The Winston Churchill Memorial Trust of Australia

Report by JOHANNA DEMAINE 2001 Churchill Fellow

To study workplace health and safety issues, together with the resultant working methods employed in industry, for the hand painted decoration of porcelain and ceramics.
UK, Netherlands, Denmark, Germany, France

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INTRODUCTION

The focus of my 10 week research program for my Churchill Fellowship was to study ***safe and best work practices employed in industry, for the hand painted decoration of porcelain and ceramics.*** As a practising ceramic artist and having experienced work related problems myself, I was aware there was little practical information readily available to potters and ceramists. Australia has a vibrant pottery/ceramic art culture but has very little in the way of a ceramics industry producing fine tableware. I was keen to see for myself how major players in the European ceramic industry had adapted working conditions to safeguard their employees so that I could personally adopt these practices as well as disseminating this information to other people involved with pottery/ceramics.

There were distinct areas that I looked at. The first was how the health and safety issues were identified, monitored and administrated within Europe and the UK. The second was how the ceramics industry had identified and implemented safety procedures dealing with the chemicals used and thirdly what measures had been used to overcome the problems associated with repetitive movements in hand painted decoration.

During my fellowship I visited 12 ceramic factories in Europe, UK and Ireland as well as meeting with people from the chemical companies, the Health and Safety Executive and medical fields. I visited the Wolverhampton University ceramics and glass department as well as a small business manufacturing lustres. I also visited museums and galleries to study the historical aspects of ceramics and visited the studios of 12 practising ceramists/potters in the UK who either used lustre or intensive decorating techniques in their everyday work.

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Executive Summary

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Project Description

"To study workplace health and safety issues together with the resultant working methods employed in industry, for the hand painted decoration of porcelain and ceramics"

As a practising ceramic artist working in the realm of intensively hand decorated ceramics I have become aware over the years of the lack of information about safe and best work practices available to potters and educators. This included information on materials as well methods of preventing over-use injuries etc. My rationale for this proposal was to become well enough informed about my own work practices so as to adopt safer work habits as well as passing this information on to other potters and educators.

Highlights of Fellowship

- Association with **Royal Doulton**, Alan Hansbury and Dr Les Bowcock, UK
- **Moorcroft Pottery,** UK
- **Koninklijke Porceleyne Fles,** (Royal Delft), Holland
- **Royal Copenhagen Porcelain,** Denmark
- **Staffordshire Enamels,** UK
- **Charles Lamb Geotechnics**

Major Lessons Learnt

1. Except in a few instances intensive hand decoration is a thing of the past in industry.
2. The words *Health and Safety issues* in my brief were confronting for many European and UK ceramics factories as the industry appears to be in crisis.
3. How the Health and Safety issues in the Ceramics industry are identified and controlled in UK and Europe
4. The composition and preparation of many of the decorating materials
5. The importance of adequate ventilation equipment and ergonomic workstations for ceramic decorators
6. Construction details of ventilation equipment and ergonomic workstations affordable for ceramists
7. There is a fine line between commonsense and going overboard with safety issues.

Proposal for Implementation and Dissemination

1. Writing articles for Pottery In Australia, Ceramics Technical and other like magazines
2. Undertake workshops incorporating the knowledge gained
3. Implement and maintain a web site covering many varied topics ranging from spray booth construction to health hazards.

Programme

United Kingdom and Ireland

1. Ceramics & enamel manufacturers visited
    - Wedgwood
    - Royal Doulton
    - Beswick
    - Moorcroft
    - Cobridge
    - Craig Bragdy Design Limited
    - Staffordshire Enamels
    - Belleek

2. Meetings and interviews
    - Alan Hansbury, Company Health, Safety & Environmental Executive **Royal Doulton**, Stoke-on-Trent
    - Dr Les Bowcock, Company Doctor, **Royal Doulton**, Stoke-on-Trent
    - Mr John Moorcroft, Managing Director, **Moorcroft,** Stoke-on-Trent
    - Roger Monaghan, HM Principal Inspector of Health & Safety, Wales & West Region, **Health & Safety Executive**, Newcastle-under-Lyme
    - Malcolm Lloyd, Group Environmental Advisor, **Ferro**, Stoke-on-Trent
    - Chris Latham, Managing Director, **Heraeus Materials Ltd.**, Stoke-on-Trent
    - Harry Fraser, **Potclays,** Stoke-on-Trent
    - Paul Spence, Ceramic and Glass Department, **Wolverhampton University**, Wolverhampton
    - Charles Lamb, **Charles Lamb Geotechnics,** Peterborough
    - Shon Powell, Director, **Craig Bragdy Design Limited,** Denbigh

3. Studio Potters visited
    - David and Margaret Frith,
    - Alvin Irving,
    - John Calver
    - Mary Rich,
    - John Pollex,
    - Peter Beard
    - Ross Emerson
    - Derek Emms
    - Tony Laverick
    - John Leach
    - John Wheeldon

- Jim Robison
- Dartington Pottery

4. Museums visited
    - Potteries Museum and Gallery
    - Victoria & Albert Museum
    - Jackson Tiles
    - Gladstone Museum
    - Sainsbury Centre for the Visual Arts

Europe

1. Ceramics manufacturers visited
    - Royal Copenhagen, Denmark
    - Staatliche Porzellanmanufaktur, Meissen, Germany
    - Koninklijke Porceleyne Fles**,** (Royal Delft), Holland
    - Manufacture de Monaco Porcelaine, Monaco
    - Manufacture Bernardaud, Limoge

2. Meeting and Interviews
    - Henk-Jan Nijenhuis, Adjunct-director, ***Koninklijke Porceleyne Fles, (Royal Delft)***, Holland

3. Museums visited
    - Belvedere Superieur, Vienna
    - KunstHaus, Vienna
    - Seccession, Vienna
    - Musee National de la Porcelaine Adrian Dubouche, Limoge
    - Design Gallery, Berlin
    - Rijksmuseum, Amsterdam
    - Louvre, Paris
    - Musee D'Orsay, Paris
    - George Pompidou Museum, Paris

Main Body

This Churchill Fellowship has been of immense value to me as it has allowed me to see and experience many different work practices within ceramics. I became familiar with health and safety issues for intensive hand decoration using either underglaze or onglaze materials. This has to do with the ***hazardous nature*** of some of the materials, the ***ergonomics*** of the tasks undertaken, as well as the ***work practices*** employed.

I was able to evaluate from the perspective of complex establishments such as Royal Doulton, Wedgwood and Royal Copenhagen, smaller "boutique" manufacturers such as Royal Delft, Belleek and Moorcroft, specialist Mural makers such as Craig Bragdy Design as well as individual artist potters some of whom were also working within the education sector. As each establishment had solutions pertinent to their own environment and philosophy this research necessarily embraces an extremely broad area. By visiting Museums and galleries I also gained an insight into the evolution of ceramics and earlier work practices as well as gaining an understanding of different techniques and approaches that could be used to achieve a similar outcome.

Throughout my travels I became aware that the ceramics industry is in crisis in Europe and the UK. It was explained to me that the different lifestyle of today's society as regards entertaining and eating habits, more stringent work regulations together with the increasing competition from Asia's burgeoning economies, have all taken a toll. Consequently more and more cost effective solutions are being sought. This has led large companies such as Royal Doulton and Wedgwood to establish new production off shore so as to remain competitive. Furthermore intensive hand decoration on the whole has been replaced with more mechanized printing processes. However, hand decoration is still being used extensively in more value-added items such Moorcroft's decorative collectables and the Beswick range of ornamental pieces which still have a very elite following. In addition to this I very quickly became aware that the words *health and safety issues* on my award certificate were confronting for many companies.

Alan Hansbury, Company Health, Safety & Environmental Executive with Royal Doulton was an invaluable contact. He facilitated meetings with material manufacturers, health and safety officials, and the company medical officer. These people were all involved with the ***Ceramics Industry Advisory Committee*** which reports to the Health and Safety Executive. Also he arranged tours of 2 different workplaces belonging to Royal Doulton, as well as arranging a private viewing of the renowned Minton collection at Company headquarters at Minton House, Stoke-on Trent. As Royal Doulton is a corporation encompassing different smaller factories it was possible to see different solutions to the same issues.

In my interviews with Malcolm Lloyd of Ferro, Chris Latham of Heraeus, Roger Monaghan Principal Inspector of the Health and Safety Executive for Wales and West Region, and Harry Fraser of Potclays I became familiar with the way the Health and Safety Commission operates in the UK.. The Health & Safety Commission is the organization responsible to parliament and its recommendations are then implemented by the Health & Safety Executive for all industries. The National Occupational Health and Safety Commission (NOSHSC) mirrors this in Australia where the States then act on the Commissions recommendations.

The Health & Safety Commission/Executive has 3 options for implementing action:

- **Guidance** (not compulsory for employers)
- **Approved Codes of Practice (ACOP)** These are practical examples of good practice, a guide to what is reasonably practicable and have a special legal status
- **Regulations** approved by Parliament. These are usually included in the Health & Safety at Work Act. These are based on EEC directives as well as homegrown "goal setting"

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The Health &Safety at Work Act (1974) lays out the general duties of care employers have towards their employees and the members of the public and those responsibilities that employees have to themselves and each other. However this is qualified by "*As far as reasonably practical"* (the degree of risk is then balanced against the time, trouble, cost and physical difficulty of taking measures to avoid or reduce the risk). The law requires good management and commonsense, that is to evaluate risks and take sensible measures. In 1992 the Management of Health and Safety at Work Regulations became more explicit. Employers are now required to undertake risk assessments in the workplace. As a consequence of Britain becoming part of the EEC, recent Health & Safety laws have originated in Europe. The proposals have come from the EEC, and member states are then responsible for their implementation. The Ceramics industry in the UK is under the direction of 3 main controls.

- **COSHH (Control of Substances Hazardous to Health)**
- **CHIP (Chemicals Hazard Information & Packaging for Supply)**
- **Potteries ACOP (Approved Code of Practice)**

COSSH is based on identifying the difference between hazard and risk. "Hazard" encompasses the potential for harm whereas "risk" assesses the degree of harm. This includes materials used, how they are used as well as workplace layout and design. This then takes into account ventilation, clothing, physical layout of workspace, lighting, temperature, noise and psychological factors. One of the requirements of risk assessment is that the employer is obliged to find out from suppliers what hazardous components are in the materials being used from the ***MSDS*** (Materials Safety Data Sheet) which should be supplied. This is then balanced against the extent of usage of that material. Only at that point can a judgement be made on the course of action to be taken so the person who creates the risk is then responsible for the judgement. This takes into account the individual. Within industry risks are assessed on a time-weighted average. Many emotive issues and many different viewpoints come into play. All in all there are many variations of products and individuals all react differently, so therefore ***commonsense*** has to prevail. Cleanliness, ventilation and good housekeeping underpin the potteries ACOP. ***The Potteries ACOP 1998*** together with ***Ceramic Decorating Materials: Aspects of Product Stewardship 1998*** form the core of the information that I reference. The ***CHIP*** data sheet is in use worldwide.

Harry Fraser from Potclays is a ceramics supplier to studio potters and schools. My meeting with him brought into perspective how some education facilities are not coping with the interpretation of the ***CHIP*** data sheet. This is mostly brought about by ignorance of the people concerned with teaching the craft and going overboard in their risk assessments. As a consequence many institutions are not offering Ceramics in their courses whilst more

hazardous pursuits are still in the curriculum. As Harry pointed out, there are cleaning products used in the home, especially in the bathroom and kitchen, which are more, or equally as toxic.

My visit with Paul Spence at Wolverhampton University showed me how, with commonsense, Ceramics and Hot Glass can be catered for safely within the education system. This meeting was then the catalyst for an interview with Charles Lamb who has a small business manufacturing lustres outside of the mainstream Ceramics Industry. The information gained here, together with that from the meeting with Chris Latham, managing director of Heraeus Materials Ltd., gave me a deeper insight into the composition of lustres.

This research was not intended to compare one company's working conditions to another's but rather to see what solutions each had arrived at. Those specific to the area of this research focus on hand painted decoration, both underglaze and on glaze. This covers not only safety factors of the materials used but also safety in work practices so as not to incur injuries due to the repetitive nature of the undertaking. With this in mind I have put together fundamentals that are considered as ***best practice*** in the ceramics industry but are just as pertinent to the individual potter. More detailed information will be available at http://johanna.demaine.org

Materials

Just as it is the employers' responsibility to inform the employees of the nature of the materials being used, so it has to be the individual's responsibility to become acquainted with the composition of their materials. ***MSDS*** are available from suppliers and should be asked for on first use of the materials if they are not provided as a matter of course.

Organic additives are widely used in the ceramics industry to adapt products to special needs. The organic additives for ceramic and glass decoration are called oils or media and can be based on different solvents: water, water soluble glycols and glycol ethers, paraffines, esters, aromatic solvents or terpenes from natural sources. Usually mixtures of solvents with different polarity and drying speed are used. Types of organic additives are listed below.

- Solvents
- Softeners (Phthalates, Dioles, Glycolic ethers and ether acetates)
- Liquifiers (Lecithines, Salts of polycarboxylic acids)
- Suspending agents (cellulose ethers)
- Fixatives (Cellulose ethers, Acrylic resins)
- Defoamers (Silicones)
- Preservatives (Amides, Isothiazolones)

Lustres are precious metal based organic compounds dissolved in a solvent base. The main solvent classifications are listed as:

- Aromatic hydrocarbons
- Hydrocarbons with low content of aromates
- Hydrotreated aromatic hydrocarbons (tetraline)
- Alcoholes and ketones (propanoles, butanoles, butanones and diacetone alcohol)
- Terpenes (turpentine oil and etheric oils)

Lustres can contain all or some of the following in varying proportions:

- ***Turpentine***
- ***O-dichlorobenzene***
- ***Cyclohexanol***
- ***Cyclohexanone***
- ***Methyl cyclohexanol***
- ***Di-iso-octylphthalate***
- ***Camphor***
- ***White spirit***
- ***Xyleone***
- ***Tetrahydronaphthalene***
- ***Isophorone***
- ***Tetrahydrofurfuryl alcohol***

Finding out precisely which of the solvents have been utilized is not easily done, as there is a degree of secrecy within the industry. So it is best to assume the worst case scenario. This has to take into account the health risks associated with a high concentration of noxious fumes, their flammable nature as well as being irritants to eyes, skin and respiratory tract. More detailed information will be available at http://johanna.demaine.org

Ventilation

Because of the hazardous nature of some of the materials used in the ceramics industry adequate ventilation is of prime concern. All places visited had high ceilings as well as using fresh air from open windows and extractors to move the air at specific rates. Certain tasks require the air to be extracted and replaced at a faster rate than others do. For instance for safe working conditions for dry fettlers and spongers the extraction rate is 150 feet per minute whereas and areas using colours containing any form of lead, the extraction is a minimum of 250 feet per minute. In all places visited extraction booths and spray booths of all differing constructions were in evidence for specific tasks such as spraying, airbrushing, grinding, dry fettling etc. Some were constructed from glass or perspex, whilst others were made of aluminium, stainless steel, galvanized iron or fibreglass/plastic. Whatever the construction they were an essential part of the production. Where extraction booths were not practical, personal protections in the form of masks and exhaust fans in windows were used. The basic premise is to vent the air away from the worker and preferably outside unless a filtering system was in place. More detailed information will be available at http://johanna.demaine.org

Work Stations.

Ergonomics is the study of the relationship between workers and their environment. Information about human abilities, attributes and limitations, is used to ensure that equipment, work and workplaces allow for the variations that occur in size, shape, strength and ability to interpret information of the workers. By looking at these factors Occupational Overuse Syndrome (***OSS***) and Repetition Strain Injury (***RSI,*** also known as Carpal Tunnel Syndrome or Tenosynovitis) can be minimized. These conditions involve repetitive or forceful movements, or the maintenance of constrained or awkward postures and are usually caused or aggravated by poor work processes and unsuitable working conditions.

Elements taken into consideration:

- Equipment which requires awkward body postures to perform repetitive tasks
- Badly designed hand tools or machinery which require excessive force to use or are out of reach
- Poor workstation layout which requires bending, twisting or stretching to perform a single task
- Chairs, desks or benches that are not at a suitable height for the work performed.

By using ergonomic principles many of the factories have made major improvements to the workstations. However in some of the factories the decorating areas seen were in separate areas especially on show for the public. Some of the actual work stations were ***state of the ar****t* and not necessarily what were in operation. This was a bonus as the ***best work practices*** were on view.

Bench heights varied for the work being performed. In all cases decorating benches were normal table heights. Footrests were widely used. They were either built into the bench structure or were separate. Chairs were either artist's stools or office chairs with lumbar supports and were mobile. Slant boards or armrests were used on decorators' benches so those jobs needing precise movements could be done slightly above elbow level. This provides decorators with support when trying to keep a steady hand as the elbows remain in a relaxed position close to the body taking the stress out of the shoulder and upper arm muscles. Where muscle strength is required the task should be performed slightly below elbow level. The most successful workstations were U shaped with shelves built into the front so storage was very close at hand. For work that needed water, benches were customized with both a sink and tap, or a bucket set into the benchtop. More detailed information will be available at http://johanna.demaine.org

Work Practices

Crucial to the above are poorly organizes work systems and processes that can cause stress on muscles and tendons. This takes into the account the effect the following can have:

- Unpredictable workflows
- Urgent deadlines which may necessitate prolonged worktime
- No variation in tasks which can cause overuse of specific muscles and tendons
- Lack of breaks to change routine or
- Lack of training for specific tasks

All the factories that I visited employed either all or some of the following practices.

- Reorganization of work so repetitive and non repetitive activities were staggered
- Frequent short rest breaks where work could not be varied or rotated
- Realistic work rates
- Simple exercises at workstation to reduce muscle tension

Royal Copenhagen Porcelain employs a physiotherapist who comes daily to the factory to coordinate exercise programs with the workers.

Lighting

All factories visited focussed on adequate lighting for tasks to be performed. Decorating benches all had extra reading/table lamps as well as ample overhead fluorescent lighting suspended at lower levels from the high ceilings.

Clothing

Some factories supplied the workers with protective clothing. This was more in the areas of production, clay making and glazing. The fabric used for the clothing at ***Royal Doulton*** was Pertex, which is used in the manufacture of rainwear. It has protective properties but still allows the fabric to breathe. Most decorators did not have protective clothing. At ***Staffordshire Enamels***, the glazers/sprayers wore latex or surgical gloves because of the lead content of the glaze. However these gloves wore worn with cotton liners so that the skin could not develop an allergy to latex by constant exposure.

Conclusions

- Craftspeople should be ***proactive*** in managing the safety aspects of their work environment. Time should be taken to become familiar with the risks and hazards within the craft. Just as employers have a responsibility to their employees, so do individual artists and craftspeople have a responsibility to themselves, other craftspeople and their public.
- ***Material Safety Data Sheets*** are available and should be asked for so that the materials being used can be fully understood.
- The lessons learnt from the ***safe and best work practices in the ceramics industry*** should be applied by potters to their own work situations. This should take into account ventilation, workstations, work practices, clothing and lighting
- ***Commonsense and good housekeeping are major players in any undertaking.***

Dissemination

I have become very aware that there is a lack of safety information in a user-friendly form for potters/ceramic artists. I propose to disseminate this information gained in the following manner:

- ***Write detailed articles*** for publication in pottery and hobby ceramic magazines on specific topics such as spray booths, workstation design etc
- ***Give workshops*** which incorporate the knowledge gained
- ***Establish a web site*** with detailed articles and images of all the information gained during this fellowship. This would be updateable and would be added to over a period of time. This would be found as part of the site http://johanna.demaine.org

Recommendations

I could help to bring about improvements in Australia by making other potters/ceramic artists more aware of the hazards and risks that are involved in the craft. As it is impossible to teach a general Art teacher all of the issues involved with safe and best practices with clay, I would recommend that in educational institutions that ***practising*** ceramists be employed or utilized as consultants.