

Contents

Chapter 1 • Introduction9

Chapter 2 • Starting Out With FreeCAD11

2.1 Extending the Functionality of FreeCAD11

2.1.1 AddOns12

2.1.2 Workbenches12

2.1.3 Macros12

2.1.4. Starting the new Extensions13

2.2 Workbenches and Context Menus13

2.3 Automatic Workbench Switchover13

2.4 The Tree View14

2.5 The Output Window15

Chapter 3 • Project Organization16

3.1 Std-Part-Container versus Body16

3.1.1. Placement versus Attachment17

3.1.2 Assembly or Std-Part-Container?18

3.2 The Topological Naming Problem18

3.3 Sketches and Datum Objects18

3.4 Other Strategies to Avoid the Topological Naming Problem19

3.5 Avoidance of Repetitive Work by Project Structure19

3.6 Always Start with the Std-Part-Container19

3.7 Shape Binder and SubShapeBinder20

3.7.1 The Shape Binder (blue)21

3.7.2 The SubShapeBinder (green)22

3.7.3 How to Reference Cut-and-Pasted Std-Part-Containers22

3.7.4 Redefining the References after Paste24

Chapter 4 • Creating Parts — First Steps28

4.1 How Much Fidelity is Needed?28

4.2 Simple Parts28

4.2.1 The Simple Spacer, Step by Step28

4.3 Color versus Appearance35

4.4 Compound Parts	36
4.4.1 Fasteners for the Simple Spacer	36
4.5 Parts Packaged with Fasteners Save Time.	53
4.6 Displaying and Hiding Elements.	53
4.7 More Examples of Compound Parts	53
Chapter 5 • Working with Sheet Metal	54
5.1 Example: 9 V 6LR61 Battery Holder.	54
5.2 Creating the Unfold	69
5.3 Exporting the Unfold	71
5.4 Creating a Drawing of the Battery Holder	74
5.5 Create a Plan for the Bending Machine.	83
5.6 Example Photos of the Battery Holder	86
Chapter 6 • Assemblies	88
6.1 “Assembly” Workbenches or Std-Part Container?.	88
Chapter 7 • An Assembly Example: The Elektor ESR Meter as a Front Panel Project.	89
7.1 Project Organization	89
7.2 Preparation – Starting the New Project Tree	89
7.3 Modeling the Front panel	90
7.4 Insertion of the Rotary Switch.	93
7.5 Generate an Associative Footprint with the SubShapeBinder.	96
7.6 The Knob and its Place in the Tree View	101
7.7 Testing the Associativity	102
7.8 The Binding Posts	105
7.9 Placement of the Panel Meter	119
7.10 Placing Components to the Rear Surface: The Anchor Plates	123
7.11 Inserting the Battery Holder	129
7.12 Inserting the Circuit Board	134
Chapter 8 • Finalizing the Front Panel with Graphic Elements	148
8.1 Drawing Guide Lines	148
8.1.1 Sketch versus Path	148
8.1.2 Guide Lines for the Rotary Switch	148

8.2 A Guide Line for the Potentiometer	159
8.3 The Engravings	165
8.4 The 'TechDraw' Workbench and the DXF Export.	170
Chapter 9 • A More Complex Design: The Lab Transformer	174
9.1 The Front Panel	174
9.1.1 Setting up File and Std-Part-Container	174
9.1.2 Creating the Panel Sheet	175
9.1.3 Placement of the Components	183
9.1.4 Punching the Holes	193
9.1.5 Adding the Engraving	199
9.2 The Rear Panel	203
9.2.1 Prepare File and Std-Part-Containers.	203
9.2.2 Placing the Components	204
9.2.3 Punching the Holes	207
9.2.4 Adding the Engraving	210
9.3 The Chassis	211
9.3.1 Preparation of File and Std-Part-Container.	211
9.3.2 Bolts for the Chassis Sheet	224
9.4 Assembling the Chassis, Front and Rear Panel.	231
9.5 Placing the Transformer	239
9.6 Placing the Anchor Plates	243
9.7 Associative Generation of the Sheet Metal Cover.	252
9.7.1 Where to Pick the References.	252
9.7.2 Creating the Cover	253
9.8 Where do the Fasteners Belong?	278
9.8.1 Fasteners for the Cover	278
9.8.2 Fasteners for the Chassis.	282
9.8.3 Fasteners for Front and Rear Panel	285
9.9 Creating the Unfold of the Cover	294
9.10 Example Photos – Meeting the Reality	294
9.11 What to do Next	294
9.12 Component Libraries – Design Recycling.	295

9.13 Importing STEP Model Files	295
Chapter 10 • FreeCAD and KiCad	296
10.1 Importing Data from KiCad to FreeCAD	296
10.2 Creating 3D Models for KiCad	296
Chapter 11 • Community Resources	302
Sources	303
Appendix A • The Rotary Switch	304
Appendix B • The Potentiometer	327
Appendix C • The Banana Jack	340
Appendix D • The Pilot Lamp	362
Appendix E • The Toggle Switch	400
Appendix F • The IEC Power Inlet	433
Appendix G • The 9 V Block (6F22) Battery	458
Index	474