USE OF CAD IN AUTOMOBILE & TEXTILE INDUSTERIES WITH VARIOUS INNOVATIVE APPLICATIONS

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ABSTRACT:
CAD is industry specific design system using computer as a tool. CAD is used to design anything from an automobile to Textile Industries. Originally CAD was used in designing high precision machinery.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. So We need to have a better understanding of how some of this technology may benefit the textiles industry, how these developing systems can be most successfully implemented, and how we can use these systems to the greatest advantage to serve our customers, today and in the future.

Keywords: *Introduction, Factors affecting CAD system, Advantages of CAD in automobile & in textile , CAD softwares, Latest technologies in Automobiles, Latest technologies in Textile industries*

INTRODUCTION:

Computers are helping to design, analyse and manufacture the product with short span of time in engineering applications and due to this applications Computers are making human life easier and comfortable. 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. 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.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. For product designers, CAD has become more or less indispensable.[1]

Literature Review

CAD means Computer Aided Design 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. 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

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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. [1]

We all know that the appropriate use of Computer-Aided Design (CAD) systems may aid significantly in achieving many goals. Most of the companies have made large expenditures on CAD systems. CAD systems are defined in this paper to be those computer tools that support the design and design engineering processes it may be in automobile or may be in textile. This definition thus includes computer tools normally classified under Computer-Aided Design, Computer-Aided Drafting, and Computer-Aided Engineering (CAE). The greatest use of these tools is in the support of mechanical design and engineering. it is that area of application that will be addressed in this paper . CAD systems can potentially lead to many important benefits for organizations. For example, CAD systems can potentially reduce the length of the product development cycle and improve relationships with both vendors and customers. [2]

Factors Affecting the Use of CAD Systems:

There are many Factors which directly affects organizational policies and actions that affect how CAD systems are used and to which uses the systems can be applied. These policies and actions make possible the use of CAD systems for various activities.

- Area of application
- Type of machinery
- Automation of machine processes
- Ease of use

ADVANTAGES OF 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. Some of its advantages are:

In Automobile:

- CAD reduce staff requirement in a given work as complex engineering drawing can be easily done by use of CAD
- Cad system produce more logical pattern & improve concentration of designer to give optimum design in modelling of vehicles
- Increased throughput or productivity of machines.
- Improved quality or increased predictability of quality.
- Improved robustness (consistency), of processes or product.
- Increased consistency of output
- Reduced direct human labor costs and expenses.
- Also improve communication efforts between design and production stages.
- It gives fewer design error
- Offer a better service to the customer [1]

In Textile:

- Allows to shorten the time elapsing between the development of the new fashion ideas and the collection presentation
- Quicker preparation of the collections
- The degree of repetitiveness in the design part is more with the help of CAD
- 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 time saving.
- CAD system provides Quick Response (QR) capabilities to an enterprise by compressing the “design-manufacturing - marketing" cycle time.
- Cad system produce more logical pattern & improve concentration of designer to give optimum design
- Lower interference with the production activity.

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- CAD system can easily interface with CAM devices
- (Computer Aided Manufacturing) for machine control & Fabric production becomes practically automatic.
- It gives fewer design error
- CAD system gives greater accuracy in design calculation
- The Designs can be stored in libraries, can be recalled, modified, and evaluated quickly
- 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.
- Continuous monitoring & the control on the whole production cycle.
- Offer a better service to the customer. [1]

Role of CAD in Mechanical industry

CAD 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:

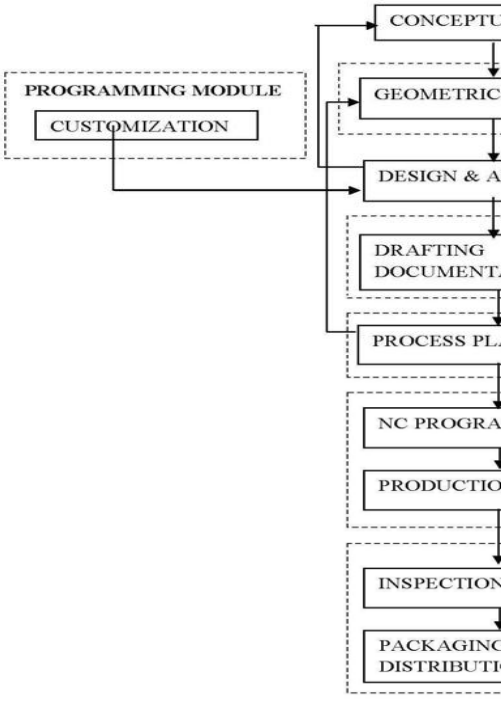

*Fig:*CAD Modules in Industry[6]

Fig representing car modelling with the help of cad

Latest technologies in Automobiles:

Automobile is a broad area in which the parts are connected to each other with the method of jointing. In order to make jointing each part must carry through positioning fixture. Computer Added Design Technology is used to carry out for perfect modelling and optimization of Vehicles. Sophisticated CAD/CAM technologies are there for used to meet advanced product modelling in the sense of designing complete product variants become more and more relevant in future. 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.

So from the point of view of today's scenario it is very necessary to increase the productivity which is only possible with the help of latest technologies of CAD. Which are given Below:

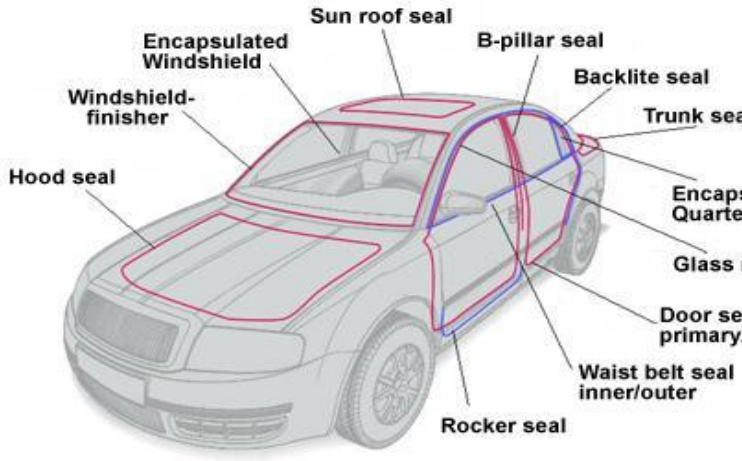

Fig Showing:From materials development to product design through to the implementation of complex sealing systems, SaarGummi produces custom solutions for outstanding vehicle comfort and safety. (Photo: SaarGummi)

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Robotics Technology: Many vast CAD technologies have been adopted by robotic manufacturer companies.

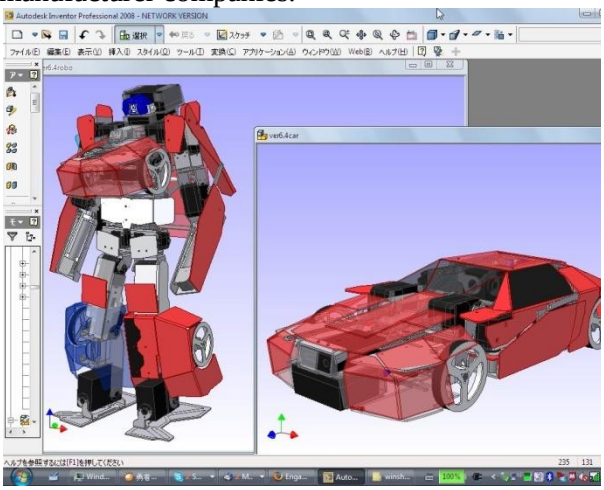

Fig:www.braverobotics.com

Acoustics, Noise control & combustion: In this combustion concerns the physics of fuels spray and droplets and their computational combustion engineering, formation & evaluation of Super Critical sprays.[3]

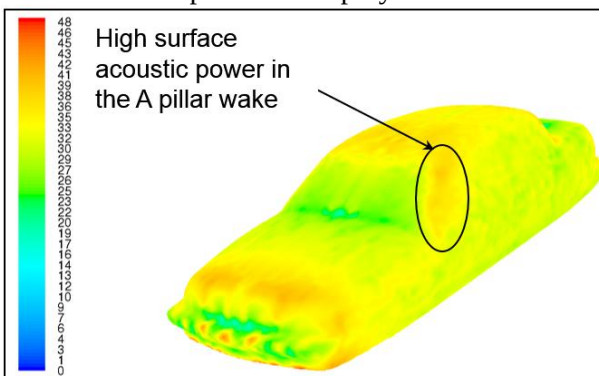

Fig:www.computationalfluiddynamics.com(Noise control)

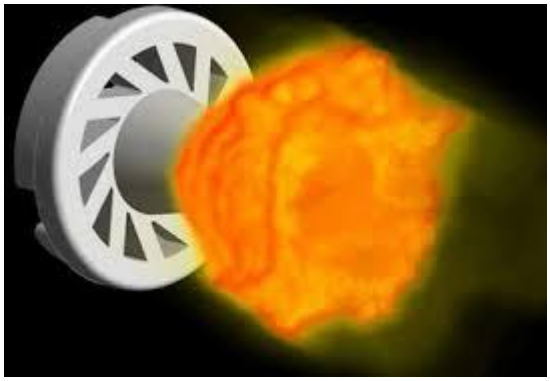

Fig:www.computationalfluiddynamics.com(combustion)

Design, Fluid mechanics and propulsion, Heat-Transfer: Heat transfer research focuses on understanding, measuring and simulating thermal phenomena, exploiting these phenomena to design and manufacture efficient devices and systems and limiting to deleterious effects of high or low temperatures on system performance.[3]

Heating, Ventilation and Air-Conditioning-

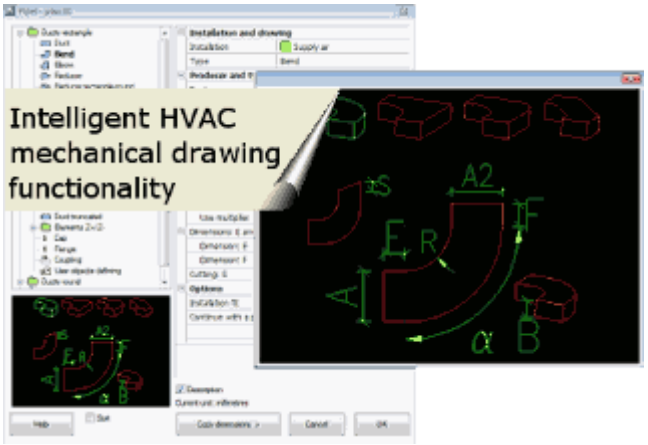

Fig:progePLAN / CADprofi MEP Building(www.caddit.net)

Current Research Involves laser based manufacturing, high speed machining and grinding processes, micro-machines of materials, intelligent manufacturing and thermal management of microelectronic components.[3]

TYPE OF CAD SYSTEMS IN TEXTILES:

a. TEXTILE DESIGN SYSTEM:

Woven textiles are used by designers and merchandisers for fabrics for home furnishing and to men-women-children wear. Most fabrics whether yarn dyes, plain weaves, jacquards or dobbies can be designed and infact are invariably used abroad using a CAD system for textiles. Similarly embroideries are also developed at CAD workstations.[4]

b. KNITTED FABRICS:

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Some systems specialize in knitwear production and final knitted design can be viewed on screen with indication of all stitch formation. For instance a CAD program will produce a pullover graph that will indicate information on amount of yarn needed by color for each piece. Another example of the new technology in the industries using a yarn scanner which is attached to the computer scans a thousand meters of yarn and then simulates a knitted/ woven fabric on-screen. This simulation will show how the fabric will look like if woven from that yarn.[4]

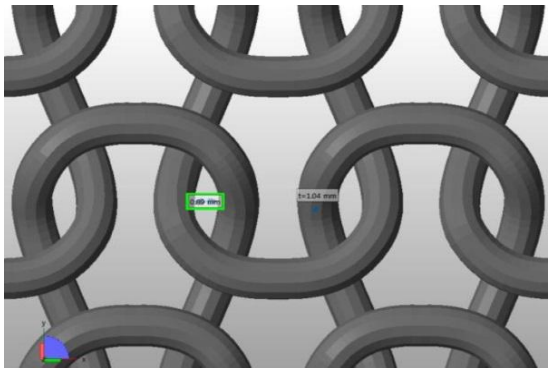

Fig:German Scientists Study Possibility of Textiles Made via 3D Printing

c. PRINTED FABRICS:

The process involves use of computers in design, development and manipulation of motif. The motif can then be resized, recoloured, rotated or multiplied depending on the designer's goal. Textures and weave structures can be indicated so that printout either on paper or actual fabric looks very much the way the final product will look. The textile design system can show color ways in an instant rather than taking hours needed for hand painting. New systems are coming which have built-in software to match swatch color to screen color to printer color automatically i.e. what you see is what you get.

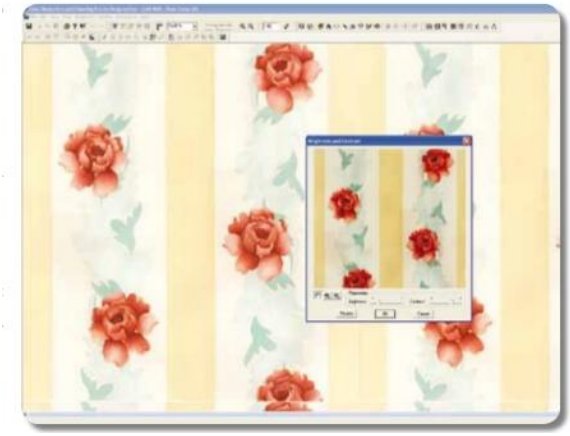

Fig:NedGraphics Home Design

d. TEXTURE MAPPING: 3D DRAPING SOFTWARE

This technology allows visualization of fabric on the body. Texture mapping is a process by which fabric can be draped over a form in a realistic way. The pattern of the cloth is contoured to match the form underneath it. The designer starts with an image of a model wearing a garment. Each section of the garment is outlined from seamline to seamline. Then a swatch of new fabric created in textile design system is laid over the area and the computer automatically fills in the area with new color or pattern. The result is the original silhouette worn by original model in a new fabric.[4]

Fig::http://www.textileschool.com/articles/74/pattern-making

LATEST TECHNOLOGIES IN THE FIELD OF TEXTILE:

a) COMPUTERIZED EMBROIDERY MANUFACTURE

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(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.[1]

b) PAD SYSTEM TECHNOLOGIES*:* PAD SYSTEM TECHNOLOGIES introduced their PAD System 4.0 software that should be available in the fall. Users will see a new "cloning" tool that allows any changes made to a master piece to also occur in the pieces cloned from that master. For example, any blouse, dress, or jacket that was cloned from one master block will automatically receive the changes made to the master block. Within the pattern design system, each piece can be coloured according to its use, as determined by the user. All pieces to be made from the fashion fabric could be blue, from the lining might be yellow, and from interlining might be gray. And since each of these might be cloned from the original, any changes to the neckline edge of the main "blue" piece, will also occur at the corresponding point on the "yellow" lining piece and the "gray" interlining piece. Frames have been updated to also affect changes on cloned pieces. Another new functionality includes the ability to work on pieces, while they are in grade view. The user can now see the effects of any changes in all sizes, at the same time. Technical drawings are viewable at every stage of pattern development and grading, as well[5]

c) *DIGITAL PRINTING*: Initial developments in ink-jet technology were directed at improving the decision-making process and the cost of sampling involved in the textile mass production operation [2]. Since that time, key players in the textile and apparel industry have begun to think outside the box and imagine ways in which this technology might be used to meet consumer needs, not just manufacturing needs. Continued improvements in the areas of ink-drop formation, pigmented or dye-based ink formulations, color control, pre- and post-treatment methods. [5]

d) GRADING: As mentioned previously, most of the apparel CAD programs enable previously created garments to be altered, based on the sizing grades that have been applied to the garments. Grade rule tables were created in Gerber's Accumark system. Based on our expected target customers, we chose to grade Garments A-C in Missy sizes 2-14. Garments E & F were graded in Men's sizes 28 through 42 and Garment D was graded as Men's S, M, L, XL.[5]

e) TEXTILE DESIGN LAYOUT: The designer also created a number of design layouts using the motifs and color-ways previously created. Examples of border prints, overall prints, and complementary prints were created so that the subject "consumers" could be led or "helped" when making their textile design decisions for their own garments.[5]

CAD SOFTWARES WHICH MERELY USED IN AUTOMOBILE AND TEXTILE INDUSTRIES:

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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

CONCLUSION:

For Automobile:

CAD systems may be directly responsible for some changes in the way engineering work is done, many changes are only enabled by CAD systems. CAD systems can lead to large improvements in productivity, but only if the work is reorganized to take advantage of the features of the systems. CAD systems' effectiveness as a communication medium allows them to be used as a gateway innovation- an innovation that is important for the other innovations it allows. CAD systems should be evaluated for their ability' to enable productive design changes, and not expected to automatically cause changes.

For Textile:

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.

Each of these technologies, alone, is amazing and powerful and provides benefits to the industry, in some way. For mass customization strategies to be profitable and successful, however, these technologies must all work together

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