Seamless Knitting Is It/Can It Be Used As A Digital Crafting Tool?

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Introduction

This is a positioning paper which looks at a digital technology, seamless knitting. It questions if it can be used as a digital crafting tool, or if it remains within a mass-production domain. Seamless knitwear technology was designed by its manufacturers, Stoll (Knit & Wear®) and Shima Seiki (Wholegarment®) to produce mass-production knitted garments which needed little or no post knitting construction (Peterson et al. 2008; Underwood 2009; Smith 2013). Given that this technology was born from production efficiencies and maintains the use of closed source proprietary software, can this technology be seen as having possibilities of being used as a digital crafting tool and if so does it then become a unique and identifiable specialist practice?

Seamless technologies remain in the domain of a closed digital source platform, as opposed to many of the open source technologies which are being adapted and used by the craft hacktivists (von Busch 2010). Therefore it remains within the mass production domain of specialist users; those trained to use it through formal university training such as textile and knitwear designers, or those trained to follow the rules through the proprietary software providers' training such as the knitting technicians (Sayer et al. 2006). All of this training is dictated to the trainees by the closed software linkages or linear rules used for learning the design and programming software, thus prohibiting more liberating way of discovering the technologies' fullest design possibilities (Smith 2013). The design possibilities are further limited by the very complexities of the technologies' software programmes; the very attributes which ironically have such huge design possibilities are also a hindrance to creativity.

Digital-Craft hackers optimise readily available internet and open source software technology devices to combine the digital with traditional craft to make socio-political, economic, and sustainable consumerist statements (von Busch 2010). This blend of old and new ways of working thus bridges the digital-craft divide, described by Shales as a 'technophilic movement in the crafts' (Shales 2008). Such cross over modes blending 'the craft of knitting' with digital seamless technologies are prohibitive within the same phenomena of use, due to the linear programming and closed CAD systems. The difference between digital-craft hacking and using a mass production based technology in a craft manner comes down to authenticity of design approaches or the designer's intent when designing using seamless technologies. 'We should look neither at the hands that perform the craft, nor the final products, but we should trace the networks, protocols, techniques and attitudes among the makers' (von Busch 2010).

There are two ways of using seamless knit technologies; the first and most prolific way it is used is by following the linear formatting within the CAD systems, which produces replications of the same (Smith 2013). The second way is by introducing a craft attitude or approach to design developments which produces replications of difference (Smith 2013). In an interview Oates, a woodworker who uses digital tools for creation, states:

'Using it (digital) as a measuring tool means making things we've seen before, but using the technology to speed up the process. Artists and designers that are using CAD/CAM as a design tool are making work that can also be made by hand, but may not have been realized without the use of CAD/CAM.' (Hanus 2015).

This is how seamless knitting technologies can be viewed; though a digital fabrication tool, if craft based knowledge and understandings of design practice are combined with the linear programming knowledge, substantial movements away from the norm can be achieved. One of the ways that this can happen successfully is through building up communities of design participants, re-engaging with the technology through collaborative practices. A realisation that the complexities of seamless technology are such that no one person can understand all aspects of it, necessitating the need for a 'craft community' of knowledge bases to combine to breach this complexity of programming to reach more creative goals. The collaborative nature and environment necessary to work with this complex technology and idea generation outside of normal practice, remains similar to its craft background of technique and knowledge sharing. This digital environment through collaborative practices can open up the future landscape for new value added products, new shapes and possibilities previously impossible to imagine within craft practice, such as are being seen when used in e- textile applications (Fraser et al. 2014).

A collaborative project called Transformation took place at AUT University, New Zealand between a seamless shape specialist, textile designer and a knit technician (Fraser et al. 2014). The brief developed was to produce seamless knitted products, varied in application, which incorporated three dimensional shape, textural and coloration/pattern qualities, employing a technical shape transformation from one product to the next. This project resulted in four seamless designed product-artefacts which all fell outside of the normal applications produced via seamless technology. Reflection on the collaborative nature of this research revealed that, though seamless knit technology is capable of producing the 'soft' aspects for use within product outputs, non-garment applications would require collaboration with other specialists for the production of the 'hard' aspects of a product.

This represents a considerable shift in design thinking, business and commercial practice for the knitwear industry, as current practice is predominantly based on a self-contained business model where all design and production is completed in-house. If this collaborative design process can become the norm within the knitted textile industry, it could support a move towards higher value design and production outputs produced using this technology, which moves away from just using it for mass-produced garment manufacturing and into an area of mixed media and collaborative design practices.

Figure one shows the final four design artefacts, which were derivative iterations of the first garment's form.

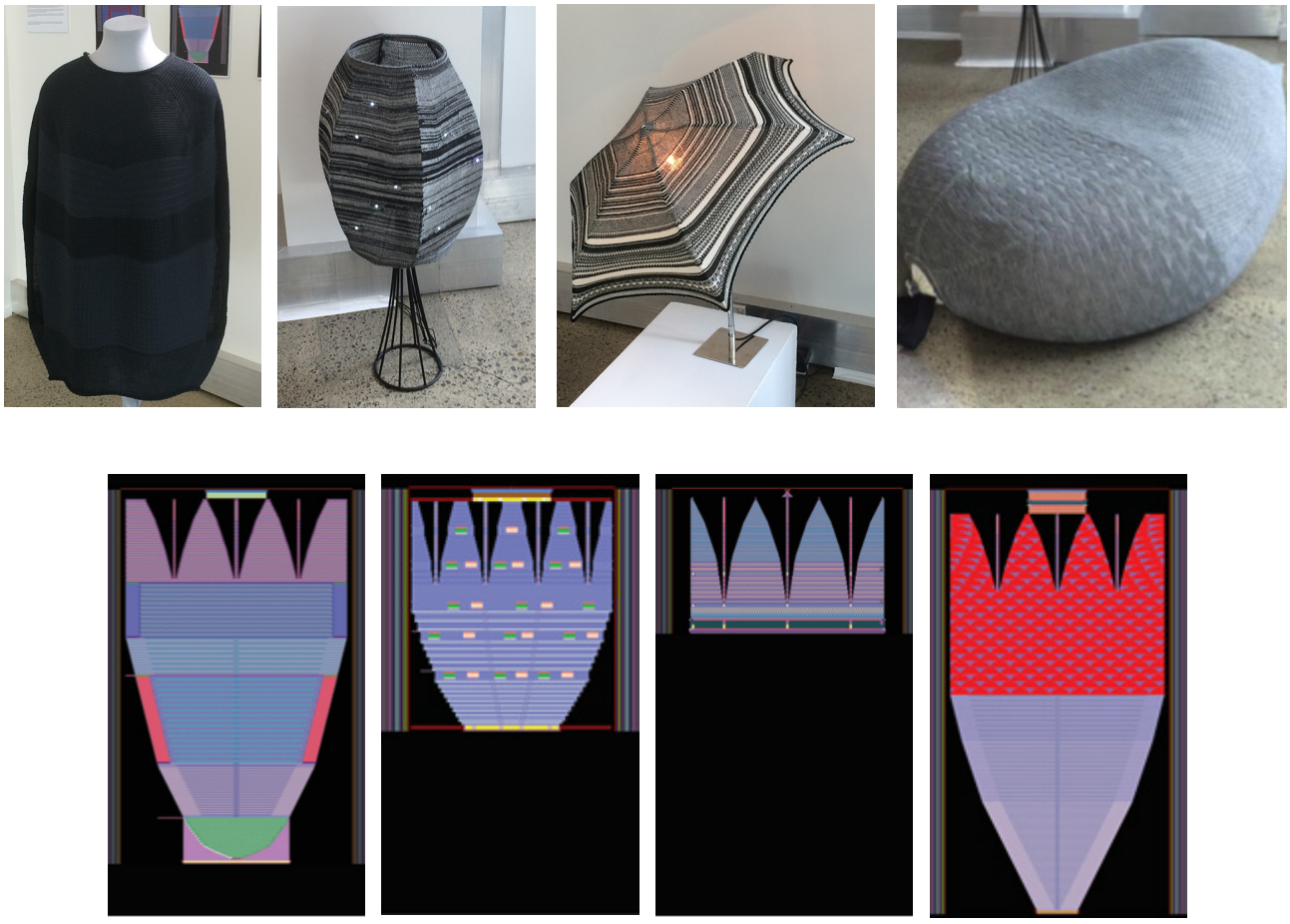

Fig 1) Transformations: (Fraser et al. 2014).

Seamless knitwear, though a mass-production technology, can when traced through its histories of development lead directly back to its craft connections and roots. This technology though advanced in many ways also has limitations which when analysed against its craft origins become more transparent. I have found that working with digital knit technologies can become a craft unique in itself; though connections and linkages to its past histories can be made and are sometimes useful in moving this technology forward. Digital crafting through the medium of seamless knit technologies is a distinct and identifiable specialist practice with its own benefits and technical challenges. However when working within this field, it has been found that having a good hand knitting, domestic machine and industrial machine background before engaging with the digital has helped to progress the digital practice. It has helped to develop not only a unique approach but has also influenced my practice and identity as a maker, with a personal digital aesthetic emerging. Mazanti states 'the 'handmade' and the 'human imprint' are central characteristics in a search for authenticity that meets the needs of the alienated consumer in our industrial age' (Mazanti 2011: 60). It was in a search for a means to introduce a nuance of craft difference or authenticity of design to the stilted and standardised garment shapes being produced using seamless knit technologies, that I developed an iterative design process which focussed on the integrity of the knitted stitch as a building block for knitted aesthetics in a digitally controlled mass production knit design system.

Generally seamless knitwear garments conform to standardised shapes, representational of classic knitwear design silhouettes. When altering the garment silhouette from two dimensions to a three-dimensional contour, a means to incorporate the shaping 'forces' of the garment needed to be integrally incorporated into the pre-installed CAD formatting process.

Influenced by hand knitting knowledge and how garments such as socks or berets are knitted, techniques for garment shape movements were analysed to see if they could be applied to seamless mass production technologies. The first garments that were developed created a twist to the basic pre-installed shapes; by introducing a 'wedge', fabric was taken away from the rectangular form in designated areas of the garment body. This movement resembles the rotational twist as seen when making a beret. It was found that until the flat two-dimensional diagram had been transformed into a physical 3D object, it was impossible to predict what each garment would look like until it was knit out and became tangible matter. In the resultant garments seen, internal forces create movement around the body, the garment deflects away from its 'nature'; the 'natural' bodyline creating an individualized three-dimensional form, machined but not of a standardized shape (Smith 2013).

Fig. 2) Singularities of Design: (Smith 2013).

It was by introducing an iterative nature of working combined with a craft based understanding of the material nature of knitted shape movements which enabled the re-introduction of an element of craft nuance to a machined product. 'Craft stages an asymmetry between maker and viewer, articulated by a difference in practical knowledge. This explains why hand-made objects, in general, are more likely to produce an effect of enchantment than mass-produced ones' (Adamson 2013: 100). The digital used in this way becomes an extension of the hand, the attitude and intent of the maker allows digital tools to be worked with sympathetically within the machined boundaries but pushing beyond the norm of product outputs. The materiality of the end product emerges empathetic in use through the maker's inherent knit knowledge whilst merged with and produced by digital technology. Memories of analogue and material-based knowledge when combined with the digital can result in artisanal designed products. These products when approached this way, though re-producible through mass-production digital means, remain deeply connected to craft based knowledge from which the digital emerged. As a notion of digital-craft emerges as a specialist knowledge arena with unique characteristics of design outputs, digital design processes can still benefit from revisiting their craft roots from time to time.

References

Adamson, G. (2013). The Invention of Craft, London: Bloomsbury Academic, ISBN: 978-0-8578-5066-9

Fraser, G., Kalyanji, J., et al. (2014).'3D Knitted Preforms and Collaborative Approaches to Practice', Transition: Re-Thinking Textiles and Surfaces: Huddersfield, UK. 26- 27 Nov 2014.

Fraser G., Kalyanji, J., et al. (2014). '3-D Knit Transformations', Auckland:108 Gallery, Ironbank Building, 150 Karangahape Road, Auckland, New Zealand. 14 - 17 Apr 2014.

Hanus, J. K. (2015). Christy Oates on Digital Fabrication. Source: http://craftcouncil.org/post/qa-christy-oates-digital-fabrication#sthash.7ogkaAmF.dpuf :Accessed: 5/10/2015.

Mazanti, L. (2011). 'Super-Objects: Craft as an Aesthetic Position': Extra/Ordinary: Craft and Contemporary Art, ed. Buszek, M.E. Duke University Press, Durham, NC.

Peterson, J., Larsson, J., et al. (2008). 'Knit on demand - Development and simulation of a production and shop model for customised knitted garments', International Journal of Fashion Design, Technology and Education 1(2): 89 -99.

Sayer, K., Wilson, J., et al. (2006). 'Seamless Knitwear: The design skills gap', The Design Journal 9(2): 39-50.

Shales, E. (2008). 'Technophilic Craft', American Craft Magazine 68: 2 April/May.

Smith, A. (2013). 'Seamless Knitwear: Singularities in design', PhD AUT University.

Underwood, J. (2009). 'The Design of 3D Shape Knitted Preforms', PhD RMIT University.

von Busch, O. (2010). 'Exploring net political craft: From collective to connective', Craft Research 1: 113–124, doi: 10.1386/crre.1.113_7