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Eco-design framework for reducing fabric waste and consumption during fast fashion production

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Fast fashion business model is well-known for being responsible for accelerated waste generation both at post-consumption and manufacturing phases. The average marker efficiency of industrial fabric cutting process for garment manufacturing is 85%, which means average 15% of fabrics is directly scrapped during this stage. This makes all the efforts and inputs given from fibre to fabric production go fully in vain and the environmental impact and climate change contribution by this 15% of scrapped fabrics unjustifiable. Zero-Waste Pattern Cutting (ZWPC) is a recent trend in increasing fabric utilisation but is only practiced in atelier environment for making one or two garments. Our previous work demonstrated the integration of ZWPC in mass production of knitwear resulting over 95% of fabric utilisation. In this work, we demonstrated an eco-design framework for integrating ZWPC in to design and pattern cutting of woven garments in mass production scenario. As ZWPC approach demands significant changes in pattern geometry to increase fabric utilisation, it is necessary to first check through wearer trial how a garment drapes and appears on human body before finalising the design for mass production. The whole process is heuristic and based on 'error and trial' method. The physical prototyping and fit checking processes are very time and material consuming, hence not sustainable in this case. Therefore, virtual prototyping and fit analysis approach has been adopted to test the fit of eco-designed garment.

Key Words: Eco-design, fabric waste, . Zero-Waste Pattern Cutting (ZWPC), marker efficiency, mass production, virtual fit analysis