Case Study: Su Blackwell, artist, UK

For the AHRC-funded project: Paper Models: Investigating laser cutting technology to develop new artists’ books and paper-based creative practice for arts, crafts and design.
Principal Investigator: Tom Sowden
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For the project’s two case studies with external artists, I assumed a role of facilitator, more in the manner of a traditional master printer, to advise on possibilities and facilitate the optimum outcomes for the period of the case study. The ideas for what would be produced had to come from the artists without interference from me, so that the machines would be approached with an open mind about their potential capabilities, not hindered with any assumptions or limitations I could predict for a proposed piece of work. What follows is a description of the process of the production of work during the four-day residency.

As part of the AHRC-funded project, Paper Models: investigating laser cutting technology to develop new artists’ books and paper-based creative practice for arts, crafts and design, Su Blackwell was invited to come to the Laser Studio in the CFPR at UWE, for a four-day residency between 28th June and 1st July 2010. I knew that Su Blackwell had only briefly used laser cutters in the past and produces the majority of her cut work by hand, so this was one of my primary reasons for inviting her to produce some new work using the laser cutters.

The invitation was purposely kept as open as possible, so that Blackwell could use the laser cutters however she saw fit. There were no conditions for what I was hoping she would produce; I thought it would be much more interesting to allow her free rein of the entire area with complete technical support from myself so that hopefully any ideas she had would be achievable. As I wanted to showcase the laser cutters as a creative tool, I thought it would be much more interesting for the artist to maintain creative ideas as the driving force, rather than put any technical restrictions in place.

Much of Blackwell’s work is produced entirely by hand, and she will adapt and alter her three-dimensional cut works in progress as a response to how the material is reacting. Consequently she did not have a great deal of knowledge of the software programmes necessary to be able to develop files ready for the laser cutter. When Blackwell arrived for the residency she had brought scanned drawings of the designs that she wanted cut, and a variety of different materials to cut into. We had spoken previously about materials and preparation of imagery, so in order to develop laser-ready files Blackwell had produced clear, black and white line drawings.

Blackwell had several ideas on how to use the drawings to laser cut with, which we initially talked through. She had a forthcoming large-scale solo exhibition, Remnants, at the Bronté Parsonage Museum in Haworth, and was really keen to use the laser to help in producing the installations that would be situated around the museum. She also wanted to produce a separate new piece of work for another solo exhibition, Happily Ever After, at Long & Ryle Contemporary Art, London - which she is represented by - in November. There were four different pieces of work that Blackwell hoped to produce whilst on the residency; a nightdress that was laser cut with moths, a dress cut with images of heather, and two copies of the book Arabian Nights that were to be cut with silhouettes of various soldiers for the Bronté show. For her show at Long & Ryle, Blackwell also had a wedding dress that she was keen to laser cut with images of weeds that would appear to be almost growing up around the train and base of the dress.
Blackwell had brought her scanned drawings as jpegs, and although these can be used to engrave on the laser cutter, all of the work she was keen to produce involved cutting through the materials. So using the scanned drawings, we placed them into an Adobe Illustrator document and Live Traced them (please see the cutting guides for more advice on using the Live Trace function in Illustrator) to covert them from jpegs to vector files. This took a little time, as there were many different designs for the weeds on the wedding dress and also many different soldiers to be cut from *Arabian Nights*.

When all the designs had been converted to Illustrator vector files, we decided to first cut the nightdress for one of the installations in the Brontë Museum as this one presented us with the least technical problems. The nightdress was to be cut with one moth design repeated over the bulk of the nightdress, cut through on both the front and back. Because of the double cut, the nightdress could be laid flat on the bed of the laser cutter, with the cutter set to cut through both the layers of fabric at the same time. The design was completed after measuring the nightdress to create a guide template in the laser cutting software APS Ethos, into which Blackwell placed the moths where she wanted them cut.

A paper mask was first cut on the bed of the laser cutter using the template, so that the dress could then be accurately placed and the moths cut in the right position. The only problem with cutting this nightdress and the other materials Blackwell had brought to cut, was that there was no spare material to use to test the strength of the laser to achieve the optimum cut. They were all antique garments, with no replacements if the cutting went wrong, which is not a situation that I like to cut in! In each of these cases I decided to estimate how fast and powerfully the laser cutter should cut and chose one inconspicuous section of the design to cut first in order to check that it was cutting well. Luckily the materials were variations of ones that I had cut before, so it was a case of tweaking the settings to achieve the best cut. With this nightdress there was
some extra consideration to make sure that the laser cut through two layers of cotton at the same time. Once the nightdress had been placed correctly and the first few tests done, the design was then left to run and each of the moths was cut out.

After the nightdress we started work on another dress that was to be hung in one of the bedroom windows of the Brontë Parsonage Museum. This was to be cut with images of heather in reference to Emily Brontë’s favourite flower, which is plentiful on the moors around the museum. As this too was a thin cotton dress that was to be cut right through both layers, we approached this in exactly the same way as the nightdress. Creating a template, placing the designs correctly within this, cutting a paper mask and then finally cutting through the dress.

Next, we began the preparation for cutting the weeds from the wedding dress and also the soldiers from the antique copies of Arabian Nights. The cutting of the wedding dress brought similar problems to the cutting of the nightdress, only this time Blackwell wanted to cut through individual layers of the dress to give the appearance that different weeds were growing around a bride’s feet. To be able to do this, we placed the wedding dress onto the floor and pulled the fabric around so that we could work out and measure the sections of material we could work on that would remain flat in the laser cutter.

Because of the quantity of fabric involved in the production of a wedding dress, and this wedding dress in particular, we really had to be careful that we could work on flat areas of the dress and stop the other areas of the dress impinging on the movement
and cutting of the laser. Thankfully two elements worked in our favour. Because Blackwell only wanted to cut at the base of the dress this was the easiest part to smooth out and keep flat. We were also assisted by the design of the laser cutter; there was plenty of excess material that needed to be moved away from the laser beam itself and the moving parts of the cutter. The large 200 watt laser we were using for cutting the dress has flaps fitted at the top and bottom of the bed, which meant we could push much of the extra material out through these so it could hang down outside of the machine.

We worked out that the dress could be cut in 4 different sections; a front panel, back panel and two side panels. As with the nightdress we made up templates in APS Ethos and Blackwell arranged the various weed designs into these shapes, with a paper mask then cut on the bed of the laser to help position the dress. I also needed to estimate the power and speed of the laser based on cutting the previous, similar material. One good aspect of
cutting the polyester of the wedding dress was that as
the designs were cut into the material the laser melted
and sealed the edges of the fabric to prevent fraying.

After cutting each of the panels with Blackwell’s
initial placing of her designs, the dress was removed
from the laser cutter and we held it up to check how
the designs worked with the dress suspended and
just trailing on the ground (as it was to be displayed).
As we had cut the designs in four separate sections
it was perhaps inevitable that the design was not
entirely straight around the base of the dress. So by
assessing what was needed to even up the pattern
and also what was to be added to make the design
more as Blackwell had imagined, we went back to the
cutting files in APS Ethos and added more. The dress
was again lined up on the laser bed using paper cut
masks, and then re-cut with extra weed designs.
This procedure was followed several times until Blackwell was satisfied with the results. Each time cutting a few extra weed designs into the fabric, and then removing it from the laser cutter to check that it worked for how the wedding dress was to be displayed. When it was finished we moved on to cutting the soldiers from the two copies of *Arabian Nights* she had brought.

Blackwell had come with a variety of different soldier designs to cut from the pages of *Arabian Nights*. Referencing some of the early writing of the Brontës’ in which they imagined a world, based on Branwell Brontë’s toy soldiers, in which there is a battle between some of the key military figures throughout history. Blackwell’s plan was to construct a large battle of figures and forts - cut from the pages of the book - within the children’s nursery at the Brontë Parsonage Museum. For example, pitting the armies of Napoleon against those of Caesar. In order to achieve the number of soldiers that she required, Blackwell had wanted to use the laser to cut as many figures as possible.

The three-dimensional fort buildings were going to be produced by hand, as Blackwell was more used to constructing these objects without working from a particular template - constructing and adapting them as she worked with the paper. The laser was needed to assist with cutting the sheer numbers of soldiers that were required. Because Blackwell was going to use repeats of the same design and to produce as many cut soldiers as possible, we decided to cut through a number of pages of the book at the same time.
It is not always advisable to cut through multiple layers at the same time using the laser cutter. The power needed to cut through multiple sheets is not consistent all the way through, which means that each page will not cut evenly. It is also possible that the small pockets of air trapped between pages can ignite with the laser, causing an increase in scorching on some of the inner pages that are cut. In this case Blackwell was not concerned about variation in the cut on each of the designs, and to help minimise scorching we used the 10-watt laser, our lowest powered machine.

Because Blackwell wanted to cut from the pages of the book, but keep the binding of the book intact (the books themselves were to be used as part of the installation), the first difficulty was in devising a way of keeping the cut surface as flat as possible so that the laser could pass over it evenly. The hardback binding proved tricky to keep flat and in the end we used a series of props and weights to keep a double page flat on the bed of the laser cutter. Props underneath the side with least pages, to bring it up to height, and weights all around to stop any pages from lifting.
We then tested how many pages could be cut through with a degree of consistency and decided on cutting six layers at the same time. To stop the laser from continuing beyond this and marking some of the pages below, I inserted sheets of thick card under the sixth page. Once all of this was in place we could then cut the designs, fitting in as many as possible into the double page spread and continue working through the book to find further suitable double page spreads to cut.

Even after all this preparation not all of the cuts were successful. The main problem we encountered was that as the laser was cutting the designs, it would free the pages from the weights and they would begin to lift. This meant that they would come up to meet the nozzle of the laser cutter and impair the ability of the laser to cut cleanly, as the laser then became out of focus. In some cases, the pages lifted up and, as the nozzle passed over them, they stuck to it and were dragged out of place. When this happened the laser had to be stopped and set up again. Thankfully this only happened occasionally, and there were still plenty of good cuts that could be used to construct the installation.

After cutting all the elements for Blackwell’s exhibitions, we had a little spare time at the end of the final day to work through one other idea that she had mentioned for a possible future piece of work. Blackwell had been considering taking a book of text and cutting out all of the letters from every other double page spread (every other because cutting the letters from one page impacted and destroyed the opposite side). She had been considering doing this by hand, but wanted to see if the laser could possibly do it instead.

I had an idea on that this could be done using the 10 watt laser which has a registration Opto Cut® camera fitted. The camera normally picks up on registration marks that have been printed or embroidered into a design so that the laser can cut in registration and in repeat according to how many rows and columns of designs there are. Normally you tell the software where the registration mark is in relation to the design, the approximate distance between marks and how many to look for, and the camera will search them out before cutting and then formulate exactly where to cut in relation to this. My idea for Blackwell’s request was to scan in a passage of text, Live Trace it in Illustrator and then identify one of the letters as the registration mark. As the marks are normally black blocks about 2mm in diameter, I coloured in a single letter with a black pen to create this.
By working with the laser in this way, it cut out all of the letters with a reasonable amount of success. There were a few slight issues that we came up against. Illustrator didn’t Live Trace all the letters with the most accuracy, but they were still in their recognisable shapes. The camera also struggled slightly to find the registration mark, as it prefers that this mark is normally isolated a little away from the rest of the design, not closely surrounded by other letters. The alignment between the camera and the laser was also ever so slightly out, meaning that the edges of some letters were just visible and not cut away. But for a quick initial test, it was very successful and none of these problems is insurmountable.

With a little more time and patience, this would certainly be something that the laser would be capable of doing very accurately. The only issue that remains is how long would it take to cut all the letters from a whole book? This is something I intend to explore in future.

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