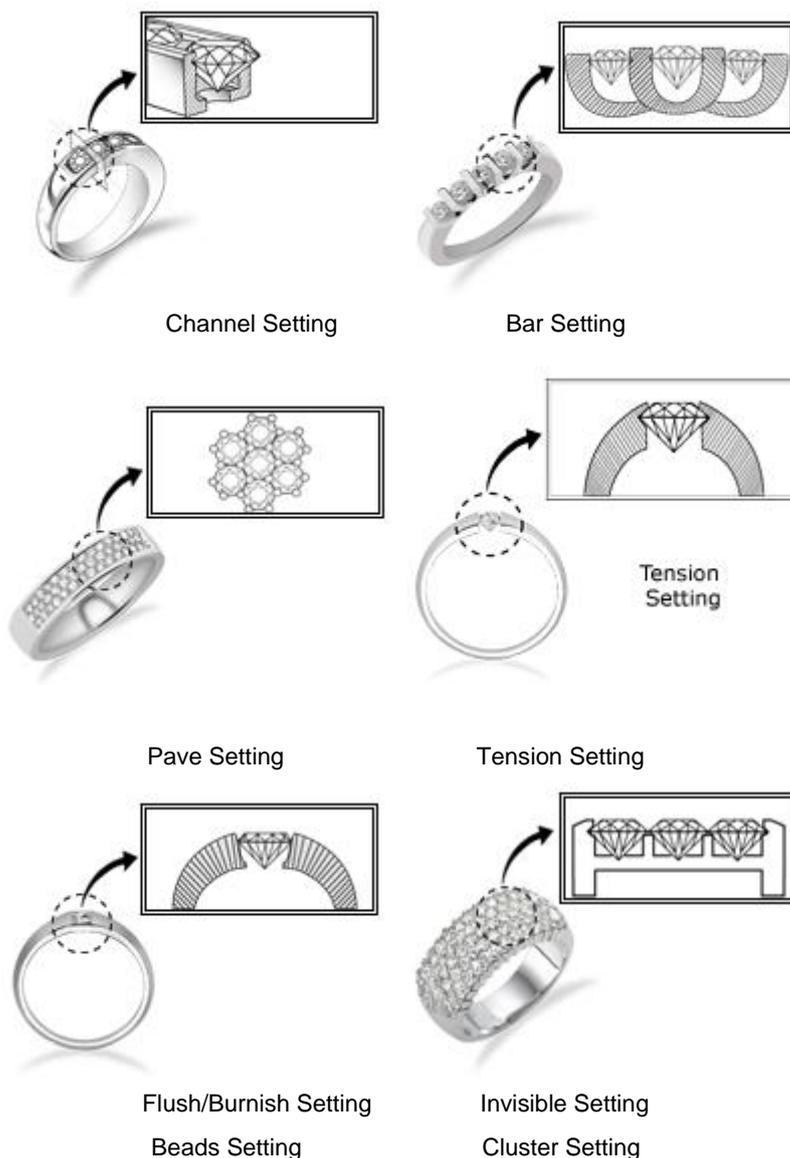
Vermiculite: An accessory material use for cool down slowly the glass beads after firing in lampworking.

The main general stone setting methods in contemporary jewellery making are shown as below:



Claw Setting

Bezel Setting



The main general stone setting methods. (Swiss Gemological Laboratory, 2014)

Claw setting: This setting often has 3, 4 or 6 small evenly spaced metal claws or prongs that are bent over the girdle to securely hold the gemstone in a piece of jewellery. These claws and prongs are similar in shape and size and attached to the central base part, known as the head or basket, of a piece of jewellery. These heads or baskets are available in various shapes and sizes depending on stone's shape and size. Common shapes of heads or baskets used in stone setting include round, emerald cut, princess cut, oval, marquise cut, pear shaped and trilliant cut. Each claw or prong extends upward and outward from the head and arching over the gemstone to form a secure and enduring grip. Prongs with platinum metal is considered very strong as platinum is a very dense and solid metal and its thin wires are sufficient to hold the gemstone securely in its place whereas gold prongs with sufficient alloys also give a strong grip. For other main general stone setting methods, please check Swiss Gemmological Laboratory website (<http://www.swissgemlab.com/EducationPages/EducationDetailPage.aspx?pcid=341&AspxAutoDetectCookieSupport=1>).