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# Employing technology and retaining authenticity: Digital machine knitting in contemporary craft

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**Abstract**

Bradford School of Art Employing technology and retaining authenticity; Digital design for machine knitting in contemporary craft Within this paper craft skill in textile making is addressed, asking if it can only be identified and verified through the purely handmade, when there are routes to incorporate digital technologies as part of the methodology of contemporary textile practice. With a focus on the employment of digital design and electronic domestic knitting machines; the opportunities this combination presents for the designer/maker and external perspectives on products and artefacts created this way, in particular the perceived craftsmanship of these. The process of making is explored by the maker as well as being addressed from the designer/customer interface. Working processes of the designer/maker embrace new models of making that view digital technology as an integral component of the textile practice, one which offers not uniformity, but the flexibility to explore, play and create beyond the scope of more traditional textile methods. The process of using CAD software to design and download patterns to a knitting machine vastly broadens the creative scope for the maker regarding design, customisation and production. It enables the design and production of small-run collections that, due to reduced making time are also affordable to a wider market (than if the technology was not employed). The potential for custom colour-ways and customised design using this technology is also vast with great potential for a much closer relationship between product and consumer. Regarding skill and craft relating to this process, the development of tacit knowledge gradually built by using the technology and machines parallels the tacit knowledge built thorough mastering a skill by hand. Technology and hand creation are no longer in opposition but interwoven to enable more personalised approaches to textile production. Whilst makers may accept the 'new authenticity' of pieces incorporating digital technology, how are these received by audiences and consumers? Are they perceived as less valid or unique due to the integration of technology in the making processes? Is this even considered by the viewer/consumer? This piece incorporates feedback from consumers of (digitally designed) machine knitted products as well as those selling these in shop/gallery settings, to begin to consider if a new form of authenticity in textile craft is emerging and being accepted. The future landscape of craft in relation to new developments in the field of machine knitting is also considered as is the inter-relation between product and consumer develops as a result of the employment of this technology. Presentation of this paper will include traditional power-point delivery with the integration of video and physical artefacts.

This research has stemmed from and is intrinsically linked with my textile practice as a designer/maker and artist working with knitted textiles. Within this paper, craft skill in textile making is addressed, asking if it can only be identified and verified through the purely handmade, when there are many routes to incorporate digital technologies as part of the methodology of contemporary textile practice. The paper will focus on digital machine knitting, the opportunities it presents for the designer/maker and external perspectives on machine knitted products. The process of making is explored by the maker as well as being addressed from the designer/customer interface.
Working processes of the designer/maker embrace new models of making that view digital technology as an integral component of the textile practice, one which offers not only uniformity, but also the flexibility to explore, play and create beyond the scope of more traditional textile methods.

Having used machine knitting in my practice for over ten years and experiencing a variety of responses to this from the public, from positive responses such as 'Wow, I've never seen anything knitted like that', to more frequent negative comments such as 'it's machine knitted, that's cheating', and 'that's too expensive, it's just machine knitted', I have started to question the perception of my work.
These experiences, as well as a consideration of the current landscape of craft and the handmade movement have led me to explore the perceived authenticity of machine knitting in relation to craft and the handmade. Within this context, authenticity in reference to the work that I do is concerned with its' perception as a hand crafted/designer-made product. In order to gather opinion on this subject, I looked to those who had engaged with my products, contacting customers posing a range of questions, responses to which will be considered later in this paper.

In order to give context to this discussion of authenticity, I will first explain my creative practice and primary making processes. Under my label 'Knit and Destroy' I make a wide variety of machine-knitted products from small sculptural pieces to scarves and large cushions. I employ machine knitting combined with digital design over hand knitting for a number of reasons.

Firstly, the aesthetic, the combination of knit software and machine allows for non-repeating graphic imagery to be applied to machine-knitted items as displayed in these examples.

*Figure 1: Saturn Cushion*

*Figure 2: Mushroom Cushions*

*Figure 3: Space collection scarves*

Graphic patterning can be created using non-electronic punch-card machines which are much more common and pre-date the electronic machine, however, there are limitations to this regarding scale of design with a maximum of 24-30 sts being worked over in a punch-card design. The electronic machine allows the full needle bed of 180 needles to be used for patterning and as many rows as you like as long as it is downloaded in sections. Another advantage of the electronic machine that I use is that it allows up to four colours at any one time, in contrast to two colours when using other machines.

When developing knitted products, cost is also an important consideration, and machine knitting allows me to produce designer-made items that are also affordable, making high quality crafted products accessible to a wider audience. Employing this process also gives scope for wholesale, as I am still able to make a small profit when wholesaling my items. Another main advantage of using knit design software is that the design is repeatable: once I have finalised and saved the design, it can be knitted any number of times.

The software that I use most frequently in my practice is Design-a-knit, which was developed for domestic use in the 1990s and can be used with a number of knitting machines, I use it with a passapE6000 machine. This combination allows for designs of up to four colours to be developed, downloaded to the machine then knitted.

*Figure 4: Working at knitting machine*

Although the software can convert images from jpeg to knit design, this is never perfect to use straight away, even when the image has been re-sized in Photoshop prior to the conversion, so I always use the drawing tool in addition to this. As you can see in the following figure (figure 5), the design is mapped out on a grid, with each square representing a knitted stitch. Several drawing tools are available in the software, and also shape drawing tools and paint bucket to fill larger areas.

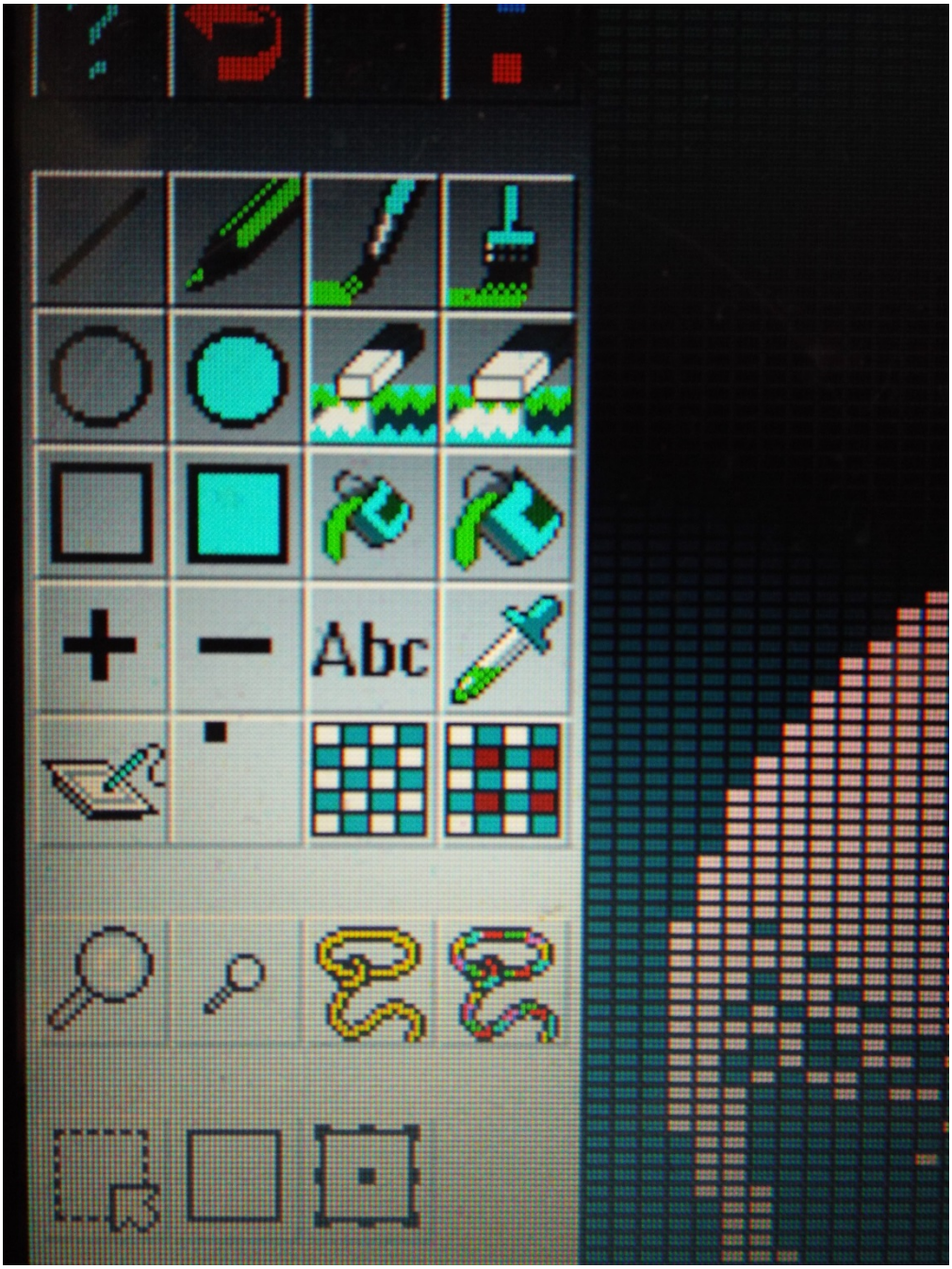


*Figure 5: Design-a-knit software tools*

More often, I will just draw straight into the software, sometimes working from an existing design and sometimes from scratch. There are copy and paste tools that are used to replicate certain areas for designs with repeated elements in them as well as to prepare the full knitting area for downloading.
Within my practice, tacit knowledge has been built up through repeated use of the software and machinery. By using the software on a regular basis, I have worked out things such as the optimum size for images to be imported at if they had to be converted, as well as increased speed and skill in using the drawing tools.

Regarding downloading software and programming the machine, the processes of multiple-section downloads and sizing have become second nature. The pattern is then downloaded to the console on the machine, which involves working across both the computer and the console.

A cable connecting the machine and console is used and a series of information such as number of needles and method of knitting is then manually entered into this console before knitting can commence. The information downloading takes a while and I usually use this time to check and prepare the machine. Considering the effective use of the machine, it must be correctly threaded with the right tension throughout, and the machine cleared of any fluff/debris. There is a sensor inside the knit carriage that works in conjunction with the knitting machine needle pushers selecting the correct needles to knit the programmed pattern. The colour is swapped every two rows by taking the carriage all the way to the end where the interchangeable yarn feeders sit. Large patterns are downloaded in sections, requiring attention and accuracy in knitting each section: in any section of the knitting, if the incorrect number of rows is knitted, the pattern will not match up with the following section.

With this knitting taking place in my studio, there is no technical support or design assistance, so I take on every role, dealing with all stages of the process from initial sketch to fixing broken machine needles. This means that a comprehensive understanding of how both the software and knitting machine function is essential in order to troubleshoot as things do go wrong. In addition to this, the ability to perform minor repairs is essential, and working knowledge of the knitting machine has been built up over the years allowing me to assess any machine problems and deal with them effectively.

When the knitting is complete, the pieces are finished by sewing in the ends, and in the case of 3D pieces sewing separate knitted parts of one product together. They are then washed or steamed depending on the yarn used.

When selling or exhibiting my work, I became aware of common misconceptions of my methods of production due to a lack of understanding of the making process. This lack of understanding has led to an over-simplification of the skills and time required to make my products.

There is a vast amount of tacit knowledge that I have built up over the years of working with this machinery and software, and I feel that if a similar practice were undertaken using hand knitting, the building of tacit knowledge would be more apparent. The hand knitter is clearly using their hands, and with practice comes improved dexterity and speed, their tacit knowledge is built through their experience. An expert hand knitter will be able to fix mistakes, write their own patterns and innovate with stitches and shaping. Within my practice a similar progression takes place, however it is much less apparent and I feel there is often little understanding of the knowledge and skill needed to create my work.

In order to explore this theory, I conducted interviews with customers. Firstly, I wanted to gauge their understanding of the process, what they knew about machine knitting and what they assumed about the making process. This gave a range of responses showing a variety of understanding and assumptions. Regarding machine knitting, a few respondents said they knew nothing, others stated that they ‘think it's like a mechanical loom’ (Chalmers, 2015) and ‘that it's much easier to make patterns neat. And is presumably much quicker’ (Prince, 2015) both showing a logical assumption as to what the knitting machine is and other responses demonstrated more in-depth understanding of the process.

Regarding the making process and the functionality of the machine, there were many assumptions around the use of computers and software. There was awareness of the use of software from some respondents with statements such as ‘It gets fed into a computer which instructs the machine’ (Prince, 2015) and ‘Using…

software to translate the design into something you can program into the knitting machine' (Hughes, 2015) which showed an understanding of the need for software in order to produce the products that they have purchased.

Comment was also passed on the physical aspect of the knitting, with one response in particular showing a real understanding of this aspect 'knit the fabric by pulling the carriage backwards and forwards across the needle bed' (Murray-Jones, 2015), at the other end of the spectrum however, was this response 'Genuinely no idea.' (Hale, 2015) which shows the range of levels of understanding. Most of the responses assumed a level of human interaction in the process. This is reassuring, as it demonstrates the differentiation between mass-production and designer-made despite the employment of machinery in the process. There was one exceptional response, where Chalmers (2015) assumes that I 'program in a pattern and the machine knits away'.

Retaining an authenticity of my work as handmade craft pieces is extremely important to me as a designer-maker. Having identified that there is a general awareness of the use of machine and software to produce these items, the next question is whether they are still considered by the consumer as being handmade. I asked the customers about both first impressions of the product and more specifically about customers' opinions on the authenticity of the pieces as designer-made craft products.

From the customer who had no idea how machine knitting works giving this response 'Yes, cause I guess you sit there and make them on your machine even if you don't sit and hand knit them' (Hale, 2015) to those with a much more in depth understanding of the process, all of the interviewees considered my work to be handmade. Even the customer who thought that the machine just knits away considers the products to be handmade because 'I know a lot of work and love goes in to them' (Chalmers, 2015).

Those with a deeper understanding of machine knitting made some interesting comments around the making process, with Rachael Matthews (2015) commenting on skill and authenticity 'The machine is a tool. Using the tool requires skills, dexterity. Authenticity is in the design, and developing the way the design is put into production - both of these things are done by the author'. As well as Elizabeth Murray-Jones (2015) commenting on my integrity to the making 'You're involved in every stage of the production - the knitting machine doesn't just produce it when you press a button.' This shows that there is a real consideration of the skill required to use the machine, and that it my work is perceived as handmade despite the use of software and machinery.

With this clear appreciation of my involvement in the process, my next consideration is what holds value in my product for the consumer. Throughout these responses, the words 'unique' and 'unusual' were often used in relation to the products and their design; there was also an indication of the draw of the 'human' element due to my heavy involvement in the process. Suzy Prince (2015) stated that 'there's a real sense of love in the process. Also, they are so unusual and rare' and Pauline Chalmers (2015) commented on the production 'I like the (unique) design and that's its handmade and not some mass-produced product'. In addition to this, a customer who had no idea about the process of machine knitting showed a great appreciation for the quality of design and the designer-made element stating that 'For me it is exceedingly rare to spend that much money on any item of clothing - never mind a scarf! But I just like the design so much and buying from someone who is designing and making items themselves' (Hale, 2015). This really highlights the value to the customer of a product being, not only handmade, but also designer-made. Customers have shown a clear appreciation of the technology being an aid to production rather than something that de-values the craft and my work is still perceived as handmade despite the use of technology.

These responses are positive for the future of craft and demonstrate successful integration of technology with traditional craft methods. They also show that the stigma around machine knit that has been witnessed by me is not an overarching view, and that people who buy and view my work appreciate the integration of technology to create products that are considered ‘unique, well designed, high quality’ (Murray-Jones, 2015).

Regarding the potential of this technology, custom design options were a logical step as designs can easily be amended and altered within the knit software. The cat-cushion shows how successful this can be and how the product, despite the use of technology and machine, can be considered unique and handmade.


*Figure 6: Custom cat cushion*

The custom aspect is a field that I will be continuing with and expanding under my label in order to make the most of the technology I am employing and to offer more unique design options to the customer.
There is huge scope to continue with this research into the employment of technology within contemporary craft both through analysis of my own work and others’. For now, this research can be concluded with the following statement that ‘Machine knitting is not cheating’.

## References

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