NEMETSCHEK Vectorworks

3D MODELING

WITH VECTORWORKS

JONATHAN PICKUP | SIXTH EDITION

written with version 2014

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For more Vectorworks training information or to purchase more copies of this book, please visit www.Vectorworks.net/training, or call us at (410) 290-5114.

There are several people I would like to thank: Steve Scaysbrook, Roger Williams, Bill Vincent, and my good friend, Allan Baggett. Without them, none of my manuals would be as good as they are.

A big thank you to my wife, Marie, and my children. I need your support and understanding to invest the hours necessary to create these manuals.

Jonathan Pickup, May 2014

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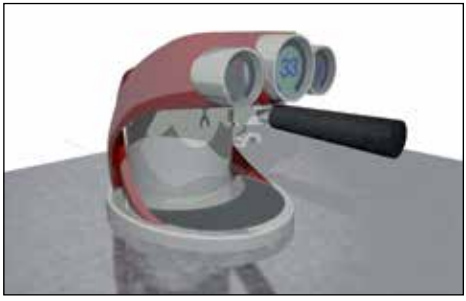
0.0 Introduction

This manual covers one of the best parts of Vectorworks, creating 3D models. It is really fun and rewarding to create the forms you want and be able to move around them to view your work from different angles.

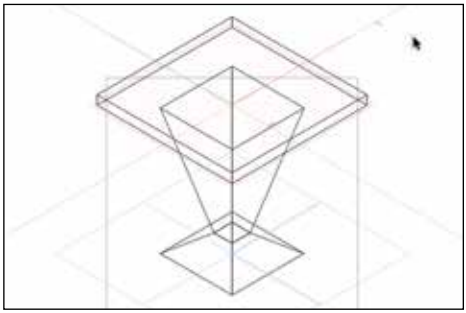
Here is an example from a first-time user of Vectorworks. The project was a high school graphics project, and the user had not used Vectorworks before. The user was given an earlier edition of this manual and worked though the exercises. Then with only a little guidance from an experienced trainer, the user was able to produce this model.



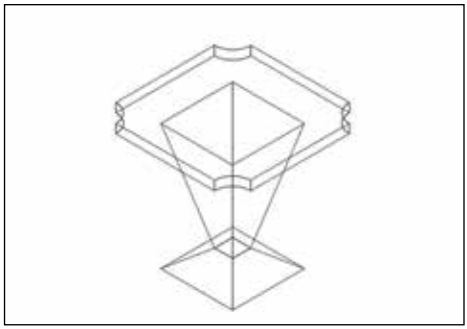
When you first look at this model, you may wonder how it was made because it seems so complex. There is a saying, "How do you eat an elephant? One bite at a time." This can be applied to your models. How can you create this coffee machine? One part at a time. This coffee machine is mainly made from simple extruded objects with a couple of complex curves. When you bring them all together, the result is magic.

If you look at the top of this table, it looks like a complex form, but if you were to make this from a timber slab, how would you build it?

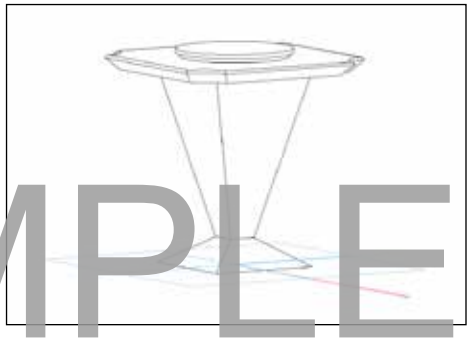
You would probably start with a solid slab of timber.



Then you could cut the corners out.



And then you can add the center piece and edit the edges.



0.1 How to Use this Manual

This manual builds on the Vectorworks Essential manual. The Essential manual is designed to show you basic concepts of Vectorworks, such as drawing, modeling, and basic file organization. If you are unfamiliar with these concepts, then you should get the Essential manual and complete it before you go any further.

Here are some ideas to help you to use this manual better:

Spend the time to work through the manual. The information in this manual will not find its way into your head if you don't complete the exercises. Reading the manual is good; reading the manual and watching the movies is better; reading the manual, watching the movies, and completing the exercises has the best results. Watch the movies, try the exercise, and then play the movie again.

Comments and discussions are shown like this.

- Instructions for you to complete are shown like this.

Tips: Useful tips are shown like this.

Measurements for you to use are shown in both metric and imperial. Metric measurements appear first followed by imperial measurements in brackets. If you are using metric, don't type in the imperial measurements; if you are using imperial, don't type in the metric measurements.

This manual comes as a hard copy with a DVD-ROM.

There are two exercise folders on the DVD. One is called "Imperial Modeling Exercises," and the other is called "Metric Modeling Exercises." Copy the exercise folder that you want to use to your computer. Place the exercise folder in a location to make it easy to find later, such as in "My Documents."

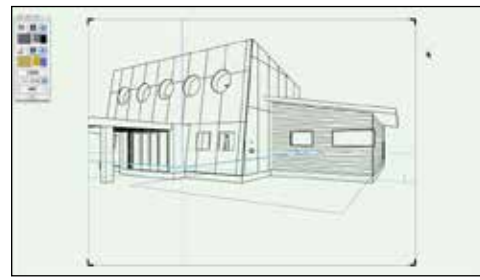
Save any training files that you work on to your exercise folder.

When you want to play a movie that is shown in the printed manual, insert the 3D Modeling Tutorial Manual DVD into your computer's DVD player. Right-click on the file on the DVD called **3D Modeling Tutorial Manual.pdf**, choose Open with..., and choose Acrobat Reader. This is your electronic copy of the manual, and it contains links to all the movies. To play a movie from the electronic copy of the manual, move your cursor over the movie icon (the cursor will change shape), and click once. When the movie is finished, it will automatically close. If you are using a Macintosh, make sure the manual opens with Adobe Acrobat Reader, not Preview. Preview will not display the movie icons. When the movie is finished, it will automatically close. Use Acrobat Reader to read the manual and play the movies; use Vectorworks to do the exercises.

0.2 What's in this Manual

This manual starts with an introduction to modeling in Vectorworks. This section explains the basic concepts you need to create complex models effectively. There are a series of modeling exercises designed to show you how individual tools and commands work. Some of these exercises will use a few tools or commands together to show you the flow of work from a simple block to the final model.

Following the introduction, there is an architectural modeling exercise to bring several modeling tools, commands, and concepts together to develop a model and create drawings from it.



The final part of the manual is a bus stop exercise. The aim of this project is to work through a long series of exercises to create a final project. You will learn how to break the project down into small parts and model each of these. You will learn how to do more advanced modeling by making street furniture, how to use some of the advanced tools for creating curved 3D models, and how to move through a series of tools and commands to get the model that you want.

0.3 New Ways of Drawing

When you are drawing in Vectorworks, draw the objects to the correct real-world sizes regardless of the scale of the layer that you are working on.

It is much easier to maximize the potential of Vectorworks by using objects to draw with, as they can be easily edited (for example, doors, windows, rectangles, etc). You could say that Vectorworks is designed to draw with objects.

When you want to draw shapes, you may be tempted to use lines and arcs to draw the shape. Always try to draw with solid shapes, rectangles, and polygons. I have created a series of exercises that show you how to make complex shapes out of simple shapes by adding the shapes together or by clipping a portion of a simple shape away to make a complex shape.

It's very important that you use these new drawing methods to draw your buildings, landscapes, or models.

This manual is intended to be used with the standard Vectorworks workspace. After you have completed this manual, you can change back to your normal workspace and carry out the 3D modeling you want.

- Go to the **Menu bar**.
- Choose **Tools > Workspaces > Fundamentals**.

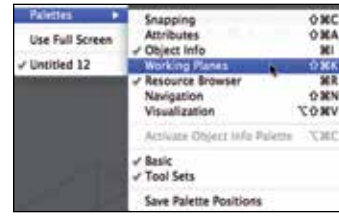
1.0 Simple 3D Modeling

1.1 Working Planes

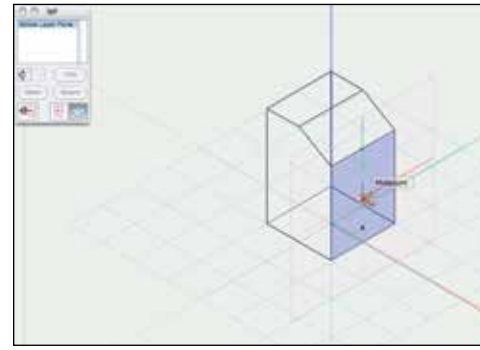
When you create extrusions and primitive shapes, they always start at zero on the working plane. When you want to create more complex shapes, working planes help you to change the active working plane to a position that suits. When you create planar objects, they are created on the working plane, so it is really important to learn how to create and manage working planes.

- Open the file **3D Model 1.sta** from the exercises folder.
- Go to the **3D Modeling** tool set.
- Select the **Set Working Plane** tool.
- Go to the **Tool bar**. Select the second mode.

- Go to the **Menu bar**.
- Choose **Window > Palettes > Working Planes**. This opens a palette where you can save, edit, and recall working planes.



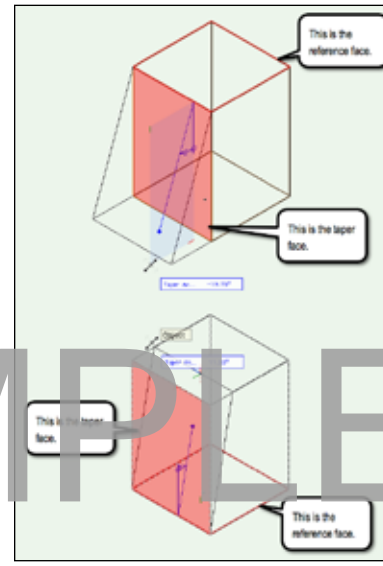
- Move the cursor to the face of the object. I've moved to the right side. Notice how the side of the object highlights.



1.18 Taper Face

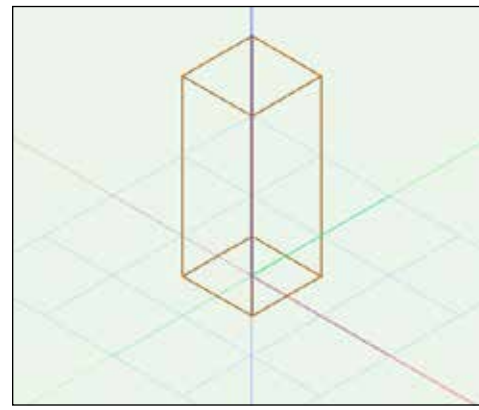
The **Taper Face** tool is useful for tapering the faces of objects relative to a reference face. In previous versions of Vectorworks, you would have created a larger object and then used the Split tool to cut off the portion no longer needed. With this tool, you can easily change the face of the object.

The concept of the Taper Edge is to choose a reference face and then choose the face to taper.



movie
movie033.mov

- Open the file **3D Model 20.sta** from the exercise folder.

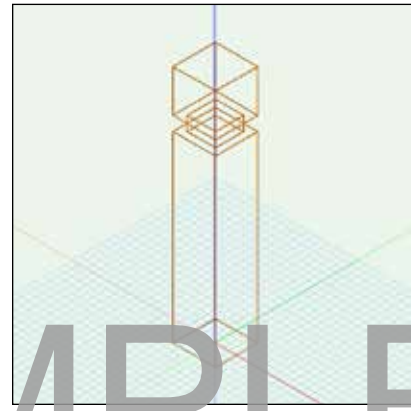


1.19 Twist Tool

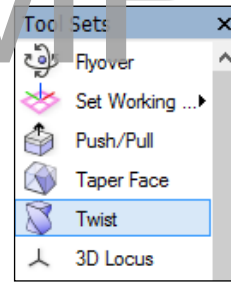
The **Twist** tool is useful for twisting objects, relative to a reference point.

movie
movie034.mov

- Open the file **3D Model 21.sta** from the exercise folder.

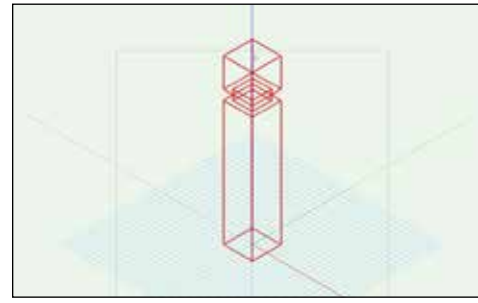


- Go to the 3D Modeling tool set.
- Click on the **Twist** tool.



- Go to the **Tool** bar.
- Click on the **first** mode, Solid.

- Move the cursor to the top of the object.
- Click once.



2.0 Architectural Modeling

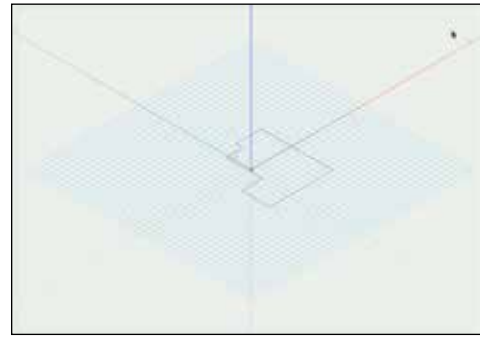
We can apply the tools we have learned to create an architectural model. We can model a building without using walls, roofs, doors, or windows. We can use the tools we've learned like extrude, protrusion, shell solid, add solid, and so on.

This exercise will show you how to use modeling tools to quickly create a building. There is always more than one way to create 3D models. In this exercise you will use the Push/Pull tool and the Split tool. I could have used the Taper Face tool, and in the movie you will see the difference between the methods.

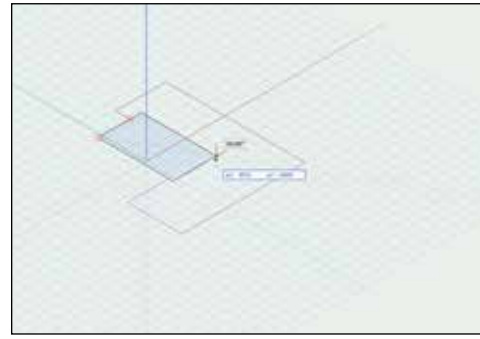
2.1 Getting Started

movie
movie035.mov

- Open the file **Architectural Model.sta** from the exercise folder. The gray area is the approximate area for the building. If you follow this guide closely, the building will fit onto a site I have prepared.



- Draw a rectangle for the main (center) part of the building.



3.0 Bus Stop Project

The aim of this exercise is to create a bus stop. I have chosen the bus stop because it is partly architecture, partly urban design. Because of the nature of this project, we will have to break the design into parts that are easy to manage. We will be using several modeling tools and techniques, but we will be working though the project in a step-wise fashion.

We will not be adding the rendering and the people. That is in another manual.

3.1 Project Setup

When you are starting a project in Vectorworks, it is worth your time to set up the file with the layers and classes that you will need to make the project. It usually works out that as the design evolves, you need to add layers or classes to the file. Don't worry if this happens to you. But if you can make some layers and classes at the beginning, that can make it easier.

I have a file for you to start with. It has a few points that we can use to center our project.

- Open the file **Start.sta** from the exercise folder. This file has been set up with two layers, the roof layer and the layer for the bus stop. We will make some more layers and classes for this project. If you don't know how to make layers and classes, go back to the Essential Tutorial Manual and do the layer and classes exercises there.
- Create the following layers:
  Mod-3D Model, scale 1:25
  Mod-Bollard, scale 1:10
  Mod-Trash Can, scale 1:10

- Create the following classes:
  Material-Concrete
  Material-Glass
  Material-Glass Roof
  Material-Stainless Steel
  Material-Wood

We can use these classes to help break up the file into useful chunks based on materials. The classes for materials become much more useful for rendering. Using classes for materials allows you to make global changes to the textures in the file.

Jonathan Pickup | sixth edition

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ABOUT THE AUTHOR

Jonathan Pickup is an architect trained in New Zealand and in the United Kingdom with over 25 years of experience. He received his Bachelor of Architecture (BArch) degree from the University of Auckland in New Zealand. He later spent more than eight years in England where he learned to use several CAD packages, including MiniCad, and began teaching this forerunner of Vectorworks. Upon returning to New Zealand in 1996, he established archoncad, a Vectorworks training and consulting company. He has written several Vectorworks training manuals for architects, landscape architects, educators, and design students. He organizes the New Zealand Vectorworks User Group and provides its main direction.

THE SIXTH EDITION Vectorworks 3D Modeling Tutorial manual is a must-have workbook for anyone seeking to learn how to free-form model with Vectorworks. Exercises aimed at building a foundation of 3D Vectorworks skills include creating 3D forms through the use of extrudes, sweeps, solids, NURBS, loft surfaces, and 3D primitives. This manual will bring you to a competent level of 3D capability.

ABOUT THE COVER

This manual contains instructions on how to create a model of this scale, along with it's accompanying plans, sections, and elevations. Pickup created the image while writing the architectural modeling portion of this manual. He strongly believes that using Vectorworks eliminates the need to employ additional modeling software at the conceptual stage of any project's evolution.

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Cover imagery courtesy of Jonathan Pickup