ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

Introduction to AutoCAD

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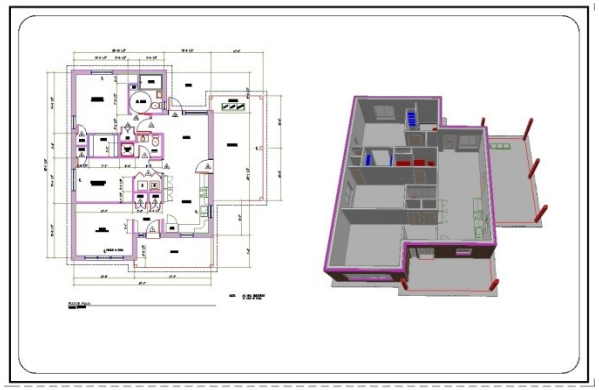
CONTENT

Introduction

Starting Auto CAD 2016

The Auto CAD 2016 graphics window

WHAT ARE THE “C”, “A”, AND “D”?



- **CAD Stands for One of**
  - **C**omputer **A**ided **D**esign
    - The More Typical Definition
  - **C**omputer **A**ided **D**rafting
- **Sometimes See CADD or CAE**
  - **C**omputer **A**ided **D**rafting & **D**esign
    - Covers Both Bases
  - **C**omputer **A**ided **E**ngineering
    - Typically CADD + Numerical-Analysis

AUTOCAD

- The Word AutoCAD is made up of two words "Auto(logo of company)"and CAD "(computer aided design)".
- Engineering Designing Software.
  - 2D and 3D computer-aided drafting software.
- Useful for Mechanical, Civil and Architectural Fields.
- Use to Create Blueprints, Floor Plans, 3D models, and Detailed Construction Drawings and Documents.

CAD SOFTWARE

Common Basic Elements

- Commands to generate geometry
  - Makes Mathematically Accurate Lines, Curves, Surfaces, Volumes, etc.
- Functions for controlling views
- Modifiers for changing drawing geometry
- Annotation commands for adding text, dimensions, and notes

The use of CAD has Revolutionized Engineering Graphics

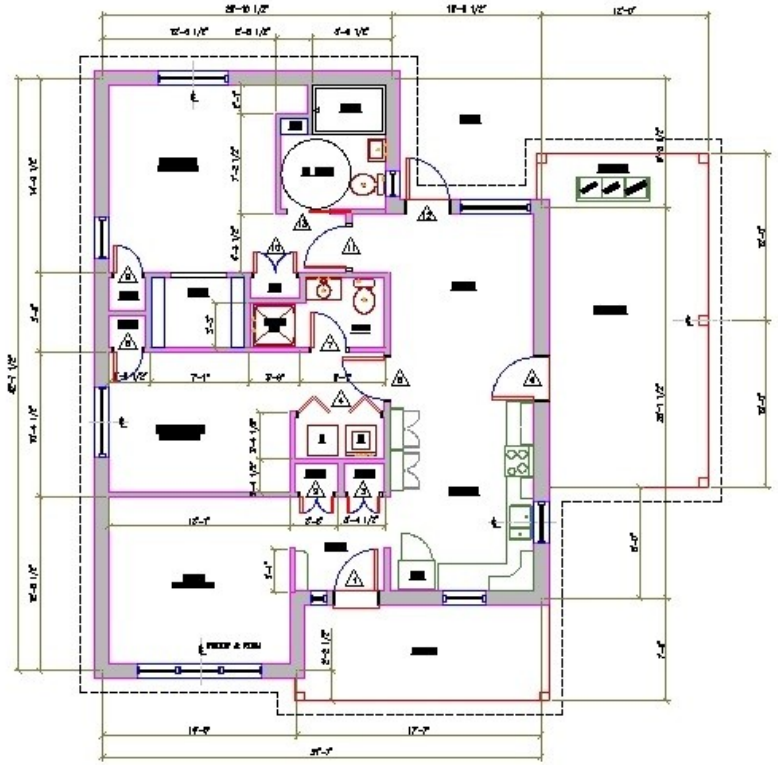
Difference Between CAD & AutoCAD

Initial CAD Software

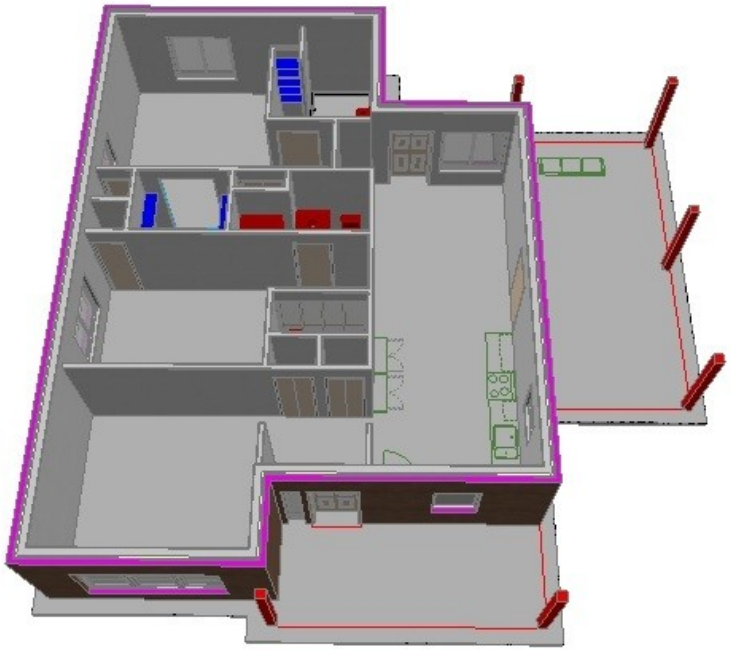
- Designed to take basic geometric shapes and manipulate them into a specific design.
- Launched first in **1957** by **General Motors** and other in **1960** by **McDonnell Douglas Automation Company**.

AutoCAD Software

- Designed to take complex and detailed designs.
- Developed by **Autodesk, Inc.**, in **1982**, to aid programmers in all aspects of 2D and 3D design.



FLOOR PLAN



Why should you use CAD?

- Traditional drafting is repetitious and can be inaccurate.
- It may be faster to create a simple “rough” sketch by hand but larger more complex drawings with repetitive operations are drawn more efficiently using CAD.

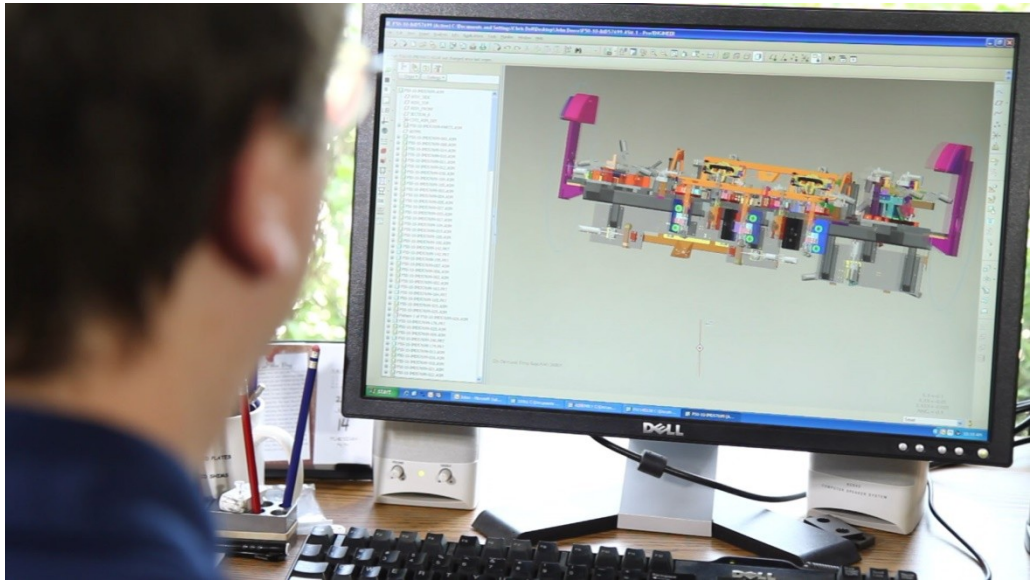
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The use of CAD has Revolutionized Engineering Graphics

CAD SOFTWARE





INTRODUCTION

Why use AutoCAD?

- **AutoCAD is a computer aided design software developed by Autodesk Inc. AutoCAD was first introduced in 1982.**

By the year 2000, it is estimated that there were over 4 million AutoCAD users worldwide.

WHAT IS AUTODESK?

Autodesk, Inc. is an American multinational software corporation that makes software for the architecture, engineering, construction, manufacturing, media, and entertainment industries.

The company was founded in 1982 by John Walker, a coauthor of the first versions of AutoCAD

Autodesk became best known for AutoCAD but now develops a broad range of software for design, engineering, and entertainment as well as a line of software for consumers, including Sketchbook, Homestyler, and Pixlr.

Architecture, engineering and construction

headquartered in Waltham, Massachusetts, in a LEED Platinum building

AutoCAD-based design and documentation software such as AutoCAD Architecture , AutoCAD MEP, and AutoCAD Civil 3D. Their flagship product for relational Building information modeling is Revit. Revit is available as Revit Architecture, Revit Structure, Revit MEP or an all-in-one product

Autodesk Media and Entertainment

designed for digital media creation, management, and delivery, from film and television visual effects, color grading, and editing to animation, game development, and design visualization.

The principal product offerings from the Media and Entertainment Division are the Autodesk Entertainment Creation Suites, which include Maya, Softimage, 3ds Max, Mudbox, Smoke, Flame, and Lustre.

Much of *Avatar*'s visual effects were created with Autodesk media and entertainment software.

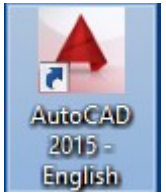
BENEFITS OF CAD

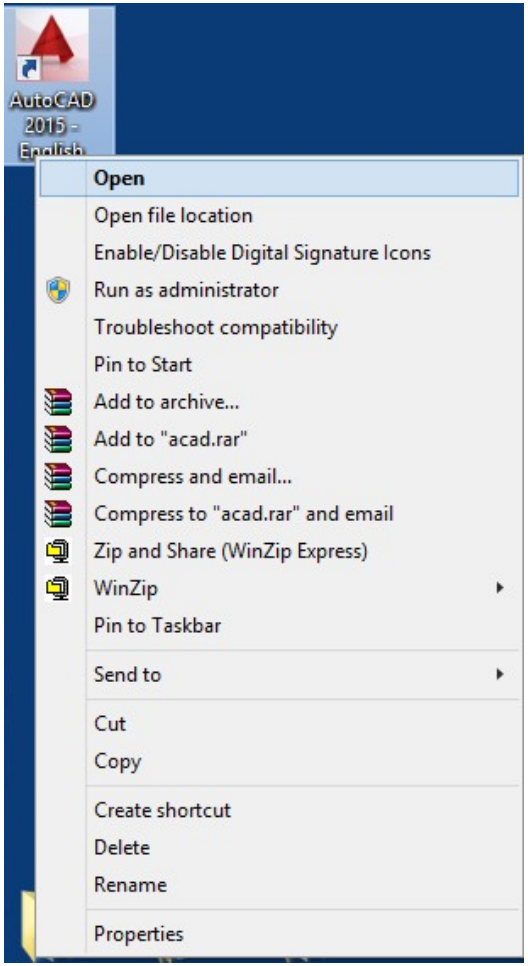
- **To Draw to Scale**
- **Lay Out The Drawing Conveniently**
- **CAD Is Flexible To Organize Drawing Information**
- **Establish Drafting Standards**
- **Draw Efficiently**
- **Draw Accurately**
- **View Your Drawing**
- **Create Dimensions and Text**
- **Modify Your Drawing**

.

Starting AutoCAD 2016

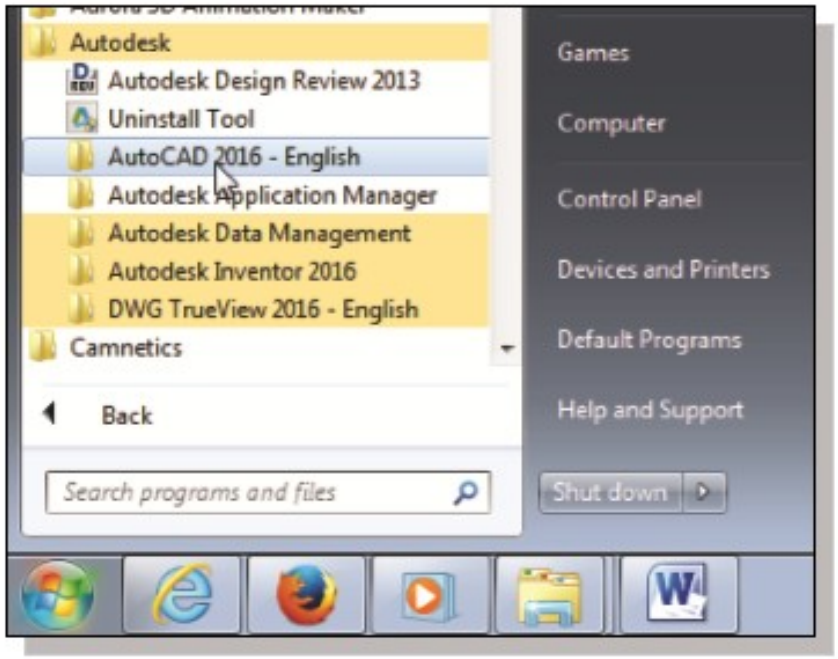
Open AutoCAD 2016 - either with a *double-click* on its start-up icon in the Windows desktop, or *right-click* on the Icon, flowed by a *Left-click* on open in the menu which then appears.

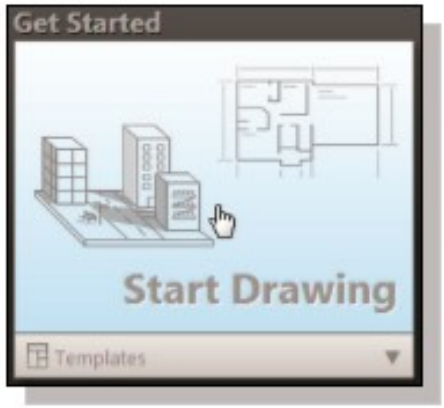




Starting Up AutoCAD 2016

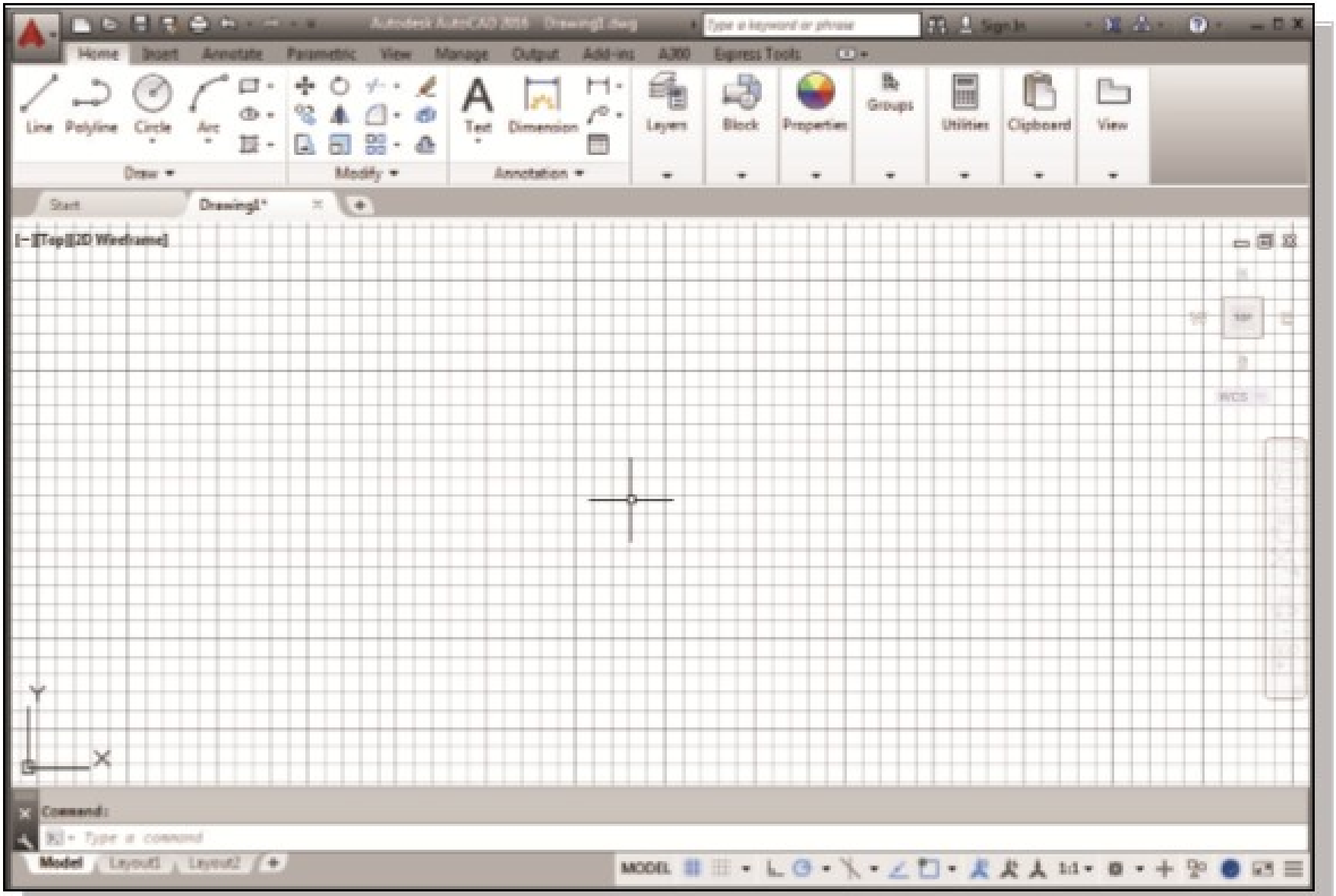
1. Select the **AutoCAD 2016** option on the *Program* menu or select the **AutoCAD 2016** icon on the *Desktop*. Click **Start Drawing** to start a new drawing.



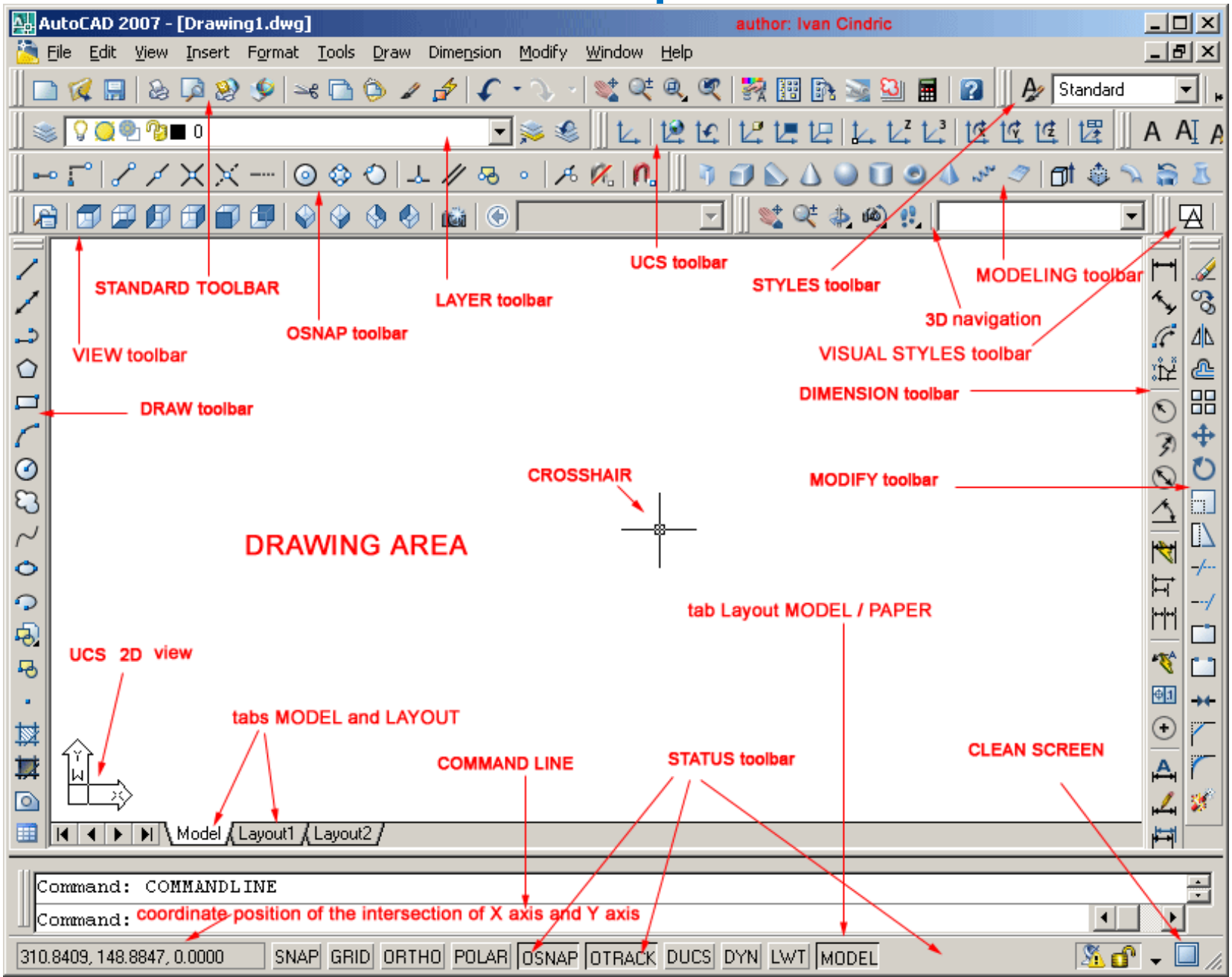


- Once the program is loaded into memory, the **AutoCAD 2016** main drawing screen will appear on the screen.

- Note that AutoCAD automatically assigns generic names, *Drawing X*, as new drawings are created. In our example, AutoCAD opened the graphics window using the default system units and assigned the drawing name *Drawing1*.

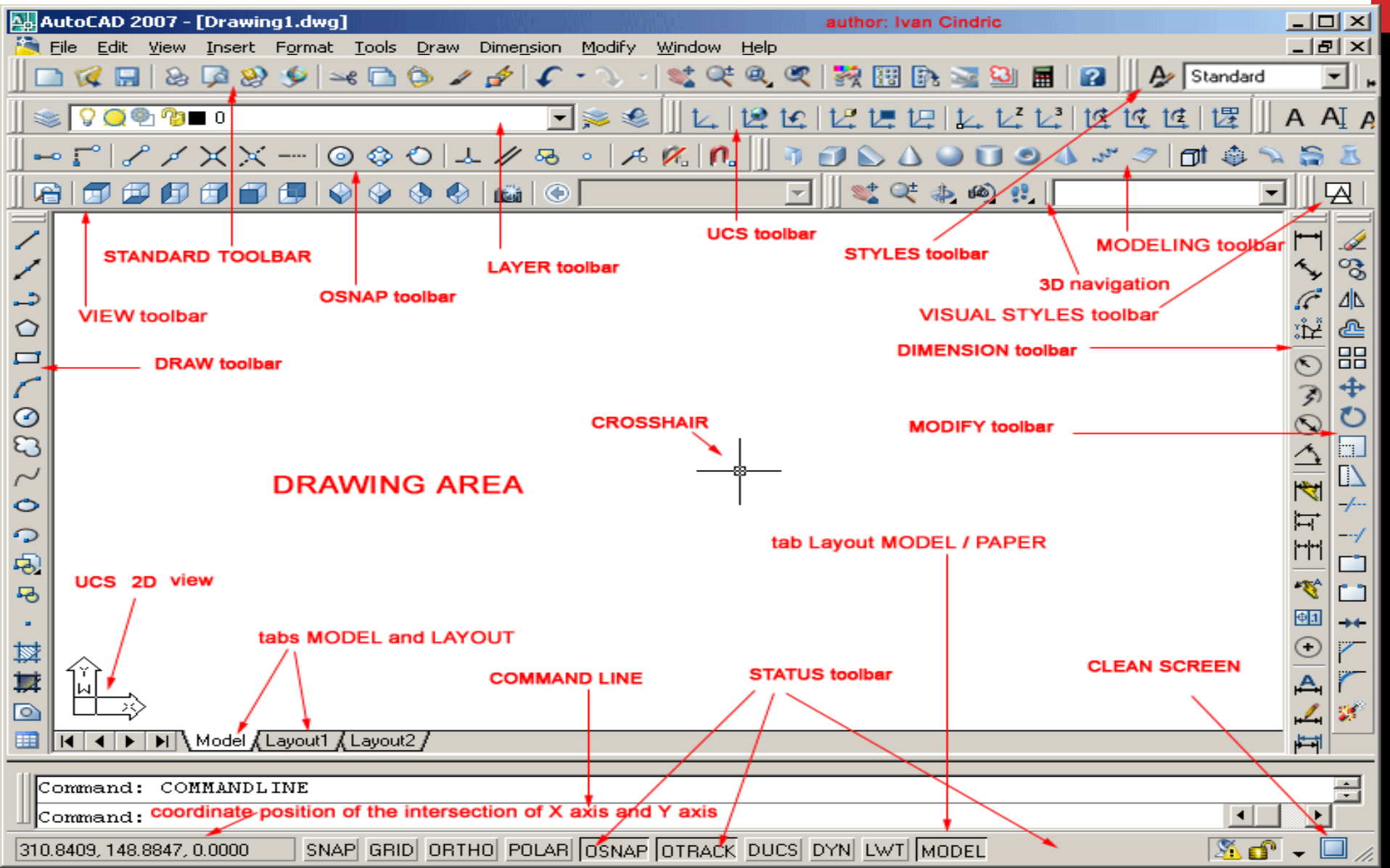


AutoCAD 2007 Workspace



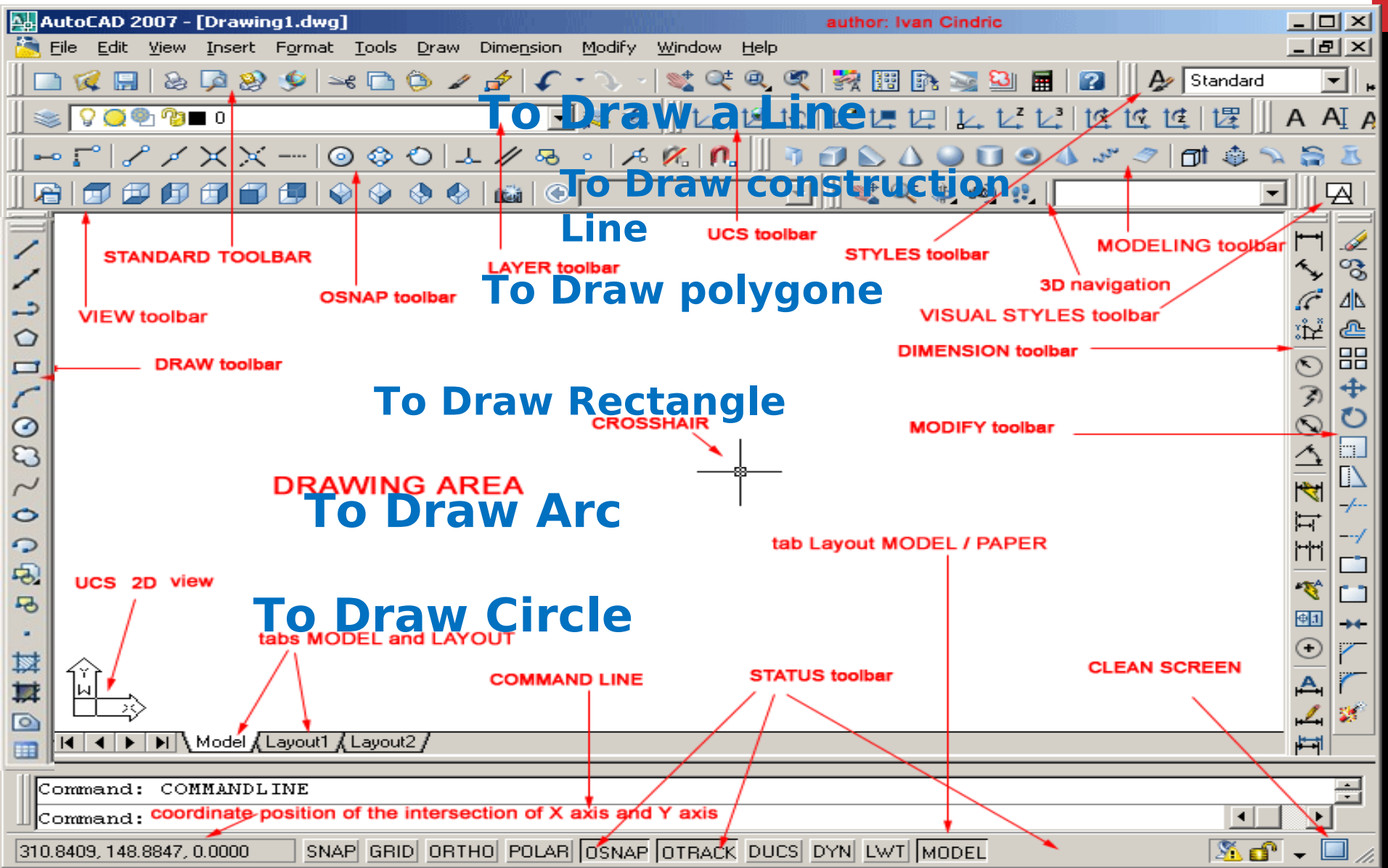
AUTOCAD 2007 TOOLBARS

Standard Toolbar



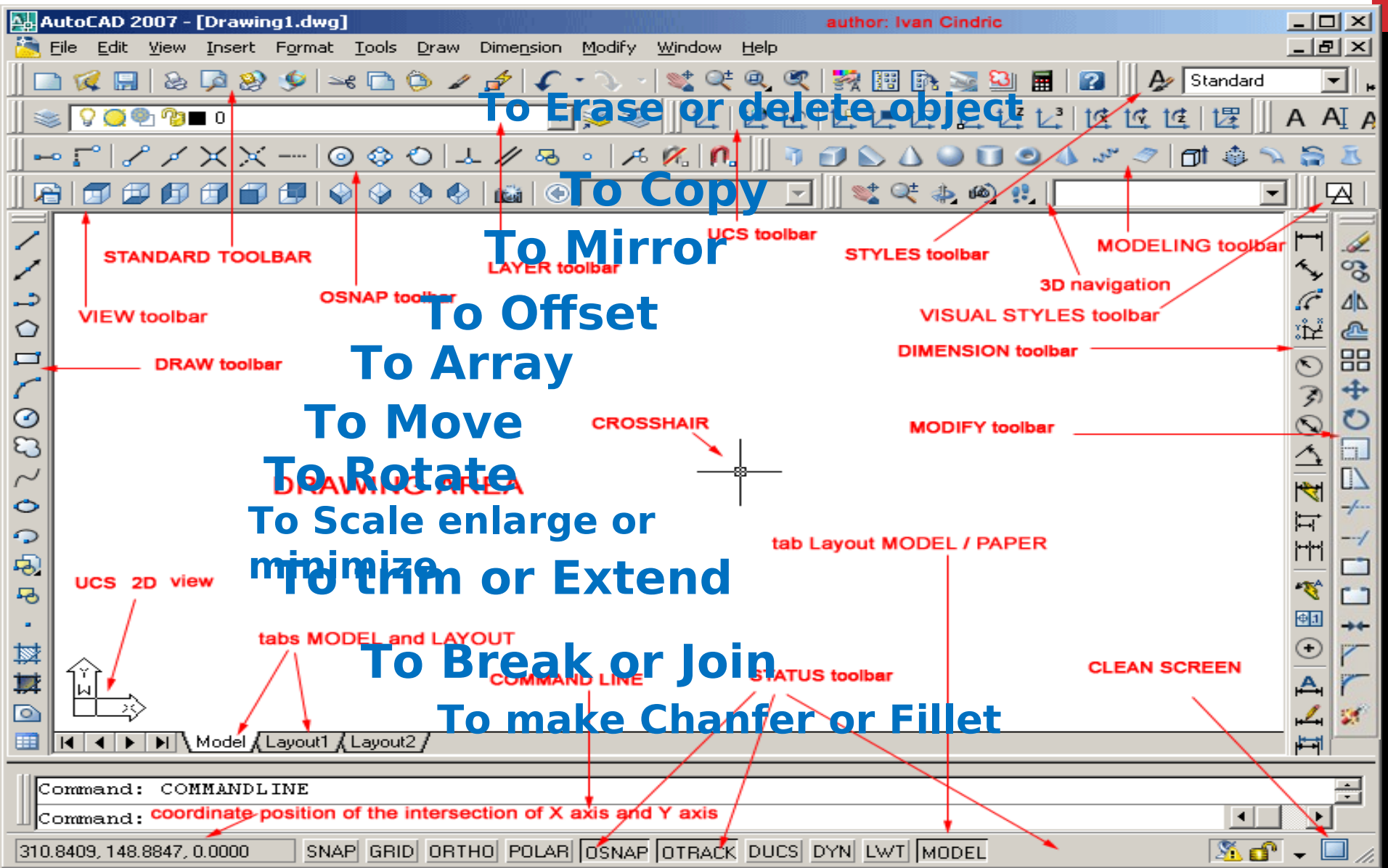
AUTOCAD 2007 TOOLBARS

Draw Toolbar



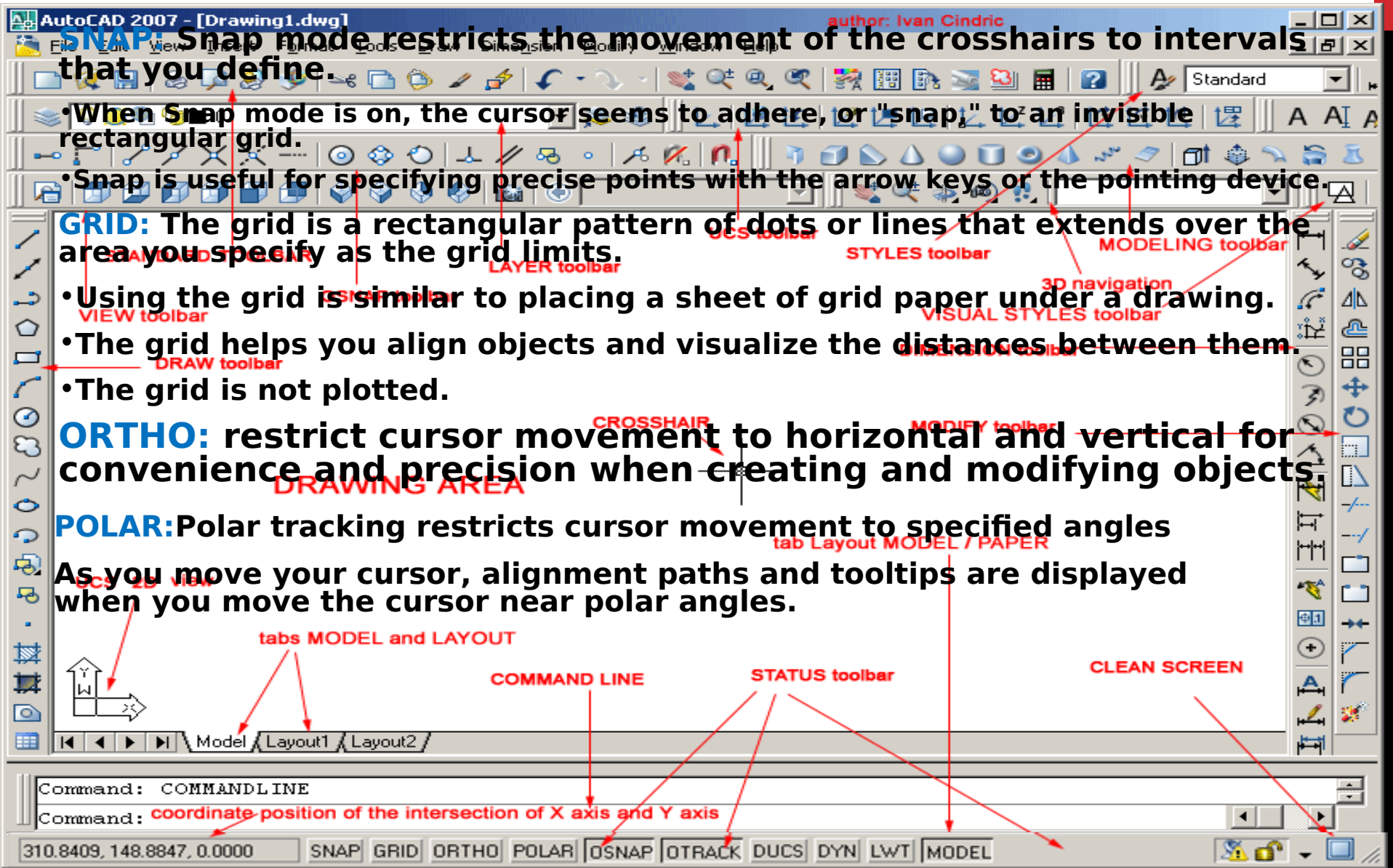
AUTOCAD 2007 TOOLBARS

MODIFY Toolbar



AUTOCAD 2007 TOOLBARS

STATUS Toolbar



SNAP: Snap mode restricts the movement of the crosshairs to intervals that you define.

- When Snap mode is on, the cursor seems to adhere, or "snap," to an invisible rectangular grid.
- Snap is useful for specifying precise points with the arrow keys or the pointing device.

GRID: The grid is a rectangular pattern of dots or lines that extends over the area you specify as the grid limits.

- Using the grid is similar to placing a sheet of grid paper under a drawing.
- The grid helps you align objects and visualize the distances between them.
- The grid is not plotted.

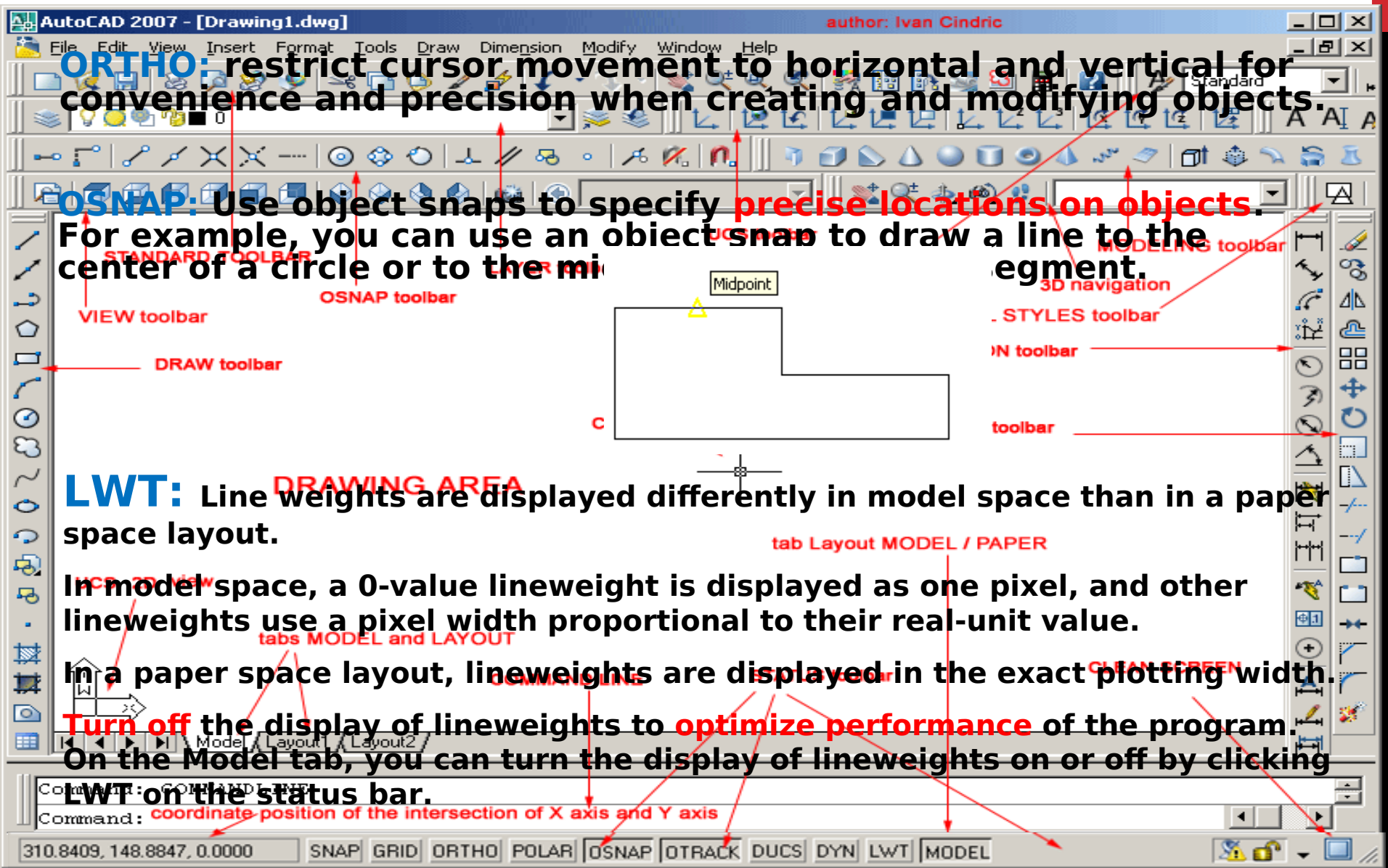
ORTHO: restrict cursor movement to horizontal and vertical for convenience and precision when creating and modifying objects.

POLAR: Polar tracking restricts cursor movement to specified angles

As you move your cursor, alignment paths and tooltips are displayed when you move the cursor near polar angles.

AUTOCAD 2007 TOOLBARS

STATUS Toolbar



ORTHO: restrict cursor movement to horizontal and vertical for convenience and precision when creating and modifying objects.

OSNAP: Use object snaps to specify precise locations on objects. For example, you can use an object snap to draw a line to the center of a circle or to the mi egment.

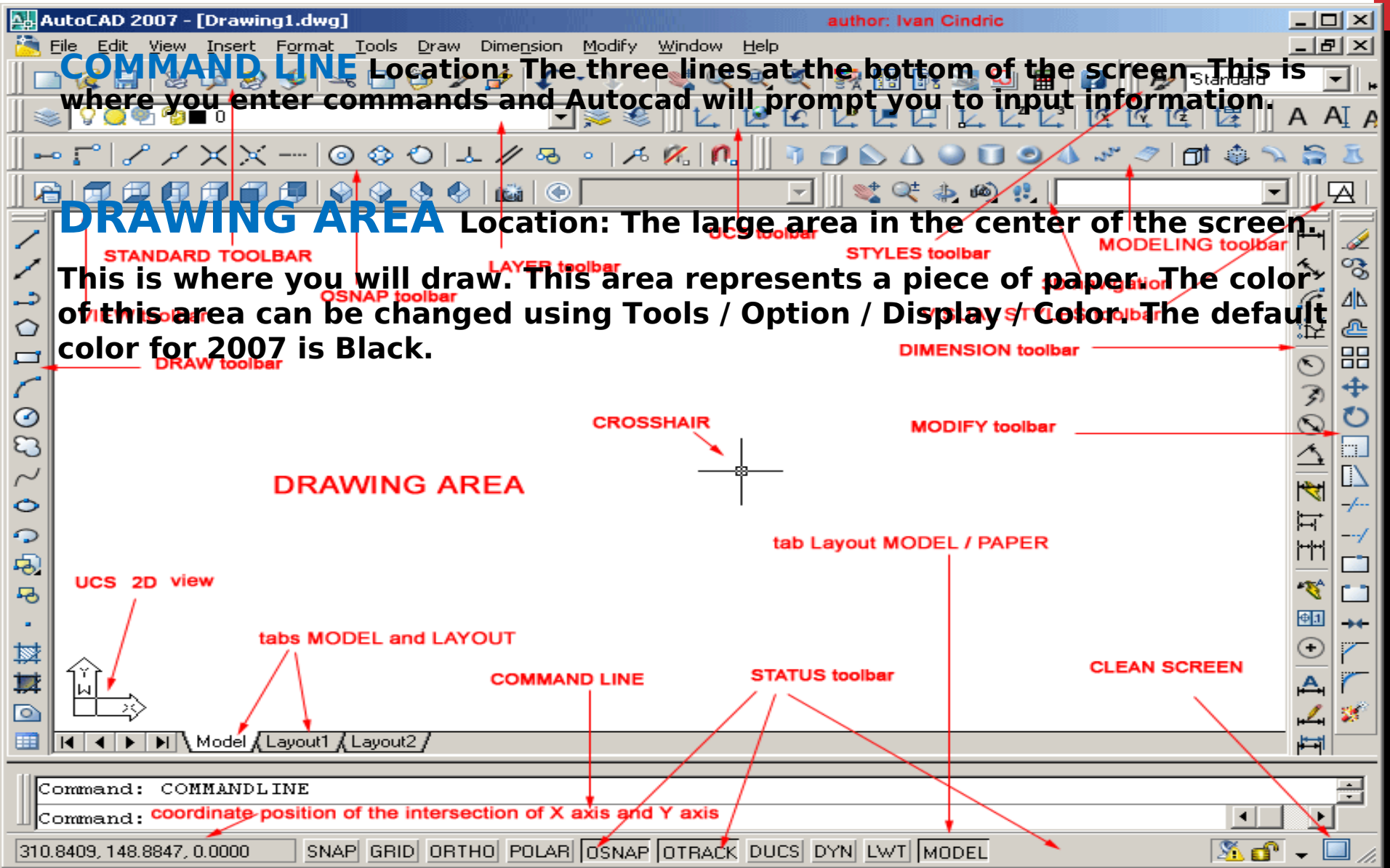
LWT: Line weights are displayed differently in model space than in a paper space layout.

In model space, a 0-value lineweight is displayed as one pixel, and other lineweights use a pixel width proportional to their real-unit value.

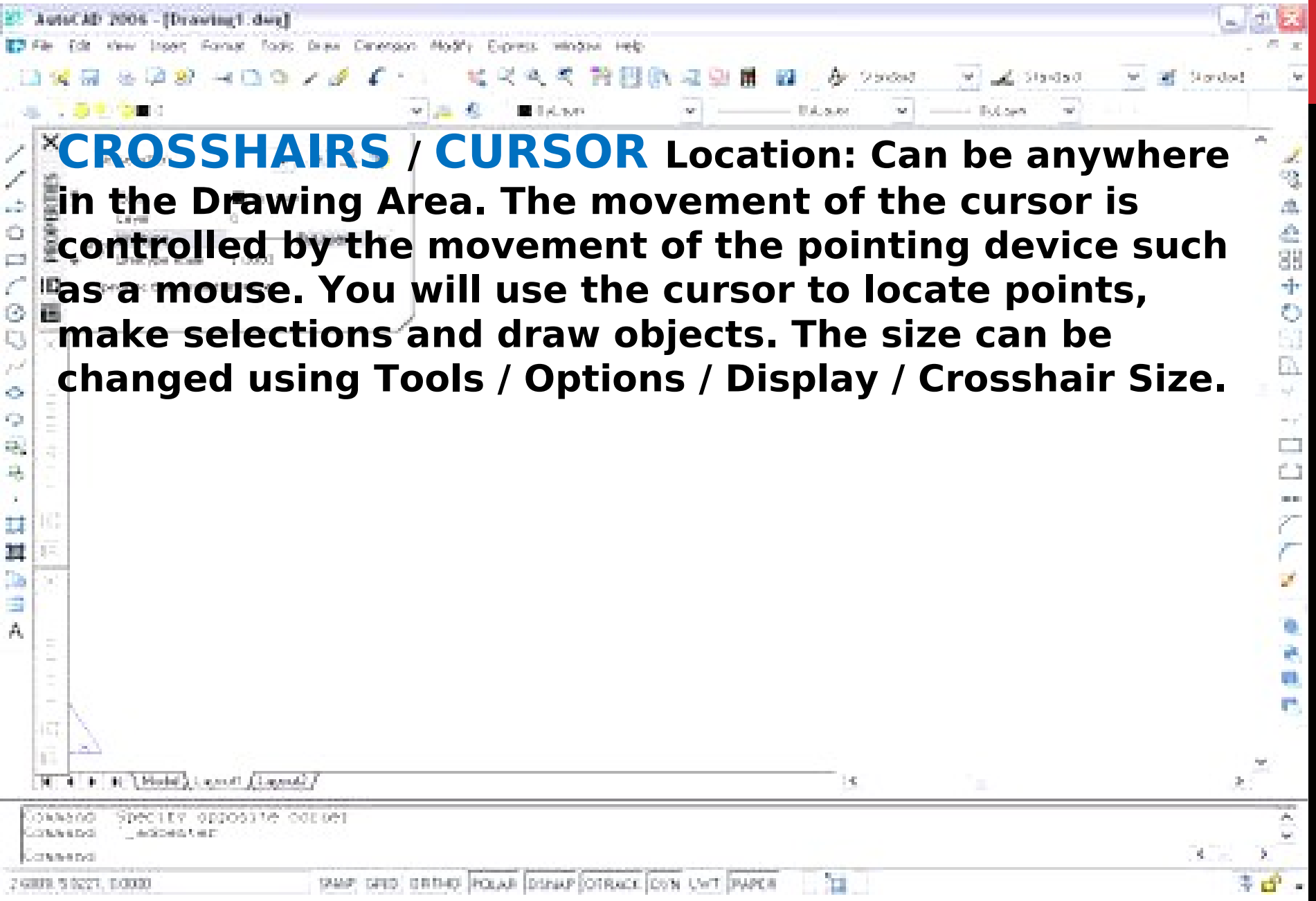
In a paper space layout, lineweights are displayed in the exact plotting width.

Turn off the display of lineweights to optimize performance of the program. On the Model tab, you can turn the display of lineweights on or off by clicking LWT on the status bar.

AUTOCAD 2007 TOOLBARS



AUTOCAD 2007 TOOLBARS



CROSSHAIRS / CURSOR Location: Can be anywhere in the Drawing Area. The movement of the cursor is controlled by the movement of the pointing device such as a mouse. You will use the cursor to locate points, make selections and draw objects. The size can be changed using Tools / Options / Display / Crosshair Size.

AUTOCAD 2007 TOOLBARS

PALETTES **There are two types of Palettes within AutoCAD**

- **The first type has been pre-designed by AutoCAD. An example of a pre-designed palette would be the Properties Palette shown below. This palette will appear automatically when you select the Properties command.**
- **The second type is a customizable Palette that you may create to hold frequently used commands, hatch patterns, symbols, etc. (Customizing is in the Advanced Workbook)**

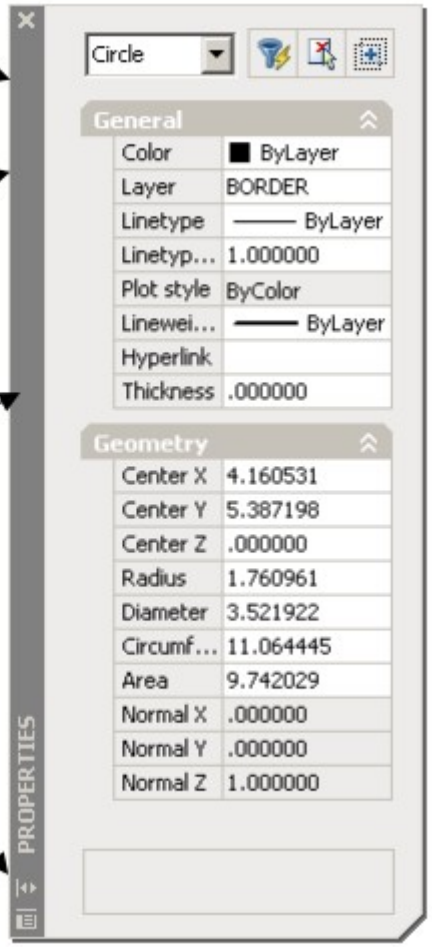
Close Palette
To close the Palette click on the "X" or press Ctrl+1

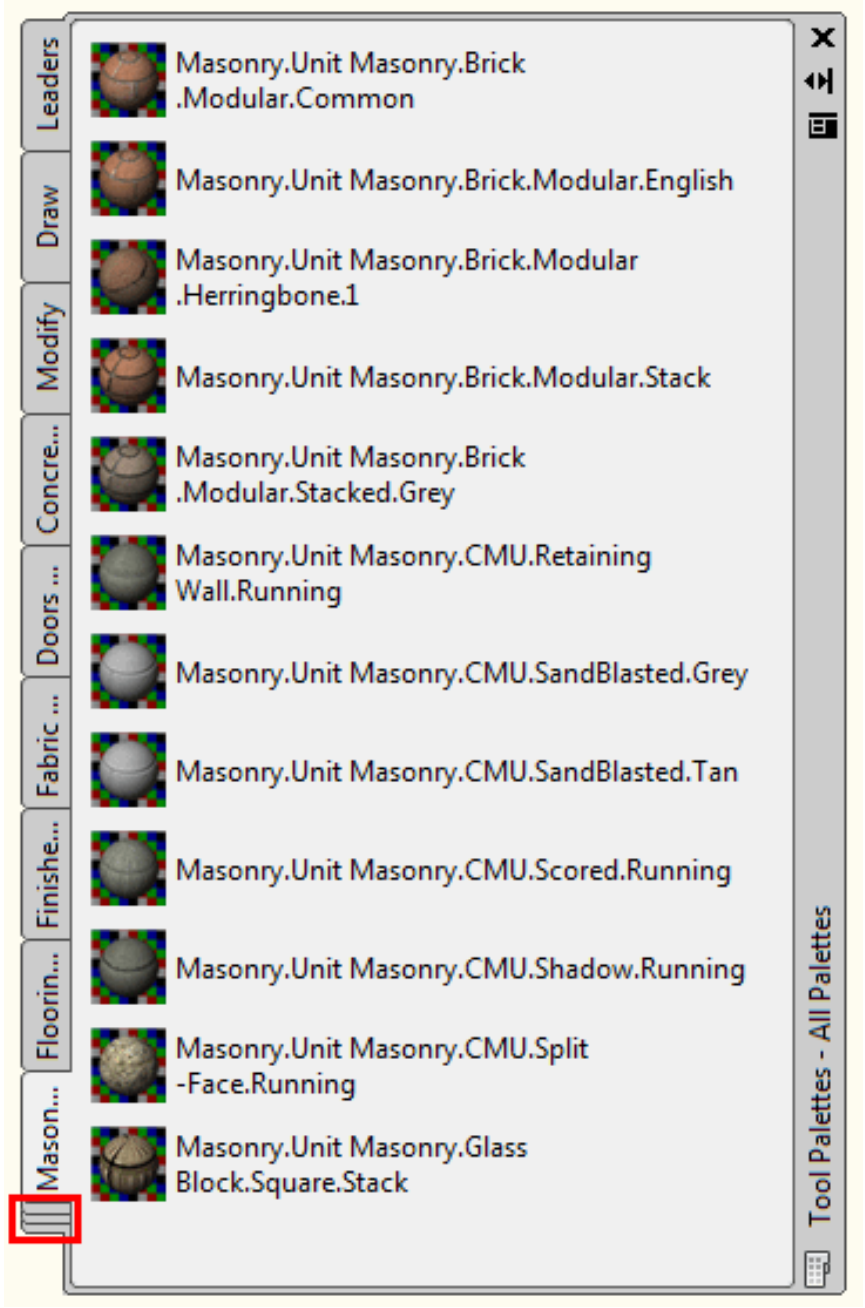
Title Bar

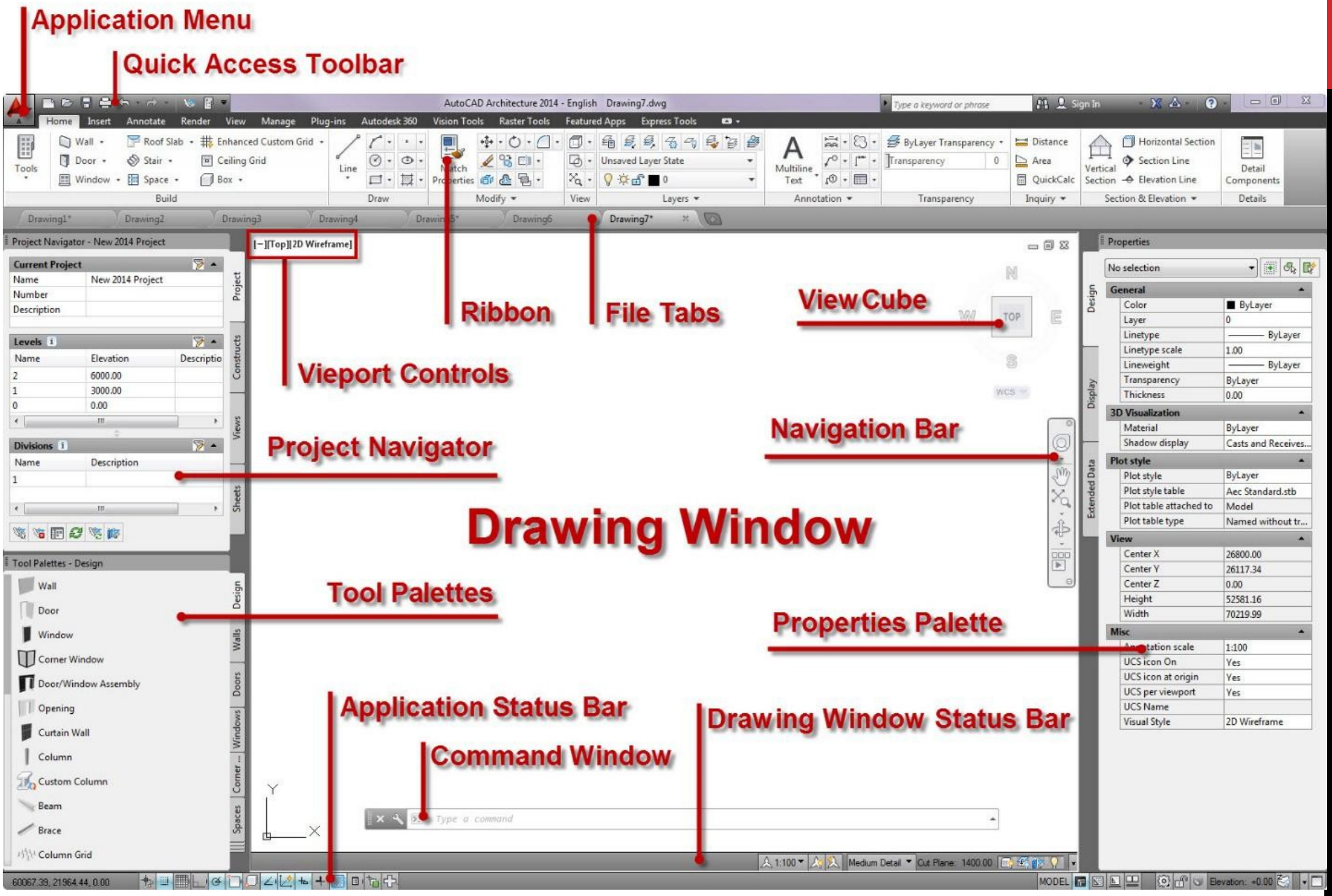
Move
To move click on the title bar and drag to new location.

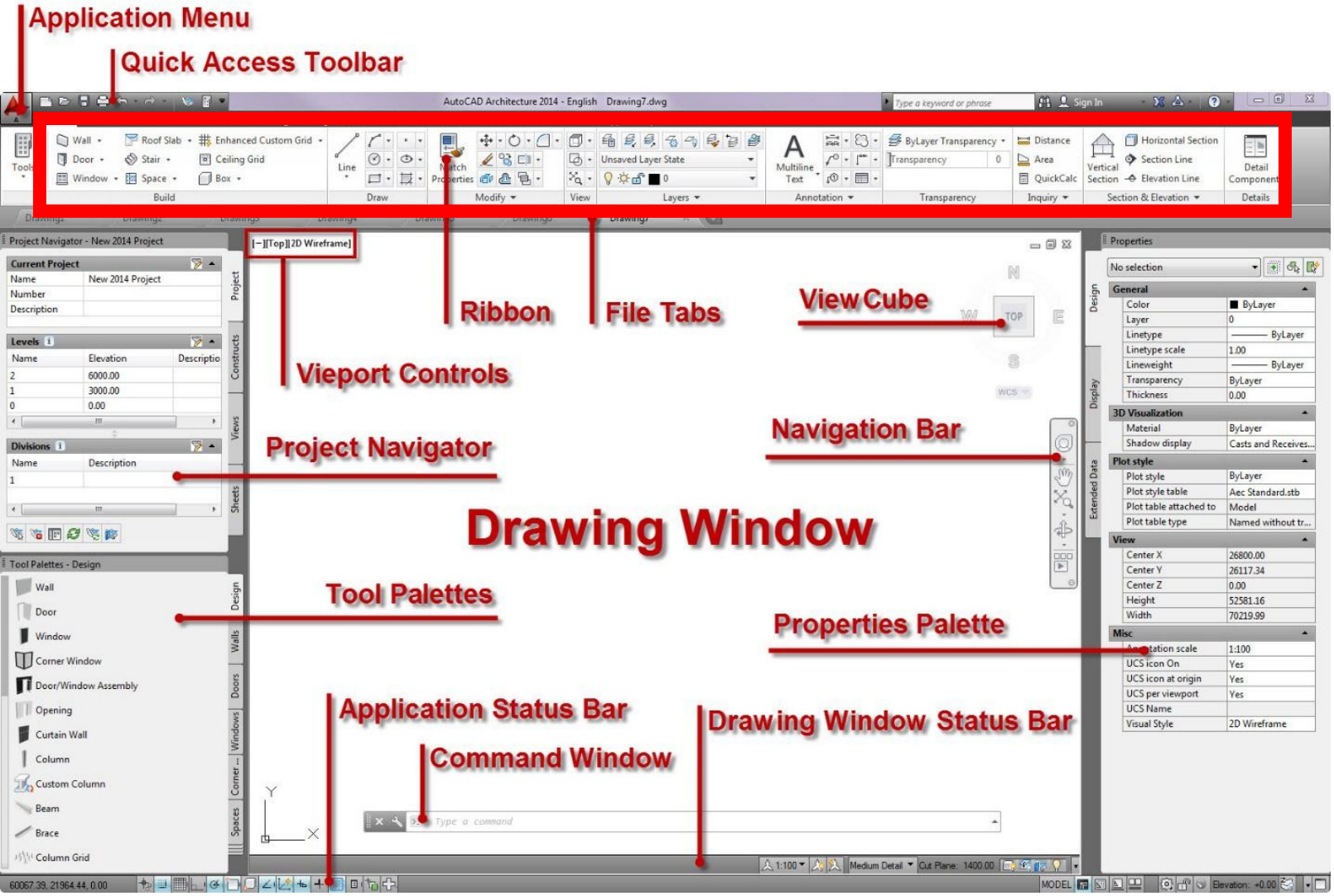
Resize
To resize, click and drag an edge.

Auto-Hide feature
(Click here to select Off or On.)
When the cursor is not on the palette, it collapses to just its title bar

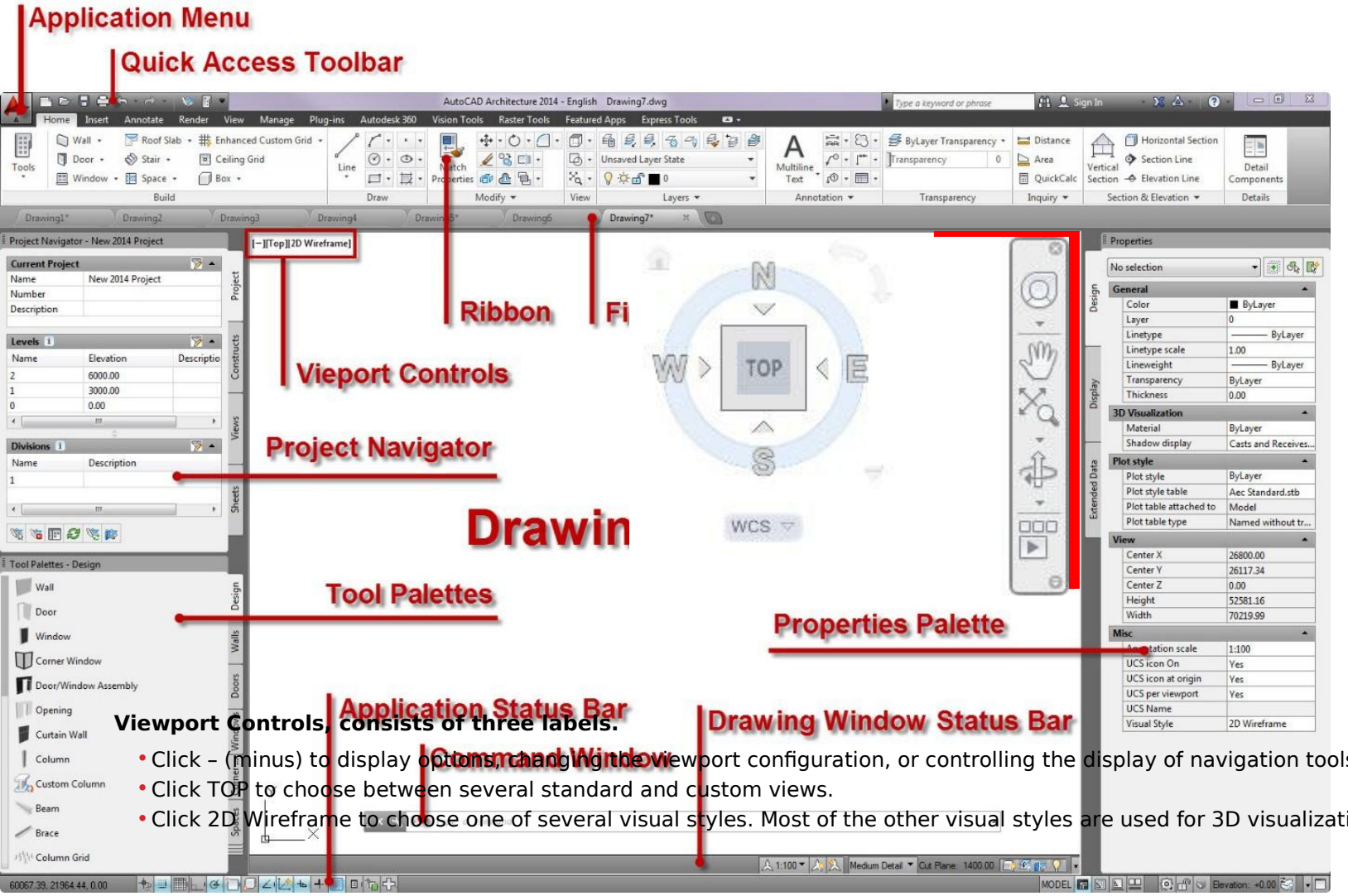



Leaders
Draw
Modify
Concre...
Doors ...
Fabric ...
Finishe...
Floorin...
Mason...
Masonry.Unit Masonry.Brick .Modular.Common
Masonry.Unit Masonry.Brick.Modular.English
Masonry.Unit Masonry.Brick.Modular .Herringbone.1
Masonry.Unit Masonry.Brick.Modular.Stack
Masonry.Unit Masonry.Brick .Modular.Stacked.Grey
Masonry.Unit Masonry.CMU.Retaining Wall.Running
Masonry.Unit Masonry.CMU.SandBlasted.Grey
Masonry.Unit Masonry.CMU.SandBlasted.Tan
Masonry.Unit Masonry.CMU.Scored.Running
Masonry.Unit Masonry.CMU.Shadow.Running
Masonry.Unit Masonry.CMU.Split -Face.Running
Masonry.Unit Masonry.Glass Block.Square.Stack
Tool Palettes - All Palettes


Application Menu
Quick Access Toolbar
AutoCAD Architecture 2014 - English Drawing7.dwg
Ribbon
File Tabs
ViewCube
Vieport Controls
Navigation Bar
Project Navigator
Drawing Window
Tool Palettes
Properties Palette
Application Status Bar
Drawing Window Status Bar
Command Window



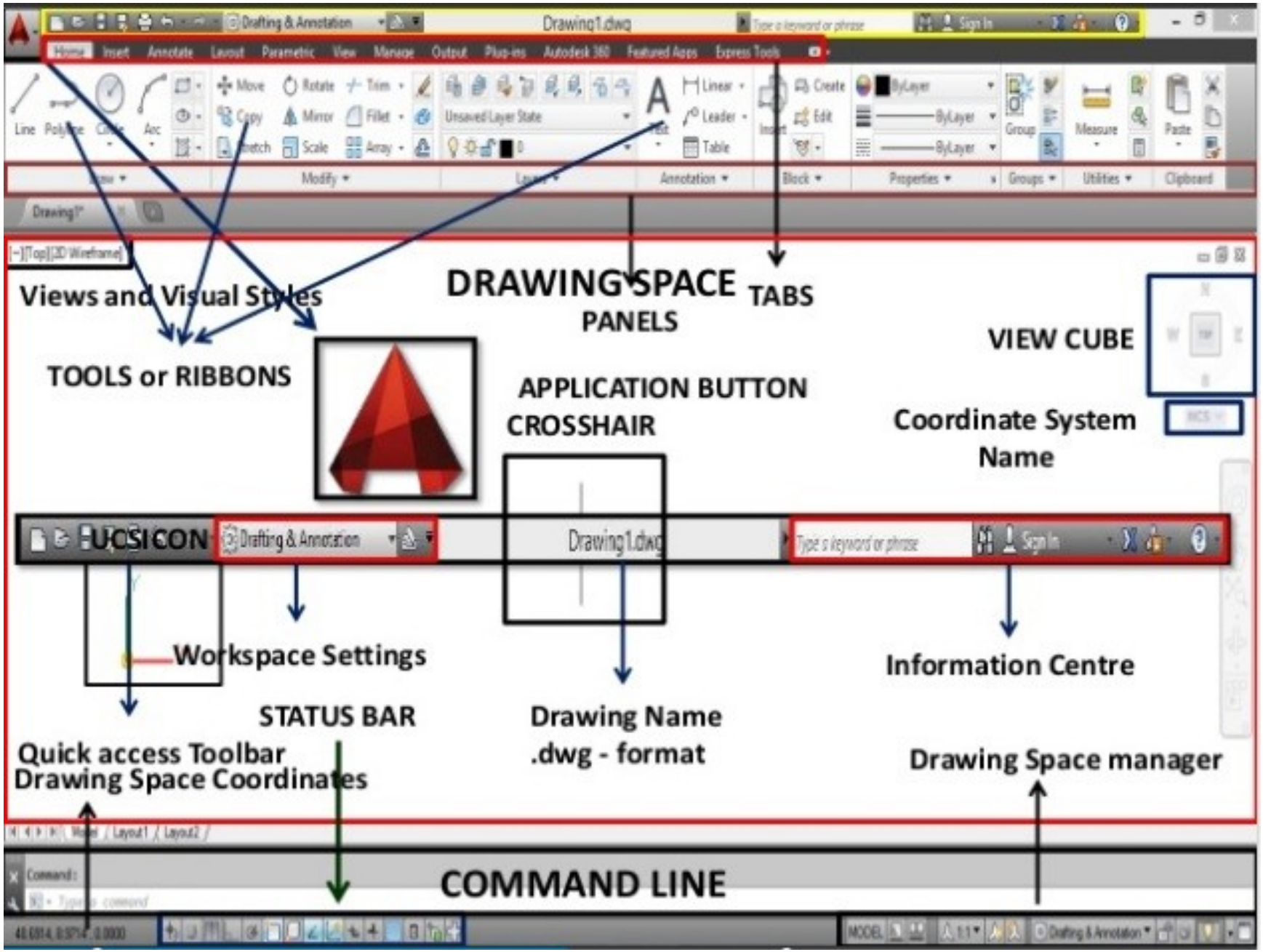
The Ribbon is overhead and consists of panels.



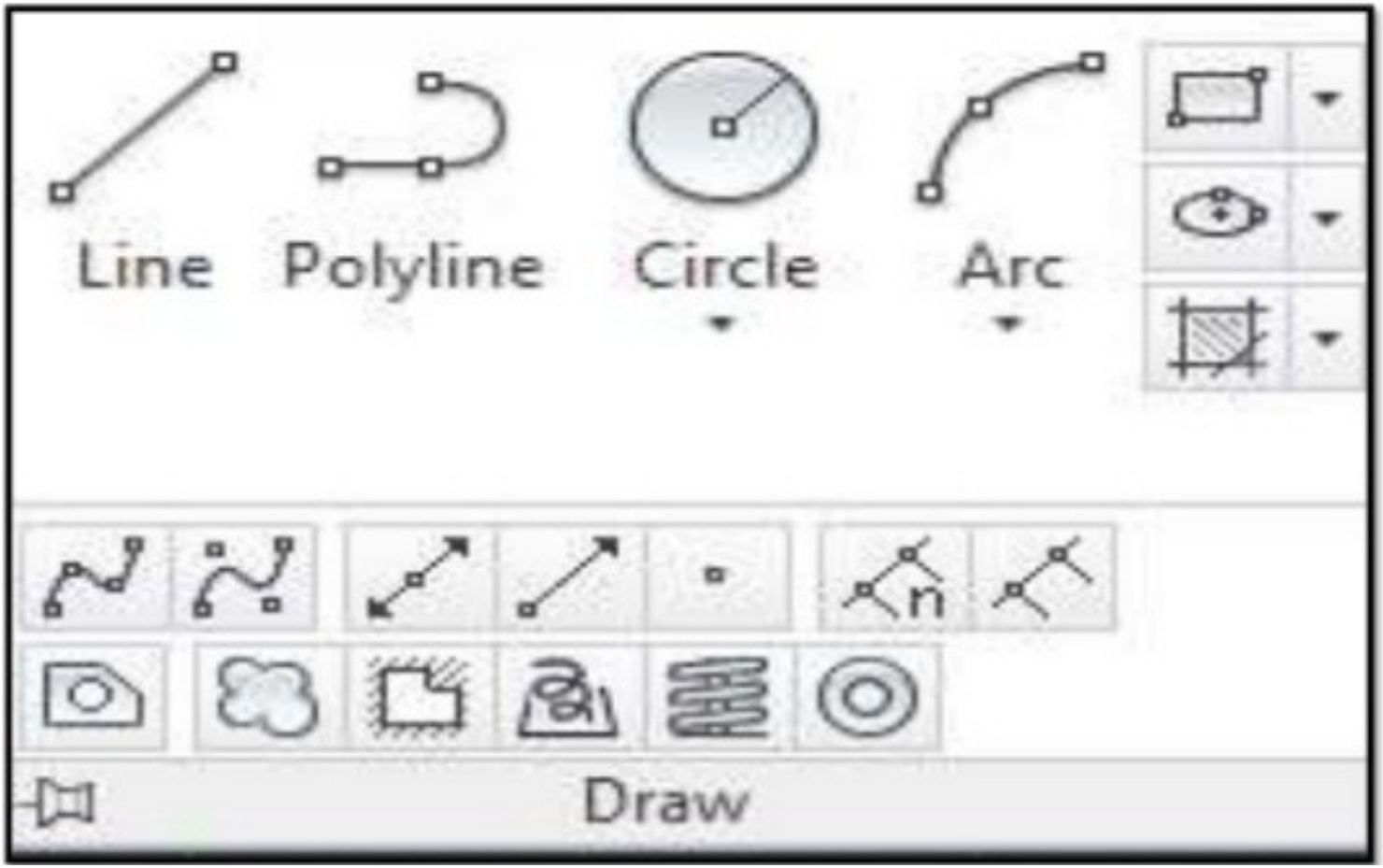
Viewport Controls, consists of three labels.

- Click – (minus) to display options, changing the viewport configuration, or controlling the display of navigation tools.
- Click TOP to choose between several standard and custom views.
- Click 2D Wireframe to choose one of several visual styles. Most of the other visual styles are used for 3D visualization.

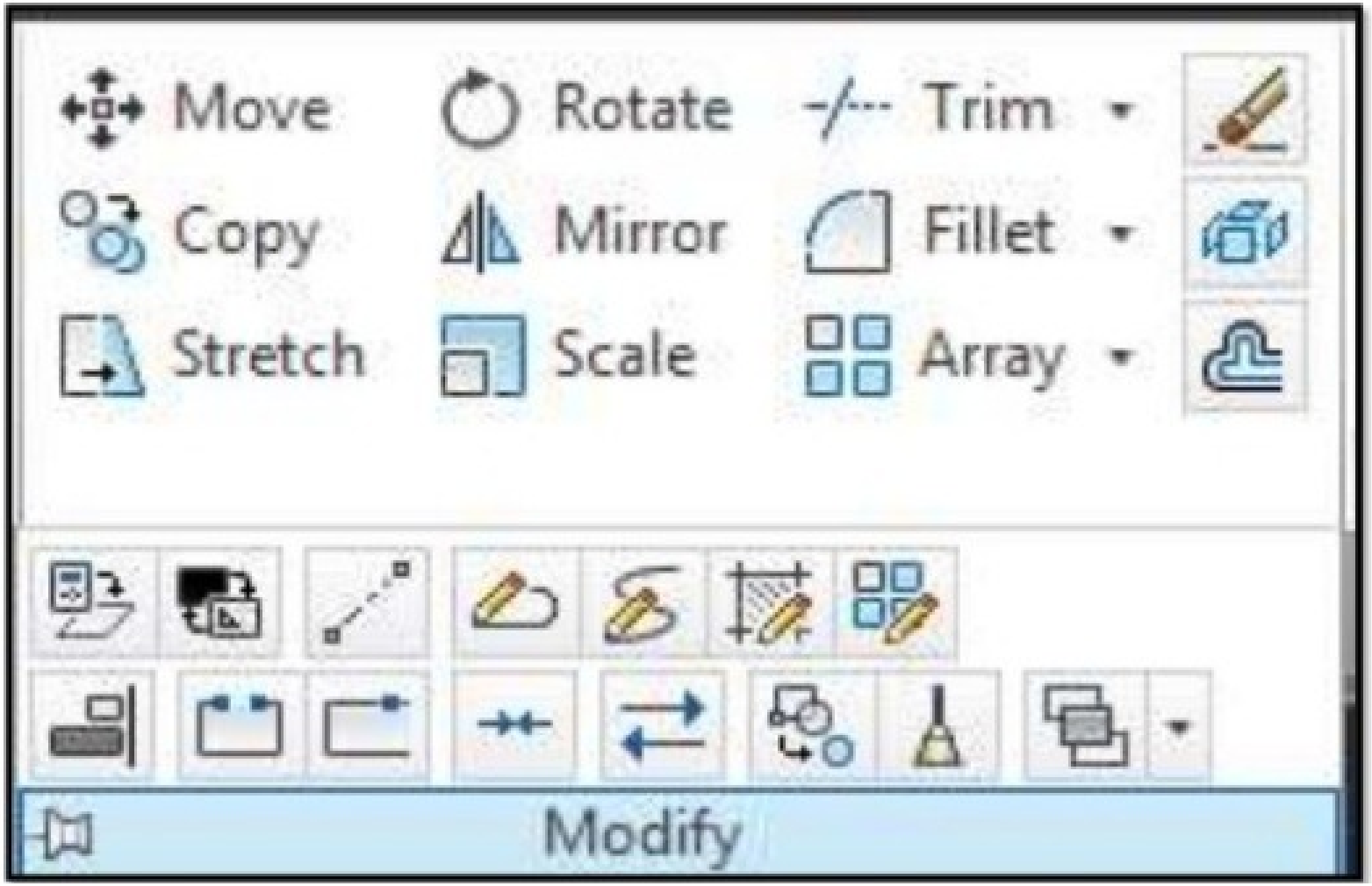
VIEW CUBE, NAVIGATION BAR AND VIEWPORT CONTROLS


Drafting & Annotation
Drawing1.dwg
Type a keyword or phrase
Sign In
Home
Inset
Annotate
Layout
Parametric
View
Manage
Output
Plug-ins
Autodesk 360
Featured Apps
Express Tools
Line
Polyline
Circle
Arc
Move
Rotate
Trim
Copy
Mirror
Fillet
Stretch
Scale
Array
Unsaved Layer State
Linear
Leader
Table
Create
Edit
ByLayer
Group
Measure
Paste
Modify
Annotation
Block
Properties
Groups
Utilities
Clipboard
Drawing1*
[-][Top][2D Wireframe]
Views and Visual Styles
DRAWING SPACE
PANELS
TABS
TOOLS or RIBBONS
APPLICATION BUTTON
CROSSHAIR
VIEW CUBE
Coordinate System
Name
UCS ICON
Drafting & Annotation
Drawing1.dwg
Type a keyword or phrase
Sign In
Workspace Settings
STATUS BAR
Drawing Name
.dwg - format
Information Centre
Quick access Toolbar
Drawing Space Coordinates
Drawing Space manager
Model
Layout1
Layout2
Command:
COMMAND LINE
MODEL
Drafting & Annotation

Drawing Commands



Modifying COMMANDS



METHODS OF ENTERING COMMANDS

AutoCAD has 3 different methods of entering commands.

All 3 methods will accomplish the same end result.

AutoCAD allows you to use the method you prefer.

The following are descriptions of all 3 methods and an example of how each one would be used to start a command such as the Line command.

- **Pull down Menu (Select Draw / Line) a. Move the cursor to the Menu Bar b. Click on a Menu header such as “Draw” c. Slide the cursor down the list of commands and click to select.**
- **Tool Bars (Select the Line icon from the Draw toolbar) Move the cursor to an icon on a toolbar and press the left mouse button.**
- **Keyboard (Type L and) Type the command on the command line.**

METHODS OF SELECTING OBJECTS

There are 2 methods.

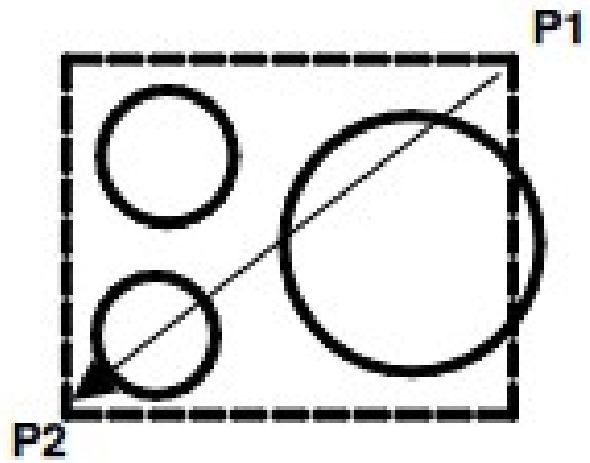
Method 1. Pick, is very easy and should be used if you have only 1 or 2 objects to select.

Method 2. Window, is a little more difficult but once mastered it is extremely helpful and time saving.

Method 1. PICK : When the command line prompt reads, “Select Objects”, place the cursor (pick box) on top of the object and click the left mouse button. The selected object will change in appearance. This appearance change is called “dithered”. This gives you a visual notice of which objects have been selected.

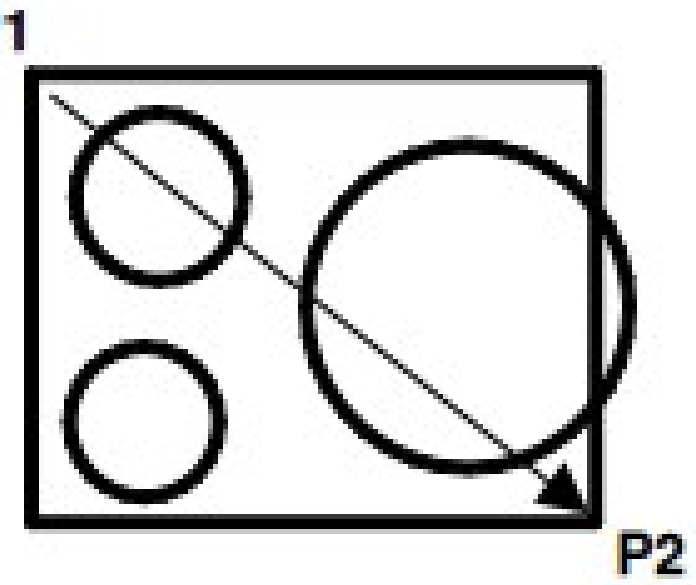
METHODS OF SELECTING OBJECTS

Method 2. WINDOW: Crossing and Window Crossing: Place your cursor in the area up and to the right of the objects that you wish to select (P1) and press the left mouse button. Then move the cursor down and to the left of the objects (P2) and press the left mouse button again. Only objects that this window crosses or completely encloses will be selected. In the example on the right, all 3 circles have been selected. (The 2 small circles are completely enclosed and the large circle is crossed by th sing windows are identified by a nce.



METHODS OF SELECTING OBJECTS

Window: Place your cursor in the area up and to the left of the objects that you wish to select (P1) and press the left mouse button. Then move the cursor down and to the right of the objects (P2) and press the left mouse button. Only objects that this window completely encloses will be selected. In the example on the right, only 2 circles have been selected. (The large circle is not completely enclosed.) This Window is identified by a continuous (soli



METHODS OF ENTERING COMMANDS

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AUTOCAD SHORTCUTS

- **F3 - OSNAP ON/OFF**
- **F4 - 3D OSNAP ON/OFF**
- **F5 - ISOPLANE**
- **F6 - DYNAMIC UCS ON/OFF**
- **F7 - GRID ON/OFF**
- **F8 - ORTHO ON/OFF**
- **F9 - SNAP ON/OFF**
- **F10 - POLAR TRACKING ON/OFF**
- **F11 - OBJECT SNAP TRACKING**

➢ **F1-HELP**

➢ **F2- DRAWING HISTORY**

Write **DS** for **Drafting Setting Dialog Box:-**

AUTOCAD SHORTCUTS

COMMON COMMANDS

SHORTCUT	COMMAND	COMMENT
A	ARC	Draw an arc
AL	ALIGN	Align an object with another
AP	APPLOAD	Opens application load dialogue box
AR	ARRAY	Opens array dialogue box
AUDIT	AUDIT	Audit drawing for errors
AV	DSVIEWER	Opens ariel view of drawing
B	BLOCK	Opens block dialogue box
C	CIRCLE	Draw a circle
CO	COPY	Copy an object
CHA	CHAMFER	Chamfer between 2 non-parallel lines
COL	COLOR	Opens select color dialogue box
CUI		Opens customise user interface dialogue
D	DIMSTYLE	Opens dimstyle manager
DC	ADCENTER	Opens designcenter
DI	DIST	Check a distance
DIV	DIVIDE	Inserts point node a set division
DO	DONUT	Draw a solid donut shape
DV	DVIEW	Perspective view
E	ERASE	Erase a selection
EX	EXTEND	Extend a selection
F	FILLET	Draw an arc between 2 intersecting lines
FI	FILTER	Opens filter dialogue box
FLATTEN	FLATTEN	Converts 3D to 2D
G	GROUP	Launches the group dialogue box
H	HATCH	Opens hatch and gradient dialogue box
I	INSERT	Insert a block

AUTOCAD SHORTCUTS

JPGOUT	JPGOUT	Creates a JPEG file of current drawing
L	LINE	Draw a line
LA	LAYER	Opens layer manager
LE	QLEADER	Draw a leader line (may need to adjust settings)
LEAD	LEADER	Leader line with annotation
LI or LS	LIST	Display information about objects in a text window
LO	-LAYOUT	Creates a new layout tab
LTS	LTScale	Change the linetype scale
M	MOVE	Move a selection
MA	MATCHPROPERTIES	Match properties of an object
ME	MEASURE	Inserts point node at input distance
O	OFFSET	Offset a selection
OP	OPTIONS	Launches options dialogue box
P	PAN	Pan in drawing
PE	POLYEDIT	Edit a polyline
PL	PLINE	Draw a polyline
PLOT	PLOT	Opens plot/print dialogue box
PO	POINT	Point marker or node - DDPTYPE to change pointstyle
PR	PROPERTIES	Opens properties dialogue box
PRE	PREVIEW	Preview a plot
PU	PURGE	Opens purge dialogue box to remove unused elements
RE	REGEN	Regenerate the display
REC	RECTANG	Draw a rectangle
REN	RENAME	Opens rename dialogue box to rename blocks, layers, etc
RO	ROTATE	Rotate a selection
SP	SPELL	Spell check a selection - ALL to check entire drawing
T	MTEXT	Insert multiline text

AUTOCAD SHORTCUTS

CONTROL KEYS

CTRL+0	CLEANSCREEN	Turns user interface elements on/off
CTRL+1	PROPERTIES	Turns properties on/off
CTRL+2	ADCENTER	Turns design center on/off
CTRL+3	TOOLPALETTES	Turns tool palettes window on/off
CTRL+8	QUICKCALC	Launches calculator window
CTRL+A		Select all
CTRL+C	COPYCLIP	Copies objects to clipboard
CTRL+H		Turns a group on or off
CTRL+J		Repeats last command
CTRL+N	NEW	Opens create new drawing dialogue box
CTRL+O	OPEN	Opens the select file dialogue box
CTRL+P	PLOT	Opens the plot dialogue box
CTRL+R	CVPORT	Switches between viewports
CTRL+S	QSAVE	Opens the save drawing as dialogue box
CTRL+SHIFT+S		Save as
CTRL+V	PASTECLIP	Pastes data from clipboard to drawing
CTRL+X	CUTCLIP	Removes select object from drawing to clipboard
CTRL+Y	REDO	Performs the operation cancelled by UNDO
CTRL+Z	UNDO	Undoes the last operation
CTRL+TAB		Switches between open drawings
CTRL+PAGE UP		Switch up between layout tabs
CTRL+PAGE DOWN		Switch down between layout tabs
ARROW UP/Down		Recall last command

AUTOCAD SHORTCUTS

FUNCTION KEYS

SHORTCUT	COMMAND	COMMENT
F1	HELP	Opens Autocad help
F2	TEXTSCR GRAPHSCR	Switches between text screen and graphic area
F3	OSNAP	Switches osnap on/off
F5 or CTRL+E	ISOPLANE	Cycles through isoplanes
F6 or CTRL+D	COORDS	Turns coordinate display on/off
F7 or CTRL+G	GRID	Turns grid on/off
F8 or CTRL+L	ORTHO	Turns ortho on/off
F9 or CTRL+B	SNAP	Turns snap on/off
F10 or CTRL+U	POLAR	Turns polar on/off
F11 or CTRL+W	OSNAP TRACK	Turns object snap tracking on/off
F12	DYNMODE	Turns dynamic input on/off

DISADVANTAGES OF CAD DRAWING?

MOST POPULAR CAD SOFTWARE LIKE AUTOCAD(LINK IS EXTERNAL), PROGECAD, MICROSTATION(LINK IS EXTERNAL) ARE HIGH PRICED FOR INDIVIDUALS. ALTERNATIVELY, INDIVIDUALS CAN TRY FREE OPENSOURCE CAD DRAFTING SOFTWARE QCAD(LINK IS EXTERNAL), LIBRECAD(LINK IS EXTERNAL) ANDOPENSCAD(LINK IS EXTERNAL).

EVERY NEW RELEASE OF THE CAD SOFTWARE, OPERATOR HAS TO UPDATE THEIR SKILLS.

IMPROPER USE OF BLOCKS AND LAYERS MAKE UPDATING AND MODIFICATION OF THE DRAWINGS A CUBERSOME TASK FOR ANOTHER PERSON.

TIME FOR A BREAK TIME……