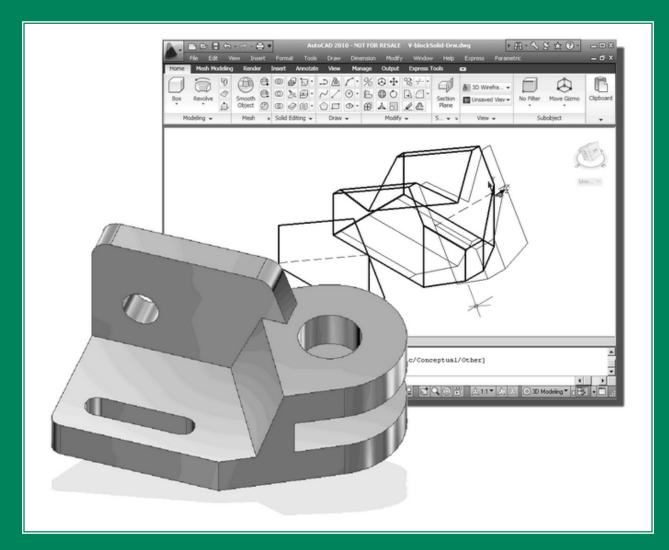
AutoCAD® 2010 Tutorial

Second Level: 3D Modeling



Randy H. Shih

Oregon Institute of Technology



Schroff Development Corporation www.schroff.com

Better Textbooks. Lower Prices.

Table of Contents

Preface Acknowledgments

Chapter 1 Getting Started

Introduction	1-2
Development of Computer Geometric Modeling	1-2
Why Use AutoCAD® 2010	1-5
Getting Started with AutoCAD® 2010	1-7
AutoCAD [®] 2010 Screen Layout	1-8
Application Menu	1-9
Quick Access Toolbar	1-9
AutoCAD Menu Bar	1-9
Graphics Cursor or Crosshairs	1-9
Command prompt Area	1-9
Cursor Coordinates	1-10
Status Toolbar	1-10
Ribbon Tabs and Panels	1-10
Draw and Modify Toolbar Panel	1-10
Layers Control Toolbar Panel	1-11
Annotation Toolbar Panel	1-11
Layout/Model Toolbar	1-11
Viewing Toolbar	1-11
Workspace Switching	1-11
Mouse Buttons	1-12
[Esc] - Canceling commands	1-12
On-Line Help	1-13
Leaving AutoCAD® 2010	1-14
Creating a CAD File Folder	1-15

Chapter 2 User Coordinate System and the Z-Axis

Introduction	2-2
The Floor Plan Design	2-2
Starting Up AutoCAD® 2010	2-3
3D Modeling WorkSpace	2-4
Drawing Units Setup	2-5
Drawing Area Setup	2-6
GRID and SNAP Intervals Setup	2-7
Drawing Polylines	2-9
Creating an Offset Polyline	2-10

Creating Interior Walls Completing the Doorway Using the TRIM Command User Coordinate System – It is an XY CRT, but an XYZ World Viewing the 2D Design in 3D Space Adding the 3rd Dimension to the Floor Plan Design Viewing the Design Using the Hide Option Adding New Layers Moving Entities to a Different Layer Moving the UCS Creating the Roof Rotating the UCS Sketching on the Rotated UCS Viewing the Design Using the Hidden Option Questions Exercises	2-11 2-14 2-16 2-17 2-18 2-20 2-21 2-23 2-23 2-25 2-27 2-28 2-29 2-30 2-31
Chapter 3 3D Wireframe Modeling	
Introduction The Locator Design Starting Up AutoCAD® 2010 Using the Startup Options Creating the Rectangular Base of the Design Create a 3D Box Object Snap Toolbar Using the Snap Options to Locate the Top Corners Using the Copy Option to Create Additional Edges Using the TRIM Command Using the View Toolbar Dynamic Rotation – Free Orbit Using the OFFSET Command to Create Parallel Edges Creating a Circle Above the UCS Sketch Plane Completing the Wireframe Model Questions Exercises	3-2 3-3 3-4 3-4 3-6 3-7 3-10 3-12 3-14 3-16 3-17 3-19 3-20 3-22 3-23
Chapter 4 UCS, Viewports and Wireframe Modeling	
Introduction The V-Block Design Starting Up AutoCAD® 2010 Layers Setup	4-2 4-2 4-3 4-4

Creating the Rectangular Base of the Design	4-5
Creating a Wireframe Box	4-6
Using the View and the UCS Toolbars	4-7
Creating Construction Lines in the Front View	4-8
Copying in the Negative Z Direction	4-10
Creating an Inclined Line at the Base of the Model	4-11
Creating Object Lines	4-12
Multiple Viewports	4-14
Using the MIRROR Command	4-15
Turn <i>OFF</i> the Construction Lines	4-17
Creating a New UCS	4-18
Creating a New Named View	4-20
Creating the V-Cut Feature on the Inclined Plane	4-22
Extend the Cut and GRIP Editing	4-23
Questions	4-25
Exercises	4-26
Chapter 5	
3D Surface Modeling	
Introduction	5-2
Starting Up AutoCAD® 2010	5-4
Using the UCS Toolbars and the Meshes Commands	5-5
Creating a Surface Using the 2D SOLID Command	5-5
Using the Visual Styles Toolbar	5-8
Creating a Surface Using the 3D FACE Command	5-9
The ViewCube	5-11
Creating a Surface of Irregular Shape	5-13
Using the <i>Invisible Edge</i> Option	5-16
Moving with the Grip Editing Tools	5-17
The <i>Locator</i> Wireframe Model	5-18
Moving Objects to a Different Layer	5-18
Advanced Surface Modeling Commands	5-20
Using the <i>Tabulated Surface</i> Option	5-23
Using the Ruled Surface Option	5-24
Questions	5-27
Exercises	5-28
Chapter 6	
Solid Modeling - Constructive Solid Geometry	
Introduction	6-2
The Guide-Block Design	6-2
Constructive Solid Geometry Concept	6-3

Binary Tree The Guide-Block CSG Binary Tree Starting Up AutoCAD® 2010 Layers Setup Creating the First 3D object Creating the Second Solid Feature Boolean Operation - UNION Creating the Second Cylinder Feature Boolean Operation - SUBTRACT Creating another Solid Feature Visual Styles Options Creating the Final Feature Rotating the Rectangular Block Moving the Rectangular Block The SteeringWheels Questions Exercises	6-4 6-5 6-6 6-7 6-7 6-9 6-10 6-11 6-12 6-13 6-14 6-15 6-16 6-17 6-18 6-20 6-21
Chapter 7 Regions, Extrude and Solid Modeling	
Introduction The V-BlockSolid Design Starting Up AutoCAD® 2010 Layers Setup Setting Up a 2D Sketch Defining the Front Edges of the Design Creating a Region Extruding the Created Region Creating a 2D Sketch at the Base of the Model Creating a Copy of the 2D Sketch Creating the Cutter Solids Boolean Operation - Subtract Mass Properties of the Solid Model Align the UCS to the Inclined Face Creating the V-Cut Questions Exercises	7-2 7-2 7-3 7-4 7-5 7-7 7-10 7-11 7-13 7-14 7-15 7-16 7-17 7-18 7-19 7-22 7-23
Chapter 8 Multiview Drawings from 3D Models	
Introduction The V-Block Design	8-2 8-2

Starting Up AutoCAD® 2010	8-3
AutoCAD Paper Space	8-4
Deleting the Displayed Viewport	8-5
Adding Borders and Title Block in the Layout	8-6
Setting Up Viewports inside the Title Block	8-7
Setting Up the Standard Views	8-8
Determining the Necessary 2D Views	8-10
Establishing an Auxiliary View in Model Mode	8-11
Adding a Viewport for an Auxiliary View	8-13
Using the <i>DVIEW</i> Command	8-16
Adjusting the Viewport Scale	8-17
Locking the Base View	8-18
Aligning the 2D Views	8-18
Creating 2D Projected Entities - SOLPROF	8-21
Completing the 2D Drawing	8-23
Questions	8-25
Exercises	8-26
Chapter 9	
Symmetrical Features in Designs	
Introduction	9-2
A Revolved Design: PULLEY	9-2 9-2
Modeling Strategy - A Revolved Design	9-2 9-3
Starting Up AutoCAD® 2010	9-3 9-4
Layers Setup	9-5
Setting Up a 2D Sketch for the Revolved Feature	9-6
Perform 2D Boolean Operations	9-8
Creating the Revolved Feature	9-12
Mirroring Part	9-13
Combining Parts	9-14
3D Array	9-15
Position and Perform the Cut	9-18
Questions	9-20
Exercises	9-21
Chapter 10	
Advanced Modeling Tools & Techniques	
Introduction	10-2
A Thin-walled Design: OIL SINK	10-2
Modeling Strategy	10-3
Starting Up AutoCAD® 2010	10-4
Layers Setup	10-5

The First Extruded Feature	10-6
Create an Offset Geometry from an Extracted Surface	10-8
Extrude with Draft Angle	10-10
Aligning the Parts	10-11
Create another Extracted Surface	10-12
Combining Parts – Boolean UNION	10-15
Creating 3D Rounds and Fillets	10-16
Creating a Shell Feature	10-18
Creating a Rectangular Array Cut Feature	10-19
Creating another Rectangular Array Cut Feature	10-21
Making a Design Change	10-23
Grip Editing Approach	10-23
Dynamic UCS Approach	10-25
Questions	10-27
Exercises	10-28
Chapter 11	
Conceptual Design Tools & Techniques	
Introduction	11-2
A Bird House Design	11-3
Starting Up AutoCAD® 2010	11-4
Layers Setup	11-5
The Base Plate	11-6
Create the 1 st Floor Inside Compartments	11-7
Create a Solid Feature Using the Press/Pull Command	11-8
Using the Press/Pull Command as an Editing Tool	11-10
Create another Cut Feature	11-11
Adjusting the Compartments	11-13
Adding Additional Compartments	11-14
Creating the Doors	11-15
Creating the 2 nd Floor	11-16
Repositioning the 2 nd Floor	11-18
Modeling the Roof Section with the Press/Pull Command	11-19
Using the Imprint Command	11-21
Conclusion	11-23
Questions	11-24
Exercises	11-25

Index