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A Recent Role of CAD/CAM in Designing, Developing and Manufacturing in Modern Manufacturing Technologies

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Abstract:-*CAD/CAM technologies for superior product modelling in the intelligence of designing complete product variants become more and more pertinent in future. Many design techniques to help interdisciplinary design actions in different engineering domains in addition to consequent processes have to be developed. A necessary job to achieve this aim is to permanently investigate the present state of the art, emerging trends, new approaches, in addition to industrial problems and requirements about the entire CAD/CAM area. With the aim of direct future research and development activities as close as possible to the continuously rising requirements of a worldwide market we carried out a wide-ranging national study in cooperation with one of the Germans leading CAD/CAM magazines. In this way, it became possible to reach a representative amount of users, to obtain their experience based assessments on today's most important aspects of CAD/CAM technology. The results of this examination are summarized in this paper to give system developers, engineers, and researchers and overview of the present condition as well as to serve as a direction for decision makers in the Design and Development areas in the modern manufacturing technologies.*

Keywords: - CAD/CAM, CIM, Product development, Design and Manufacture.

I. Introduction

CAD/CAM (computer-aided design and computer-aided manufacturing) refers to computer software that is used to both design and manufacture products. CAD is the use of computer technology for design and design documentation. CAD/CAM applications are used to both design a product and program manufacturing processes, specifically, CNC machining. CAM software uses the models and assemblies created in CAD software to generate tool paths that drive the machines that turn the designs into physical parts. CAD/CAM software is most often used for machining of prototypes and finished parts. In a globally competitive environment, time compression strategies in product development are of critically importance. Certain products have long development cycle times. Examples are aircraft and automobiles. In some of the products like computers, technological obsolescence puts a constraint on the product development time. The drawing and design software represents the most prominent concerns of developers of computer systems, and was the development of several software that fall within the design concept computer (Computer Aided Design), which is referred to as short term CAD. It was this software with two, including directions what general, including what is a specialist in one of the engineering fields such as mechanical or electrical or electronic, construction and architecture, some of which is advanced in the adoption of the principle of geometric modelling. The concept of manufacturing computer includes all the activities involved in the planning and control of production in different factories, such as digital control computer (Computer Numerical Control: CNC) and the leadership of human industrial automation (Industrial Robotics) and planning of production processes (Process Planning) and the overall layout of the plant, including so planning tables productivity and material requirements planning, and production capacity in modern manufacturing technology.

II. Steps In Product Design, Development And Manufacturing

Product design is of critical importance to the production system. It contributes more than any other attribute to the overall design and operation of the production system, and its success determines whether the production system will be fit for use in making products over the long term. **[1]** The general process of design may be seen as an iterative process with six key phases NUMLIST Recognition of need—this involves the realisation that a problem or need exists that may be solved by

design. This may mean identifying some deficiency in a current machine design by an engineer, or perceiving some new product opportunity by a salesperson. Problem definition—this involves a thorough specification of the item to be designed. **[4]** Specifications include physical characteristics, function, cost, quality, and operating performance. Synthesis—closely related with the following step, analysis, synthesis refers to the bundling of information that occurs after problem definition, and concurrently during analysis, and after re-analysis. Analysis and optimization—closely related to the previous step, analysis is concerned with the investigation of design specification information, and the optimization of this information, as well as a synthesis of new information, as required**. [6]** Evaluation—involves measuring the design against the specifications established in the problem definition phase. This evaluation may require the building and testing of prototype models to assess operative performance metrics for the proposed design. This may lead to the re-design of certain or all elements. Presentation—this is the final phase, where the design is documented by means of drawings, material specifications, assembly lists, and so on. Documentation means that the design database is created.

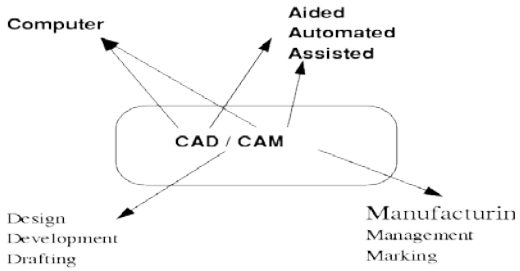

Figure1. Connection in CAD/CAM and CIM

computer is playing a major role in increasing productivity in the manufacturing section and the main reasons for the use of the system design computer because it allows a great opportunity to create a database is very necessary to manufacture the product in the Department of Manufacturing and used for many years in the industry and are prepared engineering drawings by designer is then used by manufacturing engineers to develop a plan to operate**.[8]** The events that fall under the framework of the product design process separate from those that fall under the planning process, and in general is essential to use a two-step course, this leads to the consumption of time and repeated efforts by the designer and manufacturer.**[10]** While in the system CAM / CAD Integrated there direct link to be established between the design and manufacturing does not stop the goal to automate certain stages of the design and manufacturing but also to automate the transmission of data, these systems have been developed on the basis that they are creating all the necessary data for the planning and management of the product and include (Data engineering - parts lists - material properties).

III. Product Development And Manufacture Cad/Cam

CAD/CAM as an enabling technology for product development and manufacture Developments in computers and software relating to CAD/CAM has made CAD/CAM an indispensable enabling technology for time compression in product development. This is made possible by an integrated approach to carry out different activities in product development through seamless data transfer. (Fig. 3) CAD/CAM technologies help to simulate and the manufacturing methodologies in the following ways:

A. RAPID PROTOTYPING

Rapid Prototyping technology is being more widely employed to verify and improve designs, rapid tooling as well as initial prototypes.

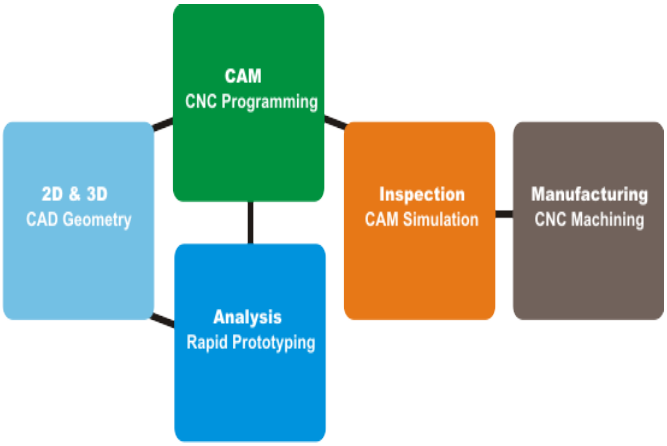

Figure 2. Rapid Prototyping

B. ASSEMBLE ANALYSIS

With the help of today's CAD/CAM technology, design team can work in a top down and bottom up manner to create a complete electronic product mock up. Once an assembly is completed, solids based kinematic analysis can be used to simulate complex motions of mechanisms as well to carry out tolerance analysis.

C. AGILE MANUFACTURING CONCEPTION AND ENABLING TECHNOLOGIES

Agile manufacturing is a term applied to an organization that has created the processes, tools, and training to enable it to respond quickly to customer needs and market changes while still controlling costs and quality. The agile manufacturing enterprise can be defined along four dimensions: (i) value-based pricing strategies that enrich customers; (ii) co-operation that enhances competitiveness; (iii) organizational mastery of change and uncertainty; and (iv) investments that leverage the impact of people and information.

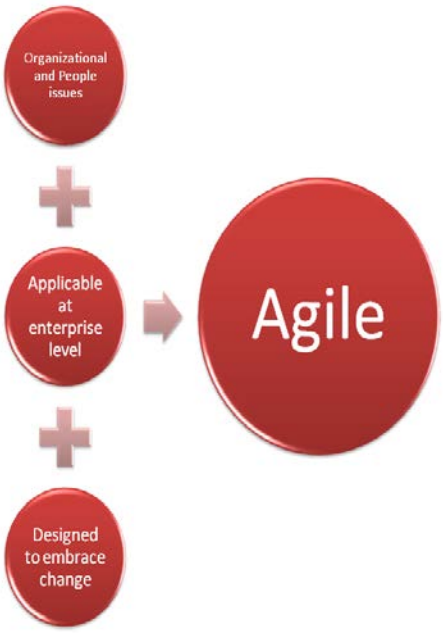

Figure 3. Agile Manufacturing

That is, agility has four underlying principles: delivering value to the customers; being ready for change; valuing human knowledge and skills; and forming virtual partnerships.

D. INTEGRATION OF CAD/CAPP/CAM/CNC TO MODERN MANUFACTURING

Computer Integrated Manufacturing [CIM] is the modern manufacturing approach with the help of computers to control the entire manufacturing process from design to end user. **[5]** The enlargement of total integration amid Computer Integrated Manufacturing Technology [CIMT] has appreciably amplifies efficiency in each individual sub system. **[9]** The independent expansion, between one sub systems to consecutive subsystems in a row wholly restrains the improvement of overall efficiency of a product in each and every state of manufacturing scheme. Therefore, it has been observed that the optimum integration between the subsystems is inevitable in Advanced Manufacturing Industries [AMI] in order to manufacture a product at nominal cost and precise quality. **[8]** The sub-systems of CIM includes Computer-aided design [CAD], Computer aided process planning [CAPP], Computer Aided Manufacturing [CAM], Computer Numerical control [CNC], and the other CIM subsystems like Computer aided quality assurance [CAQA], computer aided robot control [CARC], Computer aided inspection and planning [CAIP], computer Aided transport and stores [CATS], Computer Aided Assembly [CAA], and computer aided maintenance [CAM]. Today, to integrate one subsystem with other, so many commercialized software solutions and industrial systems are available.

IV. Conclusion

This paper concluded the results of a study the role of advanced CAD/CAM technologies in modern manufacturing industries. This paper presented the present methodologies are being used and the future oriented methodologies will be preferred. CAD/CAM and CIM users as well as designers have been asked to rate several smart CAD/CAM technologies in respect to designing, developing and manufacturing. Furthermore, problems in reverence to the consciousness of product variant design have been discussed. The recent development of technology of designing and manufacturing for product design and manufacturing increasingly inflict impacts upon smart CAD/CAM technologies, proposing greater requirements for the research on and growth of CAD/CAM and CIM Technology in modern manufacturing industries. The construction of a CAD / CAM integrated provides a direct connection between the design and manufacturing processes; the goal of the system CAD / CAM not only automate certain phases of design and manufacturing, but also automate the transition from design to manufacturing.

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