Prepared and produced by:
ASCENT Center for Technical Knowledge
630 Peter Jefferson Parkway, Suite 175
Charlottesville, VA 22911
866-527-2368
www.ASCENTed.com

Lead Contributor: Jennifer MacMillan

ASCENT - Center for Technical Knowledge is a division of Rand Worldwide, Inc., providing custom developed knowledge products and services for leading engineering software applications. ASCENT is focused on specializing in the creation of education programs that incorporate the best of classroom learning and technology-based training offerings.

We welcome any comments you may have regarding this guide, or any of our products. To contact us please email: feedback@ASCENTed.com.

© ASCENT - Center for Technical Knowledge, 2018

All rights reserved. No part of this guide may be reproduced in any form by any photographic, electronic, mechanical or other means or used in any information storage and retrieval system without the written permission of ASCENT, a division of Rand Worldwide, Inc.

The following are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and other countries: 123D, 3ds Max, Alias, AutoCAD LT, AutoCAD, the Autodesk logo, Autodesk 123D, Autodesk Homestyler, Autodesk Inventor, Autodesk MapGuide, Autodesk Streamline, AutoLiSIP, AutoSketch, AutoSnap, AutoTrack, Backburner, Backdraft, Beast, BIM 360, Burn, Buzzsaw, CADDmp, CAICE, CAMdect, Civil 3D, Combustion, Communication Specification, Configurator 360, Constructware, Content Explorer, Creative Bridge, Dancing Baby (image), DesignCenter, DesignKIDS, DesignStudio, Discreet, DWF, DWG, DWG (design/logo), DWG Extreme, DWG TrueConvert, DWG TrueView, DWGX, DXF, Ecotec, Ember, ESTmep, FABmep, Face Robot, FBX, Fempro, Fire, Flame, Flare, ForceEffect, FormIt 360, Freewheel, Fusion 360, Glue, Green Building Studio, Heidi, Homestyler, HumanIK, i-drop, ImageModeler, Incinerator, Inferno, InfraWorks, Instructables, Instructables (stylized robot design/logo), Inventor, Inventor HSM, Inventor LT, Lustre, Maya, Maya LT, MIMI, Mockup 360, Moldflow Plastics Advisers, Moldflow Plastics Insight, Moldflow, Moondust, MotionBuilder, Movimento, MPA (design/logo), MPA, MPI (design/logo), MPX (design/logo), MPX, Mudbox, NaviWorks, ObjectARX, ObjectDBX, Opticore, P9, Pier 9, Pixlr, Pixlr-o-matic, Productstream, Publisher 360, RasterDWG, RealDWG, ReCap, ReCap 360, Remote, Revit LT, Revit, RiverCAD, Robot, Scaleform, Showcase, Showcase 360, SketchBook, Smoke, Socialcam, Softimage, Spark & Design, Spark Logo, Sparks, SteeringWheels, Stitcher, Stone, StormNET, TinkerBox, Tinkercad, Tinkerplay, ToolClip, Topobase, Toxik, TrustedDWG, T-Splines, ViewCube, Visual LiSIP, Visual, VRED, Wire, Wiretap, WiretapCentral, XSI.

NASTRAN is a registered trademark of the National Aeronautics Space Administration.

All other brand names, product names, or trademarks belong to their respective holders.

General Disclaimer:

Notwithstanding any language to the contrary, nothing contained herein constitutes nor is intended to constitute an offer, inducement, promise, or contract of any kind. The data contained herein is for informational purposes only and is not represented to be error free. ASCENT, its agents and employees, expressly disclaim any liability for any damages, losses or other expenses arising in connection with the use of its materials or in connection with any failure of performance, error, omission even if ASCENT, or its representatives, are advised of the possibility of such damages, losses or other expenses. No consequential damages can be sought against ASCENT or Rand Worldwide, Inc. for the use of these materials by any third parties or for any direct or indirect result of that use.

The information contained herein is intended to be of general interest to you and is provided "as is", and it does not address the circumstances of any particular individual or entity. Nothing herein constitutes professional advice, nor does it constitute a comprehensive or complete statement of the issues discussed thereto. ASCENT does not warrant that the document or information will be error free or will meet any particular criteria of performance or quality. In particular (but without limitation) information may be rendered inaccurate by changes made to the subject of the materials (i.e. applicable software), Rand Worldwide, Inc. specifically disclaims any warranty, either expressed or implied, including the warranty of fitness for a particular purpose.
Contents

Preface ........................................................................................................................... v

In this Guide .................................................................................................................... ix

Practice Files ................................................................................................................. xiii

Chapter 1: Sketching Tools ......................................................................................... 1-1
  1.1 Splines .................................................................................................................. 1-2
      Editing a Spline ....................................................................................................... 1-4
  1.2 3D Sketches ......................................................................................................... 1-8
      3D Sketch Tools .................................................................................................. 1-9
      Modifying 3D Sketch Entities ............................................................................. 1-17
      Dimensioning & Constraining ........................................................................... 1-18

  Practice 1a Create a Swept Cut using a 3D Sketch .............................................. 1-20
  Practice 1b Imported Point Data .......................................................................... 1-26

Chapter Review Questions ......................................................................................... 1-34

Command Summary .................................................................................................... 1-36

Chapter 2: Introduction to Surfacing ......................................................................... 2-1
  2.1 Introduction to Surfaces ...................................................................................... 2-2
  2.2 Basic Surfaces ...................................................................................................... 2-3
  2.3 Patch Surfaces ...................................................................................................... 2-4
  2.4 Ruled Surfaces ...................................................................................................... 2-5
  2.5 Stitch Surfaces ...................................................................................................... 2-7
  2.6 Sculpting with Surfaces ...................................................................................... 2-9
  2.7 Thickening & Offsetting a Surface ..................................................................... 2-11
  2.8 Surfaces in Drawing Views ................................................................................ 2-14
      Surfaces in Child Views ........................................................................................ 2-16
      Annotating Surfaces in a Drawing ...................................................................... 2-16
Autodesk Inventor 2019: Surface and Freeform Modeling

Practice 2a Creating a Surface I .......................................................... 2-17
Practice 2b Creating a Surface II ........................................................ 2-20
Practice 2c Sculpting a Surface .......................................................... 2-23
Practice 2d Ruled Surface Creation ................................................... 2-26
Chapter Review Questions ................................................................... 2-32
Command Summary ............................................................................. 2-34

Chapter 3: Additional Surfacing Options ................................................... 3-1

3.1 Extend and Trim Surfaces .............................................................. 3-2
   Trim Surface .................................................................................. 3-2
   Extend Surface .............................................................................. 3-3

3.2 Replace Face with a Surface .......................................................... 3-5

3.3 Delete Faces .................................................................................... 3-6

3.4 Copy Surfaces ................................................................................. 3-7

Practice 3a Extending Surfaces ............................................................ 3-9
Practice 3b Copying Surfaces ............................................................. 3-11
Practice 3c Deleting a Surface ............................................................ 3-15
Practice 3d Creating a Solid from Surfaces ....................................... 3-20
Practice 3e Deleting a Face ................................................................. 3-25

Chapter Review Questions ................................................................... 3-28
Command Summary ............................................................................. 3-30

Chapter 4: Introduction to Freeform Modeling .......................................... 4-1

4.1 Creating Freeform Geometry ......................................................... 4-2
   Creating Standard Freeform Shapes .............................................. 4-2
   Creating a Face Freeform ........................................................... 4-6
   Converting Geometry to a Freeform ............................................ 4-7
   Deactivating and Activating Freeform Mode .................................. 4-9

4.2 Editing Freeform Geometry ............................................................ 4-10
   Edit Form ..................................................................................... 4-10
   Working with Edges ..................................................................... 4-15
   Working with Faces ...................................................................... 4-21
   Working with Points ..................................................................... 4-23
   Thickening Freeform Geometry .................................................. 4-25
   Controlling Symmetry .................................................................. 4-27
   Mirroring Freeform Geometry ..................................................... 4-28
   Deleting Entities ........................................................................... 4-29

Practice 4a Box Freeform Modeling ................................................... 4-31
Practice 4b Cylinder Freeform Modeling ........................................... 4-43
Practice 4c Working with Existing Geometry ................................. 4-53
Practice 4d Bridging Freeform Geometry ................................. 4-61
Chapter Review Questions ......................................................... 4-64
Command Summary ................................................................. 4-67

Chapter 5: Analyzing a Model .......................................................... 5-1

5.1 Analysis Types ........................................................................ 5-2
   Zebra Analysis ........................................................................ 5-2
   Draft Analysis .......................................................................... 5-2
   Curvature Analysis .................................................................. 5-3
   Surface Analysis ....................................................................... 5-4
   Cross Section Analysis ........................................................ 5-5

5.2 Analysis Procedures ................................................................. 5-7
Practice 5a Analyzing Continuity ............................................... 5-13
Practice 5b Draft Analysis ........................................................ 5-21
Practice 5c Section Analysis ..................................................... 5-24
Chapter Review Questions ......................................................... 5-30
Command Summary ................................................................. 5-33

Index ......................................................................................... Index-1