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Global Engineering Solutions presents,

CAD/CAM/CAE SCENARIO


ExtruDesign.com
CAD
CAE
CAM

What is CAD? What is CAE? What is CAM?

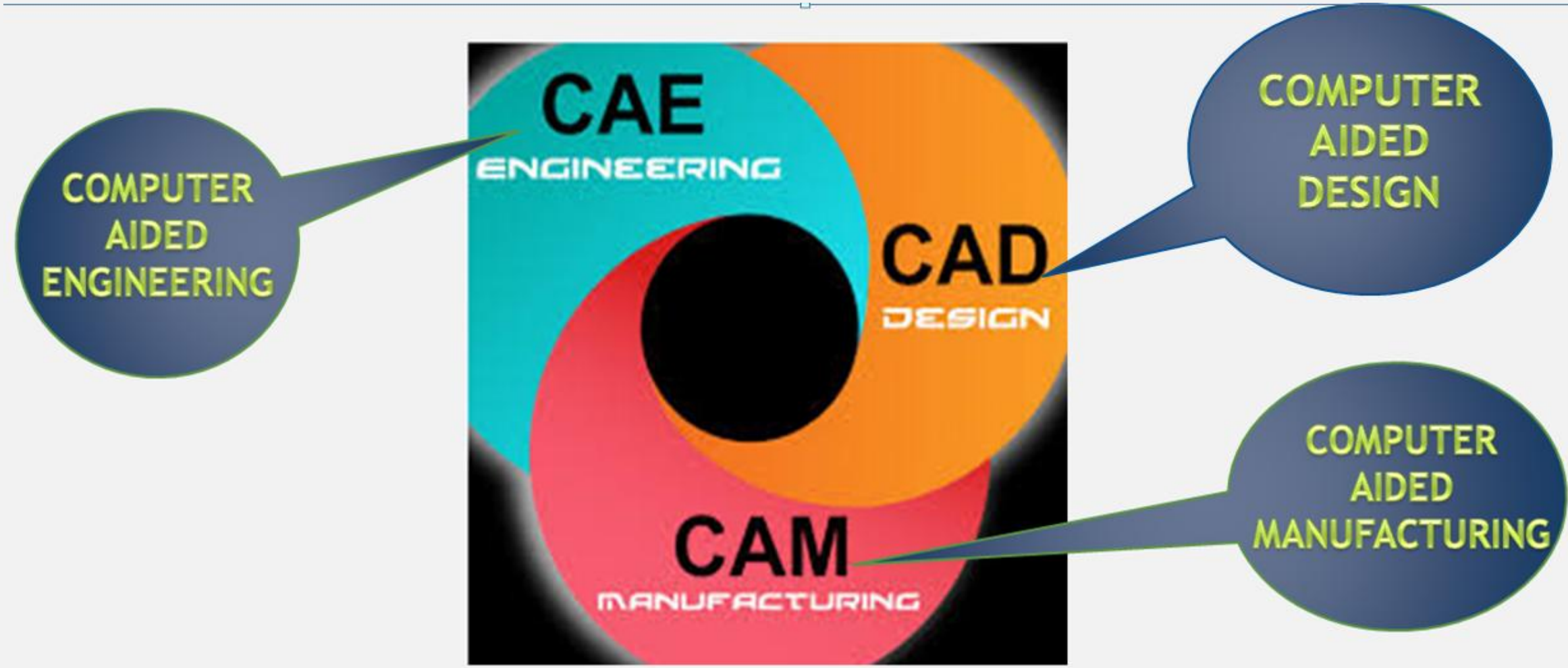
What are these softwares and how are they different from one another?

•The first thing to know about all three of these systems is, the first two letters in each abbreviation, 'CA' stands for use of computers for processing.

- CAD - Computer-Aided Design,
- CAE - Computer-Aided Engineering,
- CAM - Computer-Aided Manufacturing

•These are engineering and manufacturing software programs.

What is CAD? What is CAE? What is CAM?



Computer-Aided Design Overview

CAD

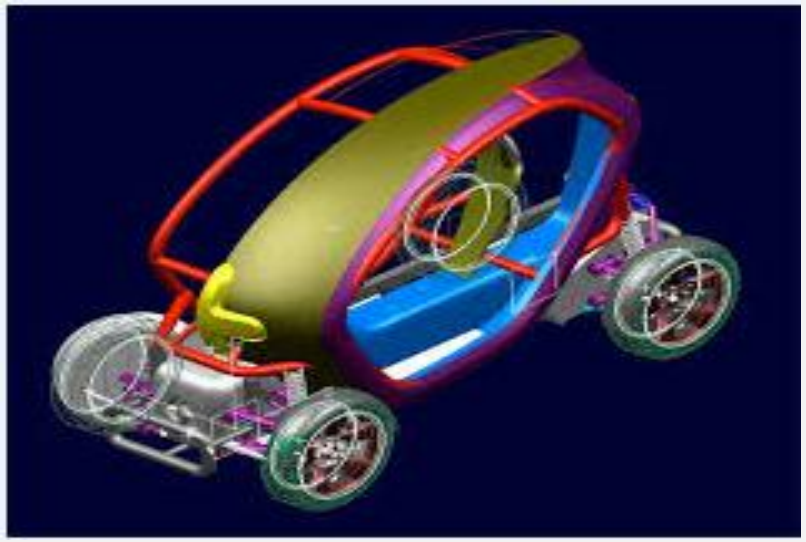
- CAD – It's a computer software program which designs a product and documents the design phase of the engineering process.

- CAD program facilitate the manufacturing process by transferring detailed diagrams of product's materials, processes, tolerances, and dimensions.

- CAD softwares are used to design complex parts and assemblies.

- CAD is used to draw 2D or 3D diagrams.

- Some CAD softwares widely used :
  - CATIA
  - NX
  - SOLIDWORKS
  - CREO, etc.



Who Uses Computer-Aided Design (CAD)

➢Here is a short list of some people who would most likely use CAD in the job.

- Architectures
- Civil Engineers
- Electrical Engineers
- Facilities Manager
- Interior Designers
- Mechanical Engineers
- Structural Engineers
- Manufacturing Engineers
- Fire Protection Engineers
- Food Services Designers, etc.

Computer-Aided Engineering Overview

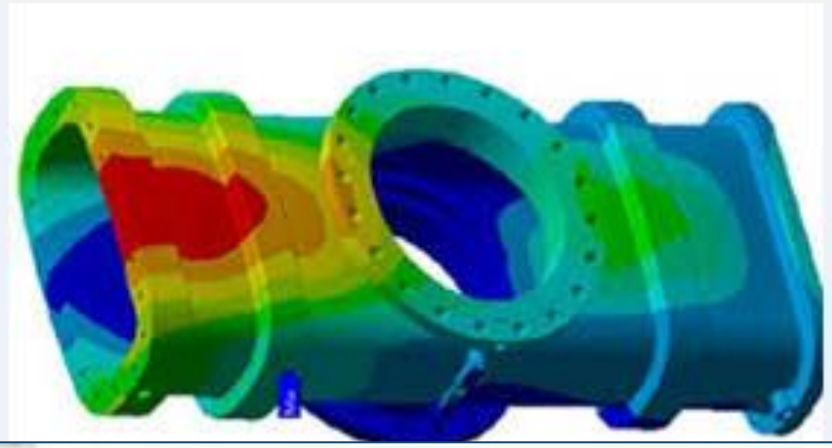
CAE

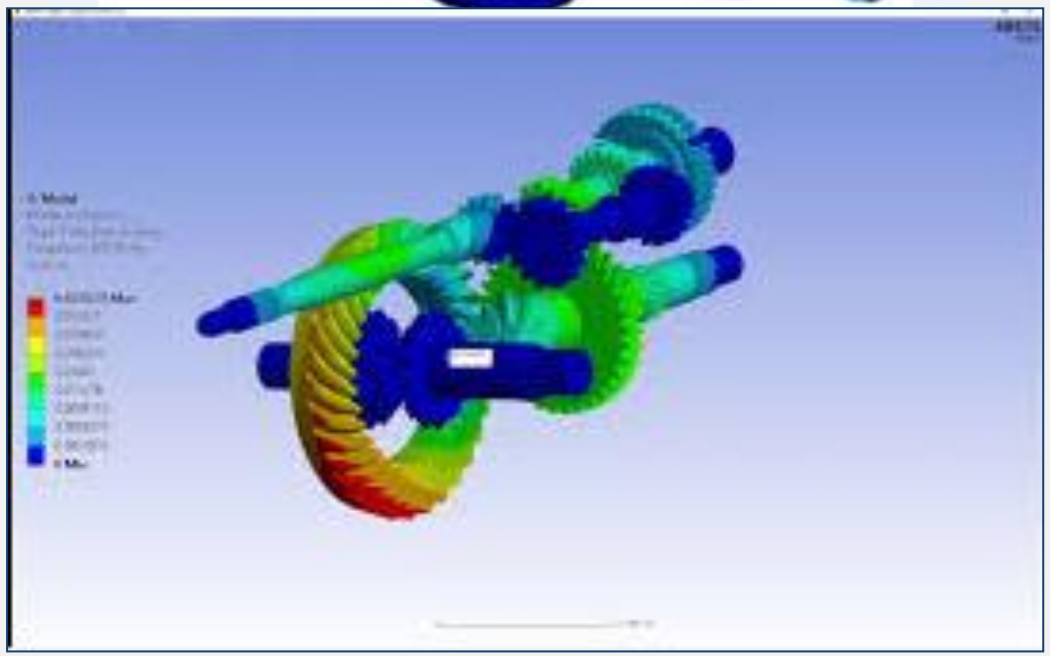
➢ CAE is the broad usage of computer software for engineering analysis tasks.

➢ Engineering software programs includes:

- Finite element analysis (FEA),
- Computational fluid dynamics (CFD),
- Multibody dynamics (MDB), and optimization.

➢The CAE softwares helps to perfom simulation, validation, and optimization of products and manufacturing tools.



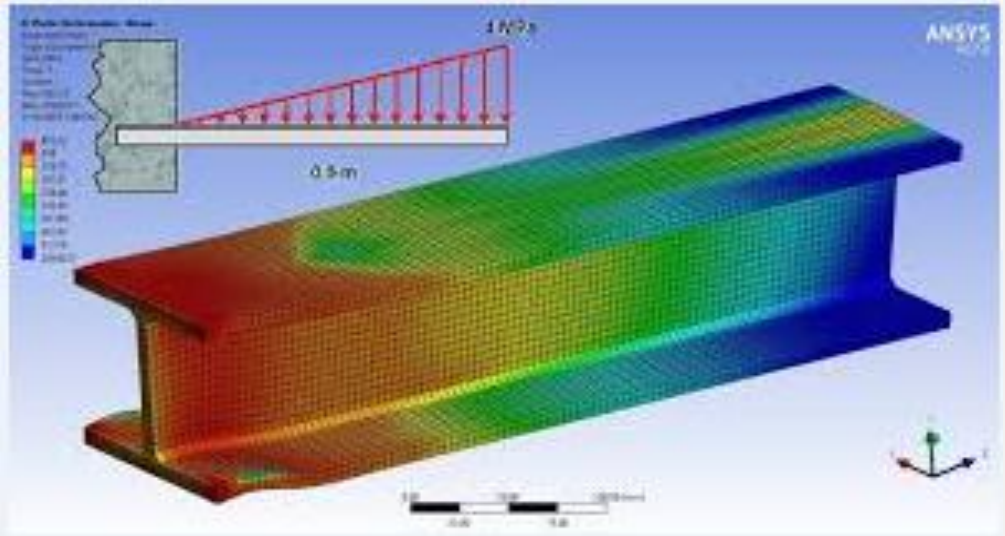


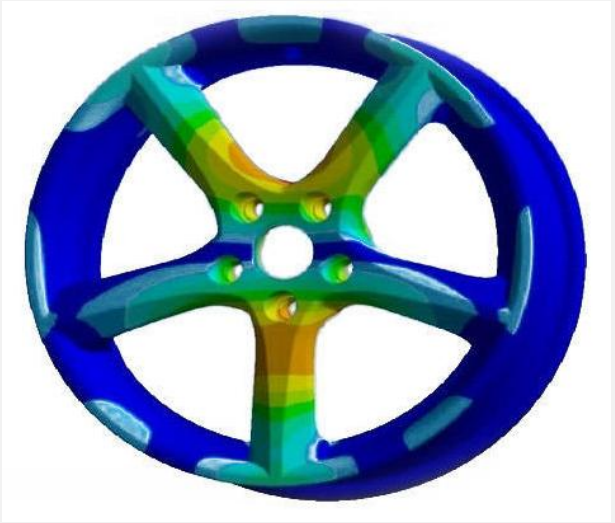
COMPUTER AIDED ENGINEERING (CAE)

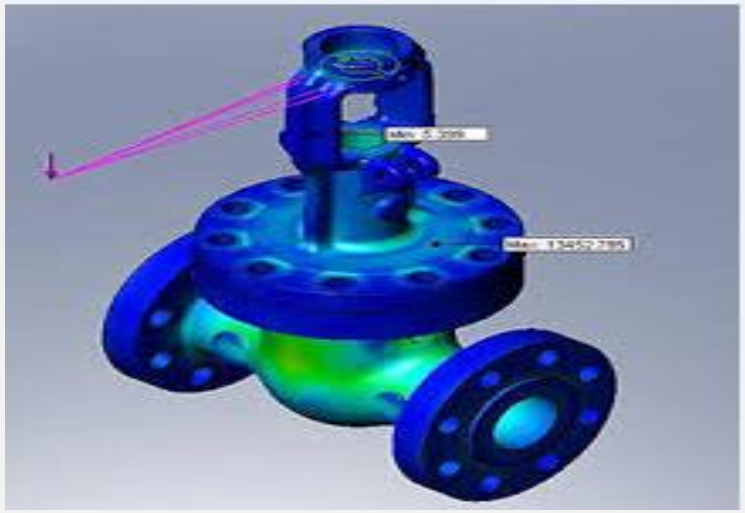
➢ Most of the parameters used for simulation are based on the environment and interactions that the model would experience during operation.

The following parameters are typically used in mechanical engineering for CAE simulations:

1. Temperature
2. Pressure
3. Component Interactions
4. Applied Forces

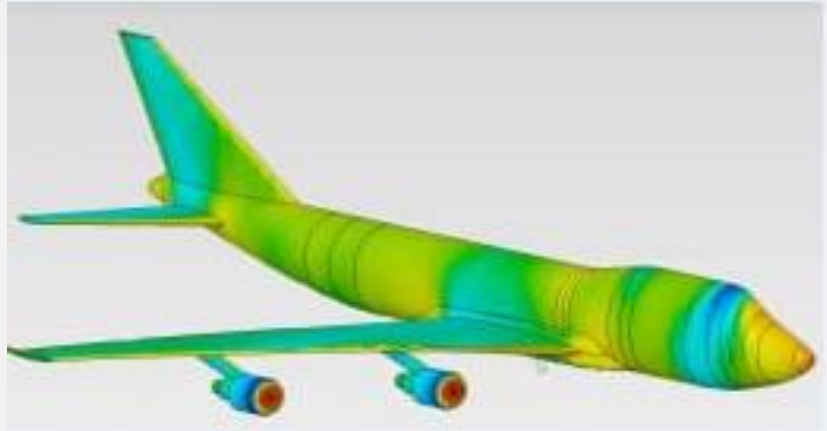






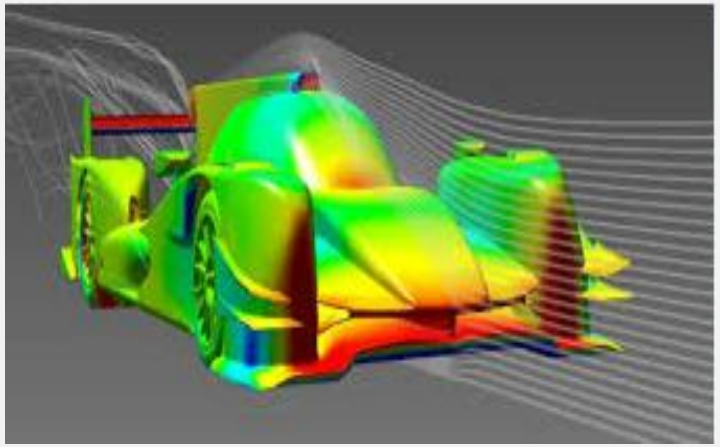
CAE covers areas like :

1. Stress Analysis on Component Assembly using FEA
2. Thermal and Fluid Flow Analysis using CFD
3. Multibody Dynamics (MBD) and Kinematics
4. Analysis Tools for Process Simulation for Manufacturing Processes
5. Optimization of process documentation
6. Optimization of product developing
7. Safety Analysis of Assemblies, etc.



Engineering software for CAE :

- **Abaqus,**
- **Ansys,**
- **Hypermesh, and much more**



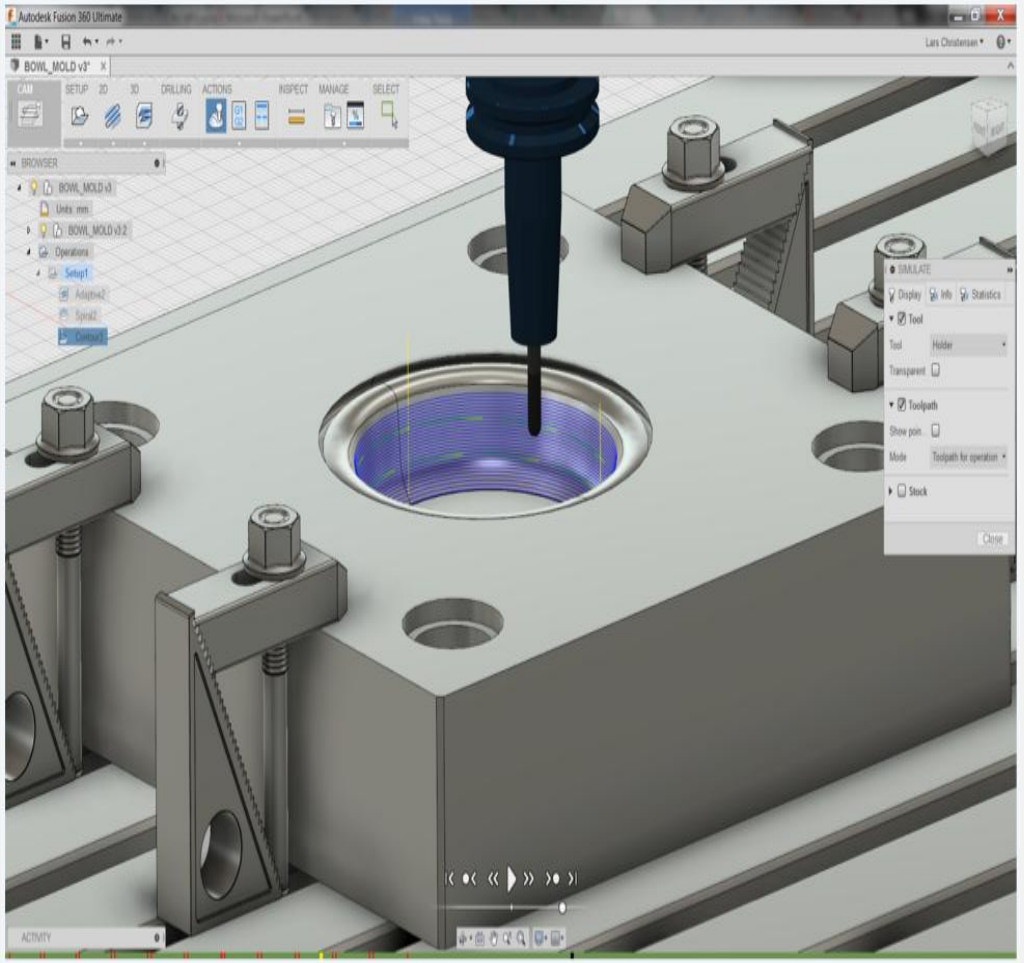
Computer-Aided Manufacturing

CAM

➢CAM is the use of computer software to control machine tools and related machinery in the manufacturing process.

➢CAM helps to assist in all operations of a manufacturing plant, including planning, management, transportation and storage.

➢ Its primary purpose is to create
- A faster production process
- Components and
- Tooling with more precise dimensions and material consistency.



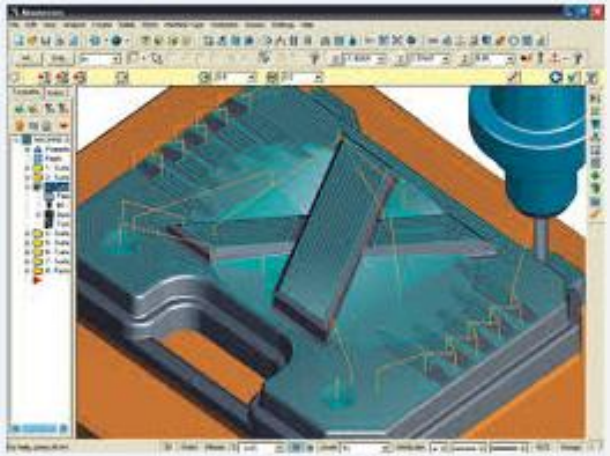
COMPUTER AIDED MANUFACTURING (CAM)

➢ **CAM used for Computer Numerical Controlled (CNC)machines.**

➢Computer Numerical Controlled(CNC) **machines are the devices that utilize the CAM code for manufacturing of products.**

CNC machines include:

* Mills
* Lathes
* Engravers
* Surface Grinders
* Welders
* Electrical Discharge Manufacturing.



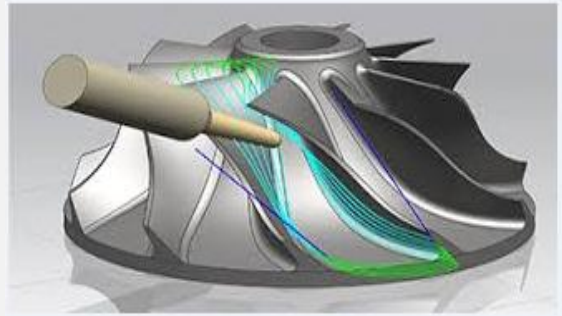
COMPUTER AIDED MANUFACTURING (CAM)

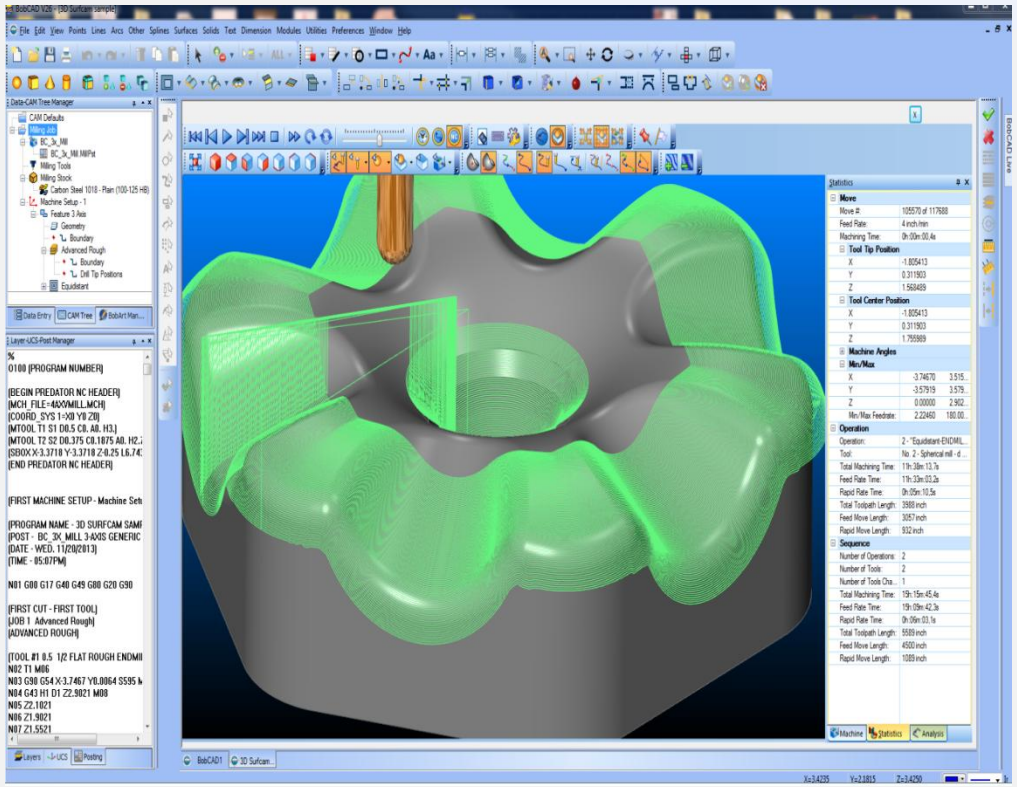
- CAM provides step-by-step instructions that the machine tools will follow to complete the manufacturing of the product.

- CAM software is used to develop the code based on the GUI (Graphical User Interface) platform.

- This code is used the CNC machines for manufacturing the products more precisely.

(Example of Software = NX-CAM)





How CAD, CAE, and CAM work together

- A modern CAD program is necessary for using either manufacturing-CAM, or engineering software programs-CAE.

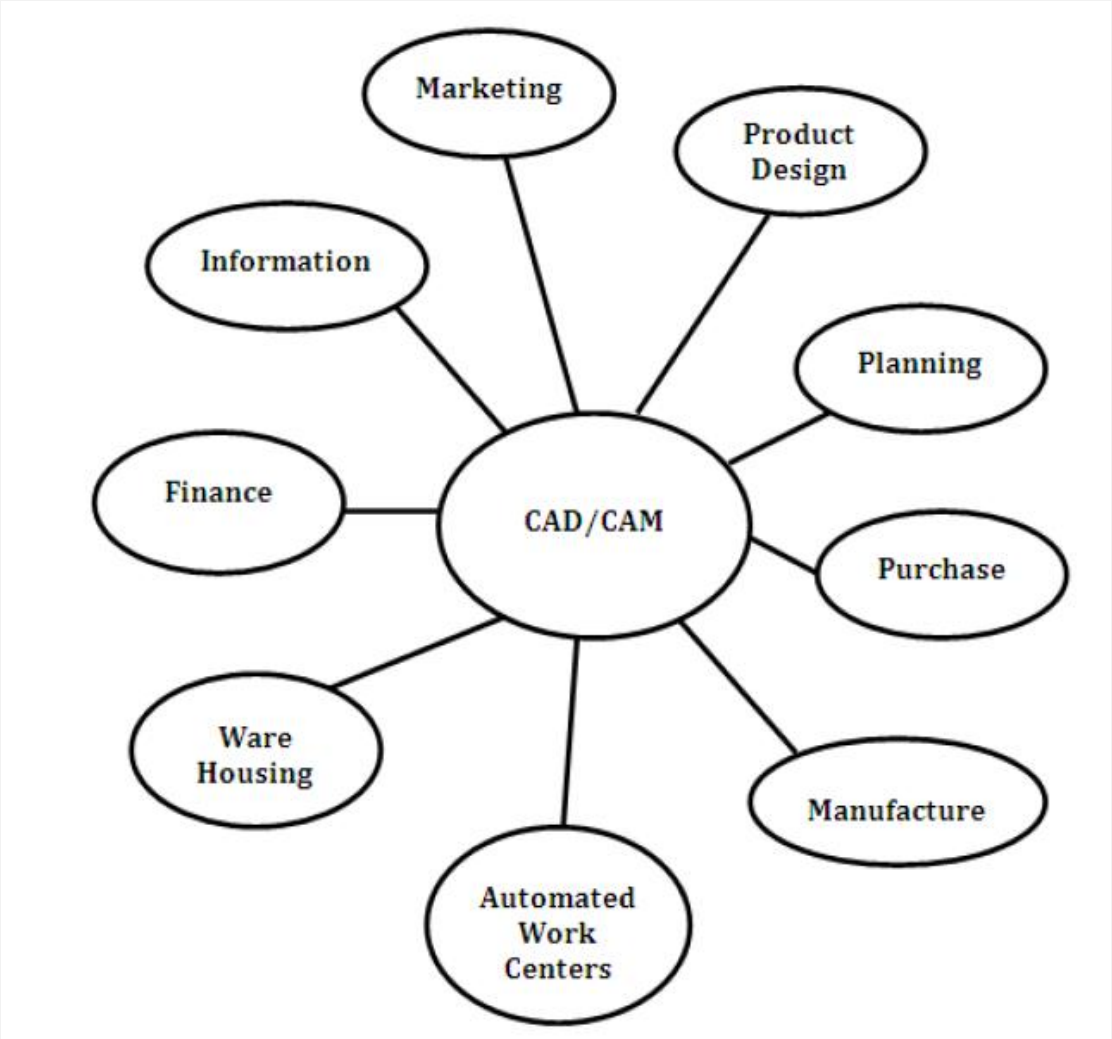
- As CAE & CAM systems require a model in order to perform either analysis or manufacturing.

- CAE requires the geometric model to determine the integrated nodal network to use for the analysis.

- CAM requires the part geometry to determine machine tool routes and cuts. Both require CAD, but CAD can be used as a stand alone system for engineering virtual models.

- CAD is the backbone for either CAM or CAE and is required for them to function properly.

CAD/CAM Linkages to all department.



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