AUTODESK
AUTOCAD

CAD Lab

Lecture # 01

AUTODESK
AUTOCAD

CAD Lab

By: Engr Asim Ahmad Riaz

Ph.D. in Mechanical Engineering (in Progress)

B.Sc Mechanical Engineering

M.Sc in Material Engineering

Dept. of Mechanical Engineering

University of Engineering & Technology Peshawar

ME-104L: Engineering Drawing and CAD Lab

Credit Hours: 1

Contact Hours: 3

Grading: As per UET Statutes

Discuss OBE Course Card for AutoCAD, Assessment & Grade Policy

Recommended Books

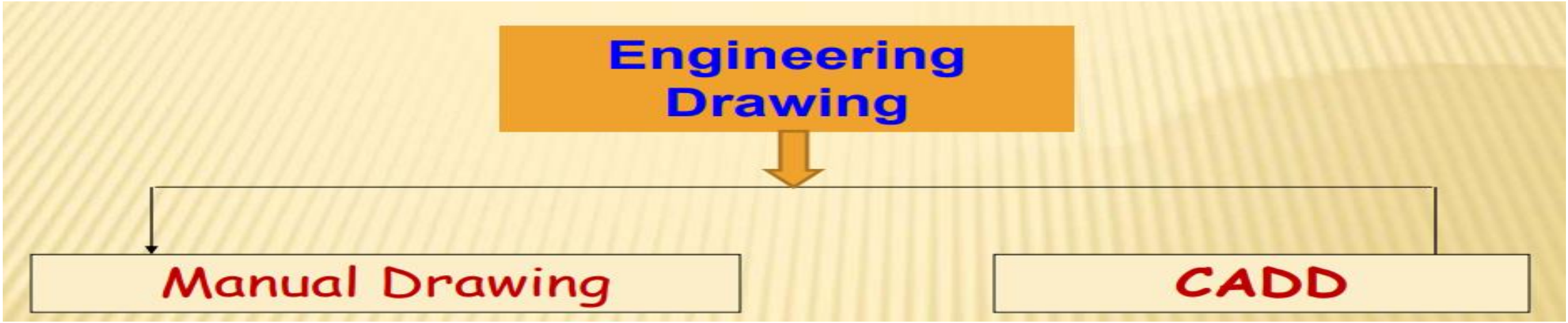
- AutoCAD 2007 User's Guide by AutoDesk.
- AutoCAD 2007 Command Reference by AutoDesk.
- Mastering AutoCAD 2007 by George Omura
- Engineering Drawing and Graphic Technology by French, Thomas E.; Vierck, Charles J. 12th Edition, ISBN 10: 0070221588, McGraw-Hill, 1978
- Engineering Drawing and Graphics Using Autocad by T. Jeyapoovan, 3rd edition, ISBN 10: 8125940006, Vikas Publishing, 2010
- Engineering Drawing by N.D Bhatt, 49 or 53rd Edition, ISBN-10: 9380358962, Charotar Publishing House Pvt. Ltd, 2014
- Google Search

Learning Objectives of this Lecture

At the end of this lecture you will learn;

- Course card & Weekly Schedule
- Course Learning Outcome ---- CLO's targeting PLO's
- Google Classroom
- AutoCAD & its introduction
- Installation of AutoCAD 2007, 2017 https://www.youtube.com/watch?v=ScoMLEqf9QA
- Introduction to AutoCAD, Graphical User Interface (GUI) and general commands, setting up drawing sheet, Units & toolbars
- To introduce the interface of AutoCAD 2007 and discuss the importance of interface.
- To elaborate the interface of AutoCAD 2007, different zooming options and basic drawing commands.

Engineering Drawing & CAD



Graphical representation of an object – Drawing

Engineering drawing – A drawing of an object that contains all information -like actual shape, accurate size, manufacturing methods, etc., required for its construction.

-No construction/manufacturing of any (man -made) engineering objects is possible without engineering drawing.

Introduction to AutoCAD

AUTODESK
AUTOCAD

CAD (Computer Aided Drawing /Drafting):

The Word AutoCAD is made up of two words “Auto(logo of company)” and CAD “(computer aided designing/drafting)”.

AutoCAD is a CAD (Computer Aided Design or Computer Aided Drafting) software application for 2D and 3D design and drafting. It is developed and sold by Autodesk, Inc. First released in December 1982, AutoCAD was one of the first CAD programs to run on personal computers.

Computer Aided Drawing /Drafting is a process of preparing a drawing of an object on the screen of a computer.

AutoCAD is a Computer Aided Design (CAD) program used by just about every Engineering and Design office in the world. Although there are alternative CAD packages, AutoCAD is by far the most widely used system. Autodesk's AutoCAD is the industry leader in CAD packages. Used by Civil Engineers, Architects, Mechanical and Electrical Engineers, Aeronautical Engineers plus many other disciplines.

Introduction to AutoCAD

r1	r13	2000	2002
2007	2009	2014	2018

BENEFITS OF CAD (Computer Aided Drawing /Drafting):

- Improved productivity in drafting.
- Shorter preparation time for drawing.
- Reduced manpower requirements.
- Customer modifications in drawing are easier.
- More efficient operation in drafting.
- Low wastage in drawing.
- Improved accuracy of drawing.
- Assistance in preparation of documentation
- Better designs can be evolved.
- Revisions are possible.
- Colours can be used to customize the product.
- Production of orthographic projections with
- dimensions and tolerances.
- Hatching of all sections with different filling patterns.
- Preparation of assembly or sub-assembly drawings.
- Preparation of part list.
- Machining and tolerance symbols at the required surfaces.
- Hydraulic and pneumatic circuit diagrams with symbols.
- Isometric views.

Limitation of CAD (Computer Aided Drawing /Drafting):

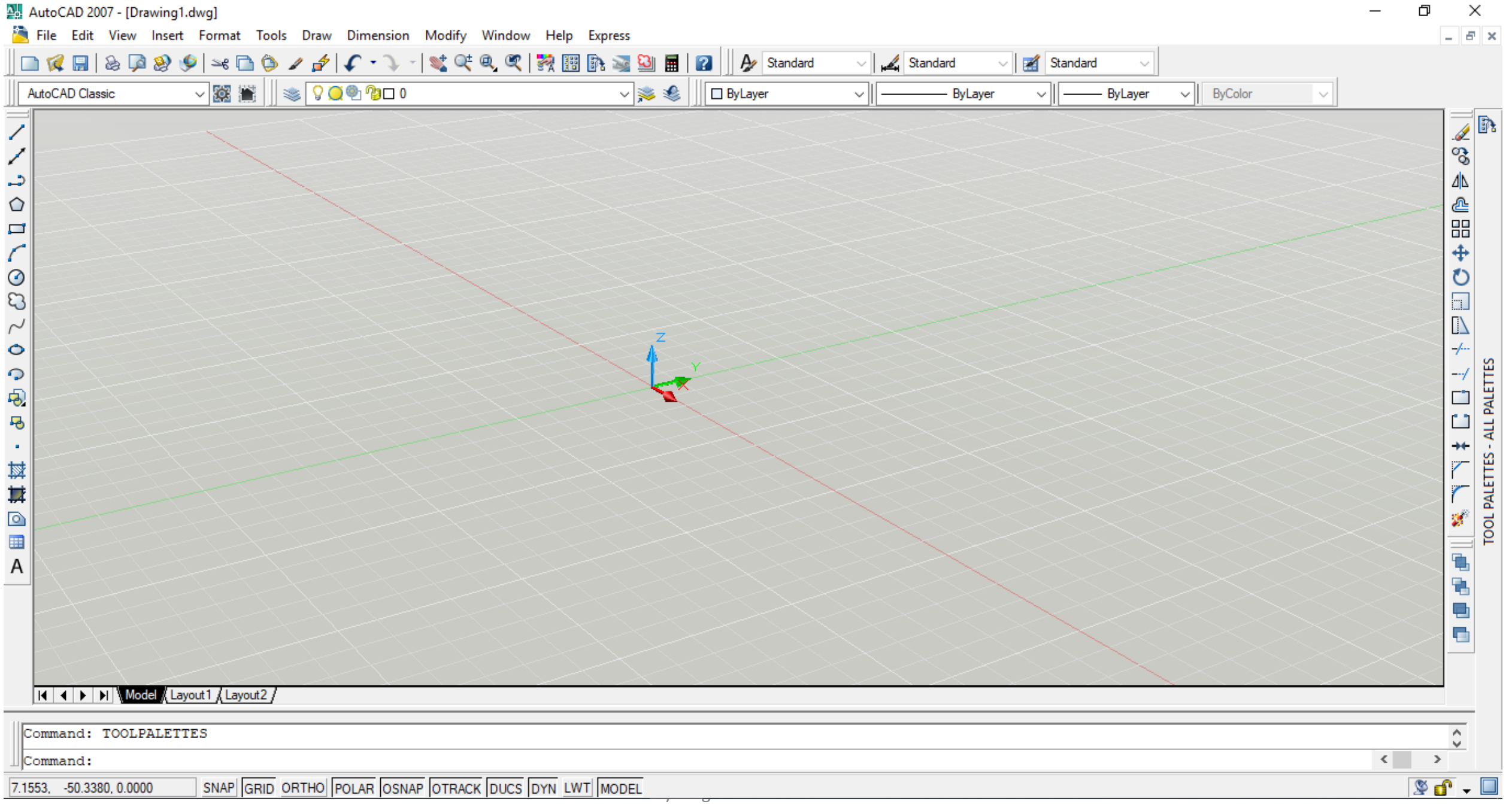
- It require large amount of computer memory.
- The size of the software package is large.
- Skill and judgment are required to prepare the drawing.
- Huge investment.

The use of CAD process provides enhanced graphics capabilities which allows any designer to;

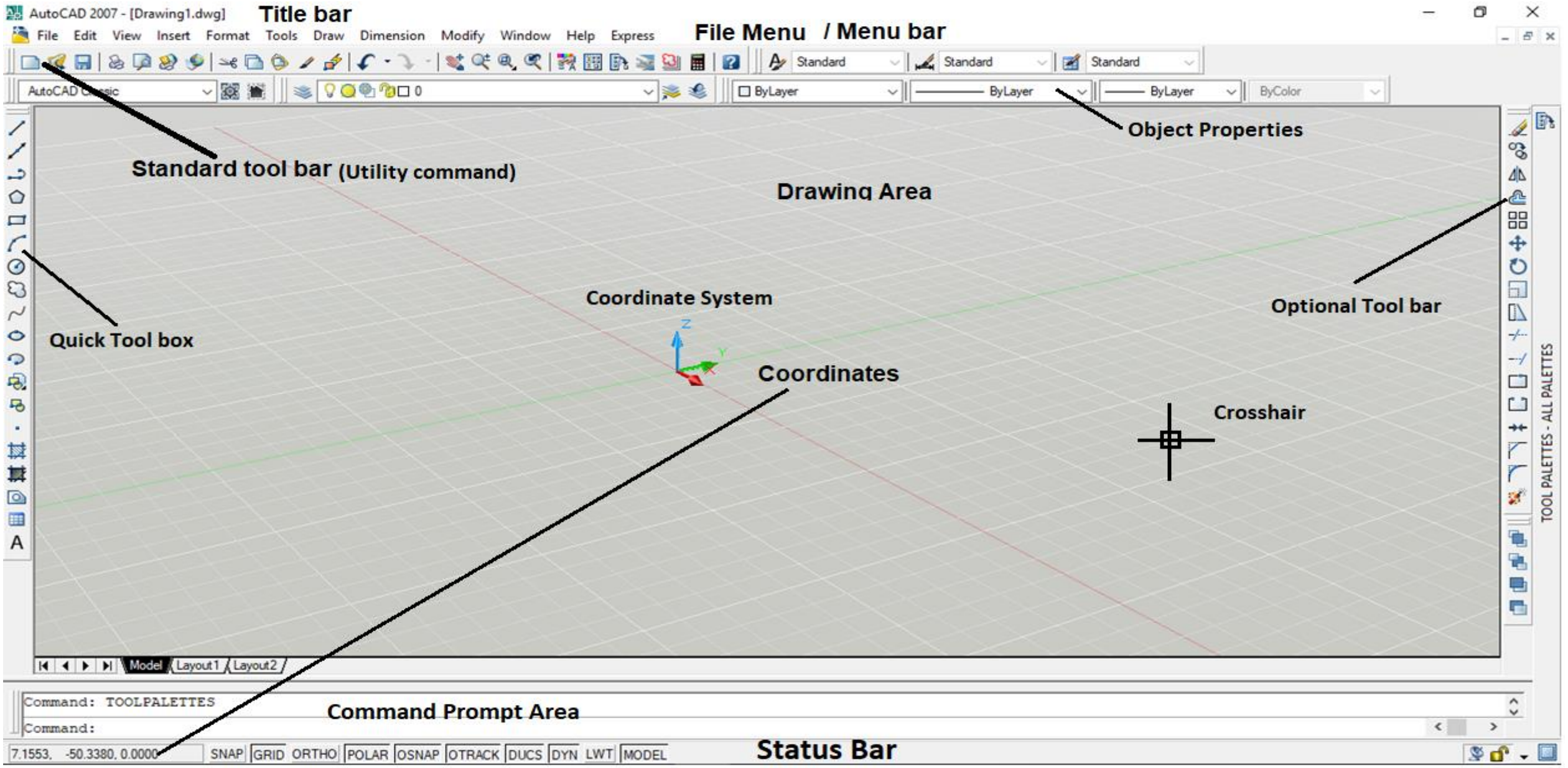
- Conceptualize his ideas
- Modify the design very easily
- Perform animation
- Make design calculations
- Use colures, fonts and other aesthetic features
- The image is constructed out of basic geometric element – points, lines circles etc.
- It can be modified according to the demand of the designer enlarged, reduced in size, moved to another location on screen ,rotated and other transformations also can be performed.

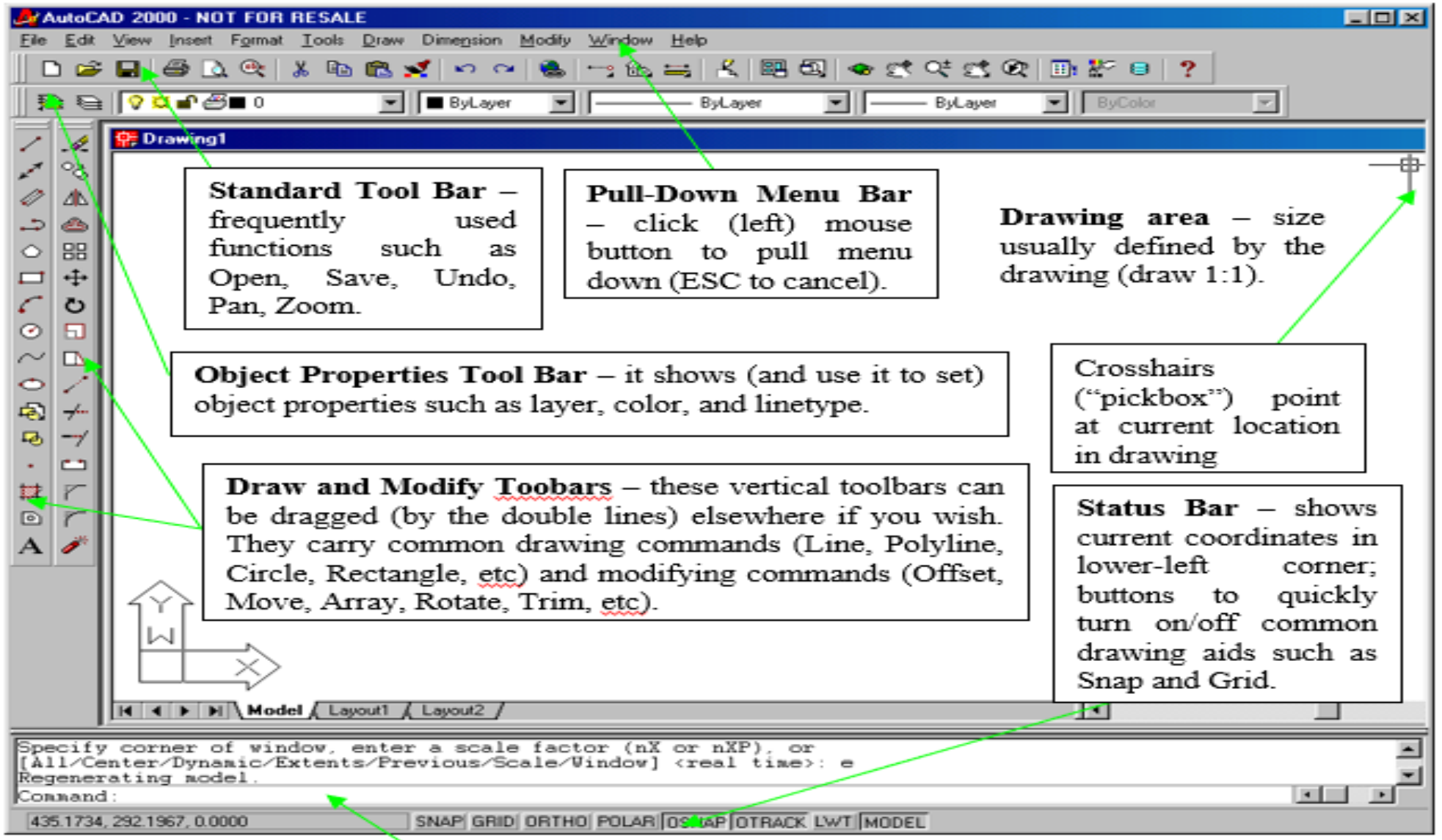
CAD Software

- **Auto-CAD**
- Pro-E
- IDEAS
- Solid Works
- CATIA
- Fluent
- Hyper mesh
- Abacus
- Transys etc.


AutoCAD 2007 - [Drawing1.dwg]
File Edit View Insert Format Tools Draw Dimension Modify Window Help Express
Standard
Standard
Standard
AutoCAD Classic
0
ByLayer
ByLayer
ByLayer
ByColor
Z
Y
X
Model
Layout1
Layout2
TOOL PALETTES - ALL PALETTES
Command: TOOLPALETTES
Command:
7.1553, -50.3380, 0.0000
SNAP
GRID
ORTHO
POLAR
OSNAP
OTRACK
DUCS
DYN
LWT
MODEL

Graphical Screen..!





Standard Tool Bar – frequently used functions such as Open, Save, Undo, Pan, Zoom.

Pull-Down Menu Bar – click (left) mouse button to pull menu down (ESC to cancel).

Drawing area – size usually defined by the drawing (draw 1:1).

Object Properties Tool Bar – it shows (and use it to set) object properties such as layer, color, and linetype.

Crosshairs ("pickbox") point at current location in drawing

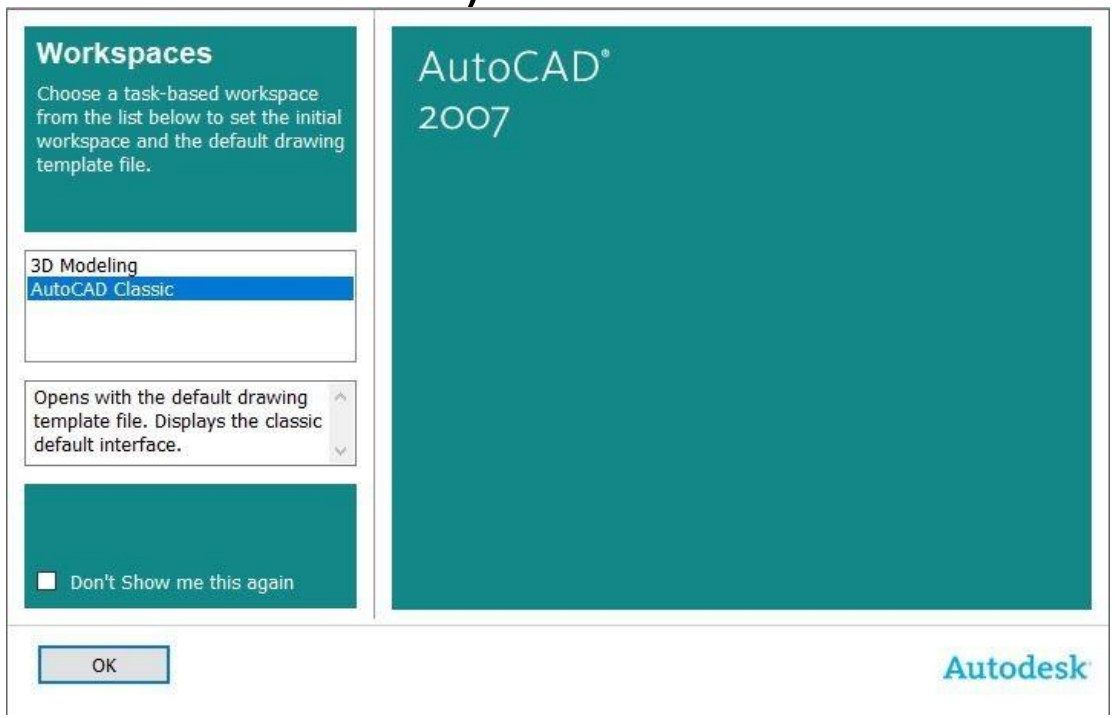
Draw and Modify Toobars – these vertical toolbars can be dragged (by the double lines) elsewhere if you wish. They carry common drawing commands (Line, Polyline, Circle, Rectangle, etc) and modifying commands (Offset, Move, Array, Rotate, Trim, etc).

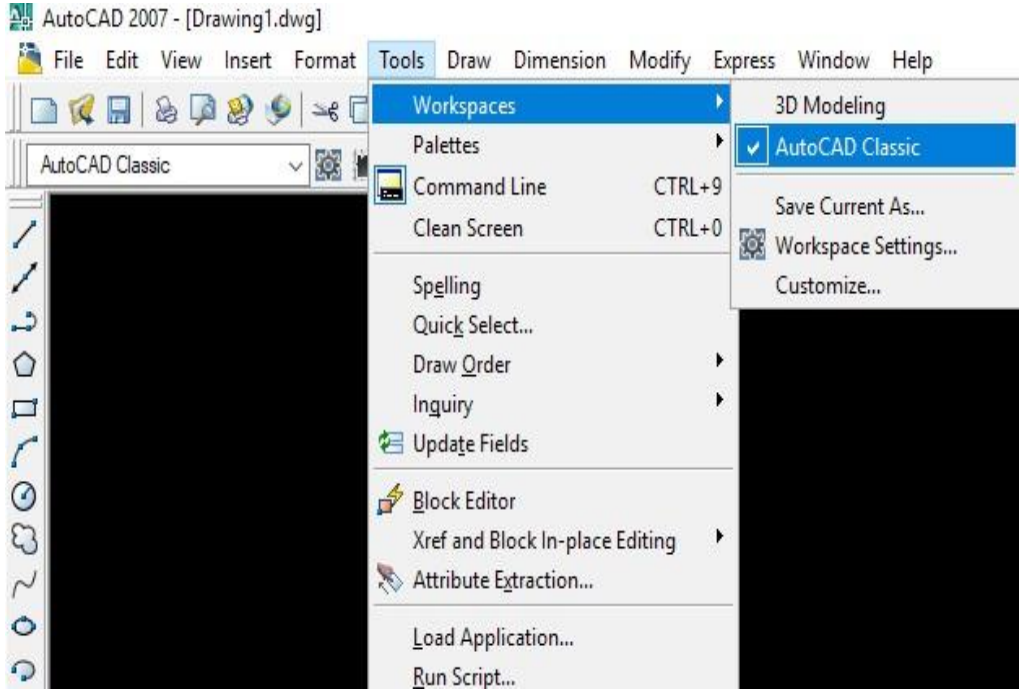
Status Bar – shows current coordinates in lower-left corner; buttons to quickly turn on/off common drawing aids such as Snap and Grid.

Command window – enter commands here to communicate with ACAD; 3 command lines are seen by default. Press F2 to see more lines / go back to drawing window.

Introduction to AutoCAD, Graphical User Interface (GUI) and General commands, setting up drawing sheet, Units & toolbars

1. **Launching AutoCAD 2007**
2. **Selecting Workspace** (Menu bar → Tools → Workspaces → 3D modeling or Autocad Classic).





3. The Graphics screen

1. Title Bar **2. Menu Bar** **3.The Standard toolbar**

4. Command prompt area **5. Status Bar**

Title Bar:

The title bar is positioned at the top of the screen and displays the AutoCAD 2007 icon, the AutoCAD Release version and the current drawing name.

Menu Bar:

The bar below title bar. It contains different number of options eg file, edit, format etc.

The Standard toolbar:

The Standard toolbar is positioned below the screen menu bar and allows the user access to several button icon selections including New, Open, Save, Plot, etc.

Command prompt area:

It is located at the bottom and used for typing commands.

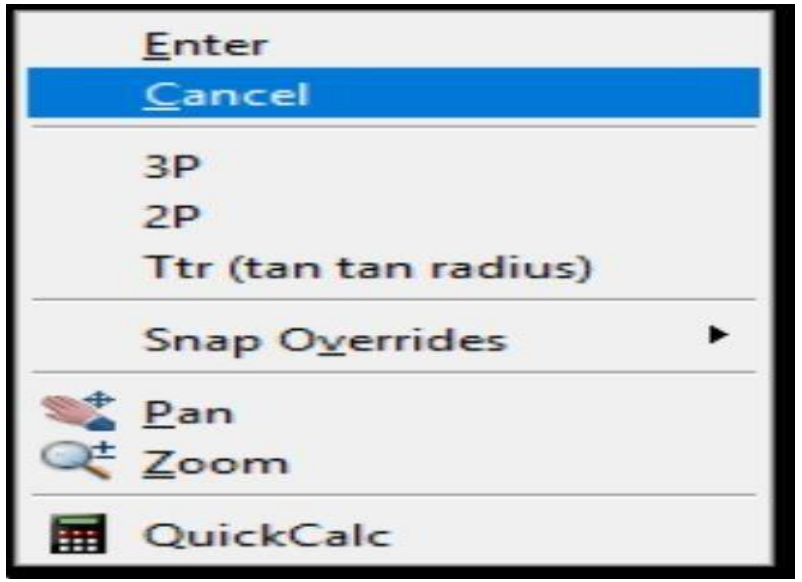
Status Bar:

Positioned above the Windows taskbar. It gives drawing aid buttons, e.g. SNAP, GRID, ORTHO, POLAR, OSNAP, OTRACK, DUCS, DYN, LWT

4. Putting the User Interface to work:

Command Prompt (Typing a Command): A command can be activated by writing its shortcut in command prompt area and pressing enter.

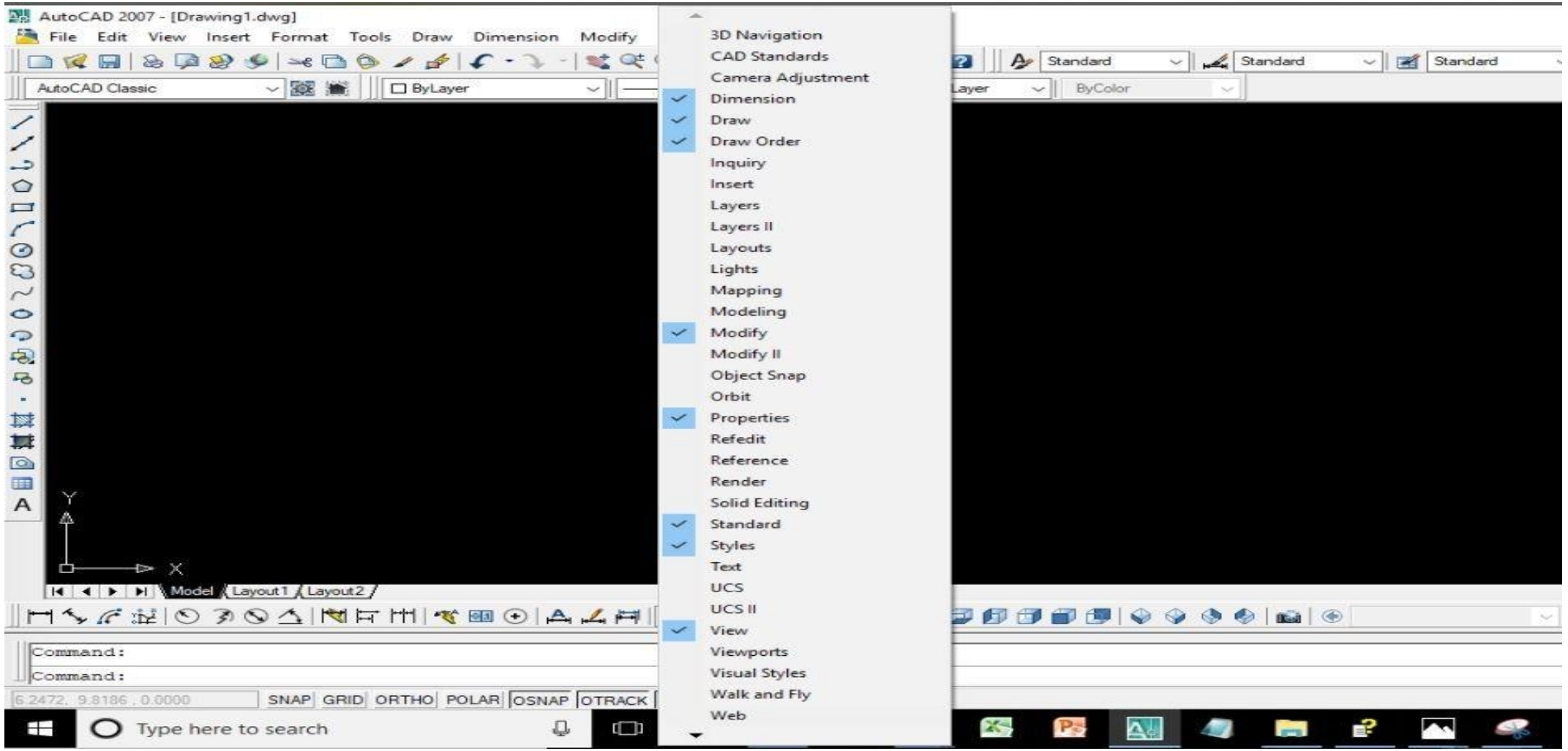
Canceling a Command: A command can be canceled by pressing Esc button or by left clicking and selecting cancel option.



5. Opening, Saving, and Printing drawing:

- **Opening Drawing:** A drawing can be opened by pressing Ctrl+O or by Clicking on file option in menu bar and then selecting open. It can also be opened by clicking open icon in standard toolbar.
- **Saving Drawing:** A drawing can be opened by pressing Ctrl+S or by Clicking on file option in menu bar and then selecting save. It can also be saved by clicking save icon in standard toolbar.
- **New Drawing:** A new drawing can be started by pressing Ctrl+N or by Clicking on file option in menu bar and then selecting New. It can also be started by clicking new icon in standard toolbar.
- **Printing Drawing:** A drawing can be printed by pressing Ctrl+P or by Clicking on file option in menu bar and then selecting Plot. It can also be printed by clicking plot icon in standard toolbar.

6. **Setting toolbars for quick use:** Right-click any toolbar button and choose from the list of available toolbars and drag it to desired place.



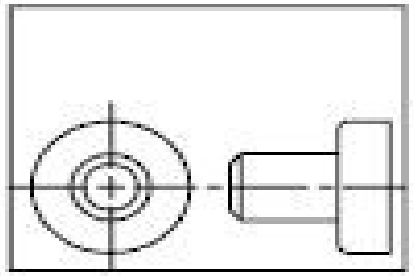
7. Zoom

ZOOM does not change the absolute size of objects in the drawing. It changes only the magnification of the view.

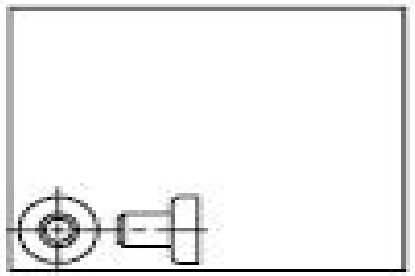
- **Zoom Shortcut Key:** z → enter
- **Zoom options:** Real Time, Extents, Previous, Dynamic, All, Dynamic, Window.

Zoom All: Zooms to display all visible objects and visual aids.Adjusts the magnification of the drawing area to accommodate the extents of all visible objects in the drawing.

- **Shortcut Key:-** z → enter → a → enter



before ZOOM All

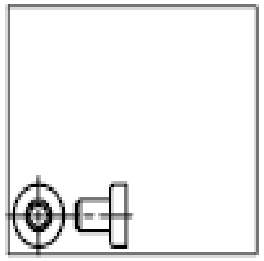


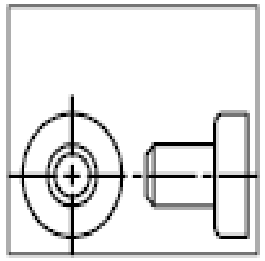
after ZOOM All

7. Zoom

Zoom Extents: Zooms to display the maximum extents of all objects.

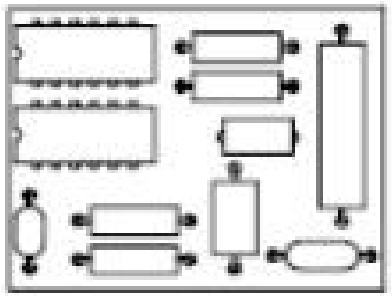
- **Shortcut Key:-** z→enter→e→enter

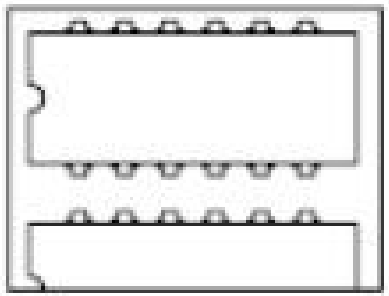

before ZOOM Extents

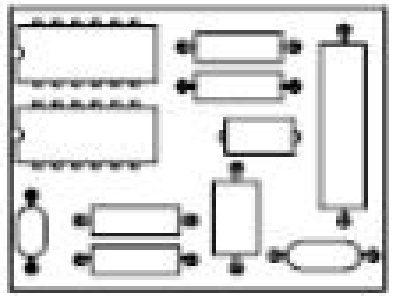

after ZOOM Extents

Zoom Previous: Zooms to display the previous view.

- **Shortcut Key:-** z→enter→p→enter

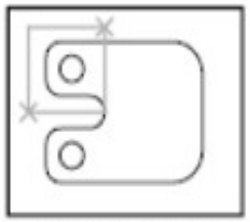

original view

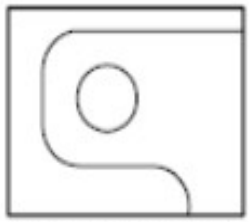

current view


after ZOOM Previous

Zoom Window: Zooms to display an area specified by a rectangular window.

- **Shortcut Key:-** z→enter→w→enter

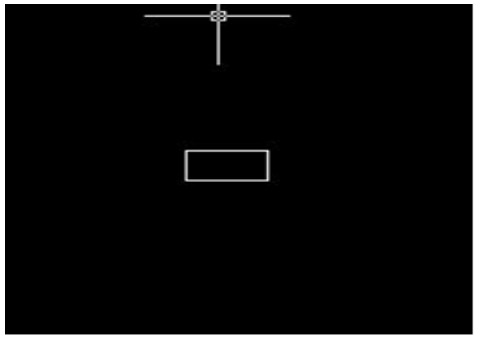

before ZOOM Window


after ZOOM Window

7. Zoom

Zoom Object: Zooms to display one or more selected objects as large as possible.

- **Shortcut Key:-** z→enter→o→enter

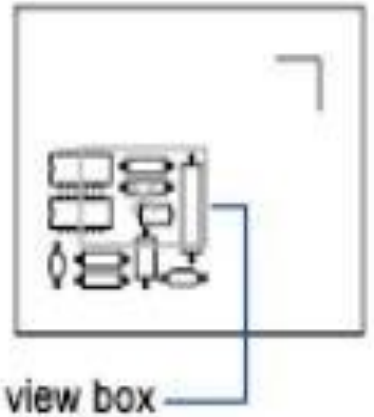


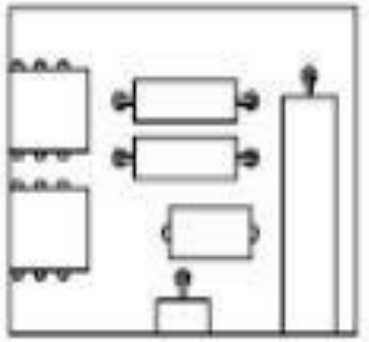
Before Zoom Object

After Zoom Object

Zoom Dynamic: Zoom using a rectangular view box. The view box represents drawing view, which can be shrinked or enlarged and move around the drawing.

- **Shortcut Key:-** z→enter→d→enter





new view

7. Zoom

Zoom Real Time: Zooms interactively to change the magnification of the view.The cursor changes to a magnifying glass with plus (+) and minus (-) signs.

Shortcut Key:- z→enter→r→enter

8. **PAN Command:** Shifts the view without changing the viewing direction or magnification.

Shortcut Key:- p→enter

It can also be activated by clicking on hand icon at the top

9. Setting up drawing limits:-

Menu bar :- Format > Drawing limits

OR

Command:- limits

- Set the drawing areas by **limits** command. First enter the limits command. It will display the prompt “to specify the lower left corner” and then the next prompt is “specify the upper right corner”.

The following is the prompt sequence of the limits command for setting limits.

- Specify lower left corner or [ON/OFF]: 0,0
- Specify upper right corner :11,9

10. Setting up drawing Units:-

Menu bar :- Format > units

OR

Command:- units

- The **units** command is used to select a format for the unit of distance and angle measurement.
-
- After entering the **units** command it will display the **Drawing Units** dialog box which is used to set the units and angles. Then specify the Precision for the units and angles from the corresponding precision drop-down list. After selecting all the set-up press **OK.**

THANKS...!

QUESTIONS ARE WELCOME ....!!!