Blocks and Attributes

Objectives:

- To define a block or block definition.
- To recognise the advantages of organising and using blocks.
- To create and insert blocks into the current drawing and another drawing.
- To define an attribute.
- To create and edit attribute definitions.
- To attach attributes to blocks.

Subject Matters:

Block

A block is a collection of objects that can be combined together to form a single object, or a block definition. Each block definition includes a block name, one or more objects, the coordinate values of the base point to be used for inserting the block, and any associated attribute data.

Use of blocks

With the use of blocks, objects can be organised and manipulated as one single component. Blocks can be inserted, scaled, and rotated in a drawing. A block can also be exploded into its component objects, each of which can be modified. Another new block definition can also be created using the modified objects.

Advantages of using blocks

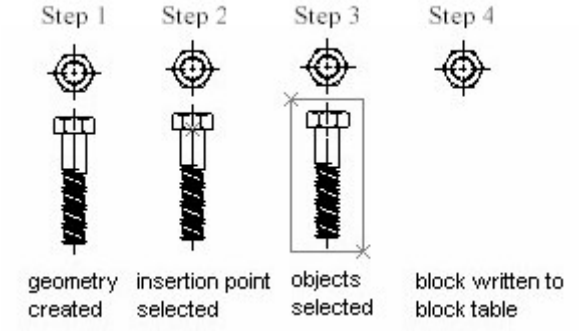
1. Using blocks can streamline the drawing process, e.g. blocks can be used to build a standard library of frequently used symbols, conventional features, or standard parts. The same block can be inserted numerous times instead of re-creating the drawing elements each time.
2. Drawings can be revised efficiently by inserting, relocating, and copying blocks as components rather than individual geometrical objects.
3. Storing all references to the same block as one block definition in the drawing database can save disk space.
4. Drawing tasks can be organised in a systematic way with blocks. Objects and the associated information (attributes) can be set up, redesigned and sorted more efficiently.

Methods of creating blocks

Blocks can be created or defined in three ways:

1. Creating a block definition for use in the current drawing.
2. Creating a block definition in a separate drawing file.
3. Create a drawing file with several related block definitions to serve as a block library.

The typical sequence for creating a block definition includes the following steps as illustrated:



Creating block definitions

The component objects of a block are drawn as usual in the drawing window before creating the block.

Creating blocks within a drawing

Draw toolbar: 

Draw menu: Block ➤ Make

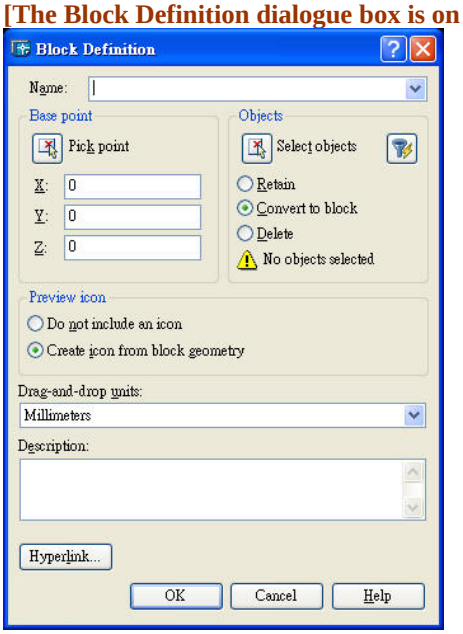
Command line: **block**

Function: It creates a block definition from selected objects.

Command sequence:

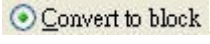
Command: **BLOCK**

[The Block Definition dialogue box is on screen]



(i) **Enter a block name in the Name box.**

(ii) **Under Base Point, click**  **Pick point and specify a point using the pointing device in the drawing window.**

(iii) **Under Objects, select**  **.**

(iv) **Click**  **Select objects.**

(v) **Use the pointing device to select the objects to be included in the block definition. Press ENTER to complete object selection.**

(vi) **In the Description box, enter a description for the block definition.**

(vii) **Choose OK to quit.**

The command window displays the following message:
Specify insertion base point:
Select objects: Specify opposite corner: (no of object) found
Select objects:

Creating blocks in separate files

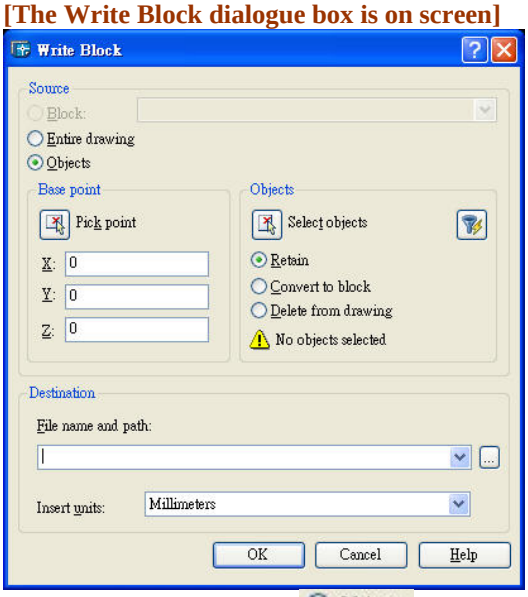
Command line: wblock

Function: It writes objects or block to a new drawing file.

Command sequence:

Command: **WBLOCK**

[The Write Block dialogue box is on screen]



(i) **Under Source, select** Objects **.**

(ii) **Under Base Point, click** **Pick point and specify a point using the pointing device in the drawing window.**

(iii) **Under Objects, select** Retain **.**

(iv) **Click** **Select objects**

(v) **Use the pointing device to select the objects to be included in the block definition. Press ENTER to complete object selection.**

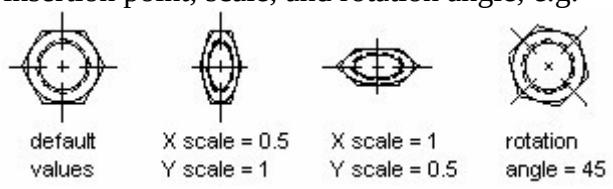
(vi) **In the File Name and Location boxes, specify a name and path for the new drawing.**

(vii) **Choose OK to quit.**

The command window displays the following message:
Specify insertion base point:
Select objects: Specify opposite corner: (no. of object) found
Select objects:

Inserting blocks

Blocks or an entire drawing can be inserted into the current drawing. When a block or drawing is inserted, specify the insertion point, scale, and rotation angle, e.g.



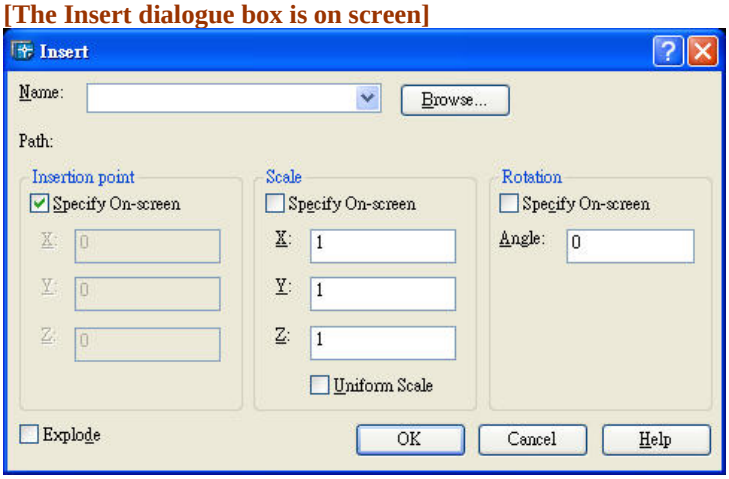
Inserting blocks

Function: It places a drawing or named block into the current drawing.

Command sequence:

Command: **INSERT**

[The Insert dialogue box is on screen]



(i) **In the Name box, select a named block from a list of block definitions.**

(ii) **If pointing device is used to specify the insertion point, scale, and rotation, select Specify On-Screen. Otherwise, enter values in the Insertion Point, Scale, and Rotation boxes.**

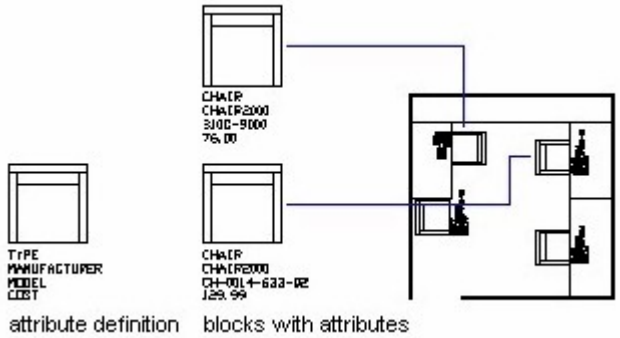
(iii) **If the objects in the block are to be inserted as individual objects instead of as a single block, select Explode.**

(iv) **Choose OK to quit.**

Tips: A block drawing file can be inserted into the current drawing by dragging the drawing file icon from the **Window Explorer**. AutoCAD prompts for an insertion point, scale and rotation values.

Attributes

Attributes are interactive labels or tags that attach data to a block. Examples of data that might be contained in an attribute are part numbers, prices, comments, and owners' names. The tag is equivalent to a column name in a database table. The following illustration shows tags for type, manufacturer, model, and cost.



Whenever a block that has a variable attribute is inserted, AutoCAD prompts to enter data to be stored with the block. If the block has only constant attributes, attributes whose values do not change, AutoCAD does not prompt for a value when the block is inserted.
Attributes also can be "invisible." An invisible attribute is not displayed or plotted; however, the attribute information is stored in the drawing file and can be written to an extraction file for use in a database program.

Creating attributes

To create an attribute, an attribute definition, which describes the characteristics of the attribute, must be created first. The characteristics include the tag (which is a name that identifies the attribute), the prompt displayed when you insert the block, value information, text formatting, location, and any optional modes (Invisible, Constant, Verify, and Preset).

Creating attribute definitions

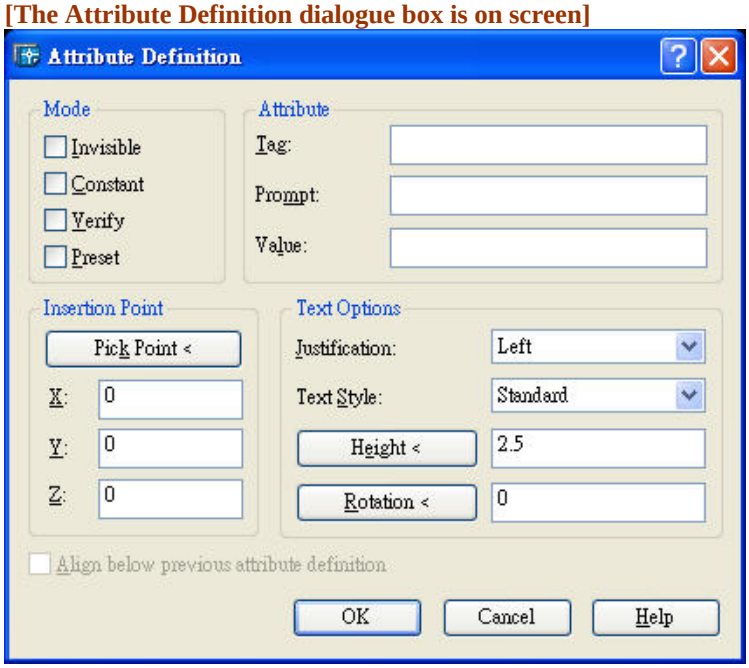
Draw menu: Block ▶ Define Attributes
Command line: attdef

Function: It creates an attribute definition.

Command sequence:

Command: **ATTDEF**

[The Attribute Definition dialogue box is on screen]



In the dialogue box,

Mode

Invisible specifies that attribute values are not displayed or printed.
Constant gives attributes a fixed value.
Verify prompts to verify that the attribute value is correct.
Preset sets the attribute to its default value when a block containing a preset attribute is inserted.

Attribute	**Tag is a name that identifies the attribute. It also identifies each occurrence of an attribute in the drawing.** **Prompt specifies the prompt that is displayed when a block containing this attribute definition is inserted.** **Value specifies the default attribute value.**
Insertion Point	**Specifies the location for the attribute.**
Text Options	**Sets the justification, style, height, and rotation of the attribute text.**

(i) **Select an attribute mode, if any.**
(ii) **Enter attribute data: tag, prompt and value.**
(iii) **Click** Pick Point < **and specify a point using the pointing device in the drawing window.**
(iv) **Select text justification and text style.**
(v) **Specify text height and text rotation.**
(vi) **Choose OK to quit.**

Editing attribute definitions

Text toolbar:

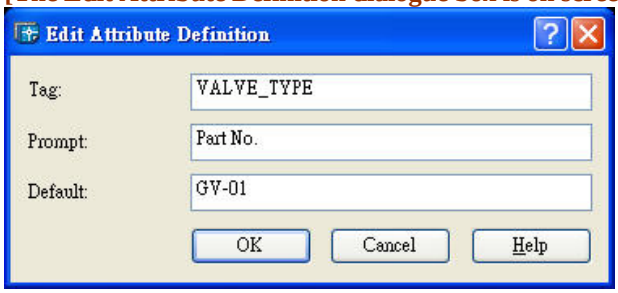
Shortcut menu: Select a text object, right-click in the drawing area, and choose Mtext Edit or Text Edit.

Command line: ddedit

Function: It edits attribute definitions, text and dimension text.

Command sequence:

Command: **DDEDIT**
Select an annotation object or [Undo]: **(drag the pick box to select an attribute definition)**
[The Edit Attribute Definition dialogue box is on screen]



Specify the attribute tag, prompt, and default value.
Choose OK to quit the dialogue box.
Select an annotation object or [Undo]: **(right-click to invoke a menu and select Enter)**

Attaching attributes to blocks

Attributes can be attached to a block when the block is created or re-defined. When prompted to select objects in creating a block, include the desired attributes in the selection window.

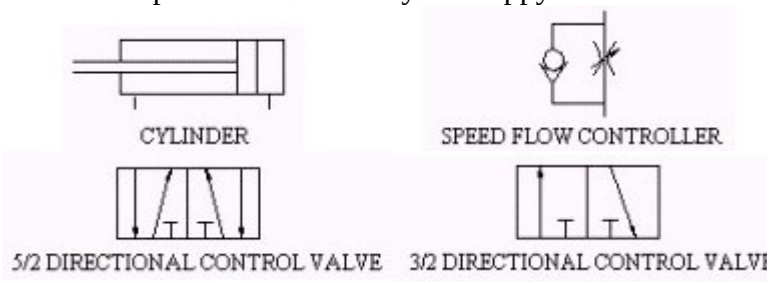
Inserting block with attributes

Inserting a block with attributes into the current drawing is similar to a block without attributes. After specifying the insertion point, scale and the rotation angle, AutoCAD displays the prompt of the attribute with a default, if any, and requires inputting value. By repeating inserting the same block, different information associated with the block can be included in the drawing.

Hands on practice

1. Open a new drawing, create the air supply, roller lever, return spring and exhaust symbols and store each as a block in the drawing.

2. Draw the cylinder, speed flow controller, 5/2 directional control valve and 3/2 directional control valve and store each as a separate block file in your floppy disk.



3. Create attribute information for each of the blocks in Part two. The block attributes should be defined as follows:
   (i) No attribute mode is selected.
   (ii) The attribute tag is a word representing the type of the pneumatic control component (e.g. valve_52 for 5/2 directional control valve).
   (iii) The attribute prompt is "Part number" for all the blocks.
   (iv) Text height for the part number is 4 mm.

   The circuit diagram in Part four indicates the insertion point of the block attribute.

4. Draw the following pneumatic circuit diagram by inserting the created blocks. Air supply lines and any symbols not included in the block creation are to be added after the symbols have been inserted in their required positions. The displayed attribute information must be shown in the same manner as the given figure.