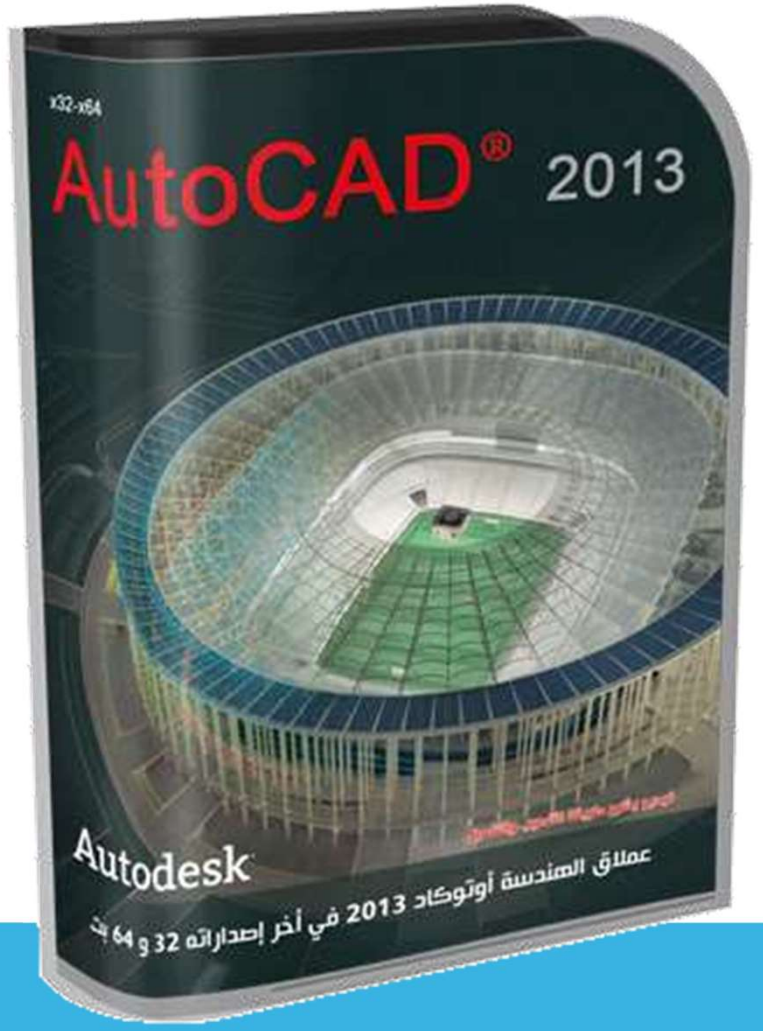
Semester- 5th

Computer Applications in Civil Engineering

PRESENTATION ON AUTOCAD

OUTLINE

- ✓ Introduction
- ✓ Latest Version
- ✓ AutoCAD Screen
- ✓ Way to provide command.
- ✓ How it Works
- ✓ Co-ordinate system.
- ✓ Toolbars
- ✓ Some 2D command.
- ✓ 3D Modeling
- ✓ Some 3D Commands
- ✓ Isometric view.
- ✓ Project work
- ✓ Benefits of AutoCAD.



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INTRODUCTION

- ✓ The Word AutoCAD is made up of two words “Auto(logo of company)”and CAD “(computer aided design)”.

- ✓ AutoCAD is 2D and 3D modeling software.
- ✓ It is developed by Autodesk company.

- ✓ Autodesk is an U.S.A based company.
- ✓ It is widely used in industry for 2D drawing and 3D modeling.

- ✓ In another way we can say that AutoCAD is a designing course , which is performed by the help of computer.

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VERSION OF AUTOCAD

- ✓ AutoCAD software was firstly launched by Autodesk company in Dec. 1982.
- ✓ It comes in India in 1988.
- ✓ The first version of AutoCAD was R1 after that R2,R3,R4…… and so on.
- ✓ In 2000,Autodesk launched a version of AutoCAD 2000 after that 2001,2002…… so on.
- ✓ This time, we have the latest version of AutoCAD is 2014,which is launched on 27th march 2013.
- ✓ Latest version is easy to use and over come the difficulties of old version.

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AUTOCAD SCREEN

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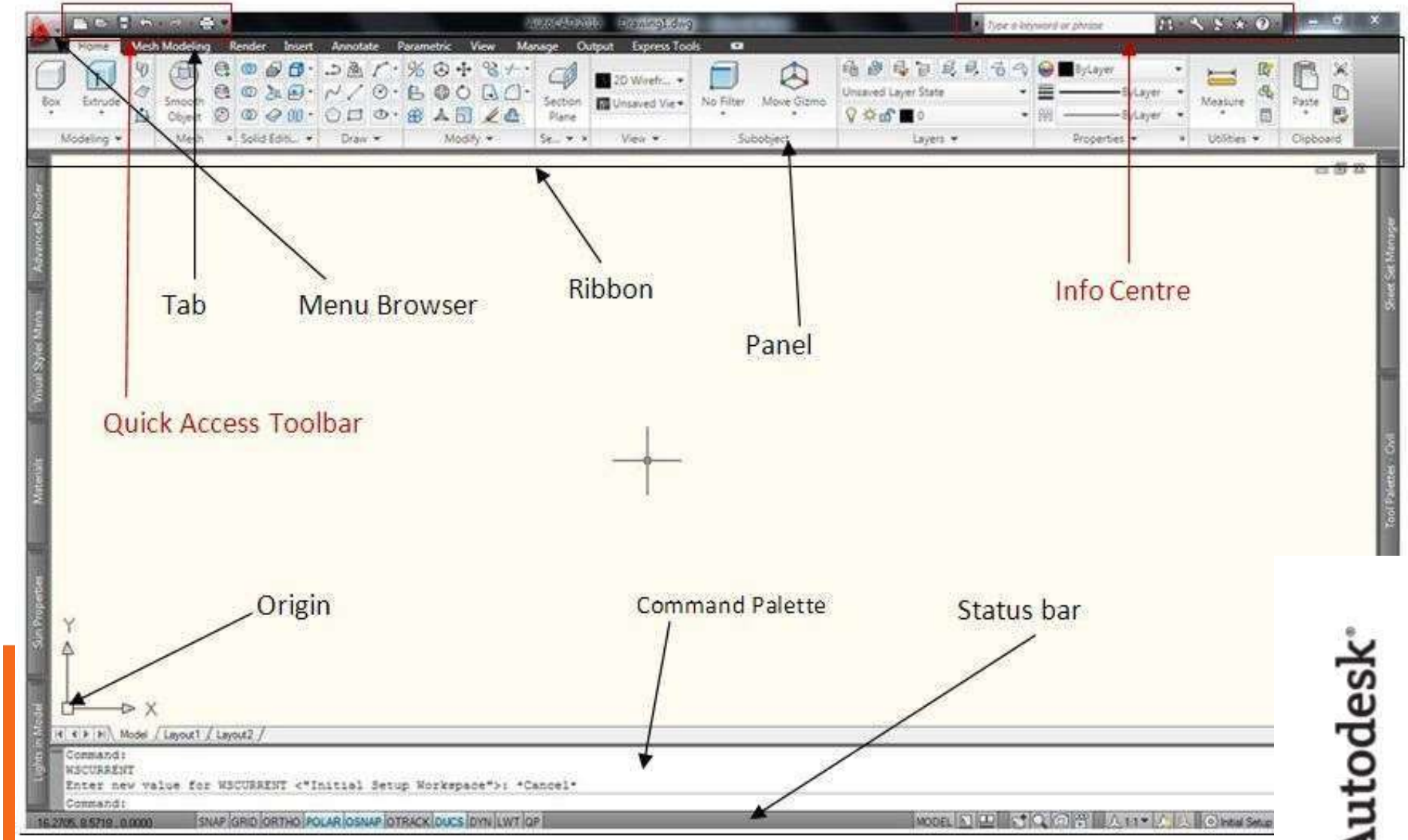
AUTOCAD SCREEN



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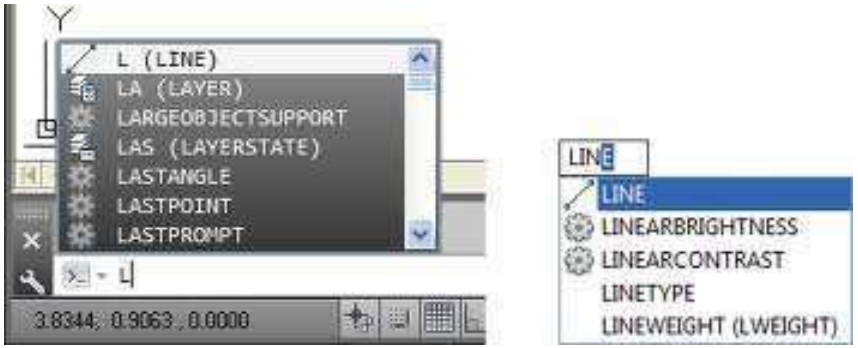
WAY TO PROVIDE COMMAND

1.



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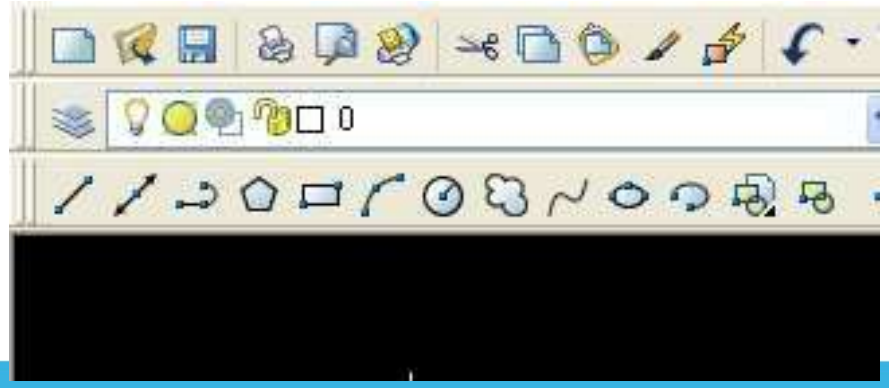

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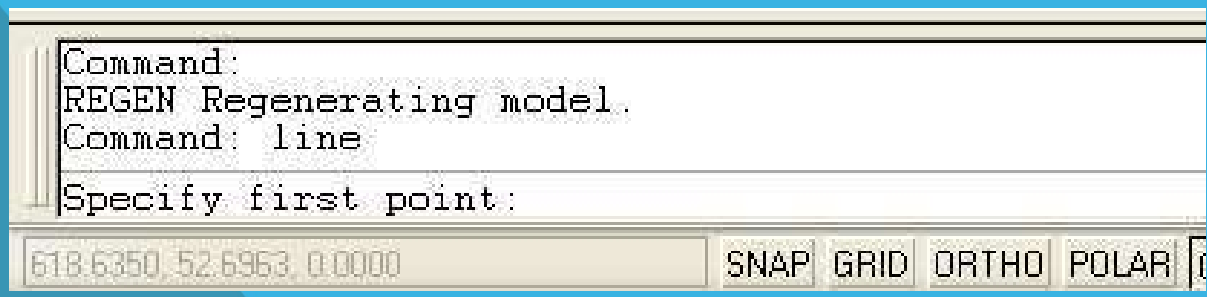

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HOW AutoCAD WORKS

- ✓ There is a co-ordinate system used in AutoCAD.
- ✓ Every drawing shows its co-ordinate.
- ✓ In above next slide the line shows its co-ordinate that is (9,6) and (-10,-4).
- ✓ There is so many commands like copy, move ,rotate ,mirror in 2D, path array , rectangular array, polar array & more.
- ✓ Different types of drawing can be made in the same time by using a command that is LAYER.
- ✓ Using line , arc , circle , rectangle , ellipse & polygon , so many drawing of different type can be made.

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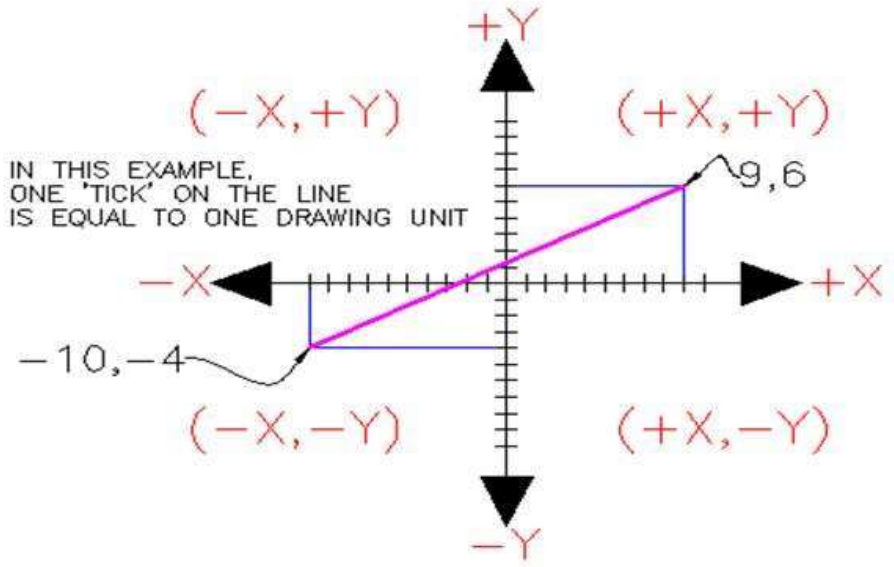
CO-ORDINATE SYSTEM

- ✓ Every thing that we draw in AutoCAD is exact.
- ✓ All object drawn on screen is based on simple X-Y co-ordinate system.
- ✓ In AutoCAD it is known as world co-ordinate system (WCS).
- ✓ We are drawing a line, so we have two points A(-10,-4) and B(9,6). As shown in figure.



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The UCS and WCS

- ✓ The AutoCAD world is 3 dimensional. However, if we want to draw a 2d object, such as a plan or a section, we will use only 2 dimensions (x and y).
- ✓ WCS (world coordinate system) is the imaginary plane that is parallel to the ground. It is the default coordinate system.
- ✓ Modifications made to the World Coordinate System (WCS) result in a User Coordinate System (UCS). It is the plane that you work on. It enables the user to draw 3 dimensional objects.
- ✓ To create a new UCS, type ucs on the command window, then say New and specify 3 points on your new UCS plane.

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DRAW TOOLBAR AND MODIFY TOOLBAR:

Following image shows two very basic tool bars, these will be heavily used as you progress towards the end of your drawing. You can access these tool bars under Home tab.

As we move cursor over any tool in the tool bar a tooltip appears stating the name of that tool. And if we further wait for about three seconds, it turns into a brief description about that particular tool. As shown by the following image.

For more details we can press F1 key. Now I am going to draw a simple object. My purpose is to introduce you with the Line, Circle, Offset, Erase, Move, Fillet and Chamfer commands. But first let us decide about unit system, we are going to use.

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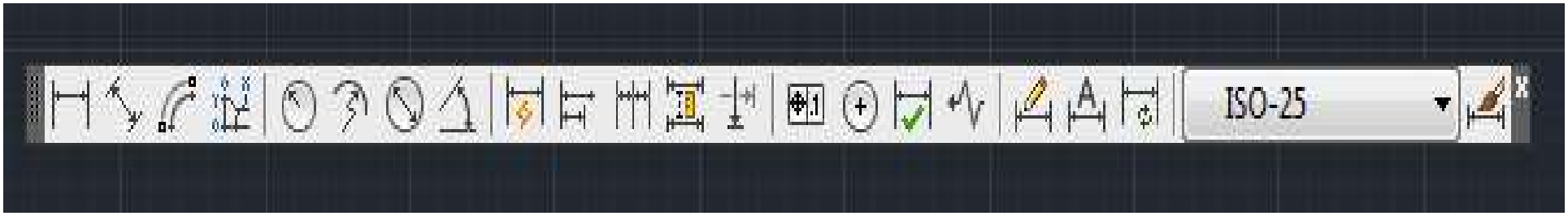
DIMENSION TOOLBAR :

AutoCAD provides a whole range of dimensioning tools which can be used to quickly dimension any drawing without the need for measurement. Dimensioning in AutoCAD is automatic; lines, arrows and text are all taken care of by the dimension commands. AutoCAD dimensions are special blocks which can easily be edited or erased as necessary.

AutoCAD provides lots of control over the way dimensions look. Using a system similar to text styles, dimension styles allow you to design dimensions so that they look just the way you want them to.



We can use the following dimensional commands like
The Linear Dimension, The Continue Dimension Command, The Baseline Dimension Command, The Aligned Dimension Command, Changing the Text, The Radial Dimension Commands, Angular Dimensions, Annotation with Leaders, Editing Dimensions, The Dimension Edit Command etc.

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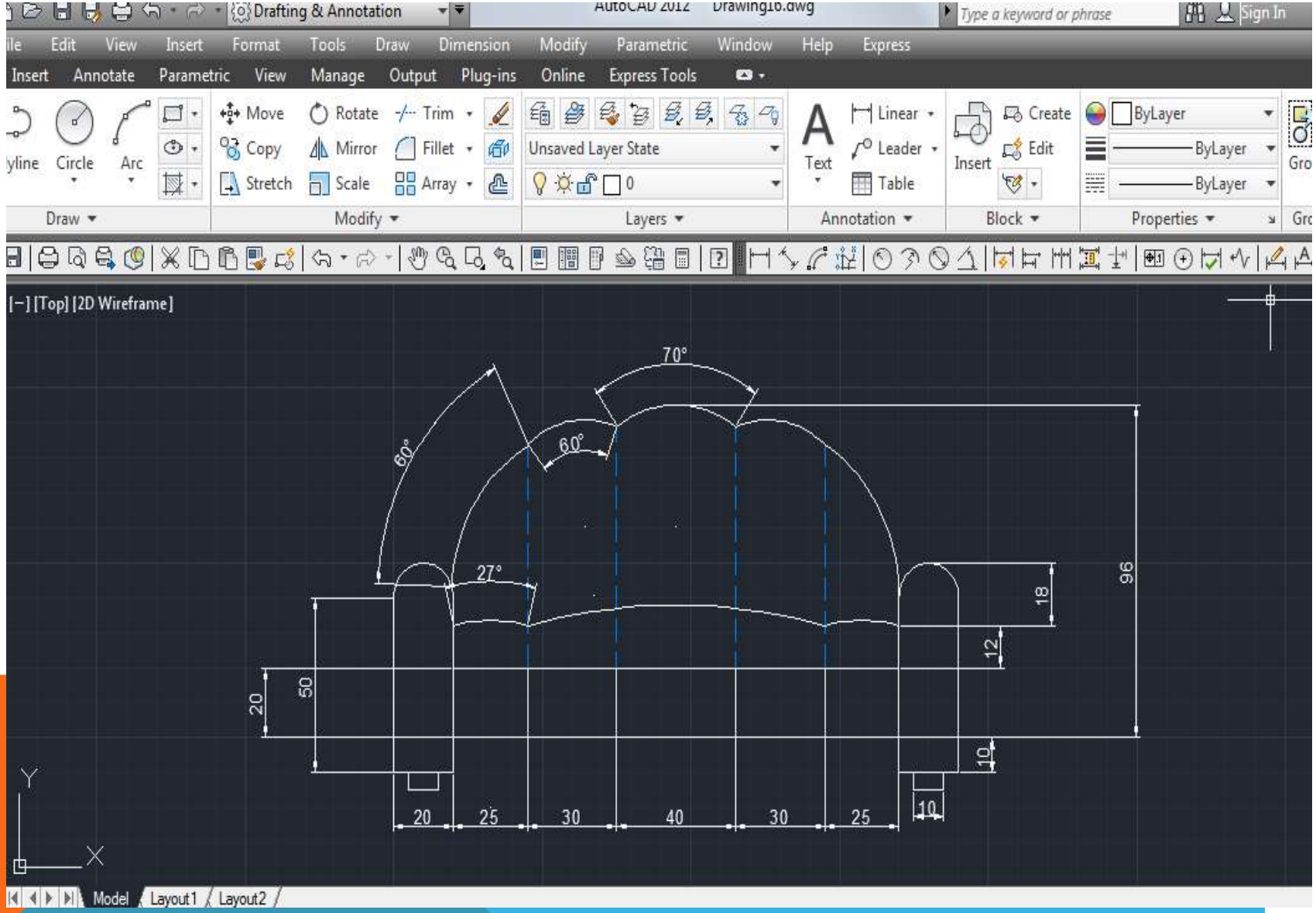
DRAWING DEPICTING USE OF DIMENSIONING



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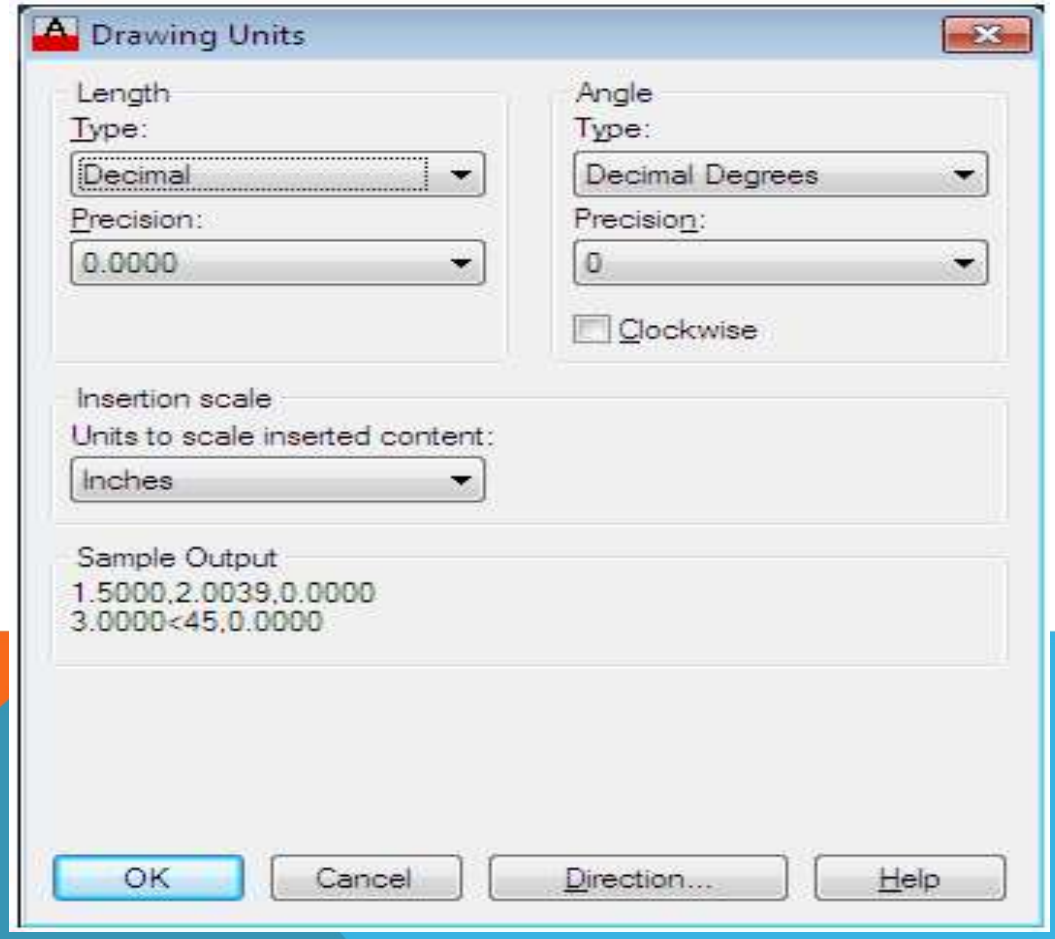
HOW TO SET DRAWING UNITS:

To set the drawing units, go to the drop down window at the top let side of the AutoCAD 2013 screen labeled as **Format** or just press **Alt + o** key to do so. And from this menu select **units**. A pop up window will appear that will set our drawing units as shown below.



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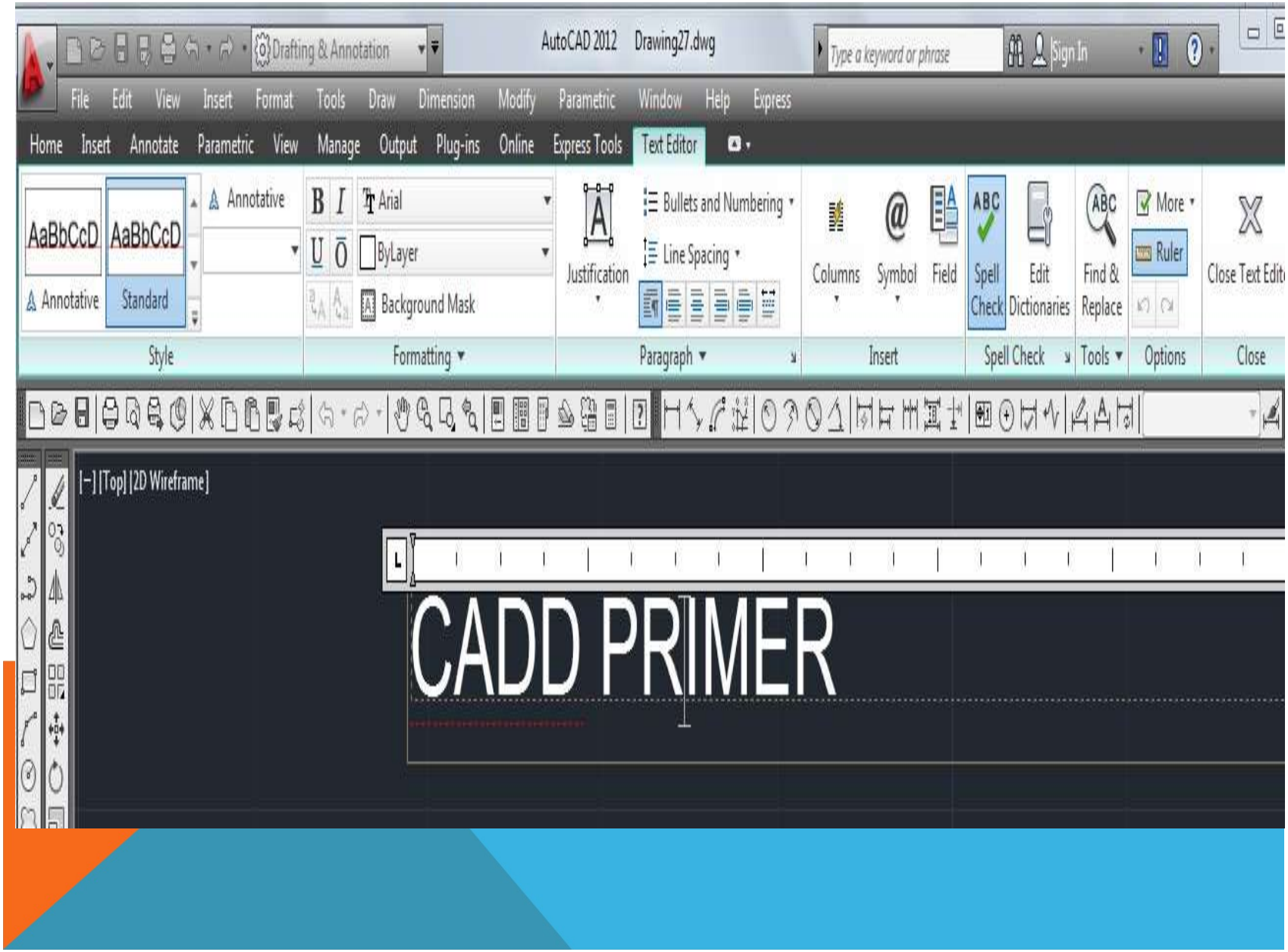
TEXT COMMAND IN AUTOCAD :



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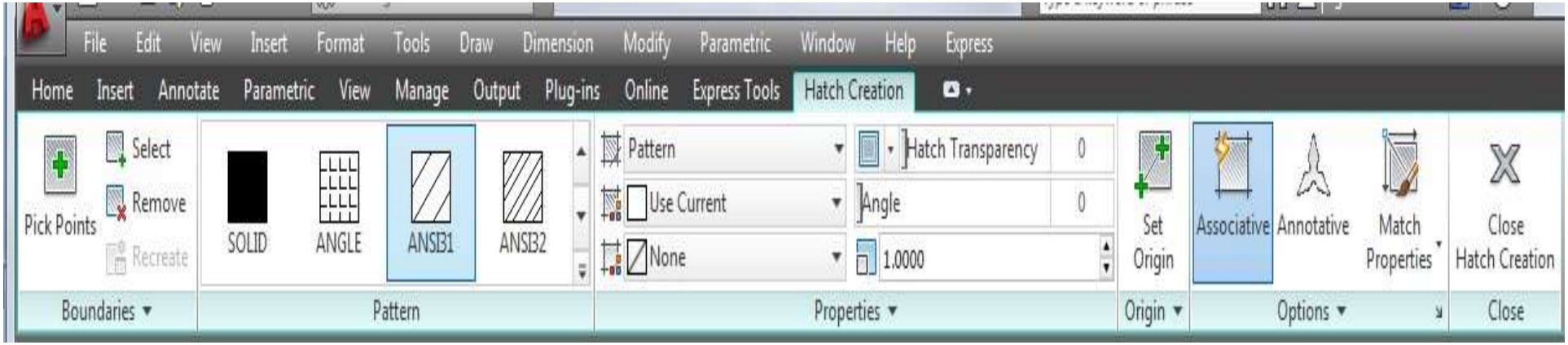
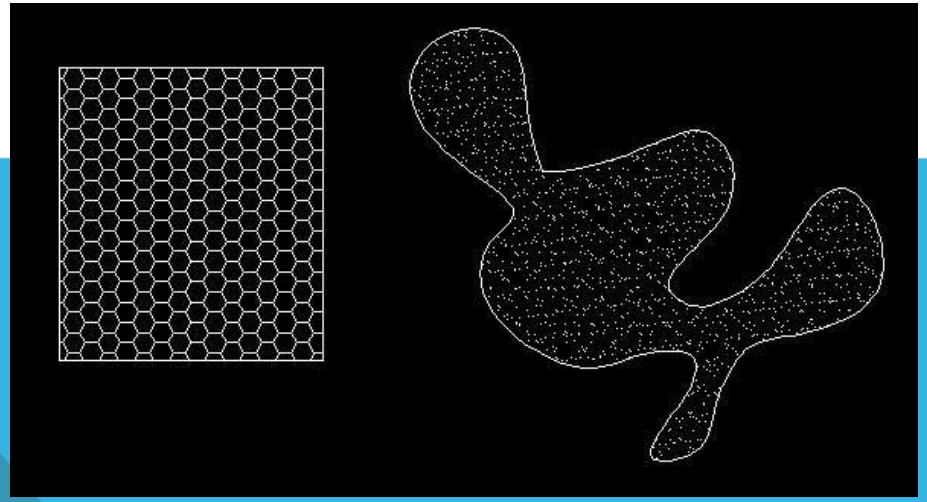
HATCHING IN AUTOCAD :



- ✓ Hatching is used to add shaded patterns to objects and shapes within an Autocad drawing. Hatch patterns can be used to indicate a material to be used, such as a concrete hatch.

- ✓ You will pick:
- ✓ Pattern
- ✓ Scale
- ✓ Angle
- ✓ points



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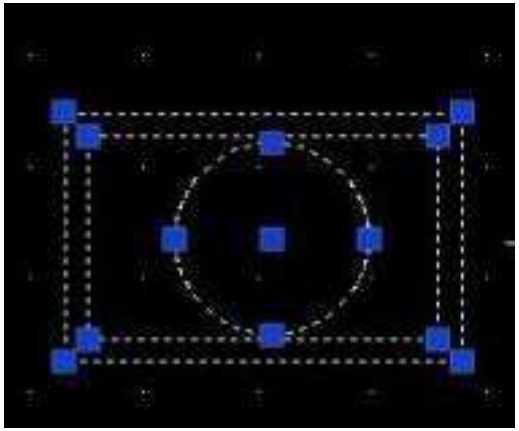
BLOCK MAKING:

So, setting up a Block looks like this:

First, we select all the objects that we want to add to the block and type in Block in the AutoCAD Commands window, and hit "Enter"



The window that pops up will prompt us for a number of fields, but the most important is "Name". For example "School Chair". There will be three options for handling objects. The first is "Retain" - this is effectively using the "Group" command to group all objects into one "thingy" for manipulation. Convert to Block gets rid of all the separate instances that make up the object, but makes it a block. "Delete" is really horribly misnamed. It converts the object to a block, and then deletes it from the current drawing - but it's still loaded up and ready to be replicated throughout the drawing.

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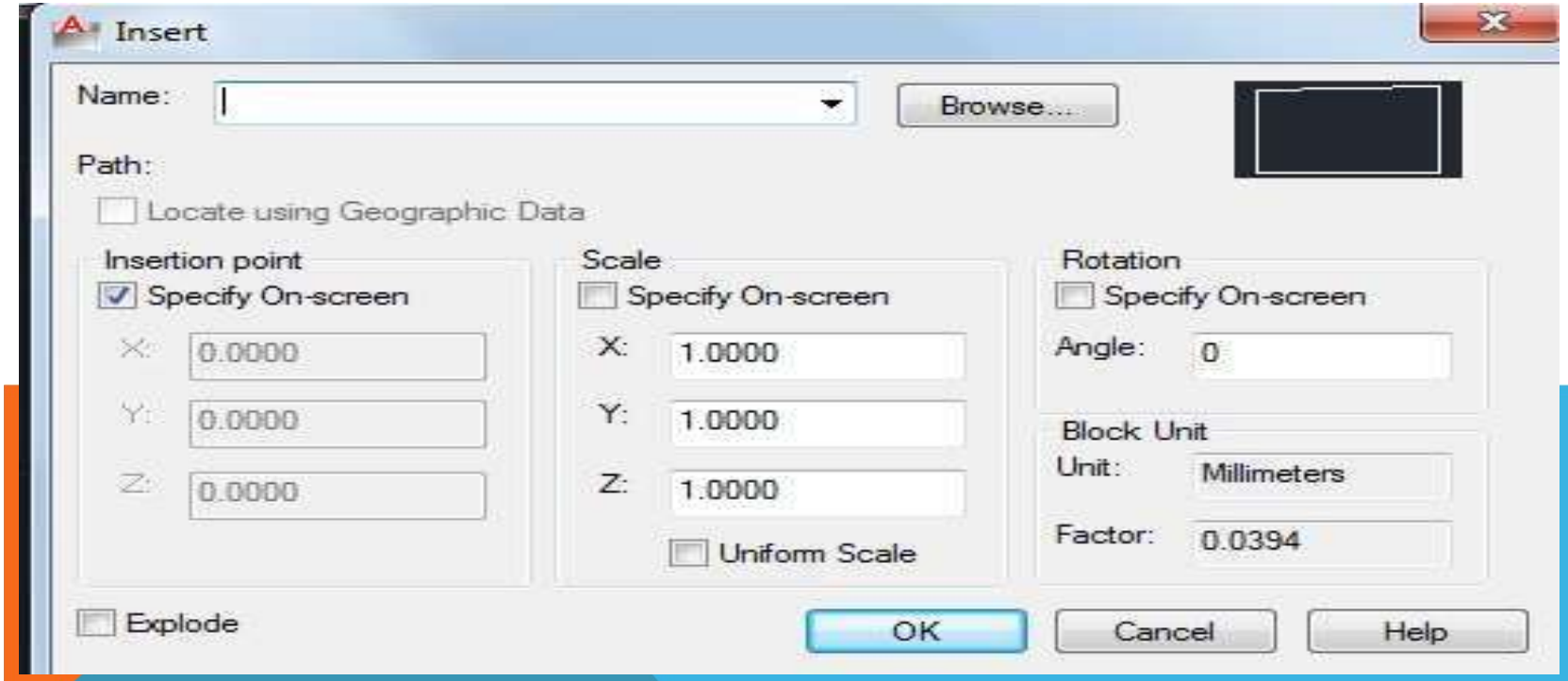
Insertion of Blocks

To insert a saved block, go to the Insert menu, then Blocks, and select the name of the saved block you want to include; it'll appear at the point that you last clicked with the mouse. When the Block Definition window is opened, you can click the button by the words "Base Point" and define the default position in the drawing for inserted blocks to appear, which can be a real time saver. You should also make sure that the units selected from the drop down menu match the units you're doing your drawing in; it's generally going to match by default, but it's the first place to look when you're tweaking something that's not working.



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COMMANDS WITH SHORTCUT

1. Co-ordinate System
   * Absolute Co-Sys (x,y)
   * Relative Co-Sys (@ x,y)
   * Polar Co-Sys (@ dis<ang)
2. Line :- L
3. Circle :- C
4. Tracking :- TK
5. Offset :- O
6. Trim :- TR
7. Extend :- EX
8. Copy :- CO
9. Move :- M
10. Polyline :- PL
11. Rotate :- RO
12. Fillet :- F
13. Chamfer :- CHA
14. Polygon :- POL
15. Array :- AR
16. Rectangle :- REC
17. Mirror :- MI
18. Table :- TAB
19. Units :- UN
20. Ellipse :- EL
21. Block :- BL
22. Write Block :- WBL
23. Points :- PO
24. Hatch :- H
25. Scale :- SC
26. Arc Text :- ARCT
27. Donut :- DO
28. Sketch :- SK
29. Stretch :- S
30. Join :- J
31. Simple Text :- DT
32. Mutiline Text :- MT
33. Dimension Style :- D
34. Dimension Scale :- DIMSC
35. Plot :- Ctrl+P
36. Pan :- P
37. Isoplane :- F5
38. Tool Pallete :- Ctrl+3
39. Match Property :- MA
40. Explode :- X

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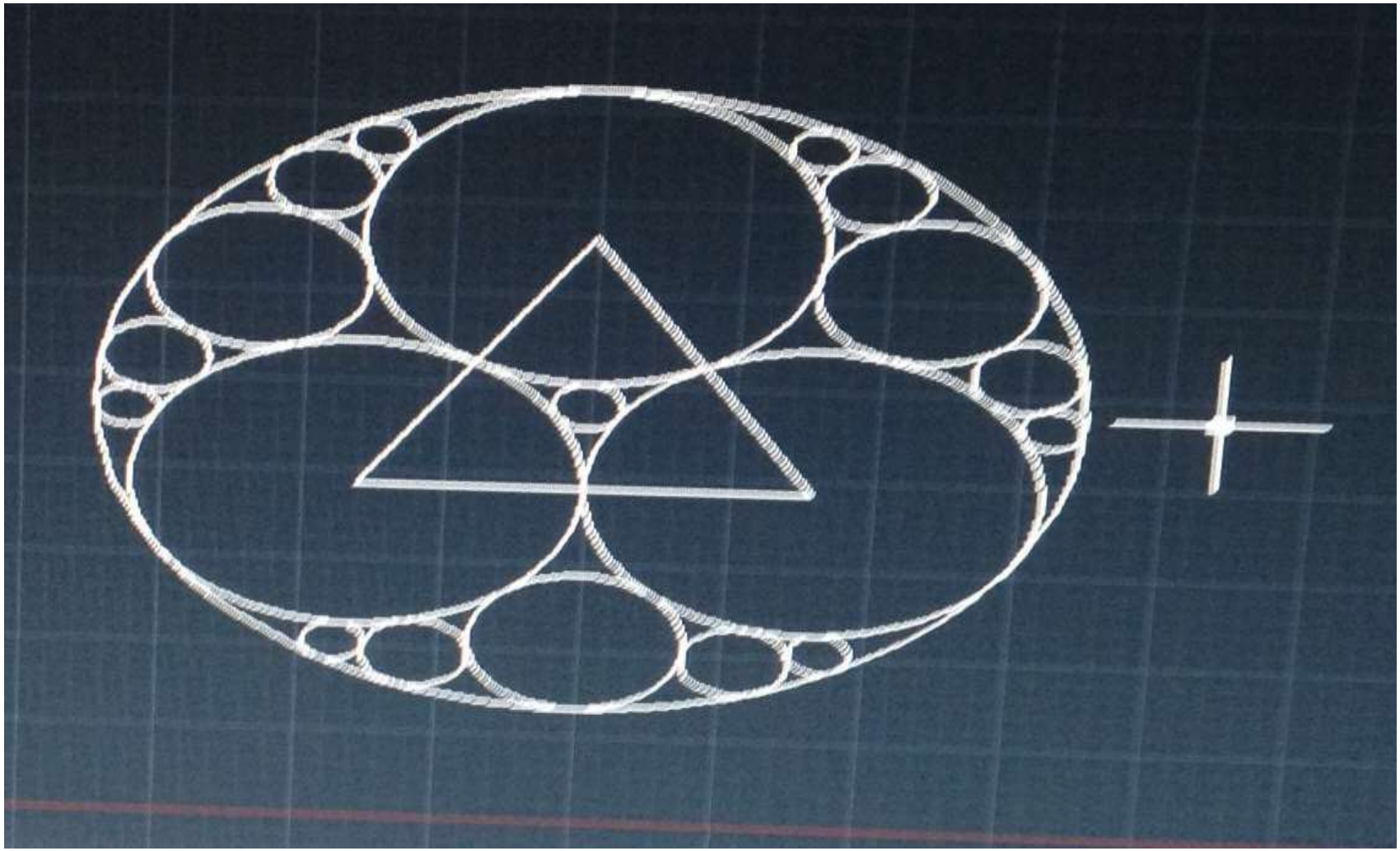
SOME 2D DRAWINGS MADE DURING THE AUTODESK AUTOCAD COURSE :

- ✓ By Use Of Circle Command (c) (ttt)



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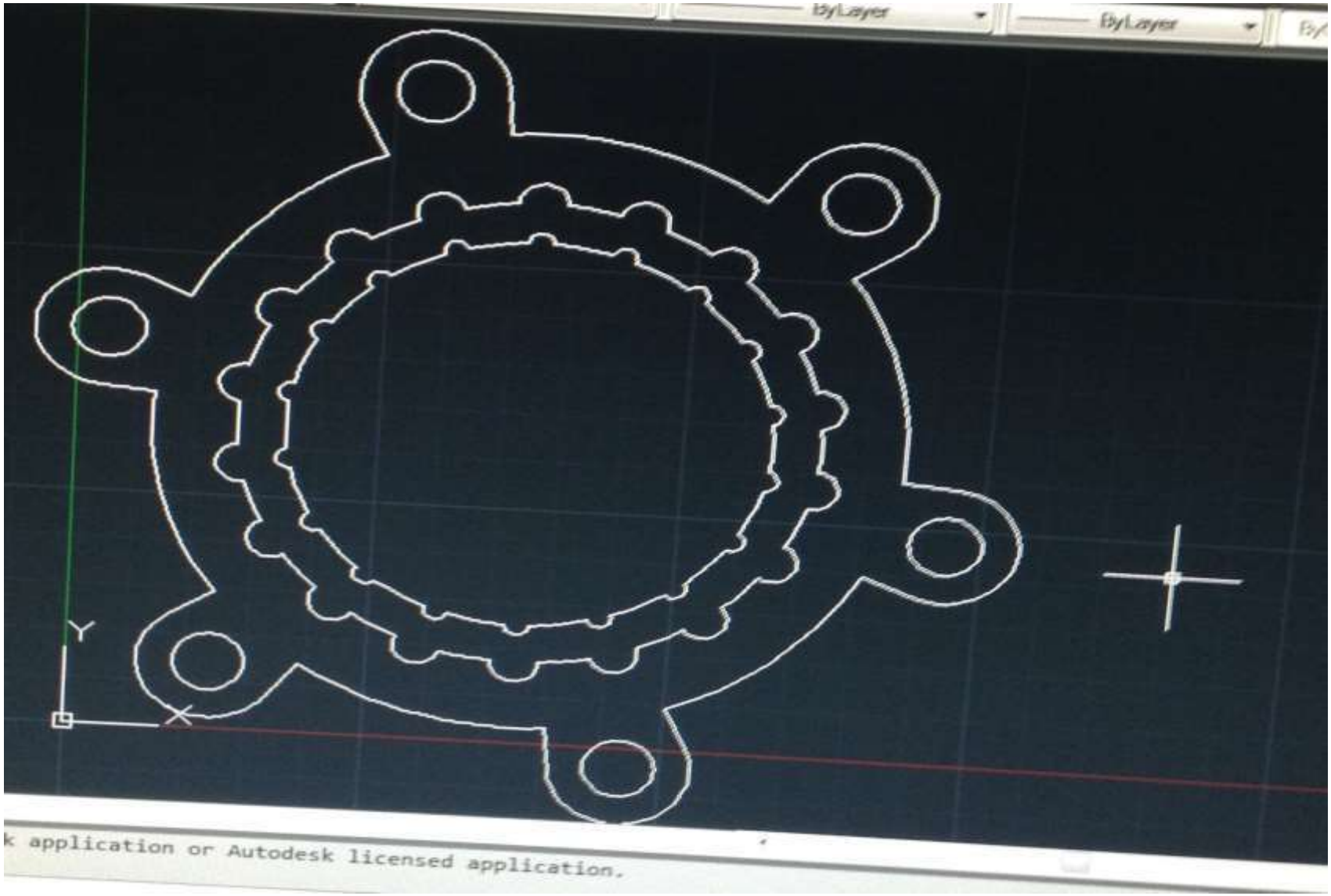
- ✓ BY USE OF ARRAY COMMAND (AR)



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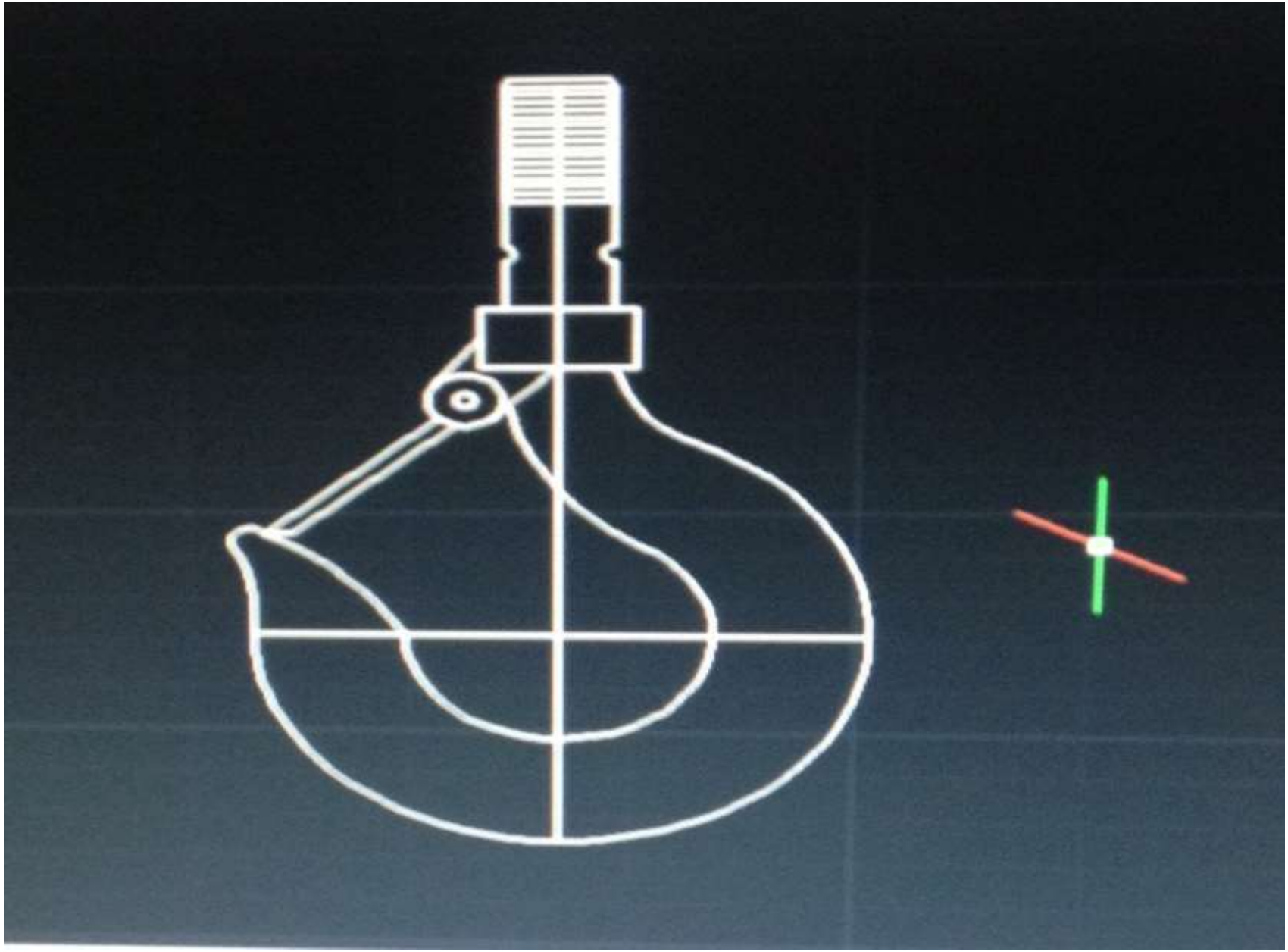
✓ HOOK DRAWING BY MIX 2D COMMANDS



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Introduction to Isometric Drawings :

The most common type of pictorial drawing used in the drafting industry is the isometric drawing. . This supplement focuses on tools and drawing aids that help you create 2D isometric views that look 3D, as if the object tilts toward you. However, a 3D model provides a better way to display isometric views, for most applications. AutoCAD and ItsApplications—

Advanced describes how to construct 3D models.The term isometric means equal (iso) measure (metric). An isometric drawing has no perspective, and therefore edges that are equal in length are drawn equal in length. The angles between the three principle planes and edges of an object

are equal. The vertical edges of an object are parallel to each other and form measurable isometric lines 90° from horizontal. The horizontal edges of an object are parallel to each other and form measurable isometric lines 30° from horizontal. All other lines are non isometric lines.

Circular features appear elliptical in an isometric drawing. The Isocircle option of the ELLIPSE tool, allows you to construct isometric circles and arcs easily. Isometric text uses a specific obliquing angle and rotation depending on the plane and drawing application.

- ✓ **To go to Isometric mode :**
- ✓ **Type Snap and right click.**
- ✓ **Next Again right click then Go to Styles - Select isometric**
- ✓ **Then again Right click .**
- ✓ **And we are ready to work in isometric plane**

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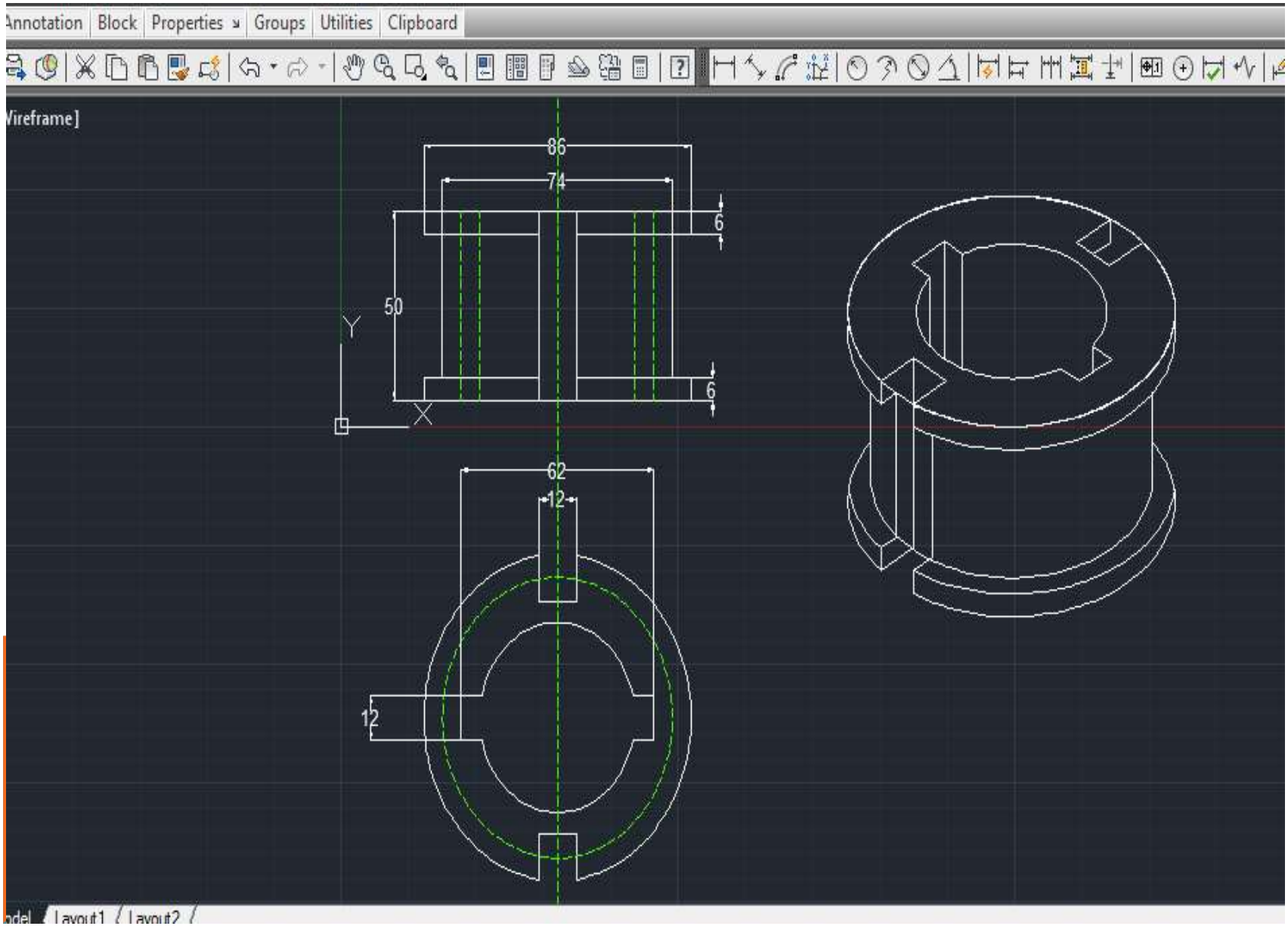
SOME ISOMETRIC DRAWINGS MADE DURING THE AUTODESK AUTOCAD COURSE :



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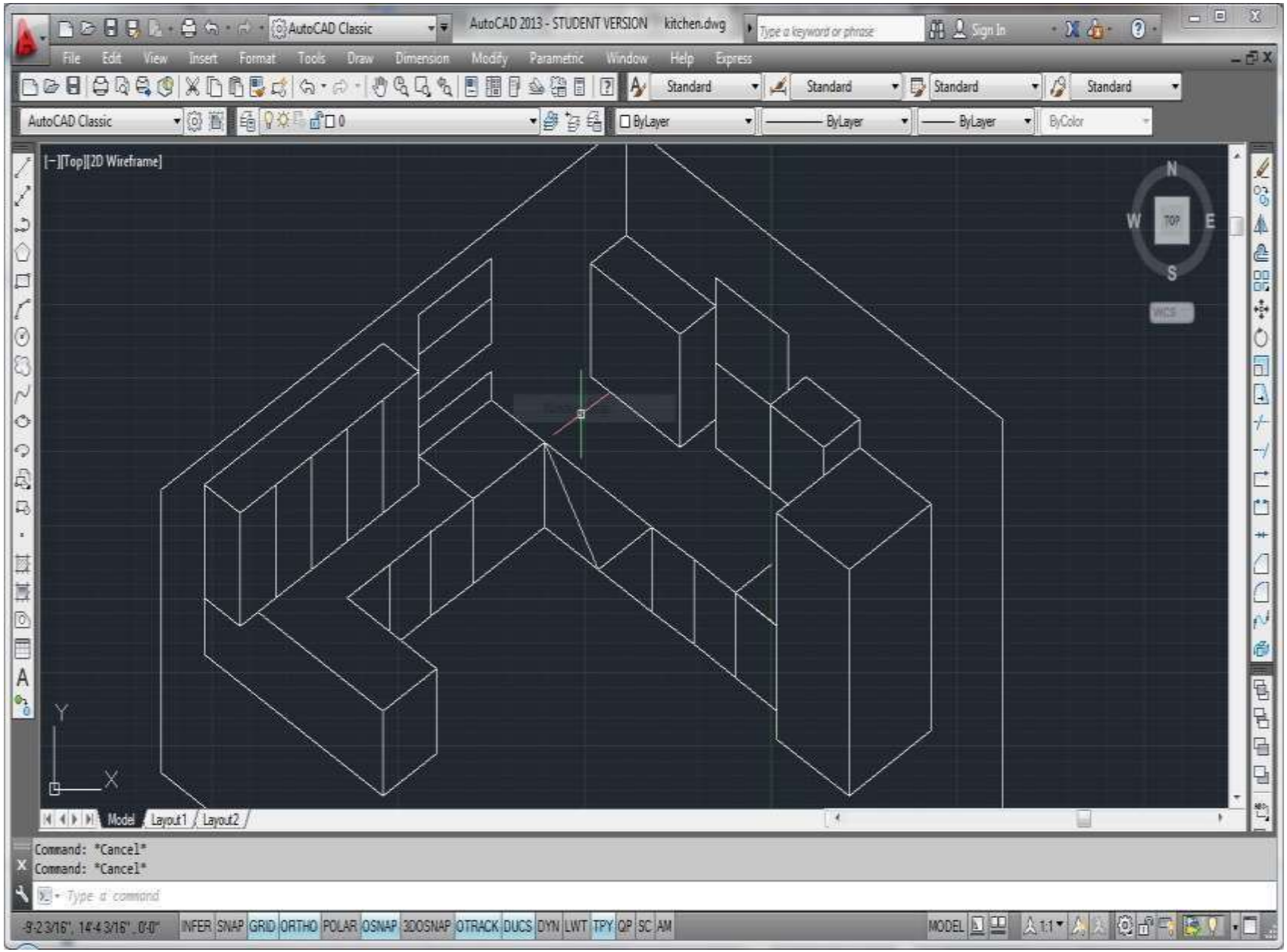
ISOMETRIC DRAWING OF KITCHEN:



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INTRODUCTION TO 3D:

3D capabilities allow you to draw pictorial views such as isometrics, oblique views and perspectives. The views drawn with CADD have a number of advantages as compared to views drawn on a drawing board. The views drawn with CADD are very accurate and provide a lot of flexibility in terms of editing and display. You can rotate a model on the screen just like an actual model, and display views from different angles. CADD provides special 3D functions that allow you to create 3D drawings that are true representations of an actual model. These drawings can be viewed from any angle just like a physical model. That is why 3D CADD drawings are called 3D models.

The major distinction between a 2D drawing and a 3D model is that a 2D drawing is defined only with two coordinates (X and Y). A 3D model is defined with three coordinates (X, Y and Z). The Z-coordinate determines the height of an object. To make a 3D model, you need to consider all the objects of the model in 3D space and enter the X, Y and Z coordinates for all drawing objects.

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3D MODELING

Solids contain the "mass properties" of 3D objects.

You can use the Solids toolbar for readily accessible objects

- Box
- Cylinder
- Wedge

You can use the Boolean operations of more complicated shapes.

- Union (join two solids)
- Subtract (carve out the second solid from the first)
- Intersection (only the common area)

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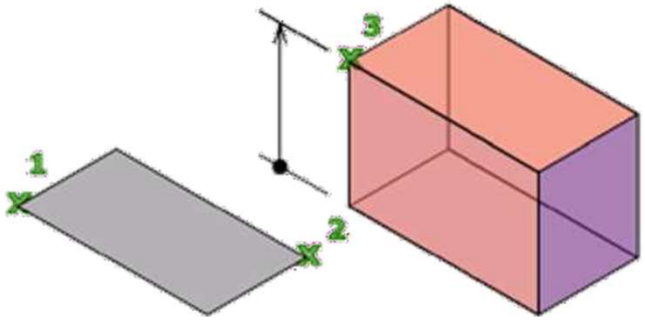
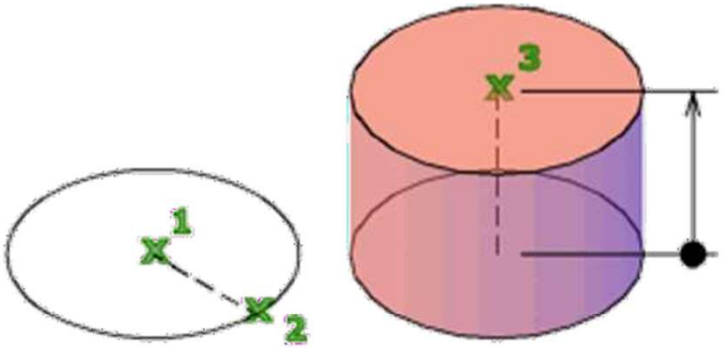
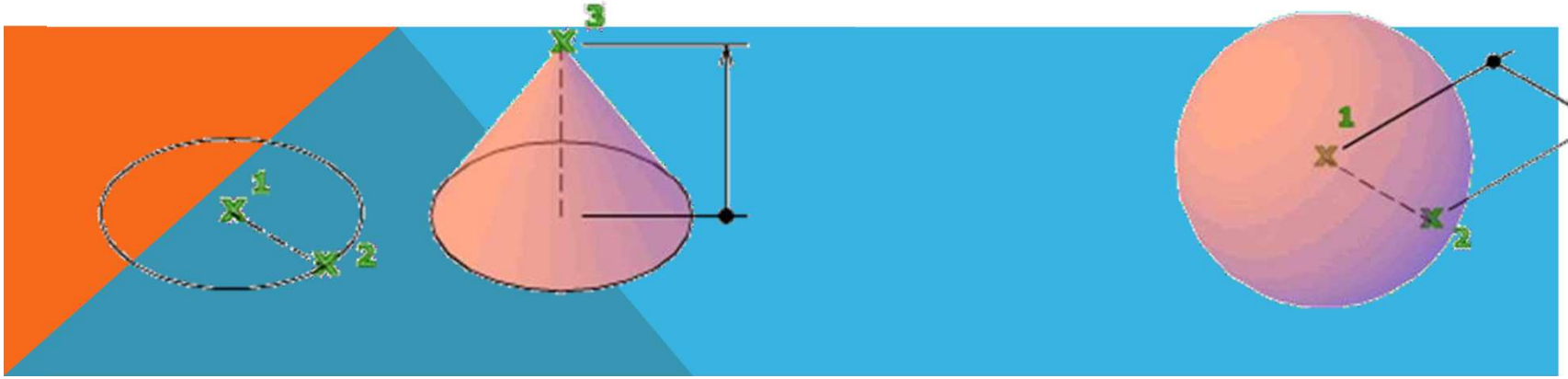
Some 3D Object







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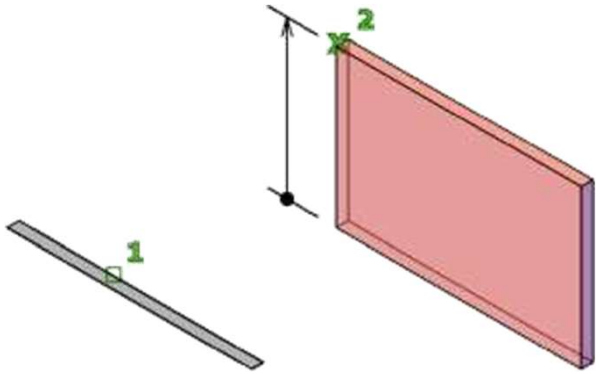
3D COMMANDS

PRESSPULL

Presspull can extend in the Z direction or be set to taper or follow a path.

You can extrude an open or closed object to create a 3D surface or solid.



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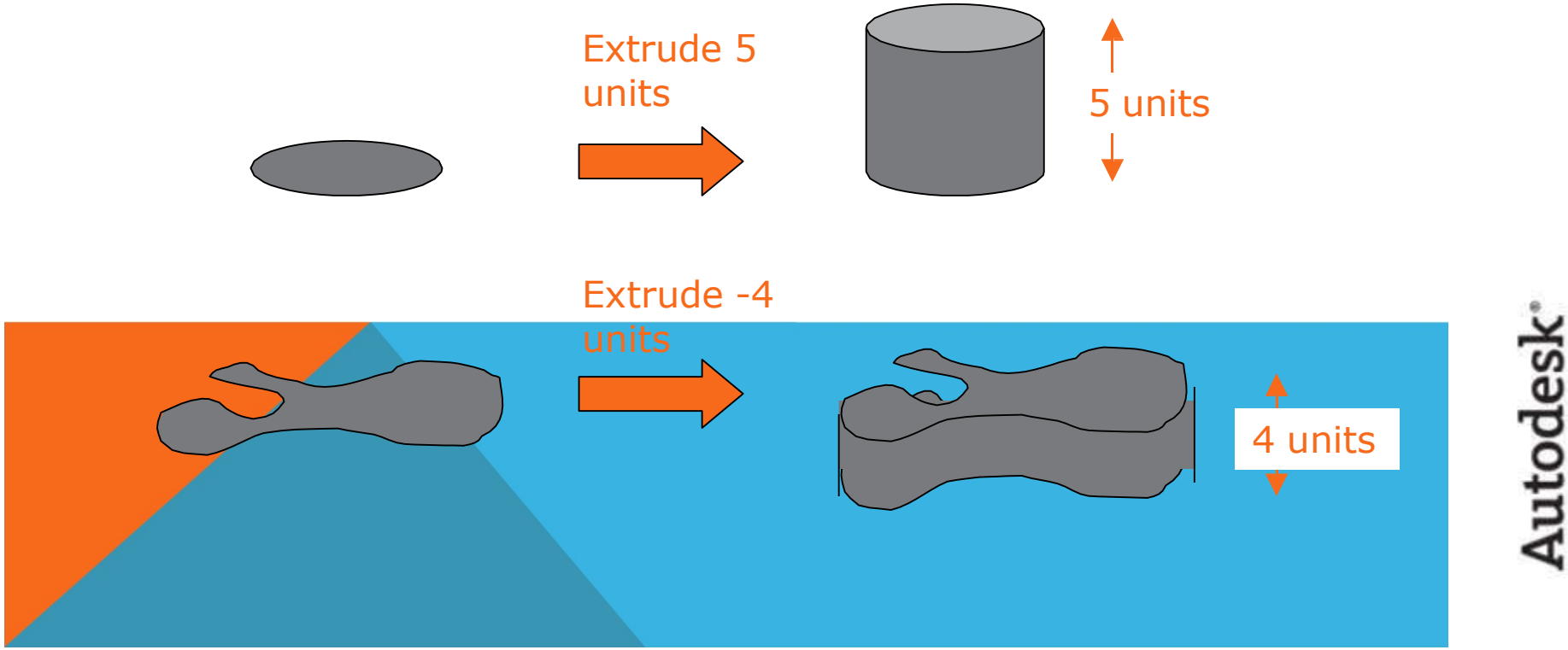
USE OF EXTRUDE COMMAND

If you "Extrude" a surface into the third dimension, you simply add a thickness in section. This basically is same as creating a "solid" object .



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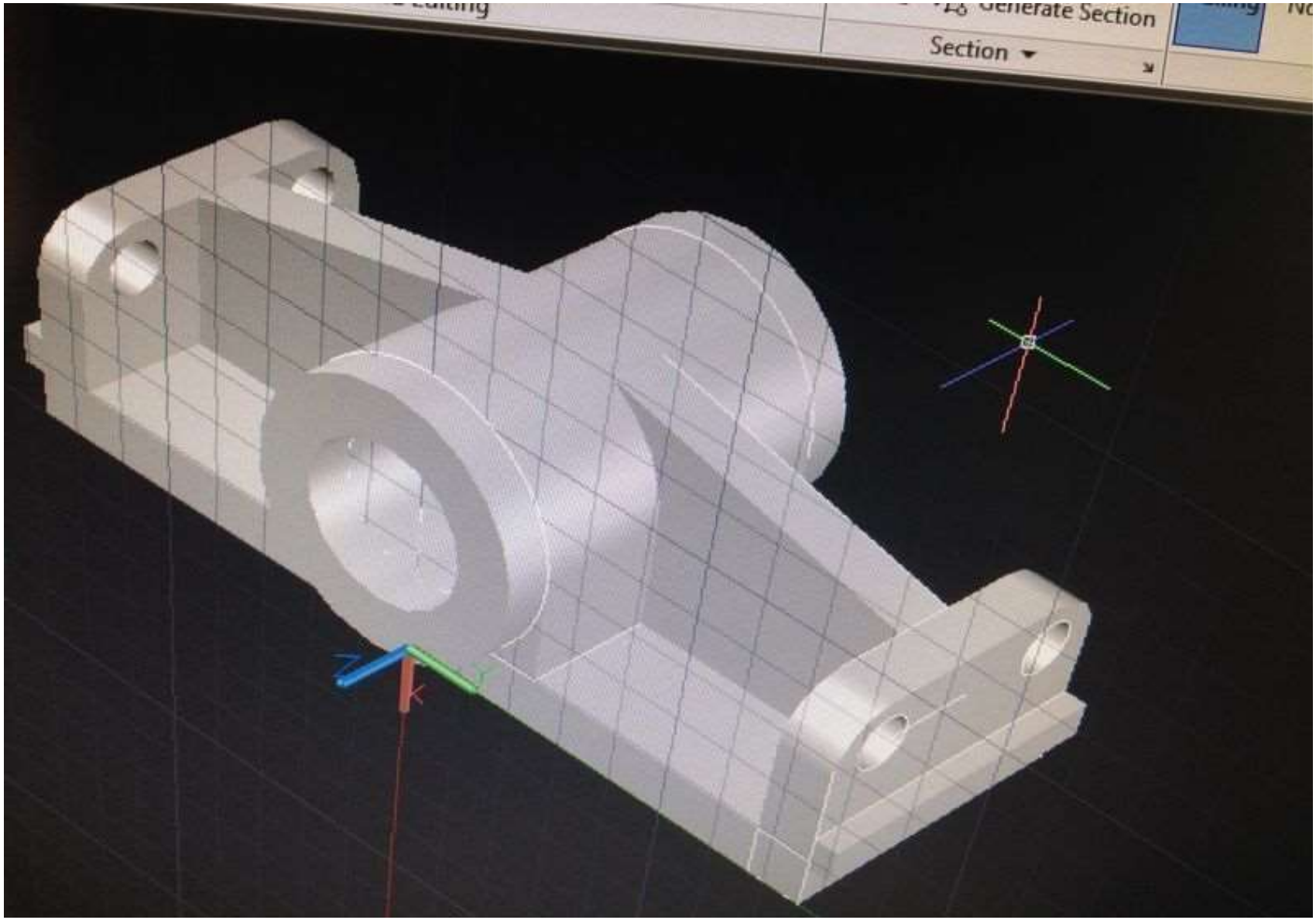
SOME 3D DRAWINGS MADE DURING THE AUTODESK AUTOCAD COURSE



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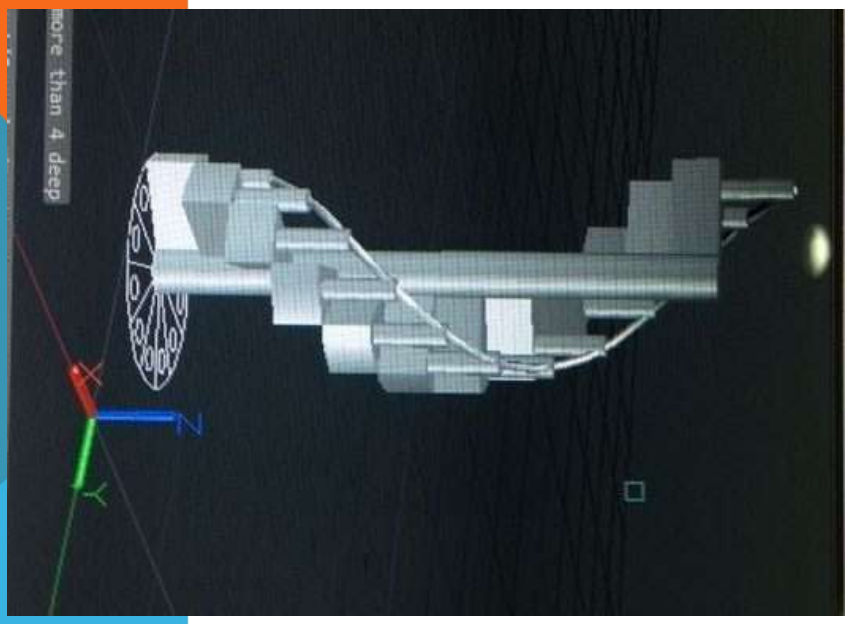

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BENEFITS/USE OF AUTOCAD

- ✓ Quickly create designs.
- ✓ Improved quality over hand drafting.
- ✓ Easily modify.
- ✓ More Accuracy.
- ✓ Easy to transfer.
- ✓ Long time save.

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STAAD PRO

STAAD or (**STAAD.Pro**) is a structural analysis and design software application originally developed by Research Engineers International in 1997. In late 2005, Research Engineers International was bought by Bentley Systems.[1][2]
STAAD.Pro is one of the most widely used structural analysis and design software products worldwide. It supports over 90 international steel, concrete, timber & aluminium design codes.
It can make use of various forms of analysis from the traditional static analysis to more recent analysis methods like p-delta analysis, geometric non-linear analysis, Pushover analysis (Static-Non Linear Analysis) or a buckling analysis. It can also make use of various forms of dynamic analysis methods from time history analysis to response spectrum analysis. The response spectrum analysis feature is supported for both user defined spectra as well as a number of international code specified spectra.
Additionally, STAAD.Pro is interoperable with applications such as RAM Connection, AutoPIPE, SACS and many more engineering design and analysis applications to further improve collaboration between the different disciplines involved in a project. STAAD can be used for analysis and design of all types of structural projects from plants, buildings, and bridges to towers, tunnels, metro stations, water/wastewater treatment plants and more.

BIM

Building design and building information modeling (BIM) software includes computer-aided design (CAD software) products used commonly within the architecture and construction industries. Many of these products offer tools and libraries specifically targeted toward architectural design and construction, including mechanical, electrical, and plumbing (MEP) and building information modeling (BIM). BIM software offers a model-based process for designing and managing buildings and infrastructures, going beyond construction drawings to generate a digital representation of the functional properties of a facility. Other products in this category may be used for a range of CAD purposes beyond architectural design, but their rankings within this grid focus exclusively on their use as a tool in building design.

ArcGIS

ArcGIS is a geographic information system (**GIS**) for working with maps and geographic information maintained by the Environmental Systems Research Institute (Esri). It is used for creating and using maps, compiling geographic data, analyzing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.

Build Superfast

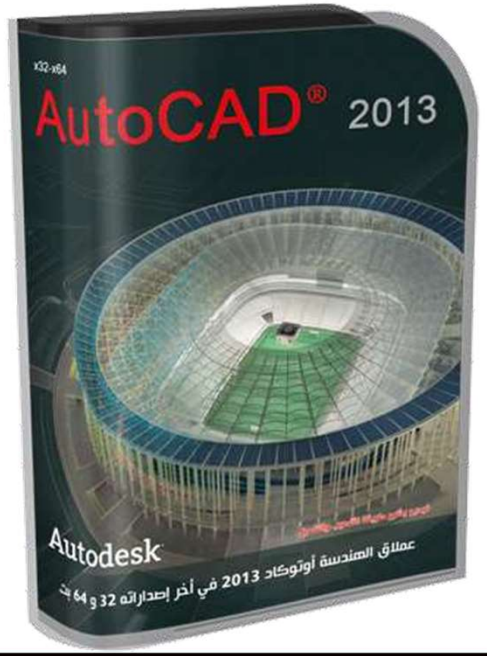
Build Superfast Accounting Software. ... Micromen Systems and Software launched a simple project planning and accounting software called **Build Superfast** for the Construction Industry including Builders, Contractors, Architects, Government Departments, and Interior Decorators.

MX Road

MX Road

MX Road is an excellent string-based modeling tool that enables the rapid and accurate design of all types of roads. Individuals such as civil engineers, designers, surveyors, system designers can access 3D modeling, construction driven engineering, and other analysis all in one engineering application. MX Road contributes to improving the quality of designs by combining traditional engineering workflow profile and cross sections with 3D modeling technology

REVIT

Begin modelling in 3D with accuracy and precision.
Automatically update floor plans, elevations and sections as your model develops.
Let Revit handle routine and repetitive tasks with automation so you can focus on higher-value work.

Thank you
Have a nice day