INTRODUCTION TO DYNAMIC BLOCKS

Definition
A *dynamic* block is a block with added properties that make it intelligent and flexible.

Points to Remember
- A dynamic block can include custom properties that affect its appearance or behavior.
- A dynamic block can contain multiple editable components. Often a single dynamic block can replace multiple similar blocks, because a dynamic block can display different views of an object in the same block definition.
- A dynamic block displays custom grips that let you adjust all or part of the block. As you modify or re-size a dynamic block, the block adjusts according to the constraints of its dynamic properties.
- You can convert an existing block to a dynamic block by adding dynamic features to it.
- You work on dynamic blocks in the Block Editor.

Working with Dynamic Blocks
AutoCAD’s tool palettes contain many pre-defined dynamic blocks that you can insert into your drawings. The icon for a dynamic block in a tool palette includes a yellow "thunderbolt" to indicate the block has dynamic properties (see Figure 1).

To insert a block (dynamic or otherwise) from a tool palette, drag it from the tool palette and drop it into your drawing.

Select a dynamic block to display its grips. The shape of a dynamic grip indicates its type (see Figure 2). A dynamic block can contain multiple dynamic properties. You manipulate a dynamic block by means of its grips. For example, you can align the dynamic Door block to a wall by dragging the block by its alignment grip until it aligns itself to the wall.

![Figure 1. Dynamic blocks in a tool palette](image1)

![Figure 2. Dynamic Door block grips](image2)
Depending how a dynamic block is defined, it can include properties that allow it to:

- Move or stretch
- Rotate
- Align to other drawing objects
- Flip about an axis
- Show a different visibility state
- Display items in a lookup table

For example, you can easily resize AutoCAD's dynamic Door block by stretching it (see Figure 3). Click on the linear grip and drag to adjust the size. The door lengthens without getting wider. The hash marks indicate that only certain sizes are permitted.

You can also manipulate a dynamic block by changing its Custom settings in the Properties window.
Editing Dynamic Blocks

The Block Editor is a separate environment where you create and edit dynamic blocks. While the Block Editor is active, your drawing is not accessible. When you are finished working on a dynamic block, you close the Block Editor and return to your drawing.

To enter the Block Editor:

- Command prompt: BEDIT
- Pulldown menu: Tools → Block Editor
- Standard toolbar: 

Before you enter the Block Editor, the Edit Block Definition dialog box appears (see Figure 5). Select a block to edit from the list, and click on OK.

The Block Editor window appears (see Figure 6).
When you enter the **Block Editor**, the Block Authoring Palettes appear (see Figure 6). The Block Authoring Palettes contain all the parameters and actions that you can define for a dynamic block.

A dynamic block must contain at least one parameter. The parameter selected may require an associated action.

- A **parameter** associates a custom property with a block.
- An **action** defines dynamic behavior for a block.

In the **Block Editor**, a parameter is represented by a label with one or more associated grips. You can select a parameter and examine or change its properties in the **Properties** window. In Figure 6, the Wall Thickness linear parameter is selected.

An action appears as a label next to a yellow thunderbolt, such as the various Stretch actions in Figure 6. Selecting a parameter also selects any associated actions. An action operates on a selected set of objects within the block.

To modify a parameter, select it and then change its properties in the **Properties** window.

- In Figure 7, the Door Size parameter is selected.
- The allowable door sizes appear in the **Properties** window in the **Value Set** category.
- A value set can be either a List or an Increment. As you can see in Figure 7, the value set for this parameter is a List.

![Figure 7. Properties of a linear parameter](image)

- To modify the values, click on the ellipsis (i.e., the "dot-dot-dot" **•••**) button.
- Then click on the ellipsis button to display the **Add Distance Value** dialog box (see Figure 8).
The allowable sizes are listed in the large window.

- Click in the box labeled Distances to add and type a new size (see Figure 8).
- Click on Add to add this value to the list.
- Repeat the two previous steps if you want to add more choices to the list.
- When you are finished, click on OK to return to the Block Editor window.

For some blocks, an increment may work better than a value list. For example, you could define a rotation parameter that would let you rotate a block in 45-degree increments. Figure 9 shows a dynamic block with a Rotate parameter open in the Block Editor.

- Select the Rotate parameter in the Block Editor window.
- In the Properties window, set the Ang type property to Increment.
- In the next box down, enter the incremental rotation angle.
- Next specify the minimum rotation angle.
- Finally specify the maximum rotation angle.
- The default minimum rotation angle is 0 and the maximum is 360, which lets you rotate the object in a full circle.

All of your drawing and editing tools are also available in the Block Editor. You can create or modify block geometry if you need to. You can also define attributes in the Block Editor.

When you are finished working in the Block Editor, click on the button labeled Close Block Editor (see Figure 6) to return to your drawing. You are asked to confirm that you
want to save your changes and apply them to any existing block references in the drawing.

Figure 9 summarizes the parameter/action pairings and associated grips.

<table>
<thead>
<tr>
<th>Parameter Type</th>
<th>Grip Type</th>
<th>Actions You Can Associate with a Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>Standard</td>
<td>Move, Stretch</td>
</tr>
<tr>
<td>Linear</td>
<td>Linear</td>
<td>Move, Scale, Stretch, Array</td>
</tr>
<tr>
<td>Polar</td>
<td>Standard</td>
<td>Move, Scale, Stretch, Polar Stretch, Array, Array</td>
</tr>
<tr>
<td>XY</td>
<td>Standard</td>
<td>Move, Scale, Stretch, Array</td>
</tr>
<tr>
<td>Rotation</td>
<td>Rotation</td>
<td>Rotate</td>
</tr>
<tr>
<td>Flip</td>
<td>Flip</td>
<td>Flip</td>
</tr>
<tr>
<td>Alignment</td>
<td>Alignment</td>
<td>None (The action is implied and contained within the parameter.)</td>
</tr>
<tr>
<td>Visibility</td>
<td>Lookup</td>
<td>None (The action is implied and controlled by visibility states.)</td>
</tr>
<tr>
<td>Lookup</td>
<td>Lookup</td>
<td>Lookup</td>
</tr>
<tr>
<td>Base</td>
<td>Standard</td>
<td>None</td>
</tr>
</tbody>
</table>

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Figure 9. Parameter/action pairings