3D Modeling

MODELING TYPES

3 Types of 3D Modeling:

- **Wireframe Modeling**

- **Surface Modeling**

- **Solid Modeling**

Wireframe Modeling:

A wireframe model is creating a skeleton of a 3D object. You draw a set of 2D objects that represent an outline and then connect the 2D objects three-dimensionally to build a wireframe of your 3D object. The most important limitation of wireframe models is that there aren't any surfaces. It is impossible to apply material properties and shading.

Surface Modeling:

Surfaces are also called meshes. It is a technique for representing solid-appearing objects. A surface model is creating the skin of an object. Surface modeling can be compared with building physical models by using thin layers of balsa wood. You can apply material properties and shading on surface models.

Solid Modeling:

A solid model is creating an object as close to true 3D as you can get. In real life objects have solidity, even a thin object such as paper has thickness. You can combine, modify and render solid objects.

WIREFRAME

## Wireframe Modeling:

Most wireframe models are built with 2D objects.

These objects have no surface or solidity.

The success key is in correct use of coordinates and 2D commands.

By using the properties Thickness and Elevation of 2D Objects you can build 3D models as well.

By adding thickness to 2D objects simple surfaces can be created. If you give thickness to a circle, it becomes a cylinder.

Elevation pushes objects to a new position from XY plane.
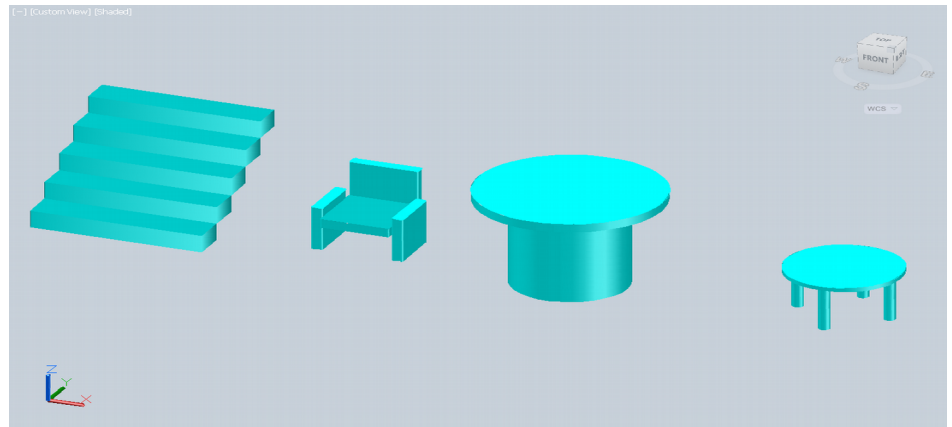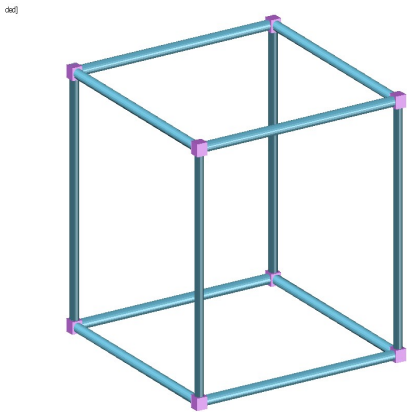
Thickness

is an object property that gives the object a 3D effect. If you apply thickness to lines, circles, ellipses, arcs, polylines, etc., they will acquire some height. Thus by changing the shade mode they will look like 3D surfaces and/or solids.

Elevation

is the default distance from XY plane along Z axis. You can override this value with direct coordinate entry or by using Osnaps.

WORLD COORDINATE SYSTEM & USER COORDINATE SYSTEM

WCS:

Every drawing is equipped with a coordinate system called WCS or "World Coordinate System". The WCS is fixed and you cannot change its location or orientation.

Drawing and editing commands can only be applied parallel to, or on the XY plane.

How can you draw an object, that is not parallel to the XY plane?

UCS:

You can customize the UCS or "User Coordinate System".

You can move or rotate UCS in any direction. The placement of objects is based on the current UCS so you can even use 2D commands to create objects in 3D space with various orientations.

UCS: Invokes the UCS command.

Display UCS Dialog: Shows UCS dialog box.

UCS Previous: Enables the previous UCS settings.

World UCS: Matches the UCS with WCS.

Object UCS: Builds the UCS based on the selected object.

Face UCS: Builds the UCS based on the selected face.

View UCS: Matches UCS with screen. The X axis horizontal, Y vertical, and Z perpendicular to the screen.

Origin UCS: Moves the UCS without changing its orientation.

Z Axis Vector UCS: Builds the UCS based on the new direction of the Z axis.

3 Point UCS: Builds the UCS by specifying the new origin, a point on positive X direction, and a point on XY plane.

X Axis Rotate UCS: Rotates the UCS about X axis.

Y Axis Rotate UCS: Rotates the UCS about Y axis.

Z Axis Rotate UCS: Rotates the UCS about Z axis.

Apply UCS: Applies the current UCS to a selected viewport.

While you are changing the UCS the grid is flipping to match the new XY plane.

This might be distracting, so you can turn the grid option off.

3D NAVIGATION TOOLS

Working three-dimensionally means you need to see your drawing from different angles.

With 3D navigation tools you can view objects from different angles, heights, and distances.

Vpoint:

Creating different views using a compass and axis tripod (bulls eye), and isometric views with vpoint presets.

You can switch to one of the standard orthographic 3D views or an isometric view.

3DOrbit:

Creating 3D views using the arcball. Dragging the mouse, the target of the view stays stationary and the camera location, or point of view, moves around the target.

Dragging horizontally, the camera moves parallel to the XY plane of the world coordinate system (WCS). Dragging the cursor vertically, the camera moves along the *Z* axis.

ViewCube:

Alternatively, you can use the ViewCube, which is a handy tool to control the orientation of your 3D views. The ViewCube allows you to change from isometric to standard views.