

Introduction

From DREAM. . .

Everything starts with an idea or concept in your mind.

To DRAWING. . .

The dream is given form by putting it on paper.

To REALITY. . .

The construction process begins.

Do you have an idea in your head that you want to get on paper – or into the computer? The next logical step is to make a *drawing* of your design. Being able to sketch out ideas is crucial in the overall process of turning any dream into a finished project. In fact, think of the drawing phase as the first step to getting a design out of the idea stage and on the road to becoming a reality.

For a modeler, drawings can be very important to the success of any project. Not only do they illustrate model design concepts, but drawings also provide detailed construction information.

Any discussion of this subject will involve what is known as *drafting*. Basic drafting techniques are what makes it possible for you to create accurate plans and construction patterns for your projects. While this may sound technical, don't worry. Using the concepts and techniques presented in this book will make it easy to bring your model design ideas to life.

But, this is only the beginning. Once you know how to make plans and construction patterns for your projects, new levels of capability and productivity are just around the corner. This is possible thanks to a number of exciting technologies such as 3D modeling and rapid prototyping.

This is actually the first in a series of books that will introduce powerful tools and techniques modelers can use to streamline their projects. Some of these methods have the potential to revolutionize the model design process. Arming yourself with this information can help you take your projects to new levels.

What This Book is About

Until now, the concepts and techniques behind making your own blueprints have been explained only in textbooks and coursework on engineering graphics

Then David gave his son Solomon the plans for the portico of the temple, its buildings, its store-rooms, its upper parts, its inner rooms. . .

(1 Chronicles 28:11 NIV)

NOTE: Underlined terms appear in the Glossary. The names of proprietary computer programs appear in *italics*.

The process of documenting construction information is known as *blueprinting*. While formal construction guides or drawings are commonly called *blueprints*, to the modeler, these are simply known as *plans*.

This book explains the art and science of drafting in a context that is specifically designed for modelers. In fact, it was written by a modeler especially for modelers and other hobbyists.

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The concepts and techniques presented here apply not only to building models, but also to other design tasks as well. For example, these same methods can be used in many types of do-it-yourself projects. The only limit is your own imagination. . .

Keep in mind, this is not a book on how to draw with a computer. A separate title is available from the publisher that can help get you up to speed on the basics of doing that. Instead, this volume focuses on how to create blueprints and construction patterns for your projects. Many of the tips and hints included here, however, focus on using computer-based tools for both speed and efficiency.

and drafting. These books have been written for engineers and architects and often contain a tremendous amount of information. This can be overwhelming for anyone who simply wants to get up to speed on the basics.

In contrast, this book was written by a modeler specifically for modelers and hobbyists. With the techniques presented here, you can create the drawings and patterns you need to build your own projects completely from scratch – whether you are constructing a real model that you can touch and feel or a “virtual” model that exists only inside the computer.

The goal here is to explain the design and blueprinting process in a format that is both easy to understand and apply. Rather than assuming any particular level of proficiency, concepts are explained from the point of view of the novice. With an easy-to-follow format and numerous, detailed illustrations on nearly every page, you’ll find plenty of helpful hints and tips along the way.

Digital Tools Are Power Tools

Imagine, for a moment, a carpenter going about his work producing something from wood using “basic” hand tools such as a hammer, saw, tape measure, and block plane. As an experienced craftsman, he can do a fine job with these tools and produce beautiful, quality work.

Now, imagine giving this same person *power tools* like a table saw, router, and drill. He will not only accomplish his work much faster, but he can do it with more precision and with greater ease. More importantly, even someone who is not an experienced craftsman can produce quality work using this kind of equipment.

In a similar fashion, the advent of computer technology has provided new power tools for the modeler. Even novice designers can use these tools to produce amazing results. If you are already experienced at designing model projects, imagine what a new set of “digital power tools” could do for you. They just might open the door to new levels of proficiency, craftsmanship, and productivity.

Exploring New Modeling Frontiers

If you don’t think you can draw, don’t worry. Whether you paint like Picasso or can barely make a stick figure, the personal computer provides some very powerful and easy-to-use features for creating many different kinds of drawings. And, because of the power inherent in these tools, you don’t need to be a trained artist – or even an engineer – in order to use them. In fact, there are many ways non-artists can use the computer to make clean and professional-looking drawings for their projects.

In fact, computers can open up a whole new world of possibilities for the modeler. Armed with a set of computerized power tools, you can make

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blueprints and construction patterns for your own projects, create your own decals and custom transfers, generate artwork for one-of-a-kind photo-etched metal parts, and even draw outlines for pieces that can be cut out with a micro-fine laser cutter or computer-controlled milling machine. How's that for new frontiers!

Best of all, you can now build your models entirely inside the computer. This makes it possible to test the fit of custom parts before they are crafted on the workbench. You can even experiment with your own designs and see how they look from every angle before starting construction. For modelers who want to design and build their own projects, the possibilities have become almost limitless – thanks to new technologies.

It all starts with a good set of drawings. Because blueprints form the foundation of just about any custom modeling project, being able to create something completely from scratch – be it in “virtual space” or in the physical realm – can depend on your ability to make drawings and construction patterns first.

For Both Traditional and 3D Modelers

Keep in mind, you don't *have* to use a computer to apply the concepts and methods demonstrated in this book. If you prefer to do things the traditional way, this material can still be of tremendous value. You can draw blueprints on paper or on screen – whichever works best for you.

Taking advantage of a digital toolset, however, can simply make the task of creating drawings faster, easier, and more efficient. Often, what can be tedious and time consuming to draw by hand on paper becomes quick and easy – thanks to computer drawing programs.

With that in mind, this book was written not only for traditional modelers who create objects in the physical realm, but also for 3D modelers who build in “virtual space.” While these are two completely different types of modeling that aren't often brought together, there seems to be more of a “crossover” between the two groups as time goes on. This is most likely due to a similarity of interests, aptitudes, and skills inherent in both types of modeling.

No matter what you want to build, having accurate plans as a guide can help streamline the construction process in many ways. For this reason, the material in this book can be considered “foundational” to the design process, regardless of which type of modeling you prefer. For example, drawings are critical when building most physical models from scratch. At the same time, they can also be valuable for many 3D modeling projects – particularly “hard surface” and “hardware” models such as vehicles, buildings, etc.

While it's easy to see how blueprints can help you make physical model parts, 2D drawings can also be very helpful when building 3D model parts

Volume 2 of this series will describe how to use 3D “power tools” to enhance the 2D drawing process. This second volume also introduces a variety of techniques that allow a 3D modeler to build complex models using information derived from 2D plans.

Volume 3 of this series will discuss creating parts for your models using computer-numeric-control or “CNC” processes. With these techniques, you can turn your 2D drawings into patterns that can be used to fabricate precision parts by machine.

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Section 1 of this volume introduces the concepts behind creating multi-view drawings or blueprints. **Section 2** then describes how you can make actual construction patterns and templates from your drawings.

Some level of proficiency with computer drawing tools will be very helpful in order to make the most of the concepts presented in this book. But, while many hints and tips are included, this is not a book on how to draw with a computer. Therefore, you should already be familiar with how to use your program of choice before getting started.

There are a number of different CAD packages from which to choose. The industry standard application is *AutoCAD*®. Many low-cost packages such as *TurboCAD*® also work just as well for basic drawing. Some programs are even free.

and structures. For instance, this process was used to create the complex 3D locomotive model seen on the front cover of this book. The bulk of the work in making that model was completed in only a matter of a few days. This is an excellent example of how extracting 2D information from a good set of blueprints can help to streamline the 3D modeling process.

As a bonus, some of the concepts and techniques covered here can also prove helpful when making custom decals, transfers, or other markings. 3D modelers may also be able to apply some of these same techniques to create precise texture maps.

How To Use This Book

A lot of effort has gone into the design of this volume to make it a useful and efficient reference. For example, the text is fairly large so it's easy to read. Illustrations are generous in both size and layout for maximum clarity. Most appear on a left-facing page while the accompanying text appears on the right-facing page. Whenever possible, text describing a particular illustration is placed opposite the corresponding figure.

Substantial margins have been included on the outside edges of every page. Special notes appear here, positioned so as to be immediately adjacent to the relevant discussion in each chapter. The remaining margin space can be used to write your own notes as you go.

Each chapter begins with an overview that explains what is being discussed and how it can be helpful. Then, it closes with a brief summary of everything that has been covered and how it relates to what is to be discussed next.

About Computer Drawing Tools

The techniques presented here will outline the basics for creating your own blueprints and construction patterns whether you are drawing with pencil and paper or with a computer program. Since computer-based drawing is the most efficient approach, however, most of the tips and hints in this book have been designed for those modelers who want to use digital tools to make their drawings.

There are two very different approaches to computer-based drawing and drafting: Computer Aided Design or “CAD” programs and computer illustration programs. These applications were designed for very different purposes. You can actually use either type of program to make blueprints and construction patterns for your projects, but the process for drawing with each type of program will be different.

CAD applications are chockfull of powerful drawing tools and options that are all geared toward *precision*. These programs tend to be complex and highly technical because they were designed specifically for draftsmen,

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engineers, industrial designers, and architects who need to produce accurate engineering drawings and technical blueprints. For this reason, CAD systems can sometimes be difficult for the novice to learn.

A CAD program may not be the best application to use for someone who is new to computer-based drawing. The interfaces in these programs are more technical in nature, and many operations involve typing commands on a keyboard. In addition, the user also needs to be familiar with the standards and conventions of drafting and technical illustration in order to make full use of these types of applications.

In marked contrast, illustration programs were created for designers and graphic artists to produce line art for publications. These came about during the desktop publishing revolution of the 1980s, making it relatively easy for anyone to create professional-quality graphics. These programs are fairly intuitive and easy to use since nearly all operations are carried out by simply pointing and clicking with a mouse. A user need not be at all familiar with the conventions and standards of technical illustration and drafting to start using one of these programs.

Many draftsman will claim one should only use a CAD program for making blueprints. The primary advantage of CAD is its accuracy – you can make drawings that are precise to within ten-thousandths of an inch. But, as a modeler, do you really need to build your projects to such close tolerances?

The fact is, you can use any computer-based drawing tool to create blueprints and patterns for your project. Most illustration programs permit you to draw lines that are accurate to within a hundredth or even a thousandth of an inch. This is probably more than adequate for most purposes. What's more, because of the flexibility and ease of use inherent in these programs, they are very simple to learn – even for the novice.

Best of all, you can use an illustration program to make much more than just blueprints. These applications can also be used to create artwork for custom decals and transfers – something that would be tedious and difficult using any other type of program. In fact, illustration programs can come in handy for any of the following model-related tasks:

- Sketching 3-views of a model project.
- Creating detailed blueprints.
- Generating templates and construction patterns from blueprints.
- Making profiles and outlines used to build 3D model parts.
- Creating artwork for custom decals and transfers.
- Generating outlines for custom photo-etching.
- Making patterns for laser cutting.
- Drawing tool paths that can be used for CNC machining.

Illustration programs fall into one of two categories: Professional graphics programs such as Adobe® *Illustrator*® and Macromedia® *Freehand*® (now owned by Adobe Systems Incorporated) and general purpose drawing programs such as *CorelDRAW*® and *Deneba Canvas*®. You should choose whichever package meets your needs and budget.

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CAD programs can also be used for many of these same tasks, but a CAD program may not be well suited for producing illustrations and artwork such as that needed for making decals. Because an illustration program can do it all and is also easier to use, this book will be present more tips and techniques for drawing with an illustration program than with a CAD package.

Just keep in mind, in order to provide a useful guide for *all* modelers, this book will discuss the general principles of drawing blueprints rather than focusing on the specifics of how to draw using any particular program or toolset. This will equip you with what you need to know to start making blueprints and patterns for your next project – no matter which method or program you use. Even if you choose to go the CAD route – or simply want to use a pencil and a piece of paper – you can still use all the principles and examples presented here in order to start making your own blueprints.

Let's Get Started

You now have a good idea of what this volume is all about and what it can do for you. If you have a dream or concept in your mind, this book will show you how to turn that idea into a set of drawings.

First, you'll review the basics of how to make multi-view drawings. Then, you'll see how to create accurate construction patterns and other templates from your finished plans. By the time you've read through this material, you will know exactly how to turn your ideas into workable plans for building your next project.

Are you ready to dive in and get started? If so, roll up your sleeves and let's get to work designing some models!