

INTRODUCTION to CAD

ACAD – BASICS

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1. INTRODUCTION

Computer Aided Drafting is a process of preparing a drawing of an object on the screen of a computer. There are various types of drawings in different fields of engineering and sciences. In the fields of mechanical or aeronautical engineering, the drawings of machine components and the layouts of them are prepared. In the field of civil engineering, plans and layouts of the buildings are prepared. In the field of electrical engineering, the layouts of power distribution system are prepared. In all fields of engineering use of computer is made for drawing and drafting. The use of CAD process provides enhanced graphics capabilities which allows any designer to Conceptualize his ideas Modify the design very easily Perform animation Make design calculations Use colors, fonts and other aesthetic features.

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REASONS FOR IMPLEMENTING A CAD SYSTEM

Increases the productivity of the designer:

CAD improves the productivity of the designer to visualize the product and its component, parts and reduces the time required in synthesizing, analyzing and documenting the design. Improves the quality of the design: CAD system improves the quality of the design. A CAD system permits a more detailed engineering analysis and a larger number of design alternatives can be investigated. The design errors are also reduced because of the greater accuracy provided by the system.

Improves communication: It improves the communication in design. The use of a CAD system provides better engineering drawings, more standardization in the drawing, and better documentation of the design, few drawing errors and legibility.

Create data base for manufacturing:

In the process of creating the documentation for these products, much of the required data base to manufacture the products is also created.

Improves the efficiency of the design:

It improves the efficiency of the design process and the wastage at the design stage can be reduced.

APPLICATION OF CAD:

There are various processes which can be performed by use of computer in the drafting process.

1. Automated drafting: This involves the creation of hard copy engineering drawings directly from CAD data base. Drafting also includes features like automatic dimensioning, generation of cross – hatched areas, scaling of the drawing and the capability to develop sectional views and enlarged views in detail. It has ability to perform transformations of images and prepare 3D drawings like isometric views, perspective views etc.
2. , Geometric modeling: concerned with the computer compatible mathematical description of the geometry of an object. The mathematical description allows the image of an object to be displayed and manipulated on a graphics terminal through signals from the CPU of the CAD system. The software that provides geometric modeling capabilities must be designed for efficient use both by computer and the human designer.

BENEFITS OF CAD:

The implementation of the CAD system provides variety of benefits to the industries in design and production as given below:

1. Improved productivity in drafting

2. Shorter preparation time for drawing
3. Reduced man power requirement
4. Customer modifications in drawing are easier
5. More efficient operation in drafting
6. Low wastage in drafting
7. Minimized transcription errors in drawing
8. Improved accuracy of drawing
9. Assistance in preparation of documentation
10. Better designs can be evolved
11. Revisions are possible
12. Colors can be used to customize the product
13. Production of orthographic projections with dimensions and tolerances
14. Hatching of all sections with different filling patterns
15. Preparation of assembly or sub assembly drawings
16. Preparation of part list
17. Machining and tolerance symbols at the required surfaces
18. Hydraulic and pneumatic circuit diagrams with symbols
19. Printing can be done to any scale

LIMITATIONS OF CAD

1. 32 – bit word computer is necessary because of large amount of computer memory and time
2. The size of the software package is large
3. Skill and judgment are required to prepare the drawing
4. Huge investment

AUTO CAD

Auto CAD package is suitable for accurate and perfect drawings of engineering designs. The drawing of machine parts, isometric views and assembly drawings are possible in AutoCAD. The package is suitable for 2D and 3D drawings.

2. AutoCAD – BASICS

2.1 STARTING WITH ACAD CAD uses four basic elements for preparation of any drawing:

1. Line
2. Curves
3. Text
4. Filling point.

Computer Aided Drafting is done by the operator by placing the mouse pointer by placing the mouse pointer at the desired location and then executing the command to draw the graphic elements using different methods. Advanced computer aided drafting packages utilize four areas on the screen.

1. CURVES

Following are the various types of curves used in the drawings:

- i. Circle
- ii. Ellipse
- iii. Arc

Regular or any other type.

Aim: to draw the following figure using ACAD

PROCEDURE

STEP 1:

Draw axis lines in the respective format with their intersection point at (0,0) Go to PROPERTIES tool bar Load line type as ISO LONG DASH SHORT DASH in the line type area. Select line type ISO LONG DASH SHORT DASH in the line type area.

STEP 2

a Draw circles of given dimensions using circle command with their centre as the intersection of the axis lines. 3 circles of diameters 94, 74 and 54 are to be drawn The circle with 74 diameter is of ISO LONG DASH SHORT DASH format

STEP 3: Draw two construction lines at an angle of 30° to the vertical axis line

STEP 4: With A as center an radius 100 draw an arc between the above lines

STEP 5: Offset the arc on the either side by the distances as mentioned in the figure.

STEP 6: Complete the figure by using fillet command.

STEP 7: Give dimensions to the completed figure. Command: `_qsave`

PRECAUTIONS:

Put ORTHO ON where ever necessary. Use the required modify tool bar commands like TRIM, ERASE, COPY, MIRROR ETC.,

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