Digital Design: Comparative Study of Seamless Knitwear Development For Weft Knitting

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Seamless garments handknitted in the round were the earliest forms of knitwear: berets, stockings, gloves, and tubular body coverings for underwear and outerwear. Technology has now come full circle with a new generation of integral whole garment outerwear machines launched 10 years ago. Early mechanisation of knitting necessitated garments with seams, made from shaped panels or cut and sewn from flat fabrics, then small diameter circular machinery enabled tubular knitting for seamless hosiery. The 1960s saw the first automatic machines for seamless gloves; by the 1970s computer control of the machinery brought knitting technology into the digital age, enabling individual stitch control and opening up vast patterning and design potential. Complete garment and seamless technologies in both the flat and circular knitting sectors represent a paradigm shift in knitwear production requiring new approaches to design. Knitwear design is a unique hybrid of textile and fashion design: complete garment knitwear simultaneously creates the fabric and the garment shape directly from the machine, with minimal making up required. Importantly, there is a shift between two-dimensional and three-dimensional design thinking, currently represented on a flat computer screen. The digital creation and programming of each design is a significant element of the production process and full exploitation of this complex technology depends on the knowledge and adaptability of designers together with interpretation between the designer and technical operators. Thus the technology has been slow in uptake by mainstream industry due to cost and complexity.

This paper will present a comparative mapping of complete garment knitting using different machinery and computer design systems, including design translation and knitting processes, in a sample of industry and education scenarios. This new generation of machinery challenges traditional knitwear production but offers tremendous design opportunities for innovative fashion knitwear and mass customisation for the future.