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SCREENPRINTING AND INTAGLIO

THE DEVELOPMENT OF COHERENT, USER AND
ENVIRONMENTALLY FRIENDLY SYSTEMS
FOR CREATIVE PRINTMAKING

CAROL ROBERTSON

A thesis submitted in partial fulfilment of the requirements of
the University of Sunderland for the degree of Doctor of
Philosophy by Existing Published or Creative Works

February 2010

Screenprinting and Intaglio: The development of coherent, user and environmentally friendly systems for creative printmaking

Carol Robertson 2010

Abstract

In 1987, to avoid working with hazardous traditional materials, I began to research with the aim of developing safer and more environmentally friendly printmaking systems for artists. I studied the history of innovation to identify principles; analysed theory and practice; identified risks; selected criteria; researched classical, traditional and new methodologies; revised classification and terminology; identified gaps in the projected systems; developed water-based materials for acrylic-resist etching, screenprinting and autographic positives; created new systems for water-based screenprinting, etching, collagraphy and other intaglio methods; tested these through teaching artists and co-publishing with high-profile artists; revised teaching and learning; documented the research; and wrote and illustrated two pedagogic books to disseminate the research.

The results of the research have been the creation of coherent printmaking systems designed for artists; the manufacture by Lascaux of eighteen new water-based materials for printmaking; the exhibition of works made using the systems; and the publication by Thames & Hudson of the books. These definitive books explain why there was a need for change; how the systems are as user and environmentally friendly as is currently possible; how the principles remain true to classical and traditional theory; how to use the new systems; and how effective and versatile the systems are; and they also demonstrate the many creative possibilities. The research has made a significant contribution to knowledge and has been influential in the worldwide move towards the modernisation of printmaking. The systems and terminology such as acrylic-resist etching (ARE) and photocollagraphy are increasingly used in art colleges and print studios. The research continues to be disseminated and validated through the international availability of new products; the creating, exhibition and purchase (for major collections) of prints made using the systems; and by documentation online, in artists' catalogues, and in my books and those written by other authors.

Publications.

Adam, R. & Robertson, C., 2008, *Intaglio: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*. London: Thames & Hudson. Paperback, 25.5 x 22.5 cm, 238 pages, 229 colour illustrations (ISBN-10: 0-500-28661-2).

Adam, R. & Robertson, C., 2008, *Intaglio: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*. New York: Thames & Hudson, Inc. Paperback, 25.5 x 22.5 cm, 238 pages, 229 colour illustrations (ISBN-13: 978-0-500-28661-6).



Hardback copies of the two books (Adam & Robertson, 2007, 2003), photograph.

Adam, R. & Robertson, C., 2007, *Intaglio: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*. London: Thames & Hudson. Hardback, 25.5 x 22.5 cm, 238 pages, 229 colour illustrations (ISBN-10: 0-500-51343-0).

Adam, R. & Robertson, C., 2007, *Intaglio: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*. New York: Thames & Hudson, Inc. Hardback, 25.5 x 22.5 cm, 238 pages, 229 colour illustrations (ISBN-13: 978-0-500-51343-9).

Adam, R. & Robertson, C., 2004, *Screenprinting: the complete water-based system*. London: Thames & Hudson. Paperback, 25.5 x 22.5 cm, 208 pages, 265 illustrations, 228 in colour (ISBN 0-500-28425-3).

Adam, R. & Robertson, C., 2004, *Screenprinting: the complete water-based system*. New York: Thames & Hudson. Paperback, 25.5 x 22.5 cm, 208 pages, 265 illustrations, 228 in colour (ISBN 13: 978-0500284254).

Adam, R. & Robertson, C., 2003, *Screenprinting: the complete water-based system*. London: Thames & Hudson. Hardback, 25.5 x 22.5 cm, 208 pages, 265 illustrations, 228 in colour (ISBN 0-500-51115-2).

Adam, R. & Robertson, C., 2003, *Screenprinting: the complete water-based system*. New York: Thames & Hudson. Hardback, 25.5 x 22.5 cm, 208 pages, 265 illustrations, 228 in colour (ISBN 13: 978-0500511152).

Robert Adam was the co-author of the screenprinting book and the intaglio printmaking book. We have worked together on printmaking projects since the 1980s (*Appendix 124-130*). An expert artist printmaker, Adam was a valuable sounding board for my concepts, and he extensively tested my research results (for water-based screenprinting, tusches for autographic positives, acrylic-resist etching, collagraphy and other intaglio methods) through making his own screenprints, engravings, acrylic-resist etchings and positives, and by co-publishing with artists using the systems.

Adam helped me structure and write about my research results in the screenprinting book (the water-based screenprinting system and methods for making positives). I formed the structure of the later intaglio book and did much of the writing with Adam making valuable suggestions and proof reading. We wrote the history and principles sections of the intaglio book together as a team. Adam wrote the glossaries and indexes, contributed diagrams, original screenprints, engravings, acrylic-resist etchings and collagraphs, and took the majority of the photographs, both of artworks and of printmaking process stages, which are illustrated in both of the books.

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Author declaration.

According to the regulations I declare that during my registration I was not registered for any other degree. I have not used the material for this thesis for any other academic award.

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Professor Allan Walker, deputy director of Glasgow School of Art, when as subject leader of Print Media at Wimbledon School of Art in 1998 he initiated the creation of the first academic ARE and water-based screenprinting printmaking studio. Barbara Diethelm, artist and owner of Lascaux, for her vision, and her colleagues for their knowledge and creative work. Jamie Camplin, managing director of Thames & Hudson, for commissioning the books. Susan Tallman and the other specialists who supported the concept of the need for the books. Jenny Wilson, the editor, and Niki Medlik, the designer, for their skill and enthusiasm.

Professor Ian Pirie of Edinburgh College of Art for his advice. Professor Peter Davies and Professor Kevin Petrie of the University of Sunderland for their expert knowledge and support. I would also like to acknowledge how every connection I have made with artists, teachers, practitioners, researchers, students, neuro-linguistic programmers, and other professionals has inspired, informed, and helped me with this research.

1. Introduction

1.1. Introduction to the commentary

My research spans a period of twenty years so as an introduction for this commentary I sketch an outline of the fields of screenprinting¹ and intaglio printmaking in 2009. I then describe how in the 1980s my experiences of studying printmaking motivated me to seek new methods; how traditional practice changed because of health and safety legislation, the work of other researchers and innovators in this time period; and how new legislation may bring further changes.

In section two I explain how my approach was informed by my study of psychology. I set out the questions (that I asked myself) which led me to form the aim of constructing and making available a coherent user- and environmentally friendly printmaking system that would enable artists to work creatively and effectively. I detail the objectives I formed and the methodologies I employed to achieve my aim. I explain how my research relates to the work of other innovators and researchers and I describe my values. Examples of the research methods are given in the appendix. These include the methodology in practice, how the new systems were tested by co-publishing prints with artists, and how teaching and learning informed my approach to developing materials and terminology for the new systems.

In conclusion, I give examples of the results of my work (detailed in the appendix). This includes information about the new materials and printmaking systems; dissemination through teaching; co-published prints I have made with the systems; dissemination through exhibiting; and the screenprinting and intaglio printmaking books. I explain the contribution which has been made to knowledge (further information in the appendix), conclusions that can be drawn at this point in time, and future aims.

¹ Please use the glossaries of the books (Adam & Robertson, 2003, pp. 205-206), (Adam & Robertson, 2007, pp. 235-236).

1.2. Outline of the research field

Intaglio printmaking has a rich history, originating in the 15th century when artists employed processes such as *criblé*, engraving, drypointing, and etching. The development of the discipline continued with the later innovations of mezzotinting, etching processes such as aquatint and photo-etching, and photogravure, abrading (photo-mask), collagraphy, photocollagraphy and acrylic resist etching (ARE), (*Appendix*, pp. 58-63).

Screenprinting is considered to have started in the late nineteenth century. In the 1950s artists were attracted to the process '*by its directness, painterliness and vivacity*'; in the 1960s artists such as Warhol and Paolozzi made images '*which are visually influential today*'; and by 1979 it was '*evident in numerous fields: it is widely taught in schools and colleges and is used as a component part in many art and design processes*' (all quotes Mara, 1979, p.10). '*The advent of water-based ink has made the potential for this new expanded medium accessible and more user-friendly*' (Hoskins, 2001, p. 13), (*Appendix*, pp. 54-57).

Light-sensitive processes can be utilised for screenprinting or intaglio printmaking. The image, held on a positive, is exposed to a light-sensitive screen mesh or intaglio plate (etching, collagraph or a direct method such as air-abrading), (Adam & Robertson, 2003, pp. 96-139), (Adam & Robertson, 2007, pp. 140-148, 176-192). The earliest use of autographic and photographic positives was in 1833. Photocopiers and digital processes can now also be used (*Appendix*, pp. 64-65).

Screenprinting and intaglio printmaking are taught in schools and colleges, and these processes are used in artists' studios worldwide. '*The practice of printmaking is active, it's alive and it's fresh.*' ... '*It is no longer isolated or elite but in active contact with local artists and the public as a medium in its own right heralded partly by the changes and interest in printmaking in art schools*' (Turner, 1989, p. 7).

1.3. Background

I started to study printmaking in 1981 at Gray's School of Art, Aberdeen. After this degree I undertook postgraduate studies at the Slade School of Fine Art, London finishing in 1987. I also learned a great deal through making prints at open-access workshops. I was taught classical² and traditional³ printmaking techniques and how to make photographic positives for printmaking processes.



Figures 1, 2, 3, Hazardous traditional etching processes, (Saff & Sacilotto, 1978), scan.



Figure 4. The nitric acid room at the Pratt Institute, New York, (Saff & Sacilotto, 1978), scan.

² I use 'classical' in this text to describe the period before 1800.

³ I use 'traditional' in this text to describe the period after 1800 and before 1989.

Studios at this time were generally poorly ventilated and were similar to the etching rooms illustrated (*Figure 4*). The materials I used included lith film photographic positives, highly toxic Kodak Photo Resist, noxious industrial screenprinting inks, cellulose spray paint, nitric acid, ammonia, solvents, and traditional etching resists. I used other processes which were hazardous (*Figures 1, 2, 3, 5, 6*) and I found these working processes slow, expensive and ineffective.

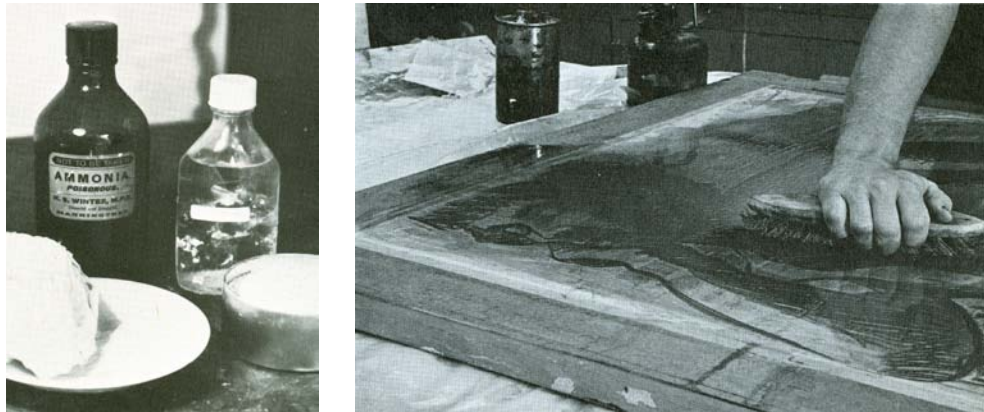
I was influenced by the progressive books of the time (Ross & Romano, 1972), (Mara, 1979), and I made photocopy positives of found objects and drawings, used acrylic media to make collagraphs, and made plaster intaglio prints (Adam & Robertson, 2007, pp. 25, 172, 200). I was curious about what might be possible if new technologies were used and I wondered if prints could be made in an easier and more user- and environmentally friendly way. In this way I started the programme of research and development which I describe in this thesis.

1.4. The reasons for change: innovators, researchers and legislation

When I was a student I became increasingly concerned about the hazards. I witnessed artists collapse from inhaling screenprinting fumes, exothermic reactions involving nitric acid, fires in dustbins (spontaneous combustion), grounds and stop-outs igniting (when being made in the studio); and I heard of printmakers becoming seriously ill. My dentist was asking me what I was doing that was damaging my teeth, and studio staff could not explain to me why my hands became wet and bled inside my gloves (now, in 2009, the permeability of gloves is better understood: see *Figure 8*).

Scientist friends were able to provide me with some safety information, and equipment such as a respirator for use when etching with nitric acid. I was criticized by printmakers for wearing this respirator even while etching 5ft (1.5 m) long mild steel plates in an open studio. It seemed that Tim Mara's (1948-1997) statement in 1979 that there was '*a considerable degree of ignorance...of the widespread hazards involved in the screenprinting process*'

(Mara, 1979, p. 158) was indeed true and that his observation could also be applied to intaglio practice (Adam & Robertson, 2007, pp. 27-34).



Figures 5, 6. Traditional printmaking materials and practices, (Saff & Sacilotto, 1978), scan.

The illustrations (*Figures 1-7*) of traditional practice are from a standard work of the period (Saff & Sacilotto, 1978). These working methods would now (2009) be considered to be incorrect practice and in some countries would contravene government legislation: for example an acid room with inadequate ventilation, the use of unlabelled containers, and artists working with hazardous materials without gloves or respirators. Many other printmaking materials and processes have been classified as hazardous by environmental or health and safety authorities (Adam & Robertson, 2003, pp. 10-16), (Adam & Robertson, 2007, pp. 27-36).

Health and safety and environmental legislation began to be enacted in the 1970s. The regulations tightened worldwide and this affected how printmaking was perceived and practised (Adam & Robertson, 2003 pp. 10-58), (Adam & Robertson, 2007, pp. 27-58). These laws varied depending on the country, state or region but all were designed to protect the health of users, people nearby ('right-to-know' legislation) and the wider environment. The response by manufacturers, suppliers, artists, printmakers, educationalists and researchers to these changes and to the increasing and tightening legislation varied.

During the late 1980s to 1990 printmakers became more informed about safer practice through the publication of books on the subject (Challis & Roberts, 1990), (Rossol, 1990), (*Appendix, pp. 55, 60*); courses and exhibitions of work (Richard Anderton, Carol Robertson, Nik Semenoff, Steven Hoskins, Mark Zaffron, Kieth Howard, Roni Henning), (*Appendix, pp. 55-57, 60-65*); and the implementation of the new legislation (*Appendix, pp. 55, 60*). Tables provided in the appendix list key legislation, innovations and research in chronological order (*Appendix pp. 54-65*). Later in this commentary I outline my research which I started in the 1980s, explain my influences and place it in context (pp. 15-30).



Figure 7. A traditional intaglio studio, (Saff & Sacilotto, 1978), scan.

As early as the 1970s manufacturers such as DuPont, Toray (Torelief®), Lascaux, and CPS had started to research and develop new generations of materials (*Appendix, pp. 54, 59*). In the late 1980s and early 1990s manufacturers such as Gibbon, Sericol, T.W. Graphics and Coates Lorilleux also began to develop new product lines (*Appendix, p. 55*). Henning used

industrial screenprinting inks and the pastes developed for use with acrylic paints (Henning, 1994, p. 9).

Dan Weldon, Zaffron, and Howard repackaged industrial materials for intaglio printmakers (for example Howard's 'Imagon' was DuPont's Riston dry film photoresist), (*Appendix*, p. 59). Weldon's Solar Plate is Torelief® (Weldon, 2001, p. 17), (Adam & Robertson, 2007, pp. 179-180). Cedric Green utilized vegetable cleaning agents (VCAs) to remove his resists (Green, C., 1998), (*Figure 13*). Kip Gresham used toothed industrial acetates (*Appendix*, p. 64) and I used smooth PVC sheets (Adam & Robertson, 2003, pp. 34-38), (Adam & Robertson, 2007, pp. 23, 40, 41, 48, 51, 58, 68, 69, 112, 127, 156, 181-89, 190, 200, 201, 208).

Household materials and art materials were also used as printmaking materials (Howard, 1992, p. V.), (Semenoff & Christos, 1991), (Semenoff, 2009), (Adam & Robertson, 2003, pp. 20-24, 150-168), (Adam & Robertson, 2007, pp. 105, 115, 124, 136, 140, 148-151, 162-173, 191, 199, 214-215). Zaffron began to manufacture new materials and products for etchers (Adam & Robertson, 2007, pp. 108-110), (*Appendix*, p. 61).

Academic research projects were initiated. Kevin Petrie, at the University of the West of England, investigated utilizing water-based screenprinting products such as those manufactured by Daler Rowney and T.W. Graphics for ceramic transfer printing. He stated '*The two main products used are a water miscible screenprinting medium manufactured by TW Graphics in Los Angeles, USA and a transfer paper produced by Brittain's TR Ltd of Stoke on Trent, UK. The 'TW' printing medium was originally developed for the printing of wallpaper but has also been used by artists to produce fine art prints.*' (Petrie, 1999, p. 6.).

Jon Pengelly (*Appendix*, pp. 57, 81-83, 96) researched and used Coates Lorilleux Screenprinting inks. He studied the work of Henning and Howard and explored the use of blue filler mixed with Vaseline (Pengelly, 1997, p. 25) to make stencils that broke down in a similar way to Howard's destruction ground (Howard, 1992, pp. 198-200). In his etching research he decided to

continue to use his preferred mordant of nitric acid and stated *'As a consequence of etching these large plates and the use of concentrated solutions of nitric acid, the researcher was exposed to the toxic fumes this process produced'* and *'The decision to use this technique was ultimately determined by personal criteria.'* (Pengelly, 1997, p. 4).

Adams, Z. I., a student at the University of Ulster, Belfast, investigated *'ways of producing inexpensive water-based screenprinting inks'* and fillers *'from readily available materials'* (Adams, 1998, p. 104). She studied the work of Henning and Hoskins.

Researchers involved in creating change have experienced that some artists resist the idea that many printmaking processes are hazardous, and the concept of employing user- and environmentally-friendly printmaking practice (Rossol, 2001, pp. 3, 6), (Henning, 1994, p. 9), (Howard, 2003, p. 2). Monona Rossol, an artist-turned-industrial-hygienist, wrote in 1990:

'Yet many schools and art-related businesses still do not comply with the new laws. This is partly due to a peculiar belief that the laws do not apply to art - that art is somehow 'special'.' (Rossol, 2001, p.6).

She also noted:

'Either we can see these new laws as impositions and resist them at every turn, or we can accept change and do our share in protecting ourselves and the environment. But whether we resist or not, progressively stricter regulation and enforcement is inevitable.' (Rossol, 2001, p. 3).

Some printmakers continue with traditional practice. For example Nigel Oxley states that nitric acid: *'can be used safely' ... 'You can use your hands to immerse the plate, although the acid will nip if there is a break in the skin. If the hands are wet the water will act as a temporary barrier.'* (Oxley, 2007, p. 48). This is in contrast to the advice given in health and safety guidance

about this acid, for example ‘Avoid all contact with substance’ ... ‘prevent skin contact through the use of impervious gloves’ and ‘all workers subject to chronic nitric acid exposure have comprehensive pre-placement and annual medical examinations including a posterior-anterior chest x-ray, pulmonary function tests, and a visual examination of the teeth for evidence of dental erosion’ (SLAC, 2009). Now, in 2009, printmakers can search the internet for the latest research findings, news, health and legislation. The following screengrabs demonstrate examples of the information that is currently available (Figures 8-13).

Reusable gloves (chemically resistant)

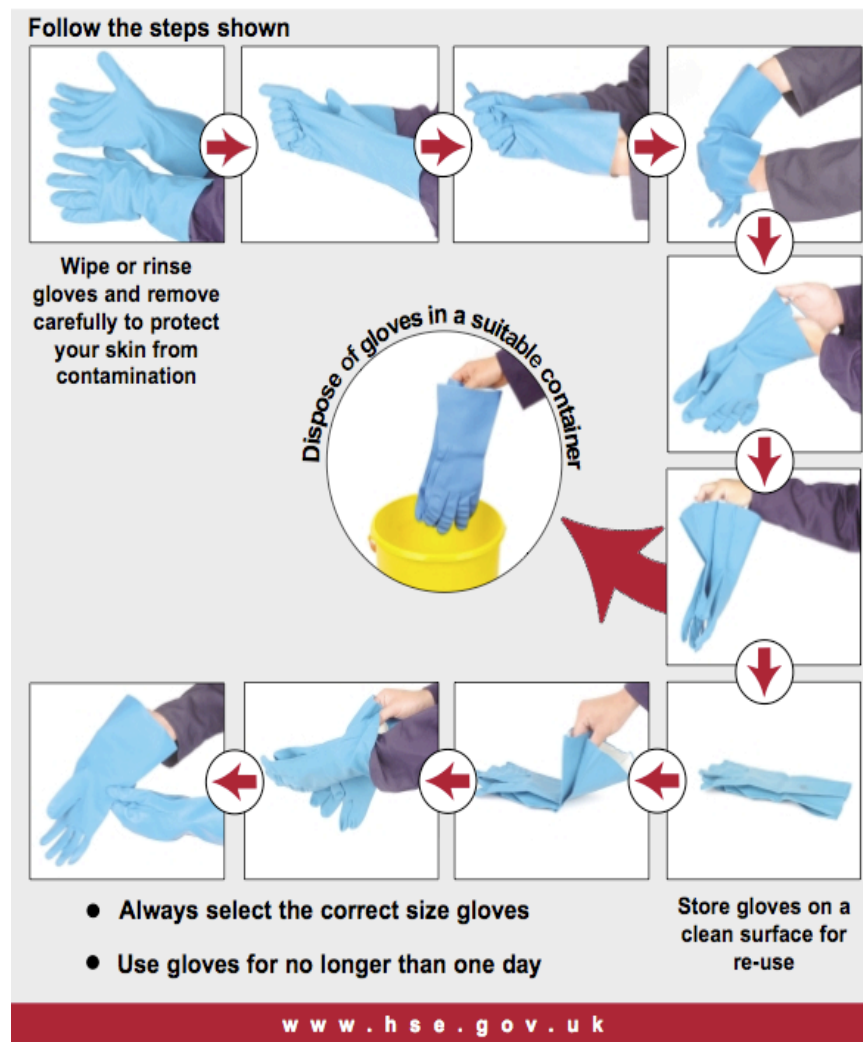


Figure 8. A poster (detail) about the correct use of protective gloves, (Health and Safety Executive, 2009), screengrab.

The screenshot shows the Chicago Artists' Resource website. At the top, there is a navigation bar with buttons for Dance, Music, Theater, and Visual. Below this is the 'CHICAGO ARTISTS RESOURCE' logo. On the left, there is a sidebar titled 'Health and Safety Articles' with a list of categories: 1. Art Materials, 2. Professions, Ceramics [17], Drawing [4], Glasswork [8], Metalworking/ Sculpture/ Jewelry [15], Museum Work [9], Music [20], Painting [4], and Papermaking [1]. The main content area features an article titled 'Art Teacher Sues and Wins'. The article text describes a lawsuit by a former NYC junior high school art teacher against the NYC Board of Education and the City of New York, claiming inadequate ventilation caused brain damage from silk screen printing between 1981 and 1985. The lawsuit was settled for over half a million dollars. The article also mentions that NYC teachers are not covered by workers' compensation. A second paragraph details the teacher's symptoms, including loss of sensation, neurological changes, memory loss, and concentration problems, all associated with high exposures to solvents. A final paragraph recommends against silk screen printing with solvent-based inks in public schools, suggesting water-based inks or stencils instead.

Figure 9. Art Teacher Sues and Wins, (*Chicago Artists' Resource*, 1988), screengrab.

Adverse effects of colophony

Authors: T Keira, Y Aizawa, H Karube, M Niituya, S Shinohara, A Kuwashima, H Harada, T Takata

Impact factor: 0.79, Cited half life: 5.9, Immediacy index: 0.23

Journal: *Industrial Health*

Regarding colophony, the use in industries, adverse effects, diagnosis, pathophysiology and control are reviewed. Colophony is an unhomogeneous mixture of resin acids as like abietic acid and neutral substances. Colophony is used everywhere, in industry, daily life and medical supplies. Soldering workers are exposed to the colophony fumes heated up to the temperature of soldering irons. The effects of exposure to colophony are classified into bronchial asthma and contact dermatitis. Colophony fumes cause bronchial asthma by its nonspecific irritation. Inhalation challenge test and repeated spirometry during working day may help the diagnosis of colophony induced asthma. Improvement of working environment for soldering and development of new flux instead of colophony will be necessary. A study on contact dermatitis revealed that colophony and its related compounds are one of major causes for contact dermatitis. Cases of dermatitis by depilatory agents used to remove hair from slaughtered swine, anti-slipping cream for ballet shoes or resin for cello strings have been reported. Patch test may contribute to the diagnosis of dermatitis caused by colophony.

Industrial health. 01/02/1997; 35(1):1-7.

ISSN: 0019-8366

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Figure 10. A study concerning the health risks related to colophony (rosin), (Keira, T. et al, 1997), screengrab.

▲ Criminal Prosecution for Acid Explosion Injury

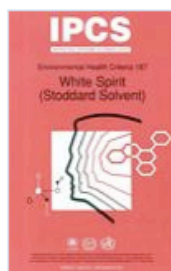
Bristol City College Fined for Health and Safety Breaches

[Posted on 08 April 2008]

The case against City of Bristol College followed an explosion involving nitric acid at the College in May 2006. This resulted in a member of staff suffering significant acid burns that required surgical treatment. The College was served with 3 enforcement notices by HSE during its investigation of the incident, all of which related to its management systems for hazardous substances. A successful criminal prosecution was also brought by HSE under Section 2(1) of the Health and Safety at Work etc. Act 1974 with a fine of £14000 awarded with £18000 costs at Bristol Magistrates Court on 4 April 2008.

Figure 11. A nitric acid explosion resulted in a legal case, (Health and Safety Office of City of Bristol College, 2008), screengrab.

White Spirit (Stoddard Solvent)



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Summary

Evaluates the risks to human health and the environment posed by exposure to white spirit, a petrochemical solvent widely used in paints and varnishes, in cleaning products, and as a degreasing and extraction solvent. These widespread uses represent a correspondingly large potential for exposure of the general population, professional painters, and workers in dry cleaning plants and other settings where white spirit is used. The report cites inhalation of vapour as the primary route of human exposure. Exposure of the general population is noted to occur during the domestic use of paints and lacquers, habitation in recently painted rooms, and during the washing of vehicles with products containing white spirit.

The most extensive sections evaluate the large body of data from laboratory experiments and epidemiological studies in humans. In humans, signs of toxicity, identified in epidemiological studies of exposed workers, include central nervous system effects ranging from dizziness and headache to impaired performance of neuropsychological tests. In severe cases, chronic toxic encephalopathy has been diagnosed. In its evaluation of effects on human health, the report gives particular attention to findings from several epidemiological studies of cancer in potentially exposed painters, metal machinists, construction workers, and dry cleaners. Though increased relative risks for cancers of the lung, kidney, and prostate, and for Hodgkin's lymphoma have been reported, the report concludes that inadequacies in the design of these studies preclude the establishment of a causal relationship between exposure to white spirit and an increased risk of cancer in humans.

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Figure 12. Book concerning risks related to white spirit, (World Health Organization, 2009), screengrab.

OSH-DB Search Results

Accession Number:

10000640

Title:

Substitution of Organic Solvent Cleaning Agents in the Lithographic Printing Industry

Author(s):

Bartlett, I. W. ; Dalton, A. J. P. ; McGuinness, A. ; Palmer, H.

Reference:

Annals of Occupational Hygiene, Vol. 43, No. 2, pages 83-90, 11 references

Pubdate:

February 1999

Subdate:

0000/00/00

Keywords:

Printing-industry / Cleaning-compounds / Organic-solvents / Occupational-exposure / Skin-irritants / Gloves / Ergonomics / Facility-housekeeping / Work-practices

Abstract:

The use of vegetable oil-based cleaning agents (VCA) as effective and less hazardous substitutes for volatile organic solvents in the lithographic printing industry was evaluated. First, available information on the hazard and technical characteristics and performance of the substitute were collected for comparison with the agents in current use. Second, the project examined the production problems, occupational health hazards, and environmental consequences of introducing the VCA through a number of case studies at different print works. Trials were carried out at a large public sector print works, a small print room, a print school, and a large newspaper print works. The VCA had a lower environmental impact than the organic solvent cleaning agents, with lower VOC emissions and less waste produced. Occupational exposure to solvent vapors was less with the nonvolatile VCA. The main health effect was skin and mucous membrane irritation, and gloves are needed when using VCA. Slightly more physical effort is needed on the part of the operator and ergonomic risk is possibly increased. More attention needs to be paid to housekeeping, particularly in dealing with spillage due to an increased risk of slipping. No special storage facilities are required. VCA do not affect print quality or reduce machine speed, nor do they damage the machines, although compatibility trials are usually needed. Slightly more time is needed to use them and the direct costs can be up to 15% more for the VCA. Retraining operators in the use of the VCA is essential. The authors conclude that the environmental and occupational hygiene benefits are clear but there are ergonomic and safety implications and, as direct costs may be higher and production time possibly slightly increased, management and trade union commitment is essential for successful substitution. [OSHDB]

Figure 13. This 1999 study into the use of VCAs concluded The main health effect was skin and mucous membrane irritation, and gloves are needed when using vegetable cleaning agent. (Bartlett, I. et al, 1999), screengrab.

1.5. Tightening legislation, REACH and VOC 2010

Due to changes in health and safety legislation, suppliers have withdrawn from sale some materials used for printmaking. They have also stopped shipping and delivering some hazardous materials, such as acids, due to legislation relating to the transport of hazardous materials. Artists are finding they need to use alternative materials which can be delivered, and this is resulting in changes to practice. It is anticipated that yet more materials may become unavailable due to new legislation. The Registration, Evaluation and Authorisation of Chemicals, (REACH Regulation, 2007) builds on the earlier regulations 'Control of Substances Hazardous to Health' (COSHH, 1990). Art materials which contain chemicals restricted by REACH will be affected as the legislation is enforced (*Figure 14*).

The recipes of some art materials have already been altered due to changes made by manufacturers' suppliers. Polymers are exempted for now as they are considered to be low risk (Official Journal of the European Union, 2007).

This suggests that using polymers for acrylic resists, tusches and screenprinting materials for printmaking is consistent with this policy.



Figure 14. A flyer about changes in legislation, (REACH Regulation, 2007), screengrab.

The EU directive 2004/42/EC (VOC 2010 Legislation) is now coming into force in Europe. The legislation, commonly called 'VOC 2010' will control the levels of VOCs (volatile organic compounds) that are permitted in paints, varnishes and other 'decorative' materials by 2010. The sale of non-compliant products will be forbidden in 2011. The DIY company Bartoline state in their newsletter that for them *'Traditional solvent-based paints are posing the main challenge as their VOC contents tend to lie significantly above 2010 legislative limits'*. Similar legislation is being applied in other countries: for example the ISSA (The Worldwide Cleaning Industry Association) website provides information regarding 'New VOC Limits for Cleaning Products Effective Beginning of 2009' and states *'we will continue to see more aggressive VOC limitations'* (ISSA, 2009).

It is expected that health-and-safety legislation and environmental legislation will continue to tighten and have an impact on solvents and other materials which are judged to be hazardous or contribute to global warming (*Figure 15*).

The information given on the European Union website highlights how important they believe it is to tackle climate change: *'The risks for the whole planet and for future generations are colossal and we need to take urgent action.'* (ECCP, 2005). Keeping track of changes in legislation is made easier due to the worldwide web. Printmakers at this point in time discuss practice, network, share news and other information on forums and blogs.



Figure 15. Information about tackling climate change, (ECCP, 2005), screengrab.

2. The research project: Screenprinting and Intaglio - the development of coherent, user- and environmentally friendly systems for creative printmaking

2.1. Asking questions and seeking solutions

My approach has been to take a positive and proactive attitude and to embrace change. I decided to focus on understanding the issues and seeking solutions with an attitude of curiosity, flexibility, enthusiasm and awareness. I used questioning techniques, lateral thinking (De Bono, 1967), 'Right-brain approaches'⁴ and Neuro-Linguistic Programming (NLP), (Bandler & Grinder, 1979) to investigate and to innovate (*Appendix pp. 86-89*). For example, when I investigated Rouault's 'aquatints' (*Figure 16*) I found that positives (as well as aquatint) were used to establish the images. In this way I learned that autographic positives had been used for important works much earlier than I had thought. I used these findings to discover the initial principles of working with positives, to design materials for a modern version of this process, and to teach the subject (*Appendix pp. 108-112*).



Figure 16. Rouault, G., Nègre portant une valise, 1922, etching.

⁴ The 1968 work of psychobiologist, Sperry, R influenced Edwards, B., (Edwards, 2009).

At the outset I asked myself the following questions:

1. What would be the most accurate way to '*define the territory*'⁵ and what would I learn from this?
2. Could user- and environmentally friendly systems be created that would be more effective, accessible, straightforward, coherent, accurate, economic, logical, provide archival quality and offer greater creative possibilities than the printmaking systems that were currently in use?
3. What knowledge and skills would be needed to create new systems? For example, a deep understanding of the discipline, a specialist knowledge of polymer chemistry, and analytical, communication and writing skills?
4. What would be the best methodologies to test and validate the new printmaking systems?
5. What would be the best ways to disseminate pedagogic information?

The first question was inspired by Einstein's celebrated statement that if he had one hour to save the world he would spend '*fifty-five minutes defining the problem and only five minutes finding a solution*' (Einstein, cited in Litemind.com, 2009, by Passuello, L.). As I reflected on this I realised that rather than think about 'the need for change' as the 'problem' it might be more helpful to question how effective and creative classical and traditional printmaking systems really were (thus defining them as the 'problem'). From that point I employed a way of thinking which relates to the NLP presupposition 'that the map is not the territory' (Korzybski, 1933) and this enabled me to scrutinize the field of my specialism with a fresh, unemotional and open viewpoint.

⁵ An NLP presupposition originating from the work of the philosopher Alfred Korzybski (Korzybski, 1933). What this means is that our perception of reality is not reality itself but our version of it

2.2. The aim of the research project

My aim was to construct and make available a coherent and user- and environmentally friendly printmaking system that would enable artists to work creatively and effectively. I planned that these reliable systems for screenprinting, intaglio printmaking, and for making positives would be accessible, reliable, related to previous practice, economical and logical to use, as safe as possible to use, and that their terminology would aid teaching and learning.

2.3. The objectives of the research project

In order to achieve my aim I developed three key objectives:

1. To develop coherent, accessible, economic, logical, reliable, user- and environmentally friendly systems for creative and effective printmaking.
2. To test, validate and disseminate information about these new printmaking systems through teaching, making prints, co-publishing and exhibiting.
3. To publish books about the new systems that would validate and disseminate information and enable other artists and educators to work in this way.

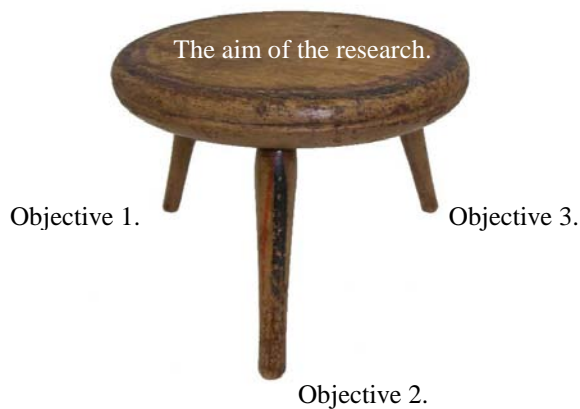


Figure 17. A metaphorical three legged stool, diagram.

From an early stage I found the visual metaphor of a three-legged stool for uneven ground to be a helpful and sturdy image to imagine and 'hold on to' when working for such an extended time span on this large and complex project (*Figure 17*).

2.4. Methodology used to realize the first objective.

The following research methods were employed in order to achieve 'Objective One' (To develop coherent, accessible, economic, logical, reliable, user- and environmentally friendly systems for creative and effective printmaking.), (*Appendix, pp. 66-78, 81-85, 115-116*).

1. Studying classical and traditional innovations to assess how effective the method was and to identify the aims of the innovators and establish 'a principle' for each printmaking method (*Appendix, pp. 66-72*).
2. Researching contemporary⁶ innovations to identify the innovators' aims, to understand the innovation's relationship with classical or traditional practice, to identify a principle, test the method and to classify it (*Appendix, p. 72, 81-82*).
3. Making a critical appraisal of all printmaking theory and practice. I also considered the role of relief printmaking and lithography (Adam & Robertson, 2003, pp. 17-18) (*Appendix, p. 72*).
4. Reviewing classical, traditional and contemporary printmaking terminologies from first principles (*Appendix, pp. 72, 91-96*).
5. Making a list of undesirable attributes and a wish list of creative possibilities (*Appendix, p. 73-74*).
6. Using the criteria as a filter (the set of criteria illustrated were defined at the start of the project and used throughout), (*Figure 18*), (*Appendix, pp. 74-76*).

⁶ I use 'contemporary' in this text by me to describe the period from 1970 to the present day.



Figure 18. The set of criteria are specified in the central boxes: the materials on the left failed the criteria, and the materials on the right passed the criteria (Appendix, pp. 74-76), diagram.

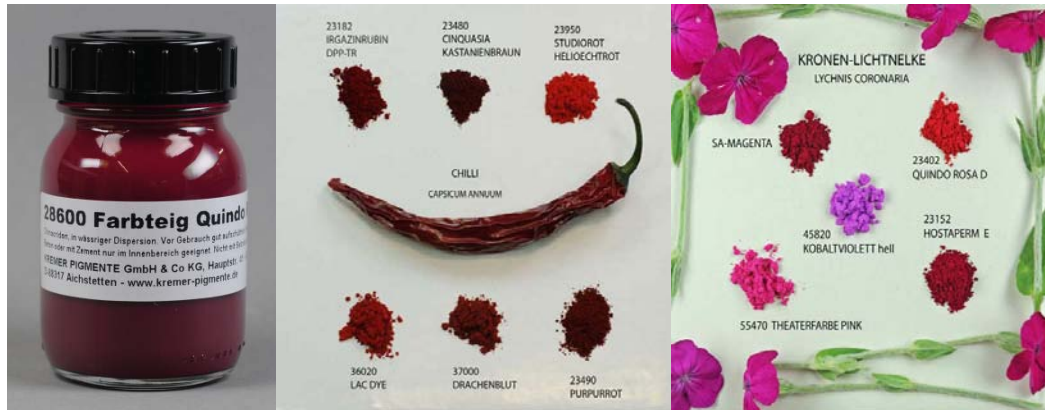


Figure 19. Kremer purchase displays, (Kremer, 2009), screengrabs.

7. Sourcing materials which could fulfil the criteria. Experimenting and testing these materials (Figure 19), (Appendix, p. 76-77).
8. Identifying 'gaps' in the existing systems (revealed by the criteria) and considering what would be required to constitute 'perfect' systems. Developing prototypes in anticipation for manufacture. Testing these new systems through a practice-led methodology (TOTE⁷ was also used), (Appendix, pp. 77, 81-82).
9. Designing and putting together systems from the materials that fulfilled the criteria and the principles. Extensive testing as above (Appendix, p. 77).
10. Deciding to identify the most highly respected (by artists) manufacturer of artists' materials with excellent knowledge of polymers⁸, standards of manufacture and environmental ethics. Persuading this company that a system could be created, and that there was a need for these new printmaking products (Figures 20, 21). Forming collaborations to research and develop my prototype materials and manufacture new materials for printmaking (Appendix, pp. 77, 115-116).

⁷ TOTE (Test Operate Test Exit): a goal is tested to see if it has been achieved and if not an operation is performed to achieve the goal; this cycle of testing is repeated until the goal is eventually achieved or abandoned (Miller, Galanter and Pribram, 1960).

⁸ In answering my own question 3 (p. 16), I realised that I could not develop these skills myself, and so sought an expert polymer chemist and manufacturer of artists' materials.



Figure 20. Lascaux resists being used at an ARE course, 2006, Fondation Lascaux educational studio, Zurich, photograph.



Figure 21. Printmakers in the Fondation Lascaux educational studio, 2007, Zurich, photograph.

2.5. Methodology used to realize the second objective

The following methods were employed to achieve 'Objective Two' (To test and validate these new printmaking systems and to disseminate information about them through making prints, co-publishing and exhibiting original prints, and teaching.).

- 1 Testing the new materials, re-assembling the systems and testing these through a practice-led methodology of trials, teaching, making prints and co-publishing (*Appendix, pp. 78-79, 82-91, 131-146*).
- 2 Identifying and making contact with the most respected (by printmakers), knowledgeable and informative suppliers in the UK, Europe, US, Australia and other countries (*pp. 45-46, Figure 45*), (*Appendix, p. 79*).
- 3 Considering how these new printmaking systems could be defined, described and taught. Selecting terminology that would be accurate, relate to historic terms and be the most helpful to students, artists and teachers (*Appendix pp. 91-96*). Testing these concepts by designing and delivering educational courses and analysing the results (*Figures 20, 21, 23, 24, 26, 30, 33, 35*), (*Appendix, p. 79*).
- 4 Teaching the new systems to national and international printmakers, educationalists and artists of all levels through a range of different types of courses, talks, seminars and articles (*Figures 20-21, 26, 30*), (*Appendix, pp. 79, 85-91, 117-130*).
- 5 Identifying artists whose work could demonstrate specific factors of the new system. Collaborating with them to co-publish original works. Using these interactions to explore many different concepts and to analyse how the new systems were performing (*Figures 22, 28*), (*Appendix, pp. 82-85, 131-133*). Exhibiting these works nationally and internationally at as wide a range of venues as possible (*Figures 34, 36*), (*Appendix, pp. 79, 134-138*).

2.6. Methodology used to realize the third objective

The following research methods were employed to achieve 'Objective Three' (To publish books about the new systems that would validate and disseminate information which could enable other artists and educators to work in this way).

1. Creating, generating and collecting intaglio plates, positives, photographs, prints, proofs and other *realia* to use as an educational resource and to illustrate specific points (*Figures 22-26*), (*Appendix, p. 91*).
2. Tracking and documenting the results of the research (*Appendix, p. 91*).
3. Conceiving, designing, and creating illustrations (*Appendix, p. 91*).
4. Writing educational material for these new systems (*Appendix, p. 91*).
5. Testing how useful artists found the written material (*Appendix, p. 91*).

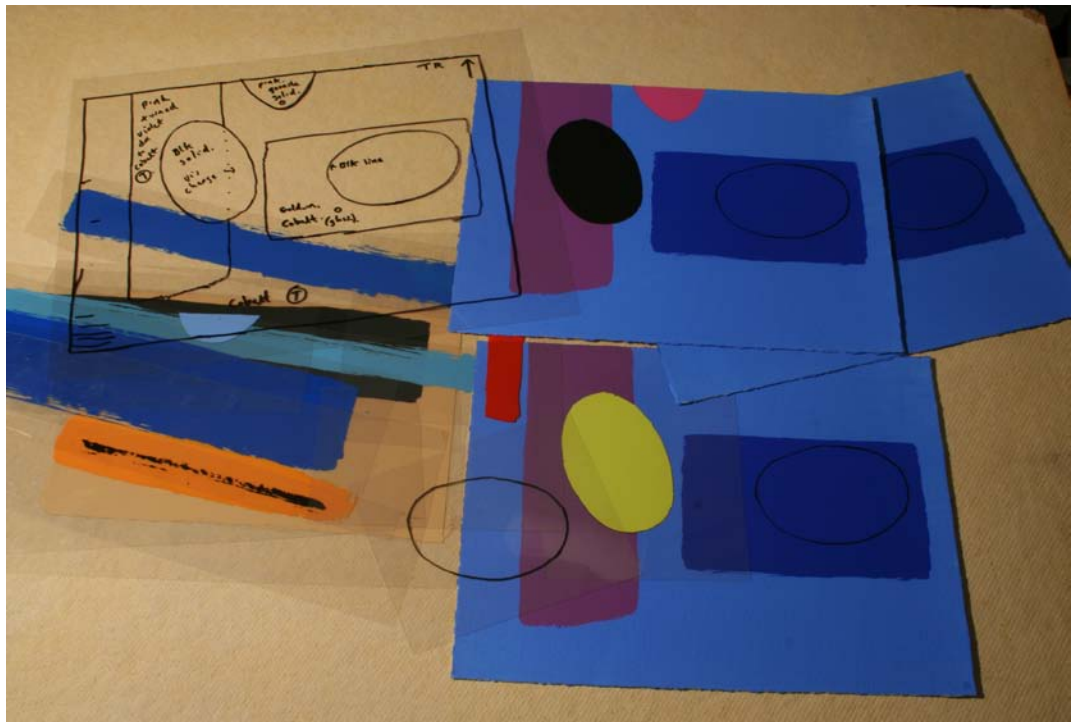


Figure 22. A map, positives, sceneprinted elements, and proofs from a Barns-Graham project, photograph.

6. Selecting a publisher (highly respected by artists and educationalists) with an international reputation and widest possible retail network (to make the books as accessible as possible internationally). Gaining a commission to write books about the new printmaking systems (*Appendix, p. 80*).



Figure 23. An etched plate created using Lascaux acrylic resists, scan.



Figure 24. Materials used with the Lascaux Soft-Ground Effect Tusche, photograph.

2.7. This research project in context with other research

I researched the key innovations in printmaking to ascertain the principles related to the function of each method. This study deepened my understanding of my subject and the knowledge underpinned my approach to developing new systems.



Figure 25. Seghers, H., A Mountain Landscape, 28 x 47 cm, c. 1620, etching.

The innovators I researched included Callot, J., (1592-1635), Niépce, J., (1765-1833), Vollard, A., (1866-1939), Thrash, D., (1893-1965), Warhol, A., (1928-1987), Paolozzi, E., (1924-2005), and Weldon (working in the 1970s), (Adam & Robertson, 2003 pp. 6-9), (Adam & Robertson, 2007, pp. 27-31), (*Appendix, pp. 54-65*). I concluded that these innovators were highly experimental in their approaches. When I considered for example that screenprinting originates from *pochoir* which uses gouache; that Seghers was making intaglio prints on canvas and using water-based materials in 1620 (*Figure 25*); that traditional hard ground is unlike classical hard grounds which were based on Callot's original 'hard varnish' (*Appendix, pp. 66-72*); and that the 'aquatints' of Rouault were made using a light-sensitive resist and autographic positives (*Figure 26*), I really began to query what the notion of

'tradition' was that some printmakers were trying to replicate and were fighting to defend (p. 28). And, when I wondered how the early innovators might have used acrylics, PVC sheet and digital processes, I surmised that they would have used the possibilities offered by the modern technologies.



Figure 26. Demonstrating how to make positives using the Lascaux tusche which provides the qualities of classical soft ground, photograph.

With this in mind I took on a pioneering attitude which helped me invent materials, techniques and processes. Examples of materials which are manufactured and marketed by Lascaux include my 'Soft Ground-Effect Tusche' (*Figure 26*), (which can be used to generate positives for intaglio and screenprinting); *Coloured Coatings*; paint-on *Soft resist*, *Plate-backing resist*, *Lift Solution*; and new ways of working (such as creating pale tones by painting my *Hard resist* onto mezzotinted plates), (*Appendix, pp. 96-112, 115-117*). Other examples include creating a screenfiller and screenpainting fluid; screenprinting with watercolours and water re-soluble mediums; making Resonance gouaches stronger by adding varnishes; creating water-based screenprinting mixtures which dry to become waterproof; and screenprinting

onto metal and plastic substrates with toughened acrylic paints (*Appendix, pp. 113-117*).

I kept up to date with legislative changes (p. 16, *Appendix, pp. 54-55, 59-60*) and the work of researchers. For example: Tim Challis, (*Appendix, pp. 55, 60*); Henning, (*Appendix, pp. 56, 95, 114*); Semenoff, (*Appendix, pp. 55, 60, 62, 64*) (Adam & Robertson, 2007, pp. 23, 158); Zaffron, (Adam & Robertson, 2007, pp. 22, 23, 24), (*Appendix, pp. 60-61, 141*); Howard, (Adam & Robertson, 2007, pp. 23, 24, 25), (*Appendix, pp. 60-63, 92, 97, 101, 143, 145*); Hoskins, (*Appendix, pp. 55-57, 95*); Green, (Adam & Robertson, 2007, pp. 24), (*Appendix, p. 62*); and Rostow and Young (*Appendix, p. 62*), (Adam & Robertson, 2007, pp. 21-26).

My research runs parallel to the work of other researchers in the field such as Weldon, Mara, Challis, Rossol, Henning, Eli Ponsaing, Hoskins, Anderton, Semenoff, Donna Moran, Zaffron and Petrie, (*Appendix, pp. 54-65*). I was in direct contact with Silvie Turner, Howard, Pengelly, Green, Ron Pokrasso and Mark Graver. I taught Rebecca Mayo, Sam Clark, Karen Guthrie, Alastair Clark, Nina Pope, Friedhard Kiekeben, Brian Park, Henrik Bøegh, representatives from the University of Ulster, Belfast, students from University of the West of England, Susan Groce, Helmut Sennhauser, and Christina and Peter Rall (*Appendix, pp. 54-65*). I worked with Robert Adam and Hugo Fritsch and my research has been widely disseminated since 1989 (*Appendix, pp. 54-57, 60-65, 77, 124-130, 115-116*).

I believe that the difference between my research and the work of other researchers results from my particular knowledge and skills, and the use of '*the principles, criteria and methodologies*' for testing that I established (pp. 15-24). The '*principles*' kept me focused on what the aim of each process was. I had learnt that the innovators had developed their own materials, and I thought that at this time of change artists needed once again to innovate and manufacture products themselves or influence the manufacturers. The set of '*criteria*' acted as a filter and determined what materials and methods I could

work with to build a new system. Many of the materials used by other researchers failed to fulfil my criteria; for example, Toyobo Torelief plates (Ponsaing, Weldon); Coates Lorilleux Inks (Pengelly); T.W. Graphics screenprinting inks (Henning, Hoskins, Petrie, Pengelly); photocopier toner (Howard, Semenoff), ammonia (Howard, Zaffron); acetone (Semenoff); white spirit (Hoskins); VCA (Green); traditional grounds and rosin (Hoskins); Badger Acrylic Aquatint (Howard); and nitric acid (Pengelly).



Figure 27. In this article Phillips states 'The new substances feel different' (Phillips, 2003), screengrab.

Some of the other researchers seemed to be seeking products which would replicate the feel and appearance of the materials and the printed results that they were used to (*Appendix, pp. 86-89*). Phillips states that one of the challenges of *'going non-toxic...is to produce a print that looks like a print and not a watercolour painting'* (*Figure 27*), (Phillips, 2003). Pengelly also noted how printmakers *'expected'* particular *'qualities'*:

'The printmaker to a large extent is at the behest of the ink manufacturer, and their struggle to bring water-based technology for graphics application up to a par with established solvent-based inks. To draw a comparison between the commercial and artist printmakers' demands would negate the evident struggle taking place, where printmakers' attitudes towards this changing technology are formed on the basis of subjective personal criteria and 'expected' qualities often seen as a characteristic of the medium of screenprinting rather than the materials used.' (Pengelly, 1997, p. 4)

The use of my criteria prevented me from making exceptions for materials I was familiar with using, and I accepted that I had to change my ways of working. My knowledge of neurology and NLP techniques helped me to recognize that taste, smell, appearance, sound, and kinesthetic⁹ qualities played a part in how the new materials, processes and finished prints were being evaluated. I understood through my knowledge of anchoring¹⁰ how the powerful linkage between the senses and the printmaking activities influenced the way that the printmakers reacted to the changes. I noticed this in my observations of other artists' reactions and also in my own responses to the changes (*Figure 27*), (*Appendix, pp. 86-89*).

⁹ *'Relating to body sensations. In NLP the term kinesthetic is used to encompass all kinds of feelings including tactile, visceral, and emotional.'* (NLP Seminars Group International, 2009).

¹⁰ *'Anchoring' is an NLP technique which originates from the work of Virginia Satir: 'The process of associating an internal response with some external trigger (similar to classical conditioning) so that the response may be quickly, and sometimes covertly, re-accessed.'* (NLP Seminars Group International, 2009).

My methodologies for testing materials differed from the procedures of other researchers. For example, the standard way of testing screenprinting inks involves screenprinting coloured stripes of the different brands (in accordance with the manufacturer's instructions) over a black printed stripe and evaluating the resulting screenprints for translucency, opacity and surface qualities (Hoskins, 2001, p. 57). My testing methods involved making prints and running the systems for an extended period of time (*Appendix pp. 82-96*). After following the manufacturers' instructions I found that the systems did not meet my requirements. I then set out to explore what might be possible using materials which passed my criteria and I worked to find solutions and to influence manufacturers to make new products where required (p. 26). In many cases I used these materials as components to make up new screenprinting mixtures, resists, or tusches. For example working in this way I was able to find ways to screenprint on delicate papers without buckling the paper, print opaque whites and yellows, print mixtures which dried to become waterproof, and develop blue and black screenprinting mixtures which were easier to print with (*Appendix 113-114*).

After making many prototype materials I realized that I needed a specialist knowledge of chemistry, and in particular polymer chemistry, in order to develop the printmaking materials in the best way possible. I sought the help of experts in these fields. I contacted manufacturers and asked them if they could assist me. In 1998 I began to collaborate with Barbara Diethelm, Fritschi and the team of polymer chemists and other specialists at Lascaux in Zurich to develop new materials (*Appendix, pp. 115-116*). This research and development project has resulted in eighteen innovative products for printmaking which are available worldwide. Evans Vanodine agreed to run tests in order to determine whether any of their products would be able to remove the new acrylic materials in their dry state (such as screenprinting mixtures, screen filler, acrylic resists and waterproof tusches). Mystrol was identified through this process (Adam & Robertson, 2007, p. 215).

2.8. The values that underpinned the work and my approach to the research

The personal values that I consider to have been important for this research include integrity, inquiry, creativity, the ability to learn, the ability to collaborate, flexibility, curiosity and idealism. From the start of the project I wanted to make an ethical system which was characterized by its quality, clarity, and accessibility. I was keen to demystify printmaking theory and practice and to create a coherent and logical system which was straightforward in terms of theory, materials, methods, and terminology. I formed this aim from my experiences gained through being taught, pursuing my own practice, studying behaviourism, teaching in open-access studios, schools and higher education, and collaborating with artists.



Figure 28. Dean, G., 1995, a detail from Trust, a print made to compare lithography and screenprinting, scan.

Once I had created the research plan and determined the size of the project I considered the methods and ways of thinking that I could use to make my research as successful as possible. I decided to learn as much as I could about health and safety and environmental issues. I kept up-to-date with the work of other researchers and considered and tested their concepts, new materials and working methods. I studied and considered the results of co-published prints which had been made using the different generations of printmaking systems. For example I compared the reticulated washes and ink qualities on Gresham's co-published screenprint with Elisabeth Frink, (Wiseman, 1998, p. 65) to the Graham Dean screenprint '*Trust*' (Figure 28), (Adam & Robertson, 2003, p. 18).

I also looked further afield to learn about new technologies. I researched the different types and functions of acrylic paints, acrylic painting media, primers and finishing varnishes. This knowledge was critical in developing water-based materials for printmaking. I learnt how to invent and make products, and developed documenting, writing, communication and digital skills (I used techniques such as modelling¹ and chunking² to achieve this). I continued to build on my areas of expertise and decided to apply energy and dedication, and to be as experimental and as bold as I could be in my practice. This included taking on projects and learning how to achieve them. For example, in 1996 when Eduardo Paolozzi contacted me and asked to see my research because it intrigued him, he showed me a collage that he would like to translate to screenprinting (this was one of his working methods). I said that I would like to try and he gave me a free hand. To realise his concept I had to learn how to use Adobe Photoshop, make digital four-colour separations and print with water-based process colours. Paolozzi loved the results saying '*the colours are so fresh*' and '*the print is like a breath of spring air*', and '*the*

¹ '*Modelling*' is an NLP technique: '*The act of creating a calculus which describes a given system*' (NLP Seminars Group International, 2009).

² An NLP technique, '*Organizing or breaking down some experience into bigger or smaller pieces*' (NLP Seminars Group International, 2009). '*Chunking*' originates from '*The Magical Number Seven*', Miller, G.

marks are so fine and lie in the paper'. We decided not to print the black element of the four separations to make it look even fresher and cleaner (Adam & Robertson, 2003, pp. 126-128). Paolozzi was surprised that the positives had been generated digitally and he declared that this was the exception to his strong dislike of digital process.

I applied the NLP '*failure versus feedback*'³ presupposition to my research and this helped me note and use all of the outcomes as I understood each of them to be 'feedback' rather than 'failure'. Working in this way I remained positive and focused on my goal while maintaining peripheral vision, which enabled me to spot, track and utilise 'happenings'. For example I was cleaning up with modern spray window cleaner after teaching a class how to make printing mixtures from pigments. I noted how the combination of loose pigment and this window cleaner made reticulated washes. From this observation I experimented and made my prototype 'tusche washes'. I tested these tusches through screenprinting with artists such as the lithographer Elspeth Lamb (*Appendix, pp. 108-112*). My concept was that lithography would not be required when washes and drawn marks could be printed easily and accurately using screenprinting. Recently I was interested to hear from suppliers that lithographers purchase the Lascaux Tusche Wash to create photolithographic washes. Concerning tracking the research, I have noted how the outcomes from one project have often been the key to another project.

I translate this concept of '*feedback rather than failure*' into '*think like a detective and see everything as a clue*' in my teaching, and I find this approach very helpful. I teach this concept as part of my core approach to printmaking (Adam & Robertson, 2003, pp. 59-64), (Adam & Robertson, 2007, pp. 59-65). Another important strategy was to identify and work with specialists to help me achieve my aims (p. 20). Many different types of collaborative relationships were formed and established and these were a

³ This originates from '*there are no mistakes in communication; there are only outcomes*', (Bandler & Grinder, 1979, p. 30).

vital part of the research project's success. Key figures include the printmaker Robert Adam, suppliers such as Alan Fitzpatrick, the artists I co-published with such as Paolozzi, W. Barns-Graham, Barbara Rae and Elizabeth Ogilvie, researchers such as Sylvie Turner, artists and researchers I taught and worked with, professional educators who were making the change, Barbara Diethelm and her team at Lascaux, and Jenny Wilson and Niki Medlik at Thames & Hudson.

Discussing my research with other people and using these interactions as a sounding board was important at every stage. The starting point might be an article in a scientific journal, alumnus magazine or web site. I would phone or email and have a conversation to find out if there was a relationship to my research. I used techniques such as rapport⁴ to maximize what I could learn from these interactions. I communicated with a diverse range of people of all ages including conservationists, toxicologists, a sundial-maker, curators, paper specialists, polymer scientists, chemists, chemical suppliers, janitorial suppliers, dry film resist innovators, solderers, circuit-board makers, industrial screenprinting materials' developers and medical researchers. Examples include the following: suppliers of industrial screenprinting materials informed me that artists were being sold materials that could not be sold to commercial companies due to health and safety laws; a conversation with a painting student about the behaviour of coloured acid resists and the traditional practice of smoking a ground led to the innovation of the coloured coatings for hard resist; and in 1990 I was teaching an etching access-level course when a newly trained painter and decorator asked '*why are such old fashioned materials rather than modern polymers like acrylics being used?*': I realised that artists were lagging behind and soon after I made a screenprinted water-based resist. I used this knowledge to make other resists which could be applied in other ways.

⁴ 'Rapport' is an NLP technique, '*The presence of trust, harmony, and cooperation in a relationship.*' (NLP Seminars Group International, 2009).

3. The conclusions of the research project

3.1. The completion of the three objectives and the aim of the research.

All three objectives and the aim of the research have been achieved (pp. 17, 53), (*Appendix, pp. 97-123, 131-146*). The innovative approaches and systems are explained in detail in the books. The theory and practice related to the new systems are placed in the context of the history of printmaking and new research. The research outcomes are shared with the art community worldwide through the availability of the new materials for printmaking and supporting pedagogic material such as the books. The results of the research have been validated through teaching and co-publishing prints, and through the international exhibition of works and the documentation of works in print journals and monographs. The changes to practice, terminology and new materials that were developed as a result of this research project are listed (*Appendix, pp. 91-95, 97-116*). In brief these new systems:

1. are as user- and environmentally friendly as possible.
2. are accessible to printmakers internationally.
3. are suitable for both professional and access-level printmakers.
4. enable artists to work in highly effective and creative ways.
5. are designed to aid teaching and learning.
6. are logical and coherent.
7. are highly versatile.
8. are comprehensive.
9. use water-based materials.
10. are compatible within each system.
11. are economic to install and to use.
12. are related to traditional theory and practice.
13. use high quality art materials for resists, tusches and screenprinting mixtures.
14. use terminology designed to aid teaching and learning.

The following (*Figures 29-44*) illustrate some of the results of the research.

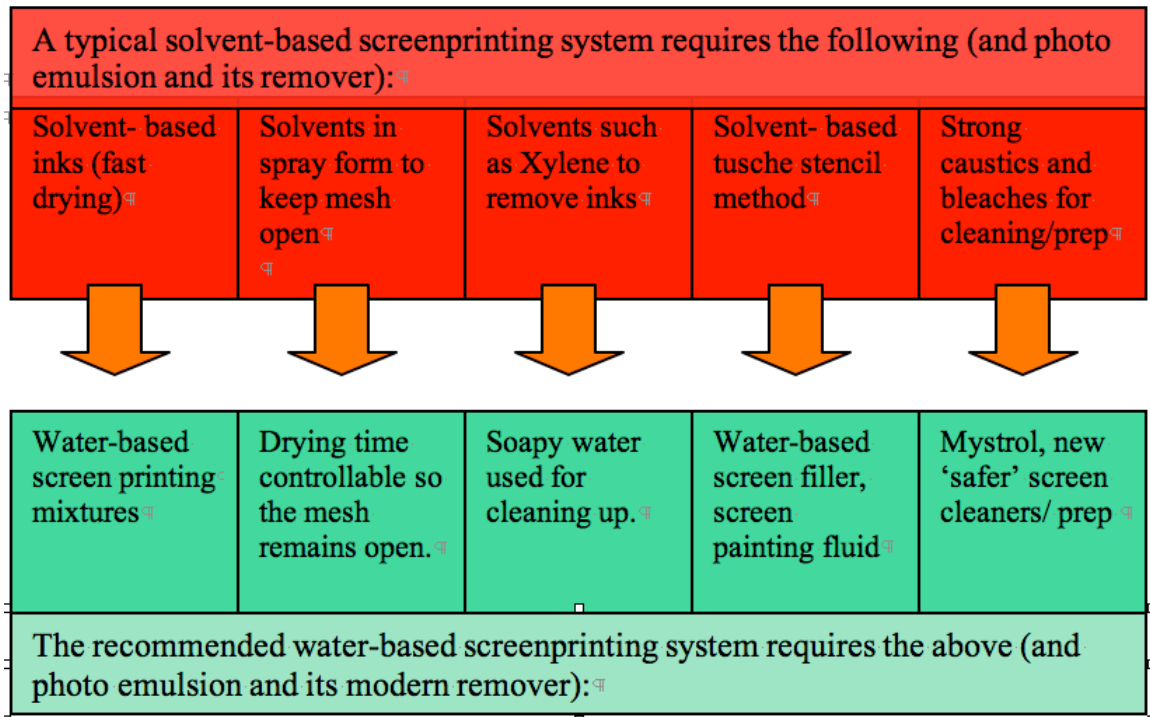


Figure 29. The change from solvent-based to the water-based screenprinting system recommended in the book (Adam & Robertson, 2003), diagram.



Figure 30. Teaching in Zurich, 2005, (stencil made from Lascaux Screen Painting Fluid and Screen Filler printed with Resonance paint), photograph.

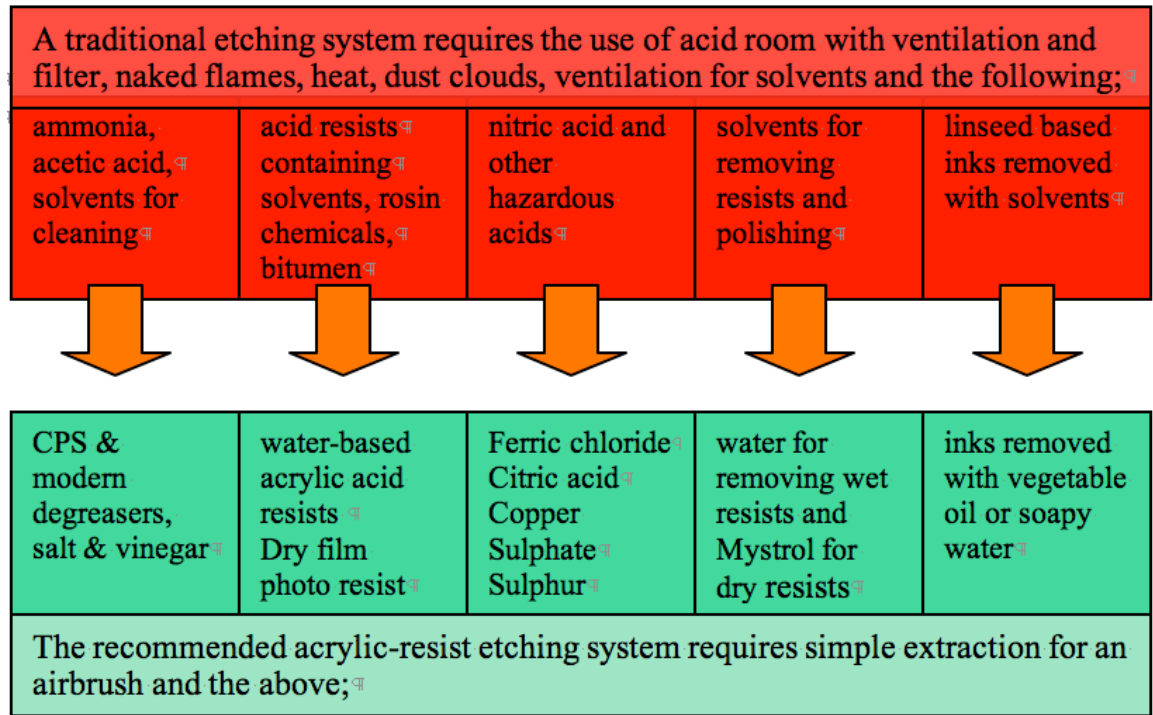


Figure 31. The change from traditional etching to the acrylic-resist etching system (Adam & Robertson, 2007), diagram.



Figure 32. The Lascaux products for ARE which resulted from the research, photograph.



Figure 33. Teaching students collagraphy and etching using acrylic materials and dry film photoresist at Edinburgh College of Art, 1994, photograph.



Figure 34. Ogilvie, E., A Poetics of Water, Stephen Lacey Gallery, London, 1999, photograph.



Figure 35. Screenprinting with water-based paints at Edinburgh Printmakers, 1992, photograph.

David Krut Projects | Wilhelmina Barns-Graham

file:///Users/carol/Desktop/David%20Krut%20Projects%20%7C%20Wilhelmina%20Barns-Graham.webarchive

...I Robertson GOLDEN FLU...Color Lines YouTube - J... Something Fyodor Dostoevsky quotes MOZO NINJAM - No...ng Archive Bo

Wilhelmina Barns-Graham

Paintings, Prints & Drawings

David Krut Projects is pleased to announce the first American solo exhibition of works by Scottish modernist Wilhelmina Barns-Graham (1912-2004).

Wilhelmina Barns-Graham was a key member of the St. Ives School, and leading innovator of British modernist abstract painting and printmaking, an artist whose contributions have long been recognized in Britain as historically undervalued. The exhibition presents work from the later stages of her career, when use of bold, passionate color was increasingly employed to convey what the artist's biographer calls her "awareness of inner, shaping principles and formative forces, rather than merely...external appearances" in nature. David Krut Projects presents a selection of paintings, drawings, and prints by Wilhelmina Barns-Graham, and will be on view from March 8 through April 12, 2008. The exhibition is presented in cooperation with Art First London and The Wilhelmina Barns-Graham Charitable Trust.

Barns-Graham's later works result from a process she called "laying bare," in which she stripped away extraneous, visible elements from natural subjects—beaches, a Swiss glacier, the wind—in search of their hidden interior, even spiritual, power. In a sense her works are paradoxical, combining vivid, turbulent colors and lines to convey this power, yet simultaneously revealing the serenity of mind that was essential to her creative process.

Supporting herself through making art, Barns-Graham exhibited consistently in Britain and internationally from the 1940s onward, and was included in several surveys of the St Ives School, including "St. Ives Past and Present" at the New Academy Gallery in London in 2001, and a solo retrospective "Wilhelmina Barns-Graham: an enduring image" at Tate St Ives in 1999-2000. Her works hang in major collections throughout the United Kingdom, including those of the British Museum, the Tate Gallery, the Victoria & Albert Museum, and the Scottish National Gallery of Modern Art. Her first monograph, *W. Barns-Graham: a Studio Life*, by Lynne Green, was published in 2001.

Accompanying this exhibition is a second monograph, *The Prints of Wilhelmina Barns-Graham* by Ann V. Gunn, Lund Humphries (2007), which focuses exclusively on the artist's printmaking, which became increasingly important in her later years, benefiting from a fruitful relationship with the Graal Press in Edinburgh. Works from this period of her career will be strongly represented in the exhibition.

A special reception will be held for Armory Week on Thursday March 27, 2008 from 6-8pm

[View images from the exhibition](#)



Figure 36. Barns-Graham, W., (Graal Press co-published prints), 2008, exhibition, New York (Krut, 2009), screengrab.

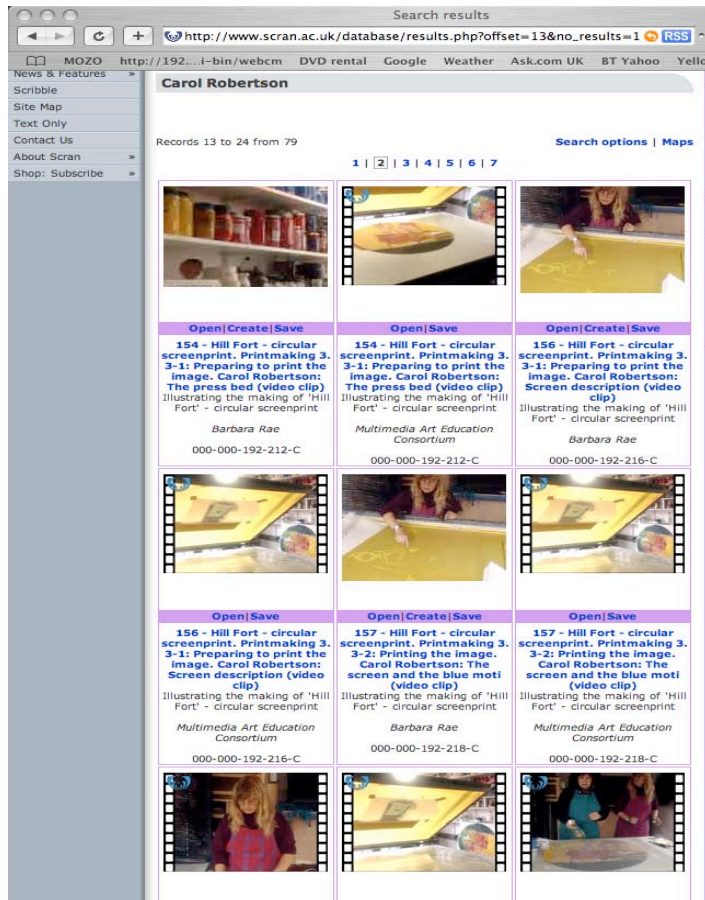


Figure 37. Films about water-based screenprinting are disseminated to over 4000 schools and 300 cultural institutions (Scran, 2009), screengrab.



Figure 38. Gunn, A. V. disseminates information about the new printmaking systems through her book (Gunn 2007), scan.

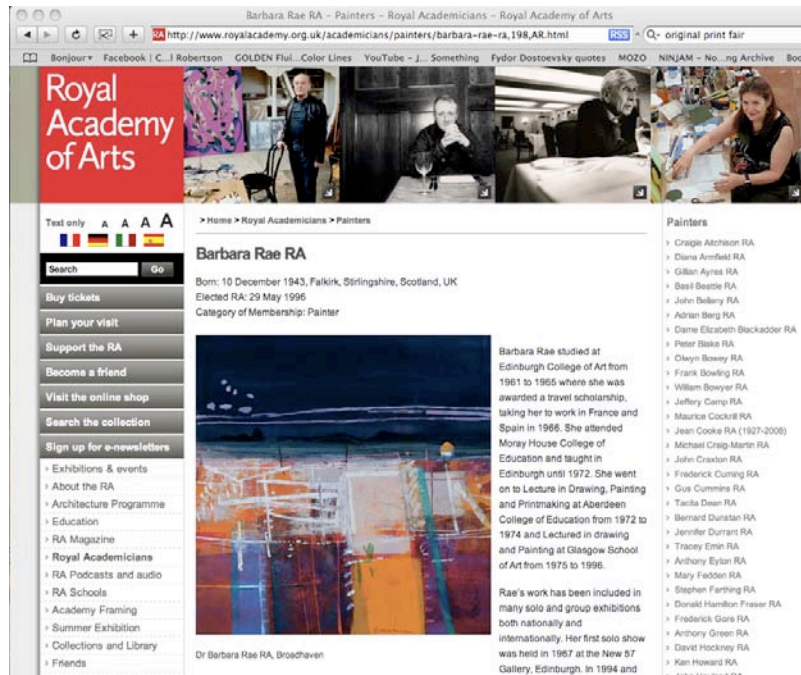


Figure 39. An illustration of Broadhaven (Rae, B. and Graal Press co-published screenprint), (Royal Academy, 2009). screengrab.

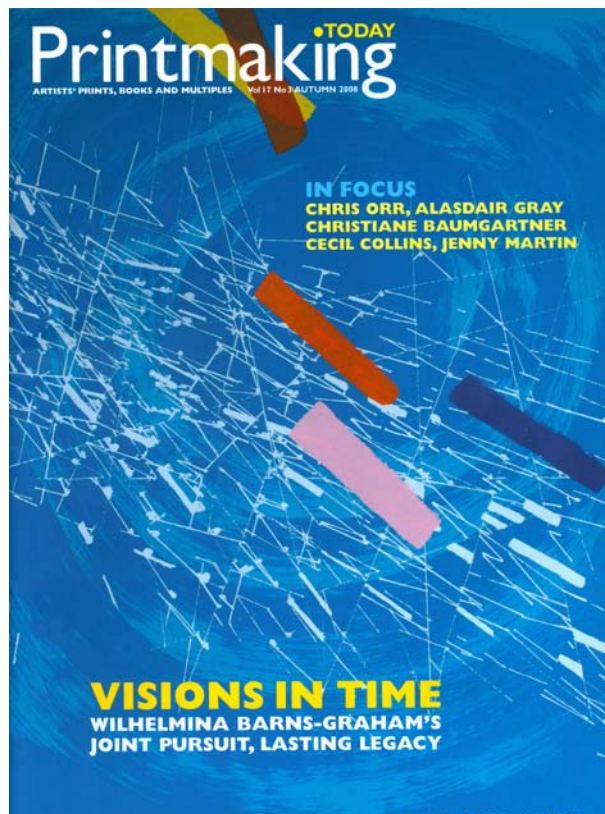


Figure 40. Printmaking Today, 2008, cover, 17 (3), illustrating Barnes-Graham, W., Vision in Time III (Graal Press co-published screenprint), scan.



Figure 41. CCP, 2009, promotional material illustrating Barns-Graham, W., Just in Time, (detail), (Graal Press co-published screenprint), scan.



Figure 42. Barns-Graham, W., 2007, 'Quiet Time' (Graal Press co-published screenprint) in Downing Street with the Prime Minister, Gordon Brown, photograph.

3.2. Screenprinting: the complete water-based system

I researched, wrote and illustrated this book with my co-author Robert Adam. The information in the book is the outcome of the research. The systems explained in the book are as user- and environmentally friendly as possible and are suitable for beginners or professionals. The book provides new information about stencils, tusches (*Figure 43*) and printing mixtures. There are indications that the book is making a valuable contribution to knowledge; for example, it is included on many academic reading lists worldwide and it has been reviewed favourably (p. 47), (*Appendix, pp. 140-144*).

It is the only publication on water-based screenprinting which illustrates only water-based screenprints (cf. Henning, 1994, p. 35. and Hoskins, 2001, p. 54). The book was published by Thames & Hudson, London and by Thames & Hudson Inc., New York as a hardback in 2003 (ISBN 0-500-51115-2), (ISBN 13: 978-0500511152) and as a paperback (ISBN 0-500-28425-3), (ISBN 13: 978-0500284254) in 2004. The book's dimensions are 25.5 x 22.5 cm, and it has 208 pages and 265 illustrations.



Figure 43. The use of Lascaux tusches illustrated in the screenprinting book (Adam & Robertson, 2003), photograph.

3.3 INTAGLIO: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking

The information in the book is the outcome of researching user- and environmentally friendly ways of making intaglio prints. I wrote and illustrated this book with my co-author Robert Adam. The book provides new information about mezzotinting (*Figure 44*), air-abrading, resists, tusches and collagraphy. It is the first book to place these changes within a historical context. New terminology and classifications are introduced and explained. The book has been selected by the largest supplier to educational establishments in the UK (Specialist Craft, 2009), (*Appendix, p. 140*). It has been reviewed favourably (*Appendix, pp. 141-142, 146*).

The book was published by Thames & Hudson, London and by Thames & Hudson Inc., New York as a hardback in 2007 (ISBN-10: 0-500-51343-0), (ISBN-13: 978-0-500-51343-9) and as a paperback in 2008 (ISBN-10: 0-500-28661-2), (ISBN-13: 978-0-500-28661-6). The book's dimensions are 25.5 x 22.5 cm, and it has 238 pages and 229 colour illustrations.

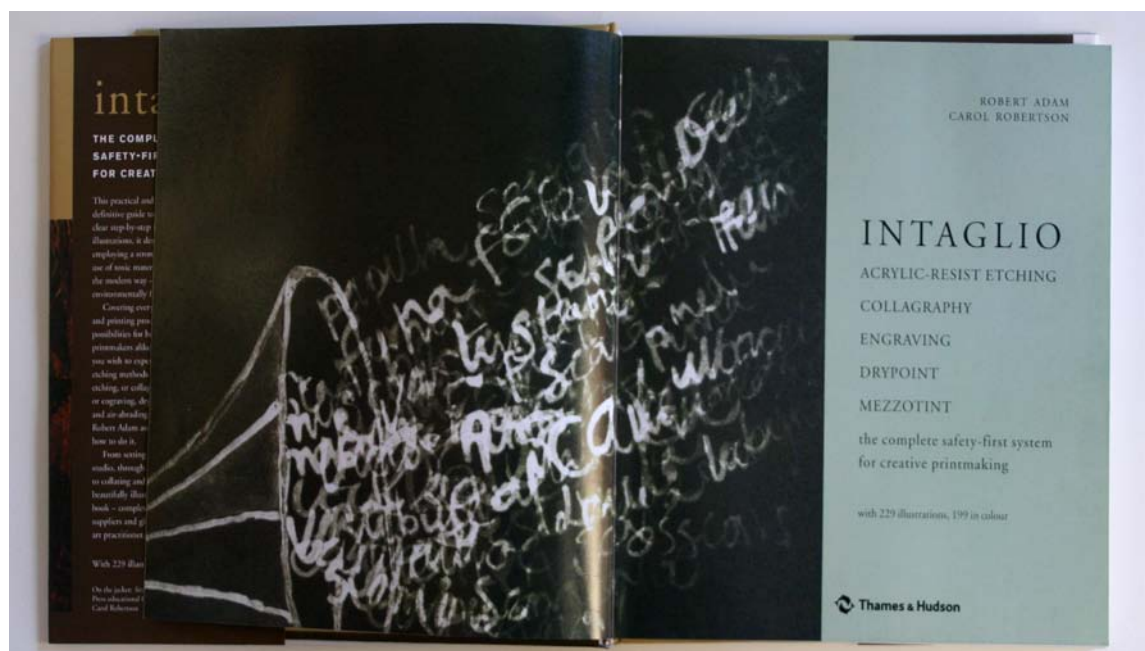


Figure 44. Frontispiece of the intaglio book: a detail printed from a mezzotinted plate with added collagraph media (Adam & Robertson, 2007), photograph.

4. The contribution to knowledge made by the research

4.1. The contribution to knowledge made by the new materials

The research has provided printmakers with new materials (and information about new materials) so that they can choose to work in this new way. These materials are now available internationally through suppliers such as Art Basic in Australia, Parasmoon Co. in Iran, Polymetaal in the Netherlands, AP Fitzpatrick in the UK, and Graphic Chemical in the US (who ship worldwide) (Figures 45-46). Retailers inform me that they have noted the change in printmaking practice through observing how over the last decade sales of the new generation of materials are steadily growing and are now outselling traditional printmaking materials. For example the materials listed on the web pages illustrated below have only been available since 2000.

The screenshot shows the homepage of Graphic Chemical & Ink Co. with a navigation bar including Home, Customer Service, Shopping Cart, and Printmaking Community. A search bar is also present. The main content area is titled 'CATEGORIES' and lists various printmaking materials. The 'Lascaux' category is selected, showing a list of products with descriptions, prices, and quantities.

Category	Product Name	Description	Price	Quantity
Lascaux	418020	Lascaux Tusche Wash 500 ml	US\$32.50	1
	These are not used directly on plates but are designed for making opaque marks on positives for light-sensitive printmaking. This tusche has handling qualities similar to ink and can be diluted to make graduated washes typical of stone lithography. By scratching into the dry marks, delicate non-printing lines can be created. It is not used directly on the plate but designed for making opaque marks on positives for light-sensitive printmaking.			
	418021	Lascaux Tusche Wash/Spray 500 ml	US\$32.50	1
	The Lascaux Tusches cannot be used directly on an etching plate as they are designed for making opaque marks on positives for light-sensitive printmaking. This tusche can be sprayed from a simple airbrush and is required if Lascaux Lift Solution is to be used. Other airbrush techniques can be employed and tonal effects similar to aquatints in etching can be created. It can also be used for painting washes and handles like Chinese ink. When diluted it creates a further range of washes.			
	418022	Lascaux Waterproof Tusche 500 ml	US\$32.50	1
	Fast drying, waterproof and scuff resistant - this tusche has homogenous covering power and is used for a broad range of painted marks - the diluted tusche dries to resemble "toad-skin" washes usually found in zinc plate lithography.			
	418023	Lascaux Water Soluble Tusche 500 ml	US\$32.50	1
	This viscous tusche can be painted in a smooth even layer which can be scratched away to create delicate non-printing lines. It can also be used for a broad range of painted marks, offsetting and pattern-making. The diluted tusche dries to create characterful granular washes. Dry marks can be re-wet and altered if required.			
	418024	Lascaux Tusche Soft Ground Effect 500 ml	US\$32.50	1
	The Lascaux Tusches cannot be used directly on an etching plate as they are designed for making opaque marks on positives for light-sensitive printmaking. This slow drying viscous tusche has been designed to produce effects similar to soft ground in traditional etching. Using this method soft non-printing drawings may be made and impressions of fabric, leaves, feathers and other collage materials may be taken. The tusche can also be used for a broad range of painted marks and can be drawn into with paint shapers and other tools. The diluted tusche dries to create granular washes. Dry marks can be re-wet and altered.			
Lascaux	418040	Lascaux Tusche Diluting Solution 500 ml	US\$32.50	1
	The Lascaux Tusches cannot be used directly on an etching plate as they are designed for making opaque marks on positives for light-sensitive printmaking.			
Lascaux	43990	Boxed Set of Lascaux Assorted Liquid Tusches - 6 85ml	US\$44.75	1
	Set of 6 - 1 each 85 ml - Tusche Wash, Tusche Wash/Spray, Waterproof Tusche, Water Soluble Tusche, Tusche Soft Ground Effect & Diluting Liquid. The Lascaux Tusches cannot be used directly on an etching plate as they are designed for making opaque marks on positives for light-sensitive printmaking.			

Shopping Cart Items: Your Cart Is Empty

Order selected Products

Figure 45. Worldwide supplier of Lascaux materials for printmaking, (Graphic Chemical & Ink Co, 2009), screengrab.

http://www.lascaux.ch/pdf/en/produkte/druckgrafik/uerbersicht_druckgrafik_e.pdf

http://www.lascaux.ch/pdf/en/produkte/druckgrafik/uerbersicht_druckgrafik_e.pdf Google

http://192...i-bin/webcm DVD rental Google Weather Ask.com UK BT Yahoo Yellow Pages >>

Lascaux
the spirit of colours

Lascaux Products for Printmaking

ARE ACRYL RESIST ETCHING	COLLAGRAPHY	WATER-BASED- SCREENPRINTING			
<p>A system of acrylic resists, coloured coatings, a lift solution and photo-resist to replace traditional materials. All the materials can be used on copper, brass, steel, zinc or aluminium. The plates may be etched in a range of mordants and printed with oil- or water-based inks.</p> <ul style="list-style-type: none"> • Plate-backing resist • Soft-resist • Hard Resist • Coloured coating for Hard Resist • Stop-out-resist • Aquatint spray resist • Lift Solution • Wash-resist <p>Photoresists* (e.g. Photoc or Puretch)</p> <p><small>*not available from Lascaux</small></p>	<p>A printable surface can be built up on intaglio plates using the following acrylic and lightsensitive materials, all of which can be used on a variety of substrates. The plates may be printed with oil- or water-based inks.</p> <ul style="list-style-type: none"> • Pastes (Modelling Pastes, Structura, Impasto Gels) • Primers (Gesso, Pastelground) • Acrylic resists (Soft, Hard, Stop-out and Plate backing) • Studio Original acrylics • Mediums (for adhering collage materials) <p>Photocollagraphic plates* (e.g. Toyobo, Solarplate, Printight) and photopolymer films* such as ImagOn and Photoc</p> <p><small>*not available from Lascaux</small></p>	<p>A system of water-based stencils and printing mixtures to replace solvent-based materials.</p> <p>Printing mixtures</p> <ul style="list-style-type: none"> • Screenprinting Paste • Transparent Varnish • Thickener • Retarder • Colours <p>Stencils</p> <ul style="list-style-type: none"> • Screenfiller • Screen painting fluid (for creating painted marks which will print) • Paper stencils* <p>Photostencils* (e.g. Murakami or Folascreen)</p> <p><small>*not available from Lascaux</small></p>			
<p>MAKING POSITIVES FOR LIGHT-SENSITIVE PRINTMAKING PROCESSES</p> <p>A range of light-blocking tusches, a diluting liquid and a lift solution for creating images on positives; or for altering digital positives, photopositives and photocopy positives. Positives are used for photo-etching, photocollagraphy, photoscreenprinting and photolithography.</p> <table border="1"> <tbody> <tr> <td> <ul style="list-style-type: none"> • Tusche waterproof • Tusche water-soluble • Tusche wash </td> <td> <ul style="list-style-type: none"> • Tusche wash / spray • Lift solution • other stencils* <p><small>*not available from Lascaux</small></p> </td> <td> <ul style="list-style-type: none"> • Tusche soft-ground effect • Tusche diluting liquid </td> </tr> </tbody> </table>			<ul style="list-style-type: none"> • Tusche waterproof • Tusche water-soluble • Tusche wash 	<ul style="list-style-type: none"> • Tusche wash / spray • Lift solution • other stencils* <p><small>*not available from Lascaux</small></p>	<ul style="list-style-type: none"> • Tusche soft-ground effect • Tusche diluting liquid
<ul style="list-style-type: none"> • Tusche waterproof • Tusche water-soluble • Tusche wash 	<ul style="list-style-type: none"> • Tusche wash / spray • Lift solution • other stencils* <p><small>*not available from Lascaux</small></p>	<ul style="list-style-type: none"> • Tusche soft-ground effect • Tusche diluting liquid 			
<p>FOR CLEANING AND REMOVAL</p> <ul style="list-style-type: none"> • Lascaux water-based materials (while still wet) are cleaned from brushes, rollers, other tools and screen meshes with warm soapy water. • Lascaux materials which remain water-soluble when dry are cleaned, 'lifted' or removed from plates, screens or positives with warm soapy water. • Remover is used to strip dried Lascaux resists and collagraph materials from plates, Lascaux Screenfiller from screen meshes, and Lascaux Tusches from smooth PVC sheets. 					

52334.02

Lascaux Colours & Restauro, Barbara Diethelm AG, Zürichstrasse 42, CH-8306 Brüttisellen
Telefon +41 44 807 41 41, Fax +41 44 807 41 40, info@lascaux.ch, www.lascaux.ch

Figure 46. Product information (results of the research), (Lascaux, 2009), screengrab.

4.2. The contribution to knowledge made by the books

Both books are available internationally through libraries and can be purchased from Amazon and other booksellers in Europe, Australia, Japan, Poland, China, America and Canada as well as specialist printmaking suppliers (*Figure 47*). The books have received favourable reviews from *Printmaking Today*, London; *IMPACT*, Magazine for the Print Council of Australia, Melbourne; *Artists and Illustrators*, London; *Screen Process & Digital Imaging*, US; *Books matter*, US; *The Midwest Book Review*, US; and elsewhere. A Google search for the book title finds references to printmakers who are using the books worldwide (*Figure 47*). The books are used by educationalists and are listed on academic reading lists (*Appendix, pp. 140-146*).

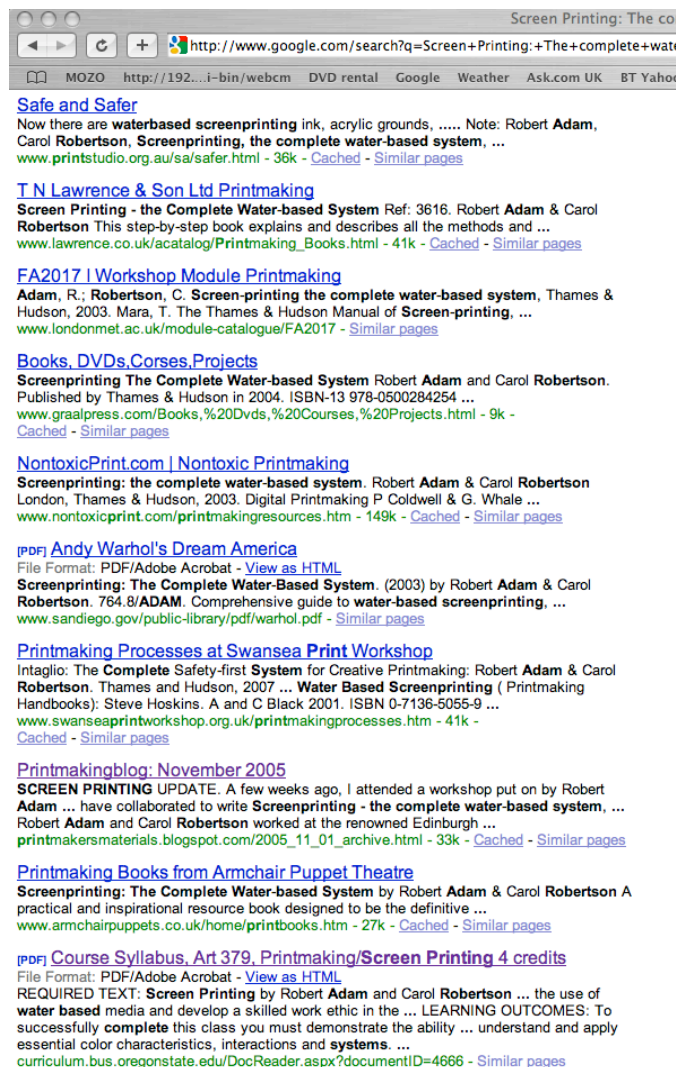
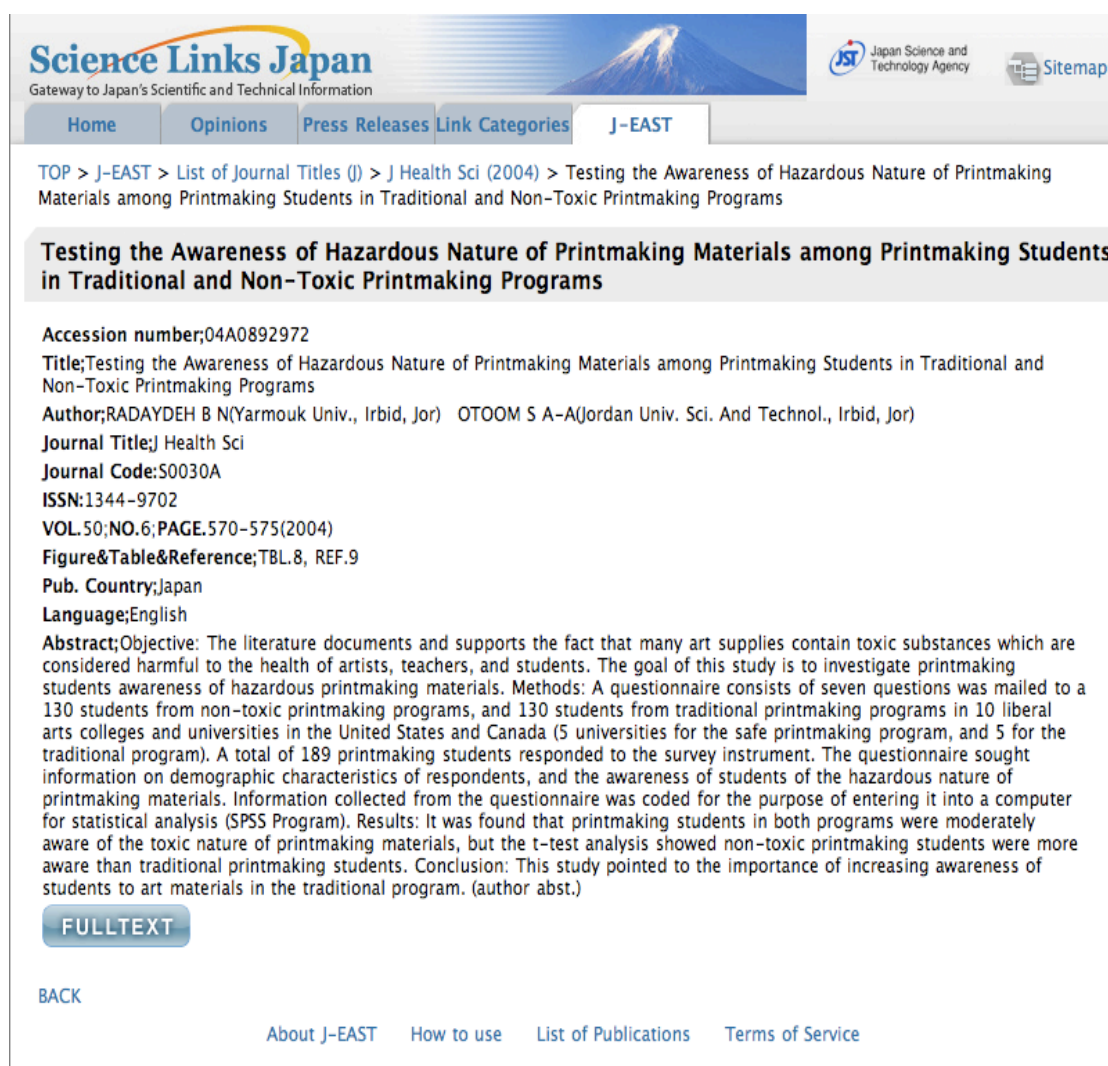


Figure 47. A Google search for the screenprinting book in libraries, screengrab.

4.3. Measuring the evidence that the research is influential using surveys.

The results of questionnaires and surveys (e.g. *Journal of Health Science*, 2004), (*Figure 48*) demonstrate that the research is influential in the present worldwide move towards the modernization of printmaking practice. In the UK, Pengelly's 1994 questionnaire '*established that water-based screenprinting media are used in 80% of higher education fine-art printmaking courses*' (Pengelly, 1997, p. 103). In 2004 Hoskins points out that workshops and studios had also changed practice and that water-based screenprinting had become the norm in around fifteen years (Hoskins, 2004, pp. 98-99).



The screenshot shows the Science Links Japan website interface. At the top, there is a header with the Science Links Japan logo, a navigation bar with links like Home, Opinions, Press Releases, Link Categories, and J-EAST, and logos for JST and the Japan Science and Technology Agency. Below the navigation bar, a breadcrumb trail reads: TOP > J-EAST > List of Journal Titles (J) > J Health Sci (2004) > Testing the Awareness of Hazardous Nature of Printmaking Materials among Printmaking Students in Traditional and Non-Toxic Printmaking Programs. The main content area features the title of the article in a highlighted box. Below the title, various metadata fields are listed, including the accession number, title, author, journal title, journal code, ISSN, volume and page information, figure and table references, publication country, and language. An abstract follows, detailing the study's objective, methods, results, and conclusion. A 'FULLTEXT' button is visible below the abstract. At the bottom of the page, there is a 'BACK' link and a footer with links for 'About J-EAST', 'How to use', 'List of Publications', and 'Terms of Service'.

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Testing the Awareness of Hazardous Nature of Printmaking Materials among Printmaking Students in Traditional and Non-Toxic Printmaking Programs

Accession number;04A0892972
Title;Testing the Awareness of Hazardous Nature of Printmaking Materials among Printmaking Students in Traditional and Non-Toxic Printmaking Programs
Author;RADAYDEH B N(Yarmouk Univ., Irbid, Jor) OTOOM S A-A(Jordan Univ. Sci. And Technol., Irbid, Jor)
Journal Title;J Health Sci
Journal Code;S0030A
ISSN;1344-9702
VOL.50;NO.6;PAGE.570-575(2004)
Figure&Table&Reference;TBL.8, REF.9
Pub. Country;Japan
Language;English
Abstract;Objective: The literature documents and supports the fact that many art supplies contain toxic substances which are considered harmful to the health of artists, teachers, and students. The goal of this study is to investigate printmaking students awareness of hazardous printmaking materials. Methods: A questionnaire consists of seven questions was mailed to a 130 students from non-toxic printmaking programs, and 130 students from traditional printmaking programs in 10 liberal arts colleges and universities in the United States and Canada (5 universities for the safe printmaking program, and 5 for the traditional program). A total of 189 printmaking students responded to the survey instrument. The questionnaire sought information on demographic characteristics of respondents, and the awareness of students of the hazardous nature of printmaking materials. Information collected from the questionnaire was coded for the purpose of entering it into a computer for statistical analysis (SPSS Program). Results: It was found that printmaking students in both programs were moderately aware of the toxic nature of printmaking materials, but the t-test analysis showed non-toxic printmaking students were more aware than traditional printmaking students. Conclusion: This study pointed to the importance of increasing awareness of students to art materials in the traditional program. (author abst.)

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Figure 48. Testing the Awareness of Hazardous Nature of Printmaking Materials among Printmaking Students in Traditional and Non-Toxic Printmaking Programs, (Journal of Health Science, 2004), screengrab.

Howard in the US quotes from the results of The Tamarind Institute, US, 2001 survey made *'in an attempt to better understand contemporary issues and future directions for printmaking.'* This survey indicated *'that 89% of art departments in the USA have adopted non-toxic processes. That 33% of schools surveyed have eliminated one or more courses in the past 5 years due to health concerns is a startling fact.'* and *'There is evidence to suggest that there is an inclination to adopt non-toxic processes in all print media'* (Howard, 2003, pp. 4-5). Researchers continue to measure the change using questionnaires and surveys.

4.4. Measuring the evidence of change

The ongoing changes in printmaking practice can also be measured by the increasing number of advertisements in print journals for courses and workshops in the new methods or by searching the worldwide web for courses, printmakers and studios who are using these 'safer' methods (*Figures 49-54*).

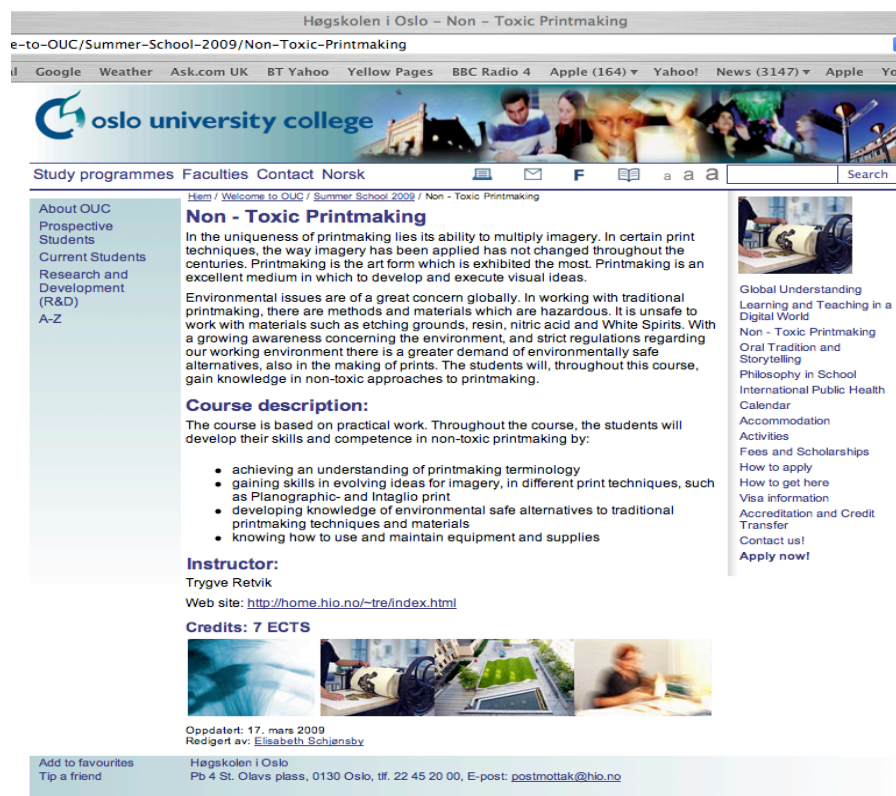


Figure 49. A course in safer methods of printmaking, Oslo University College, 2009, screengrab.

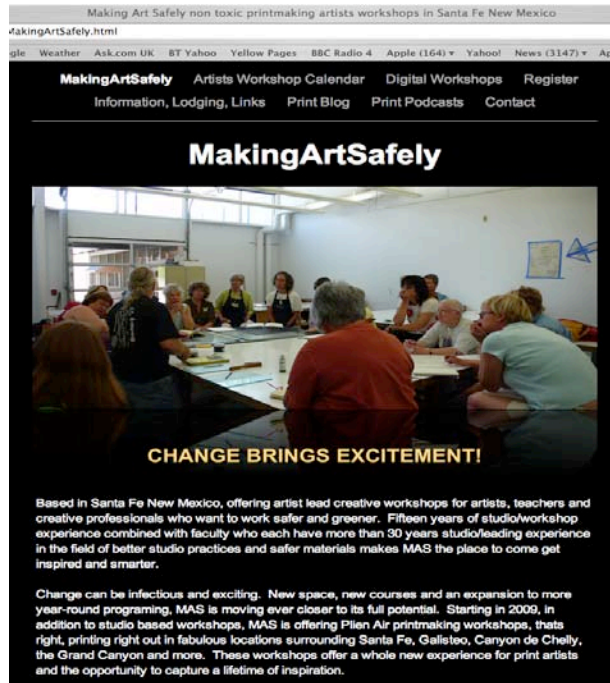


Figure 50. Making Art Safely, workshops, USA, screengrab.

Books

Acrylic Resist Etching Workshops

Wharepuke Print Studio is offering weekend workshops covering two different non toxic etching techniques using copper and aluminium on the following dates:

October 2009:
Course 1: Saturday 3rd and Sunday 4th – 10.00 am – 4.00pm - copper etching
Course 2: Saturday 24th and Sunday 25th – 10.00 am – 4.00pm - aluminium etching

November 2009:
Course 3: Saturday 7th and Sunday 8th – 10.00 am – 4.00pm - copper etching
Course 4: Saturday 14th and Sunday 15th – 10.00 am – 4.00pm - aluminium etching

Figure 51. Graver, M., ARE workshops in New Zealand, screengrab.

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DOUBLE ELEPHANT
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Acrylic Resist Etching Weekend 13th & 14th February 2010

Acrylic Resist Etching
Weekend, 10am to 4pm
£80. 6 places
13th 14th February 2010

All the expressive mark making typical of traditional etching without the use of harmful organic solvents. Hard ground, soft ground, aquatint, wash and semi permeable grounds on offer. Plus an introduction to different ways of applying colour.

Tutor: Lynn Bailey

Figure 52. ARE workshops, UK, screengrab.

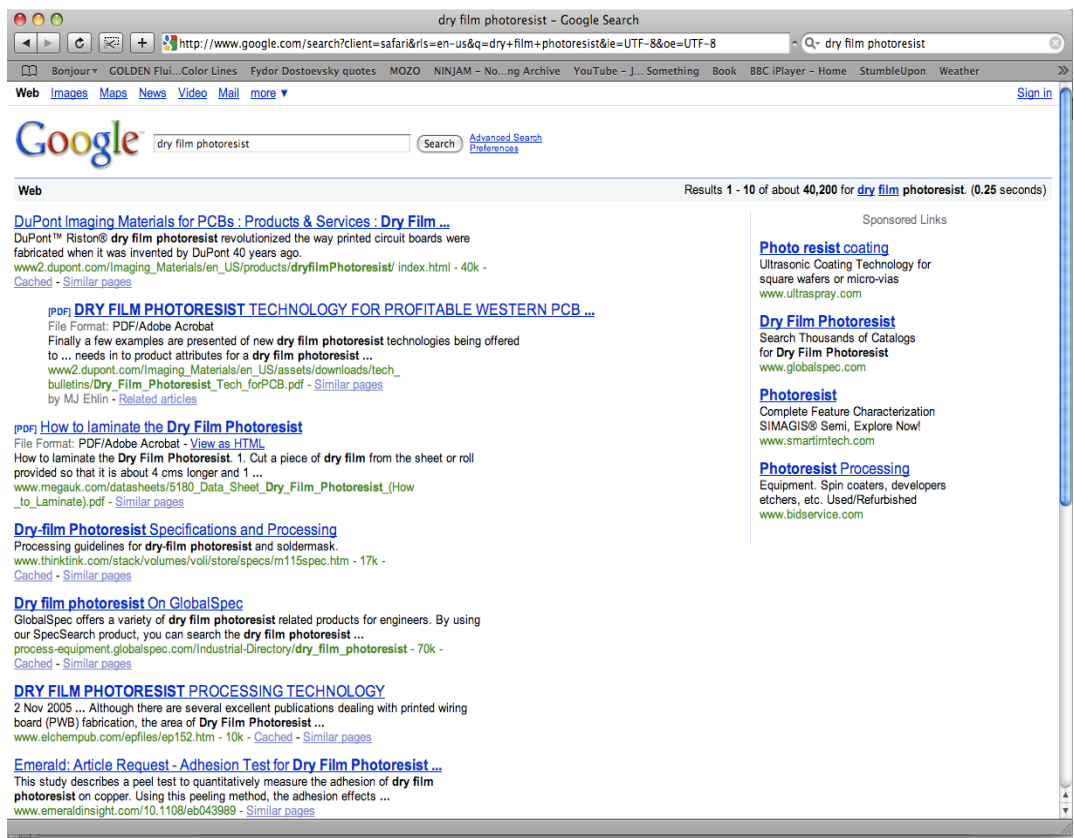


Figure 53. A Google search for dry-film photoresist, screengrab.

Another sign of the evidence of contribution to knowledge made by this research is the use of my terminology such as tusches (for light-sensitive printmaking processes), photocollagraphy, and acrylic-resist etching (ARE), (*Appendix, pp. 91-95*). ARE is now used internationally, including by Howard (Howard, 2003, title) (*Figure 56*). The first use of the generic terminology 'dry-film photo resists' in my intaglio book enables printmakers to source more information than before. At this time toxic materials such as Kodak Photo Resist have been superseded by safer photoresists which are now used for etching and for collagraphy worldwide (*Figure 55*). The speed of change is accelerating and it is not unreasonable to imagine that the acrylic resists which are compatible with these photoresists will in time supersede the traditional resists. Labelling systems such as the American Society for Testing and Materials (ASTM International, 2009) enable artists to select materials which have been judged to be safer to user and the environment, such as the materials and working methods which were developed through my research.

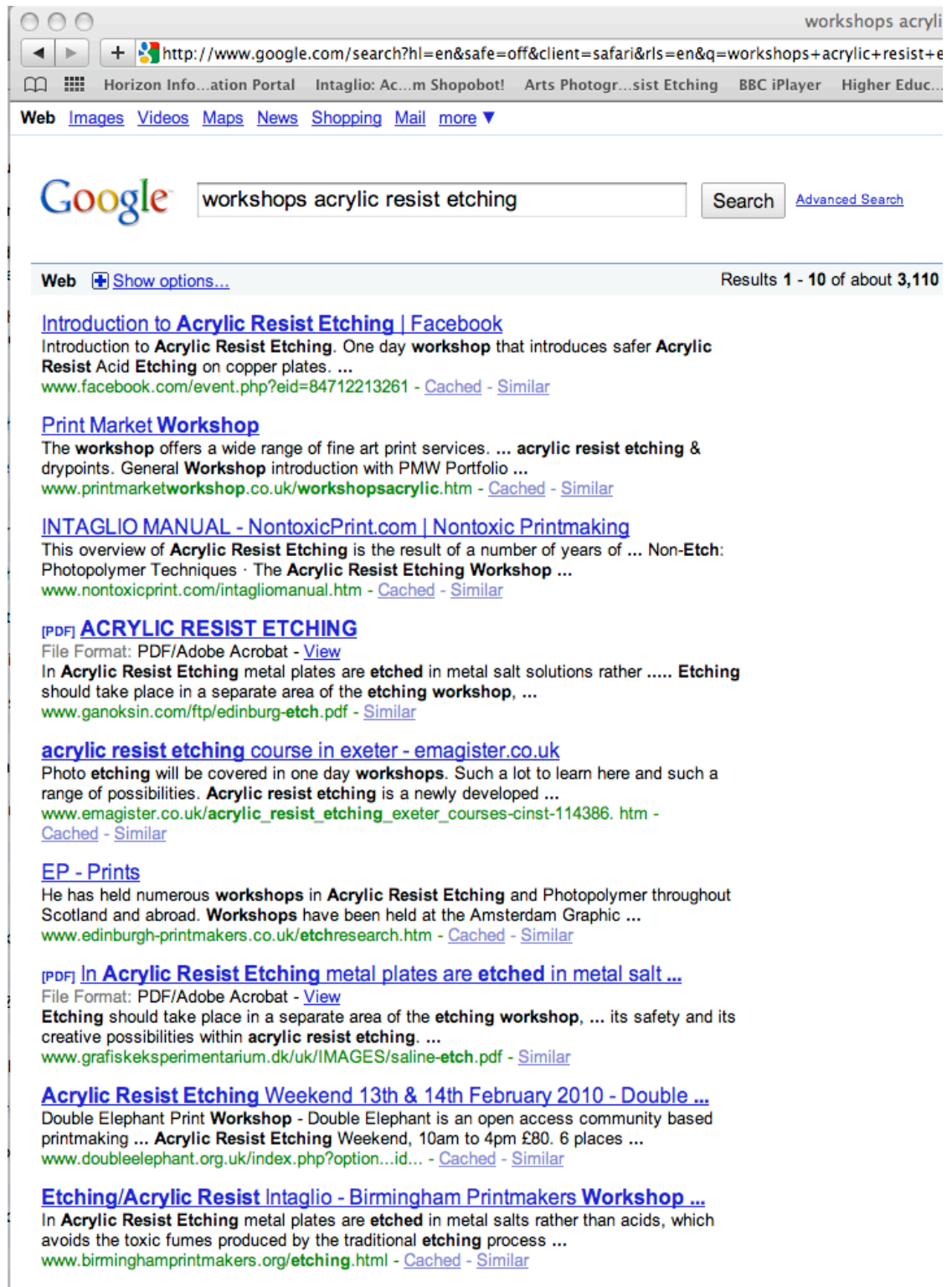


Figure 54. A Google search for 'workshops acrylic resist etching' finds courses in safer printmaking and illustrates how the terminology is being widely used, screengrab.

5. Conclusions at this time

The aim to construct and make available a coherent user and environmentally friendly printmaking system that enables artists to work creatively and effectively has been achieved. The resulting systems for screenprinting and intaglio printmaking (and for making positives) are accessible, reliable, related to previous practice, economical and logical, and as safe as possible to use, and their terminology aids teaching and learning. And as the move towards the use of safer and more environmentally friendly printmaking continues around the world I trust that my contribution to the field will continue to help printmaking to flourish in schools, colleges and workshops; allow artists to explore their concepts through printmaking; and enable more artists to use printmaking in their practice. I hope that artists will gain an understanding through my books of how this new approach relates to the classical and traditional principles.

Appendix

1. Timelines of innovations and other developments which have changed printmaking practice

1.1. Tables of innovations and other developments

The following tables provide a timeline of research activity, list the major changes in legislation, the important books, the key educators, and the main innovators and their innovations in the various disciplines. My research, and research I was closely involved in, is coloured blue for easy identification.

Table 1. Innovations and developments in screenprinting (1970-1980).

Date	Name	Innovation or development	Selected website or reference
1970s	Lascaux Colours & Restauro, Zurich	Created Lascaux Screenpaste for screenprinting in conjunction their water-based paints. Lascaux is environmentally conscious and their products fulfil both Swiss and United States standards, qualifying respectively as 'non-toxic' and 'no health labelling required'.	www.lascaux.ch
1970	Legislation (US)	Occupational Safety and Health Act. 'The Clean Air Act' and EPA (Environmental Protection Agency)	www.epa.gov
1974	Legislation (UK)	The Health and Safety at Work Act (HASAWA)	www.healthandsafety.co.uk
c.1975	Folex Image (Switzerland)	Created screenprinting products such as photo-emulsion and remover in response to the changes in health and safety and environmental legislation.	www.folex.com
c.1975	CPS	Manufactured environmentally friendly chemicals for the screenprint industries.	www.cps.eu
1979	Mara, T. (UK)	Publication of his book 'The Thames and Hudson Manual of Screenprinting'	(Mara, 1979)
c.1980	Speedball (US)	Manufactured screen fillers, inks, acrylic process-colours which qualify as 'no health labelling required'.	www.speedballart.com/

Table 2. Innovations and developments in screenprinting (1981-1990).

Date	Name	Innovation or development	Selected website or reference
1984	Seeger, N. (US)	Publication of her book on safer working methods.	(Seeger, 1984)
c.1985	Liquitex (US)	Manufacture acrylic paints and mediums which can be used for screenprinting onto paper or fabric.	www.liquitex.com
1989	Anderton, R. and Hoskins, S.	Start to research into water-based screenprinting. Teaching students and providing courses. Exhibiting works and writing articles.	www.uwe.ac.uk
1989	Robertson, C. (UK)	Start to research into water-based screenprinting. EP provides workshops to generate change. Disseminates information through international network of printmakers and contacts, e.g. Elspeth Lamb in contact with Nik Semenoff.	(Adam & Robertson, 2003, p. 17)
c.1989	Golden Colours (US)	Start to provide screenprinting mediums to adapt acrylic paints for screenprinting onto paper or fabric.	www.goldenpaints.com
1990	Legislation (UK)	Introduction of 'The Environmental Protection Act' and the 'Control of Substances Hazardous to Health' regulations (COSHH). Material Safety Data Sheets (MSDS) had to be made available with materials, and studios had to hold these data sheets in the studio.	www.hse.gov.uk
1990	Rossol, M. (US)	Publication of her book, <i>The Artist's Complete Health and Safety Guide</i> .	(Rossol, M, 1990)
1990	Challis, T. (UK)	Publication by estamp of his book <i>Print Safe</i> .	(Challis, 1990)
1990s	Daler Rowney (UK)	Market System 3 Screen Printing Medium and System 3 Textile Printing Medium for use with their System 3 Acrylic Colours.	www.daler-rowney.com
1990s	Sericol, T.W., Graphics, Coates et al.	Companies began to make safer and more environmentally-friendly products including ultraviolet curing inks.	www.sunchemical.com
1990	Semenoff, N. (US)	Began to research water-based screenprinting. Suggested using wallpaper paste, dyes and pigments.	http://homepage.ussask.ca/~nis715/

Table 3. Innovations in screenprinting (1991-1997).

Date	Name	Innovation	Selected website or reference
1991	Robertson, C. (UK)	EP became the first editioning and open-access studio to make the complete changeover to these methods of water-based screenprinting. The prints are exhibited internationally. Written information is disseminated.	(<i>Printmaking Today</i> , (6) 3)
1992	Robertson, C. (UK)	Consultant to Edinburgh College of Art which is the first college in Scotland to make the changeover to water-based methods.	
1994	Anderton, R., Hoskins, S. et al.	UWE, Centre for Fine Print Research is established. Research into water-based screenprinting using industrial inks and paints. Teaching students and providing courses.	(‘Print Dynamics’, <i>Printmaking Today</i> , (8) 2) www.uwe.ac.uk
1994	Henning, R. (US)	Publication of her book on water-based screenprinting. Advocated use of TW Graphics Inks.	(Henning, 1994, p. 9)
1994	Moran, D. (US)	Advocated use of TW Graphics Inks.	(<i>Printmaking Today</i> , (4)1 p. 25)
1994	Anderton, R. Hoskins, S. et al (UK)	A series of articles. In 1995 Hoskins saw T.W. Graphics Inks and prints at Gemini GEL Studio Los Angeles (US). At UWE they select TW Graphics 1000 series inks for professional use and Daler Rowney System 3 for students. UWE courses attended by many national and international artists and educators.	(<i>Printmaking Today</i> , (3) 2 p. 25.), (<i>Printmaking Today</i> , (1) 4 p. 25.), (Hoskins, 2001, p. 59)
1994	Robertson, C. (UK)	Rejected both T.W. Graphics inks and Daler Rowney System 3. and instead used acrylic varnish and adapted Lascaux, Kremer and Golden products to make screenprinting mixtures suitable for all levels of teaching and publishing. In order to validate the system artists are selected to publish with.	(Adam & Robertson, 2003, pp. 10-38)
1995	Shaw, P. (UK)	Articles about his approach to making ink for screenprinting such as ‘ <i>Fruit & Veg or Growing Your Own Ink</i> ’ were published.	(<i>Printmaking Today</i> , 4 (4))
1997	Adam, R. (UK)	Article about EP and the implementation of the new methods ‘What does it mean in practice?’ published in <i>Grapheion</i> and <i>Printmaking Today</i> .	(<i>Printmaking Today</i> , 6 (3)), (<i>Grapheion</i> , 1997, August, Prague)

Table 4. Innovations and developments in screenprinting (1997-2007).

Date	Name	Innovation or development	Selected website or reference
1997	Robertson, C. (UK)	Teaching and providing advice to professionals from over 100 organizations. Made over 50 collaborative print projects with artists, including Sir Eduardo Paolozzi, Ogilvie, Newcomb.	(Adam & Robertson, 2003, pp. 6, 10, 16, 24, 28, 58, 75, 87, 97, 103, 126, 141, 163, 170, 186, 200)
1997	Pengelly, J. (UK)	<i>'Environmentally sensitive printmaking: a framework for safe practice'</i> , Ph.D Thesis, Robert Gordon University. He used T.W. Graphics Ink	(Pengelly, 1997)
1998	Robertson, C. (UK)	Established Graal Press with Adam and continued to research, document, validate (editioning programme) and disseminate. Consultant for the modern print studio at Wimbledon School of Art, and taught students. Started a major research project with Lascaux, Zurich, to develop new materials.	(Adam & Robertson, 2003, pp. 9, 12, 20, 21, 23, 6, 60, 61, 62, 63, 64, 76, 77, 78, 82, 84, 86, 89, 90, 93, 95, 101, 105, 106, 109, 111, 120, 126, 149, 156, 160, 163, 169, 187, 200)
1998	Adams, I. (UK)	<i>'Exploration of Water-Based Inks in Fine Art Screenprinting'</i> , D. Phil, Northern Ireland.	(Adams, 1998)
1998	Anderton, R (UK)	Patented his non-toxic printing methods and wrote educational information for Daler-Rowney.	www.uwe.ac.uk
1999	Petrie, K. (UK)	<i>'Water-based ceramic transfer printing'</i> PhD at UWE.	(Petrie, 1999)
2001	Hoskins, S. (UK)	Publication by A & C Black of his book <i>'Water-based Screenprinting'</i>	(Hoskins, 2001)
2003	Robertson, C. (UK)	Publication by Thames & Hudson in the UK and US of the hardback of <i>'Water-based Screenprinting: the complete system'</i>	(Adam & Robertson, 2003)
2004	Robertson, C. (UK)	Publication by Thames & Hudson in the UK and US of the paperback. of <i>'Water-based Screenprinting: the complete system'</i>	(Adam & Robertson,, 2004)
2004	Hoskins, S. UK)	Publication by A & C Black of his book on inks.	(Hoskins, 2004)
2005	Robertson, C. (UK)	Teaching workshops in Europe, attended by print professionals such as Helmut Sennhauser, Ralls.	www.werkstall.ch
2007	Gunn, A. V. (UK)	Publication by Lund Humphries of Gunn's book about the prints of W Barns-Graham, including the collaborations with Robertson .	(Gunn, 2007, cover , frontispiece , pp. 48-65, 105-149)

Table 5. Innovators and innovations in intaglio (European, 1600-1800).

Date	Name	Innovation or development	Selected website or reference
c.1589-1640	Seghers, H. (Europe)	Experimental approach, etched complex tones, textures, and soft lines. He used colour, water-based inks, and printed unique prints on canvas and paper which were sometimes painted on first.	(Saff & Sacilotto, 1978, p. 90), (Getlein, 1964, p.92)
1592-1635	Callot, J. (Europe)	Created the first hard varnish (ground) and the <i>échoppe</i> etching needle. His aim was to avoid foul-bite and achieve a crisp etched line similar to an engraved line.	(Saff & Sacilotto, 1978, p. 99) (Lumsden, 1962, p. 207)
1606-1669	Van Rijn, R. (Europe)	He admired Seghers, worked with soft grounds, used nails and other instruments to make marks, and scraped and burnished.	(Saff & Sacilotto, 1978, p. 101)
c.1609-1680	Von Siegen, L. (Europe)	Invented mezzotinting	(Saff & Sacilotto, 1978, p. 104)
1731-1809	Sandby, P. (Europe)	Named aquatint, used spirit aquatint to gain fine effects and invented step-biting.	(Lambert, 2001, p. 61)
1746-1828	Goya, y L. (Europe)	Successive aquatints and stopping-out to form image and achieve rich tones	(Getlein, F, D, 1964, p.192)
1757-1827	Blake, W. (Europe)	Deep biting, stop-out varnish, relief printing and using water-based materials	www.tate.org.uk/learnonline/
1765-1833	Niépcé, J. (Europe)	The first photoresists and photo-etchings (heliographs)	(Sacilotto, 1982, p. 15) www.niépcé.com
1800-1877	Fox Talbot, H. (Europe)	Patented photogravure	http://foxtalbot.dmu.ac.uk/ (Sacilotto, 1982, p. 18).
1893-1975	Nesch, R. (Europe)	Made 'metal prints' by using deep etching, soldering, weaving wire, drilling, sawing, and collage techniques	www.nesch.no

Table 6. Innovations and developments in intaglio (1900-1984).

Date	Name	Innovation or development	Selected website or reference
1893-1965	Thrash, D. (US)	Abrading plate surface with carborundum to create tones.	http://www.philamuseum.org/micro_sites/exhibitions/thrash/flash.html
1902-1995	Margo, B. (US)	Invented the cellocut.	www.borismargo.net
1909-1989	Goetz, H. (France)	Creative use of carborundum for engraving, etching process and collagraphy	http://www.polymetaal.nl/beguina/mapc/carborundum.htm
1914-1996	Alps, G. (US)	He invented the term 'collagraphy' in 1956.	(Eichenberg, 1976 p. 340)
1915-2001	Peterdi, G. (US)	Building up the plate (additive methods) and working into the added material.	(Eichenberg, 1976 p. 320)
1953	Kodak	Invention of Kodak Photo Resist (KPR)	(Sacilotto, 1982, p. 87)
1970	Legislation (US)	The Occupational Safety and Health Act. The Clean Air Act Environmental Protection Agency (EPA).	www.epa.gov
1970	Dupont. (US)	Dry-film photoresist replaces KPR in industry.	www2.dupont.com/Imaging_Materials
1972	Chamberlain, W. (UK)	States in his book that acrylics could possibly be sprayed as a resist for aquatint in the future.	(Chamberlain, 1972, p. 63)
1972	Welden, D. (US)	Used Torelief plates (solar plate) for intaglio.	www.solarplate.com
1974	Ross, J. Romano, C. & Ross, T (US)	In their book <i>'The Complete Printmaker'</i> they described collagraphy as an 'additive' method as the plate surface is built up.	(Ross, Romano, Ross, 1972)
1974	UK Legislation	The Health and Safety at Work Act (HASAWA).	www.healthandsafety.co.uk
1984	Seeger, N. (US)	Publication of her book <i>'Printmaker's Guide to the Safe Use of Materials'</i>	(Seeger, 1984)

Table 7. Innovations and developments in intaglio (1985-1994).

Date	Name	Innovation or development	Selected website or reference
1987	Robertson, C. and Adam, R. (UK)	Developed a method of photo-etching to replace working with KPR	(Adam & Robertson, 2007, page 25).
1990	Legislation (UK)	Introduction of 'The Environmental Protection Act', 'Control of Substances Hazardous to Health' regulations (COSHH) and Material Safety Data Sheets (MSDS).	www.hse.gov.uk
1990	Challis, T. (UK)	Publication of his influential book ' <i>Print Safe</i> '	(Challis, 1990)
1990	Rossol, M. (US)	The publication of her influential book ' <i>The Artist's Complete Health and Safety Guide</i> '	(Rossol, 1990)
1991	Semenoff, N. (US)	Article on electro-etching process	http://homepage.usask.ca/~nis715/
1991	Robertson, C. (UK)	Screenprinted acrylic resists onto etching plates. Made collagraphs using solely acrylic media.	(Adam & Robertson, 2007, p. 25)
1992	Blundell, B. (US)	Informed Howard of the use of Future floor polish	(Howard, 1992 p. v)
1992	Howard, K. (US)	Published his book which describes how to make photo-etchings using a gelatin-based process; describes aquatinting by spraying screen filler, and resists made with floor polish and relief ink.	(Howard, 1992, pp. 40, 4171, 72, 73, 74, 75, 76, 77, 80, 81)
1993	Zaffron, M. (US)	Used dry-film photopolymer resist and introduced this to Howard and other printmakers as an acid-resist for etching.	www.zacryl.com
1994	Howard, K. (US)	Gives workshop at EP in 1994. Teaches resist system from his book but uses dry-film photoresist instead of gelatin.	(Howard, 1992)
1994	Robertson, C. (UK)	Used Hunt screenfiller and other acrylic materials on plates laminated with a dry-film resist and holding an image. Uses components from the recipe for screenprinting resist to strengthen other resists so they can be used on zinc and steel. Used water and dish-washing liquid as stencils for spray aquatint. Applied dry-film photoresist to wood and other substrates.	Proof, prints and notes from the period, some of which are illustrated in the intaglio book (Adam & Robertson, 2007).

Table 8. Innovators and innovations in intaglio (1994-1995).

Date	Name	Innovation or development	Selected website, reference or editions
1994	Adam, R. (UK)	EP became the first open-access and editioning studio in the world to change to using 'non-toxic' etching. Supported team of Alfons Bytautas, Mayo, and Robertson .	(<i>Printmaking Today</i> 6 (3)), (<i>Grapheion</i> , 1997, August, Prague)
1994	Robertson, C. (UK)	Invents term 'acrylic-based etching' instead of 'non-toxic' etching.	
1994	Mayo, R. (UK/Aus)	Makes four-colour separation etchings, photo-collagraphs, combination prints with water-based screenprinting, photocollagraphy, and acrylic-resist etching. Joins staff of EP. Works with Robertson researching materials such as polishes and Photec to implement Howard's system.	(Adam & Robertson, 2007, pp. 17, 25) (Adam & Robertson, 2003, pp. 7, 39)
1994	Bytautas, A. (UK)	Responsible for EP's etching department, researches photo-processes.	Editions at EP.
1995	Howard, K. (US)	Teaches using dry-film resist as an added intaglio layer and calls this 'non-etch' and 'Intaglio Type'.	(Howard, K, 1998)
1995	Guthrie, K. (UK)	Works part time at EP with Robertson on researching sugar lift and embossing methods in intaglio and 4-colour separation in screenprinting.	(Adam & Robertson, 2003 p. 125)
1995	Clark, S. (UK)	Works part-time at EP in intaglio and editions using ARE and screenprinting, explores photocollagraphy and photo-etching.	Prints, and Kate Bright etching edition.
1995	Zaffron, M. (US)	Began to market his system of acid-resistant materials which are classified as safe to use.	www.zacryl.com
1995	Ponsaing, E. (Denmark)	Published his ideas in his book. Flexographic plates are used and so it is similar to Weldon's work.	(Ponsaing, E, 1995)
1995	Robertson, C. (UK)	Invents term acrylic-resist etching (ARE) to replace 'acrylic-based' and 'non-toxic' etching	(Adam & Robertson, 2007, p. 25)
1995	Kiekenben, F. (UK)	Works part-time at EP, is taught ARE by Robertson , editions using ARE, researches his mordant 'Edinburgh Etch', writes up notes on methods used at EP and teaches.	(Adam & Robertson, 2007, p. 24, 26, 155)

Table 9. Innovators and innovations in intaglio (1996-1998).

Date	Name	Innovation or development	Selected website or reference
1996	Adam, R., Robertson, C., Bytautas, A., Kiekeben, F. and Guthrie, K. (UK)	Designed and taught a series of ARE educational courses at EP. These were attended by over 100 printmaking specialists from all over the world, (including Henrik Bøegh who set up Grafisch Experimentarium (DK) and Susan Groce (US).	(<i>Printmaking Today</i> 6 (3), (Adam & Robertson, 2007, p.25)
1996	Rostow, S. and Jung, W. (US)	Researched, developed and manufactured safer inks for intaglio, mono and relief printmaking marketed as Akua.	www.waterbasedinks.com
1996	Stijnman, A. (Netherlands)	Suggested that use of vegetable cleaning agent (VCA) would solve the problems of hazardous fumes.	Printmaking forums such as MTSU.
1997	Kiekeben, F. (UK)	Published article about his research into a mordant of ferric chloride and citric acid,	(‘Edinburgh Etch’, <i>Printmaking Today</i> 6 (3)
1998	Howard, K. (US)	Publishes his book <i>Non-Toxic Intaglio Printmaking</i> and articles in <i>Printmaking Today</i> .	(Howard, 1998)
1998	Green, C. (France)	Published his book <i>Green Prints</i> about his methods of 'galv-etch' (an electrolytic etching process) and developed his mordant 'Bordeaux Etch' for etching aluminium, zinc and steel. His system of oil-based resists are used with VCA.	(Green, C, 1998)
1998	Robertson, C. and Adam, R. (UK)	Established Graal Press, consultants to The Slade School of Art, Wimbledon School of Art, London. A collaborative project was established with Lascaux, Zurich to invent, research and develop new materials for intaglio (ARE, collagraphy, engraving and stencils for air abrading methods), screenprinting, and for making autographic positives. The 18 new products are classified as safe to use, are removed with a household cleaner and are sold by international retailers.	(‘World View–Growth at Graal’, <i>Printmaking Today</i> 9 (4)) www.lascaux.ch
1998	Semenoff, N. (US)	An article about using aluminium plates and describing the use of copper sulphate with different quantities of added salt (sodium chloride) and sodium bisulphate as an etchant.	(Semenoff, N, <i>Leonardo</i> , 31 (2))

Table 10. Innovations in safer intaglio methods (1998-2008).

Date	Name	Innovation or development	Selected website or reference
2001	Weldon, D. (US) and Muir, P. (Aus)	Publication by Watson-Guptill of <i>Printmaking in the Sun</i> which describes and illustrates Weldon's methods of making positives, plates and prints.	(Weldon & Muir, 2001)
2002	UWE (UK)	Collaborative project with Cranfield Colours (sponsored by KTP and ITI) to develop water-washable inks for intaglio and relief.	www.uwe.ac.uk
2003	Howard, K. (US)	Publishes his book and uses term 'Acrylic-Resist Etching' in title. Sections by Elizabeth Dove, Kiekenben, David Jay Reed and Rossol.	(Howard, 2003)
2005	Robertson, C. (UK)	Teaching workshops in Europe, attended by print professionals such as Helmut Sennhauser, Christina and Peter Rall, and François Lafranca.	www.werkstall.ch www.lafranca.ch
2005	Hartill, B. and Clarke, R. (UK)	A & C Black publish their book on collagraphy. Acrylic gesso mentioned for use by children.	(Hartill & Clarke, 2005, p. 114)
2006	Brown, K. (US)	Publishes her book about prints made at her studio, Crown Point Press. Describes how Chuck Close used a 'plastic' (polymer) ground, and use of spray aquatinting to make etchings.	(Brown, 2006, p. 24)
2006	Gale, C. (UK)	A & C Black publish his book which describes some of the new materials, terminology and processes.	(Gale, 2006)
2007	Robertson, C. and Adam, R. (UK)	Publication in US and UK by Thames & Hudson of the hardback of my co-authored book on intaglio. Categorization of new methods and use of new terminology. Describes and illustrates the new system created by the research in the context of the field of intaglio. Lascaux products used in the disciplines of engraving, air abrading, mezzotint, etching, collagraphy and intaglio inks.	(Adam & Robertson, 2007)
2008	Robertson, C. and Adam, R. (UK)	Publication in US and UK by Thames & Hudson of the paperback version of my co-authored book on intaglio.	(Adam & Robertson, 2008)

Table 11. Innovations in the discipline of making positives (1826-1997).

Date	Name	Innovation or development	Selected website, reference or editions
1765-1833	Niépce, N. (France)	In 1826 he made the first positive by making oiling a print to make it translucent. He made the first photo-positives, a precursor to photography.	(Sacilotto, 1982, p. 15)
1800-1877	Fox Talbot, W. (UK)	Developed the technique of making photographic positives further.	http://foxtalbot.dmu.ac.uk/
1796-1875	Corot, J. and Millet, J. (France)	An positive/negative was created by removing areas of smoked (like hard ground) glass by drawing into it.	(Sacilotto, 1982, pp. 183, 184)
1841-1926	Klic, K. (Austria)	Used a halftone screen to generate tone.	(Sacilotto, 1982, p. 18)
1866-1939	Vollard, A. (France)	A print publisher, he encouraged artists such as Chagall, M. (1887-1985), and Rouault, G. (1871-1958) to make autographic positives by painting with gouache and then oiling the paper to make it translucent.	(Adam & Robertson, 2007, p. 18)
1924-2005	Paolozzi, E. (UK)	He used photo-positives and autographic methods.	(Adam & Robertson, 2003, p. 126)
1928-1987	Warhol, A. (US)	He used photo-positives and autographic methods.	(Sacilotto, 1982, p. 147)
1980s	Gresham, K. (UK)	Using pigments to create 'salt' washes. Used these with Elizabeth Frink.	(Wiseman, 1998, p. 65)
1990	Robertson, C. (UK)	Using pigments and window cleaner to create washes on smooth PVC.	Published prints
1990s	Gresham, K. (UK)	Worked with Autotype to find substrate ideal for positives. Truegrain is launched.	Published prints www.theprintstudio.co.uk
1990s	Weldon, D., Roberts, G., Semenoff, N. (US)	All using photocopy toner to create washes, in combination with acetone, meths and others solvents. They all suggest using toothed PVC. They also used the same materials suggested by Ross and Romano.	www.solarplate.com (Weldon, 2001) http://homepage.usask.ca/~nis715/

Table 12. Innovations in the discipline of making positives (1998-2008).

Date	Name	Innovation or development	Selected website, reference or editions
1998	Robertson, C. (UK)	Working with Lascaux to create range of purpose made materials for making autographic marks for positives. Lascaux Tusche Wash, Waterproof, Watersoluble, Spray/wash, Soft Ground Effect, Lift Solution and Diluting Liquid were launched.	(Gunn, 2009) Published prints http://www.barns-grahamtrust.org .
2003	Robertson, C. and Adam, R. (UK)	Publication by Thames & Hudson in the UK and US of the hardback of my co-authored book <i>Water-based Screenprinting: The complete system</i> . Categorization of new methods and use of new terminology. Describes and illustrates the new system created by the research in the context of the field of screenprinting.	(Adam & Robertson, 2003)
2005	Robertson, C. and Adam, R. (UK)	Teaching workshops in Europe, attended by print professionals such as Helmut Sennhauser, Christina and Peter Rall and François Lafranca.	www.werkstall.ch www.lafranca.ch
2004	Robertson, C. and Adam, R. (UK)	Publication by Thames & Hudson in the UK and US of the paperback of my co-authored book <i>Water-based Screenprinting: The complete system</i> .	(Adam & Robertson, 2004)
2007	Robertson, C. and Adam, R. (UK)	Publication in US and UK by Thames & Hudson of the hardback of my co-authored book on intaglio. Categorization of new methods and use of new terminology. Describes and illustrates the new system created by the research in the context of the field of intaglio. Lascaux products used in the disciplines of engraving, air abrading, mezzotint, etching, collagraphy and intaglio inks.	(Adam & Robertson, 2007)
2007	Gunn, A. V. (UK)	Publication by Lund Humphries of Gunn's book about the prints of W Barns-Graham including collaborations with Robertson.	(Gunn, 2007, cover, frontispiece, pp. 48-65, 105-149)
2008	Robertson, C. and Adam, R. (UK)	Publication in US and UK by Thames & Hudson of the paperback version of my co-authored book on intaglio.	(Adam & Robertson, 2008)

2. An example case history of the practice-led research methodologies

2.1. Case history: researching acid-resistant materials for stopping-out in the etching process

Materials for screenprinting and intaglio printmaking were tested through a practice-led research methodology. These included classical, traditional, contemporary and manufactured materials, as well as my own prototypes (and the manufactured versions), and 'found' products (e.g. Mystrol). This entire process is too lengthy to publish in this commentary, so I have selected the following case study as an example. The first ten research methods listed in the commentary were employed to achieve 'Objective One' (in this case to develop a stop-out resist which would be one element in a coherent, accessible, economic, logical, reliable, user- and environmentally friendly system for creative and effective printmaking.), (*Commentary*, p. 18-20).

Method 1. I researched classical and traditional innovations and assessed how effective each method was. I identified the aims of the innovators and established 'a principle' for stopping-out (Commentary, p.18).

The first etchers utilised the acid-resistant materials that were available to them (Adam & Robertson, 2007, pp. 27). To research stopping-out I investigated the innovative work of Jacques Callot (1592-1635) who created an improved resist 'hard varnish', the stopping-out process and the *échoppe* etching needle (*Figure 55*), (Adam & Robertson, 2007, p. 11). It seemed logical to me that Callot would have used his own 'hard varnish' for stopping-out. Contemporary printmakers use stop-outs to edit, make corrections, for the step-biting process and for making painterly marks which do not etch (Adam & Robertson, 2007, p. 119-123). The research for stop-out related so closely to hard grounds that the research results (below) include information about 'grounds'.

The research revealed that Callot experimented with the hard varnishes used on musical instruments and that his aim was to provide a crisp line with the

qualities of an engraved line. In Abraham Bosse's 3rd edition of the '*De La Manière de Graver á l'Eau Forte et au Burin et de la Gravure en Manière Noire*' which was first published in 1645, Callot's recipe is given as half *huile grasse* and half mastic. Mastic is an ivory-coloured resin from *pistacia lentiscus*. It is said that Callot '*liked the hard varnish so much that he had it shipped to Nancy after he moved back there in 1621*' (Wake Forest University, Print Collection, 2009). Callot's prints look clean (no foul bite) and the line resembles an engraved line (Figure 56).

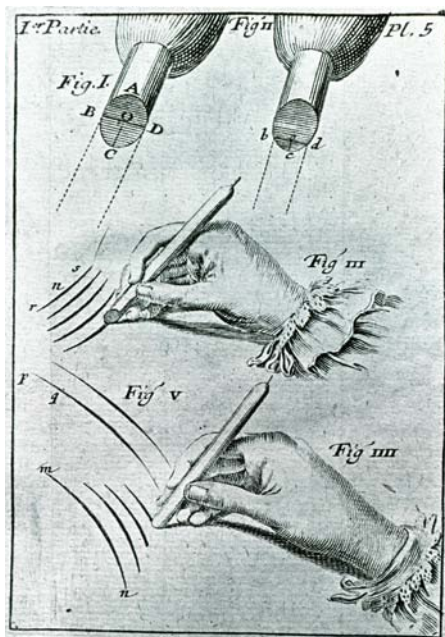


Figure 55. Bosse, A., 1645, Manière d'utiliser les échoppes, etching, screengrab.

Figure 56. Callot, J., 1622, Gobbo Playing the Bagpipe (note the absence of foul bite), etching, screengrab.

Callot had been dead for ten years when this recipe was published and it is possible that the *grasse* is the resin from *thuja articulata*, called by the Arabs *sandarac glessum* (*glas*), which according to Tacitus and Pliny was the ancient German name for amber (Eastlake, 2001, p. 244). Sandarac varnishes are documented in Armenini's (1533-1609) '*On the True Precepts of the Art of Painting*', (Armenini & Olszewski, 1977. p. 196) and were used from the 12th

century. *Vernice liquida* varnishes are made from linseed oil and amber¹⁵ or *sandarac*. Koen Padding, a specialist in restoration and classical violin varnishes describes these varnishes as being very easy to paint with, with little drag, excellent flow characteristics, with high resistance, of medium hardness, flexible, self-levelling and showing a typical opaque ivory-white fluorescence (Padding, 2009). This description of a 'white fluorescence' fascinated me as I have often met etchers who were seeking a white ground recipe which was reputed to have a wonderful qualities. I wondered was this 'it', the lost white ground recipe? It made sense that it could be *vernice liquida* as these varnishes fell into disuse around 1750 to 1800. This new knowledge made me reconsider Lumsden's comments (1962) that he made about classical white grounds recipes:

'In this manner Rimbrant varnished his plates:-

<i>Virgin wax</i>	1 oz	
<i>Mastic</i>	1/2 oz	
<i>Amber or asphaltum</i>	1/2 oz'	(Lumsden, 1962)

In particular I was interested by Lumsden's statement regarding Hamerton's (1834-1894) description of Rembrandt's recipe as a white ground in '*Etching and Etchers*' (Hamerton, 1878). Lumsden writes '*Yet he calls it a 'white ground' which, if it contains asphaltum it can hardly be, by itself*'. Having learnt about Callot's hard varnish and the properties of *vernice liquida* varnishes I had noticed that according to Lumsden, Rembrandt's recipe stated either amber or asphaltum. Amber was used in the classical *vernice liquida* recipes and does indeed provide a 'white fluorescence'. From this observation and the knowledge that Lumsden only used asphaltum (which is brown) in his recipes I drew the conclusion that a working knowledge of Callot's 'hard varnish' was lost at this time and therefore could indeed be the 'mystery white ground'.

I also researched other printmakers' attempts to create white grounds. For example the white coatings used by Wenceslaus Hollar (1607-1677) and Hamerton. It seems there was another technique which involved laying a

¹⁵ In the past the word 'amber' was also used to describe other resins such as *sandarac*.

ground and then whitening it, as the following quotes demonstrate: '*Hollar employed a duck's wing feather for spreading on the ground and squirrel's tail brush for the white*' (Vertue, 1759, p. 133) and '*Spread over it when cool extremely finely ground white lead diluted with eau gommé*' (Lumsden, 1925, p. 36). Frank Brangwyn's etching notes state '*I used to experiment with a white surface by painting over the ordinary ground with several things. I found gum cracked up the ground in the drying by its contraction, so I bought some powdered zinc-white and mixed it with the yolk of an egg as a medium*' (Lumsden, 1928, p. 345). I was also interested in John Everett's method of using lithography inks and oil colours as a paint-on ground or stop-out, and his discovery that they were all permeable (Lumsden, 1925, p.364-67).

I investigated transparent grounds and these recipes of mastic and white wax seem similar to Callot's recipe. Regarding brown translucent grounds such as those made to this day by Rhinds, Lumsden states '*The great difficulty in making grounds is to obtain the right sort of asphaltum. The best is the true Dead Sea Asphaltum.*' (Lumsden, 1925, p. 38). Contemporary hard grounds made to 'traditional' recipes are much softer than earlier hard grounds and '*the soft ground is our ordinary ground and must not be confused with ground mixed with tallow for 'soft-ground etching*' (Chamberlain, 1972, p. 40). Also of interest was Lumsden's mention of a '*rather slower drying ground made by Roberson and Co which could be applied with a soft brush, and such a liquid was particularly valuable for making alterations on a plate. Mr Pennell told me that he used it out of doors considerably.*' (Lumsden, 1925, p. 42). Lumsden further states

'A good ground must have the following properties:-

- (a) It must be impervious to acid.*
- (b) It must be sufficiently hard to allow of being freely handled and to prevent adhesion to the drawing as the drawing proceeds. When removed by the point it should be possible to blow it away in the form of dust.*
- (c) It must be elastic enough to permit the needle to move freely in any direction without chipping or flying especially where the lines are drawn closely together and cross-hatched'* (Lumsden, 1925, p 35).

Lumsden's principles for 'hard ground' intrigued me as I did not think an asphaltum-based hard ground could achieve them for the following reasons. Asphaltum-based grounds are so greasy that when you draw through them the displaced ground cannot easily be blown away because of its intrinsic greasiness. This characteristic often causes it to stick to the plate, thus closing lines - especially in cross-hatching when substantial quantities of resist are removed in close proximity. Asphaltum grounds are quite delicate and are softened by the warmth of one's hands, by the heat of the sun (often bemoaned by *plein air* artists) and by the warmth of centrally-heated or sunny studios. When they are softened they can be smudged and scratch more easily. They cannot be transported reliably (Brown, 2006, p. 24). I had experienced through my practice that stopping-out these asphaltum-based grounds with asphaltum-based stop-out varnishes was not reliable, and foul-bite often resulted.

In contrast I considered that Callot's hard varnish would have been able to fulfil the principles that Lumsden cites. The following statement made by Lumsden in 1925 made me wonder about how Callot's original aim was perceived at that time, '*The hard ground is of interest because it shows that the men who employed it thought of etching merely as a quicker means of imitating the strokes of the burin*' (Lumsden, 1925, p. 35).

Callot did indeed wish to achieve making an etched line with the qualities of an engraved line. This is clear because he designed the *échoppe* etching needle so that it would provide lines characteristic of engraving when used to draw through the hard varnish. From this study I decided to use what I determined to be Callot's principles as a basis for new acid-resistant materials for drawing into and for stopping-out.

The principles for an acid-resistant material for drawing through

- a. It must be able to adhere to all commonly used metals (for etching) including deeply bitten plates.
- b. It must be highly acid-resistant.
- c. It should be easy to apply with a brush, and quick to dry.

- d. It must be compatible with the other acid-resistant materials being used.
- e. It must be sufficiently hard to allow being freely handled, and easily and safely transported (without scratching).
- f. Earlier etched lines should be visible through the acid-resistant layer.
- g. It must allow the point of the needle to be moved freely in any direction without chipping or flying, especially where the lines are drawn closely together or cross-hatched. Other drawing tools such as steel wool should be able to remove it. It must be able to provide a clean line which resembles the line made by an engraving burin. It should be possible to blow the removed particles away in the form of dust.
- h. It should be able to withstand washing in water (degreasing).
- i. It should not be affected by temperature and should be able to be used outside.
- j. It should be easy and safe to remove from the plate.

The principles for an acid-resistant material for stopping-out

- a. It must be able to adhere to all commonly used metals (for etching) including deeply bitten plates.
- b. It must highly be acid-resistant.
- c. It must be compatible with the other acid-resistant materials being used.
- d. It must be coloured and easy to see (the hard resist is translucent but could be used in the place of a designated acid-resistant material for stopping-out).
- e. It must be easy to apply with a brush and quick to dry. It should be able to be diluted to deal with different depths of bites, types of metal and painting techniques, for example offsetting (more viscosity required), painting delicate lines (less viscosity) and splashing (diluted but still acid-resistant).
- f. It must be sufficiently hard to allow being freely handled and easily and safely transported (without scratching).
- g. It must allow the point of the needle to be moved freely in any direction without chipping or flying especially where the lines are drawn closely together and cross-hatched. Other drawing tools such as steel wool should be able to remove it. It must be able to provide a clean line which

resembles the line made by an engraving burin. It should be possible to blow the removed particles away in the form of dust.

- h. It should be able to withstand washing in water during degreasing.
- i. It should not be affected by temperature and should be able to be used outside.
- j. It should be easy and safe to remove from the plate.

Method 2. I researched contemporary innovations and identified the aims of the innovators, in order to understand the innovation's relationship with classical and traditional practice. I identified the principle, tested the method and classified it (Commentary, p. 18).

I researched Z*Acryl Hardground Emulsion Stop-out varnish (Adam & Robertson, 2007, 109-110, 123-14) which I found rather pale-coloured. I also researched Golden Stop-out varnish (Adam & Robertson, 2007, p. 124) but found that it separated when it was painted on the plate. The manufacturers developed these stop-outs to meet the traditional principles.

Method 3. I made a critical appraisal of all printmaking theory and practice. I also considered the role of relief printmaking and lithography (Commentary, p. 18).

I noted that contemporary printmakers are interested in using painting techniques so it is important that a new resist should be excellent for painting with. It must also be compatible with dry-film photoresist. Traditional solvent-based stop-out varnishes are not compatible with dry-film photoresist. Introducing this new resist does not alter other disciplines in any way. I took into consideration that a highly durable stop-out resist is required if the etched plates are to be used for relief printmaking as the resist has to withstand a longer period of etching.

Method 4. I reviewed classical, traditional and contemporary printmaking terminologies from first principles (Commentary, p. 18).

The term 'stop-out' describes the process of stopping out, however 'varnish' does not describe the function of protecting the metal (as the plate is not being varnished and the new material is not a varnish). The original stop-out may have been a varnish like Callot's hard varnish. It seems that these early hard grounds were known as varnishes (Martin, 1813, p. 333; Lumsden, 1925, p. 35). (It also interested me that the term 'grounding' was originally used to describe creating a stable and even coating for painting on.) The acid-resistant material is used for stopping-out and other creative techniques so therefore 'stop-out resist' aptly describes it.

Method 5. I made a wish list of creative possibilities and a list of undesirable attributes (for stopping out), (Commentary, p. 18).

Creative possibilities wish list

- reliably acid-resistant
- easy and pleasant to paint with
- can be used on all metals
- compatible with other materials in system
- coloured so that it can be seen
- able to bridge deep etches
- able to create delicate lines
- able to splash
- able to paint wide flat areas
- able to double-coat
- dries translucent so any unwanted biting can be seen
- does not crack or flake when drawn into
- can be used on edges of the plate
- able to be diluted with water
- washed off with water
- dries quickly
- when dry can be removed as safely and easily as possible
- economic
- accessible
- as safe as possible for user and environment

List of undesirable attributes

contains VOCs
hazardous, toxic or flammable
harmful to the environment
allows foulbite
sticky and unpleasant to paint with
cannot be used on all metals
incompatible with other materials in system
clear so that the plate surface can be seen
separates so hard to see true line
unable to bridge deep etches
unable to be diluted
unable to create delicate lines
unable to splash
unable to paint wide flat areas
unable to double coat
dries opaque so any unwanted biting cannot be seen
cracks or flakes when drawn into
cannot be used on edges of the plate
washed off with solvents which contain VOCs
dries slowly and remains sticky
when dry must be washed off with solvents which contain VOCs
expensive

*Method 6. I used the set of criteria as a filter throughout the research project
(Commentary, pp. 18-19).*

Criteria: Classical Stop-out

Is this material (method or system) as user friendly as possible?

No – requires use of solvents to remove it from plates.

Is this material as environmentally friendly as possible?

Yes – but materials like amber are precious and non-renewable.

Is it suitable for professional, educational & access level use?

No – for professional use only, as very slow drying, expensive and non-renewable.

Can this material be used to achieve the original principle?

Yes

Could another material or method be used instead?

Yes

Does this material provide any new creative possibilities?

No

Criteria: Traditional Stop-out

Is this material (method or system) as user-friendly as possible?

No – hazardous, toxic to foetus, flammable, contains xylene and requires use of solvents to remove it from plates.

Is this material as environmentally friendly as possible?

No

Is it suitable for professional, educational & access level use?

No – for professional use only, not easy to paint with, and it is hard to clean from brushes as it is rather tarry. Consequently artists tend to use inexpensive brushes.

Can this material be used to achieve the original principle?

Yes

Could another material or method be used instead?

Yes

Does this material provide any new creative possibilities?

No

Criteria: Golden Stop-out Varnish

Is this material (method or system) as user friendly as possible?

No: for professional use only (contains toxic pigment).

Is this material as environmentally friendly as possible?

No: contains toxic pigments.

Is it suitable for professional, educational & access level use?

No: for professional use only

Can this material be used to achieve the original principle?

No: separates into clear and black; is not viscous enough to bridge deep etches

Could another material or method be used instead?

Yes

Does this material provide any new creative possibilities?

No

Criteria: Z*Acryl Stop-out

Is this material (method or system) as user friendly as possible?

No: ammonia required to clean.

Is this material as environmentally friendly as possible?

No: ammonia required to clean.

Is it suitable for professional, educational & access level use?

Not suitable for professional use, and as it is clear it is not ideal for teaching or access level.

Can this material be used to achieve the original principle?

No: not viscous enough

Could another material or method be used instead?

Yes

Does this material provide any new creative possibilities?

No

Method 7. I sourced materials which could fulfil the criteria. I learned as much as possible about these and experimented and tested them (Commentary, p. 20).

I experimented with B & Q varnish, acrylic floor polishes, acrylic floor sealants, acrylic mediums, varnishes, crackle varnishes, acrylic gesso and the recipe that I used to make screenprinted acid-resists (this was made from a green studio acrylic paint, Lascaux varnish and a small quantity of Lascaux Screenprinting paste). I stopped trying to make the resists resemble traditional resists (pp. 88-89) and concentrated on meeting the criteria and principles. Thousands of tests were made, e.g. working on all kinds of commonly used metals, different degreasers, different users, and mordants.

Method 8. I identified 'gaps' in the projected system (revealed by the criteria) and considered what would be required to constitute a 'perfect' system. I created prototype materials in anticipation for manufacture. I tested these systems through a practice-led methodology (Testing as Method 7), (Commentary, p. 20).

In this case a new prototype resist was developed. The overall results of this project are described below (p. 81-82)

Method 9. Designing and assembling systems from the materials that fulfilled the criteria and the principles (Testing as Method 7), (Commentary, p. 20).

Tests were made (as Method 7) and it was checked that the prototype stop-out resist was compatible with other selected resists and photoresist.

Method 10. Identifying the most highly respected (by artists) manufacturer of artists' materials with the excellent standards of manufacture and environmental ...with them to research and develop my prototype materials and manufacture new materials for printmaking (Commentary, p. 20).

I achieved this by collaborating with Lascaux Paints & Restauro, Zurich, Switzerland (www.lascaux.ch) to research and develop my prototype materials, and manufacture new materials for printmaking. As described above I had found through my research that Callot had most probably used his 'hard varnish' for his stopping-out process. Working in collaboration with Hugo Fritschi (Lascaux's polymer chemist who is also a specialist in restoration of classical musical instruments), we used the information gained through the research to create acrylic hard and soft resists. The hard resist dries quickly to become a strong hard resist (Adam & Robertson, 2007, pp. 110-117). The soft resist may be drawn into with a pencil or impressions made in it with textured materials and it remains moist for up to ninety minutes. Both are applied by brush and can be used as stop-out resists, each providing a different quality of line and being ideal when extensive drawing is required. These acrylic resists

have properties close to Callot's principles and by coincidence also show a white fluorescence until they dry to become clear (Adam & Robertson, 2007, p. 106). They are highly acid-resistant and provide a clean line. They are easy to paint onto the plate, with excellent flow characteristics and little drag. They have high resistance, medium hardness, and are self-levelling. A coloured and easily visible stop-out resist was also developed and is manufactured as part of the range of resists.

The following five research methods were employed to achieve 'Objective Two' in the commentary (in this case to test and validate the stop-out resists and to disseminate information about them.), (*Commentary*, p. 22).

Method 1. I tested the new product for stopping out (using the criteria). I re-assembled the prototype systems and I tested this through a practice-led methodology of teaching, making prints and co-publishing (Commentary, p. 22).

Criteria: Lascaux Stop-out Resist

Is this material (method or system) as user friendly as possible?

Yes

Is this material as environmentally friendly as possible?

Yes

Is it suitable for professional, educational & access level use?

Yes

Can this material be used to achieve the original principle?

Yes

Could another material or method be used instead?

No

Does this material provide any new creative possibilities?

Yes: it is easier to paint with and can be use as a collagraph medium.

The Lascaux resist passed the tests and is generally used in every etching project (Adam & Robertson, 2007, throughout [where stated Lascaux was used]).

Method 2. Identifying and making contact with the most respected suppliers...other countries, (Commentary, pp. 22, 45, 46).

This project was shared with Lascaux. For my part it involved talking to suppliers and asking artists about their suppliers and experiences with them. Distributors such as Dean and Susan Clark of Graphic Chemicals & Ink Co (US), staff from Intaglio Printmaker (UK), and AP Fitzpatrick (UK) attended courses about the new systems.

Method 3. I considered how these new printmaking systems could be defined, described and taught. I selected terminology that would be accurate, relate to classical terms and be the most helpful to students, artists and teachers. I tested these concepts by designing and delivering educational courses and analysing the results (Commentary, p. 22).

I tested how using the terminology of 'Stop-out resist' helped students grasp the concept and understand the relationship with the other materials. I realized that I had to teach how acrylic resists behave, that acrylics resists are highly acid resistant and how having a correctly set up studio is important. I noted how the artists used the terminology as an *aide memoire*.

Method 4. I taught the new systems to national and international printmakers, educationalists, and artists of all levels through a range of different types of courses, talks and seminars (Commentary, p. 22).

This disseminated information about the stop-out resists.

Method 5. I identified artists whose work could demonstrate specific factors of the new system. I invited them to co-publish...as possible. (Commentary, p. 22)

I used these interactions to explore many concepts and to analyse how the new systems were performing. These works have been exhibited nationally and internationally at wide a range of venues. The artists involved in the project

disseminated information about the new methods. The following six research methods were employed to achieve 'Objective Three' (To publish books about the new systems that would validate and disseminate information which could enable others to work in this way), (*Commentary*, p. 23).

Method 1. I collected and used realia (pp. 93-94), (Commentary, p. 23).

Some of this collection is illustrated in the books (Adam & Robertson, 2007, throughout), (Adam & Robertson, 2003, throughout).

Method 2. I documented the results of the research into stop out (pp. 93-94), (Commentary, p. 23).

Method 3. I created illustrations relating to stop out (pp. 93-94), (Commentary, p. 23).

Method 4. I wrote educational material for the use of stop out (pp. 93-94), (Commentary, p. 23).

Method 5. I tested the written material about stop out (pp. 93-94), (Commentary, p. 23).

Method 6. Selecting a publisher and gaining a commission (Commentary, p. 24).

Initially Silvie Turner's publishing company *estamp* was selected. Turner was enthusiastic about the project and a book was planned. A team was chosen and funding was sought to pay for the publication. When Turner decided to close *estamp* to pursue other interests the project was reconsidered. Turner suggested Thames & Hudson as a publisher. A draft manuscript was written and submitted. Thames & Hudson sent this to experts in the field such as Susan Tallman and, having received positive feedback about the content and the need for such a book, they commissioned the writing of a book. Rewriting began and later it was decided that the material should be split into two publications.

2.2. The results of identifying the gaps in the existing systems and developing new systems

After applying the research methods described in the commentary (*Commentary*, pp. 18-20), the following gaps were found in the existing systems.

1. There was no single coherent water-based screenprinting system which was certified in accordance with the ASTM standard D-4236 'No health labeling required' that was suitable for both professional and access-level screenprinters.
2. There were no purpose-made materials certified in accordance with the ASTM standard D-4236 'No health labeling required' and there was no single, coherent, accessible, reliable system for making creative autographic marks on positives.
3. There was no comprehensive system of purpose-made resists certified in accordance with the ASTM standard D-4236 'No health labeling required' which were suitable for protecting all types of metal during the etching process.

In response to these discoveries I began to develop systems using a range of materials and I made prototype products so that 'perfect' systems could be created. I tested and used these systems in my practice and teaching and found that the creative results far surpassed my original aims. In 1998 a collaboration with Lascaux, Zurich was initiated to research and develop a range of printmaking materials (Lascaux, 2009). This research resulted in the innovation, manufacture and international retailing of:

1. Screenprinting materials including screen fillers and painting fluids (certified in accordance to the ASTM standard D-4236 'No health labeling required') which can be used in a single water-based screenprinting system which is suitable for professionals and access-level screenprinters (pp. 117-120), (Adam & Robertson, 2003, pp. 17-40).

2. A set of tusches (certified in accordance to the ASTM standard D-4236 ‘No health labeling required’) which are designed to as a coherent reliable system for creating autographic marks on positives (pp. 112-116, 119-121), (Adam & Robertson, 2003, pp. 100-115), (Adam & Robertson, 2007, pp. 182-189).

3. A comprehensive set of versatile acrylic acid-resistant materials (resists) which can be applied to protect the commonly used metals during the etching process; coloured coatings for colouring the hard resist; and a lift solution which can be used as a stencil and provides marks similar to sugar lift (all certified in accordance with the ASTM standard D-4236 ‘No health labeling required’), (pp. 101-110, 182-189), (Adam & Robertson, 2007, pp. 96-140).

These innovative materials and their related methods and systems were thoroughly tested through a practice-led research methodology (pp. 66-80).

2.3. Example cases of the practice-led methodology: testing the systems through collaborative projects

I tested the systems by collaborating with a wide range of artists, and publishing limited editions of original screenprints and intaglio prints. Finding ways to realise the concepts of these diverse artists helped me to explore and test in a more extensive way than I could through making test and educational works or through my own practice as an artist. The work produced had to satisfy not only me but the artist I was collaborating with. The artists were selected for a number of specific reasons, for example:

- a. Sir Eduardo Paolozzi’s collage techniques provided opportunities to create autographic positives with Lascaux Tusche Waterproof, digital positives (a new exploration for Paolozzi) and to screenprint with Speedball process colours Lascaux (Adam & Robertson, 2003, pp. 126-128), (*Commentary*, pp. 32-33). Lascaux Sirius watercolours and Acryl colours were also experimented with. Acrylic-resist etching techniques were also used to generate a series of sculptural intaglio plates.
- b. Barbara Rae’s skill and deep knowledge of painting techniques such as

rolled effects, offsetting, dry brush marks and washes provided opportunities to work on smooth PVC sheet and test and develop the tusches. (Adam & Robertson, 2003, pp. 103, 104-105), (Adam & Robertson, 2007, p. 183). Her use of complex layers of colour and interference pigments provided an opportunity to explore the glossy effects of Golden Fluid paints in contrast to the matt Lascaux Gouche; the unusual effects of Golden Iridescent Gold paint, Lascaux Perlacryl, Aquacryl paints, Kremer Pearlescent, Bismuth, Glitter Pigments and metal powders; the intensity of Kremer Organic Pigment pastes; dusting techniques and the natural colours and texture of Kremer Earth pigments (Adam & Robertson, 2003, cover, pp. 6, 60, 64, 144, 158-59, 164 169).

- c. Elizabeth Ogilvie's interest in substrates such as plastics, laminated wood and aluminium provided opportunities to screenprint with Kremer powdered glass, Lascaux Varnish, acrylic paints and retarder on plastic (Adam & Robertson, 2003, pp. 9, 29, 199). Scratch-proof and waterproof screenprinting mixturers were researched, and this research was important in gaining an understanding how to reduce paper buckling when screenprinting with water-based printing mixtures. Etching aluminium was also explored and the research during this large-scale project related to other investigations related to how acrylic resist behaves on this metal (*Figure 75*), (Adam & Robertson, 2007, p. 225), (*Commentary p. 38*).
- d. W. Barns-Graham's use of rich dense colours and translucent overlays (Gunn, 2007, pp. 60) provided opportunities to explore a range of materials and techniques. These included the use of Lascaux Tusche Waterproof, Lascaux Tusche Watersoluble, Lascaux Tusche Wash, and Tusche Wash Spray to make positives (Gunn, 2007, p. 53). Screenprinting mixtures were made using Lascaux Varnish, Lascaux Thickener, Kremer pigments (Gunn, 2007, p. 52); Lascaux Resonance (Gunn, 2007, p. 57); Gouache and artist's acrylic paints (Gunn, 2007, pp. 48-63, 105-150), (Green, 2001, pp. 269-270, 267-268), (Adam & Robertson, 2003, pp. 20, 156, 198, 200), (. Collagraphy, acrylic-resist etching techniques and water-based intaglio inks were also explored and used. The extensive body of work that was generated is

considered to be important (Gunn, 2007), (*Commentary pp. 23, 39, 40-42*).

- e. Robert Callender's image provided an opportunity to deeply etch a plate in order to emboss the paper (Adam & Robertson, 2007, pp. 12, 199).
- f. Victoria Crowe's aim to combine 'found objects' with drawn and painted marks and her drawing and painting skills provided opportunities to investigate the tusches in combination with drawn marks (Adam & Robertson, 2003, pp. 111-115, 119), (Adam & Robertson, 2007, p. 163). Other projects explored the possibilities generated by creating prints from a combination of collagraph and photocollagraph plates (Adam & Robertson, 2007, pp. 162-3, 178), (*Figure 74*).
- g. Lucy Cobb (Adam & Robertson, 2007, pp. 2-3, 166, 175) and Jenny Hendra's (Adam & Robertson, 2003, pp. 92) enthusiasm and curiosity enabled me to experiment and test the systems and the educational information in creative ways. Mezzotinting, acylic-resist etching, screenprinting, tusches and collagraphy methods were explored (Adam & Robertson, 2007, pp. 59, 114, 115, 120, 123, 148, 149, 157).
- h. Working with artists who used other media in their usual practice was informative and projects of this type were important to my understanding; for example, the folio project with the group 'Underwired'. At the outset of this project, '*21 Works by Women*', I asked the artists (who had all experienced some printmaking at college or school) what they thought their finished print would look like. I was fascinated that most anticipated that the work would be 'basic', 'simple', 'crude' and 'probably black and white'. Most had prepared sketches which demonstrated their perceptions graphically. They said that they imagined that the printmaking process would be difficult, limiting, 'messy' and involve wearing gloves and respirators. I then asked them to describe the work they were working on. This ranged from installation, photography and digital to drawing; and from this conceptual starting point the prints were made. This approach surprised the artists and they found the new methods of printmaking creative and accessible, and they achieved

results that exceeded their expectations. Many of the artists involved in this project went on to specialize in printmaking (e.g. Ruth Peltzer, Edinburgh College of Art).

- i. Working with school children, special needs groups and amateur artists (from age 17-92) was also important to my understanding.
- j. Collaborating with established printmakers such as Paolozzi, Rae, George Donald, and Adam, and lithographers such as Lamb, gave me other important insights and confidence in the systems.

Collaborations with the artists listed above and others—such as Mary Newcomb (Adam & Robertson, 2003, pp. 16, 200), Werner Schmidt (Adam & Robertson, 2007, pp. 25, 226), Maclaurin (Adam & Robertson, 2003, p. 28), and Margaret Hunter (Adam & Robertson, 2003, pp. 60-63)—allowed me to test the systems to the highest professional standards in over two hundred projects of this type (pp. 82-84). I began to make collaborative works in 1987.

My previous professional experience of co-publishing using traditional printmaking systems enabled me to make a comparison between the solvent-based and water-based systems. Testing and developing the new systems through collaborative practice enabled me to make an analysis of how user-friendly the new systems were. The prints made with the new systems continue to be exhibited internationally and have been purchased for major collections (pp. 134-138). Artists who see these works either as originals or in reproduction form can make an evaluation of how effective these new printmaking systems are.

2.4. Example cases of the practice-led methodology: considering and testing the new systems through learning and teaching

I have taught these innovative ways of working to international printmakers and educationalists since 1990 through print studio courses (access, professional level, and outreach), seminars, talks, lectures, academic courses (primary, secondary, tertiary, degree, postgraduate and PhD students) and through

discussions with visiting artists and wider networking.

Many of the artists who have learnt about the systems have subsequently set up the new methods in their own studios and now disseminate information from their studios, colleges and websites (*Commentary*, p. 27).

I studied learning and teaching methods and the effect this had both on the dynamics in the studio and in the work outcomes. I taught using 'right-brain' approaches and accelerated learning techniques. In my observations of students and teachers I used NLP techniques such as Eric Robbie's 'seven levels of auditory/digital thinking' (Robbie, 2009). I also used my knowledge of NLP concepts such as representational systems¹⁶ and anchoring¹⁷ to understand my own and other printmakers' responses to the changes. The following are examples:

- a. Artists have said that they missed the scent of solvents and some also described missing a taste or sensation (particularly in relation to fumes from ammonia, melted rosin, and acids). Often, when I have been teaching the water-based system, artists have told me how effective the tusches with solvents in them were. When I asked them to show me which water-based tusches contain 'solvents', they showed me the tusches which are scented with oil of sage. When I explain that these are water-based they are surprised, and often then become aware of how they are using their sense of scent to make judgements about the material (rather than considering that an effective tusche will adhere to the smooth substrate, is able to be wiped away from the substrate without smearing, and is consistently opaque over the entire surface of the substrate and can be used to make creative marks).
- b. My initial reaction to the pale or strong blue colour of dry film resist was of surprise, as this was different from the black Kodak Photo Resist; and I was

¹⁶ *The five senses: seeing, hearing, touching (feeling), smelling and tasting.* (NLP Seminars Group International, 2009).

¹⁷ *The process of associating an internal response with some external trigger (similar to classical conditioning) so that the response may be quickly, and sometimes covertly, re-accessed.* (NLP Seminars Group International, 2009).

taken a back at seeing that the first photoresist was also a pale blue colour (Figure 57).



Figure 57. Niépce, J. N., 1827, etching plate, photograph.

- c. I noticed when I made acrylic resists for stopping-out and plate-backing I initially tried to make them brown and blue-black. When I questioned myself about this, I realized I was unconsciously trying to imitate the traditional brown stop-out varnish and blue-black straw-hat plate-backing varnish that I was accustomed to. Artists using the blue acrylic stop-out resist and magenta plate-backing resist that resulted from the research often make comments such as *'the resist works very effectively but why did you make it coloured?'*. When I explain that the pigments in these colours have a special affinity with metals and are more able to resist the mordant the printmakers realize that function and principle are more important than colour.

- d. If, during a changeover to ARE, the rosin powder aquatint box is replaced with an aquatint spray unit (with gadgets like lights and flaps) similar to the size of the original box, the printmakers are more relaxed about the change. This is because the process of making an aquatint feels more familiar as it involves a similar sequence of actions (e.g. opening flaps, switching on lights).
- e. Learning that traditional hard grounds were unlike classical hard grounds (Callot's 'hard varnish') changed my approach to making a new hard ground (Lascaux Hard resist). Classical hard ground feels, looks and sounds quite different to draw into than the more greasy traditional brown hard ground (pp. 66-70).
- f. Printmakers were often amazed that the fine surface of photocollagraphs could hold enough ink to print richly. This led me to research collagraph surfaces (which are normally highly textured) and I developed a way of making collagraphs with fine surfaces. The prints from these plates resemble hard-ground and soft-ground etchings (Adam & Robertson, 2007, pp. 162-165, 168-169).
- g. Researching classical soft ground, as part of my investigation into stopping-out, inspired me to invent and develop the Lascaux Tusche Soft Ground-effect. This is used to generate autographic marks which resemble soft ground effects on positives (Adam & Robertson, 2007, pp. 184-186), (Adam & Robertson, 2003, pp. 106-108). The characteristic marks can therefore be screenprinted, etched or used in collagraphy or lithography. In this case I made this tusche resemble classical soft ground in terms of its scent, feel and appearance.
- h. Printmakers attending exhibitions of water-based screenprints have mistaken these for lithographs, complimenting their rich colour and complex reticulated washes. They were then shocked and expressed disapproval when they discovered they were actually looking at screenprints made with artist's

materials. When questioned about what upset them they explained that they believed each medium should have an identity of its own, and that screenprints should not look like lithographs, paintings or digital outputs. This was in contrast to the attitude of the artists who had made the screenprints and were happy that the works had satisfied the concept which had originated in their mind's eye.

- i. I noted how the sound of a familiar word creates a powerful link to the material or method normally associated to it and this informed my use of terminology.

Understanding these reactions and responses enabled me to be creative, to innovate and helped me teach the new systems. I found that these systems offered new creative possibilities but the differences to the traditional systems made the change more difficult for some printmakers. I observed that printmakers who had a strong grasp of theory found the transition easier. I noted that artists who had never made prints before could learn printmaking with the new systems and terminology more easily than when I had taught using the old system (I subsequently taught the traditional system after using the new system as a further test of this insight).

When I showed etched plates and the etchings made with the ARE system to experienced printmakers they could not fault these nor identify them as being made with a new printmaking system. They sometimes mistook collagraphs for etchings; photocollagraphs for photo-etchings or photogravure; and collagraph techniques on mezzotinted plates for scraping and burnishing. As mentioned above, printmakers often mis-identified water-based screenprints as lithographs, watercolours or digital output.

I also observed how students who had never made prints before quickly became adept when they worked with the systems. For example, I used some of these as illustrations in the books (Adam & Robertson, 2003, p. 97, 163), (Adam & Robertson, 2007, pp. 63, 117, 111). I also noted how the new materials could comfortably meet the wide range of creative demands (Adam &

Robertson, 2003, frontispiece, pp. 10, 12, 21, 23-24, 39, 87, 97, 99, 100, 106, 125, 140, 146, 148-149, 168, 186, 198, 200), (Adam & Robertson, 2007, frontispiece, pp. 12, 17, 45-46, 62- 64, 97, 112, 129, 132-135, 140, 149, 157, 166, 172, 175, 178, 183-185, 187-190, 213). I noticed that even the initial ARE intaglio plates that students made were adventurous, experimental and exploratory. I saw that students learning to etch using the ARE system were working creatively in ways which I had not seen before. For example:

- a. Students were able to aquatint images made with the other resists which allowed them to create tone and to make much softer and freer marks. In traditional practice, an aquatint cannot be applied to an image made on the plate with hard, soft ground or stop-out varnish as the heat required to melt the rosin (which melts at 250°F) or asphaltum powder (which melts at around 400°F) damages the other resists (Saff & Sacilotto, 1978, 135-143).
- b. Acrylic hard, soft and stop-out resist was used creatively on a plate, drawn into and then aquatinted selectively using stencils including lift solution, water and other materials (Adam & Robertson, 2007, pp. 133-136). An aquatint could also be laid before stopping-out. In traditional practice the stop-out varnish is applied to an aquatint but painting accurate delicate lines is difficult on the moles of rosin (Chamberlain, 1972, p. 62).
- c. Students painted the hard and soft resists onto selected areas of the plate and drew into them. Traditional hard and soft grounds are applied singly to the entire plate surface.
- d. Students flash-bit their dried and resilient soft-resist plates and edited their images by drawing into them, stopping-out and aquatinting (Adam & Robertson, 2007, p. 112). Traditional soft resists remain delicate, are difficult to edit and cannot be aquatinted.
- e. Artists were able to work in their studio and *en plein air* as the resists are 'scratch proof' enough to transport (Brown, 2006, p.25), (Adam & Robertson, 2007, p. 102).

- f. Artists were easily able to create whites and complex controllable light tones by using the acrylic resists as collagraph media. The acrylic resists can be stripped off (Adam & Robertson, 2007, pp. 162-179). In traditional practice enamel paints can be used but they are toxic, less controllable, slow drying and hazardous to remove from the plate.

From 1990 to 1998 I had shared my concepts and findings. I wrote and disseminated a series of information booklets and data sheets for students and artists. I also took scans, photographed and recorded key prints, plates, positives, process- and studio-shots. I collected, designed and made pedagogic illustrations for the projected books. In 1998 I made booklets of educational *realia* and wrote a studio manual for Wimbledon School of Art; I documented my new research, continued to collect educational material, collaborated with Scran and Barbara Rae on an educational film and digital resource, made illustrations and educational plates, positives and prints, and began to write the two books. I tested my written material by asking artists to work from the notes and then looked at the resulting prints and discussed with them what their experience was. (Adam & Robertson, 2003, pp. 18, 34-36, 42-46, 51, 57-58, 64, 66, 70-74, 76, 77-78, 81-84, 86, 87-90, 93- 96, 101-105, 109, 117-120, 122-125, 130, 132, 134-135, 137, 139, 144-145, 147, 150, 151-155, 158-159, 160-161, 166-168, 172-73, 176-178, 179-80, 182-184, 187, 191, 193, 195-96), (Adam & Robertson, 2007, pp. 45-49, 51-57, 61, 63, 70-72, 78-79, 82-85, 89, 93-100, 102, 103, 105-107, 113, 116, 119, 121-122, 126-127, 129-131, 134-35, 137, 139, 140-144, 147, 149, 150, 154, 156-157, 160-163, 165, 169, 170, 172, 174, 179, 181, 187, 194-197, 200, 212, 214- 216, 219-222, 226).

2.5. Example cases of the practice-led methodology: considering and testing terminology through learning and teaching

When I was teaching traditional etching I also noticed that artists often queried the term '*ground*'. They had learnt that a ground was '*a prepared surface to which paint is applied*' (New Oxford American Dictionary, 2005). I understood their point and I wondered how learning and teaching would change if the 20th century term of '*resist*' was used (as in acid-resistant material). I had thought of

each of the different materials as ‘resists’ since 1981 and felt this had deepened my understanding of theory and practice. Expert etchers such as Anthony Kirk at Tyler Graphics was also using the term resist, which I noted in 1993 when he and I were discussing the contemporary practice of using an oily crayon as a resist (Kirk, 1993).



Figure 58. Robertson, C., 1994, a photocollagraph plate (a print from this plate is illustrated by Howard (Howard, 1998. p. 39), photograph.

The term photoresist has been used internationally since the 1950s by artists, and is also used to describe part of the industrial process of making circuit boards (*Figure 58*). I found that when I used the term ‘resist’ generically to describe the other commonly used acid-resistant materials—such as straw hat varnish and stop-out varnish—students grasped the theory and practice of etching very quickly. What I discovered was that this terminology allowed me to teach etching theory and practice in a much shorter space of time.

Later, my naming the new system of etching ‘acrylic-resist etching’ (ARE) was a development of this thinking: ‘resist’ to describe the function, and ‘acrylic’ to differentiate the materials from the traditional materials. My belief is that the word acrylic will gradually fall out of use as the new system becomes established (this has happened with water-based screenprinting which is now generally referred to simply as screenprinting).

In etching the resists (hard resist, soft resist, stop-out resist, plate-backing resist, and spray-aquatint resist) replace the traditional acid-resistant materials (hard ground, soft ground, stop-out varnish, straw hat varnish, Brunswick black, rosin, bitumen, cellulose spray-paint aquatint). The new terms group the acid-resistant materials as an associated family, linking the name to the use of each resist (Adam & Robertson, 2007, pp. 96-98). For example:

1. *Hard* sharp lines can be drawn in *hard* resist (Adam & Robertson, 2007, pp. 102-110).
2. *Soft* pencil-like lines, crayon and textured pencil lines, marks and textures can be made using *soft* resist (Adam & Robertson, 2007, pp. 110-117).
3. *Stopping-out*, editing and creative mark-making can be explored using *stop-out* resist (Adam & Robertson, 2007, pp. 119-124).
4. The *back of the plate* can be protected from the action of the mordant by painting it with *plate-backing* resist (Adam & Robertson, 2007, pp. 99-101).
5. Reticulated *washes* can be generated using *wash* resist (Adam & Robertson, 2007, pp. 138-140).
6. A multitude of irregular dots of resist can be applied to a plate (an *aquatint*) using *aquatint* spray resist (Adam & Robertson, 2007, pp. 124-136).

I noted how the use of classification and terminology affected the student’s understanding and progression. I used the information from this research to

classify the methods (for example, photocollagraphy) and to select terminologies (for example, resists, tusches, and positives) which are used in my teaching and in the books (Adam & Robertson, 2003 contents, pp. 59-64, 76-77, 101-115), (Adam & Robertson, 2007, contents, pp. 8-26, 59-63, 96-97, 126, 132, 133, 138, 163, 184-189).



Figure 59. An artist making positives using Lascaux Tusches on PVC, 2007, photograph.

I discovered that artists worked in a free and creative manner using the clear and straightforward concepts of a 'map' and 'positives' (*Figure 59*). I aimed to create specially designed safer materials for making autographic marks on positives (Adam & Robertson, 2003, pp. 96-126), (Adam & Robertson, 2007, pp. 181-192).

I noticed that when the term photocollagraph was used, students grasped the concept that it is only the added layer that holds the ink (this is different from a photo-etching where the plate is etched and the photoresist is then stripped, allowing the etched metal plate surface [which will hold the ink] to be worked further either by final polishing or by etching further).

I also observed that the idea of working the surface of a photocollagraph plate further with other collagraphy materials and techniques was also learnt more easily (Adam & Robertson, 2007, pp. 162-180). In addition I found that introducing the classification as a photocollagraph made it easier for printmaking students to understand the relationship between the many different materials and brands (Adam & Robertson, 2007, pp. 140-141, 177-180).

Most screenprinting researchers refer to the materials used to screenprint with as 'inks' (Henning, 1994, pp. 82-83), (Hoskins, 2004, p. 99). I found that when making screenprints using artists' paints that this standard term was imprecise and confused other professionals (artists, academics, curators, gallery directors, archivists, critics and collectors).


For example a print made using industrial screenprinting inks is different from one made with watercolours or gouaches, which should be handled as if it was a painting. In my teaching of screenprinting I started to use the term 'printing mixture' rather than 'inks' and I found that this empowered students to be adventurous, experimental, and creative. They became interested in the qualities and behaviours of the different paints and painting aids, and were motivated to make colour swatches and to measure their printing mixtures precisely (Adam & Robertson, 2003, pp. 150-168).

There is wide confusion amongst printmakers about the difference between water-based and water-miscible products. During the testing programme I found that many of the products sold as water-based and water-miscible could not be cleaned up with water, and an alkaline solution was required to remove them from meshes, rollers, plates and surfaces.

Compatibility with water was an important criterion in my research. For example, in screenprinting, water (with a drop of dish-washing liquid) easily cleans my suggested screenprinting mixtures from the mesh (Adam & Robertson, 2003, pp. 192-194); a washed screen (after screen-painting fluid processing, stencil processing, stencil alteration and colour changes) may be

printed with immediately; Lascaux Screen Filler may be diluted with water to create washes (Adam & Robertson, 2003, p. 86); water is used to remove wet filler, and water is used to process Lascaux Screen Painting Fluid stencils; screenprinting mixtures made using artists' materials and containing water store well for many years; and all types of stencil decoat easily when the paints and painting aids recommended in my book are used (Adam & Robertson, 2003, pp. 17-27, 150-168).

The artists' materials used in these screenprinting mixtures are classed as water-based or water-soluble by the manufacturers (*Figures 7*). For example, Lascaux state on their website '*All of our products can be diluted with water*' (Lascaux, 2009). Caring for the environment and using water responsibly is fundamental to the Lascaux ethos (*Figure 60*).



A craft at one with the environment

Water, the source of all life
Water is life, and each Lascaux line of paints springs from water. Since its establishment Lascaux has consistently focused on water-based systems, and Lascaux paints are made primarily without the use of solvents. That is why they are certified as non-toxic in accordance with both Swiss regulations and US standards.

Flowing together
A fundamental element of the paint's characteristic structure is the high quality of Swiss water, which is additionally energised on the company premises. Each process at the Swiss production site near Zurich is tracked and monitored both visually and manually. And only raw materials with the strongest character and structure flow into the recipes and formulas, which are constantly adapted to the state of the art.

Perfected
Most of the colour lines and mediums are perfected on the three-mill roller, a process that guarantees the utmost quality. The equipment and machinery are cleaned exclusively using water, which is only discharged into the environment once it has passed through a water treatment plant designed specially for the company.

Smooth transitions
It is only after a meticulous final inspection that the colour is finally filled into the original and distinctive Lascaux bottles. Smooth transitions between the individual production stages and painstaking care ensure that the end product satisfies the highest artistic and ecological

Figure 60. Lascaux (2009), a webpage which describes how the company values water and the environment, screengrab.

3. The changes to intaglio practice that resulted from the research

3.1. Intaglio plate preparation

Classical, traditional and new practice was researched in order to determine the principles of these processes. Cutting, bevelling, cleaning, and polishing were examined and solvents were removed from the processes of cleaning and polishing (Adam & Robertson, 2007, pp. 66-71, 75-77). Howard's method of toothing the plate by electric sanding was researched and replaced with a hand-graining process which is less abrasive, quieter, and safer (Adam & Robertson, 2007, pp. 71-75).

Degreasing was researched and traditional ammonia and whiting replaced with screenprinting degreasers. I found that the alkaline degreasers degraded acrylic resists. Therefore a deposit of alkaline degreaser on the surface of the plate was attacking the resists from below. An acidic rinsing solution solved this issue (Adam & Robertson, 2007, pp. 78-80). De-oxidizing was researched and the traditional practice of using acetic acid was replaced with the use of household vinegar and salt (Adam & Robertson, 2007, pp. 70-71).

3.2. The direct methods of engraving, drypoint, mezzotint, etc.

Classical, traditional and new practice was studied in order to determine the principles of these processes (Adam & Robertson, 2007, pp. 85, 89, 90). I found that printmakers complained of glare from the polished metal, the difficulties of making a guide drawing on the metal and problems with the tools skipping and slipping. I noted that in etching these difficulties are not encountered due to the use of the acid-resistant layer. I became curious to see if a removable layer could solve these problems. I found that the Lascaux coloured coatings could be used to colour the plate before engraving. This technique allows a guide drawing to be made in pencil, provides a tooth for the engraving tool which helps prevent skipping, and solves the issue of glare from the normally shiny metal.

The concept of the Black Coloured Coating was inspired by the traditional practice of darkening the resist by smoking the plate, and by the aim to create a perfect coating (can be drawn onto with pencil, washes away before etching). In this coating the 'soot' is held in an aqueous solution which can be painted on to the plate. The concept of the White Coloured Coating was inspired by the traditional practice of whitening the resist by painting it with white lead, and by the aim to create a perfect coating. The invention, development, manufacture and marketing of Lascaux Coloured Coatings enable artists to employ this technique (for the first published example of this technique see Adam and Robertson [2007], p. 82).

Classical and traditional mezzotint practice was researched in order to determine the principles of this process (Adam & Robertson, 2007, pp. 90-94). I found that printmakers found that mezzotinting the surface and then burnishing the toothed surface down required time and dexterity. Pre-rocked mezzotinted plates could be purchased and I was curious if there was another way to create whites and pale tones. I found that the Lascaux resists can be painted onto a mezzotinted plate in a range of different dilutions. The acrylic solution fills the indentations of the rocked surface to different levels, reducing the amount of ink which is held. The smooth surface of the resist is non-ink holding. In this way a range of controllable pale tones and whites can be generated. This concept was inspired by my knowledge of collagraphy and by the traditional technique of using enamel paints to repair etching plates and create whites. The invention, development, manufacture and marketing of Lascaux Resists enable artists to employ this technique (first published example of this technique, Adam and Robertson [2007], frontispiece, pp. 90, 175).

Abrading, scraping and burnishing, and repoussage were examined and traditional practice was found to be sound.

3.3. The direct method of air abrading

This contemporary technique was researched in order to determine the principles of this process. I found that Lascaux Stop-out Resist, Plate-backing Resist, and Hard Resist can be used as stencils for air abrading. This concept

was inspired by the practice of stenciling and the photoresist. The invention, development, manufacture and marketing of Lascaux Acrylic Resists enable artists to employ this technique, (first published illustration of this technique, Adam and Robertson [2007], pp. 94-95), (first documentation of the use of modern photostencils designed for air abrading in a book for fine art printmakers, Adam and Robertson [2007], p. 95).

3.4. Etching, Acrylic-Resist Etching (ARE)

Classical, traditional and new practice was researched in order to determine the principles of these processes (Adam & Robertson, 2007, pp. 8-26). Traditional acid-resistant materials and working methods were examined and were found to be hazardous. New acid-resistant materials and working methods were also researched and gaps in the systems were identified (for example some of the resists were only suitable for use on copper). A research project was initiated to invent and develop new materials.

The concept of the new terminology of 'acrylic-resist etching' was inspired by the modern international use of the term 'photoresist'. I found that artists learning about 'photoresist' remembered its function easily and literally. I was curious whether teaching and learning would be accelerated if I used literal terms for traditional acid-resistant materials which described the function, for example '*Plate-backing Resist*' to describe an acid-resistant coating designed to protect the back of the etching plate. I found this effective, and when this terminology was applied to each resist, it became clear exactly how they are all associated and in the same family (first published examples of these terms: Adam [1997a], Adam [1997b], Lascaux [1998], and Adam and Robertson [2007], pp. 96-151).

This means that teaching the use of resists can be accomplished in a single session rather than many separate sessions (as standard practice with traditional etching). This is also possible because the new acrylic resists are applied by paintbrush and airbrush, and clean up with water. In contrast, the application of traditional resists requires hotplates, two separate dabbers or rollers, plate-smoking holder and open flame, paint brushes, spray paint,

aquatint box or shakers, grill and Bunsen flame and solvents. The invention, development, manufacture and marketing of Lascaux Acrylic Resists enable artists to use these new techniques.

3.5. Plate-backing resist, hard resist and soft resist

Classical, traditional and contemporary practice were studied in order to determine the principles of these processes. The concept of an acrylic plate-backing resist was inspired by the principle of using traditional straw hat varnish, and by the aim to create a perfect resist for protecting the back of the plate (for example, easy to apply, dries quickly, scratch-proof, highly acid-resistant, compatible with all commonly used metals and easy to remove after etching). The terminology is based on the function (i.e. an acid-resistant material which can be painted on to the back of a plate). The invention, development, manufacture and marketing of Lascaux Plate-backing Resist enables artists to employ this technique (first published example: Adam and Robertson [2007], pp. 99-101).

Classical, traditional and contemporary practice were studied in order to determine the principles of these processes. The concept of the hard resist was inspired by Callot's innovations, the principles of his techniques and by the aim to create a perfect hard ground (for example, pleasant to draw into, clean lines, punctures cleanly, easy to edit, highly acid-resistant, can be aquatinted, compatible with all commonly used metals and easy to remove after etching). The terminology is based on the function (i.e. an acid-resistant material which when drawn through can provide a clean (hard) line). The development, manufacture of Lascaux Hard Resist enable artists to employ this technique (first published example: Adam and Robertson [2007], pp. 102-110).

Classical, traditional and contemporary practice were studied in order to determine the principles of these processes. The concept of the soft resist was inspired by the classical greasy soft ground and by the aim to create a perfect soft ground (for example, able to offset cleanly, dries to become strong, easy to edit, gives clean lines, highly acid-resistant, can be aquatinted, can be used on all commonly used metals and easy to remove after etching). The new

terminology is based on the function (i.e. an acid-resistant material which can be used to generate soft-ground effects). The invention, development, manufacture and marketing of Lascaux Soft Resist enable artists to employ this technique (first published example: Adam and Robertson [2007], pp. 110-117). I also found that R & F Pigment Sticks could be used and provided a 'soft resist' which behaves very like the classical resist in that it remains soft and greasy (first published example: Adam and Robertson [2007], pp. 118, 149).

3.6. Wash resists, stop-out resists, tonal methods, and aquatints

Classical, traditional and contemporary practice was studied in order to determine the principles of these processes. The new terminology of wash resist is based on the function (i.e. an acid-resistant material which can be used to generate wash effects). The concept of the wash resist was inspired by lithographic reticulated washes, by Howard's wash technique 'destruction ground' (Howard, 1998, pp. 198-200), and by the aim to create complex washes on all commonly used metals. The invention, development, manufacture and marketing of Lascaux Wash Resist enable artists to employ this technique on all commonly used metals (first published example: Adam and Robertson [2007], pp. 138-140).

Classical, traditional and contemporary practice was studied in order to determine the principles of stopping-out techniques. The concept of the stop-out resist was inspired by the principle of using traditional stop-out varnish, and by the aim of producing a perfect resist for creative work, editing, altering and stopping-out during the stage-biting process (for example easy to paint with, can be diluted with water, pleasant to draw into, gives clean lines, highly acid-resistant, can be aquatinted, compatible with all commonly used metals and easy to remove after etching).

The new terminology is based on the function (i.e. an acid-resistant material which can be used to stop out). The invention, development, manufacture and marketing of Lascaux Stop-out Resist enable artists to employ this technique on all commonly used metals (first published example: Adam and Robertson [2007], pp. 119-122).

Classical, traditional and contemporary practice was studied in order to determine the principles of the processes used to create tonal effects. These include methods such as puncturing, impressing, absorbing, cross-hatching, aquatinting and using a dot screen. The term 'scrobiculated' was introduced to describe a pitted etched surface in contrast to the etched reticulated structure produced by the aquatint process, (Adam & Robertson, 2007, p. 126). The introduction of a system of puncturing similar to Henri Goetz's system was made possible by the invention, development, manufacture and marketing of Lascaux Hard Resist (first published example of this technique: Adam and Robertson [2007], pp. 125-126).

Classical, traditional and contemporary practice was studied in order to determine the principles of these processes such as spirit, powder and spray aquatints. The concept of the aquatint spray resist was inspired by the principles of the aquatint technique and by the aim to create a perfect resist for uniform and modulated tonal work, creative techniques, stencilling and lift processes (for example, can be used in an airbrush, can be diluted with water, easy to paint with, visible, highly acid-resistant, compatible with all commonly used metals, and easy to remove after etching). The new terminology is based on the function (i.e. an acid-resistant material which can be sprayed onto a plate to generate aquatints). Traditional spirit, powder and sprayed aquatints were researched and studied in order to achieve this. The invention, development, manufacture and marketing of Lascaux Aquatint Spray Resist enable artists to employ this technique on all commonly used metals (first published example: Adam and Robertson [2007], pp. 128-136).

3.7. Case history: Aquatint

When I was teaching professional printmakers the new methods of aquatinting I found there was a certain amount of confusion about the traditional aquatint process (*Figures 61, 62*). I surmised that this stemmed from information given in the standard reference books. For example Lumsden states '*the ground laid does not entirely protect the metal from the acid*' and then states (incorrectly) that when etched '*a series of minute irregular dots*' is created in the surface of

the plate (Lumsden, 1925, p. 118). Chamberlain is clear and accurate when he states '*Each grain of clear rosin on the plate acts as a minute point or island of acid resist; the unprotected metal around each point will corrode down.*'.

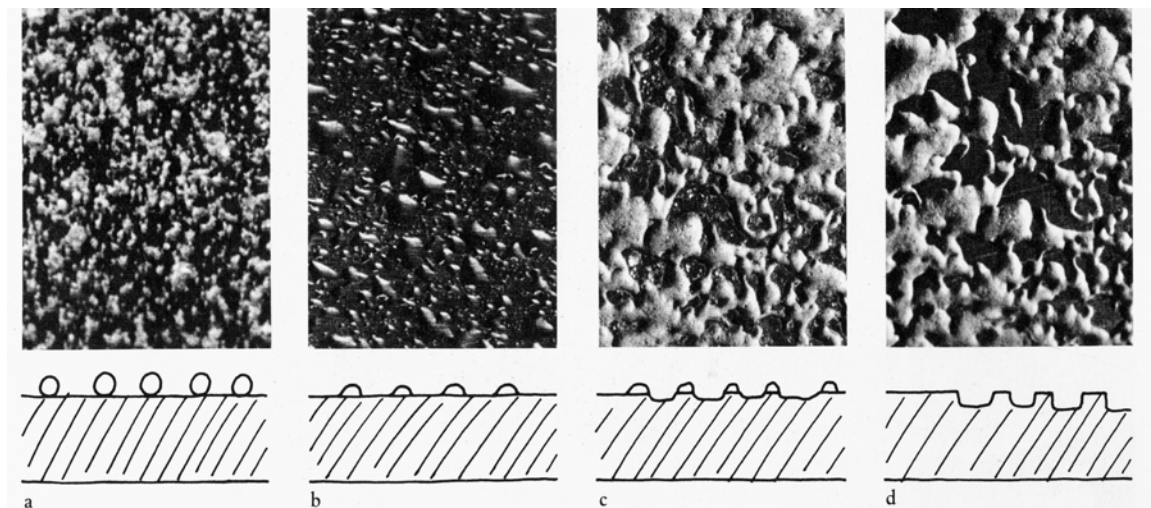


Figure 61. Aquatint process: **a** shows rosin on the plate, **b** shows rosin melted on the plate, **c** shows first period of etching, **d** shows the etched and cleaned plate; (Saff & Sacilotto, 1978, p. 143), scan.

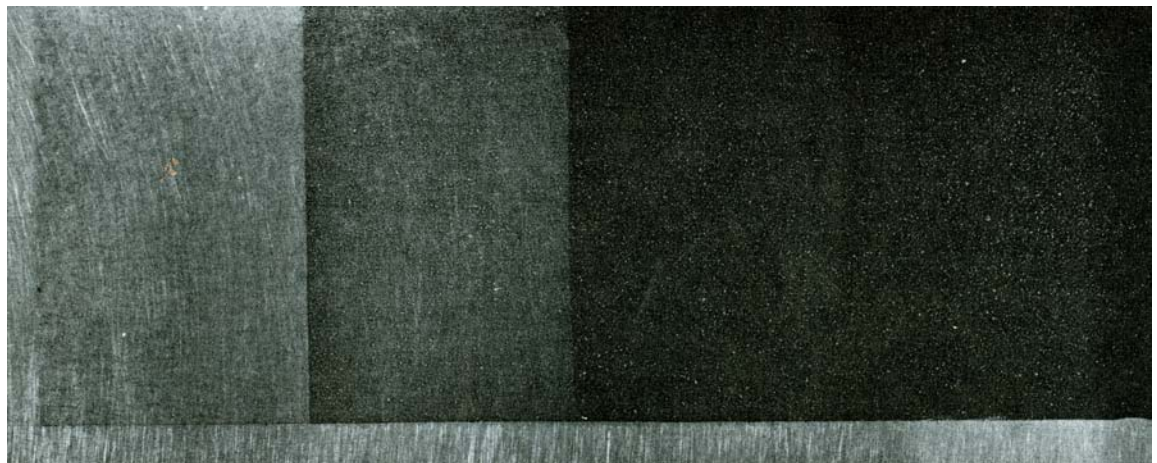


Figure 62. A detail of a print taken from an aquatinted plate (Saff & Sacilotto, 1978, p. 142), scan.

I noticed that many printmakers believed (as Lumsden did) that the etched surface is pitted rather than reticulated. I have also noted that these printmakers find the concept of dots of acrylic resist being used instead of dots of bitumen or rosin challenging (Adam & Robertson, 2007, pp. 128-138). However when a magnifying glass was used (or digital scan taken and magnified) to examine the

resist, the etched reticulated structure in the plate, and the resulting print I found that students grasped the concept (*Figure 61, 62*). This research regarding learning and teaching informed me and led to the use of terminology such as *reticulated* and *scrobiculated* and the classification of aquatint as a tonal technique in my book on intaglio (Adam & Robertson, 2007, pp. 124-137).

In my experience some printmakers are resistant to the idea of using an airbrush, spray gun, diffuser or other tools to create an aquatint (Adam & Robertson, 2007, pp. 47-48, pp. 130-136). These new methods enable the printmaker to create acid-resistant dots of either equal or varying sizes and to position them on the plate with accuracy. There is a belief that to achieve a 'good result' it is imperative to use an aquatint box or 'dust-box' to apply the rosin or bitumen powder in dots of equal size over the entire plate surface.

However this viewpoint conflicts with advice about traditional etching practice given in the standard works regarding aquatint. For example '*The dust bag method allows greater variety of concentration and particle size on different parts of the plate. Put the powder in a bag made of several layers of muslin, silk or nylon. The fineness of the mesh fabric and the numbers of layers will determine the size and number of particles that filter through to the plate. Separate bags can be made for use with different sized particles*' (Saff & Sacilotto, 1978, p. 143).

I was interested in Lawrence's statement '*Judging by the work of the old aquatinters of a hundred years ago the spirit grounds yielded extra-ordinarily delicate and perfect results, and they appear to have been able to control it with certainty*' (Lawrence, 1924 p. 118). Lawrence himself was unable to make a spirit aquatint work. When I was a student at the Slade (1985-87), Bartolomeu dos Santos and I tried repeatedly to make 'spirit ground' aquatints, but we could not produce controllable tones.

For this research project, rather than try to make a functioning spirit aquatint, I examined prints of the period referred to by Lawrence and prints from plates made using 'spirit ground' aquatints. Paul Sandby (*Figure 63*) was a master of

aquatint and of this particular process. I observed that the tonal structure of these works was very similar to the tonal effect provided by a fine spraying of acrylic aquatint resist.



Figure 63. Sandby, P., 1777, The Port of Aegina, aquatint (detail of print), 28.2 cm x 48.8 cm, © Trustees of the British Museum, photograph.

3.8. Lift Solution, other types of resist, mordants and resist removers

Classical, traditional and new practice were studied in order to determine the principles of this process. The concept of lift solution was inspired by the traditional sugar-lift technique, ink-painting method and by the aim to create a perfect lift material (e.g. fast drying, unusual quality of line and easy to lift).

Lascaux Lift Solution is a solution which provides active lines which resemble traditional sugar lift. It can be painted on all commonly used etching plates.

When the solution is dry it becomes unstable, absorbent and therefore unbridgeable. After aquatint is applied and dried the lift solution can be 'lifted off'. The metal is revealed in the form of the painting and the plate can be edited if necessary (e.g. a second aquatint may be applied) and then etched.

The new terminology is based on the function of the solution. The invention, development, manufacture and marketing of Lascaux Lift Solution enable artists to employ this technique (first published example of Lascaux Lift Solution: Adam and Robertson [2007], pp. 131, 135).

Oily resists, waterproof pens, adhesive tapes, and photocopy transfer techniques were researched and traditional practice was found to be sound. These methods can be used in combination with acrylic resists (first published example of these techniques in conjunction with the Lascaux Aquatint/Spray Resist: Adam and Robertson [2007], (pp. 149- 150).

Classical, traditional and modern light-sensitive processes were researched and the most user- and environmentally friendly modern materials and working methods were selected (Adam & Robertson, (2007), pp. 28, 30, 140-148, 150, 177-180).

The generic terminology of dry-film photoresist was used for the first time (Adam & Robertson, 2007, pp. 140-148).

Flexographic plates were researched and health hazards were identified (Adam & Robertson, 2007, pp. 179-180).

Classical and new mordants were studied and the safest mordants selected (Adam & Robertson, 2007, pp. 151-161).

Classical and modern methods of removing resists from etching plates were researched. Methods of affecting the cross-linked structure were explored. This included investigating the effects of heat and freezing on the polymers.

As a result of the research two modern removers were found (Adam & Robertson, 2007, p. 215), (one in collaboration with Lascaux, and one with Evans Vanodine, a company which makes cleaning products).

4. The changes to collagraphy practice that resulted from the research

Traditional materials and working methods were studied and some were found to be hazardous. New ways of working with acrylic materials were researched. During the trials it was found that many acrylics became sticky during the intaglio printing process and bonded to the printing paper. The shellac and polyurethane varnishes used in traditional practice sealed the plate and solved this problem. A research project identified an acrylic varnish that was able to perform in the same way (Adam & Robertson, 2007, pp. 162, 169). This allows artists to seal media such as PVA adhesive, which tend to become sticky when in contact with the dampened printing paper. My intaglio book recommends the acrylic materials which performed best during trials.

A further research project explored making collagraph prints which had the qualities of etchings such as open-bite, fine lines, impressions and highly controllable tonal changes. This led to working with very thin additive layers and led to several discoveries and new ways of working (Adam & Robertson, 2007, pp. 164, 165, 166, 169, 175). These techniques allow artists to make intaglio plates which have all the characteristics of traditional etching but do not require etching. After editioning, the added layer (which has been worked) can be stripped and the plate used again. These techniques also include the process of adding a layer of dry-film photoresist and processing this layer to hold the ink. Making this classification of the process led me to create and use the new terminology of 'photocollagraphy' for the latter process (Adam & Robertson, 2007, pp. 176-179).

Classical and modern materials and methods of printing and cleaning intaglio plates were researched and the most user- and environmentally friendly materials were selected (Adam & Robertson, 2007, pp. 193-213, 215-216). Collating and presenting intaglio works was also considered (Adam & Robertson, 2007, pp. 222-229).

5. The changes to the practice of making positives that resulted from the research

Classical, traditional and modern materials, substrates and methods of making positives were studied (*Table 11, 12*), (Adam & Robertson, 2007, pp. 15-26). For example the works of Rouault and Corot were investigated (*Commentary, p. 15*). Some difficulties in the performance of materials used for autographic positives were identified and a research project was initiated to make a set of materials designed for mark-making positives. For example, some materials were not sufficiently opaque, and some were hazardous—such as photocopy toner and solvents.

Having determined the principles, I set out to create new materials that would be more reliable and provide creative and exciting possibilities. My concept was to select the materials and methods of printmaking which artists were most inspired and fascinated by, such as *cliché verre*, lithographic reticulated washes, soft-ground impressions, monotyping, Chinese ink drawings and paintings, sugar-lift effects, airbrushed marks, delicate drawings, pattern-making, application by roller, offsetting, and the raised lines which William Blake made on his plates in order to print his text (Adam & Robertson, 2007, p. 13).

My aim was to create a range of materials which would enable the artist to explore the special effects related to each printmaking method and the sensations related to these working methods (for example, rolling up soft ground, laying the collage, running it through the press, and then lifting the elements and examining the result). This way of working would allow artists to have greater conceptual and creative control as the finished positives can be used in any printmaking medium (for example, the soft-ground effect positive may be printed as a screenprint—whereas before these effects could only be realized in etching).

The lightweight and flexible sheets of PVC or toothed film can be altered, stored, transported easily (unlike a litho stone or etching plate coated in a

traditional ground). This allows artists to work in their own studios and *en plein air*. The new terminology of ‘tusches’ (for light-sensitive methods) was inspired by the meaning and the use of the word ‘tusche’ in lithography:

‘Tusche

A greasy black composition, in liquid form or to be mixed with liquids, used as ink for making lithographic drawings.’

Origin early 20th cent.: from German *tuschen*, from French *toucher* ‘to touch’ (New Oxford American Dictionary, 2005)

From the 1980s to 1998 I made many prototypes which I tested and used with students and artists. In 1998 I began to work with the team of polymer chemists at Lascaux Colours & Restauro, Zurich, Switzerland with an aim to develop, manufacture and market a complete range of tusches for light-sensitive printmaking processes. The result of this research is an innovative and unique set of water-based painting materials which have been certified in accordance to the ASTM standard D-4236. They are designed for creating or altering positives for light-sensitive printmaking processes (e.g. photo-etching, photoscreenprinting, photocollagraphy).

These different tusches offer a wide variety of mark-making possibilities, including delicate drawings, painted marks, lithographic-type washes (*Figure 64*), sugar-lift effects, soft-ground effects, airbrushed marks, application by roller, offsetting and pattern making. The tusche marks on the clear substrate of the positive will ultimately print. For example, in etching the marks will be the area which is etched; in photocollagraphy the marks will be the area that dissolves leaving ink holding indentations; in screenprinting the marks will become the open areas on the mesh which the printing mix can be squeegeed through onto the paper. The tusches are compatible, and thus may be used in combination with each other; and they are coloured for easy identification.

5.1. Tusche Soft-ground Effect

The concept of the Tusche Soft-ground Effect was inspired by the traditional method of using soft ground in etching. Creative techniques include impressing

collages and offset drawing methods. The tusche was also inspired by the rolling and offsetting techniques related to lithography and relief printing. I designed the tusche to be multifunctional and it can be diluted to make a wash similar to stone lithography washes. The invention, development, manufacture and marketing of Lascaux Tusche Soft-ground Effect (which is water-based and can be used on smooth clear PVC sheet or grained sheets) enable artists to employ this technique (first published examples: Adam and Robertson, [2003], pp. 106-108, Adam and Robertson, [2007], pp. 184-186).



Figure 64. Lascaux Tusche Wash on clear smooth PVC, 2006, photograph.

5.2. Tusche Wash/Spray

Tusche Wash/Spray was inspired by several printmaking techniques. As a wash it provides reticulations inspired by lithographic tusche washes on lithographic zinc plates. As a spray the inspirations were airbrush techniques such as modulated tonal effects, stencilling and lift techniques in acrylic-resist etching (sugar lift in traditional etching practice), and the effects generated by random dot screens used in photo processes. The invention, development, manufacture and marketing of Lascaux Tusche Wash/Spray (which is water-based and can be used on smooth clear PVC or grained sheets) enable artists to use this

technique (first published examples: Adam and Robertson [2003], pp. 104-105, 108-109; Adam and Robertson [2007], pp. 183-187.).

5.3. Tusche Wash

The concept of the tusche wash was inspired by lithographic tusche washes on lithographic stones and by the appearance of wet painted marks (*Figure 64*). The new terminology is based on the function (i.e. a painting material which is formulated to generate wash effects).

The invention, development, manufacture and marketing of Lascaux Tusche Wash (which is water-based and can be used on smooth clear PVC sheet or grained sheets) enable artists to employ this technique (first published examples: Adam and Robertson [2003], pp. 101-105 111-115, and Adam and Robertson [2007], pp. 184, 189).

5.4. Tusche Water-soluble and Waterproof

The concept of the water-soluble tusche was inspired by the *cliché verre* method, the appearance of dry painted marks, intaglio press monotyping methods, stencilling, lift methods, and lithographic and screenprinting reversal techniques. The invention, development, manufacture and marketing of Lascaux Tusche Water-soluble (which is water-based and can be used on smooth clear PVC sheet or grained sheets) enable artists to employ this technique (first published examples: Adam and Robertson [2003], pp. 102, 113, 115 and Adam and Robertson [2007], pp. 184, 190).

The concept of the waterproof tusche was inspired by the appearance of dry and wet painted marks (especially in Chinese painting techniques), stencilling, offsetting, lift methods, and lithographic and screenprinting reversal techniques. Another important concept was the fact that the waterproof marks could be painted over with water-soluble tusches which could then be washed off after exposure without damaging the painting made with waterproof tusche.

The invention, development, manufacture and marketing of Lascaux Tusche Waterproof (which is water-based and can be used on smooth clear PVC sheet

or grained sheets) enable artists to employ this technique (first published examples: Adam and Robertson [2003, pp. 104 -105, 112-115, and Adam and Robertson [2007], pp. 183-184).

5.5. Diluting liquid for tusches

The concept of the diluting liquid originated from the practice of diluting the tusches to gain a range of effects. I wanted a diluting liquid which dried quicker than the traditional slow-drying lithographic washes, and so this diluting liquid is designed to dry on an impervious substrate more speedily than water.

The invention, development, manufacture and marketing of Lascaux Diluting Liquid (which is water-based and can be used on smooth clear PVC sheet or grained sheets) enable artists to employ this technique.

5.6. Lift Solution

Classical, traditional and contemporary practice was researched in order to determine the principles of this process. The concept of 'Lift Solution' was inspired by the traditional sugar-lift technique, ink-painting method, lithography tusche lifts, and by the aim to create a perfect lift material (e.g. fast drying, unusual quality of line and easy to lift).

Lascaux Lift Solution is a solution which provides active lines which resemble traditional sugar lift. It can be painted on smooth or toothed PVC sheet. When the solution is dry it becomes unstable, absorbent and therefore unbridgeable. Lascaux Spray/Wash Tusche is applied over the dried lift solution, and when this in turn is dried the lift solution can be 'lifted off'.

The clear sheet is revealed in the form of the painting and the image can be edited if necessary (e.g. more spray may be applied) and then exposed. The new terminology is based on the function of the solution. The invention, development, manufacture and marketing of Lascaux Lift Solution enable artists to employ this technique, (first published examples of Lascaux Lift Solution, Adam and Robertson [2003], pp. 108-109, and Adam and Robertson [2007], pp. 186-187).

6. The changes to screenprinting practice that resulted from the research

6.1. Screen Filler for water-based screenprinting

There was a common belief that there were no screen fillers which could be used with water-based screenprinting mixtures (Hoskins, 2001, p. 45). I developed two products with Lascaux so that it would be possible to work directly on the mesh. In the book (Adam & Robertson, 2003) I describe how to use the water-based Lascaux Screen Filler and Lascaux Screen Painting Fluid on the mesh to create or alter stencils.

These new materials have excellent handling qualities, are reliable, and are suitable for professional or access-level use. They have been registered with the Swiss Federal Office of Public Health and they have been certified in accordance with the European standard EN 71-3 and the US ASTM standard D-4236. The concept of this screen filler was inspired by the function of traditional screen fillers, the appearance of lithographic washes and the aim to generate reversals and to create a 'perfect' filler (for example, easy to paint with, can be squeegeed, can be diluted with water, can make complex washes, can bridge a range of mesh sizes, is flexible, compatible with photo-emulsion, and can easily be removed from tools and meshes in as safe and user-friendly way as possible), (first published examples of a reversal and washes: Adam and Robertson [2003], pp. 86, 91-92,). The invention, development, manufacture and marketing of Lascaux Screen Filler enable artists to employ this technique, (first published examples of Lascaux Screen Filler: Adam and Robertson [2003], pp. 76-77, 85-95).

6.2. Screen Painting Fluid for water-based screenprinting

The concept of this screen painting fluid was inspired by the traditional screenprinting reversal method which utilizes lithographic tusche and a screen filler for solvent-based screenprinting (when the painted marks will ultimately be the areas of mesh that can be printed). The aim was also to create a perfect painting solution (for example, easy to paint with, coloured and easily visible,

able to bridge a range of mesh sizes, difficult to bridge with screen filler, compatible with photo-emulsion, and easily lifted and removed from tools and meshes with water). The invention, development, manufacture and marketing of Lascaux Painting Fluid enable artists to employ this technique (first published example: Adam and Robertson [2003], p. 93).

6.3. Paper stencil techniques

Henning suggests that Amberlith or Ruby films are the best choice (Henning, 1994, p. 34.) and Hoskins states that paper stencils '*will only last for a few prints*' (Hoskins, 2001, p. 13). My book describes how to make reliable 'paper' stencils from a range of materials such as PVC, tinfoil, and Japanese paper; how to print with the stencils; and what factors may cause them to fail (Adam & Robertson, 2003, pp. 79-84).

6.4. Screenprinting mixtures for water-based screenprinting

After researching the various types of screenprinting colour systems such as those created by companies providing materials for industrial screenprinting (e.g. Gibbon, Sericol, Coates Lorrilux, Union Ink Company, Nazdar Inks and Coatings, Apollo Colours Ltd., J T Keep, Small Products, TW Graphics) and screenpastes designed to work in combination with artist's paint (Lascaux, Speedball, Golden Colours, Createx, Daler Rowney), I found that none of them were suitable for both access level and professional artist screenprinters. There were difficulties related to toxicity, stickiness, paper warping, quality and range of colours and metallics, incompatibilities within the systems, incompatibilities with screen fillers and control of surface finish (Adam & Robertson, 2003, pp. 20-30). I developed ways of working which solved these issues. My screenprinting book provides detailed innovative information about how to screenprint on a range of substrates with a variety of artist's materials such as varnishes (gloss, satin or matt), thickeners, retarders, screenprinting pastes, mediums (which dry to become waterproof or watersoluble) Lascaux gouaches, watercolours, the Sirius colour system, and acrylics, Golden acrylic paints, Speedball process colours and Kremer aqueous solutions and dry pigments (Adam & Robertson, 2003, pp. 142-193).

7. Innovations and collaborations with business

From the 1980s to 1998 I had been conceiving, inventing and running trials for new materials for etching, collagraphy, screenprinting and light-sensitive printmaking processes. I made many prototypes which I tested and used with students and artists. In 1998 I began to work with the team of polymer chemists at Lascaux Colours & Restauro, Zurich, Switzerland (Lascaux, 2009) with an aim to develop, manufacture and market a complete range of modern printmaking materials (*Figure 65*).

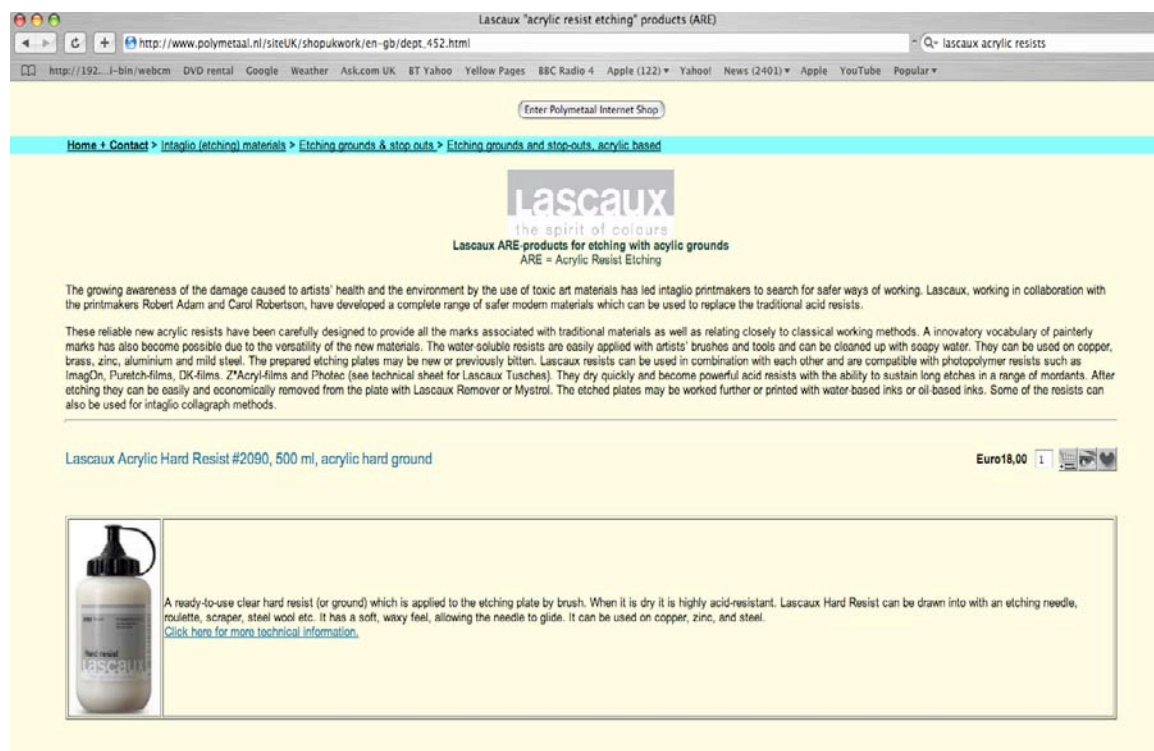


Figure 65. Online catalogue (Polymetaal, 2009), screengrab.

This research project with Lascaux has resulted in 18 water-based products. These have been registered with the Swiss Federal Office of Public Health and they have been certified in accordance with the European standard EN 71-3 on the safety of toys and the US ASTM standard D-4236 ('no health labeling required'), (ASTM, 2009). The products are supported by information sheets which I wrote for artist printmakers and educationalists. Lascaux have published these in French, German and Dutch (Lascaux, 1998). The products are available from suppliers in the UK, Europe, America and Australia. These

suppliers can ship the materials worldwide.

Products for screenprinting

Lascaux Screen Filler

Lascaux Screen Painting Fluid

Acrylic resists

Lascaux Hard Resist

Lascaux Soft Resist

Lascaux Wash Resist

Lascaux Plate-backing Resist

Lascaux Stop-out Resist

Lascaux Aquatint/Spray Resist

Coloured coatings for hard resist

Lascaux Black Coloured Coating for hard resist Resist

Lascaux White Coloured Coating for hard resist Resist

Tusches for making autographic marks on positives

Lascaux Tusche Wash

Lascaux Tusche Soft-ground effect

Lascaux Tusche Wash/Spray

Lascaux Tusche Water-soluble

Lascaux Tusche Waterproof

Lascaux Tusche Diluting Liquid

Other Products

Lascaux Lift Solution for use with Lascaux Aquatint/Spray Resist or Lascaux Tusche Wash/Spray

Remover

Lascaux Remover for removing dried resists, tusches, screenprinting mixtures, dried collagraph material and dry screenfiller

8. Masterclasses, lectures and workshops

2009 – 1998 (selected)

Robertson, C., *Magical Journeys*: public lecture at University of St Andrews, Gateway Gallery, St Andrews.

Robertson, C., 'W. Barns-Graham': *Painters and Printmakers: Creative Partnerships in 20th-Century British Printmaking*: conference lecture at School of Art History, University of St Andrews, St Andrews.

A series of water-based Screenprinting workshops: Kunsthaus, Switzerland.

A series of Acrylic-resist etching workshop: Kunsthaus, Switzerland.

A series of courses about the art of making autographic positives with Lascaux Tusches: Kunsthaus, Switzerland.

Acrylic-resist etching & tradition: a series of workshops, Amsterdam, Holland.

Modern printmaking, Fondation Lascaux, Switzerland. Printmakers who learned how to use the methods later gave workshops in ARE in Zurich (*Figure 66*).

Workshops and lectures in water-based screenprinting, acrylic-resist etching, etching and photo-etching, Making autographic positives with Lascaux Tusches, collagraphy and photocollagraphy: Resident Master Printmaker, Centrum Frans Masereel, Belgium.

A series of workshops in water-based Screenprinting: Fondation Lascaux, Switzerland.

A series of workshops in acrylic-resist etching: Fondation Lascaux (Switzerland)

A series of workshops in collagraphy and photocollagraphy: Fondation Lascaux, Switzerland.

A series of workshops in making autographic positives with Lascaux Tusches, Modern Etching, and Mordant: Fondation Lascaux, Switzerland.

Staff development: Dundee Contemporary Arts, Dundee.

Workshops in acrylic-resist etching: Dundee Contemporary Arts, Dundee.

Making autographic positives with Lascaux Tusches: Dundee Contemporary Arts

Modern Printmaking: Printmaking Fellowship Programme at Northern Print Studio, Gateshead.

A series of workshops in water-based water-proof screenprints: Graal Press, Edinburgh.

Screenprinting for secondary education: Graal Press, Edinburgh.

Two schools residencies: Cockburn Association, Edinburgh.

Staff development courses: Graal Press, Edinburgh.



Figure 66. Poster for ARE workshops in Switzerland (detail), scan.

A series of workshops in acrylic-resist etching: Graal Press, Edinburgh.

A series of workshops in modern printmaking: Graal Press, Edinburgh.

A series of workshops about using Kremer pigments and colour pastes for screenprinting: Graal Press, Edinburgh.

Collagraphy courses: Graal Press, Edinburgh (Figure 67).

A series of workshops in screenprinting with process colour: Graal Press, Edinburgh.

A series of workshops in screenprinting with water re-soluble materials: Graal

Press, Edinburgh.

A series of workshops in acrylic-resist etching: Wimbledon School of Art, London.

A series of workshops in water-based screenprinting: Wimbledon School of Art, London.

Workshops about making autographic positives with Lascaux Tusches: Wimbledon School of Art, London.

Workshops in collagraphy and photocollagraphy: Wimbledon School of Art, London.

Modern etching and mordants: Wimbledon School of Art, London.

A series of staff development workshops and seminars: Wimbledon School of Art, London.

1998 – 1990

The following list shows some of the organisations whose staff attended seminars and workshops at Edinburgh Printmakers on acrylic-resist etching, modern photo-etching, water-based screenprinting, process colours, printmaking for schools, collagraphy and photocollagraphy, making autographic positives, and how to set up a modern print studio. Many individual independent artists also attended these trainings.

SCOTLAND (selected).

Dornoch Print Studio

George Watson's College, Edinburgh

Art TM, Inverness

Glasgow School of Art

Edinburgh College of Art

Dunfermline Print Workshop

Da Hatchery Printmakers, Shetland

John Wheatley College, Glasgow

Gray's School of Art, Aberdeen

Aberdeen Grammar School

Glasgow Print Studio

Edinburgh Academy

Duncan of Jordanstone College of Art, Dundee
Dundee Printmakers Workshop
Crawford Art Centre, St Andrews
University of Edinburgh
Loretto School, Edinburgh
Lothian, Central and Fife Education Authorities

ENGLAND (selected)

Camberwell College of Arts, London
Newham College of FE, East Ham, London
Kensington & Chelsea College, London
Woolwich College, London
Croydon College, London
Chelsea College of Art & Design, London
Intaglio Printmaker, London
Alan Fitzpatrick, London
Wimbledon School of Art, London
Eton College, Windsor
Somerset College of Art & Technology
Anglia Polytechnic University, Cambridge
Oxford Brookes University, Oxford
Cumbria Studio, Bowness
Charles Keene College of FE, Leicester
University of Brighton
Salford College, Swinton
Radley College, Abingdon
Barton Peveril College, Eastleigh, Hants
North Oxfordshire School of Art & Design
St Paul's Print Workshop, Mirfield, W. Yorks
Canterbury Christchurch College, Canterbury
Falmouth College of Art
Fosse Arts Centre, Leicester
University of Portsmouth
Hull College

Stoke-on-Trent College
West Thames College, Isleworth
Norwich School of Art & Design
Northbrook College, Worthing
Fairfield Arts Centre, Basingstoke
Loughborough College of Art & Design
Bristol Printmakers Workshop
Gainsborough's House Print Workshop, Sudbury
Oxford Printmaker Co-op Ltd
De Montford University, Lincoln
Evelyns Community School, Yiewsley, Middlesex
Stafford College
De Montfort University, Leicester
Cumbria Studio, Lancashire
Charles Keene College, Leicester
Sheffield Hallam University
Cumbria College of Art and Design, Carlisle
Leeds College of Art & Design
Dartington & Wilkey's Moor Print Workshop, Devon
Coventry Technical College
University of Sunderland, Sunderland
University of Lancaster
Northern Print Studio, North Shields
Cannock Chase Technical College, Wolverhampton

WALES (selected)

Lonbryteg Glyngarth, Menai
Cardiff Prints
Coleg Meirion-Dwyfor, Gwynedd
Pembrokeshire College, Haverfordwest, Pembrokeshire

NORTHERN IRELAND (selected)

Seacourt Print Workshop, Bangor, Co Down
Belfast Print Workshop

University of Ulster, Belfast

OVERSEAS (selected)

University of Maine, US

South Australian Print Workshop, Adelaide

Winchester School of Art, Barcelona, Spain

Crawford College of Art & Design, Cork, Eire

Instituut Beelend, Brussels, Belgium

St Josephs Convent, Dublin, Eire

Grafik Eksperimentarium, Copenhagen, Denmark

Cork Printmakers Ltd

Cholamandal Artists' Village, Madras, South India

CONSULTANCIES (selected)

Edinburgh College of Art, Edinburgh 2007, 1992

Slade School of Fine Art, London 1998

Wimbledon School of Art, London 1998

Fife Education Authority, 1994

Advice and support has been given to many organisations, including the following (selected):

Wharepuke Print Studio, New Zealand.

Australian Print Workshop, Melbourne

British Council, London

Canadian School for Non-Toxic Printmaking, Alberta, Canada

Timberwick, Santa Fe, US

Columbus College, Georgia, US

Grafisch Atelier, Utrecht

International Society for Education through Safe Printmaking, Vancouver, Canada

Fondaçion Joan Miro, Mallorca

Okanagan University College, British Columbia, Canada

Queen's Park Art Centre, Aylesbury, Bucks

Royal Commission for Ancient Monuments

The School of the Museum of Fine Arts, Boston, Mass., US
University of Northumbria, Newcastle-upon-Tyne
Gray's School of Art, Aberdeen
Spike Island, Bristol
Center for Contemporary Printmaking, Norwalk, US
The Bluecoat, Liverpool, UK
Dumfermline Print Studio.
London Kills Me, London
Orkney Print Workshop, Orkney
Graphic Chemical & Ink Co., Chicago, US
A.P Fitzpatrick, London



Figure 67, Robertson, C., Act 8, intaglio print from collagraph plate made with Lascaux gesso, varnish and acrylic resists such as soft resist, photograph.

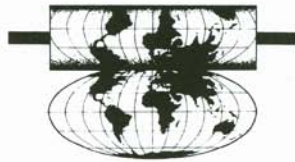
9. Robert Adam

Robert Adam and I met when we were postgraduate students at the Slade School of Art in 1986. At that time Adam was making complex screenprints, and layering screenprinted images on glass and Perspex. In 1986 he won a prize for experimental printmaking at the Printmakers' Council and Whatman Paper National Print Competition, Royal Festival Hall, London. Our first project together was researching safer ways of making photo-etchings (Adam & Robertson, 2007 p. 25).

I returned to Scotland in 1987 and began making prints at Edinburgh Printmakers (EP). In 1989 Adam was appointed as the director of EP, at a time when the organisation was in financial difficulty. I was employed by the workshop and worked in the studio in the same year. The workshop is an independent artist-led organisation, and operated as a business having to fulfil health and safety and environmental requirements.

Local legislation was becoming stricter and we predicted that the forthcoming introduction (in 1990) of the 'Control of Substances Hazardous to Health Regulations' (COSHH) and 'The Environmental Protection Act' regulations would mean that printmaking practice would have to change radically. We wanted to be proactive rather than reactive, and Adam supported my research into user- and environmentally friendlier printmaking methods such as water-based screenprinting, making photocopy and autographic positives, and acrylic collagraphy.

In response to the interest from printmakers and educationalists we developed and provided a range of courses to disseminate the research findings. These were attended by professionals from national and international institutions (pp. 69-75). An article written by Adam and published in *Printmaking Today* (Adam, 1997a) and *Grapheion* (Adam, 1997b) created even more interest (*Figures 68-72*), (*Table 8*).



Editorial

It is four years since we published the first article by Keith Howard on safe photo-etching. Since then he has zealously taken a fresh look at all aspects of safer, non-toxic printmaking. What started as the recognition that many screenprinting and widely-used photographic materials were dangerous has led to a reappraisal of almost every branch of printmaking. This is part of a global concern that the planet is suffering from widespread pollution and that our health is endangered. New movements spawn evangelical convictions and entrenched protection, we have seen both.

We make no apology for giving an unusual amount of space to the article by Robert Adam, director of the Edinburgh Print Workshop, wherein he describes how the first open access studio in Britain has adopted as much of the non-toxic message as possible. It is a solid read, which may put off those who like everything to be in pictures with simple slogans. The time is right to assess progress: it is amazing that non-toxic methods are established in so many countries and in such a short time.

Howard himself has not rested from developing the initial idea towards academic acceptance and we must praise those who have given support to the Canadian School of Non-toxic Printmaking. By initiating the post degree diploma and by establishing centres of collaboration in other countries (Edinburgh Print Workshop is the first) a strong focus now exists.

What is a logical step for an open-access workshop will not necessarily appeal to the skilled artist who works alone and knows what hazards must be avoided. It would be sad to lose all the historical knowledge of traditional methods and even sadder if the contemporary push for quick and easy results meant *any* loss to the diversity of printmaking.

In the next issue

Volume 6, number 4, Winter, 1997 will include:
John Duffin, Bernard Cheese;
Australian print collections;
Silk aquatint at the New York studio of Kathy Caraccio; 107 Workshop.

Figure 68. The editorial of Printmaking Today, 1997, 5 (3), p. 2, scan.

Non-toxic Printmaking

What does it mean in practice?

Robert Adam, director of Edinburgh Printmakers Workshop, surveys five years of innovation

The continuing debate about innovative, non-toxic printmaking techniques is a healthy sign that most artist-printmakers and art educators are prepared to consider new ways of working, especially if these offer clear advantages. At Edinburgh Printmakers we collectively decided some time ago to bite on the bullet, and now, far from the honeymoon period being long past and forgotten, our enthusiasm for and excitement in these new methods grows from day to day.

We originally decided to explore a wide range of new possibilities aiming to develop working methods which would be coherent, complementary, cost-effective, and as safe as possible. All this was to be accomplished in a busy open-access studio catering each day for up to 30 artists, from novices to professionals of international stature.

Over five years ago we switched to an exclusively water-based screenprinting system; we have been using acrylic-resist etching for over half that time and running the system exclusively for more than 18 months. We now have a lot of practical experience in running a non-toxic studio; this paper describes what this means for everyone who is involved in this workshop.

Ours is not the only true way (one exciting aspect of these developments is that artists can choose from a wide variety of possibilities), but we do believe that we have now developed a coherent system which works well for us. It may work as well for others.

Some background

Edinburgh Printmakers Workshop (EPW) was the first open-access print studio in Britain. We are 30 years old this year, and have a membership of well over 200 artists.

From our early years the studio has been given essential financial support by the Scottish Arts Council, but this – with other public funding – represents substantially less than half the annual income we need. This larger portion is self-generated through selling prints, paper, and materials; running an education programme; generating and touring print exhibitions; and through a continuing and successful programme of collaborative print projects with a wide range of artists, from comparative unknowns to major international figures. We also make some income from membership subscriptions and studio fees, but these are heavily subsidized as a matter of policy by our other activities – the main aim of

the studio is to provide printmaking facilities at reasonable cost. At its cheapest, a year's membership with 'all-in' fees works out at 70p a day; £3.50 buys 49 hours of studio time per week.

Like many small arts organizations, we live on the edge financially, planning all our activities within tight budgets, and unlikely ever to build any financial reserves. So our embarkation on this voyage of discovery was not undertaken lightly: we did not have much spare cash to spend.

Why change well established working methods?

Unusually for a print studio, EPW is in neither an attic nor a cellar. We are lucky to have a large, open-plan, city-centre space which was built some 70 years ago as a 'steamie' – one of many Scottish communal neighbourhood laundries. This space makes an excellent studio, with its interior of white glazed bricks and glass roof. However, about six years ago we were increasingly concerned about the discomfort artists were experiencing. The workshop was becoming busier than ever, and extraction systems in screenprinting and etching were thundering away a lot of the time. We were spending a lot of hard-earned income on heating, on fume-extraction, on screenprinting inks and solvents and on rags. And people were complaining of headaches and allergies.

When we first began to consider changing our way of working we agreed that we wanted to be certain of achieving real advantages for the workshop, its artist-members, and its staff – in terms of making our working conditions safer, opening up new possibilities in mark-making and making prints, and making these processes more reliable, faster, and cheaper. Otherwise the trauma of change, and the risk of ending up with an inferior (albeit safer) system might not be worth it.

Water-based screenprinting

Carol Robertson, who runs our screenprinting section, contacted manufacturers and suppliers and then tested and evaluated different products and ways of working. She also read a pile of safety data sheets. It was, and is, a jungle: ink manufacturers were beginning to sense a change of attitude to traditional solvent-based screenprinting systems and were marketing new products with claims which we found

exaggerated. With the requirements of our studio in mind, we worked through a considerable range of inks, pastes, media, light-sensitive emulsions, decoating agents and degreasers, with the clear aim of designing a system which was toxin-free, flexible, reliable, and which achieved artists' archival standards in terms of stability, quality of pigment, and light-fastness. An important bonus would be the easy storage and recycling of surplus ink, so shelf-life after mixing and non-skinning qualities were issues.

Our criteria were met by a system based mainly on Lascaux products. We developed a range of working methods, including the admixture of Lascaux mediums and varnishes to the ink mix, as well as paste and water. The proportionate introduction of these elements is crucial in producing the right mix for a specific application – and applications can vary from printing on Japanese paper to printing on perspex or plastic-laminated wood. This, with image-building and printing technique, is the answer to paper-expansion problems.

The beauty of the system is that the artist has complete control of the behaviour of the ink during printing and the appearance of the ink in the finished print. The ink can be mixed to dry rapidly or slowly – both in the mesh and on the substrate – according to the ability of the printer or the requirements of the job. The ink is thick and easily manipulated on the mesh, so blends and discrete colour areas can be printed without problem. At last, the artist is free to experiment confidently: using fine detail, flat colour fields, monoprinting techniques, and repeat printing.

Registration is easier, as the printer has up to a quarter of an hour to sort it out before the ink begins to dry in the mesh – which can be helpful in the case of computer-generated imagery, trichromatic separations, elements of installations, and awkward-to-handle substrates.

The components of the inks are designed for artists, who can print with gouache, acrylics, varnishes, and pure pigment. A complete spectrum of colours is available, including a trichromatic range. The ink can be translucent, opaque, metallic, powdery, or glossy.

Light-sensitive emulsion is now relatively inexpensive, reliable, and easy to use. We use it in combination with other stencil methods: paper stencils, filler, oil-crayons, or screen-drawing fluid (a wonderful sugar-lift medium

Figure 69. Adam, R., 1997, Non-toxic printmaking - what does it mean in practice?, Printmaking Today, 5 (3), p. 22, scan.



Edinburgh Print Workshop.



Untitled, by Mary Newcomb. Non-etch intaglio, 490 x 590 mm.

and a reliable reversal technique). All these stencils are simple to remove from the mesh.

The emulsion is used mainly to translate autographic material on to the screen. Much mark-making in the studio is done using a range of paints and drawing tools on inexpensive substrates: tracing paper, clear PVC, sanded PVC, drafting film. Drawing media include conté, pencil, gouache, poster paint, water-based relief ink, pigment with window-cleaner, acrylic varnish with ink, tea with conté or gouache. Other autographic work is created on the computer or photocopier. And of course there is scope for using photographic elements in images.

Our screenprinting department now runs with amazing economy. We have recycled our extraction system into a new aquatint bay (see below); there are no fumes; our rag bill is minimal; one complete wall is a rainbow of jam jars containing surplus, ready-mixed ink (some of it over four years old) which many artist-members use all the time in preference to mixing up new batches; and meshes and squeegee blades enjoy a much extended life being cleaned with mild detergent which does not perish their surfaces.

Acrylic-resist etching

In May 1994, buoyed up with the success of the studio's transition from oil-based to water-based screenprinting, we were the only Scottish venue to host Keith Howard on his first workshop tour of Britain. I was sceptical about some of the claims Howard appeared to be making, but as his philosophy seemed in tune with ours, we allowed our curiosity to take over, and laid on

the facilities he had requested as comprehensively as we could. Participants came from all over Scotland and the north of England. From the moment Keith laid out prints made with his methods, everyone was fascinated. In the three years since then we have worked hard at EPW to push these ideas forward, generate new ideas by thinking laterally and create a reliable methodology to unite them.

Acrylic-resist etching has now really moved on. In the last 18 months, we have run seven two-day acrylic-resist seminars aimed at influential educators and specialist printmakers. So far, they have been attended by over 70 printmakers, from a similar number of institutions from all over the UK, from Eire, Denmark, Spain, the US and Australia. Without exception, the participants have been fascinated – just as we were in 1994. They see that this is not a new medium, but an evolutionary development of etching – the principles remain, but the materials and methods used make the medium simple and accessible, efficient, reliable and safe. The bonus is that acrylic-resist etching opens up completely new creative possibilities for the artist/printmaker.

The new system

The task was to develop an acrylic-resist etching system that would function in a busy studio environment.

We analysed the stages of the etching process identifying areas of risk to health and safety. Where possible we replaced old methods with safer alternatives. (Sometimes – as in the case of replacing nitric acid with ferric chloride – the replacement was far from a discovery; but the method, using a

vertical dip-tank, was new for printmaking.) Many of these ideas came from Howard; others we developed.

The 'traditional' processes we considered potentially hazardous for which we found safer alternatives were:

- applying grounds (fumes)
- applying aquatint (dust, naked flame/explosion, fumes)
- backing the plate with straw-hat varnish (solvents, fumes)
- stopping out (solvents, fumes)
- biting with nitric acid (fumes)
- removal of grounds (solvents, fumes)
- removal of stop out (solvents, fumes)
- removal of aquatint (solvents, fumes)
- removal of straw-hat varnish backing (solvents, fumes)
- inking the plate on a hotplate (fumes)
- cleaning ink from plates (solvents, fumes)
- applying photo-etching fluid (Kodak Photo Resist)
- developing photo-etching (KPR)
- stripping photo-etching (KPR) (although, like many print studios, we stopped using KPR many years ago).

To make the transition as easy as possible and to emphasize that the principles of etching had not changed, we retained traditional names 'stop out', 'aquatint', and 'grounds' as far as possible. The materials – although now polymer-based – are doing the same job as their predecessors.

Acrylic grounds and aquatint

We have substituted virtually all methods commonly used in generating etching plates with acrylic-based alternatives. These make a whole system that is fully compatible in itself. But the plates are still printed with traditional etching inks.

Figure 70. Adam, R., 1997, *Non-toxic printmaking - what does it mean in practice?*, *Printmaking Today*, 5 (3) p. 23, scan.

There are many ways of applying an acrylic hard ground onto a plate by pouring, rolling, or spraying specific acrylic varnishes. Acrylics are superior to their wax-and-oil-based predecessors in terms of acid-resistance on all metals commonly used, while retaining the possibility of reproducing line-work, open-bite, or any other kind of mark with maximum accuracy.

Preparation for modern aquatinting uses compressed air to spray a fine mist of acrylic onto metal plates in a ventilated spray-booth with negative airflow. The density of the grain can be varied as in the old system. This method is ideal for creative drawing with an air-brush and exciting possibilities, such as using brushed-on water as a resist to the aquatint, are easy to explore.

Most acrylics produce tonal or textural effects when diluted with water. Now a wide range of painterly marks can be incorporated in an etching by creating 'aquatint washes', which resemble effects usually associated with water-colours or lithographs. In other words, you can now manipulate aquatint with a brush or other tools.

We have developed a new stop out which is very reliable: it can be varied in strength so that any depth of bite (even right through the plate) is possible. Specialized techniques such as soft ground and reversal methods such as sugar-lift are all included in the system.

None of these substances gives off harmful vapours and no organic solvents are used for taking them off the plates. Stripping of all resists is done safely in trays or tanks with an alkaline substance, taking the usual precautions with visor and gloves.

Backing the plate

This is now simple, quick and effective. For large plates we use plastic adhesive film (which can be bought in bulk for the studio). For small plates, one can also use cheap plastic parcel-tape, or just strong acrylic stop out.

Biting the plate

All etching of copper and steel plates is now done in a fumeless ferric chloride solution in oxygenated and temperature-controlled dip tanks, in which the plates stand vertically during biting. All the metals used in intaglio printmaking, including zinc, steel, copper, brass, and silver can be etched (but zinc, and aluminium, because of their natures, must be etched in a horizontal tray in a weaker solution). The quality of bite is really accurate compared to that achieved by using the much more toxic and temperamental nitric acid. The stream of air bubbles in the dip tanks agitates the mordant, removing

the deposit and speeding the bite. The reaction between the metal and ferric chloride gives off no fumes, so we no longer need extraction equipment in the plate-biting area, although this is still available for any special circumstances. Everyone using the biting area wears protective gloves and goggles to minimize risks from splashes and skin contact.

Friedhard Kiekeben, who has played a key role in researching and developing these ideas in our studio, is responsible for developing a new mordant, the 'Edinburgh Etch', which is revolutionizing especially the biting of zinc and steel, making this safe, accurate, and rapid (see this issue of *Printmaking Today* p. 26).

Removing grounds and stop out

All grounds and stop out are removed by immersing the plate in a dip-tank (similar to the mordant dip tanks) containing an alkaline stripping-solution, and soaking it for between ten minutes and half-an-hour (depending on the strength of the stop out used). The artist then removes the plate, and scrubs off any residue using bleach-based bath-scourer and hot water. Further soaking and scrubbing will remove stubborn areas. Again, protective goggles and gloves have to be worn.

Photo-polymer films

The introduction of photo-polymer films enables artists easily to transfer autographic and photographic material - drawings, photocopies, or other kinds of stencil - from positives onto a plate and print these as an etching. The resulting prints are superb and on a par with the best available photo-etching techniques, such as photogravure. The range of mark-making possibilities is endless - exactly as described for screenprinting using light-sensitive emulsion. Many creative and flexible working methods are possible, such as drawing or painting directly on the laminated plate, and using sunlight as a UV source. And an aquatint can be incorporated on the film using a simple contact-printing technique.

Amazingly these photo-polymer plates do not even require etching, (although this can be done) and are ready for printing after a simple developing process. This is because the film itself (or rather its absence where dissolved away in the developing process) forms a recess more than adequate to accept and hold the etching ink during printing. The plastic-laminated surface of the plate is easier to wipe than a 'normal' plate and, under the initial guidance of Alfons Bytautas who is in

charge of our etching area, many artists are now fluent in this process and confidently producing editions of multi-plate colour etchings. It is possible to generate an intaglio plate and print it within one hour, although it is generally better to 'cure' a plate for longer if a full edition is planned.

Economies are not restricted to time spent on the process. The film is cheap (it is manufactured in bulk for the electronics industry) and is readily and safely stripped from the etching plate in an alkaline solution. The plate supporting the film can be used again and again - for the rest of your printmaking career!

Possibilities emerge: artists in our studio now use this non-etch process to bring a new dimension to collagraph techniques and to create relief-printing plates. There is great scope for experiment.

Inking the plate

This process is unchanged, except that we encourage artists to ink up 'cold', if necessary adding some Easy Wipe compound or oil to make the ink more pliable. Baking ink residues on hotplates creates toxic fumes which soon waft round the studio.

Cleaning up

We have eliminated any volatile or organic solvents, alcohols, and cleaning agents such as turps, white spirit, and methylated spirit from the etching area. All cleaning ink residue is now done with vegetable oil (the cheapest supermarket brand) and a rag, the surfaces are given a final clean with a dilute mixture of washing-up liquid and water (using a recycled Lascaux squeezy acrylic container and a clean rag). At a stroke we removed our solvent bills, cut our rag bills, and massively reduced the risk of anyone ingesting toxins through breathing fumes and skin contact.

Studio equipment

Changing our etching department over completely to the acrylic-resist method, enabled us to redesign the area to incorporate the necessary work stations, and to plan 'flow' through the area so that it could accommodate an optimal number of artists at any one time. Facilities include the biting and stripping tanks and rinsing area; the plate-stripping tank and rinsing area; the ventilated spray booth for applying aquatint; a drying unit for acrylic varnishes; and various work stations for plate preparation and ground application. We also have an exposure and processing area for photo-etching.

The cost was reasonable. For

Figure 71. Adam, R., 1997, Non-toxic printmaking - what does it mean in practice?, Printmaking Today, 5 (3) p. 24, scan.

instance, we recycled our redundant screenprinting extraction equipment to provide negative airflow for the aquatint spray-booth; and we designed this and other units in such a way that we could build them from simple materials – well within the reach of a do-it-yourself enthusiast. We bought a good UV light source and vacuum print-down unit for a nominal sum from a graphic-design company which had computerized its operations: since then we have been offered similar items as gifts, which shows that this equipment is around for the asking. The longer term financial benefits are significant: for instance, in the first year of full-time ARE operation we saved over £1000 on our acid bill alone.

What about lithography?

We have now eliminated the toxins in our studio where possible, or have them under careful control and used minimally where they remain an essential part of a process. Lithography, where the antipathy of oil and water is intrinsic, is a real challenge in terms of the eradication of the associated solvents such as turps and white spirit, and the (small amounts of) nitric acid used for etching stones. (We no longer have an offset press, so we do not need blanket-wash.) We work to some extent with waterless litho techniques, but these have their limitations. There are many artists for whom lithography is a chosen medium, no matter how much the mark-making possibilities of water-based screenprinting or acrylic-resist etching are beginning to encroach on 'traditional' litho territory.

We are reviewing our litho studio practice to make it as safe and responsible as possible. Alastair Clark, who runs the litho department, is working towards an ink cleaning-up system based on vegetable oil and degreaser, but contamination with grease can threaten the integrity of stones and plates. Fastidious studio practice (easier to establish in a private studio than in a busy open-access facility) may overcome this. The use of high-grade odour-free solvents is another possibility, but this is expensive.

The important principles at present are to make sure that artists take sensible precautions at every stage (no outdated practices such as 'huffing' the stone); and to be receptive to possible radical improvements to traditional working methods.

Relief printing

Relief printing at EPW was re-invigorated by the purchase of a large Columbian press in superb condition several years ago. We have experimented with different water-based inks and driers, with varying degrees of suc-

cess; but a stumbling block has been the drying qualities of these products. Editions which seem to be dry appear to respond to humidity by 're-wetting', and stored editions, printed books, and framed prints can become sticky, with dreadful consequences.

So we continue to use lithography inks for relief printing. Artists clean up wearing gloves and using vegetable oil, followed by degreaser. We are still researching water-based relief inks; it is only a matter of time before a product is developed which has acceptable qualities.

The result

The studio is a friendly, busy place, with lots of white glazed surfaces which are easily kept clean. There are no fumes to speak of, and no complaints about headaches or allergies. People do not seem to get so tired or fractious; they learn printmaking techniques faster, and experience much less frustration in trying to get their ideas to work: the journey from idea to result has become simpler and less treacherous, allowing artists to achieve their aims and produce work faster. There is now greater common ground between the media in terms of working methods and the integration of materials. Prints which combine screenprinting, for instance, with lithographs or intaglio are a whole new area of exploration.

We are experimenting with new water-based screenprinting and acrylic-resist intaglio techniques and ideas constantly through our publishing programme and in collaborations with artists: screenprinting on Japanese paper with George Donald, non-etch multi-plate intaglio with Barbara Rae, trichromatic water-based screenprinting with Eduardo Paolozzi, layering pure pigment with Mary Newcomb, combining screenprinting and stone lithography seamlessly with Graham Dean, building up complex layers of colour with Victoria Crowe, and installations involving screenprinting onto perspex and plastic-laminated wood with Elizabeth Ogilvie. They are artists of great experience and authority who are clearly intrigued and impressed by the potential of these methods, and enjoy the speed and security they offer.

The psychology of change

The real challenge in this process of change did not lie in assembling and developing the ideas, nor in mapping the route. It lay in steering through the uncertainty and mistrust you inevitably encounter in such a voyage. We asked colleagues to forsake many years' hard-won experience, and join an excursion into uncharted regions, armed only with ideas, enthusiasm, and common sense. In the end, most realized that

the principles – both in screenprinting and in etching – remained the same: just the application has evolved. EPW accepted these changes 95% wholeheartedly. Having now charted a reasonable area we are keen to share our knowledge; but do not underestimate the determination you may find necessary to convince colleagues.

In our experience changes in environmental and health and safety legislation, and – even more importantly – increasing awareness of self-health and toxicity amongst younger artists, are forcing change in printmaking methods. We are involved in a major educational programme in response to this need, and welcome any reader to our studio to see these processes in action, and to learn more about them.

Robert Adam and his colleagues are writing a studio manual of progressive printmaking techniques which will be published by estamp later this year.

EPW runs regular two-day specialist seminars on acrylic-resist etching (£250 plus VAT), and tailored courses on water-based screenprinting (£150 plus VAT per day).

From autumn 1997 EPW will offer a one-year full-time post-degree diploma course in non-toxic printmaking, in association with the Canadian School for Non-toxic Printmaking.

Contact: Edinburgh Printmakers Workshop, 23 Union Street, Edinburgh EH1 3LR, Scotland, UK. Tel: +44 (0) 131 557 2479; Fax: +44 (0) 131 557 2479. e-mail: printmakers@ednet.co.uk

Jane Joseph Two Decades of Work on Paper 1980 -1997

Exhibition of drawings
and etchings,

November 5th - 27th

at Morley Gallery,
61 Westminster Bridge Road
London SE1 7HT

Gallery Opening Times

Mon. 1pm - 6pm
Tues. Thurs. Fri. 10am - 6pm
Wed. 10am - 8pm
Sun. 2pm - 5pm

**Tel: +44 (0)171 450 9226
Fax: +44 (0)171 928 4074**

Figure 72. Adam, R., 1997, Non-toxic printmaking - what does it mean in practice?, Printmaking Today, 5 (3) p. 25, scan.

The graph (*Figure 73*) shows the financial growth of Edinburgh Printmakers during the period of changing to safer practice. This success was due in part to the interest in the research which had allowed us to expand the educational programme, generating extra revenue. The quality of the prints that we were able to achieve attracted high profile artists for the publishing programme and motivated the artist-members, as well as stimulating the interest of collectors. The other benefit was that revenue from print sales and studio fees showed a steady increase. The profile of the studio was significantly enhanced by the education programme (including its international dimension), the high-profile artists working there, and the increased quality of the prints produced.

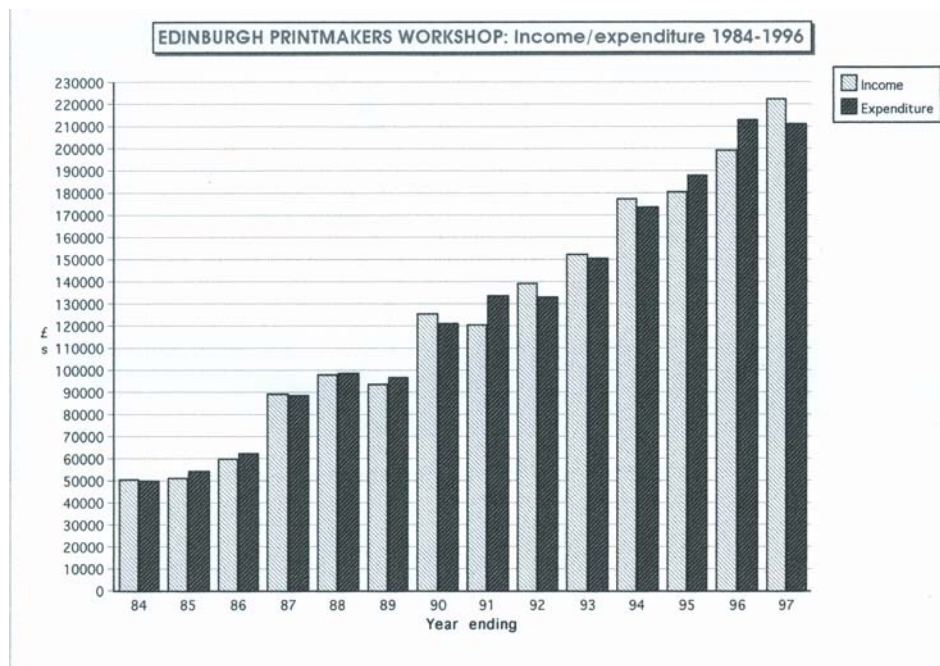


Figure 73. The growth in turnover at Edinburgh Printmakers 1984—1997, scan.

In 1998 Robert Adam and I set up Graal Press and continued to work together on various projects including writing and illustrating both books, and testing the materials through teaching and co-publishing. He used the new systems to continue making his own screenprints and intaglio prints. The exhibition of his own work both validates and disseminates information about the systems. Adam has supported me throughout the research project, and has acted as a valuable sounding board.

10. Collaborations and publishing projects with artists

2009-1995

Barbara Rae CBE RA DLitt: editions of screenprints and monotypes. These ongoing projects involve researching the use of tusches and specialist methods of screenprinting with gouache, Kremer organic pastes, Golden interference paints and other artist's materials (*Figure 24*). The relationship and body of work is documented in detail in a forthcoming monograph by Gareth Wardell et al (Wardell, 2010).

2009

Kate Downie RSA: editions of etchings (commissioned by the Royal Botanic Garden, Edinburgh) and screenprints using dry pigments, glossy printing mixtures and watercolour printing mixtures.

2008 - 1998

W. Barns-Graham CBE HRSA DLitt: a substantial body of work including screenprint and etching collaborations and editions representing the artist's major output during the last six years of her life (Figures 22, 25). Posthumous editioning completed 2008. The relationship is documented in detail in a monograph by Ann Gunn (Gunn, 2009) and is also discussed in the biography *W Barns-Graham: a studio life* (Green, 2001).

2009 - 1995

Victoria Crowe OBE RSA: hand-made artist's book and folio, intaglio and relief prints involving further research into book-making, book-binding, acrylic-resist etching, screenprinting and etching in combination, archival quality *chine collé* methods, dry-film photoresists used in etching and collagraphy, digital output, screenprinting with Acryl paint using the Sirius colour concept (*Figure 74*).

2007-2005

Scott Myles: acrylic-resist etching and screenprint

Romeo Alaeff (US): project planning consultant

Jenny Hendra: acrylic-resist etching, screenprinting, testing educational


material.

Lucy Cobb: collagraphy, screenprinting, acrylic resist etching, testing educational material.

Center for Contemporary Printmaking – Exhibitions

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Victoria Crowe, OBE
Jenny + Feeding, 2000
Etching & screenprint
Edition 100
\$450
Courtesy Graal Press
[Purchase Print](#)



Victoria Crowe, OBE
Landscape with Figure & Dogs, 2000
Etching & screenprint
Edition 75
\$590
Courtesy Graal Press
[Purchase Print](#)

Figure 74, Crowe, V., exhibition including Graal Press co-published works [online catalogue], 2009, US: Center for Contemporary Printmaking, screengrab.

2005 -2003

Barbara Diethelm (Switzerland): screenprinting editions involving research into methods of screenprinting with Lascaux Perlacryl paints and specialist nacreous materials such as natural pearl and guanine (a protein crystal). Etching projects incorporating soft resist, lift solution and aquatint.

Werner Schmidt (Germany, Switzerland) and John Berger (France): acrylic-

resist etching project incorporating spit biting, text and installation.

Margaret Hunter (Germany): project involving research into combination printing using acrylic-resist etching intaglio plates; *chine collé*; artist's materials, screenprinting and collagraph intaglio plates, resulting in screenprint, etching and combination editions.

2003- 1990

Sir Eduardo Paolozzi, Elizabeth Ogilvie (*Figure 75*), Samantha Clark, Robert Callender, Henry Kondracki, Robert Adam, Caroline McNairn, Irina Zatulovskaya, Ian Hamilton Finlay, Joseph Davie, Elspeth Lamb, 21 Works by Women (folio), Gwyneth Leech, Susan Norrie, Colin Thoms, George Donald (folio), Gail Lemasurier, Jane Hyslop, Ian MacIntyre, Joan Smith, Paul Moriarty, Mary Newcomb, Underwired (folio), *An Edinburgh Suite* (folio), *The Sea, The Sea*, (folio), Total Kunst (book covers), Kate Bright.



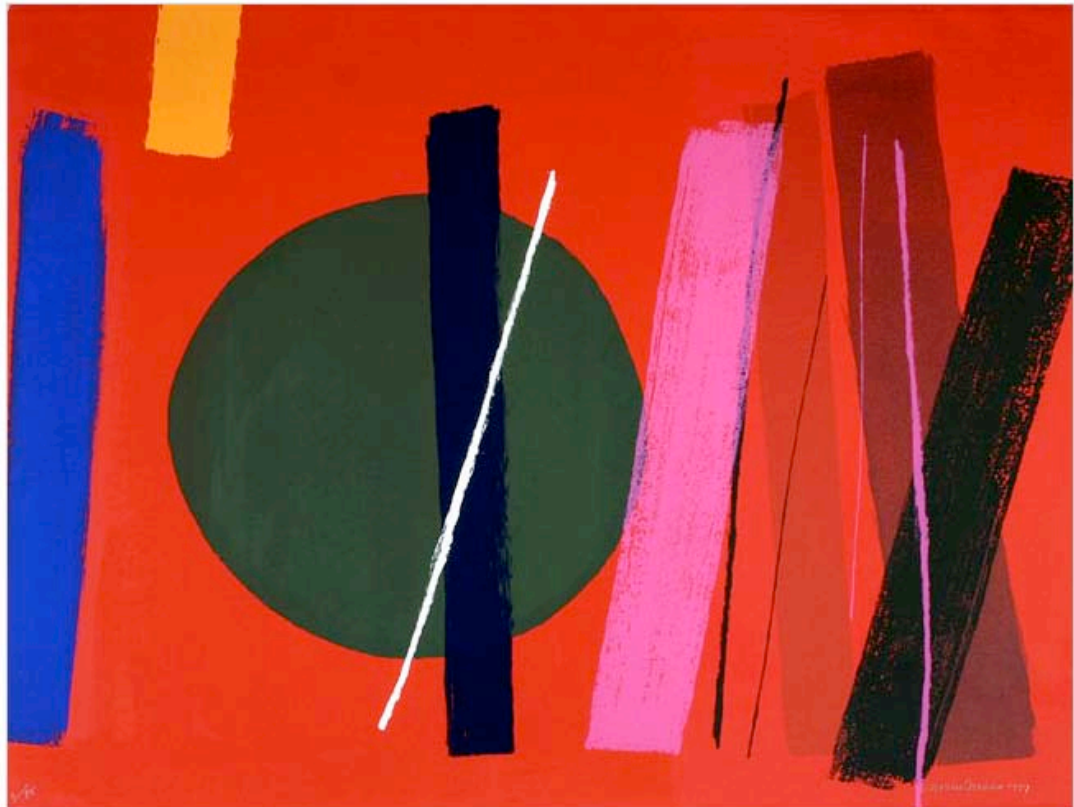
Figure 75. Ogilvie, E., 1998, working at Graal Press, photograph.

10.1. Exhibitions: collaborative practice (selected)

Works have been exhibited internationally and nationally, including; Royal Scottish Academy; Smart Art, Seattle, USA + tour; Edinburgh; Scottish National Portrait Gallery, Edinburgh; Gallery Galtung, Oslo; Royal Academy, London; Crawford Gallery, St Andrew, Scotland; Susi Landolf, Switzerland; McGeary Gallery, Brussels; Graphics Studio Workshop, Dublin; Glasgow Print Studio, Glasgow; Edinburgh Printmakers Workshop, Edinburgh; Penwith Galleries, St Ives; Odapark, Netherlands; Stephen Lacey Gallery, London; Universität der Künste, Berlin; Tate St Ives, St Ives; Art First, London; Art First, New York, US; Kunsthalle, Zurich; Fondation Lascaux, Zurich; Center for Contemporary Printmaking, Norwalk, US (*Figure 76*); David Krut Fine Art, New York, US.

The New York Times

April 26, 2009



ACROSS THE SEA Among the works being exhibited at the Center for Contemporary Printmaking in Norwalk is Wilhelmina Barns-Graham's "Just in Time."

Figure 76. Barns-Graham, W., (Graal Press co-publication), 2009, Just in Time. US: The New York Times, scan.

10.2. Collections: collaborative practice (selected)

Works made in collaboration with artists are in public, corporate and private collections worldwide, including the Museum of Scotland; HM The Queen; City of Glasgow Collection; City of Edinburgh Collection; the Government Art Collection (The Prime Minister's office); New Hall, Cambridge; Royal College of Art, London; University of Edinburgh; University of Exeter; University of Aberdeen; Moray House College; Scottish Office; Scottish Provident; Standard Life; Ernst & Young CA; Edinburgh Printmakers (*Figure 77*).

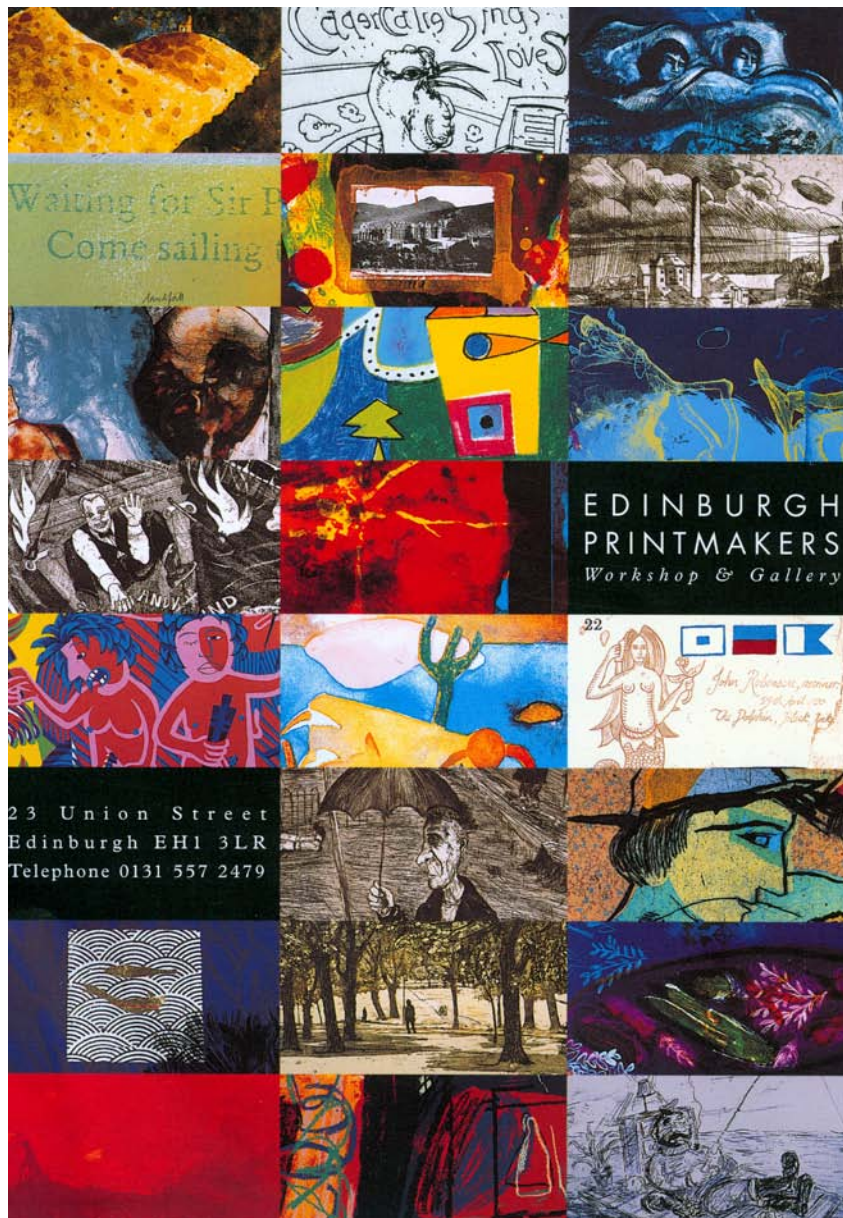


Figure 77. EP catalogue, prints made with the new systems (details), 1996.
Edinburgh: Edinburgh Printmakers, scan.

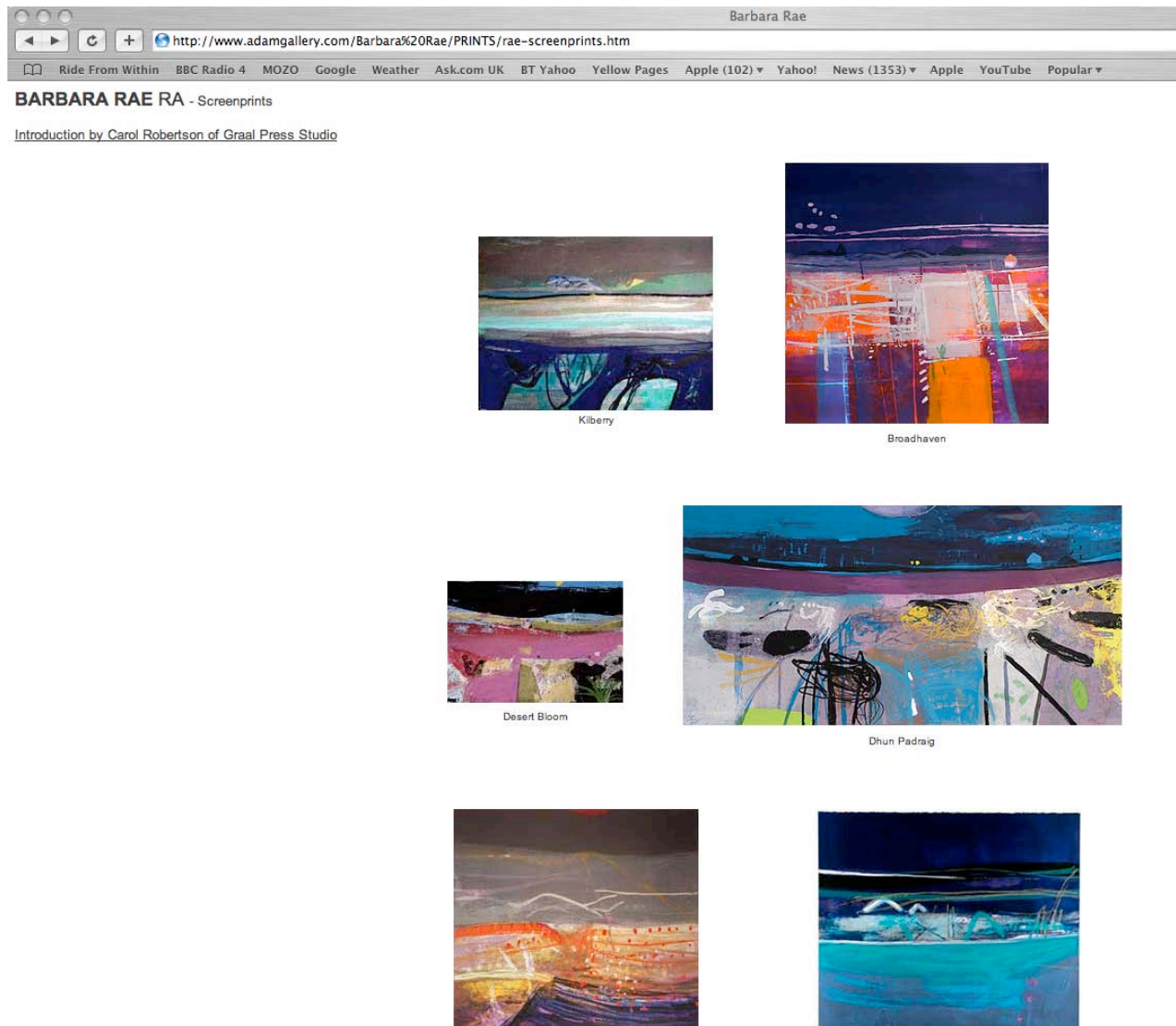


Figure 78. Rae, B., (Graal Press co-published screenprints), 2009. London: The Adam Gallery website, [accessed September 2009], screengrab.

10.3. Documentation: collaborative practice (2010- 2001 selected)

Wardell, G., et al, 2010 (forthcoming), *Barbara Rae: Prints*, London: Lund Humphries (Figure 78).

Genocchio, B., 2009, 'Scottish Contemporary, with International Appeal', New York: *New York Times*, April 23rd.

Art review, 2009, 'Five Scottish print studios exhibit artwork at CCP'. US, *Norwalkplus Magazine*, [internet] 1 June. Available at: www.norwalkplus.com [accessed June 2009].

Downie, K., 2009, *The Coast Road Diaries*, Edinburgh: Scottish Gallery.

CCP, 2009, *Five Scottish Print Studios* [group exhibition], Norwalk (CT): Center for Contemporary Printmaking.

Gunn, A.V., 2009, *A different way of working: The screenprints of Wilhelmina Barns-Graham*. [a lecture about the prints made in collaboration with Carol Robertson]. Edinburgh: National Galleries of Scotland.

Gunn, A.V., 2008, 'Visions in Time: Wilhelmina Barns-Graham's Joint Pursuit, Lasting Legacy'. London: *Printmaking Today* 17 (3).

Yakir, N., 2008, *The Sublime Art of Wilhelmina Barns-Graham: The Last Two Decades*. [lecture about the prints made in collaboration with Carol Robertson]. Falmouth: University College Falmouth.

Gunn, A. V., 2007, *The Prints of Wilhelmina Barns-Graham: A Complete Catalogue*. London: Lund Humphries.

Crowe, V., (a handmade book printed at Graal Press), 2007, *Plant Memory*. Edinburgh: Royal Scottish Academy.

Events, *International Printmakers*, 2009, <http://inkteraction.ning.com>. [online networking], (accessed September 2009). USA: Inkteraction,

Adam, R. and Robertson, C., 2007, (Graal Press co-published prints) *INTAGLIO: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*, 2007 (hardback), 2008 (paperback), London: Thames & Hudson, and New York: Thames & Hudson Inc.

Rae, B. 2005, *Barbara Rae: Portrait of an Artist*, cover illustration, *North Harbour* (Graal Press co-published screenprint). Aberdeen: *Aberdeen Magazine* (University alumni magazine).

Mathias Gentinetta, 2005, *Day of the Open Door, (workshop, ARE products and Graal Press prints)*, Zurich: Kupferdruck Werkstatt.

Rae, B., 2004, full-page colour illustration of the screenprint *Broadhaven*, (co-published by Graal Press). London: *Royal Academy Illustrated*.

Adam, R. and Robertson, C., 2004, (Graal Press co-published prints) *Screenprinting: the complete water-based system*, 2003 (hardback), 2004 (paperback). London: Thames & Hudson, and New York: Thames & Hudson Inc.

Art First, 2005, *1912-2004 - A tribute: Recent Paintings and Prints (Barns-Graham, W.)*, London: Art First.

Royal Scottish Academy, 2005, (Rae, B. screenprint *Broadhaven*, co-published by Graal Press) Edinburgh: *Royal Scottish Academy catalogue*

SCRAN, 2001, *Hill Fort- circular screenprint. The print and its making by Barbara Rae and Carol Robertson*, SCRAN educational films (www.scran.ac.uk) [accessed September 2009]. Edinburgh: Scottish Cultural Resources Access Network.

Rae, B., (Graal Press co-published screenprints), *Ten Years of Printmaking*. Essex: North House Gallery.

Cambridge University, 2002, (Graal Press co-published Barns-Graham, W. screenprint), *Another Time*, entry in *Women's Art at New Hall*, 3rd edition. Cambridge: New Hall.

Green, L., 2001, (entry regarding collaborations with Barns-Graham, W. and Robertson, C., at Graal Press), *A studio life*, pp 267-270, London: Lund Humphries (*Figure 79*).

simultaneously, the images that emerge can vary considerably in mood. Some will be worked on more than others before the statement satisfies the artist. In moving from one work to the next a rhythm and a connection are established: while the individual paintings are entirely independent, they may also be seen as distinct melodies that none the less harmonise as a coherent and consistent song.

This particular way of working – in which the image is developed essentially in a number of separate 'layers' – served Barns-Graham well as she embarked on a series of limited edition silkscreen prints, done in close co-operation with the Scottish printmaker, Carol Robertson. Robertson and her partner, the respected printer Robert Adam, run a print studio in Midlothian. When Robertson first met the artist there was, both acknowledge, an instant rapport. The working relationship that evolved is not one in which the artist simply presents the printer with an image that is then transposed into the print medium. Robertson works with Barns-Graham in the studio, directly translating the artist's ideas and responses to form and colour into the most appropriate and sympathetic materials. The priority has been to establish a *modus operandi* that is as natural as possible for the artist, thereby creating the least disruption to her accustomed way of

working. In the process new materials have been experimented with, and ground-breaking techniques have evolved. For Barns-Graham this 'slow painting' has brought a new sort of control.⁶⁰ This is very different from her experience of screen-printing in the mid 1970s, when she had found its limitations frustrating: the way of working she and Robertson have established is flexible and comparatively fast. Barns-Graham's acute sense of colour and of colour relationships has pushed the medium's capacity to its extremes: in some prints there may be fifteen layers of colour to achieve the right tone. There is, Carol Robertson remarks, always a perfect balance of colours, with each one having a definite effect on mood. She describes her role as one of enabler, likening it to a musical accompanist. The relationship between any artist and their printer must be one of trust, but this is a very rare creative partnership: Barns-Graham has accepted Robertson into the profoundly solitary process of creation.⁶¹ It is a private, collaborative relationship, which both women find deeply satisfying. Robert Adam's role comes into focus later in the process, in the print studio. Robertson has an enormous admiration for the artist's broad vision (that is open, never fixed), and for her ability to see possibilities out of the corner of her eye. They may be working on the development of one image, when suddenly Barns-Graham will glimpse an entirely

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Figure 79, Green, L., describes the collaboration, (Green, 2001, p. 267), scan.

11. Individual practice: exhibitions (selected)



Figure 80. Robertson, C., 2001, November the 5th (screenprint, detail) was used on promotional material for the Edinburgh Festival exhibition Art in the City. Edinburgh: City Art Centre, photograph.

11.1. Selected exhibitions (2009-2005).

Five Scottish Print Studios, Center for Contemporary Printmaking, Norwalk, America.

Swans: lovers, myths and stars, Dundee Contemporary Arts (solo exhibition)

Exhibiting finalist for Sovereign European Art Prize for painting

Preston Street, animated film, Edinburgh Filmhouse; Dynamic Earth, Edinburgh

Our Neighbourhood, animated film, Edinburgh Filmhouse; Dynamic Earth, Edinburgh.

11.2. Selected group exhibitions of prints, paintings and installations.

Numerous group exhibitions including New York Art Fair, US; CCA Galleries, London; *Art in the City*, City Art Centre, Edinburgh (*Figure 80*); *Book of Ours*, Smart Art, Seattle, USA + tour; *Carol Robertson and Pippa Smith*, The New Ashgate Gallery, Surrey; *Connections*, Festival Exhibition, Royal Scottish Academy; *Belgrade Edinburgh: Edinburgh Belgrade*, Galerija Graficki Kolektiv, Belgrade, Yugoslavia; *Islands* installation piece, Edinburgh Printmakers; *Underwired - A Day in the Life of -* (photography folio), Edinburgh Festival Exhibition; *Scottish and Irish Prints*, East West Gallery, London; *Partners in Print*, Fruitmarket Gallery, Edinburgh; *Susan Norrie and Carol Robertson*, Edinburgh Printmakers; *Printmakers Council & Whatman Paper National Print Competition*, Royal Festival Hall, London; *Sex*, Young Unknowns Gallery, London.

11.3. Collections.

Works held in many public, corporate and private collections including HM The Queen; City of Glasgow Collection; City of Edinburgh Collection (Lord Provost's office); University of Edinburgh; Moray House College; Scottish Office; Crown Office; Scottish Provident; Edinburgh Fund Managers; Ernst & Young CA; Standard Life; Playhouse Theatre; Fondation Lascaux, Switzerland; Paintings in Hospitals Scotland; John Purcell Paper, London; Leeds Education Authority.

11.4. Documentation (selected 2009-).

Documentation relating to the books and the research project (*Figures 81-90*).

Specialist Craft: the intaglio book is included in the print section by *Specialist Craft* catalogue 2009, largest suppliers in UK to educational establishments from primary to university, occupational therapy departments, prisons, social service centres, etc. UK: (www.specialistcraft.co.uk), [accessed September 2009].

Kirk, A., (collagraphs), *Five Scottish Print Studios*. 2009, USA: Center for Contemporary Printmaking, Norwalk.

Anon, 2009-2007, book review of *Screenprinting*. USA: Goliath (School Arts).

Screenprinting – The complete water-based system

Robert Adam & Carol Robertson

Thames and Hudson, UK, 2003. 208 pp
228 colour & 37 b/w illustrations. Hardback
250 x 225 mm. £24.95. ISBN 0 500 511152

My immediate reaction to this comprehensive resource book was to admire its slick, impressive design. But with so many books covering technique on the market do we need another one? Well, in this case, yes. Thames and Hudson have come up with a perfect hybrid combining coffee-table aesthetic with informed and clear advice by two experienced water-based screenprinters: glossy hardback meets technical manual. It is not really one to abandon among the ink pots, to languish until an emergency screen blockage or a mid-edition quality control panic, this is more of a trophy reference book for the printmaker who likes to entertain or the technician about town.

The book covers every stage of the printing process and, although it sometimes follows a familiar format (how screenprinting developed, designing a studio etc.) it presents the reader with a logical, consistent introduction to methods, practice and problem-solving which can be digested by the beginner or dipped into by the experienced screenprinter.

As a practitioner, with a solvent-based studio, contemplating a system change, I found the book a great help and was able to cruise the text to make judgements on comparative aspects of the systems and to shore up missing areas in my knowledge. As an educationalist I have found it an invaluable resource and, due to its contemporary design and lack of technobabble, one which can be accessed by students directly.

Although it might be guilty of being a bit formulaic in structure, it is, nevertheless, a current, contemporary treatment of that formula and, as you would expect from Thames and Hudson, an absolute thoroughbred. Crammed with 265 illustrations (228 in colour) I think this definite companion to the current water-based screenprinter would be a welcome addition to any practitioner's or educator's bookshelf.

Peter Lloyd, artist-printmaker and teacher
at Winchester School of Art, Hants, UK

Dear Carol and Robert,
I think this might be an old e-mail address, but hopefully it will make it to you.
I just wanted to let you know that I recently purchased your book. Your positive representation of the Z*Acryl materials and the CRATE (my studio in Oakland) not withstanding, I think it is absolutely superb, and the finest resource on progressive printing techniques yet written. But, as for the former, THANK YOU!

I wonder if it is possible to sell copies of your book from my studio, as I think it would be well received by the artists that come to learn and work here. If so, can you give me information on wholesale prices, and contact information.

I look forward to hearing from you. Congratulations, again.

Kind regards,
Mark

Mark Zaffron
Director,
The C.R.A.T.E.

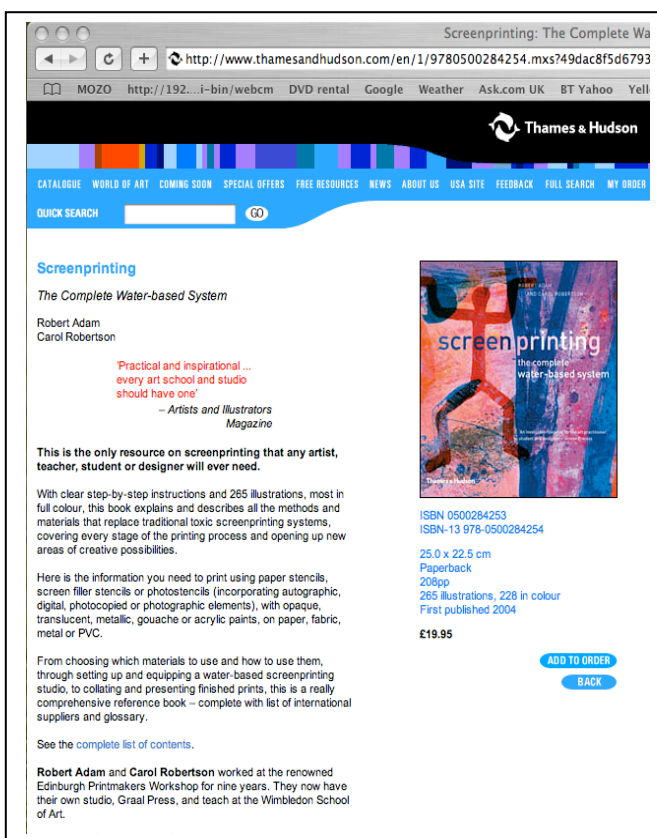


Figure 81. Lloyd, P., 2003, book review, *Printmaking Today*, 12 (3), scan.

Figure 82. Zaffron, M., 2008, letter regarding the intaglio book, scan.

Figure 83. Book review, Thames & Hudson webpage, screengrab.

Spare, R., 2007, book review of *Intaglio* by *Printmaking Today*, 16 (3).

Edinburgh Printmakers, 2007, 'Forty years of Edinburgh Printmakers' (interview for documentary film). Edinburgh: Edinburgh Printmakers.

Adam, R. and Robertson, C., 2007, (prints and illustrations) *INTAGLIO: acrylic-resist etching, collagraphy, engraving, drypoint, mezzotint - the complete safety-first system for creative printmaking*, 2007 (hardback), 2008 (paperback), London: Thames & Hudson, and New York: Thames & Hudson Inc.

Clark, D., 2006, 'ARE - The New Order'. USA: Printmakingblog, (printmakers.blogspot.com), [accessed June 2007].

Anon, 2005, book review of *Screenprinting*. US: Books Matter (online), [accessed December, 2005].

Martin, R., 2004, book review of *Screenprinting* by US: *High beam Research, School Arts*, November 1, (online, accessed December 2004).

Hesterman, H., 2004, book review of *Screenprinting* by *Impact*, 39 (2) p. 18 Melbourne: Magazine for the Print Council of Australia,

Adam, R. and Robertson, C., 2004, *Screenprinting: the complete water-based system*, paperback (2004), hardback (2003). London: Thames & Hudson, and New York: Thames & Hudson Inc.

Anon, 2004, serialized excerpts from *Screenprinting*, book review *Screen Process & Digital Imaging*, USA.

The Midwest Book Review, 2004, book review of *Screenprinting*. Oregon, WI: *The Midwest Book Review*.

Lloyd, P., 2003, book review of *Screenprinting*, *Printmaking Today*, 12 (3).

Anon, 2003, book review of *Screenprinting*, *Artists and Illustrators*.

Robertson, C., 2001, *EDINBURGH: An intimate city*. Edinburgh: City of Edinburgh Council.

Anon, 2001, 'Picture Perfect Edinburgh', article, *Edinburgh Evening News*, 6 July.

Anon, C., 2001, 'Art in the City', *Scotsman*, 30 June.

City Art Centre, 2001, *November the 5th* (screenprint) selected to promote the Edinburgh Festival exhibition *Art in the City*, (posters, banners, advertising on city transport). Edinburgh: City Art Centre.

Howard, K., 1998, illustration of photocollagraph, *Non-toxic Intaglio Printmaking*, Canada: self-published.

Course Syllabus, Art 379, Printmaking/Screen Printing 4 credits

Kay Campbell, Professor of Art, e-mail: kcampbell@oregonstate.edu, CampKS@aol.com
Office: Fairbanks Hall, Rm. 202 ph: 737-5015
Office Hours: Tues./Thurs. 8:30-9:00 a.m., Tues. 1:00-2:00 p.m.

REQUIRED TEXT: Screen Printing by Robert Adam and Carol Robertson

PREREQUISITES: Department of Art core curriculum

CATALOG DESCRIPTION: Studio course in screen printing with emphasis on paper stencil, drawing fluid and photo emulsion processes. Students are exposed to a range of techniques and concepts and are encouraged to investigate personal motivations while making multiple color prints. PREREQ: Art core curriculum.

COURSE OBJECTIVES: To introduce students to several modes of artistic expression in the serigraph processes of printmaking. Students will become conversant in the technical aspects of screen printing, the use of water based media and develop a skilled work ethic in the implementation of the formal aspects of the process. Students will be directed to explore their individual artistic vision by developing personal imagery to enable them to use screen printing as a visually expressive medium. This course is intended to complement the other offerings in the Printmaking program and to integrate with others means of artistic practice. Students are expected to work outside of class time during the week and/or weekends and can anticipate an additional 6 hours or more per week.

LEARNING OUTCOMES: To successfully complete this class you must demonstrate the ability to-

- have a completed portfolio of work that represents all assignments.
- be conversant with multiple introductory screen printing processes of paper stencil, drawing fluid and photo emulsion.
- have a command of the technical aspects of all processes covered.
- attain the ability to mix and apply water based inks as well as photographic emulsion.
- apply color theory concepts in the sequencing of colored layers in compositional space.
- understand and apply essential color characteristics, interactions and systems.
- possess an awareness of the historic traditions of the medium.
- have the discipline to develop your initial preliminary ideas to create inventive, visually

Figure 84. Oregon University, 2009, course reading list, screengrab.



Figure 85. Jordan, T., 2009, web page, screengrab.

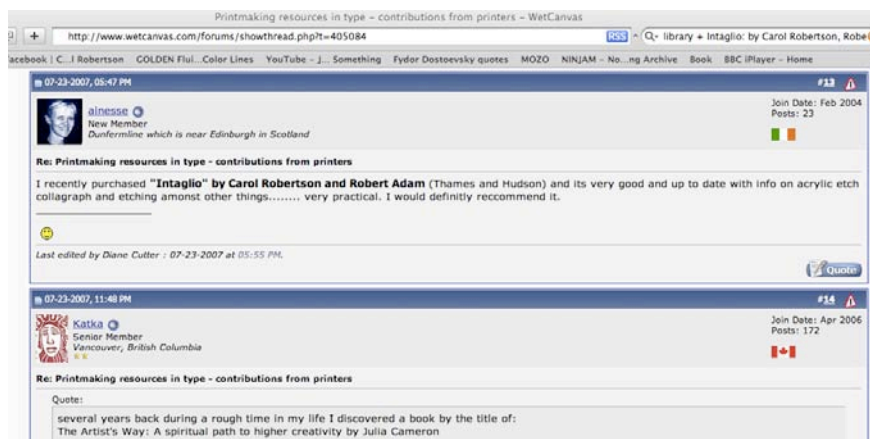


Figure 86. The Wetcanvas online forum, 2009, screengrab.

Reading List

Recommended Text

- Adam, Robert and Robertson, Carol (2004) *Screenprinting: The Complete Water Based System* Thames and Hudson [Voyager search](#)
- Buckland-Wright, John (1953) *Etching and Engraving: Techniques and the Modern Trend Studio* [Voyager search](#)
- Castellman, Riva (1988) *Prints of the 20th Century* Thames and Hudson [Voyager search](#)
- Chamberlain, Walter (1972, 1992) *The T&H Manual of Etching & Engraving*, Thames and Hudson [Voyager search](#)
- Gale, Colin (2006) *Etching and Photopolymer Intaglio Techniques A&C Black* [Voyager search](#)
- Gilmour, Pat (1981) *Artists in Print*, BBC Publications [Voyager search](#)
- Gilmour, Pat (1978) *The Mechanised Image*, Arts Council of Great Britain [Voyager search](#)
- Griffiths, Anthony (1990) *Avant-Garde British Printmaking*, British Museum Publications [Voyager search](#)
- Griffiths, Anthony (1980) *Prints and Printmaking, Introduction to History and Techniques*, British Museum Publications [Voyager search](#)
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Notes

This module is at [CQFV](#) Level 5

Figure 87. Aberystwyth University printmaking module reading list, 2009, screengrab.

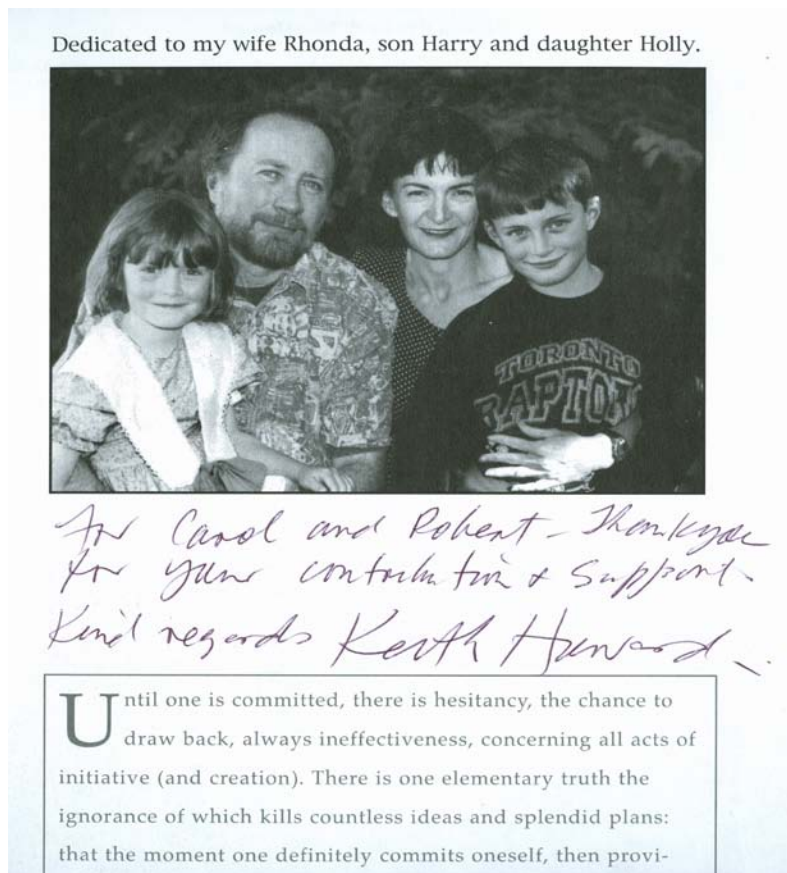


Figure 88. Personal inscription to Robertson and Adam for their 'contribution & support' by the author (Howard, K., 1998, p. ii.), scan.

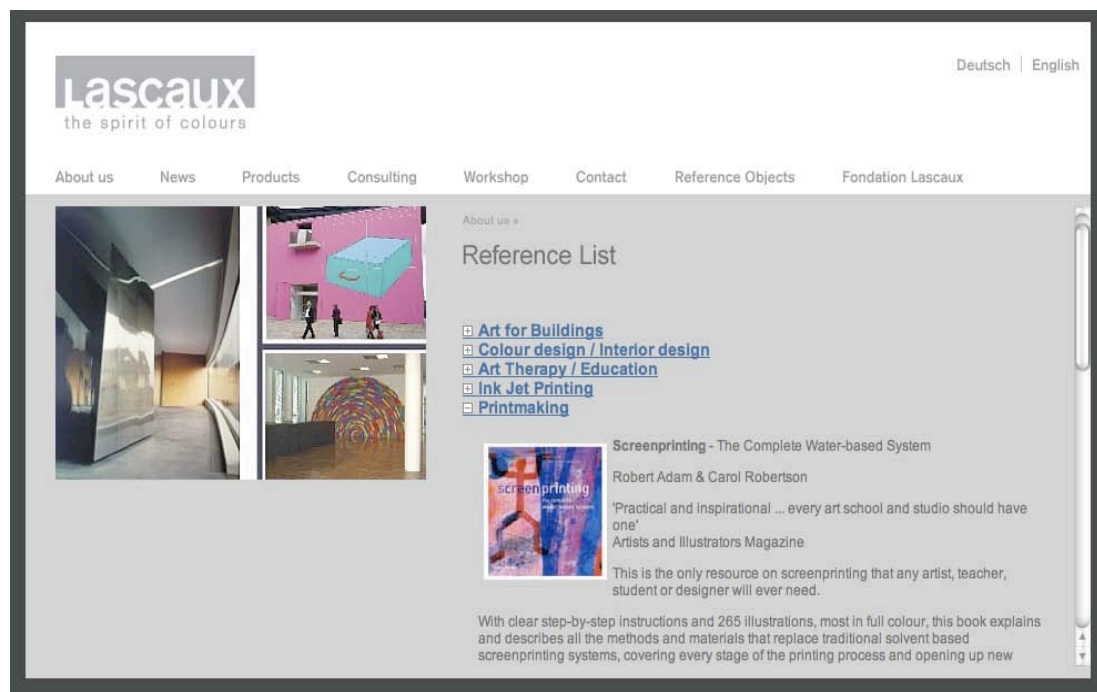
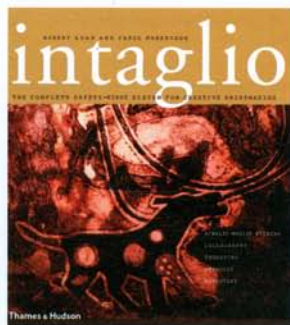


Figure 89. Lascaux reference list, 2009, screengrab.



**Intaglio – The complete
safety-first system for
creative printmaking**
Robert Adam &
Carol Robertson

Thames & Hudson, UK, 2007. 240 pp. 199
colour & 30 b/w illustrations. Hardback, 258
x 233 mm. £27.50. ISBN 0 500 513430

This handsome tome will prove invaluable for printmaking beginners and professionals. It opens with a brief history, which includes information on traditional techniques and their hazards, followed up by invaluable advice on studio planning. This is based on the setting up of clearly-defined, dedicated workstations, thus avoiding cross-contamination between 'dirty' and 'clean' tasks and minimizing health and safety risks. Every gallery owner and dealer should have a copy of this book to reflect on when they are complaining about their overheads.

Clear explanations of alternative, safe methods are then set out for each intaglio process. For example, water-based etching techniques using acrylic resists, that can be painted on a range of metals and are effective on deeply bitten plates, are suggested as an alternative to traditional soft ground. I particularly like the illustration of plate cross-sections for resist, drypoint, engraving, mezzotint, photocollagraph etc – an excellent teaching aid showing how the plate surface differs in each process. Indeed, the illustrations throughout are fresh and inspiring and the list of suppliers is welcome. This book definitely has its place in my studio library.

Richard Spare
Artist and printer

Figure 90. Spare, R., 2007, book review, *Printmaking Today*, 16 (3), scan.

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