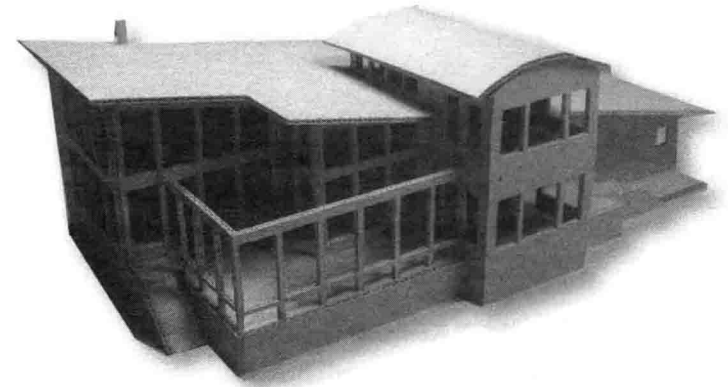


ARCHITECTURAL
**MODEL
BUILDING**
TOOLS, TECHNIQUES, AND MATERIALS

ROARK T. CONGDON



ARCHITECTURAL MODEL BUILDING



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ARCHITECTURAL
MODEL BUILDING

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Foreword

by Ross King

The Roman historian Suetonius tells the story of how Julius Caesar destroyed a newly completed house that had been built for him, at vast expense, on his estate at Nemi. Even though Caesar had witnessed the construction of the villa from the foundation upward, the finished product did not meet with his approval. For the Renaissance architect Leon Battista Alberti, there was a valuable lesson to be learned from this episode: “For this reason, I will always recommend the time-honored custom, practiced by the best builders, of preparing not only drawings and sketches but also models of wood or any other materials” (pp. 33 – 34).

All architects today would agree with Alberti. Behind virtually every great building is an architectural scale model of the sort he advocated. It is probably safe to assume that

in 448 BCE, when a competition was held in Athens for the war memorial planned for the Acropolis, the sculptor Phidias constructed some kind of three-dimensional model to showcase his design and sway Pericles and his fellow Athenians. Likewise, one of the biggest building projects of the 21st century—the development of the World Trade Center site in Lower Manhattan—began in December 2002 when nine architectural models went on public display at the Winter Garden in the World Financial Center in New York.

Architectural models combine practicality and detailed craftsmanship with an artistic flair. Many great architects—Brunelleschi, Bramante, Michelangelo, François Mansart—originally trained as goldsmiths, painters, or sculptors. Some of them lavished great artistry

(and great sums of money) on their models. A number of surviving examples, such as Antonio da Sangallo the Younger’s for St. Peter’s in Rome, or Sir Christopher Wren’s “Great Model” for St. Paul’s in London, are works of art in themselves. The former is 26 feet in length and took a carpenter six years to build. The latter featured small details, such as statues on the parapets, believed to have been commissioned by Wren from Grinling Gibbons, the greatest woodcarver in history.

The materials and techniques of model making have changed over the centuries. Wood, pasteboard, and stone have made way for laser-cut styrene and even (as the models at the Winter Garden revealed) holograms and sophisticated computer animation. But the impetus remains the same: to solve design

problems, inform and impress patrons and the public, and win commissions. The need for skill, ingenuity, and imagination likewise remains. In what follows, Roark Congdon presents a clear step-by-step account of this process and of the methods and materials

that can be used to achieve what Alberti calls “a clearer and more certain idea” of the building in question.

Ross King is the author of three books on Italian history and art: *Brunelleschi's Dome:*

How a Renaissance Genius Reinvented Architecture (2000); *Michelangelo and the Pope's Ceiling* (2002); and *Machiavelli: Philosopher of Power* (2007). He has also published two novels as well as *The Judgment of Paris* (2006), a study of French Impressionism.

Preface

Architectural Model Building: Tools, Techniques, and Materials was written in order to present the inexperienced or student model maker with simple instructions, illustrations, exercises, and practical applications; all of which were designed to develop the skills necessary to build professional quality models. Unlike in Great Britain, the United States has few colleges or universities that offer courses that focus solely on the teaching of model building theories and techniques. Rather, certain techniques may be introduced as smaller units of broader courses.

Oftentimes, through the process of trial and error, students learn these processes on their own. In addition to this being a useful textbook for an architectural model making course, the information presented herein is intended to

supplement courses for a variety of disciplines, including Interior Design, Landscape Architecture, Furniture Design, Industrial Design, Engineering, Lighting Design, and Theater and Stage Set Design. Introductory courses in Fine Arts that stress three-dimensional fundamentals would benefit from this as well. Finally, the nonacademic interested reader or hobbyist will find this information useful and simple to understand.

This book is divided into three distinct parts. Part 1 consists of Chapters 1 through 6, and begins by presenting the reader with a brief history of the use of models. The subsequent chapters offer tips on how to prepare an area for model making, and which tools to purchase. Even the most experienced model maker or designer will benefit from Chap-

ter 4, “Planning a Model,” before they begin their next project.

In Part 2 of this book, Chapters 7 through 11, students are introduced to presentation strategies and fundamental construction techniques. They will hone their physical model making skills by following a logical progression of exercises and examples. The materials introduced in each chapter—paper-based products, foam board, balsa wood, and basswood—become, in that order, progressively more difficult to work with. New techniques are introduced using the simplest of materials, thus giving the reader confidence in the fundamental techniques. To gain confidence working with a new, more demanding material, the reader will be asked to practice the simple techniques learned in earlier chapters.

Each material will demand that you make subtle changes in the primary techniques. The demonstrations and exercises are provided to assist you in perfecting those techniques.

In Part 3, Chapters 12 and 13, advanced learners will have the opportunity to fine-tune their techniques and add realistic detail. Working with mixed media and representing real-life materials is the rewarding and challenging conclusion to this textbook.



In addition to supplying the student with basic how-to information, this book also provides instructions on shortcuts, and tips on avoiding common mistakes in passages that display the Learn from the Pros icon. A glossary defines key terms,

which are **boldfaced** throughout the text. The photographs make the hands-on lessons easy to grasp. Chapter Review and Practice offers carefully considered critical thinking questions as well as hands-on practice for the beginning to intermediate model maker. Advice from the Pros box (pp. 43–45) reinforces the lessons in an engaging format.

As you know, architectural models can be visualized in many different ways. Rough sketches in the design phase help inspire. Measured drawings can help communicate early ideas to clients. CAD programs are used to start seeing models in three dimensions. Appendix A shows the basic shapes used in the models you see photographed in this book. These were created using Google SketchUp.

The aim is to help visual learners conceive of all aspects of the three-dimensional model in ways they might not have seen in the photographs. The templates provide alternative forms of learning and visualizing the three-dimensional model.

In the field of three-dimensional modeling, the range of physical possibilities, topics, processes, and mediums is far too broad to be covered in entirety in one book. Indeed, materials such as styrene, and advanced techniques that utilize acrylics or wood, and processes such as mold making, casting, and computer-aided physical modeling are related topics of interest, covered in a handful of other books.

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This book would not have been possible without the help of the following:

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Materials Needed by Chapter

The following list indicates the materials mentioned in each chapter, and are recommended to have handy to complete Chapter Review and Practice. Part 1 of the text is preparatory. In Part 2, beginning with Chapter 7, students embark on learning and practicing model building techniques. Materials needed to execute advanced techniques, to create presentation quality and realistic models, are also included here.

CHAPTER 7

- #11 blades (limitless amount)
- Architect's scale
- Bevel cutting tool
- Burnisher
- Cardboard
- Chipboard
- Craft knife

- Double-stick tape
- Drafting paper
- Drafting pencils with B and 4H lead
- Drafting tape or dots
- Floor plan from a previous project
- Foam board
- Graphite transfer paper
- Metal straightedge
- Museum board in 1/32" and 1/16" thickness (2 ply and 4 ply)
- Mylar or acetate sheets (four 8 1/2" × 11")
- Nail file
- Paper towels
- Retractable knife with snap-off segments
- Sandpaper in a variety of grits (180–220 grit)
- Sewing pins
- Small strip of wood measuring 1/2" × 1/2" × 3"

- Sobo or Tacky Glue
- Spray adhesive
- Triangles (a variety of them)
- Try square or a contractor's combination square
- T square
- Tweezers
- Utility knife, preferably retractable, with extra blades
- Vellum or tracing paper
- Vinyl cutting mat

Optional

- Pounce wheel

CHAPTER 8

- #11 blades (limitless amount)
- Architect's scale

Burnisher
Cardboard
Chipboard
Compass
Craft knife
Double-stick tape
Drafting compass
Drafting paper
Drafting pencils with B and 4H lead
Foam board
Drafting tape or dots
Four 8½" × 11" Mylar or acetate sheets
Graphite transfer paper
Hobby clamps
Illustration board
Metal straightedge
Museum board in 1/32" and 1/16" thickness (2 ply and 4 ply)
Nail file
Paper towels
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Sewing pins
Sobo or Tacky Glue
Spray adhesive
Triangles (a variety of them, including an adjustable one)
Try square or a contractor's combination square
T square
Tweezers
Utility knife, preferably retractable, with extra blades

Vellum or tracing paper
Vinyl cutting mat
Wire cutters
Wood (small strip: ½" × ½" × 3")

Optional

Acrylic and watercolor paints
Cups to hold water
Markers (a variety of them)
Mat board cutting system (straightedge integrated with a bevel and straight cutter; Logan is recommended)
Paint brushes (a variety of them)
Spray paints (a variety of them)

CHAPTER 9

#11 blades (limitless amount)
Architect's scale
Burnisher
Cardboard
Cardstock
Chartpak Graphic Tape, white, 1/16" and 1/8" widths
Chipboard
Craft knife
Double-stick tape
Drafting compass
Drafting tape or dots
Drafting paper
Drafting pencils with B and 4H lead
Foam board
Elevation drawings of four-panel windows

Graphite transfer paper
Hobby clamps
Hobby drill, Dremel Moto-Tool, or electric drill
Metal straightedge
Museum board in 1/32" and 1/16" thickness (2 ply and 4 ply)
Mylar or acetate sheets (four 8½" × 11")
Nail file
Paper towels
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Scissors
Sewing pins
Small strip of wood ½" × ½" × 3"
Sobo or Tacky Glue
Spray adhesive
Triangles (a variety of them, including an adjustable one)
Try square or a contractor's combination square
T square
Tweezers
Utility knife, preferably retractable, with extra blades
Vellum or tracing paper
Vinyl cutting mat

Optional

Mat board cutting system (straightedge integrated with a bevel and straight cutter; Logan is recommended)

CHAPTER 10

#11 blades (limitless amount)
Architect's scale
Burnisher
Chipboard
Craft knife
Double-stick tape
Drafting compass
Drafting tape or dots
Drafting paper
Drafting pencils with B and 4H lead
Foam board
FoamWerks L clips and T clips
FoamWerks Straight/Bevel Cutter and replacement blades
FoamWerks Tape
Graphite transfer paper
Hobby clamps
Hobby drill, Dremel Moto-Tool, or electric drill
Metal straightedge
Mylar or acetate sheets (four 8 $\frac{1}{2}$ " \times 11")
Nail file
Paper towels
Rabbit foam board cutter, either by FoamWerks or Alvin
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Scissors
Sewing pins
Small strip of wood 1/2" \times 1/2" \times 3"
Sobo or Tacky Glue
Spray adhesive

Triangles (including an adjustable one)
Try square or a contractor's combination square
T square
Tweezers
Utility knife, preferably retractable, with extra blades
Vellum or tracing paper
Vinyl cutting mat

Optional

FoamWerks Channel Rail with the Straight and V-Groove Cutter Attachments
FoamWerks Circle Cutter
FoamWerks Freestyle Cutter
FoamWerks Hole Drill
Mat board cutting system (straightedge integrated with a bevel and straight cutter; Logan is recommended)

CHAPTER 11

#11 blades (limitless amount)
Architect's scale
Balsa wood in widths of 4" \times 1/16" and 1/8"
Balsa-wood stripper
Balsa wood in strips of 1/4" \times 1/16" and 1/8"
Basswood in widths of 4" \times 1/16" and 1/8"
Basswood in strips of 1/4" \times 1/16" and 1/8"
Burnisher
Craft knife
Double-stick tape
Dowels (variety of them)
Drafting compass

Drafting paper
Drafting pencils with B and 4H lead
Drafting tape or dots
Engineer's square
Graphite transfer paper
Hobby drill, Dremel Moto-Tool, or electric drill
Hobby clamps
Metal straightedge
Mini clamps
Miter box
Mylar or acetate sheets (four 8 $\frac{1}{2}$ " \times 11")
Nail file
Paper towels
Razor plane
Razor saw and miter box
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Scissors
Scroll saw
Sewing pins
Small strip of wood 1/2" \times 1/2" \times 3"
Sobo or Tacky Glue
Spray adhesive
Triangles (variety of them)
Try square or a contractor's combination square
T square
Tweezers
Utility knife, preferably retractable, with extra blades
Vellum or tracing paper
Vinyl cutting mat

Optional

Acrylic and watercolor paints (a variety of them)
Band saw
Corner clamps
Cups to hold water
Dremel Moto-Tool
Dremel Scroll Saw
Electric drill
Markers (a variety of them)
Micro table saw
Micro miter saw
Paint brushes (a variety of them)
Palm sander
Spray paints (a variety of them)

CHAPTER 12

#11 blades (limitless amount)
Acrylic cement
Arylic sheets (two 8 $\frac{1}{2}$ " \times 11", one 1/16" thick and one 1/8" thick)
Architect's scale
Balsa wood in strips of 1/4" \times 1/16" and 1/8"
Balsa wood in widths of 4" \times 1/16" and 1/8"
Basswood in widths of 4" \times 1/16" and 1/8"
Basswood in strips of 1/4" \times 1/16" and 1/8"
Burnisher
Cardboard
Cardstock
Chipboard
Craft knife
Double-stick tape
Dowels (a variety of them)

Drafting brush
Drafting compass
Drafting pad, sometimes called a Skum-X pad
Drafting paper
Drafting pencils with B and 4H lead
Drafting tape or dots
Flat Grey automotive primer
Foam board
Graphite transfer paper
Hobby clamps
Hobby drill, Dremel Moto-Tool, or electric drill
Linoleum knife
Metal straightedge
Museum board in 1/32" and 1/16" thickness (2 ply and 4 ply)
Mylar or acetate sheets (four 8 $\frac{1}{2}$ " \times 11")
Nail file
Paper towels
Razor saw and miter box
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Scissors
Sewing pins
Sheet of cork (1/8")
Small strip of wood 1/2" \times 1/2" \times 3"
Sobo or Tacky Glue
Spray adhesive
Triangles (a variety of them, including an adjustable one)
Try square or a contractor's combination square

T square
Tweezers
Utility knife, preferably retractable, with extra blades
Vellum or tracing paper
Vinyl cutting mat

Optional

Acrylic and watercolor paints (a variety of them)
Band saw
Corner clamps
Cups to hold water
Dremel Moto-Tool
Dremel Scroll Saw
Electric drill
Feather
Markers (a variety of them)
Micro miter saw
Micro table saw
Paint brushes (a variety of them)
Palm sander
Spray paints (a variety of them)

CHAPTER 13

#11 blades (limitless amount)
12–16 gauge wire
Acrylic cement
Arylic sheets, (two 8 $\frac{1}{2}$ " \times 11", one 1/16" thick and one 1/8" thick)
Adjustable triangle
Architect's scale
A piece of furnace filter

Balsa wood in strips of $1/4" \times 1/16"$ and $1/8"$
Balsa wood in widths of $4" \times 1/16"$ and $1/8"$
Basswood in strips of $1/4" \times 1/16"$ and $1/8"$
Basswood in widths of $4" \times 1/16"$ and $1/8"$
Burnisher
Cardboard
Cardstock
Chipboard
Craft knife
Double-stick tape
Dowels (a variety of them)
Drafting compass
Drafting paper
Drafting pencils with B and 4H lead
Drafting tape or dots
Dried plants or twigs, such as yarrow
Foam balls of various sizes
Foam board
Graphite transfer paper
Hobby clamps
Hobby drill, Dremel Moto-Tool, or electric drill
Inexpensive chopsticks

Linoleum knife
Metal straightedge
Museum board in $1/32"$ and $1/16"$ thickness (2 ply and 4 ply)
Mylar or acetate sheets (four $8\frac{1}{2}" \times 11"$)
Nail file
Paper towels
Razor saw and miter box
Retractable knife with snap-off segments
Sandpaper in a variety of grits (180–220 grit)
Scissors
Sewing pins
Small strip of wood $1/2" \times 1/2" \times 3"$
Sobo or Tacky Glue
Spray adhesive
Triangles (a variety of them)
Try square or a contractor's combination square
T square
Tweezers
Utility knife, preferably retractable, with extra blades

Vellum or tracing paper
Vinyl cutting mat
Wire cutters

Optional

Acrylic and watercolor paints (a variety of them)
Band saw
Corner clamps
Cups to hold water
Dremel Moto-Tool
Dremel Scroll Saw
Electric drill
Feather
Markers (a variety of them)
Micro table saw
Micro miter saw
Paint brushes (a variety of them)
Palm sander
Scale figures or vehicles
Spray paints (a variety of them)

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