Embedding Body Scanning in Bespoke Product Development Pipelines

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Abstract

Body scanning offers opportunities to collect large amounts of measurement data more quickly and often with a better understanding of accuracy than manual methods. This data can be used to develop bespoke products, however, this requires consideration of how the data is captured and processed to be applied into the product development pipeline. This research outlines how the Apparel Design Engineering (ADE) group developed and explored approaches to utilise body scanning directly in bespoke product development.

The pipeline includes scan data collection, processing, measurement extraction (including error analysis and reliability), data preparation, parametric pattern development and the creation of bespoke products. We focused on developing products for a series of 5 dress forms, and explored measurement variability and accuracy to understand how our data may compare to manual approaches. In body scanning we utilised repeat scans to address the issues of allowable error during data collection.

Our research determined that scanner and manual measurements are generally comparable when taken at the same location. We further established that body scanning data can be utilised to create bespoke products with successful outcomes that recognise the individual's body. We have established that body scanning can successfully drive bespoke patterns and facilitates the engineering of garment fit. These approaches can be realised with commercial body scanning applications and open source software. However, considerations must be taken regarding data management throughout the process and we propose some key considerations for the data management pipeline to realise body scanning to bespoke.

Keywords: 3D Body Scanning, Bespoke pattern development, Parametric pattern drafting, Engineered clothing fit.

1. Introduction

This extended abstract provides a brief outline of the developed process and some focus on aspects of the pipeline.

The development of garment patterns is generally a time-consuming manual process which makes use of limited actual body measurements. Once drafted a pattern often requires digitisation to enter it into the digital pipeline. The limited use of body measurements can create issues for bodies which do not conform to expected proportional norms in current product development and sizing. In this research we used body scanning data to increase the number of actual measurements used to create the pattern and developed a pipeline to use this data directly in creating a bespoke garment pattern. We explore this in the context of a sweatshirt and shirt for the upper body and outline the considerations to enable this process. In a traditional sweatshirt draft around 6 actual measurements of the body are used, the experimental method developed here uses 19 body measurements and is developed within Seamly software which allows for the development of a parametric pattern mesh. This is then resizable to different measurement outputs based on a measurement input file.

Consideration is given in this process to measurement error something which is recognized important, especially in applying new techniques like body scanning.

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2. Outline of the process pipeline

The process pipeline consists of a number of stages which can be summarised into 9 main aspects as shown in figure 1.

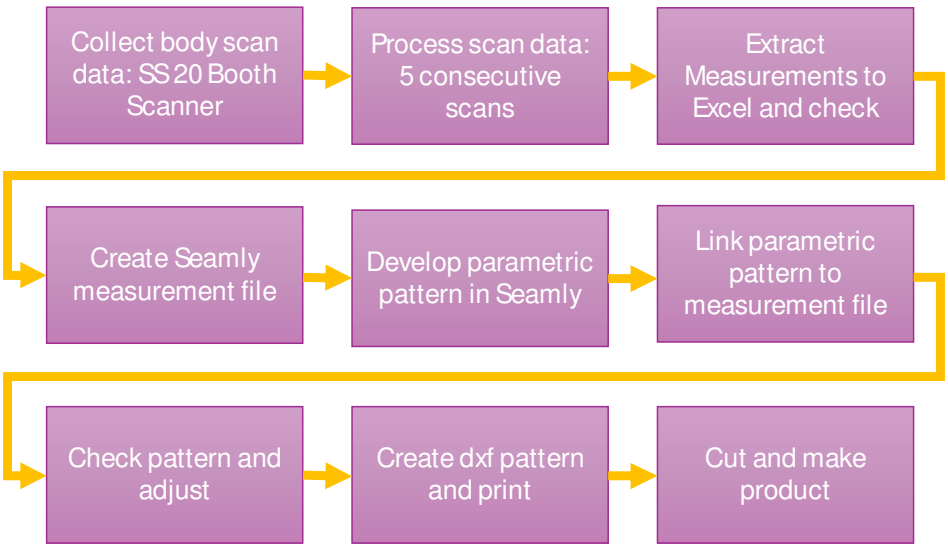

Figure 1 Visualisation of key stages of the bespoke product pipeline

Collection of the scan data utilised an SS20 booth scanner which collected 5 consecutive scans in accordance with the process documented by Gill et al., in 2016 [1]. The five consecutive scans were processed, which involves the manual checking of the scan data to ensure there are no major errors, the Size Stream Studio software is used for this. Also landmarks are checked and some are repositioned to provide a more appropriate measurement, the landmarks of the neck and waist often require some modification. Measurements are extracted from all five scans and the median value is used to reduce any potential measurement error, a process similar to that of Gryphon [2]. The measurements are opened in Excel and a python script is used to create a Seamly .vit or .smis measurement file. A parametric pattern for the sweatshirt was developed and used the measurement file template, by linking a new measurement file to the draft the pattern is adjusted to create a new draft to the new individual measurements, very much like drafting a bespoke pattern. These patterns were then checked in Seamly 2D software and once validated a dxf pattern was developed and printed to paper. The paper pattern requires a manual operation in the sweatshirt to adjust from a set in to a raglan sleeve and then it is cut and made from fabric.

A current limitation of needing a paper pattern reflects the lack of tools to automate single ply fabric cutting from accessible systems. Automated single ply cutting would significantly reduce steps in the process. It was noted that interoperability of dxf pattern data provided another limitation as it could not always be freely transferred between different CAD systems.

3. Conclusions

It is possible to use body scanning as the initiation point to create bespoke garments for individuals using commercially avaible software. It is important to determine a set of measurements, which using body scanning can be expanded far beyond those used in traditional pattern drafting. Pattern drafts can be developed utilising a greater number of measurements than traditional drafts and these can allow bespoke patterns that respond to the individuals size, shape and proportion. There are clear opportunities to develop pattern engineering and adopt more sustainable approaches toward developing garments. Existign software provides opportunities to create engineered approaches to clothing, but concurrent developments in measurement definitions, standards for gaining suitable data veracity from body scanners and work to evolve pattern drafting methods is necessary.

References

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