

CATIA® V5 Workbook

Release V5-6R2013



Richard Cozzens

Visit the following websites to learn more about this book:



[amazon.com](https://www.amazon.com)

[Google books](https://books.google.com)

[BARNES & NOBLE](https://www.barnesandnoble.com)

TABLE OF CONTENTS

Preface	i
Workbook Revisions	i
About the Author	ii
Acknowledgements	iii
Download Site	iv
Canvas Course Module (for CATIA Instructors)	iv
Related Sites	iv
Table of Contents	v
Workbook Overview	O-1

Lesson 1 Introduction to CATIA V5

Introduction	1.1
Objectives	1.2
The CATIA Acronym	1.2
How to Use this Workbook	1.2
A Brief History of CATIA	1.3
CATIA V5 Configuration	1.4
CATIA V5 Application Tools	1.5
CATIA V5 Workbenches	1.6
CATIA V5 Documents	1.11
Running CATIA V5 on Windows	1.11
Contextual Menus	1.11
Drag and Drop	1.12
Summary	1.12
Review Questions	1.13
Practice Exercises	1.14

Lesson 2 Navigating the CATIA V5 Environment

Introduction	2.1
Objectives	2.1
CATIA V5 Standard Screen Layout	2.2
1 The Start Menu	2.3
2 The Current Active CATIA V5 Document	2.4
3 The Standard Windows Toolbar	2.4
4 The Specification Tree	2.16
5 The Compass	2.22
6 The Select Tool and Toolbar	2.22
7 The Current Workbench	2.23

8 Window Maximize and Minimize	2.25
9 Plane Representation (xy, yz and xz).....	2.25
10 The Current Workbench Tools and Toolbars	2.26
11 Axis Orientation	2.28
12 The Tools Toolbar	2.29
13 The Product Knowledge Template Toolbar	2.30
14 The Analysis Toolbar	2.30
15 The View Toolbar	2.31
16 The CATIA V5 Standard Toolbar	2.34
17 The Prompt Zone	2.35
18 The Knowledge Toolbar	2.35
19 The Apply Material Tool	2.36
20 The Measure Tool	2.36
21 The Power Input Mode	2.37
22 The Double Chevron Symbols	2.37
Summary	2.37
Review Questions	2.38
Practice Exercises	2.40

Lesson 3

Sketcher Workbench

Introduction	3.1
Objectives	3.2
Sketcher Workbench Toolbars	3.2
Steps to Creating a Simple Part Using the Sketcher Workbench	3.10
1 Start CATIA V5	3.11
2 Select the Sketcher Workbench	3.12
3 Specify a Working Plane	3.15
4 Entering the Sketcher Workbench	3.16
5 Customizing the Grid	3.17
6 Creating Geometry Using the Profile Tools	3.20
7 The Starting Point	3.20
8 Creating Line 1	3.22
9 Creating Line 2	3.24
10 Creating Line 3	3.24
11 Creating Lines 4, 5 and 6 Using the Profile Tool	3.25
12 Breaking Line 6	3.26
13 Deleting the Broken Line	3.26
14 Completing the Profile Using the Trim Tool	3.27
15 Modifying the Profile Using the Corner Tool	3.27
16 Modifying the Profile Using the Chamfer Tool	3.29
17 Anchoring the Profile Using the Anchor Tool	3.30
18 Constraining the Profile	3.31
19 Modifying the Constraints	3.36
20 Over Constraining the Profile ...Not a Good Thing	3.37
21 Exiting the Sketcher Workbench	3.38

22 Extruding the Newly Created Profile Using the Pad Tool	3.39
23 Saving the Newly Created “L Shaped Extrusion”	3.41
24 Exiting CATIA V5.....	3.42
Summary	3.42
Review Questions	3.43
Practice Exercises	3.45

Lesson 4	Part Design Workbench
Introduction.....	4.1
Objectives	4.1
Part Design Workbench Toolbars	4.2
Steps to Extruding a Profile Using the Part Design Workbench	4.7
1 Start CATIA V5	4.7
2 Select the Part Design Workbench	4.8
3 Open the “L Shaped Extrusion.CATPart” Document	4.8
4 Review the “L Shaped Extrusion.CATPart”	4.8
5 Extruding the Sketcher Profile Using the Pad Tool	4.8
6 Creating a Fillet	4.9
7 Creating a Fillet on the Back Edge of the “L Shaped Extrusion”	4.11
8 Creating a Chamfer	4.12
9 Creating Holes	4.15
10 Creating a Pattern of Holes	4.18
11 Modifying the Width of the Base Leg	4.22
12 Translating the “L Shaped Extrusion”	4.26
13 Rotating the “L Shaped Extrusion”	4.27
14 Creating a Symmetrical “L Shaped Extrusion”	4.31
15 Mirroring the “L Shaped Extrusion”	4.32
16 Scaling the “T Shaped Extrusion”	4.34
17 Applying Constraints in the Part Design Workbench	4.35
18 Applying Material to the “T Shaped Extrusion”	4.39
19 Managing the Specification Tree	4.41
20 Customizing the Specification Tree	4.42
21 Reviewing the Design Process Using the Specification Tree	4.44
22 Save the Completed “T Shaped Extrusion” Before It Gets Away	4.46
23 Exiting CATIA V5	4.46
Summary	4.46
Review Questions	4.47
Practice Exercises	4.49

Lesson 5	Drafting Workbench
Introduction to Creating Sheets and Views	5.1
Objectives	5.1
Drafting Workbench Toolbars	5.2
Steps to Creating Sheets and Views Using the Drafting Workbench	5.5
1 Start CATIA V5	5.5
2 Select the Part Design Workbench	5.5
3 Open the “T Shaped Extrusion.CATPart” Document	5.5
4 Select the Drafting Workbench	5.6
5 The Drafting Workbench Layout	5.9
6 Customizing the Default Values	5.10
7 Creating a New Sheet	5.13
8 Creating a New View	5.14
9 Modifying an Existing View	5.20
10 Creating a Detail View	5.23
11 Creating a Section View	5.27
12 Creating an Auxiliary View	5.31
13 Creating a Clipped View.....	5.33
14 Organizing Your Drawing.....	5.34
15 Saving Your Newly Created Drawing.....	5.36
16 Printing the Newly Created Sheets	5.36
Summary	5.37
Review Questions	5.38
Practice Exercises	5.40

Lesson 6	Drafting Workbench
Introduction to Creating Text and Dimensions	6.1
Objectives	6.1
Drafting Workbench Toolbars	6.2
Adding Text and Dimensions to Drawings Using the Drafting Workbench	6.7
1 Start CATIA V5	6.8
2 Select the Drafting Workbench	6.8
3 Open the “T Shaped Extrusion.CATDrawing” Document	6.8
4 The Drafting Workbench Layout	6.8
5 Customizing the Default Values	6.9
6 Creating and Modifying Text	6.9
7 Creating and Modifying Leaders	6.16
8 Creating and Modifying Dimensions	6.17
9 Creating a Diameter Dimension.....	6.21
10 Creating an Angle Dimension	6.23
11 Generating Dimensions	6.23
12 Finish Dimensioning Sheet 2.....	6.24
13 Crating a Border/Title Block Using the Geometry Creation Toolbar	6.25
14 Inserting Bill of Materials into the Title Block	6.27

15 Inserting Picture Documents into the Title Block	6.27
16 Saving Your Updated Drawing	6.29
17 Printing the Finished Drawings	6.29
Summary	6.30
Review Questions	6.31
Practice Exercises	6.33

Lesson 7	Complex and Multiple Sketch Parts
-----------------	--

Introduction	7.1
Objectives	7.2
Tools Used For Complex and Multiple Sketch Parts	7.2
Steps to Creating Complex and Multiple Sketch Parts	7.5
1 Creating the “Swivel” Using Multiple Sketches	7.5
2 Creating the “Top U-Joint”	7.12
3 Modifying the “Bottom U-Joint”	7.23
4 Creating the “Bottom U-Joint” Using Boolean Geometry	7.24
Summary	7.33
Review Questions	7.34
Practice Exercises	7.36

Lesson 8	Assembly Design Workbench
-----------------	----------------------------------

Creating an Assembly	8.1
Objectives	8.2
Assembly Design Workbench Toolbars	8.2
Steps to Creating an Assembly	8.7
1 Entering the Assembly Design Workbench	8.7
2 Inserting Components into the Assembly Design Workbench	8.8
3 Moving Components in the Assembly Design Workbench Using the Manipulation Tool	8.9
4 Moving Components in the Assembly Design Workbench Using the Compass	8.11
5 Assembling Existing Components	8.12
6 Modifying a Component in the Assembly Design Workbench	8.17
7 Creating a Bill of Material	8.21
8 Analyzing/Modifying Assembly Constraints	8.23
9 Clash Detection	8.25
10 Measuring Tools	8.25
11 Assembly Dependencies	8.27
12 Mechanical Structure	8.27
13 Adding Annotation	8.28
14 Saving a Specific View	8.28
15 Exploding the Assembly	8.30
16 Saving Animation with Respect to Constraints	8.31

17 Saving the Newly Created Assembly	8.32
Summary	8.33
Review Questions	8.34
Practice Exercises	8.36

Lesson 9	Generative Shape Design Workbench
-----------------	--

Introduction	9.1
Objectives	9.1
Generative Shape Design Workbench Toolbars	9.1
Steps to Creating a Simple Wireframe Part	9.10
1 Select the Generative Shape Design Workbench	9.10
2 Creating a Local Axis System	9.11
3 Creating Points	9.18
4 Creating Lines Using the Point-Point Method	9.20
5 Creating Line 3 Using the Point-Direction Method	9.21
6 Creating Line 8 Using the Same Point-Direction Method	9.23
7 Completing the Wireframe by Creating Lines 9, 10 and 11 Using the Point-Direction Method	9.25
8 Creating Planes	9.26
9 Creating Corners	9.28
10 Using the Split Tool	9.30
11 Adding an Elliptical Wireframe Using the Sketcher Workbench	9.32
12 Applying a Surface to the Wireframe Using the Fill Tool	9.34
13 Creating a Fillet Between Two Surfaces	9.36
14 Creating the Elliptical Cutout Using the Split Tool	9.38
15 Creating Surface Thickness Using the Thick Surface Tool	9.39
16 Creating a Helix	9.41
Summary	9.45
Review Questions	9.46
Practice Exercises	9.47

Lesson 10	Generative Shape Design Workbench
------------------	--

Creating Surface Geometry Using the Sweep Tool	10.1
Objectives	10.2
Generative Shape Design Workbench Toolbars	10.2
Steps to Creating a Part Surface Using the Sweep Tool	10.2
1 Select the Generative Shape Design Workbench	10.3
2 Creating the Profile in the Sketcher Workbench	10.4
3 Creating the Guided Curve in the Sketcher Workbench	10.6
4 Joining the Guided Curve Entities Using the Join Tool	10.7
5 Creating a Surface Using the Sweep Tool	10.8
6 Creating the Trimmed Profile for the Top Flange Using the Sketcher Workbench	10.10

7 Extruding the “Flange Trim” Sketch Using the Extrude Tool	10.13
8 Trimming the Surfaces Using the Split Tool	10.14
9 Creating Surface Thickness Using the Offset Tool	10.17
10 Closing the Surfaces Using the Fill Tool	10.18
11 Joining the Surfaces Using the Join Tool	10.21
12 Closing the Surfaces Using the Close Surface Tool	10.23
13 Adding the 8-Degree Angle Using the Plane and Pocket Tools	10.25
14 Dressing Up the “Joggled Extrusion” Solid Using the Fillet Tool	10.29
15 The Finishing Touch: Applying Material	10.30
Summary	10.31
Review Questions	10.32
Practice Exercises	10.34

Lesson 11	DMU Navigator
Introduction	11.1
Objectives	11.2
DMU Navigator Workbench Toolbars	11.2
Navigating the Assembly Using the DMU Navigator	11.7
1 Downloading the Document from the SDC Publications Website	11.7
2 Unzip the SuperMileage.Zip File to Your Working Directory	11.7
3 Entering the DMU Navigator Workbench	11.8
4 Inserting Objects into the DMU Navigator Workbench	11.9
5 Navigating through the Assembly Using the Fly Mode	11.10
6 Creating an Annotated View	11.21
7 Creating 3D Text	11.22
8 Creating a Scene	11.22
9 Recording and Replaying a Fly Thru	11.25
Summary	11.27
Review Questions	11.28
Practice Exercises	11.30

Lesson 12	Real Time Rendering
Introduction	12.1
Objectives	12.2
Real Time Rendering Workbench Toolbars	12.2
Bringing the Assembly into the Rendering Workbench	12.5
1 Entering the Rendering Workbench	12.5
2 Loading the Documents into the Real Time Rendering Workbench	12.6
3 Creating an Environment	12.7
4 Defining a Light	12.10
5 Adding Images to the Walls	12.15
6 Create a Camera and a Shooting	12.17
7 Animating the Rendering	12.22

Summary	12.25
Review Questions	12.26
Practice Exercises	12.28

Lesson 13	Parametric Design
------------------	--------------------------

Introduction	13.1
Objectives	13.2
Toolbars Used in this Lesson	13.2
The Constraints Toolbar	13.3
The Knowledge Toolbar	13.4
Geometrical Constraints Symbols and Definitions	13.5
Dimensional Constraints and Definitions	13.7
1 Stop! Take Time to Analyze the Part	13.8
2 Develop a Plan of Attack	13.8
3 Execute the Plan	13.11
4 Create the Base Feature	13.11
5 Create the Secondary Feature	13.18
6 Creating the Dress Up Features	13.21
7 Putting the Plan to the Test	13.23
8 Additional Notes	13.24
Summary	13.24
Review Questions	13.25
Practice Exercises	13.27

Lesson 14	Knowledgware
------------------	---------------------

Introduction	14.1
Objectives	14.2
Toolbars Used in this Lesson	14.3
The Problem	14.6
The Solution	14.6
The Knowledgware Solution	14.7
1 Determine the Requirements.....	14.7
2 Creating the Extrusion Profile Sketch.....	14.7
3 Constraining the Extrusion Profile Sketch	14.8
4 Modifying the Constraint Names.....	14.9
5 Create the Profile Sketch of the Joggle	14.11
6 Constraining the Joggle Profile Sketch	14.12
7 Modifying the Constraint Names.....	14.12
8 Creating the Solid of the Joggled Extrusion	14.12
9 Creating an Extrusion Table	14.14
10 Importing the Extrusion Table.....	14.15
11 Applying the Extrusion Table to the Joggled Extrusion	14.20
12 Editing the Extrusion Table	14.22

13 Display the Extrusion Type in the Specification Tree	14.22
14 Modifying the Existing Joggle Profile Sketch	14.23
15 Automating the Modification Using a Marco	14.24
16 Customizing the Macro Using the VBScript	14.28
17 Testing the Customized Macro	14.30
18 Creating a tool Icon for the Macro	14.31
19 Applying Correct Processes and Standards Using the Check Tool	14.33
20 Practical Application Creating an Up-to-Date Production Drawing	14.36
Summary	14.38
Review Questions	14.39
Practice Exercises	14.43

Lesson 15	Generative Structural Analysis
------------------	---------------------------------------

Introduction	15.1
Objectives	15.2
Toolbars Used in this Lesson.....	15.3
Create and Analyzing a Beam	15.6
1 Creating the Beam.CATPart	15.6
2 Apply Material and Apply View Properties.....	15.9
3 Starting the Generative Structural Analysis Workbench	15.10
4 Links Manager.....	15.11
5 Finite Element Model	15.12
6 Applying Advanced Restraints	15.13
7 Applying a Force.....	15.14
8 Compute Solution	15.15
9 Visualizing the Displacement	15.16
10 Visualizing the Von Mises Stress	15.19
11 Animating Views	15.22
12 Amplitude Modulation & Image Layout	15.22
13 Cut Plane Analysis	15.25
14 Smooth Virtual Part	15.26
15 Mechanical restraints	15.30
16 Knowledge Advisor	15.32
17 Insert a Buckling Case	15.36
18 Insert Frequency Case.....	15.39
19 Creating Reports	15.42
Summary	15.42
Review Questions	15.43
Practice Exercises	15.46

Lesson 16	DMU Kinematics
Introduction	16.1
Objectives	16.2
Workbench Tools and Toolbars.....	16.3
Steps to Simulating an Assembly Using the DMU Kinematics Workbench.....	16.7
1 Preparing the Assembly	16.7
2 Creating the Mounting	16.7
3 Assembling the U-Joint into the Mounting.....	16.10
4 Moving an Assembly into the DMU Kinematics Workbench	16.12
5 Automatic Joint Creation	16.12
6 Manual Joint Creation.....	16.14
7 Mechanism Analysis.....	16.16
8 Adding a Command.....	16.17
9 Editing a Simulation	16.18
10 Playing a Simulation	16.20
11 Compiling the Simulation.....	16.21
12 Replaying the Simulation.....	16.22
13 Distance and Band Analysis	16.23
14 Clash Analysis	16.25
15 Edit Analysis.....	16.27
16 Swept Volume.....	16.29
17 Trace Analysis	16.30
Summary	16.32
Review Questions	16.33
Practice Exercises	16.35