

Engineering Graphics

Introduction to AutoCAD Commands and Toolbars

7.1 Introduction to Different Commands and Toolbars of AutoCAD

AutoCAD is a widely used computer-aided design (CAD) software application that allows engineering drawings to be created, edited, and managed digitally, offering far greater speed, precision, and ease of modification compared to traditional manual (instrument-based) drafting. Commands in AutoCAD can be accessed in several ways: by typing the command name (or its short alias) directly at the command line, by selecting the corresponding icon from a toolbar or ribbon panel, or by selecting the command from a pull-down menu. This section introduces the most commonly used commands, grouped according to their function.

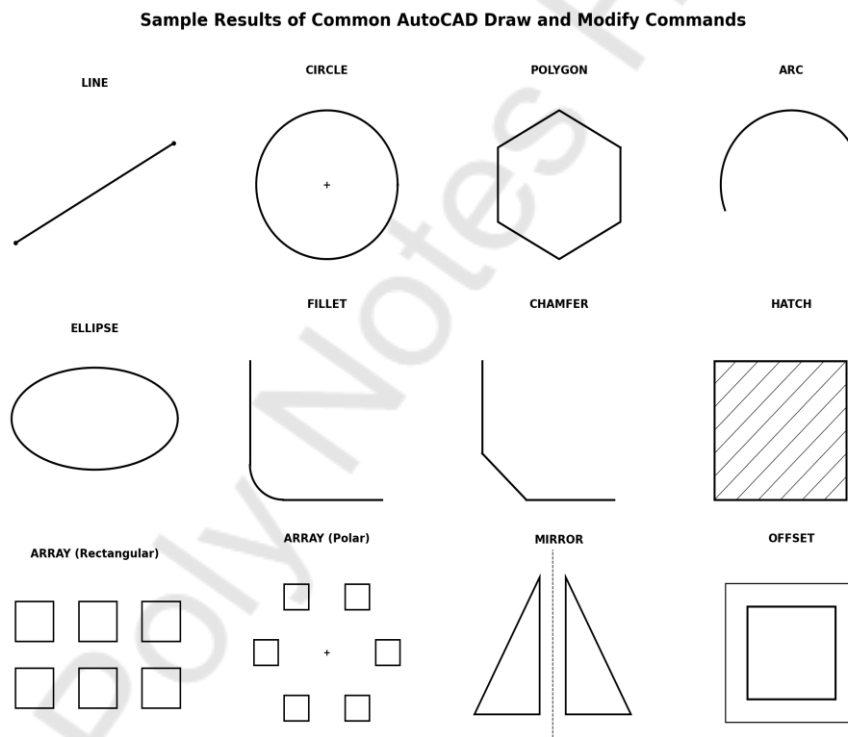


Figure 1: Sample results of common AutoCAD Draw and Modify commands

(a) Draw Commands

Draw commands are used to create new basic geometric objects in a drawing, forming the fundamental building blocks of any AutoCAD drawing:

Command	Command Line Entry	Function
Line	LINE (or L)	Draws a straight line segment between two or more specified points

Circle	CIRCLE (or C)	Draws a circle, using various methods such as centre and radius, centre and diameter, or three points
Polygon	POLYGON (or POL)	Draws a regular polygon (with a specified number of equal sides), inscribed in or circumscribed about a given circle
Arc	ARC (or A)	Draws a circular arc, using various methods such as three points, or start point, centre, and included angle
Ellipse	ELLIPSE (or EL)	Draws an ellipse, typically by specifying the endpoints of one axis and the length of the other semi-axis
Polyline	PLINE (or PL)	Draws a connected sequence of line and/or arc segments that are treated as a single combined object
Fillet	FILLET (or F)	Rounds off a sharp corner between two lines (or other objects) by inserting an arc of a specified radius
Chamfer	CHAMFER (or CHA)	Bevels a sharp corner between two lines by connecting them with a straight, angled line of specified distances
Hatch	HATCH (or H)	Fills a closed boundary area with a repeating pattern of lines or a solid fill, commonly used to indicate sectioned material
Array (Rectangular)	ARRAYRECT (or AR)	Creates multiple evenly spaced copies of selected object(s) arranged in a grid of rows and columns
Array (Polar)	ARRAYPOLAR	Creates multiple copies of selected object(s) arranged evenly around a specified centre point, at a specified angular spacing

(b) Modify Commands

Modify commands are used to alter, adjust, duplicate, or remove existing objects in a drawing, allowing a basic geometric construction to be refined into the finished, required shape:

Command	Command Line Entry	Function
Offset	OFFSET (or O)	Creates a new object parallel to (and at a specified distance from) a selected object, preserving its shape
Trim	TRIM (or TR)	Removes the portion of an object that extends beyond a specified cutting edge (another object)

Extend	EXTEND (or EX)	Lengthens a selected object so that it meets (ends precisely at) a specified boundary edge
Erase	ERASE (or E)	Deletes selected object(s) from the drawing
Fillet	FILLET (or F)	Rounds a sharp corner with an arc of specified radius (also listed under Draw, since it modifies existing objects)
Chamfer	CHAMFER (or CHA)	Bevels a sharp corner with a straight angled line (also listed under Draw, for the same reason)
Break	BREAK (or BR)	Removes a portion of an object between two specified points, splitting it into separate pieces
Lengthen	LENGTHEN (or LEN)	Changes the length of a selected line or arc, without needing a cutting or boundary edge
Copy	COPY (or CO / CP)	Creates one or more duplicate copies of selected object(s), placed at a specified displacement
Move	MOVE (or M)	Relocates selected object(s) from one position to another, without creating a copy
Mirror	MIRROR (or MI)	Creates a mirror-image copy of selected object(s) about a specified mirror line
Stretch	STRETCH (or S)	Moves or reshapes selected object(s) that cross a selection window, while leaving unselected portions unchanged
Match Properties	MATCHPROP (or MA)	Copies the properties (such as layer, colour, and linetype) of a selected source object onto other, target objects
Pedit	PEDIT (or PE)	Edits polyline objects, allowing operations such as joining segments, adjusting width, or converting other objects into polylines

(c) View Commands

View commands control how the drawing is displayed on screen, without altering the actual geometry of the drawing itself:

Command	Function
Zoom All	Zooms the drawing display to show the entire drawing extents together with the defined drawing limits
Zoom Window	Zooms into a rectangular area of the drawing, specified by the user by defining two diagonal corner points
Zoom Extents	Zooms the drawing display to show all objects in the drawing at the largest possible scale that fits the screen

(d) Dimensioning Commands

Dimensioning commands are used to add measurement annotations to a drawing, clearly indicating the size, location, and geometric relationships of the features represented:

Command	Function
Dimension Style / Settings (DIMSTYLE / D)	Allows the creation and modification of dimension styles, controlling the appearance of dimension lines, text, arrowheads, and units used throughout a drawing
Linear (DIMLINEAR)	Creates a horizontal or vertical dimension between two selected points
Aligned (DIMALIGNED)	Creates a dimension line parallel to the line joining the two selected points, regardless of their orientation
Radial (DIMRADIUS)	Creates a dimension indicating the radius of a selected circle or arc
Diameter (DIMDIAMETER)	Creates a dimension indicating the diameter of a selected circle or arc
Leader (LEADER / QLEADER / MLEADER)	Creates a line with an arrowhead, connecting a note or annotation to a specific feature on the drawing
Angular (DIMANGULAR)	Creates a dimension indicating the angle between two selected lines, or defined by three points

(e) Text Commands

Text commands are used to add written annotations, notes, and labels to a drawing:

Command	Function
Text Style (STYLE)	Defines and manages named text styles, controlling the font, height, width factor, and obliquing angle used for text in the drawing
Dtext (DTEXT / TEXT)	Creates single-line text, allowing the text to be typed directly on screen, with each line treated as a separate text object
Mtext (MTEXT)	Creates multi-line (paragraph) text within a defined text boundary, treated as a single combined text object, useful for notes and longer annotations
DDedit (DDEDIT / ED)	Allows an existing single-line or multi-line text object to be selected and edited

(f) Format Commands

Format commands are used to configure the overall settings, organisation, and display environment of the drawing:

Command	Function
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Limits (LIMITS)	Sets the boundary (drawing area) of the working drawing sheet, used together with Zoom All to define the visible working area
Layers (LAYER / LA)	Creates and manages layers, allowing objects to be organised into named groups, each with its own colour, linetype, and visibility settings
Pan (PAN)	Shifts the view of the drawing on screen without changing the zoom (magnification) level, allowing the user to see different parts of the drawing

7.2 Making a Few Simple 2D Drawings in AutoCAD

Once the basic Draw, Modify, View, Dimensioning, Text, and Format commands introduced in Section 7.1 are understood, they can be combined systematically to construct complete, correctly dimensioned 2D engineering drawings. The general workflow typically followed when creating a simple 2D drawing in AutoCAD is outlined below:

Step	Action
1	Set the drawing units and limits (using the UNITS and LIMITS commands), then use Zoom All to display the full working area.
2	Create appropriate layers (using the LAYER command) for different types of lines (such as outlines, centre lines, hidden lines, and dimension lines), assigning suitable colours and linetypes to each.
3	Use the Draw commands (Line, Circle, Polyline, etc.) to construct the basic geometric shape of the object.
4	Use Modify commands (Trim, Extend, Fillet, Chamfer, Offset, Mirror, Array, etc.) to refine the geometry, add rounded corners, chamfers, repeated features, or symmetric details.
5	Add dimensions to the drawing using the appropriate Dimensioning commands (Linear, Aligned, Radial, Diameter, Angular), after first configuring an appropriate dimension style.
6	Add any necessary text or notes using Dtext or Mtext, and edit as required using DDedit.
7	Review the complete drawing using Zoom Extents, check all layers, dimensions, and annotations for correctness, and save the drawing file.

As a simple practical exercise, students should attempt to construct basic 2D drawings such as a rectangular plate with filleted corners and a central circular hole, a hexagonal flange with a bolt-hole pattern created using a polar array, or a simple bracket profile involving lines, arcs, fillets, and chamfers, applying the complete workflow described above, from initial layer setup through to final dimensioning. Regular practice with such simple exercises

builds familiarity and speed with the AutoCAD command set, forming the essential foundation for producing more complex engineering drawings using CAD software.

2. Multiple Choice Questions (MCQs)

Answer the following questions by selecting the most appropriate option.

1. The AutoCAD command used to draw a regular polygon with a specified number of sides is:

- A) LINE
- B) POLYGON
- C) ELLIPSE
- D) HATCH

2. The command used to round off a sharp corner between two lines using an arc of specified radius is:

- A) CHAMFER
- B) FILLET
- C) TRIM
- D) OFFSET

3. The command used to bevel a sharp corner between two lines with a straight angled line is:

- A) FILLET
- B) CHAMFER
- C) EXTEND
- D) BREAK

4. The command used to fill a closed area with a repeating pattern (commonly used for sectioned material) is:

- A) HATCH
- B) ARRAY
- C) OFFSET
- D) MIRROR

5. The command used to create multiple copies of an object arranged in rows and columns is:

- A) ARRAY (Rectangular)
- B) MIRROR
- C) COPY only, with no other option
- D) STRETCH

6. The command used to create multiple copies of an object arranged evenly around a centre point is:

- A) ARRAY (Rectangular)

- B) ARRAY (Polar)
- C) OFFSET
- D) EXTEND

7. The command used to remove the portion of an object extending beyond a specified cutting edge is:

- A) EXTEND
- B) TRIM
- C) BREAK
- D) LENGTHEN

8. The command used to lengthen a selected object so that it meets a specified boundary is:

- A) TRIM
- B) EXTEND
- C) ERASE
- D) MOVE

9. The command used to create a parallel copy of an object at a specified distance is:

- A) OFFSET
- B) MIRROR
- C) ARRAY
- D) STRETCH

10. The command used to create a mirror-image copy of selected objects about a specified line is:

- A) COPY
- B) MIRROR
- C) MOVE
- D) MATCHPROP

11. The command used to copy the layer, colour, and linetype properties from one object to another is:

- A) MATCHPROP
- B) PEDIT
- C) STRETCH
- D) LENGTHEN

12. The view command used to display the entire drawing extents together with the defined drawing limits is:

- A) Zoom Window
- B) Zoom All
- C) Pan
- D) Zoom Extents only

13. The dimensioning command used to create a dimension line parallel to the line joining two points, regardless of orientation, is:

- A) Linear
- B) Aligned
- C) Angular
- D) Radial

14. The command used to create multi-line (paragraph) text as a single combined object is:

- A) DTEXT
- B) MTEXT
- C) DDEDIT
- D) STYLE

15. The command used to create and manage named groups of objects with their own colour and linetype settings is:

- A) LIMITS
- B) LAYER
- C) PAN
- D) STYLE

Answer Key

1. B) POLYGON | 2. B) FILLET | 3. B) CHAMFER | 4. A) HATCH | 5. A) ARRAY (Rectangular) | 6. B) ARRAY (Polar) | 7. B) TRIM | 8. B) EXTEND | 9. A) OFFSET | 10. B) MIRROR | 11. A) MATCHPROP | 12. B) Zoom All | 13. B) Aligned | 14. B) MTEXT | 15. B) LAYER

3. Broad / Long Answer and Practical Questions

1. Explain the purpose and function of any five Draw commands available in AutoCAD.
2. Explain the purpose and function of any five Modify commands available in AutoCAD, distinguishing Trim from Extend, and Fillet from Chamfer.
3. Explain the difference between Zoom All, Zoom Window, and Zoom Extents.
4. Explain the purpose of the Linear, Aligned, Radial, and Diameter dimensioning commands, giving an example of when each would be used.
5. Explain the difference between the Dtext and Mtext commands for adding text to an AutoCAD drawing.
6. Explain the purpose of the Layer command, and discuss why organising a drawing using layers is considered good practice.

7. Explain the difference between the Rectangular Array and Polar Array commands, giving a practical example of when each would be used.
8. Describe the general step-by-step workflow that should be followed when creating a simple, correctly dimensioned 2D drawing in AutoCAD.
9. Using the commands introduced in this chapter, describe how you would construct a rectangular plate, 100 mm × 60 mm, with all four corners filleted to a 10 mm radius and a central hole of 20 mm diameter.
10. Using the commands introduced in this chapter, describe how you would construct a hexagonal flange with six equally spaced bolt holes arranged around a bolt circle, using the Polar Array command.

Poly Notes Hub