

# Role of Computer and Automation in Design and Manufacturing for Mechanical and Textile Industries: CAD/CAM

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**Abstract**— *Luckily, the times when we needed to explain why we need a COMPUTER & CAD are history. Manufacturing industry witnessed not only a tremendous modernisation in technology but also adoption of information technology & computer science in massive scale. Automobile and fashion designing companies face significant challenges to remain competitive in today's industry, including supplying innovative collections at the right price, controlling margins, designing personalized garments, enhancing brand image, building customer loyalty and expanding business horizons. To unleash the creativity of the component designers, Computer Aided Design Technology and Automation is being used more and more in mechanical / textile industry (both in automatic and manual machines like power loom and handloom). Today, with the introduction of CAD and its many software capabilities, the possibilities are endless. These challenges can be faced by combining solutions such as CAD/CAM and 3D technologies with Internet tools to provide optimal solutions for meeting all requirements, from collection design to visual merchandising through production. Automation (CAD/CAM) involves all the processes of conceptualizing, designing, analysing, prototyping and actual manufacturing with Computer's assistance. As Automation can be said as "A process without direct human activity in the process", so this paper goes through the need & necessity of computer (CAD/CAM) in mechanical and textile industry & as a helping tool in both industries. In this paper, the detail information of CAD/CAM and effect of Automation is being presented. The functions, applications & the points above, parameters, necessary for new century are discussed.*

**Keywords**— CAD, CAM, PRODUCT DESIGN CYCLE, AUTOMATION.

## I. INTRODUCTION

Computers have influenced every sphere of our life in one way or other. Computers are making human life easier and comfortable. Computers are helping to design, analyse and manufacture the product with short span of time in engineering applications.

A computer is a fast and accurate data manipulating system that is designed to automatically accept and store input data. Process them and produce output results under the directions of a stored program.

Computer is a tool to increase productivity in many aspects of our life. Computer is an electronic machine that can perform mathematical and logical calculations and data process functions in accordance with a predetermined program of instructions. The various physical components are as Hardware and Software consist of programs and instructions are used to control the working of a computer. The areas where computer are being utilized currently can be classified into

1. ENGINEERING APPLICATIONS
2. BUSINESS APPLICATIONS
3. SCIENTIFIC APPLICATIONS

### Data and Information

- i. Data is a plural of word **Datum** which means fact.
  - o Data is represented by symbols i.e. 1,4,5,9,0 or A,B,G,T,R or %, ?, \$.
- ii. **Information** -Data is a raw material for information.
  - o Information is knowledge that makes sense and produce meaning full results.

**Computer Program**-a detailed set of instructions to the computer for performing a typical task

Computer based information technology have been extensively used to help both designing and manufacturing industries manage their processes and information system to focus their efforts on increasing the overall efficiency and meet the customer's requirements. The role of computer in manufacturing may be broadly classified into following two groups:

- Computer monitoring and control of the manufacturing process
- Manufacturing support application, which deals essentially with the preparation for actual manufacturing and post manufacturing process.

The Engineering Applications Includes of different important types likes,

- i. **CADD**: - **COMPUTER AIDED DESIGN** and **DRAFTING**
- ii. **CAM**: - **COMPUTER AIDED MANUFACTURING**

**CAD** stands for Computer Aided Design. Most CAD programs now permit creation of three-dimensional models, which may be viewed from any angle. State-of-the-art solid modelling CAD programs are a virtual reality for machine design that helps **architects, engineers, and designers** in design activities. It involves both software and special-purpose hardware.

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CAD is essentially an automated system for the design, drafting, and display of graphically oriented information. Furthermore, CAD is used in the manufacturing process for layouts.

We can broadly categorize the industrial manufacturing activity (for only mechanical industries, i.e. making discrete components) for mass production; batch production etc. the term connected to CAD is CAM (Computer Aided Manufacturing). For product designers, CAD has become more or less indispensable.

## II. AUTOMATION

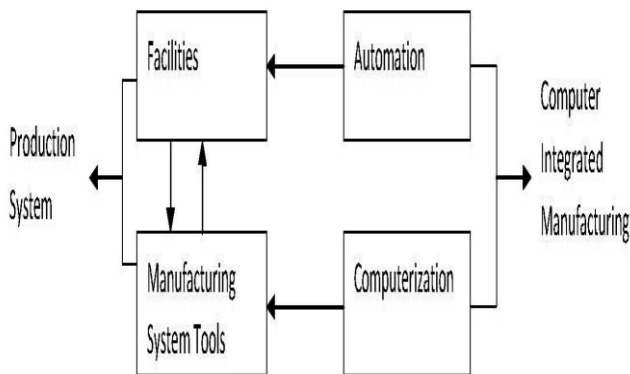
**Automation** is the use of machines, control systems and information technologies to optimize productivity in the production of goods and delivery of services. The word automation was originally coined by an engineering manager of Ford Motor Company in 1946 in order to describe the variety of feed device mechanism and automatic transfer devices.

“Automation is a technique of automatically controlled operation of an apparatus, process or system by mechanical or electronic devices that takes place of human organs of observation, efforts and decision.”

### 1) Automation and Computerization in Production System:

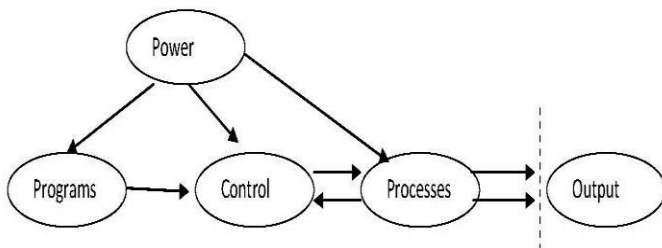
There are basically two categories:

- i. Automated Manufacturing System
- ii. Computerized Manufacturing System



**Fig 1 Automation and Computerization in Production System**

### 2) Elements of an Automated System:



**Fig 2 Elements of and Automated System**

### 3) Automation Tools

Computer-aided technologies (or CAx) now serve the basis for mathematical and organizational tools used to create complex systems. Notable examples of CAx include Computer-aided design (CAD software) and Computer-aided manufacturing (CAM software). The improved design, analysis, and manufacture of products enabled by CAx has been beneficial for industry.

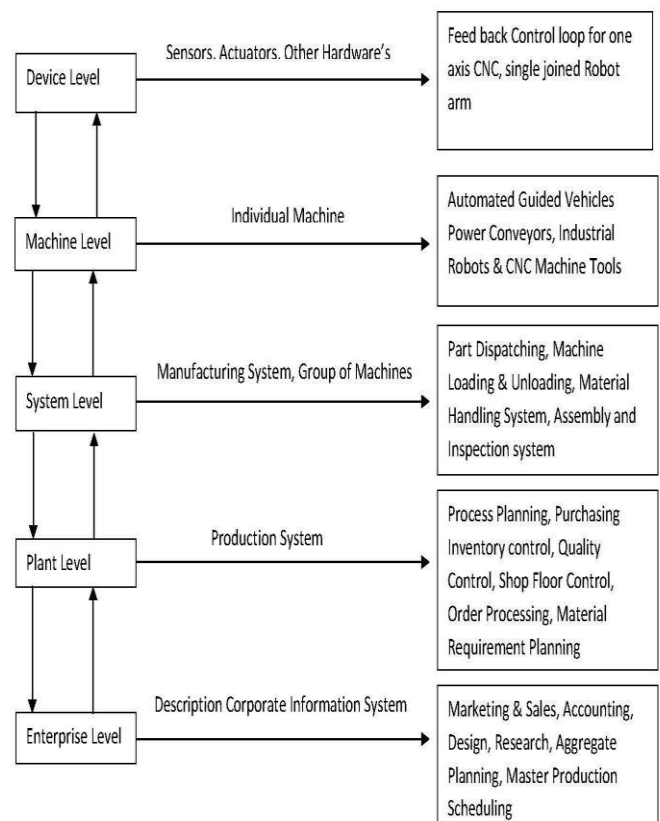
### i. Different types of automation tools exist:

- ANN - Artificial neural network
- BPM - Bonita Open Solution
- DCS - Distributed Control System
- HMI - Human Machine Interface
- SCADA - Supervisory Control and Data Acquisition
- PLC - Programmable Logic Controller
- PAC - Programmable automation controller
- Instrumentation
- Motion control
- Robotics

### 4) The main advantages of automation are:

- Increased throughput or productivity.
- Improved quality or increased predictability of quality.
- Improved robustness (consistency), of processes or product.
- Increased consistency of output.
- Reduced direct human labour costs and expenses.

### 5) Level of Automation



**Fig.3 Five Levels of Automation in Manufacturing**

## III. PRODUCT DESIGN CYCLE AND COMPUTERS

A product designing and development cycle starts with the market needs and ends up at actual product in market and again market demand and expectations starts the cycle again for a new or improved product.

Computer can be coupled with every logical steps of product design and development life cycle. It can help in two different ways as:

- i. Used with relevant software at different stage (design, analysis, process, planning, manufacturing, etc.)
- ii. Can handle and manage the database efficiently.

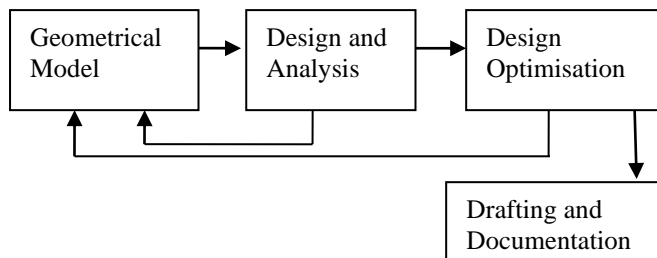
Product life cycle with computers can be divided in following main sections:

- i. Conceptual Design: Used from market needs to final product. Computers can only help as an assistant for handling data or comparing ideas/ concepts.
- ii. CAD: Replaces all kind of prototype and testing with the use of virtual models and simulated analysis.
- iii. CAM: In part programming, machine control, inspection and packing jobs.
- iv. Selling and Follow-up: To generate new challenges and needs for the new product development.

The combination of all CAD, CAM and FMS is called Computer Integrated Manufacturing (CIM).

#### IV. INTRODUCTION OF CAD

**CAD** means **C**omputer **A**ided **D**esign that is a project assisted by a computer. CAD is the use of computer technology to aid in the design of a product A CAD system permits to develop project functions, mainly based on the design of the item which one wants to create by using a series of tools provided by a data processing system to improve the speed and efficiency of the operations which are usually made by hand. CAD actually encompasses all those activities of product design cycle with converts a workable concept into a ready to manufacture product specifications. The various sections are:



**Fig. 4 Phase of CAD process**

CAD is used to design, develop and optimize products, which can be goods used by end consumers or intermediate goods used in other products. CAD offers solutions dedicated to the textile market that not only decrease product time-to-market, but also improve communication efforts between design and production stages. With electronic communication between fabric design software and production tools (weaving and knitting looms, textile printers), textile producers can achieve a more efficient industrial process and seamless communication with end consumer. In textile industry with introduction of new fibers, new machine and new processing with ever increase in demand for new design, the art of textile design and fashion become challenging than ever before. On account of these changing and increase demand there is necessity of. Thus through strong development and regular interaction with its large and prestigious customer base, the products are upgraded to latest trends in textile & fashion technology. It reduces Pressure of manufacturer and satisfying customer desire with improved version of fashion and designing. The textile designer & technocrats were confined to fabric design but they could not correlate the fibrous yarn and fabric

characteristic but incorporate them into the ultimate design department. The entire process of designing a fabric is revolutionized, where previously designers used to labour over graph paper and stencils, now they simply have to play with a mouse or stylus pen to come out with innovative designs. Introduction of Computer Aided Design and Computer Aided Manufacturing Technology through adoption of modern designs and colour combinations is making the automobile tools / textile fabrics more attractive and competitive to meet the rapid changing mood of the consumers for fashionable designs both nationally as also internationally.

The CAD in Mechanical branch leads lots of applications as Surface Generation specially in Automobile sector, and in Textile-CAD is used to design fabrics and fabric variations, and to simulate quickly their final appearance through prints reproducing faithfully their colour and structure; it is used for yarn dyed, printed and Jacquard fabrics.

Hence CAD may be defined as “A process of use of computers in creating, analysing, modifying, optimizing and drafting / documenting a product data so as to achieve its design goal efficiently and effectively”

##### 1) CAD tool Elements:

- i. Geometrical Modelling and Computer Graphics: Helps in generation and visualizing models on which the analysis is done subsequently.
- ii. Analysis and Optimization tool: It predicts the behaviour of the model under the loading conditions when all constraints are simulated using boundary conditions.
- iii. Drafting and Documentation tool

##### 2) CAD Software

CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing.

Originally software for Computer-Aided Design systems was developed with computer languages such as **FORTRAN**, **ALGOL** but with the advancement of object-oriented programming methods this has radically changed.

**Auto CAD:** Explore and visualise 2D/3D concepts with a powerful set of intuitive design tools.

**Real CAD Pro:** It is all purpose 2D/3D CAD software for full 3D modelling, rendering, and 2D drafting in one inexpensive solution.

**Rhino3D:** It is the best tool for opening, editing, fixing and converting 3D files of almost any type, as well as being a brilliant 3D modeller in its own right.

**Iron CAD:** It is the productivity leader when it comes to moving creative ideas into full 3D reality.

**PRISM:** It allows the editing of shades of colours on the printer and makes a calibration according to the original colour & colour on the screen.

**COLOUR TEX:** It creates realistic simulation of fabric created in colour weave. It is possible to create a wide variety of yarns of all material and types.



**MODARIS:** Garment Sector  
**TUKACAD (TUKATECH):** Garment Sector  
**LECTRA:** Used in garment sector mostly for pattern making ,Grading and designing.  
**REACH CAD (REACH TECHNOLOGY INDIA):** Garment Sector  
**OPTITEX PDS (pattern design system) -** Garment Sector  
**AUDACES APPAREL (VELCO GARMENT MACHINERY, S.AMERICA):** Garment Sector  
**GT RESOURCES:** Garment Sector

**V. VARIOUS TYPES OF CAD SYSTEMS**

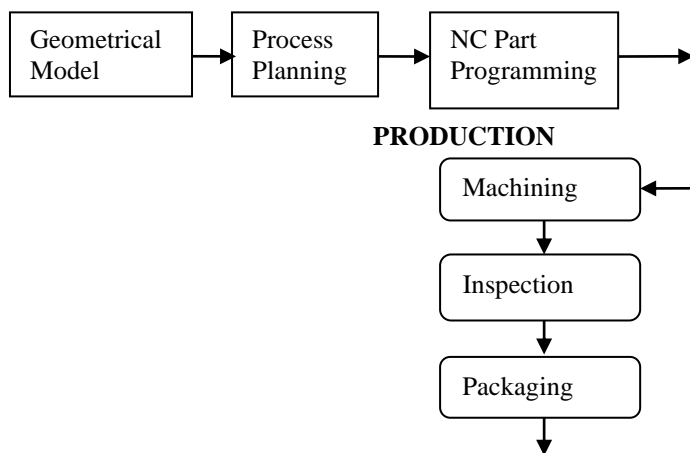
Currently, the following are the different types of CAD systems available in the market for the use of garment industry.

- i. Digitizing systems
- ii. Grading systems
- iii. Marker making systems
- iv. Pattern design software (PDS)
- v. Pattern generation software (PGS)
- vi. Body measurement software
- vii. Texture mapping
- viii. Embroidery systems
- ix. Specification & costing systems

**VI. COMPUTER AIDED MANUFACTURING (CAM)**

**CAM** is the use of computer software to control machine tools and related machinery in the manufacturing of work pieces.

Traditionally, CAM has been considered as a numerical control (NC) programming tool, wherein two-dimensional (2-D) or three-dimensional (3-D) models of components generated in CAD software are used to generate G-code to drive computer numerically controlled (CNC) machine tools.



**Fig. 5 Phase of CAM Process**

- 1) A CAM system employ computer for two basic purposes:
  - i. Computer monitoring and control
  - ii. Manufacturing supporting applications
- 2) Typical areas of concern:
  - i. High Speed Machining, including streamlining of tool paths
  - ii. Multi-function Machining
  - iii. 5 Axis Machining

- iv. Feature recognition and machining
  - v. Automation of Machining processes
  - vi. Ease of Use
- Over time, the historical shortcomings of CAM are being attenuated, both by providers of niche solutions and by providers of high-end solutions. This is occurring primarily in three areas:
- i. Ease of use
  - ii. Manufacturing complexity
  - iii. Integration with PLM and the extended enterprise

3) *CAM Tools:*

- i. CAD Tool: Geometric information of model
- ii. Manufacturing Tool: Fundamental of manufacturing processes
- iii. Networking Tool: Communication between various machines and computers

4) *CAM software by direct revenues is sorted:*

- i. Dassault Systems
- ii. Siemens PLM Software
- iii. Delcam
- iv. Vero Software
- v. PTC
- vi. CNC Software
- vii. SolidCAM
- viii. BobCAD-CAM

**VII. COMPUTERIZED EMBROIDERY MANUFACTURE (CEM)**

Embroidery can be applied directly to piece goods and continuous fabrics. The design philosophy for the embroidery CAD / CAM system was developed on the basis of an engineering CAD/CAM. It is appropriate to call the system as CED/ CEM (Computer Embroidery Design /Computer Embroidery Manufacture). CED is a multi user, multi-taking computer graphics system for the design of embroidery patterns. CEM machine coding and the online electronic control of embroidery machines represent the embroidery pattern. The first part of the CEM is carried out by the software, which converts the design data to machine code in the computer. The more specific part of CEM relates to on line control of machinery.

**VIII.SYSTEM REQUIREMENTS**

Today, CAD systems exist for the entire major platforms (Windows, Linux, UNIX and Mac OS X); some packages even support multiple platforms. The following are the minimum requirements for optimum performance of this type of software:

1) *Hardware*

- i. IBM compatible INTEL Pentium III / 750 MHz or higher
- ii. 256 MB RAM or higher
- iii. 20 GB HDD (SCSI preferable) or higher
- iv. 1.44 MB FDD
- v. CD Drive
- vi. LAN Card
- vii. AGP Card 32 MB (SiS 6326 or equivalent) [24 bit colour support]



- viii. 17" or 21" colour monitor (1240 X 1024 X 24 bit or 32 colour support)
- ix. Keyboard
- x. Mouse

#### 2) Operating system

MS Windows 2000 with Service Pack 2 / XP Professional.

#### 3) Peripherals

- i. Flatbed Scanner
- ii. Cordless Digitiser (preferably 12 in X 12 in)
- iii. Inkjet Colour Printer
- iv. Laser Printer
- v. Plotter (24" / 36" / 42")
- vi. ZIP drive or CD writer (For backup purpose)
- vii. UPS (1 KVA)

The peripherals must be compatible with MS Windows platform. The hardware requirement may vary with the particular brand of package to be installed.

#### 4) User interface of the modules

The unique customization feature facilitates redesigning the Graphic User Interface [GUI] according to our needs:

- i. Keyboard customization
- ii. Toolbar customization
- iii. Desktop customization
- iv. Palette customization
- v. Different views facility
- vi. Design view
- vii. Graph view
- viii. Thumbnail view
- ix. Repeat view
- x. Multiple design view

Most companies abroad have now integrated some of CAD into their design and production process. In fact, according to National Knitwear Association of US, out of 228 Apparel manufacturers:

- 65% use CAD to create color ways
- 60% use CAD to create printed fabric design
- 48% use CAD to create merchandising presentation
- 41% use CAD to create Knitwear designs

Today, the costs associated with CAD implementation are more heavily weighted to the costs of training in the use of these high level tools. The cost of integrating a CAD/CAM using enterprise across multi-CAD and multi-platform environments and the costs of modifying design workflows to exploit the full advantage of CAD tools

### IX. APPLICATION OF COMPUTER & CAD

Computer-aided design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question.

CAD is one part of the whole Digital Product Development (DPD) activity within the Product Lifecycle Management (PLM) processes, and as such is used together with other tools, which are either integrated modules or stand-alone products, such as:

- i. Computer-aided engineering (CAE) and Finite element analysis (FEA)
- ii. Computer-aided manufacturing (CAM) including instructions to Computer Numerical Control (CNC) machines

- iii. Photo realistic rendering
- iv. Document management and revision control using Product Data Management (PDM).

All these CAD/ CAM solutions consist of several Common Modules like:

- i. Edit Module: It is the mother of all modules. Edit is one of the modules, which can cater to the needs of jacquard, furnishing, carpets, durries, plastic mats, sarees, labels, towels, dress materials, knitwear, lace, printing and many more industries. This module combines an excellent collection of painting tools, and powerful retouching capabilities -- all-in-one easy to use Windows application.
  - Knitting module
  - Jacquard module
  - Print module
  - Weave Library
  - Colour Library
  - Yarn Library

- ii. Checks & Stripes module: Extra component to produce virtually unlimited varieties of check & stripe effects in the fabrics.

There are several different types of CAD

- i. 3D wireframe is basically an extension of 2D drafting
- ii. 3D "dumb" solids are created in a way analogous to manipulations of real world objects
- iii. 3D parametric solid modelling requires the operator to use what is referred to as "design intent".

#### 1) Production Control & Analysis in the Weaving Rooms

The systems for production control and analysis permit to reach the following objectives:

- i. Collection of reliable data
  - Automatic and immediate collection (in real time) of the data concerning the running of each weaving machine (stop, weft breakage, warp breakage).
- ii. Improving the production of the weaving departments
- iii. Better use of resources
  - Optimum processing conditions.
  - Reduction in the number of breaks
  - Optimum speed and balanced machine allocations.
- iv. Quick start of production for new articles
  - The immediate indication of the results
  - Permit a quick variation of the working parameters
  - Immediate checks & Comparisons.
- v. Optimization of the setting-up
  - System indicates in advance, on basis of the yield data recorded during the weaving process & permits to plan in the best way.
  - Setting-up stage & minimize the volume of warp storage is predetermined.
- vi. Easing of yield calculation
  - system stores all production data for each article processed on one or more weaving machines and permits therefore to calculate easily the industrial outputs & any comparison among the various types of looms available in the weaving department;

- vii. Integration with a company server
  - Permits the direct transmission of the collected information to the company server.
  - Allows integrating the phase of production data collection and analysis with the subsequent phases of industrial cost accounting without any manual operation of data recording or re-introduction.

viii. Data Detection

Before installing a monitoring system, it is advisable to evaluate some basic aspects to ensure a correct implementation.

- Identify the technological period to which the machines composing the weaving department belong.
- Check if the machines must be equipped with suitable sensors to obtain the warp and weft stops.

ix. Weaving Room PC

This receives the detected production data and represents the final point where the data are Processed, stored and from where all statements expected from the system can be requested.

- Production statement
- Analysis statement of machine allows in learning the causes.
- Statement on weaving machine unloading on basis of the collected production data, can supply the unloading forecast of each loom.
- Multimedia and Internet in the weaving room

x. CD-ROM and INTERNET are now indispensable tools for the diffusion of the information and for order management.

- The spare parts catalogue
  - The training of the weaving personnel:
  - The possibility of ordering spare parts on-line
- The remote diagnosis and assistance service

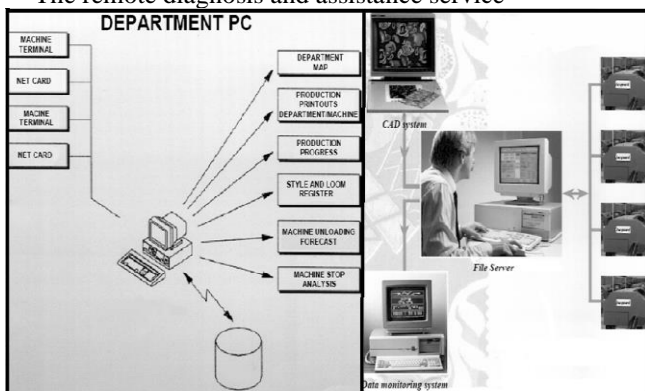


Fig.6 A typical setup of CAD Textile Engineering

Use of dobby or jacquard weaving technology to actually produce the fabric, or to pass the necessary data to a weaving mill. For doing **jacquard**, CAD is a production necessity. There is two main types of jacquard machines: mechanical and electronic. In **dobby** fabric production, weave is much smaller, so in most cases, it is acceptable to punch the dobby cards manually. Now day's electronic dobby machines, warpers and drawing-in machines are available. This will enable to make realistic fabric simulations, based on the technical data entered.

X. CAD / CAM IN INDUSTRY

1) Mechanical Industry

CAD/CAM system have greatly influenced in all kind of industries, but perhaps its effort can be appreciated more by those industries which used to invest a lot in prototype building and testing.

Basic conceptual model which can be used in Mechanical Industry are:

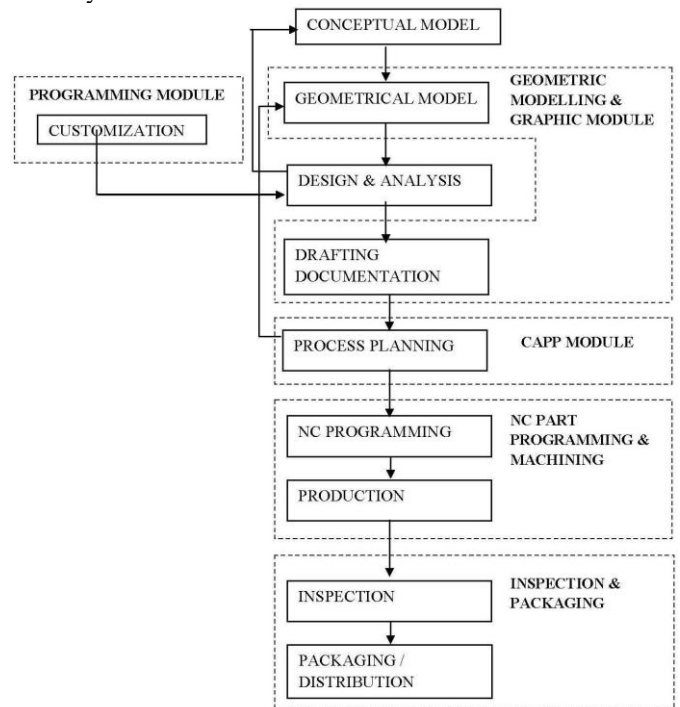


Fig.7 A CAD/CAM Modules in Industry

2) Knitting Industry

Technological, economic and attitudinal factors all act to create a situation where knitwear designers have very little opportunity to use or develop competence with knitting machine CAD systems.

To state the obvious, effective use of new technology involves providing the right technology for the needs of the industry, and the right industry for the technology, so that it is not wasted because of bad organisation or training, or harmful attitudes. The design of knitted garments is an activity shared by knitwear designers and knitting machine technicians. The process involves programming of knitting machines using CAD systems, which are designed and used by the technicians

3) Garment Industry

The apparel industry started using size designation systems to produce and sell ready to wear clothing. Designing of garments that fit customer's requirement needs the information about the individual's size and shape.

Pattern Generation by CAD in Garment Field & other Textile Filed

- i. Pattern Generation
- ii. Sketch Formation
- iii. Specification Sheet
- iv. Reshape Curve
- v. Arm Hole/ Sleeve Cap
- vi. Create Binding
- vii. Reduction & Cleanup Image
- viii. Simulation & Texture
- ix. Design Modification
- x. Colour (16.7 Million Colours,



From 75- 400 Dots Per Inch.)

xi. Catalogues

4) Other Sectors

The production planning, cost and quality control, finance, sales & inventory management are some other areas of application of computers. The computer integrated Management information system (MIS ) is becoming popular day by day.

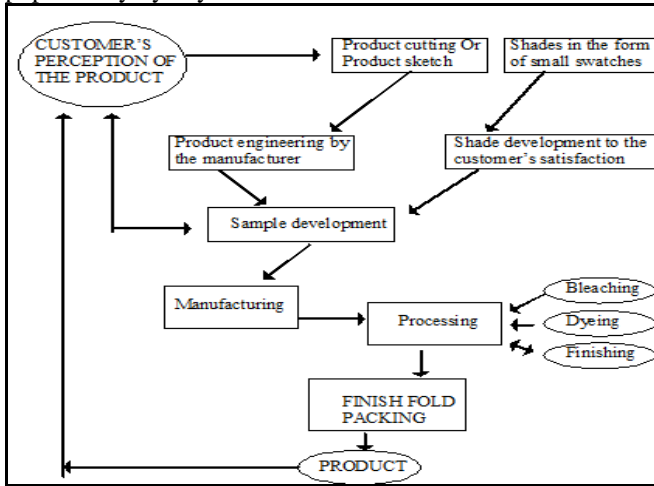


Fig 8 A Business Process Followed in Textiles

The information technology has taken significant position in textile processing in last few years to monitor and control the business. Some of the areas are .

- Product development
- Production & Process controls
- Production planning administration

i. Product Development

Data colour has developed software for the product development process wherein it improves the interaction with the customer much faster and reduces the lead-time drastically. The software called Image match and Image sync. The customer can mail a shade or a design required by the customer electronically through the Image sync. It can also transfer the shade on the same media. The image master than process this shade with the help of colour matching system and auto lab and develop the shade. This reduces the development time to almost a week. The customer has a choice to change the colour combination hence more flexibility.

ii. Production and Process Controls

As the textile business is fashion oriented, the product run is very short and do not repeat frequently. It is very essential to record all the process parameter right from the development stage, as the production order must resemble the approved sample product. Most of the parameters are not possible to control manually. Individual machines can be automated through a machine controller. All process parameter can be predefined on this machine controller.. Each control system has to meet individual customer's need. These software packages contain order administration and process control steps to ensure perfect reproducibility and rapid preparation of dyes and chemicals for the batch.

The possibility of having available a tool which quickly generates on the screen the representations of fabrics with complete and true colour effects permits to the designer to examine a number of variations extremely higher than those which will be woven later on; considering that the cost of printing is rather limited, it will be possible to study a large

number of alternatives and make a choice before taking a decision

iii. Production Planning and administration

A mechanical / textile manufacture needs MIS [Management Information System] like other industries. List of production planning administration system available are as under:

- As-400
- Datatex
- Intex consulting
- SAP
- systextil
- Prodis/X-time and more

Among these Enterprise Resource Planning remains at the core of business. Information Technology has been used in textile processing since a few years; some of the applications would be:

i. To control the process, viz.

- Dyeing process on jet/beams/yarn dyeing machines
- Scouring machines
- Shearing/cropping machines
- Decatising machines
- Superfinish machines

ii. For designs in printing/weaving, CAD/CAM progresses

iii. For checking the colour weighing

iv. For dispensing of colours/chemicals

v. For recording the past data

vi. For material planning

vii. For invoicing in the folding department

viii. For wage calculation etc

4) Mechanical / Textile Marketing

i. **E-Business** is using the Internet in all the business processes from procurement of raw material and manufacturing to getting the product into the hands of the customer. In other words e-Business encompasses use of the Internet for supply chain management, e-commerce, e-marketing and customer relationship management.

ii. **E-Commerce-** Businesses have realized that the potential for them is in using the Internet for B2B applications with their existing customers. This process has eliminated the hitherto manual processes using fax and telephone or sales people taking orders from customers. Online order processes provide for order entry, order management, status checking and businesses are moving towards electronic invoicing and bill payments.

iii. **E Marketing-** Internet has opened up new channels for marketing cost efficiently. E-mail based marketing has proven to be very cost effective and with high response to campaigns. It also helps to track the success rate of marketing campaigns by knowing which email links the customers clicked through. Most commerce sites also provide for contextual marketing of cross-selling/up-selling based on the content that the user is looking at. The goal is to bring incremental revenue and successful apparel retail companies have mastered this art.

## XI. ADVANTAGES OF CAD

- i. Allows to shorten the time elapsing between the development of the new fashion ideas and the collection presentation
- ii. CAD reduce staff requirement in a given work as complex engineering drawing can be easily done by use of CAD
- iii. Quicker preparation of the collections
- iv. The degree of repetitiveness in the design part is more with the help of CAD
- v. The number of prototypes or samples to be physically produced prior to acceptance by the customer is greatly reduced by use of CAD system, thus resulting in cost and timesaving.
- vi. CAD system provides Quick Response (QR) capabilities to an enterprise by compressing the “design - manufacturing - marketing” cycle time.
- vii. Cad system produce more logical pattern & improve concentration of designer to give optimum design
- viii. Lower interference with the production activity.
- ix. CAD system can easily interface with CAM devices
- x. (Computer Aided Manufacturing) for machine control & Fabric production becomes practically automatic.
- xi. It gives fewer design error
- xii. CAD system gives greater accuracy in design calculation
- xiii. The Designs can be stored in libraries, can be recalled, modified, and evaluated quickly
- xiv. The CAD systems can directly download process information (e.g. machine settings, lifting plan) to the shop floor; designs can be quickly brought to production of woven fabric.
- xv. Continuous monitoring & the control on the whole production cycle.
- xvi. Offer a better service to the customer

## XII. CONCLUSION

To survive in the global market we have to keep in pace with the adventures of modern generation which demands for Flexible, Dynamic & Versatile techniques. CAD plays a vital role in textile designing as well as fabric simulation. These possess gives customer satisfaction, on time delivery, variety in design & colour and rapid transmission of design to consumer. It is currently developing a host of new products. To survive in the global market, the textile activities in India should be well planned by using ERP system at the core

We wish to conclude by affirming that these control systems, besides improving the production quality supply all useful indications to establish parameters like: yarn consumption, fabric unloading, optimization of the material flow, the organization of maintenance stops, etc would enable fabric & garment product producers to be dynamically adoptable to the fast and even changing needs of the fashion oriented “GLOBAL MARKET” place, which is steadily getting COMPETITIVE.

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