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Development of a CAD Tool for Pattern Making of Garments

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ABSTRACT

This study aims to develop a 2D virtual simulation pattern draft for garment designing. The 2D virtual simulation tools available in industry is compared and analyzed with the tool developed in this work . Dress form used in apparel industry has been designed analyzed and compared. This study provides an insight for improvement in 2D virtual fit simulation technology for effective prototyping and quality assessment in the fashion industry.

Index Terms: CAD tool, C++, Pattern draft, Gerber software

Introduction

The appearance and fit of a garment is highly dependent on each process. Pattern making is one of the earliest steps in the development of a garment. It is a craft that has evolved over the centuries into a skilled technical process. Today, pattern making tools have been carefully tailored to quickly perform repetitive time-consuming tasks, allowing apparel companies to cater to the fast paced world of fashion. As technology improves and research intensifies, patternmaking software packages continue to become more sophisticated. Software packages are being finely tuned in order to successfully address the needs of the apparel manufacturer. In the late medieval period, weaving was a laborious process, carried out entirely by hand on primitive looms. As a result fabric was regarded as a coveted commodity. For the most part, clothing was constructed with rectangular shaped pieces of uncut fabric. Fabric was left intact to minimize waste.

In the fifteenth century the seminal art of patternmaking began. Instead of using uncut fabric, carefully engineered pieces were cut to contour to the body. Forevermore, fabric would take a back seat to fashion. Prior to the Industrial Revolution the art of patternmaking was highly revered. Tailors meticulously worked with their client's personal measurements to customize patterns. Clothing made by tailors was elaborate and relegated only to the very rich. With the onset of the Industrial Revolution, standardized patterns were essential to the success of ready-to-wear clothing. Initial attempts to create standardized patterns resulted in poorly fitted garments with little detail. After lengthy experimentation and standardized sizing, patternmaking made a triumphant transformation from customization to standardization [1]. In the drafting method, patterns are made directly from measurements taken from a pre-existing garment, an individual or a body form. Using the collected measurements, the pattern is drawn directly onto paper. Computers have been used by apparel companies since the early 1980's.

Pattern making has now reached to the advanced level and digital platform is playing an important role in this area. Although software's are available but pattern making is being done manually in maximum cases. The use of computer involves big investment but at the same time advantage is that it saves time, gives more opportunity, options and accuracy. Though there is affinity to accept high level technology but still there is confrontation either due to high investment or by operators/masters due to fear of losing their jobs. The garment manufacturing comprises of numerous stages such as product development, spreading, cutting, sewing, finishing and packing. Product development is the most critical of the garment manufacturing and if the garment is made correctly in terms of fit, style, color and design at

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this stage, half the battle is win. Pattern making is the most critical of all the product development processes. A nice perfect fit contributes to the success of any style. Pattern making process has evolved as skilled technical art through the years which requires a proper thoughtfulness [2]. Consequently fit approval takes the major time of the lead-time. This industry is completely dependent on the skilled pattern master [3]. Buyers are placed at distant places and in most of the cases approval needs to be done by the buyer so sending the samples to the buyer takes long time and then getting comments will take time and our first concern is time.

Secondly, if we receive any recommendation on that particular sample, pattern need to be corrected so doing the pattern all over again, making the revised sample and sending again for buyer's approval will add to the time. Moreover it involves cost as well. After every variation or correction pattern master has to make the pattern again and again to see the result which eventually adds to the time of final garment making. In today's fast changing fashion world, quick response is the main key factor to success. An agile automation system will permit industries to take action towards the changing market conditions. By accepting technology, industrialists can create examples for their competitors by cost cutting and increasing profits [4]. Through software such as CAD, the pattern can be made easily and correction can be done as many times as required, E-fit or virtual prototyping can be used to drape garment on model on the screen and animation helps to see fit and drape [5]. The CAD system or smart mark (automatic marker making) is much more productive compared to the manual method. They systems will provide great advantages in responding quickly to multi-piece, multi-size orders in small quantities. Moreover, these will provide substantial savings as far as fabric costs are concerned. Pattern making consist of the design and creation of templates from which clothing and craft items can be sewn. Patterns are made of pieces of paper shapes that are traced onto the fabric need to be cut, with each pattern piece serving as a form for an individual part of the garment or item to be sewn. Generally the pattern masters create pattern as per buyer's specifications and the first fit sample is made. If fit sample gets approved in first go, it's great, but it is very rare [6]. If not the whole process need to be redone and sample has to be rectified as per buyer's comments. These revised samples need to be sent to the buyer till it get approved.

Garment is the main product of textile and clothing sector. Today garment is not only the basic necessity but it stands for the status. People want stylish garments to match their status. Also garment industry is very much dependent on the season. It gets affected by the change in seasons, changes in customer's lifestyle and requirements [3]. Due to seasonal variations, the product development time is very tight and strict to the seasonal fashion calendar. Textile and apparel product development is normally planned one year in advance. Frequent planning and product development is required to overcome the shorter lead times. Flexible manufacturing technology enables to respond quickly any variation in style.
Patternmaking is one of the earliest steps in the development of a garment. This craft has grown into a skilled technical process over the centuries. With the extensive research and standardized sizing, patternmaking took revolutionary step from customization to standardization. Pattern Making can be 2D or3D process [2].

The major component in the costing is fabric consumption. Earlier merchandiser used to give design sheets to the pattern masters and get the patterns made and grading done. This process normally used to take 3-4 day then also after taking so much time companies had to quote the price approximately. CAD has made this process tremendously easy and faster as master can made the pattern in lesser time or he can also retrieve the similar pattern see the grading and marker of that style and quote the prize.

Pattern Design Systems (PDS) have become invaluable tools to the patternmaker, assisting in much of the repetitive tasks associated with patternmaking. PDS systems are capable of storing an incredible amount of data that can be quickly retrieved, tweaked and re-filed. Using a mouse or stylus, patternmakers are able to swiftly add style details and make changes. There are many benefits to PDS - speed, accuracy and ease of data transmission being some of the most obvious. In today's competitive environment, software companies are zeroing in on the growing demands of the apparel manufacturer.

In this paper we present a new tool for draft/pattern making of garments. The tool has been developed using C++ programming by developing its algorithm and writing the source code in C++ language.

RESULTS AND DISCUSSION

Algorithms for pattern designing of various garments have been developed. In the present work algorithm for knee length skirt block, A-line kurta, fitted sleeve, loose sleeve, full circular skirt, half circular skirt, bodice block, final bodice block, half bodice block, bodice block grading, classic shirt block. The algorithm for knee length skirt block for example is presented below:

Algorithm-Knee length skirt

1. Draw a line for skirt length i.e. 61cm as 0 and
2. Measure 1/2 Round Hip+2.5cm=49cm.
3. Mark 2cm downwards on line.
4. Waist to hip i.e. 20cm on line.
5. Half of line i.e. 20/2=10cm.
6. Same as 0-1 i.e. skirt length 61cm (join 1 to 3.
7. 7-8 & 5-6: From point 7&5 draw a horizontal line and join it, on line 2-3 and mark it as 8&6 respectively.
8. Point 9,10,11,12: Mark the mid-point on line 0-2 i.e. 9, on 7-8 i.e. 10 on 5-6 i.e. 11 and on 1-3 i.e. 12 and join all the 4 points vertically.
9. 2-13: vertically mark 1cm from point 2 downwards and mark it as 13.
10. Point 14&15: from point 10 mark 1.5cm horizontally on both the sides and mark it them 14&15.
11. Now join point 14 to point 11 and extend it upward on line 0-2 with the help of hip curve and name the intersecting point as 16 on line 0-2.
12. Repeat the process for point 15. Join it to 11 and extend upward on line 0-2 and on intersecting point name it as 17 with the help of hip curve.
13. Now with the help of hip curve join point 17 to point 13 and point 16 to point 4.
14. Point 18 & 20: Take the mid-point of 17-13 and name it as point 20 and mid-point of 16-4 & name it as 18.
15. 18-19: Vertically mark point 19 from point 18 on the distance of 12cm.
16. 20-21: Vertically mark 10 cm down from point 20 and name it as 21.
17. Now calculate the distance of point 22&23 from point 20 and distance of point 24&25 from point 18.
18. Mark 2.8cm from point 18 on both the side and mark it as 24&25. Now mark 1.4cm from point 20 on both the side and name it as 22&23. Join 24&25 on point 19 with the help of hip curve and point 22&23 with point 21 with the help of hip curve.

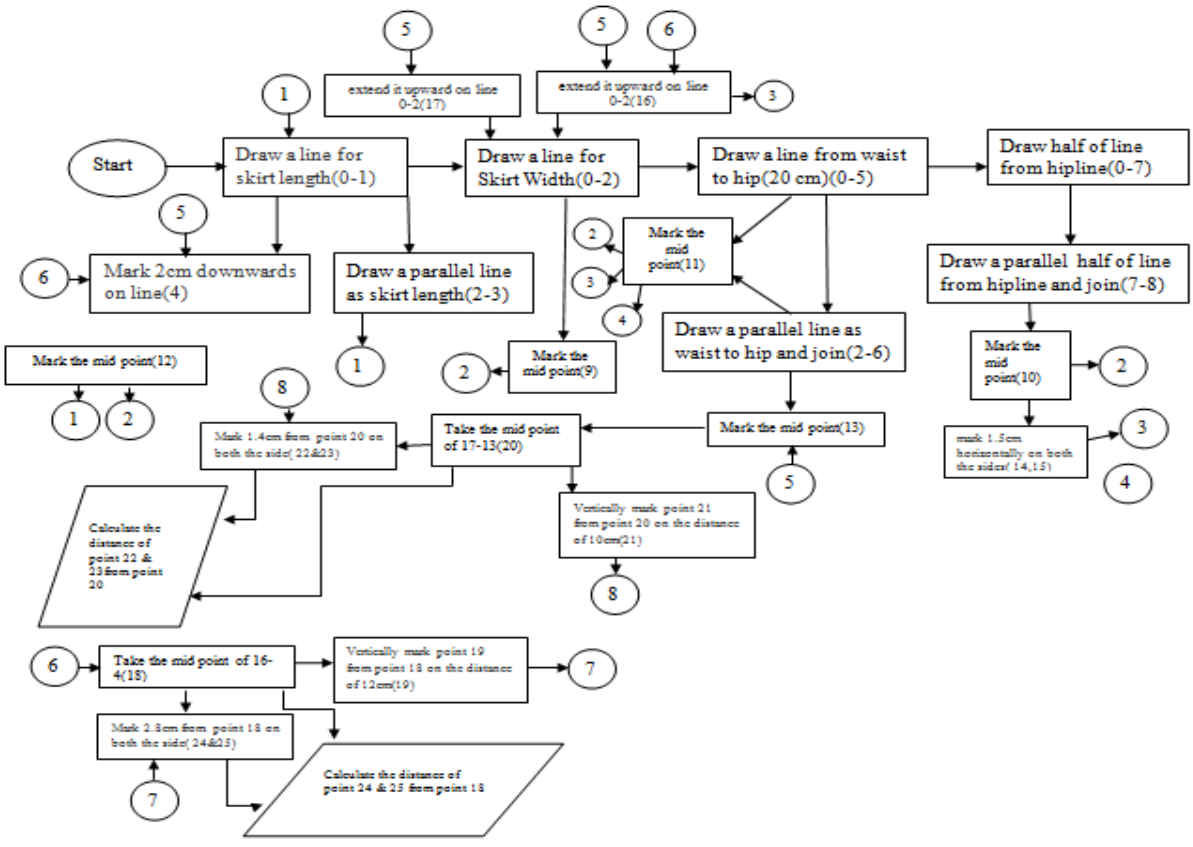

Fig. 1: Flowchart for knee length skirt

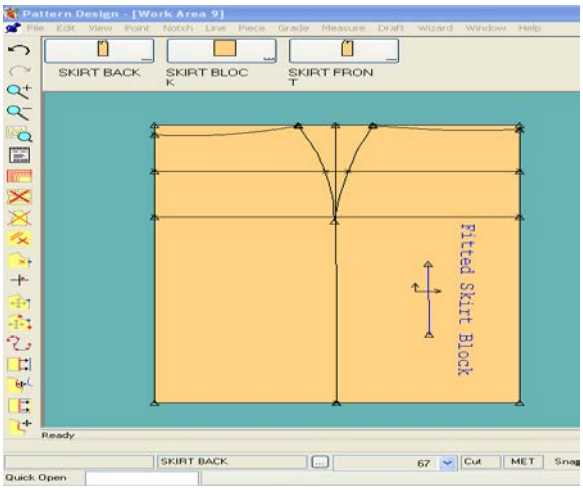

Fig. 2: Pattern draft of knee length skirt created in Gerber software

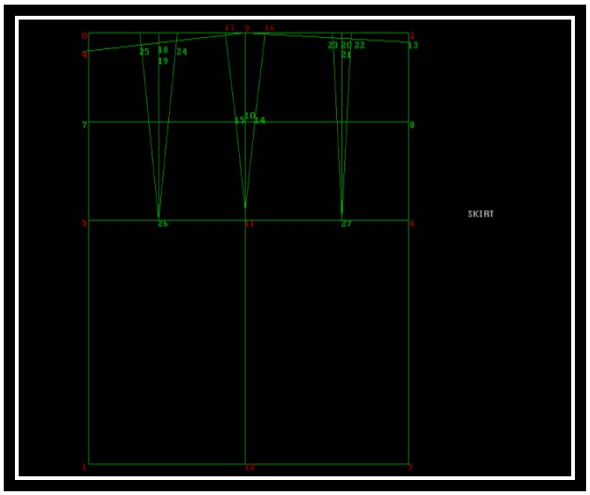

Fig. 3: Pattern draft of knee length skirt developed by using C++ programming

As shown in figure 3 draft pattern of knee length skirt is generated using the algorithm developed and flowchart shown in fig.1. The specifications taken in the algorithm and program are clearly visible in fig. 3. The implementation of algorithm and programming is clearly demonstrated. A knee length skirt using the same specifications as used in the program is drawn using commercially available Gerber Software and the results are shown in fig. 2. From the perusal of the results of fig. 2 and 3 it can be safely concluded that the output generated by the program developed in the present work is better in visualization and also the specifications of measurements are visible in the present work whereas it is not visible in the Gerber software.

Draft pattern of A-line kurta using developed program is shown in fig.5 whereas the output generated by Gerber Software is shown in fig.4. The specifications taken in the algorithm and program are clearly visible in fig.5. The implementation of algorithm and programming is clearly demonstrated. The output generated from Gerber software (cf. fig. 4) appears to be primitive and less clear in visualization.

A-LINE KURTA:

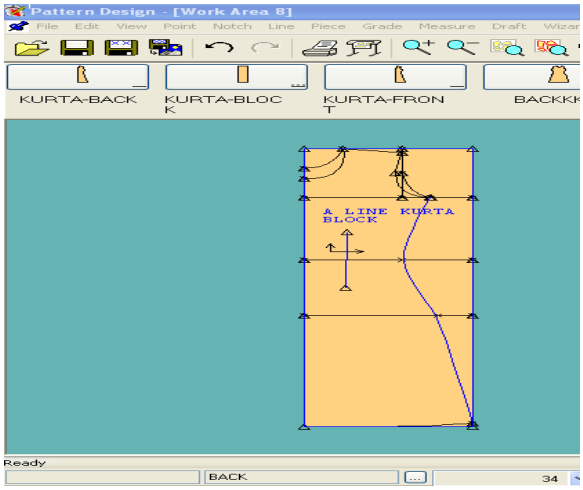

Fig. 4: Pattern draft of A- line kurta created in Gerber software

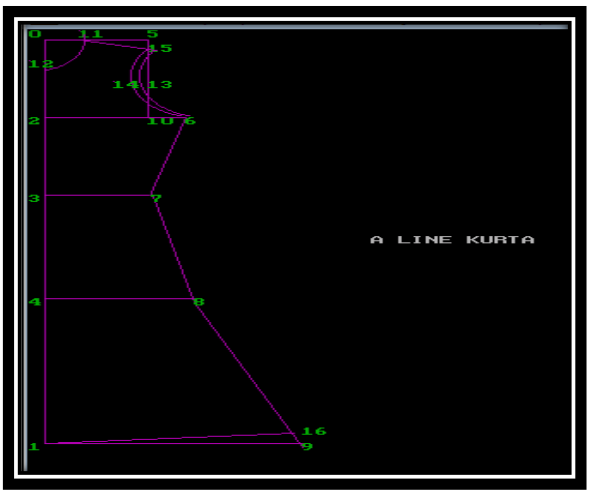

Fig. 5: Pattern draft of A- line kurta developed by using C++ programming

CONCLUSIONS:

Although there much software for pattern making are available in the market, yet the tool developed here has many advantages over the given software and many other software's commercially available. One of the most important features of tool developed in this work is that it can be used even by a person who does not know drafting. Other software's available in the market have the limitation that the person using them must have the skill of the drafting. The steps and procedures used in the developed tool are logical and simple to understand.

The advantages of this tool have been illustrated in many figures comparing it with other software's available in the market.

All the patterns are generated using C++ programming taking into account already prescribed standard size measurement. Standard size measurement pattern are custom-fitted basic pattern from which patterns for many different styles can be created. The designers or dressmakers need a block or a pattern to create styles. Most designs are made to fit average, standard or ideal figures. Patterns that are made from an individual's measurements are checked for accuracy by cutting out in sample fabrics and the resulting garments are fit tested for accuracy. Using this type of patterns increases productivity and makes work easier for the dressmaker. Its use does not change the nature of the design process but as the name states it aids the product designer. The user can nearly view the actual product on screen, can make modifications in it, and present his/her ideas without any prototype, especially during the early stages of the design process.

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