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Application of Cad-Cam in Textile Apparel Industry

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Abstract

CAD/CAM technology is becoming increasingly apparent in the textile and apparel industries. Computer aided-design (CAD) is frequently used for the design and drafting, generating reports, three dimensional modeling, analysis of finite elements and as an input source for computer –aided manufacturing (CAM). The analysis of design and their translation for the manufacturing system is carried out by equipment that is part of computer-aided engineering (CAE)and is the combination of CAD, CAM and CAE, which make-up computer-integrated manufacturing (CIM). The time consuming and cumbersome process of textile engineering has been made by CAD. Computers are helping to design, analyzing and manufacturing the product with span of time in engineering applications. CAD find it's practical utility in textile, apparel and fashion industry, right from the design initiation to production stage laying, design, planning, spreading, cutting, and sewing. Nowadays, computer-aided design (CAD) software becomes one of the most essential tools for pattern making and released jobs in the clothing industry. To unleash the creativity of the fashion and textiles designers, computer-aided technology is being used more and more in fashion and textile industry.CAD has been a boon for designing and manufacturing industry allowing efficiency and productivity, which a normal pen-paper design can never compare with. At present we see that the link between fashion design and CAD is growing stronger and deeper. CAD software has aided and made drawing and

sketching very easy and convenient as compared to normal drawing of any for.

Keywords: *Purposive sampling technique, Fashioning design, CAD solution, Textile pattern libraries, Apparel industry*

INTRODUCTION

CAD/CAM technology is becoming increasingly apparent in the textile and apparel industries in U S. These applications are reviewed and integration of CAD/CAM technology throughout the production and marketing chain is emphasized and explored. Adoption of voluntary standards data usage is central to such integration. Training of students in textiles and clothing in the electronic communication as well as in the software and hardware involved is an important task of textile and clothing educators. Additionally the linkages between textile and apparel production and distribution should be emphasized and the facilitation of these linkages is suggested as an important research focus [1].

Computer aided design (CAD) for design and drafting generating reports, three dimensional modeling, and finite of elements analysis and as an input source for computer-aided manufacturing (CAM). The CAD has become popular as tools essential for designing and manufacturing with computers. The process of CAD includes three phase: designing the geometrical model, analysis of generated model against various physical quantities, optimization and visualization of computer graphics based on results and analysis. CAD is a very powerful tool for the manufacturing industry offering several benefits such as improved product design, increased productivity, higher utilization and better quality control. Today, CAD use is widespread in textile and fashion industry [2].

CAD/CAM systems assist automatic tasks with design and manufacturing. CAD helps in design and product development and CAM helps in controlling the operations steps of production and equipment. The analysis of design and their translation for the manufacturing system is carried out by equipment that is part of computer-aided engineering (CAE). It is the combination of CAD< CAE, and CAM that take up computer-integrated manufacture (CIM)-otherwise referred to as CAD/CAM. A CAD/CAM system may

also link the production stages to orders, sales, production, planning and scheduling and sales analysis, etc via a secured server through an electronic data (EDI) system. All CAD/CAM systems can create, save, store, retrieve, amend and correct designs created on the CAD system used [3].

Computer Aided Design (CAD) is the contraction form and this term means different things to different persons involved in designing, manufacturing, manufacturing and mechanical engineering. CAD has brought a revolution in the textile industry, especially in the apparel sectors. The time consuming and cumbersome process of textile designing has been made easier by CAD> Now thoughtful and innovative designs are available to textile designers and textile manufacturers at the click of a mouse. The working flow chart of CAD section in apparel industry gives a clear picture of how works are done in the apparel industry [4].

Computer-aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation and to create a data base for manufacturing.CAD output is often in the form of electronic file for print machining, or other manufacturing options. Commonly used software for Cad are AUTOCAD, MSVISIO, smart Draw, etc. CAM is the use of computer software to control machine tools and related machinery in the manufacturing of work pieces. CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage [5].

The fashion business is growing rapidly and brings opportunities and challenges to textile and clothing enterprises. Apparel industries follow the trend of the international market and latest technologies for industrial up gradation. Many textiles and fashion designers use CAD systems for creating textile and garment designing. The designer may start by hand-drawing a few rough images. Then the rough images are scanned into a computer and final designing is done using cad. A designer uses CAD to modify design drafts and make changes. Depending on the type of textile designing a designer uses different types of CAD

software. There are systems for designing as well as creating knitted, printed fabrics, illustration and sketch pad applications that allow a person to draw free hand directly on the computer. There are CAD systems that show a designer how a fabric might drape for a particular type of garment. Some CAD programs even design embroidery patterns [6]

There are some key advantages of CAD in the readymade apparel industry which are listed: CAD system reduces the most valuable times compared to the laborious manual work of designing. All the design data can be easily stored, transmitted and transported through the computer files. The design can be done from anywhere and the total process can be easily controlled by the customers. Digital swatches can be preserved on zip disks, floppy disks, hard devices or CD-ROM which saves enough space. Another major benefit of CAD software in the clothing manufacturing industry is the designers do not need to produce different swatches all the time for different colours as they can now use how a particular fabric or apparel looks in different shapes and colours on the computer screen itself [7].

Computer aided drafting and design (CADD) is virtually a “no limit” solution for fashion and designers. Last decade fashion industry witnessed not only a tremendous modernization in technology but also an adoption of information technology and computer science in a massive scale. To unleash the creativity of the fashion and textile designers, computer aided design technology is being used more and more in fashion and textile industry (power loom and hand loom). This not only enhances designing possibility but also increases the productivity by eliminating the manual work and thus time consuming process of designing. In the textile manufacturing field, almost every composite textile mill has adopted CAD/CAM software for the smooth manufacturing process. Thus software’s with their plethora of tool and utilizes unleash the creativity of the designs. The software produces all the required outputs within a few seconds to allow the craftsman to weave exquisite pieces. CAD/CAM helps to create technical drawings easily and accurately and provides clear guidelines for the pattern development [8].

CAD has been a boon for designing and manufacturing industry allowing

efficiency and productivity which a normal paper design can never be compared. The CAD system and its tools have become an essential component of garment manufacturing fast fashion makers. Th3e application of CAD is vastly incorporated in various types of industries ranging from manufacturing, aerospace, etc, to designing of garments, textiles, machines, layouts, architects structures. The application of CAD software is thus based on certain features of it which can be classified as: solid modeling, assembly, drafting, drafting details, and reverse engineering. The benefits of the CAD software are such as increase in the productivity of the designer, improve the quality of the design, creating documentation of the designing, creating the database for manufacturing, simulations, elimination of inventory [9].

The link between computers and fashion designing has developed and evolved over the decades with the changing time, taste and pace of fashion and style. When we talk about application of computers in the fashion industry we cannot imagine the smooth functioning of it without the use of CAD software. Nowadays, we are seeing the link between fashion design and CAD/CAM is growing stronger and deeper. The knowledge of CAD software is essential for an aspiring Fashion Designer entering the Fashion industry and even for an established fashion designer within the Fashion Industry. So, before we jump into understanding how is CAD so important in Fashion Designer as well as fashion design institute. Let us understand what exactly is CAD. CAD is the use of computer technology for the process of design development of design development/collection development. CAD reduces the requirement of manual sketching which is very crucial for fashion sketches, flat drawing, patterning development manual, marker planning and many other fashion designing related aspects [10].

According to Adu-Gyamfi and agyedu (2007) a computer is an electronic device that stores and process data, according to a list of instructions. It allows a user to manipulate data easily. The speed of performance of a computer is incomparable. Fuori and Giola (1994) stated the two areas where personal computers are being used to improve productivity are computer aided design and computer aided manufacturing. According to Burn and Bryant (2007), by 1970 CAD was in use but specifically

developed CAD software for the garment industry hit the fashion scene in early 1980s. They further stressed that since then computer software up gradation have improved against CAD software, it is now useful for sewing, textile design and garment production. Diamond and Diamond (2008) and Beak Ham and Quinn (2008) stated that CAD has revolutionized the garment industry as they are available in a broad range of programs, from simplest to the more sophisticated. Fuori and Giola (1994) further stated that CAD permits architect engineers and designers to prepare complex drawing quickly and easily. Leach (2002) reiterated that CAD is a tool that can be used for design and drafting activity. It is also used to make rough idea drawing although it is suited to create accurate finished drawing [11].

Application of Cad Cam in Garment Industry

Connectivity is the need for companies in design, production, in the design and production chain to communicate goal market. Design creation or ideation is done through image or mood boards, designs, virtual fabrics or clothing. Production data management is the ability to use product data management (PDM) software to control the whole production cycle of a garment. This type of software allows tracking of the work flow and identification of the status of an individual garment at any one time. Pattern design is divided into two areas one being the specification drawings, the second one is at PDS (pattern design system). It is in these systems that the pattern is generated for a garment. Garment sampling at this stage the pattern created in the PDS can be modelled in both physical patterns and 3D virtual systems. In these systems garments can be virtually stitched together, tested for fit in a virtual environment and then even visualized on virtual run ways. It is also at this stage that patterns can be exported to digital textile printing machines and proto type garment is produced. Sizing the process which is advent of body scanners had left to an increase in made-to-measure clothing, leading companies to companies to develop mass customizing as a process for ensuring better customer fit, style and options. Pattern grading systems now mean that the processing of patterns is leading to more streamlined process for pattern making. Pattern grading is done by inputting pattern data, creating the grading criteria, grading the pattern and then sending this data to the production planner.

In production the data created at the pattern grading is converted into a production pattern, known as production lay planning and marker making. Using the software the pattern can be specifically laid to create the best efficiency for cutting out, and lower costs especially related to material waste. Companies who non-utilize CAM system to enable the accurate cutting out of garments and production pieces. These systems enable companies to review waste management in terms of fabrics. Product life cycle management (PLM) software that can be accessed on a global basis is data base software enabling companies to view all aspects of a product from design finished. It is usually integrated with PDM system software. This allows companies to monitor the style to the market, the work flow and the sales from design inspection to completion. Besides, CAD software becomes essential in the field as geometric modeling of yarn necessary [3].

CAM is the use of computer software to control machine tools and related machinery in the manufacturing of work pieces. CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage. The term CAD/CAM implies that an engineer can use the system both for designing a product and for controlling manufacturing processes. CAD is a broad term to represent use of computer in designing CAM in terms that denotes the computerized control of manufacturing processes. All most all industries are using CAD in their designing departments. CAD can help to draw textile design for the textile industry. It should not be confused that CAD is only with drawings. CAD covers many aspects of designing like design calculations, data analysis and simulation [5].

Advantage and Disadvantages of Cad in Apparel Manufacturing

There are some key advantages of CAD in readymade apparel industry which are discussed as: CAD system reduces the most valuable time compared to the laborious manual work of designing, all the design data can be easily stored, transmitted and transported through the computer files, and the design can be done from anywhere and the total process can be easily controlled by the customers. Digital swatches can be preserved on zip desks,, floppy, floppy disks, hard drives or CD-ROM which saves enough space. Another major benefit of CAD in the clothing manufacturing industry is the

designers do not need to produce swatches all the time for different colours as they can show how a particular fabric or apparel look in the different shapes and colours on the computer screen itself.

The total design can be easily personalized and customized within a short period of time without significant delays or cost increase. Though, it is too hard to get a negative update about computer-aided design or CAD application in the apparel industry. But there are some slight disadvantages of CAD application which come from several CAD experts from the industry [7].

Fashion CAD's innovative approach to pattern making ensures that we that we can create patters for our own unique designs that will fit our shape or each of our individual customer's size and shape. CAD;s approach to grading is to "re-think" in computer terms. Patterns are created to exact measurements and adjacent pattern curves can be forced to be the same length ensuring patterns make up with no puckering and designing will end up with a quality professional looking designer garment. Fully featured tools enabling designers to create or modify patterns to their unique requirements. Excellent for all pattern making needs fabrics and patterns like casual, bridal, evening tailored suits, baby clothes, lingerie, swimwear, even home furnishing and accessories. CAD/CAM provides 200 basic pattern blocks of different sizes, which designers can use as starting point to create their own innovations and set up their own design collection [8].

With the use of CAD software designers are able to visualize the final products, constituent parts of it, assembly and also it's synthesizing, analyzing and documentation of the design. Along with the conversion from 2D to 3D , the software also helps in giving animation to product and the designer to know how the design will work and thus allowing to make immediately make any modification according to it. With the CAD software, the designing professionals have better options for various design tools that will help in easing up the process of designing like mirroring, accurate shapes, etc, along with thorough engineering analysis of the proposed design. The tools also help designs to perform inspections on the design for errors. With CAD the accuracy of the design increases drastically reducing errors thus leading better and accurate design. Having proper documentation of the design is a very important part of

designing and this can be done very efficiently on CAD software. The process of documentation of an existing pattern can be done through a digitizer and then stored digitally for later use. 3D designing being the future for CAD has already started influencing the world of fashion. With features like 3D virtual sample making, where in we can altogether by pass the physical process of sample making and dramatically reduce the time and cost associated with products development. With it we can also make a virtual 3D avatar of a human being figure just by scanning through specific hardware. With 3D modelling there is no need for a physical sample to be made. Everything starting from sample making, photo shoot for on line sales, buyer communication can be done through it. This also eliminates the need for having an inventory as every design can be stored on line for future reference [9].

Categories of Cad System

CAD for fabric designs: Fabric design on CAD includes both surface design and structural design. It acts as a simulation for all types of fabric and allows us up to plan a complex weave, colour, colour scheme, etc. With the powerful features, the software is able to create a pattern based on the design and also generate an infinite number of design variations. We can also create any kind of weave patterns starting from plain to dobby and jacquard. Some of the prominent software are Design Dobby, Design Jacquard, from Tex Tronic, Pro Weave from Point Carre, TUKA Studio for TUKATRA, Weave It, Adobe Illustrator, etc.

CAD for apparel design: Foe any garment to be made the process starts with a proper design of the garment which will contain the shape of the garment, any design or embellishment that will go on garment, etc. All this process can now be done entirely on a computer system where we can design garment, check and colour combinations, make changes if needed and along with that documentation. After that, they can be made ready for pattern making. Some of the most useful designs of software are Adobe Photoshop, Adobe Illustrator, Corel Draw, Auto CAD, Smart Designer, Modern High Tech, Telestia Creator, etc.

CAD for pattern making: The use pattern making comes a great deal in garment expert houses, fashion schools, medium or large-size garment businesses, etc, because of its features and convenience With CAD

the clumsy and tough job of pattern making which required skilled technician can be done with ease and accuracy. With this pattern a maker can justify before print out through 2D/3D visual effects. Nowadays, even a garment can be scanned and modified digitally and printed again on the plotter.

With CAD the accuracy end easiness of pattern digitizing, drafting, grading has increased many fields. It also helps in visualizing the measurements of different styles and gain control of internal features as notches, button drill holes. Some of the World's renowned pattern making software along with their website links are such as Lectra, O/DEV by Opti Tex, RUKA CAD by TUKA Tech, Rich Peace, Gemini CAD system, Wild Ginger, etc.

CONCLUSION

The linkages between textile and apparel production and distribution should be emphasized and the facilitation of the linkages is suggested as an important research focus. The CAD has become popular as tools essential for designing and manufacturing with computers. A CAD/CAM system may also link between production stages to orders sale production and scheduling and sales analysis etc via a secured server through an electronic data interchange (EDI) system. Textile designers and manufacturers can use CAD programs to do repetitive or time-consuming processes.

All most all industry sectors are using CAD in their designing departments. CAD can help to draw textile designs for textile industry. CAD finds its practical utilization in textile apparel and fashion right from the design initiation and production stage through lay planning spreading pattern making cutting and finally sewing. CAD brings a revolutionary change in today's read made apparel export business. Fully featured CAD tools enabling designers to create or modify patterns to their unique requirements. Garment makers have been able to reduce production time many folds by using a CAD system. Established Fashion designer and Fashion Industry experts already know the potential of the CAD software and hence they are already leveraging it. To be able compete in the World fashion computer technology is extremely important to garment production firms as well as to the fashion designer.

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