

UNIT B: 3D Modeling

Competency: D402.00

Demonstrate 3D solid modeling techniques.

Objective: D402.02

Explain techniques for modifying and duplicating 3D geometry.

- A. Shell – The shell command is used to “hollow out” solids.
1. Select the faces of the solid that will be eliminated.
 2. Determine a wall thickness for the shell.

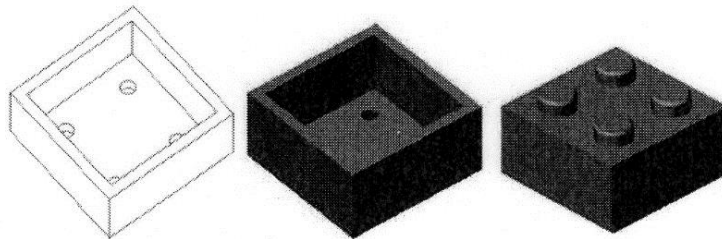


Figure 1. Object Created with a Shell.

- B. Helix or Coils – A helix or coil can be used to create several types of parts. When combined with a sweep, it is especially good for creating springs and for cutting threads. Most software will allow a helix or coil to be defined by the following parameters:
1. Pitch and revolution.
 2. Height and revolution.
 3. Height and pitch (good when used to produce threads).

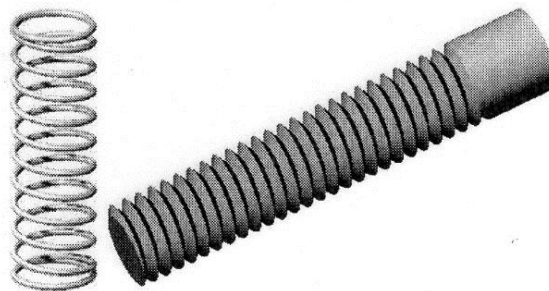


Figure 2. Objects Created with a Helix or Coil.

- G. Fillets (most CAD software does not distinguish between fillets and rounds)
1. Select the edges to be filleted.
 2. Specify a radius of the fillet.



Figure 3. Creating Fillets.

H. Chamfers

1. Select the edges to be chamfered.
2. Specify the distance and angle of the chamfer.

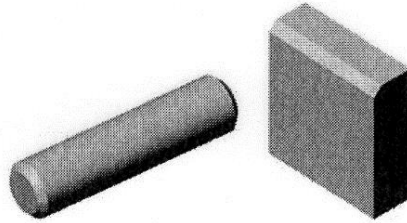


Figure 4. Creating Chamfers.

Duplicating Geometry or Features

A. Patterns or Arrays - These can be created at the 2D or 3D level.

1. Linear or Rectangular Patterns or Arrays
 - a. Select the 2D or 3D feature(s).
 - b. Specify a direction for copying the objects in one direction.
 - c. Specify the distance between features as well as the number of features to duplicate in that direction.
 - d. Specify a direction for copying the objects in another direction.
 - c. Specify the distance between features as well as the number of features to duplicate in the second direction.

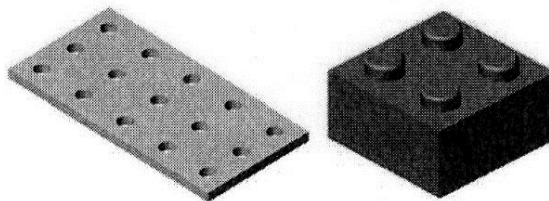


Figure 5. Linear Patterns.

2. Circular or Polar Patterns or Arrays
 - a. Select the 2D or 3D feature(s).
 - b. Specify an axis of rotation for the feature(s).
 - c. Specify a direction for copying the objects.
 - d. Specify the angle between features as well as the number of features to duplicate.

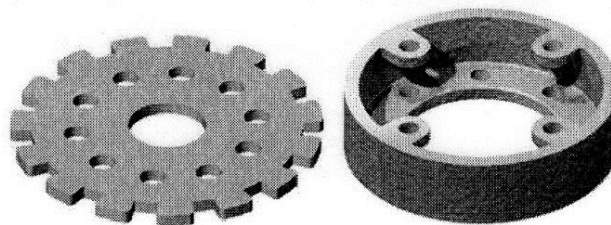


Figure 6. Circular Patterns.

- B. Mirroring 3D Features
 - a. Select the 3D feature(s).
 - b. Specify a 2D plane to mirror the features about.

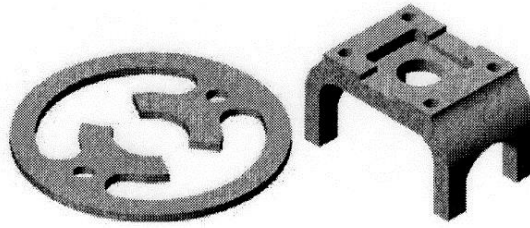


Figure 7. Mirroring 3D Features.