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Introduction

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# The Intersection of Lacquer and Laser Technology in Contemporary Jewellery Design.

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**Abstract**: The design of jewellery and objects involves a process of material investigation and application of technological methods. Digital technology complements traditional techniques in designing by assimilating and adapting industrial/manufacturing processes for studio-based practice, thus providing the designer with new methods of working with materials and new processes for making. New methodology can be developed from this transfer of ideas from the industrial/research base to design studio practice. The resulting combination is often reflective of the technological influences upon the aesthetics, form and function of contemporary jewellery and object design.

Digital technology has contributed significantly to the area of jewellery and object design from the precision in drawing and detail to the application of laser technology to create multivarious possibilities in 'new' surfaces. It is conceivable that a synthesis of traditional art making methods, and digital technology can provide an intersection which leads to a new methodology for jewellery design and object making in the era of the new media.

This paper examines a new methodology in studio-based practice by synthesising traditional Vietnamese lacquering processes with digital technology for application to contemporary jewellery and object design. The paper focuses on a case study based on material and process investigation of traditional Vietnamese lacquering methods, experiments with digital and laser processes, and the outcomes of the application of the methodology to a series of objects which are inspired by the chrysanthemum. The research explores the various 'new' surfaces on the objects arising from the new methodology which provide a contemporary representation, aesthetics and cultural reading of the chrysanthemum within the context of material, maker and motif.

Digital technology is the link between the process of designing and the traditional craft of making in jewellery and object design; it provides the liaison between the design practitioner and industry. Digital technology has potential to inspire the design practitioner with opportunities to extend the visual language of traditional culture to a contemporary context.

***Key words: Laser Technology, Traditional Lacquering, Jewellery, Chrysanthemum Motif, Synthesis***

## 1. Introduction to the Role of Technology in Studio Practice

The design of jewellery and objects involves a process of material investigation and application of technological methods. This is an ancient and traditional synergy extended by the latest of tools to position the designer at the intersection between traditional craft based practices and expanding industrial processes. Our understanding of craft generally relates to handwork. Indeed the technological dictionary lists in its possible meanings for the word *craft* the words *hand* and *skill* in many combinations. The application of the dictionary 'tool' of Mac's OSX technology comes to our aid in characterising the domain of this research, that of studio-based design practices in Australia where an exchange between new technologies and traditional craft skills are employed in jewellery and object design and production. In particular this analysis is focussed on one studio based practice that marries traditional jewellery processes and lacquer-working techniques with the digital capacities of laser engraving and cutting.

In the beginning, there was a time where everything was craft, where all making involved hand processes, all objects whether for the utilitarian rituals of everyday use or for ritualistic use on special occasions involved the manual arts. The story of craft is the story of increasing skill, of material knowledge and of an understanding of the nature of things in the natural environment. New knowledge allowed craftspeople to make 'things' that enabled their users and advanced societies.

Initially in making these objects craftspeople used their hands to fashion materials; reed, clay, fibre and more resistant substances such as metal. Metal was a useful substance and beautiful. But hands alone were insufficient to work this material, hands needed help and so the maker improvised and developed aids for this work. Hands held *tools* to model objects. The development and refinement of objects resulted from manipulations and fine interventions by both hand and tool. Skills and tools developed in tandem to modify and refine each generation of objects through to contemporary times. Technology, in particular digital technology is just another way of describing a tool, an implement designed to serve a purpose and produce a desired outcome.

Digital technology complements traditional techniques in design by assimilating and adapting industrial/manufacturing processes for studio-based practice, thus providing the designer with new methods of working with materials and new processes for making. The resulting combination is often reflective of the technological influences upon the aesthetics, form and function of contemporary jewellery and object design. Jewellery and object design and making constitute one of the oldest craft traditions. Contemporary jewellery design mediates ideas and materials. This combination of thought and substance continues an international jewellery tradition of several millennia where the roles of decoration, declaration of rank in society and spiritual protection have been expressed through wearable jewellery forms. Jewellery is traditionally defined by its relationship with the body, by fine craft-skills, attention to detail and through the manipulation of a wide range of both everyday and luxury materials. The field has in our time undergone fundamental changes in it's mode of practice, where the convergence of traditional crafts are complemented by the application of computerised technological methods. "Machines modify the world. Machines continually reconstruct a new world based only partially on the social relations of the old." [1] And so in this 'modified world' suggested by Steven Lubar, new methodologies are constructed. New methodologies developed from the tailoring and transferring of ideas from

industrial research base to design studio practice. Ways of working and progression are seen in contemporary practice, where design and making combines a number of thought processes, linking craft skill disciplines and liaisons with industries to produce the final result.

This level of intersection between technology and hand skills confirms the influence industrial manufacturing processes have on the maker, whether as an inspiration, tool, or working methodology. Staci Kerman is a metalsmith, whose interest lies in the connections between technology, art, and mutual collaborations with industry professionals in rapid prototyping. Kerman believes that technology will continue to revolutionise practice affecting both jewellery manufacturers and designers.

> "Industries are continually becoming technologically revolutionized. Jewelry manufacturers and artists should take advantage of the latest technology to stay competitive. This computerized technology is possibly one of the most significant advancements of the twentieth century and will soon become the future of progressive manufacturing." [2]

## 2. Approaches to Problem Solving

The studio-based practice at the heart of this analysis draws heavily on a skills and knowledge base grounded in Graphic and Jewellery and Object design. There is a natural affinity with these design methodologies and digital technology. Insights into the translation of imagery through digital processes synthesise perfectly with the capacities of laser cutting and engraving technologies. These advantages are beneficial to creating multivarious possibilities in 'new' surfaces and methods for enabling creative practice in jewellery and object design. The precision of line drawings developed through the use of computer graphic software enabled authentic images of complex structures for example the chrysanthemum, instanced in this case study, to be recreated in linear outlines. The language of two dimensional graphics and interest in surface pattern making, provide a platform for experiments to be articulated on three-dimensional form. Shifting from one field to another via a technological pathway provides an arena for speculation, inspiration and new practice. Artisans have practiced this form of convergence for centuries.

> "Material and technique have shaped the evolution of patterns throughout history, yet it would be a mistake to identify ornamental styles too closely with particular materials and techniques. Crossover has always been more the rule than the exception. Makers train in more than one craft, or they simply reach out and borrow as the need and inspiration move them." [3]

It is conceivable that a synthesis of traditional art making methods, and digital technology can provide an intersection which leads to a new methodology for jewellery design and object making in the era of the new media.

Fig. 1 EPS File of Chrysanthemum Design in Vector Form (2004)

### 3. The Synthesis of Traditional Skills and New Technologies

This case study is articulated through a particular series of works. These jewellery objects integrate the various facets of practice espoused in this paper. That is traditional jewellery hand working processes, and traditional Vietnamese lacquer-working technique both allied with laser cutting and engraving. The surface created in the jewellery pieces reveals layers of process combining both traditional and digital techniques translated as a surface aesthetic.

Traditional lacquering is a craft practiced particularly in Asia. It is a medium recognised for its lustrous qualities and unique colours. The lacquer used in this research is specifically Vietnamese. In its labour intensity there are parallels with traditional jewellery practice. Lacquering requires the application of layers of lacquer material (a botanical resin which lends itself to pigmentation) onto a substrate (base) to achieve a certain level of lustre. The hand process involved is arduous and laborious. This process requires a sophisticated understanding of its various phases. The ancient technique varies markedly from the new technology. Working with lacquer is more intuitive. Considerations related to choice of pigment, intensity of colour, application, and curing conditions are essential knowledge required of the practitioner.

Fig. 2 Detail of Lacquer Laser Cut Timber Veneer (2004)

The preparation of the substrate is as time consuming as the application of the coats of finish. Lacquer working requires patience as it relies on its environment's humidity to cure (dry). Each coat requires essential polishing and this process can take up to a day for the finalisation of one coat before the next layer can be applied. Two

approaches to the integration of laser were used. In each case the substrate of timber veneer was prepared, in the first experiment the base designs were coated with lacquer, this lacquered surface was then engraved with the laser. Secondly this order was reversed, the substrates were prepared using the laser and then finished with the lacquer.

In contrast to lacquer work, working with the laser is systematic and predictable. There are a higher level of control over the tool with an expectation of precision and accuracy. The laser also provides efficiency related to quantity and multiple production work. This work represents a convergence of handcrafts and technology. Jane Andrew discusses this synthesis in her paper. She talks of designer/makers working in "collaboration with the manufactures in order to access new materials and manufacturing techniques." [4] This is an indication of the way traditional skills and new technologies have engaged contemporary jewellery and object designers.

The motif selected for the case study was the chrysanthemum observed during the previous research into lacquer. This floral emblem is easily recognised and is depicted in countless ways across a variety of decorative art surfaces in many Asian countries. It was the inherent beauty of the chrysanthemum observed on a range of lacquered surfaces and its history of use over a 5000 year period that intrigued and excited. The combination of different materials, elaborate surface details, nuances, techniques and technologies inspired a reinterpretation of the chrysanthemum motif for this amalgamation with digital technology.

The involvement with laser technology developed while working on the creation of a particular surface pattern. This interest inspired liaisons with industries and this became an integral part of the design problem solving process and ultimately the making process. The collaboration and experimentation with laser technology has revealed the opportunities and possibilities in creating 'new' surfaces direct from computer graphic data. Understanding the process from the perspective of a contemporary jewellery designer, the laser was seen as a tool in the development of new designs allowing for multiple reinterpretations of the chrysanthemum.

## 4. Process: New Methodology for Jewellery and Object Design

Digital technology, particularly laser engraving, has allowed for the emulation of the ancient tradition of hand engraving, a mark making technique requiring great expertise. The capacity of the laser allowed for the work to be developed with accuracy and precision, translating a visual imagery onto a variety of material surfaces. These images were manipulated to evolve from visual to vector. The process involved in creating a digital file of data for transfer to the laser machine began with establishing the visual graphic of the chrysanthemum. In this case study, a floral visual depicting the chrysanthemum goes through several selection and drawing process. Specific graphic software allows for the translation of the skeleton of the motif. These outlines are then further manipulated and arranged to suit the outcome of the work. The image in its digital form is then passed onto the laser machine for cutting or engraving. At this stage, the size of the line is changed to a numerical system. These numerical values dictate whether the laser will cut through the material or engrave the surface. The settings on the laser machine were adjusted for speed and impact. Several tests were carried out before finalisation.

Using digital mediums for this process, with its cited accuracy and textural capabilities on a variety of surfaces provoked new directions in the design and making process. The capacity to reinterpret traditional visual graphics, encourages multiple manipulations and allows for the translation of a visual document into a contemporary object, a transfer from two dimensions through to three dimensions. This approach to design provides a contemporary reading and interpretation of the chrysanthemum in the context of material, maker, and motif. The integration of digital technology complements traditional craft mediums and skills.

Fig. 3 Chrysanthemum Brooches, Laser Cut Timber Veneers and Sterling Silver (2004)

## 5. The Exploration of Various 'New' Surfaces from Contemporary Practice

A review of Australian object designers and jewellery practitioners reveals several utilising digital technology as part of their creative methodology. This popularity would seem to confirms technology's influence and place in the contemporary design environment. Recent conferences, 'A Sense of Wonder – The Amalgamation of Art, Science, and Technology' [5] 'Inherited Futures: Technologies to Trap Ideas' [6] and Challengingcraft [7] affirms the integration between technology and practice. Cinnamon Lee, Christian Hall, and Andrew Last are contemporary object and jewellery makers who collaborate with industry and utilise industrial processes.

Each practitioner utilises technology in a specific manner. Each perceives technology as a tool. Cinnamon Lee uses rapid prototyping (RPT) to translate a three dimensional computer file into a finished object. Her designs are developed using drawing software that is translated as stereo lithography, the computer draws and builds the object using a plasticised material. Cinnamon Lee argues that this technology "like any other tool, requires the knowledge and understanding by the operator in order to procure a successful result." [8] The importance of new knowledge and how that is utilised in a new era of practice establishes new methodologies. Peter Dormer in his paper, Craft and the Turing Test for Practical Thinking states "possessing personal know-how that allows them to be masters or mistresses of the available technology, irrespective of whether it is a mould, a hand tool, an electrically driven machine or a computer. It is not craft as 'handcraft' that defines contemporary craftsmanship: it is craft as knowledge that empowers a maker to take charge of technology." [9]

Christian Hall uses current technology to explore the limits of scale, function, and combination of hand and computer driven work. His research explores the relationship between two dimensional designs developed with computer graphic software through to conversion onto metal using a photochemical milling process. Working with flat shapes the cutting process allows for the metal sheet to be developed into three dimensional objects and

wearables via the minimal affects of lines and folds. His education has encouraged him to explore new possibilities in design problem solving. Hall utilises technological applications in liaising with industry professionals, he states "using new technology like other ways of working has a determinant effect on the outcomes." [10] These outcomes are made possible through mediation with non-traditional methods. Hall's process allows drafting and sampling through the aid of the computer for fabrication and production work. This view is also suggested in Susan Ostling paper, "contemporary craft and digital technologies are a match made in our everyday culture and that the match will last as long as it is useful, or until digital technologies of production, communication and consumption are superseded." [11]

In Andrew Last's body of work for the exhibition Vast Terrain, his design processes exploit a progression from computer graphics through to aluminium objects. The aid of computer technology and application of specialised software becomes the sketchbook for creating patterns and models for his designs. Last discusses two projects; "the role of the computer as a design tool was minimal in the case of the initial jewellery works. I found a Phyllotaxis pattern of dots on the Internet and drew lines over that pattern with the CAD program. I then manipulated scale and proportion on the computer. Once I had the basic pattern to start with, I played with material and process and arrived at a range of interpretations of that pattern." [12] At other times Last completely resolves models and designs on the computer screen, "In contrast to the Jewellery, the bowls and Phiball light were thoroughly resolved as three-dimensional CAD models, prototyped as cardboard models and manufactured with CAD-CAM fabrication processes." [13] He describes his approach as, "these two modes of working – materials and process experimentation, as with the jewellery and rigorously pre-determined modelling for the larger works – are typical of my design development process." [14]

## 6. The Intersection, Material, Maker, and Motif

Digital technology has the potential to inspire the design practitioner with opportunities to extend the visual language of traditional culture to a contemporary context. The use of materials and motifs are representative of a history of ideas, meanings, and technologies. Aided by the 'new tools', this heritage can be reconstrued for a contemporary context. Visual imagery acts as a marker of time and of cultural and social traditions. An examination of the portrayal of the chrysanthemum throughout history eloquently demonstrates this point. An artefact is reflective of its time and its tools. James Thrilling talks of ornament as "a many-faceted drama of creation and renewal, remembering and forgetting." [15] And hence the chrysanthemum motif is a response to the technologies of its time.

Fig. 4 Series of Integrated Ring Boxes Ebony Acrylic filled Laser Engraved Surfaces Sterling Silver and Gold

## 5. Conclusion

A new alliance is represented through the synthesis of traditional lacquer-working processes, traditional metalworking skills and digital technologies. This intersection provides a seamless exchange between the process of designing and the traditional craft of making jewellery and objects. Technology also provides the interface between the design practitioner and industry, assimilating two working models, that of studio based practitioner and of industrial manufacturer. It provides the designer with the opportunity to tailor and transfer technological ideas into tangible objects. A synergy between new tools and old skills has the potential to inspire.

Fig. Chrysanthemum Series Brooches Laser Engraved Timber Veneer and Sterling Silver (2005)

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