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Review Paper

Latest trends and improvements in CAD/CAM: a review paper

Navjot Singh Matharu* and Devesh Shrivastava
BIT Durg, Chattishgarh, India
navjotmath7@gmail.com

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Abstract

Computer-aided design and computer-aided manufacturing are industrial computer applications that have greatly influenced the chain of processes between the initial design and the final realization of a product. The systems work best in the integrated form and they are not only confined to the engineering world but every corner of the process background. Designing has been well advanced in previous years and meets the requirements of the task, these systems are sophisticated for both big, as well as small industries. These systems meet the requirement of every managerial as well as engineering and processing industries whether it is the process or operation handling or the manpower and resource handling or meeting the deadlines of the deliveries. Ongoing refinements saves manufacturers tens of millions of dollars in time and resources. Machine learning can help us to develop designs that would have minimum errors and after the rescans and checks the AI part of the software will eliminate the error. Prototyping, Reverse Engineering, Additive Manufacturing, Intelligent Management are the features of this system. As a consequence, these technologies are responsible for massive gains in both productivity and quality, particularly since the 1980s. Overall in this paper refinements in CAD/CAM systems are described which will make designing and manufacturing more sophisticated.

Keywords: S CAD/CAM, program language, artificial intelligence, machine learning.

Introduction

Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM), CAM is an acronym of Computer-Aided Manufacturing which means manufacturing using the computer. Manufacturing may be a very tough job where we've to trace the inventories, need to keep records of orders, got to make generalized lists for the manufacturing processes which are often done just by one click on a computer having CAM software[1].

CAD is an acronym of Computer-Aided Design, within the previous times even today at some places we see those designs of parts of engines, bridges, buildings, spare-parts, aircraft, etc. are made both fail-proof and fail-safe which suggests they're safe for the amount of their commission whether it's flight hours or years of representing airplanes and buildings respectively, all this is often possible only by this application which emits human errors and provides the suitable suggestions based upon the info feed.

With the latest trends and improvements via machine learning in the engineering field, this software is being made far more advanced with user-friendly features which enables us to form designs more sophisticatedly. The introduction of AI (Artificial Intelligence) has revolutionized this field software like SOLIDWORKS, AUTOCAD. They can now catch the mistakes initially, hand, and suggest the simplest ways to the designer and manufacturer. AI uses computer memory and stores the foremost corrected things to suggest to the user and provides the suggestions[1].

In the sector of AI, machine learning techniques are developed to fight complex relationships based upon the mechanism that generates a group of outputs from a group of empirical inputs which are considered as input data for the complex algorithms. Once we talk about the numerical simulations, we take into consideration the different idealization processes which are totally based upon the CAD models for preparing simulation model which may be seen as a good completion of complex nature which involves high-level expertise and operations for addressing such problems, machine learning techniques show good means to drive the CAD model preparation. They are often helpful within the knowledge embedded during a set of adaption scenario.

CAD/CAM for micro laser machining

Laser machining is popular cause it can device effectively on any matter or substance with delicacy. This gives it major advantage, the quality material fabrication it gives without any damage to work piece is also one of its ability. The CAD/CAM, powerful software packages with easy-to-use tools such as machining parts, quality check of materials makes the laser machining error less. This software's has changed the way a company works by making designing easy and accurate.

The figure here shows a ray machining system attached to a computer, including a femto second laser, an ocular structure, control laser power density, peripheral apparatus, and command structure. The ocular structure concentrates the ray set up by the fem to second laser into the piece for matter and substance eradication. Neutral thickness filters are passed down to tune the product ray power to a felicitous amount. A computer-administered shade is used to carefully put on/alienate the ray. The sample piece is coupled on a computer-managed 3-axis platform, while the program is employed to create the path for inspection of the ray head and control ray screen. The sample piece platform including, three stands which are directed by straight motors. The particularities of fabrication can be supervised by a CCD camera fixed upon a dichroic reflector[2].

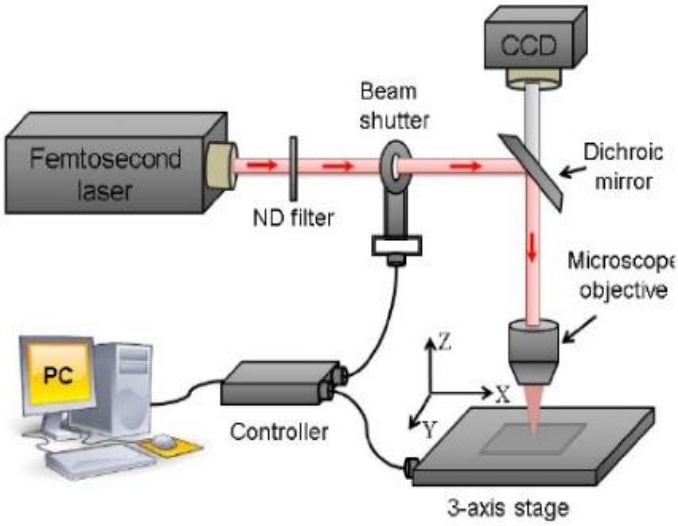

Figure-1: Computer-controlled laser machining system[3].

Developing managerial integration for CAD/CAM

These past 10 years have seen creative adoption of Advanced Manufacturing Technologies (AMTs) by Western European enterprises, in an attempt to support the increasing demands for, inter alia, shorter product development lead times, shorter delivery times, and improved quality of the product. Over this period, the character of these technologies has changed, where once the implications of new technology were largely limited to the function carrying out the execution, a new generation of integrating technologies (such as CAD/CAM) has emerged which has implications throughout large areas of the organization.

The rapid expansion, and early costs, of these technologies, has been such that adopting organizations have had limited experience on which to base their implementation planning, and tight deadlines to establish returns on investments. As a result, attention has been focused on the technical installation of equipment; where this has been successful, there remains a failure to realize the business benefits originally required. In the case of CAD/CAM, it is the integrating nature of these technologies that enables many profits (such as reduced product development lead times, better design, and design for manufacture) to accrue.

This technology is managerial and an engineering integration combining both sectors which are dependent on each other. CAD/CAM has played the role of the time saving and money storing concept and elimination of the errors that cause failure and waste of time. The idea is to make an integration between Engineering and Manufacturing.

Rapid and efficient product development has become the key and major strategic importance to many companies, the cross-functionality and co-operation have been well defined and establishment of linkages between all functions. Some of the key points made are; integration through minimization, differentiation by integrating functions; by coupling men and machines; by making the user familiar with the user interface of the machine. These systems have been a keen and interesting subject; it has not only made the user interface and machine management easier but has also made the supervision so easy for operation[3].

Artificial intelligence in CAD/CAM and integration

The highly dedicated tools package and multi stage manufacturing of various products we see in our day-to-day life from our smart phones to plane requires only one software that is CAD. We can literally design a whole car, assemble it and test for its quality and features. From the various suitable layouts, design tools and functions the designers can easily do their work without moving from one software to other for each detail and part.

Introduction of AI in CAD/CAM has made them irreplaceable as it can automatically now calculate the materials mass, durability, elasticity and suggest changes so that product is manufactured error less. This also makes system automated as it can imitate the engineer's pattern and develop a design within minutes, plus it records every data so one might know if something gets wrong where is the fault.

The figure here shows the process of CAD/CAM integration. At first engineers used to make 2D drawings using this system, and also some diagrams but all of this was a very time taking process and causes a lot of human mistakes. So to eliminate humane mistakes and to perfect the work, integrated CAD/CAM was developed.

Nowadays companies are providing such products which are able to perform complex designing, make 3D models and add graphics which makes product look original even on a screen. Companies like Parametric Technologies with Pro/E and Pro/

Manufacturing, Unigraphics, Dassault's Catia, SDRC's IDEAS, Computer vision's CADDS 5, Solid works by Dassault, all provide high sophistication, high power, and high-cost solutions. These products typically provide data interface, application integration and works smoothly and efficiently without any human errors, giving 100% results.

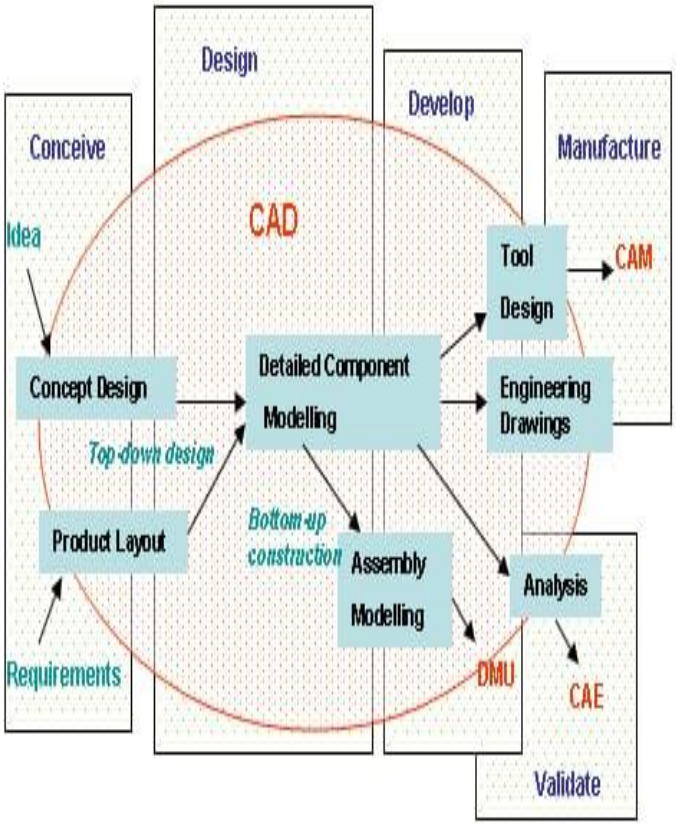

Figure-2: Process of CAD/CAM/CAE integration[5].

Conclusion

In modern times race towards the development and advancement has complexed the situations and we need an errorless system that would help organizations to emerge from the distress. The computers have been a friend of humans, right from the time they were invented. We are surrounded by computers from the manufacturing units to the aerospace industries to the medical field, we need an integration which would sync the data and help us to get improved results[1]. CAD/CAM applications have provided a tremendous productivity to the industries. CAD is used to build the designs using modern-day computing and then bought into the particular field for development. CAD applications can be connected with Artificial Intelligence where the computer provides proposals about the designs and there optimization, machine learning has added to the CAD systems which make them much more advanced. CAM (Computer-Aided Manufacturing) is an application type which manages all the manufacturing tasks, we need to synchronize the system with the available resources, materials, and available manpower with other industrial requirements. It provides us with the ideal solution. Adding AI (Artificial Intelligence) to the CAM systems we can better their performance. Machine learning can tweak the performance of the system and it doesn't have to repeat the loop tasks.

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