"CAD CAM"

Unit - 1

1. DEFINE CAD AND CAM. WHAT ARE THE BENEFITS OF CAD CAM?

Computer-aided design/computer-aided manufacturing (CAD/CAM) is a combination of two terms CAD and CAM to describe the software that is used to design and manufacture prototypes, finished products, and product runs.

CAD

CAD is a software tool used by engineers, architects, designers, and drafters to create digital 2D and 3D drawings to design a variety of items and spaces. Computer models are created and defined by geometrical patterns. CAD allows designers to test the objects by simulating real-world conditions. It can design anything from a simple shampoo bottle to a complex jet plane.

CAM

CAM uses geometrical design data to control automated machinery. These systems are associated with CNC or direct numerical control (DNC) systems, in which both can mechanically encode geometric data. The main purpose of CAM is to create a faster production process and allow components and tools to have precise dimensions and material consistency.

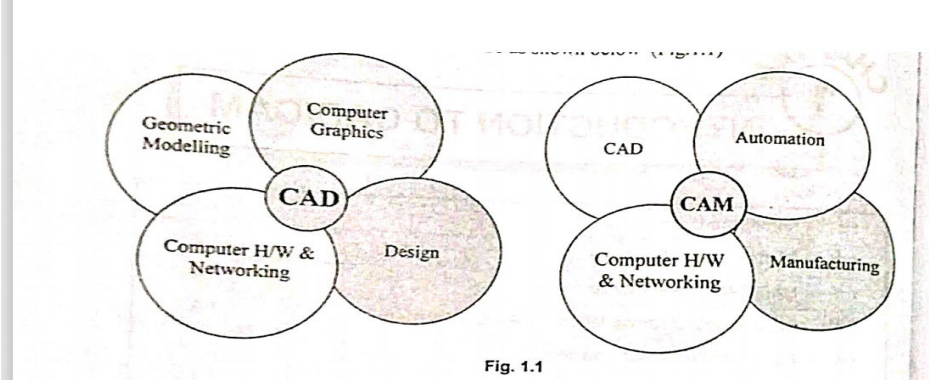

Fig. 1.1

Benefits of CAD-CAM

Today, every manufacturing plant uses at least a type of CAD-CAM system to control their operations. Here are the various advantages they can avail by using these software applications.

- ***Improves Machining Capabilities:***

  By using a CAD-CAM system, manufacturers can improve their machining capabilities. For example, when a manufacturer takes up a complex 3-axis machining task, they rely on the combination software to create a tool path for machining projects such as molding. The CAM system automates the process, and makes it easier for manufacturers to complete the project in time.

- ***Improves Client Accessibility:***
  The CAD-CAM software allows manufacturers to receive CAD files from their customers. After receiving these files, they can set up the machining tool path, and perform simulations, which helps them calculate the machining cycle times. The software allows manufacturers to minimize errors, execute projects easily, and deliver products to the market within a shorter turnaround time.

- ***Helps Improve Productivity of CNC Machines:***
  Most CAM-CAD systems provide high–speed machine tool paths, which help manufacturers minimize their cycle times, reduce tool and machine wear. High-speed tool paths enable manufacturers to improve their cutting quality and accuracy. This type of high- speed machining helps improve the productivity of the CNC machine by more than 50%.

- ***Helps Reduce Material Wastage:***
  As CAM–CAD software feature simulation features, it helps a manufacturer to visually inspect the process of machining. This allows him to capture tool gouges, and collisions at an early phase. This feature contributes to the overall productivity of a manufacturing set up. This also helps them eliminate mistakes, as well as reduce material wastage.

2. EXPLAIN ABOUT PRODUCT CYCLE?

Product cycle

- The product begins with a need which is identified based on customers and market demands.
- In order to establish the scope and definition of CAD/CAM in an engineering environment and identify existing and future related tools, a study of a typical product cycle is necessary.
- The product goes through two main processes from idea of conceptualization to finished product: the design process and manufacturing process.
- Design process starts with design need, ends with design documentation and communication.
- Synthesis is crucial to design.
- The end goal of the synthesis sub-process is a conceptual design of the prospective product.
- Manufacturing process begins with the process planning and ends with the actual product.
- CAD is a subset of the design process.
- CAM is a subset of the manufacturing process.

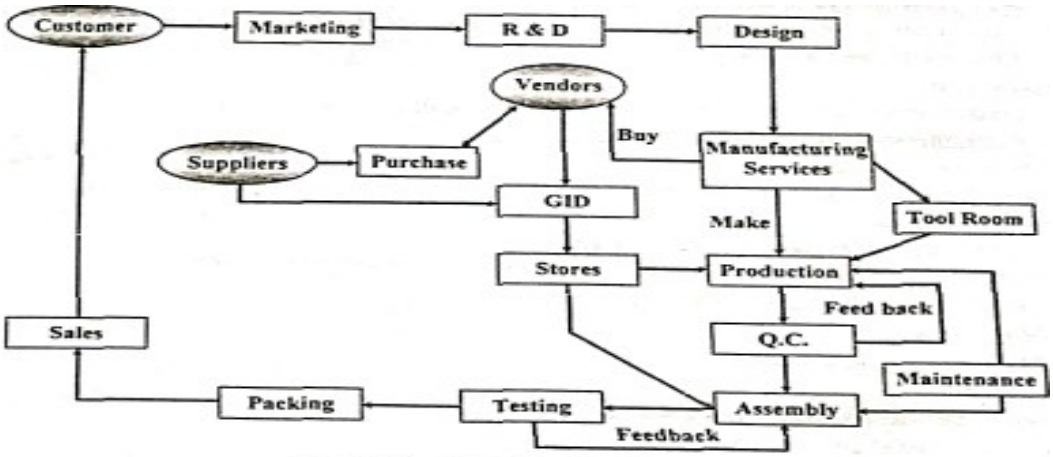

Fig. 1.2 Traditional Product Cycle

The various functions of each department are summarised below-

Marketing Department-

- ✓ Market survey
- ✓ Recognize customer needs
- ✓ Forecasting- Period wise-weekly , monthly, quarterly , product wise, region wise etc.
- ✓ Competitors Survey
- ✓ Customer order information

R & D

- ✓ Product concept
- ✓ Reverse engineering.
- ✓ Prototyping
- ✓ Competitors product comparison
- ✓ Previous product comparison

Design

- ✓ Design, release process- Modelling, assembly, drafting, analysis
- ✓ Optimisation, sensitive analysis
- ✓ New Product development
- ✓ Product specification and manual preparation
- ✓ BOM generation

Manufacturing services (production planning and control)

- ✓ Processes Design
- ✓ Design tools, Jigs , fixtures
- ✓ Capacity planning
- ✓ Make or Buy decision

1.4 ✓ CAD / CAM / CAE

- ✓ New resources procurement-man, Machines
- ✓ Coordination between- Production, QC, Maintenance, Tool room, assembly,
- ✓ Time study, method study

Production

- ✓ Prepare production plan day wise, weekly or monthly
- ✓ Assignment- Man, Machine-shift wise
- ✓ Inprocess inspection
- ✓ Involve in new design process-DFM

Quality Control

- ✓ Calibration of gauges, measuring tools
- ✓ Metallurgical testing
- ✓ Goods Inward Department (GID)
- ✓ SQC tools
- ✓ Machine Alignment tests

Tool Room

- ✓ Jig,fixture design and manufacturing.
- ✓ Gauge maintenance

Purchase

- ✓ Procurement , Vendor rating etc.

Sales

- ✓ After sales services
- ✓ Sales analysis- productwise, period, region, customer type.
- ✓ Sales comparison with competitors