

# Table of Contents

<b>Dedication</b>	iii
<b>Preface</b>	xxi

## Chapter 1: Introduction

Introduction to Autodesk Inventor 2015	1-2
Part Module	1-2
Assembly Module	1-2
Presentation Module	1-3
Drawing Module	1-3
Sheet Metal Module	1-3
Mold Design Module	1-3
Getting Started with Autodesk Inventor	1-3
Quick Access Toolbar	1-6
Ribbon and Tabs	1-7
Sketch Tab	1-8
3D Model Tab	1-9
Sheet Metal Tab	1-9
Assemble Tab	1-9
Place Views Tab	1-9
Presentation Tab	1-10
Tools Tab	1-10
View Tab	1-10
Navigation Bar	1-11
Browser Bar	1-11
Units for Dimensions	1-12
Important Terms and Their Definitions	1-12
Feature-based Modeling	1-12
Parametric Modeling	1-12
Bidirectional Associativity	1-12
Adaptive	1-12
Design Doctor	1-13
Constraints	1-13
Joints	1-15
Consumed Sketch	1-16
Stress Analysis Environment	1-16
Select Other Behavior	1-17
Hotkeys	1-17
Part Module	1-17
Assembly Module	1-18
Drawing Module	1-19
Customizing Hotkeys	1-19
Creating the Sketch	1-21
Marking Menu	1-21

Color Scheme	1-22
Self-Evaluation Test	1-23
Review Questions	1-24

## Chapter 2: Drawing Sketches for Solid Models

The Sketching Environment	2-2
The Initial Screen of Autodesk Inventor	Enhanced 2-2
Starting a New File	2-4
The Open Dialog Box	2-5
Setting a New Project	2-7
Import DWG	2-8
Invoking the Sketching Environment	2-8
Introduction to the Sketching Environment	2-8
Setting Up the Sketching Environment	2-9
Modifying the Document Settings of a Sketch	2-9
Sketching Entities	2-11
Positioning Entities by Using Dynamic Input	2-11
Drawing Lines	2-12
Drawing Circles	2-16
Drawing Ellipses	2-17
Drawing Arcs	2-17
Drawing Rectangles	2-19
Drawing Polygons	2-22
Drawing Slots	2-23
Placing Points	2-25
Creating Fillets	2-26
Creating Chamfers	2-27
Drawing Splines	2-28
Deleting Sketched Entities	2-31
Finishing a Sketch	2-32
Understanding the Drawing Display Tools	2-32
Zoom All	2-32
Zoom	2-32
Zoom Window	2-33
Zoom Selected	2-33
Pan	2-33
Orbit	2-33
Constrained Orbit	2-34
Tutorial 1	2-35
Tutorial 2	2-40
Tutorial 3	2-44
Tutorial 4	2-49
Self-Evaluation Test	2-52
Review Questions	2-53
Exercise 1	2-54

Exercise 2	2-54
Exercise 3	2-55
Exercise 4	2-55

### Chapter 3: Adding Constraints and Dimensions to Sketches

Adding Geometric Constraints to a Sketch	3-2
Perpendicular Constraint	3-2
Parallel Constraint	3-2
Tangent Constraint	3-3
Coincident Constraint	3-3
Concentric Constraint	3-3
Collinear Constraint	3-4
Horizontal Constraint	3-4
Vertical Constraint	3-5
Equal Constraint	3-5
Fix Constraint	3-5
Symmetric Constraint	3-5
Smooth Constraint	3-6
Viewing the Constraints Applied to a Sketched Entity	3-6
Controlling Constraints and Applying them Automatically while Sketching	3-7
Constraints Settings Dialog Box	Enhanced 3-7
Scope of Constraint Inference	New 3-8
Deleting Geometric Constraints	3-9
Adding Dimensions to Sketches	3-9
Linear Dimensioning	3-10
Aligned Dimensioning	3-11
Angular Dimensioning	3-12
Diameter Dimensioning	3-14
Radius Dimensioning	3-15
Linear Diameter Dimensioning	3-16
Setting the Scale of a Sketch	3-17
Creating Driven Dimensions	3-18
Understanding the Concept of Fully-Constrained Sketches	3-18
Measuring Sketched Entities	3-19
Measuring Distances	3-19
Measuring Angles	3-21
Measuring Loops	3-22
Measuring the Area	3-22
Adding Linear Measurements	3-23
Clearing Accumulated Dimensions	3-23
Evaluating Region Properties	3-23
Tutorial 1	3-24
Tutorial 2	3-29
Tutorial 3	3-34
Tutorial 4	3-40
Self-Evaluation Test	3-43

Review Questions	3-44
Exercise 1	3-45
Exercise 2	3-45
Exercise 3	3-46
Exercise 4	3-46
Exercise 5	3-47
Exercise 6	3-47

## Chapter 4: Editing, Extruding, and Revolving the Sketches

Editing Sketched Entities	4-2
Extending Sketched Entities	4-2
Trimming Sketched Entities	4-2
Splitting Sketched Entities	4-3
Offsetting Sketched Entities	4-4
Mirroring Sketched Entities	4-5
Moving Sketched Entities	4-7
Rotating Sketched Entities	4-9
Creating Patterns	4-11
Creating Rectangular Patterns	4-11
Creating Circular Patterns	4-15
Writing Text in the Sketching Environment	4-17
Writing Regular Text	4-17
Writing Text Aligned to a Geometry	4-20
Inserting Images and Documents in Sketches	4-21
Editing Sketched Entities by Dragging	4-22
Tolerances	4-23
Converting the Base Sketch into a Base Feature	4-24
Extruding the Sketch	4-25
Revolving the Sketch	4-29
Direct Manipulation of Features by Using the Mini Toolbar	4-32
Command Options	4-32
Manipulators	4-32
Rotating the View of a Model in 3D Space	4-33
Rotating the View of a Model Using the Orbit	4-34
Changing the View Using the ViewCube	4-35
Navigating the Model	4-38
Controlling the Display of Models	4-39
Setting the Visual Styles	4-39
Setting the Shadow Options	4-41
Setting the Camera Type	4-42
Creating Freeform Shapes <small>New</small>	4-42
Tutorial 1	4-46
Tutorial 2	4-50
Tutorial 3	4-53
Tutorial 4	4-58
Self-Evaluation Test	4-60

Review Questions	4-61
Exercise 1	4-63
Exercise 2	4-63
Exercise 3	4-64
Exercise 4	4-64
Exercise 5	4-65
Exercise 6	4-65
Exercise 7	4-66

### **Chapter 5: Other Sketching and Modeling Options**

Need for other Sketching Planes	5-2
Work Features	5-3
Creating Work Planes	5-3
Creating Work Axes	5-13
Creating Work Points	5-17
Other Extrusion Options	5-22
Other Revolution Options	5-28
The Concept of Sketch Sharing	5-30
Tutorial 1	5-31
Tutorial 2	5-37
Tutorial 3	5-41
Self-Evaluation Test	5-46
Review Questions	5-46
Exercise 1	5-48
Exercise 2	5-48
Exercise 3	5-50
Exercise 4	5-51

### **Chapter 6: Advanced Modeling Tools-I**

Advanced Modeling Tools	6-2
Creating Holes	6-2
Creating Fillets	6-12
Creating Chamfers	6-23
Mirroring Features and Models	6-26
Creating Rectangular Patterns	6-29
Creating Circular Patterns	6-32
Creating Rib Features	6-34
Thickening or Offsetting the Faces of Features	6-38
Creating the Embossed and Engraved Features	6-42
Applying Images on a Feature	6-44
Assigning Different Colors/Styles to a Model	6-45
Assigning Material to a Model	6-46
Modifying the Properties of an Existing Material	6-46
Tutorial 1	6-48
Tutorial 2	6-54

Tutorial 3	6-60
Tutorial 4	6-67
Tutorial 5	6-71
Self-Evaluation Test	6-78
Review Questions	6-78
Exercise 1	6-80
Exercise 2	6-81
Exercise 3	6-82

## Chapter 7: Editing Features and Adding Automatic Dimensions to Sketches

Concept of Editing Features	7-2
Editing Features of a Model	7-2
Updating Edited Features	7-4
Editing Features Dynamically by Using 3D Grips	7-4
Editing the Sketches of Features	7-6
Redefining the Sketching Plane of a Sketched Feature	7-8
Suppressing and Unsuppressing the Features	7-9
Editing of a feature using the Direct Tool	7-10
Deleting Features	7-12
Copying and Pasting Features	7-12
Manipulating Features by EOP	7-15
Adding Automatic Dimensions to Sketches	7-16
Projecting Entities in the Sketching Environment	7-17
Projecting Edges or Faces	7-17
Projecting Cutting Edges	7-18
Projecting 2D Sketch on 3D Face	7-19
Tutorial 1	7-20
Tutorial 2	7-27
Tutorial 3	7-32
Self-Evaluation Test	7-38
Review Questions	7-39
Exercise 1	7-40
Exercise 2	7-41
Exercise 3	7-42
Exercise 4	7-43
Exercise 5	7-44

## Chapter 8: Advanced Modeling Tools-II

Advanced Modeling Tools	8-2
Creating Sweep Features	8-2
Creating Lofted Features	8-10
Creating Coil Features	8-21

Creating Threads	8-25
Creating Shell Features	8-28
Applying Drafts	8-30
Creating Split Features	8-34
Trimming Surfaces	8-36
Extending Surfaces	8-38
Deleting Faces	8-39
Replacing Faces with Surfaces	8-41
Creating Planar Boundary Patches	8-42
Stitching Surfaces	8-44
Working with the Sculpt Tool	8-45
Working with the Bend Part Tool	8-47
Reordering the Features	8-49
Using the Sketch Doctor	8-51
Using the Design Doctor	8-52
Tutorial 1	8-53
Tutorial 2	8-57
Tutorial 3	8-60
Tutorial 4	8-62
Tutorial 5	8-65
Self-Evaluation Test	8-69
Review Questions	8-69
Exercise 1	8-71
Exercise 2	8-72

## Chapter 9: Assembly Modeling-I

Assembly Modeling	9-2
Types of Assemblies	9-2
Top-down Assemblies	9-3
Bottom-up Assemblies	9-3
Creating Top-down Assemblies	9-4
Creating Components in the Assembly Module	9-4
Creating Bottom-Up Assemblies	9-7
Placing Components in the Assembly File	9-7
Assembling Components by Using the Constrain Tool	9-8
Assembly Tab	9-9
Motion Tab	9-17
Transitional Tab	9-19
Constraint Set Tab	9-20
Specifying the Limits for Constraining	9-20
Assembling Parts by Using the Assemble Tool	9-21
Using ALT+Drag to Apply Assembly Constraints	9-23
Applying Joints to the Assembly	9-23
Joint Tab	9-23
Limits Tab	9-28

Showing and Hiding Relationships	9-28
Show Relationship	9-29
Hide Relationship	9-29
Show Sick Relationship	9-29
Moving Individual Components	9-29
Rotating Individual Components in 3D Space	9-30
Tutorial 1	9-30
Tutorial 2	9-46
Tutorial 3	9-53
Self-Evaluation Test	9-63
Review Questions	9-64
Exercise 1	9-65

## Chapter 10: Assembly Modeling-II

Editing Assembly Constraints	10-2
Editing Components	10-3
Editing Components in the Assembly File	10-3
Editing Components by Opening their Part Files	10-5
Creating Subassemblies	10-5
Creating a Subassembly Using the Bottom-up Design Approach	10-6
Creating a Subassembly Using the Top-down Design Approach	10-6
Checking Degrees of Freedom of a Component	10-6
Creating the Pattern of Components in an Assembly	10-7
Component	10-7
Associative Tab	10-8
Rectangular Tab	10-9
Circular Tab	10-9
Replacing a Component from the Assembly File with another Component	10-10
Replacing a Single Instance of the Selected Component	10-10
Replacing all Instances of the Selected Component	10-11
Mirroring Subassemblies or Components of an Assembly	10-12
Copying Subassemblies or Components of an Assembly	10-15
Deleting Components	10-16
Editing the Pattern of Components	10-16
Making a Pattern Instance Independent	10-17
Deleting Assembly Constraints	10-17
Creating Assembly Section Views in the Assembly File	10-18
Analyzing Assemblies for Interference	10-19
Creating Design View Representations	10-20
Design View Representation Area	10-21
Positional Representation Area	10-22
Level of Detail Representation	10-22
Simulating the Motion of Components of an	
Assembly by Driving Assembly Constraints	10-22
Creating Positional Representations	10-25
Viewing the Bill of Material of the Current Assembly	10-26



Working with Assembly Features	10-28
Tutorial 1	10-28
Tutorial 2	10-31
Tutorial 3	10-32
Self-Evaluation Test	10-38
Review Questions	10-39
Exercise 1	10-40

## Chapter 11: Working with Drawing Views-I

The Drawing Module	11-2
Types of Views	11-3
Generating Drawing Views	11-5
Generating the Base View	11-5
Generating Projected Views	11-10
Generating Auxiliary Views	11-12
Generating Section Views	11-13
Generating Detail Views	11-15
Generating Broken Views	11-17
Generating Break Out Views	11-19
Generating Overlay Views	11-21
Generating Slice Views	11-23
Drafting Drawing Views	11-24
Editing Drawing Views	11-24
Deleting Drawing Views	11-25
Moving Drawing Views	11-27
Copying Drawing Views	11-27
Rotating Drawing Views	11-27
Changing the Orientation of Drawing Views	11-29
Assigning Different Hatch Patterns to Components in Assembly Section Views	11-29
Editing the Default Hatch Style of the Sectioned Objects	11-32
Excluding Components from Assembly Section Views	11-33
Tutorial 1	11-35
Tutorial 2	11-40
Self-Evaluation Test	11-46
Review Questions	11-46
Exercise 1	11-48

## Chapter 12: Working with Drawing Views-II

Modifying Drawing Standards	12-2
Inserting Additional Sheets into Drawing	12-3
Activating a Drawing Sheet	12-3
Displaying Dimensions in Drawing Views	12-3
Retrieving Parametric Dimensions in Drawing Views	12-4
Adding Reference Dimensions	12-5
Modifying the Model Dimensions	12-5

Editing Drawing Sheets	12-5
Creating Dimension Styles	12-7
Applying Dimension Styles	12-8
Modifying a Dimension and its Appearance Using the Shortcut Menu	12-8
Adding the Parts List	12-9
Source Area	12-9
BOM Settings and Properties Area	12-10
Table Wrapping Area	12-10
Editing the Parts List	12-11
Column Chooser	12-12
Group Settings	12-12
Filter Settings	12-13
Sort	12-13
Export	12-13
Table Layout	12-13
Renummer Item	12-14
Save Item Overrides to BOM	12-14
Member Selection	12-14
Adding/Removing Custom Parts	12-14
Shortcut Menu Options	12-14
Setting the Standard for the Parts List	12-15
Adding Balloons to Assembly Drawing Views	12-15
Adding Balloons to Selected Components	12-16
Adding Automatic Balloons	12-17
Adding Text to a Drawing Sheet	12-19
Adding Multiline Text without a Leader	12-19
Adding Multiline Text with Leader	12-20
Tutorial 1	12-21
Tutorial 2	12-26
Tutorial 3	12-31
Self-Evaluation Test	12-36
Review Questions	12-36
Exercise 1	12-37

## Chapter 13: Presentation Module

The Presentation Module	13-2
Creating the Presentation View	13-3
Assembly Area	13-3
Explosion Method Area	13-4
Defining Units for Presentation Files	13-6
Tweaking Components in the Presentation View	13-6
Create Tweak Area	13-6
Transformations Area	13-8
Animating an Assembly	13-9
Rotating the Presentation View Precisely	13-15
Tutorial 1	13-16

Tutorial 2	13-23
Self-Evaluation Test	13-29
Review Questions	13-30
Exercise 1	13-31

## Chapter 14: Working with Special Design Tools

Adaptive Parts	14-2
Defining Parameters <i>Enhanced</i>	14-2
Working with iParts	14-7
Types of iPart Factories	14-7
Creating iPart Factories	14-7
Procedure to Create an iPart	14-13
Inserting an iPart into an Assembly	14-14
Changing the iParts in the Assembly File	14-17
Creating 3D Sketches	14-18
Line	14-18
Spline	14-19
Bend	14-19
Include Geometry	14-19
Intersection Curve	14-19
Helical Curve	14-20
Tutorial 1	14-21
Tutorial 2	14-25
Tutorial 3	14-31
Tutorial 4	14-34
Tutorial 5	14-38
Self-Evaluation Test	14-45
Review Questions	14-46
Exercise 1	14-47

## Chapter 15: Working with Sheet Metal Components

The Sheet Metal Module	15-2
Setting Sheet Metal Component Parameters	15-4
Setting the Sheet Metal Rule	15-4
Setting the Material Style	15-12
Setting the Unfolding Rule	15-12
Creating Sheet Metal Components	15-14
Folding Sheet Metal Components	15-18
Adding Flanges to Sheet Metal Components	15-20
Creating Cuts in Sheet Metal Components	15-25
Creating Seams at the Corners of Sheet Metal Components	15-26
Bending the Faces of a Sheet Metal Component	15-31
Rounding the Corners of Sheet Metal Components	15-33
Chamfering the Corners of Sheet Metal Components	15-35
Punching 3D Shapes into Sheet Metal Components	15-36

Creating Hems	15-39
Creating Contour Flanges	15-41
Creating the Flat Patterns of Sheet Metal Components	15-44
Adding or Removing Material from the Flat Pattern	15-44
Tutorial 1	15-45
Tutorial 2	15-52
Self-Evaluation Test	15-58
Review Questions	15-59
Exercise 1	15-60

## Chapter 16: Introduction to Weldments

Understanding Weldment Assemblies	16-2
Main Types of Welds in Autodesk Inventor	16-3
Cosmetic Welds	16-3
Fillet Welds	16-4
Groove Welds	16-4
Adding Welds to Assemblies	16-5
Assembling the Components of Weldment Assemblies	16-5
Preparing Assemblies for Weldments	16-6
Adding Welds	16-6
Creating Fillet Welds	16-6
Creating Cosmetic Welds	16-8
Creating Groove Welds	16-10
Creating Symbols	16-11
Creating Report	16-11
Tutorial 1	16-12
Tutorial 2	16-17
Self-Evaluation Test	16-21
Review Questions	16-22
Exercise 1	16-23

## Chapter 17: Miscellaneous Tools

Introduction	17-2
Copying the Sketches	17-2
Scaling the Sketches	17-3
Finding the Center of Gravity	17-3
Extracting the iFeature	17-4
Inserting the iFeature	17-6
Creating iMates	17-7
Applying iMates in the Assembly Environment	17-9
Interactively place with iMates	17-9
Automatically generate iMates on place	17-9
Viewing the iProperties	17-9
Creating User-Defined Drawing Sheets	17-11
Importing AutoCAD Blocks into Inventor	17-18

Tutorial 1	17-21
Tutorial 2	17-26
Self-Evaluation Test	17-30
Review Questions	17-30
Exercise 1	17-32

## Chapter 18: Introduction to Stress Analysis

Introduction to FEA	18-2
Types of Engineering Analysis	18-3
Structural Analysis	18-3
Thermal Analysis	18-4
Fluid Flow Analysis	18-5
Electromagnetic Field Analysis	18-5
Coupled Field Analysis	18-5
General Procedure to Conduct Finite Element Analysis	18-5
FEA Through Software	18-6
Important Terms and Definition	18-7
Strength	18-7
Load	18-7
Stress	18-7
Strain	18-8
Elastic Limit	18-8
Ultimate Strength	18-8
Factor of Safety	18-9
Lateral Strain	18-9
Poisson' Ratio	18-9
Bulk Modulus	18-9
Stress Concentration	18-9
Bending	18-9
Bending Stress	18-9
Creep	18-10
Degrees of Freedom	18-10
Stress Analysis in Autodesk Inventor 2015	18-10
Creating Simulation	18-11
Using the Guide Tool	18-14
Applying Stress Analysis Settings	18-14
Stress Analysis Browser Bar	18-15
Assigning Material	18-16
Assign Material	18-16
Applying Constraints	18-18
Fixed	18-18
Pin	18-19
Frictionless	18-20
Applying Loads	18-20
Force	18-20
Pressure	18-22

Bearing Load	18-23
Moment	18-23
Gravity	18-24
Remote Force	18-24
Body	18-25
Meshing the Component	18-26
Mesh View	18-26
Mesh Setting	18-26
Local Mesh Control	18-28
Convergence Setting	18-29
Solution Phase of Analysis	18-30
Postprocessing the Solutions	18-30
Generating Report	18-31
Animating the Result	18-32
Tutorial 1	18-33
Tutorial 2	18-38
Tutorial 3	18-43
Self-Evaluation Test	18-54
Review Questions	18-54
Exercise 1	18-55
Exercise 2	18-56

**Chapter available for  
free download**

## Chapter 19: Introduction to Plastic Mold Design

Introduction to Plastic Mold Design	19-2
Invoking the Mold Design Environment	19-2
Methods of Designing Core and Cavity	19-2
Importing Plastic Part in Mold Environment	19-3
Adding Core and Cavity	19-4
Adjusting Orientation and Position of the Part	19-5
Adjusting Orientation of the Part	19-5
Adjusting Position of the Part	19-6
Selecting Material	19-8
Commonly Used Material	19-8
Specific Material	19-8
Details	19-9
Report	19-10
Creating Core and Cavity for the Part	19-11
Adjusting Orientation	19-11

Specifying Gate Location	19-11
Settings for the Process	19-15
Analyzing Part for Filling	19-17
Specifying Shrinkage Allowance	19-17
Defining Workpiece	19-19
Creating Patching Surface	19-21
Creating Planar Patches	19-22
Creating Runoff Surface	19-22
Generating Core and Cavity	19-23
Creating Pattern of the Mold	19-26
Creating a Rectangular Pattern	19-26
Creating a Circular Pattern	19-26
Creating a Variable Pattern	19-27
Creating Runner of the Mold	19-28
Creating Runner Sketch	19-28
Creating Runner	19-30
Creating Gates for the Molds	19-31
Placement	19-33
Copy of all Pockets	19-33
Adding Cold Wells	19-33
Adding Mold Base to the Assembly	19-33
Standard Area	19-34
Placement Area	19-35
Layout Information Area	19-36
Adding Sprue Bushing	19-36
Adding Cooling Channel	19-37
Generating Drawing Views	19-38
Tutorial 1	19-39
Self-Evaluation Test	19-59
Review Questions	19-59
Exercise 1	19-60

**Index****I-1**

***Evaluation Copy. Do not reproduce. For information visit [www.cadcim.com](http://www.cadcim.com)***