

Between two cultures: a dialogue in jewellery

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Introduction

How different are artists from scientists and engineers?

This paper is concerned with the research I am carrying out at The University of Manchester's Laser Processing Centre, a project which emerged through a need to understand more about laser technology and its potential for use in the creative industries. My interest lies specifically with titanium and, being a jeweller this means finding answers for contemporary jewellery, but I have found that crucially, since I am based in the School of Mechanical, Aerospace and Civil Engineering, it is the dialogue between myself and the engineers and scientists that surround me that has enabled most of the progress. I therefore have to thank Professor Lin Li and Professor Andrew Gale for their continued support in this unusual venture.

The need for a new language began the day I arrived and was asked by a senior engineer: 'Is that art?'

The nature of an artist is one of enquiry and investigation. We are continually looking for answers to our own self-inflicted design problems. We uncover the reality of the materials we use by exploiting and experimenting with them until they yield into place¹. We are often unhappy with the final outcome which is the reason most of us continue the search. We acquire an extraordinary understanding of materials through years of research and we also responsible for the direct implementation of this knowledge. Like engineers,

we apply the accumulated material knowledge, our much underrated practical expertise and construct with it three-dimensional artefacts with awesome resultsⁱⁱ. It is the same logic that enables engineers to build impossible distances into the sky whilst allowing concrete to move.

It is easy to make superficial generalisations about either culture, but the lateral thought process that artists are renowned for is quite often the gateway that opens new territory and applications for emerging technologies. The work of Lynne Murrayⁱⁱⁱ with rapid prototyping is a good example of this. A language that can be understood by the non-expert^{iv} helps to demystify the technology by bringing inside information out to new audiences, encouraging hybrid practices that can be extraordinary fruitful^v. The work carried out in this research uses this dialogue together with laser technology to create artefacts that prove the success of the art / science, or art / engineering partnership. In the current debate^{vi}, however, it is most unusual to have this emerge as jewellery. Far more common are the links made with fine art, photography and digital art. This research also attempts to retain much of the direct contact that artists need to have with their material. Drawing is an essential background ingredient that counterbalances the work, whilst the attempt to render the technology transparent calls for a more direct 'freehand' approach to laser processing. I would also like to show what visual wonders lay beneath the visible surface of the irradiated metal by showing some microscopic images.

Lasers

Laser is an acronym and stands for Light Amplification by the Stimulated Emission of Radiation). Lasers are not new technology. They were invented in the 60's, coincidentally with the rise of contemporary jewellery and the introduction of titanium into the jewellery schools. If only we had all met earlier. My interest in titanium goes back to my undergraduate years where, we experimented with techniques of anodising which 'gave' the metal a colour. The colour is not the result of any pigment but of light interference achieved through oxidation by a source of heat. In this phenomenon both the metal surface and its microscopic film of oxide (caused by applying heat or anodising)

reflect light. But as white light rays enter the oxide film it is broken up and refracted from the metal surface back through the oxide layer as multiple reflections into the eye. It is the different thicknesses of oxide that cause the film to appear as different colours.

‘Ocular Series 1-6’

Because of the low diffraction of the laser beam its precise focal point allows for very controllable work compared to anodising techniques. By applying selected parameters predictable oxide layers can be obtained on the surface. Once the object is designed, the drawings have to be realised in software that controls the laser. In the *Ocular Series 1-6*, laser parameters for Fig. 1 are illustrated in Fig 2. The laser is a CO₂ and parameters include the percentage of power used, the speed at which the beam travels, the number of pulses per inch and the density of the lines marked. This allows for certain predictable colours to appear, for example: the sky blue horizontal line in Fig. 1 was set at 28% power, 3% speed, 1000 dpi. and an image density of 6 which represents 100% of the beam’s potential delivery.

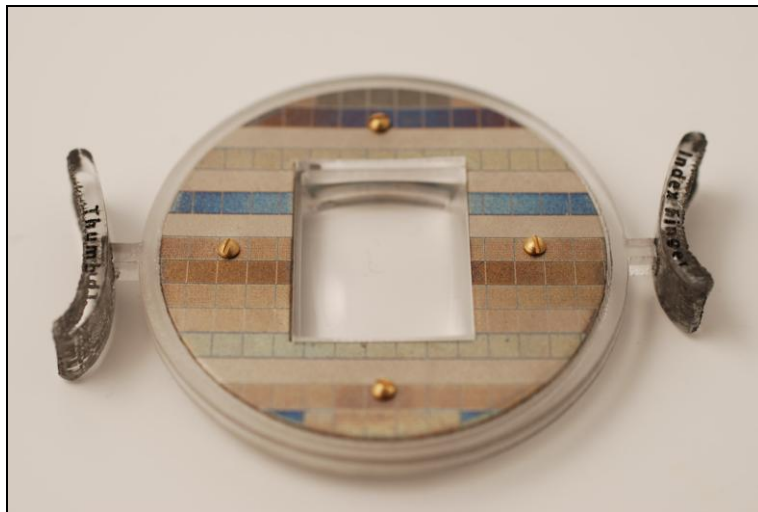


Figure 1: *Ocular Series no. 5*. The colour visible on the titanium is controlled by different laser parameters

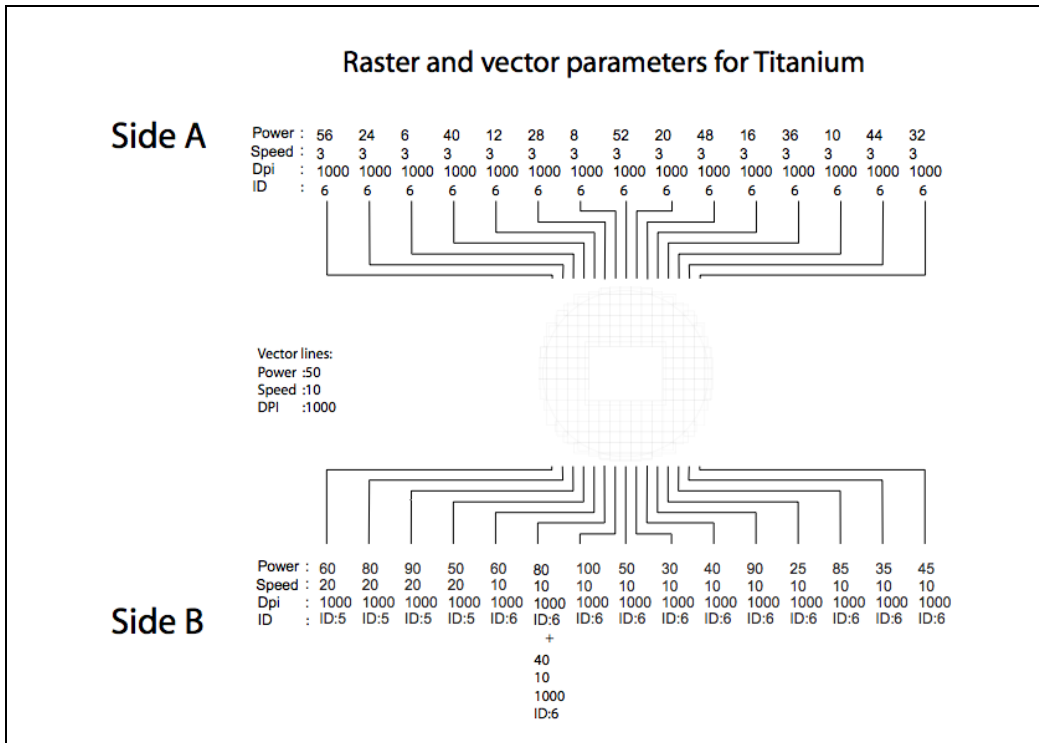


Figure 2: Laser parameters for *Ocular Series no. 5*.

Alternatively, the same CO₂ laser can be driven by a bitmap, as in Fig. 3, where a detail from a scanned drawing has been converted to black dots that vary in their intensity according to the image sent. This file will create a signal for the laser to mark wherever those dots appear. The resulting marks appear to have been applied by hand quite spontaneously. This a deliberate attempt to create a transparent technology, one that allows a closer interaction with the artist and which may create in the viewer a sense of enquiry and which is not so overtly technologically driven.

The parameters set for this kind of work will be fixed once, based on prior experimentation and knowledge. The results will be less predictable than Fig. 1 but will always show how the areas of intense heat where the dots are close together produce colours in the higher order such as pale blue.



Figure 3: Drawing converted to bitmap.

This series is based on the aesthetic of optical measuring equipment and relates to concepts of vision: ‘seeing the bigger picture’, ‘clouded vision’, ‘seeing through tinted glasses’.... This is emphasized by the observation of engineers in scientific research and their experiments that have in their own right become inspirational in my work.



Figure 4: *Ocular Series no 3*. Titanium marked in response to bitmap file in Fig. 3.

Inside Out

The observation of this work would not be complete without a look at the tracks made by the laser down a microscope. Tracks made by the laser beam can be seen and the effect of oxidation around it. Measurements have shown the beam on an Nd:Yag laser to have spot size of 93 micrometers, the average width of a human hair. Subsequent pictures have been layered to obtain one complete, focused image.

Conclusions

If my aim has been to engage in ‘artefactual’ conversation with the engineers and scientists that work around me, this has been a most productive venture. The work on display in the exhibition ‘Walking with Scientists’ at the Manchester Museum that this paper accompanies is three-dimensional proof of a successful dialogue, despite differences between laboratory and art studio, methodologies, expectation and environment.

‘Walking with Scientists’ is also a clear illustration of how art can help the public understanding of a particular discipline. Samples traditionally used by researchers in engineering have been adopted as aesthetically viable material and form part of the exhibition and catalogue.

The response to my project at The University of Manchester has been very supportive. I was taken by surprise when, in a seminar, I was asked recently “what makes you think you’re not an engineer?”. I haven’t yet decided whether this is a compliment, but perhaps C.P. Snow had it right all those years ago:

“Attempts to divide anything into two should be regarded with much suspicion”^{vii}

References

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