



THIRD EDITION

TEXTILES *for*
RESIDENTIAL
&
COMMERCIAL
INTERIORS

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Third Edition

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Second Edition

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**Textiles for
Residential &
Commercial Interiors**

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■ The third edition of *Textiles for Residential and Commercial Interiors* reflects the suggestions of several professors who used the second edition. Many of these professors also willingly shared comments offered by their students. Together, their input led to changes in the organization, pedagogy, and scope of the work. The book continues to be, however, written for use by students, educators, extension personnel, practicing interior designers, architects, retailers, and consumers with a professional or personal interest in textile furnishings.

The major objectives for the third edition are:

- to enhance understanding by updating illustrations and adding extensive color photographs
- to examine current and new technologies in the textile industry, including microfibers, nanotechnology, new construction techniques, and new fiber developments
- to expose the students to a wider variety of interior fabrics through use of an optional corresponding swatch kit
- to identify current green/sustainable methods in interior design, including fiber and fabric production, recycling and finishing techniques
- to increase awareness of environmental issues related to the manufacture and use of interior textiles

To achieve a greater understanding of interior textiles requires examining and studying fabrics as well as the information included in the textbook. An optional fabric swatch kit has been developed to correspond directly with the textbook. The residential/commercial interior fabrics include sustainable textiles and are organized in the order they are listed in the textbook. The fabric swatches allow for hands-on experience with interior fabrics. The knowledge gained from this experience will be useful to both the student starting and the professional continuing a career in the interior design industry. (The Interior Design Swatch Kit can be obtained from Textile Fabric Consultants, www.textilefabric.com.)

Because readers will have different levels of knowledge about textiles, the text begins with a focus on textile fundamentals. As requested by users of the earlier edition, all aesthetic, durability, appearance retention, comfort, and health/safety properties are examined in greater

Preface

depth. Fibers, both natural and manufactured, are discussed in greater detail. Newly developed fibers, as well as new fiber processing techniques, are also covered.

The scope of the book has been expanded to include in-depth coverage of institutional textiles, as well as household textile goods. Critically important material has been added on codes, standards, environmental concerns, and green products.

For the benefit of the instructor and the student, there are key terms and review questions for each chapter. Case studies provide a means for the student to analyze a problem. The appendices include a listing of generic manufactured fiber names, formulas for metric conversions, a bibliography, and an extensive glossary. The text is richly illustrated, with line drawings and full-color, detailed photographs of fibers, yarns, fabrics, equipment used in manufacturing, coloring and finishing processes, as well as end products and end-use settings.

The text is presented in five units, with Unit One having a focus on textile fundamentals. Readers having previous formal study of textiles and professionals with knowledge from experience may use this unit for review;

others may study the material more thoroughly, to master information built on in later units. Units Two through Five are divided by end-product category. Unit Two includes discussion of upholstered furniture coverings and fillings; Unit Three focuses on window coverings, drapery linings, and textile wallcoverings; Unit Four covers soft floor coverings and cushions; and Unit Five presents material on both functional and decorative textile bath, bedding, and tabletop products used in household and institutional settings.

In larger institutions with extensive offerings, *Textiles for Residential and Commercial Interiors* is appropriate for a course to follow completion of introductory textiles and interior design courses. It can be used in either textiles or interior design departments. In smaller institutions where course offerings may be more limited, the text would be useful in an introductory course with an expansive scope (e.g., apparel textiles and interior textiles, or housing and interior textiles). The book's organization permits the selection of units or chapters dealing with topics in the order preferred by the instructor.

■ We are appreciative of all the companies and individuals who contributed color photographs and illustrations to make this edition more visually appealing. Nancy Oxford, Dana Miller, and Sharon Coleman would also like to give special thanks to coauthor Amy Willbanks, who shot most of the photographs in this edition. Her meticulous attention to detail and amazing organizational skills facilitated the coordination of the entire project.

We are grateful to the many colleagues who provided ideas and helpful comments as we developed this edition. We would also like to thank Textile Fabric Consultants, Inc., for providing facilities, use of photocopying, faxing and scanning equipment, as well as numerous pots of coffee in the production of the new edition of *Textiles for Residential and Commercial Interiors*.

Other readers selected by the publisher were also very helpful. They included: Wendy Beckwith, La Roche College; Jan Cummings, Johnson County Community College; Rita Christoffersen, University of Wisconsin-Stout; Elizabeth P. Easter, University of Kentucky; Karen LaBat, University of Minnesota; Ann Beth Presley, Auburn University; Leanne C. Stone, University of Nevada-Reno; Katherine Wiggins, Madison Area Technical College; Patricia Williams, University of Wisconsin-Stevens Point; and Robyne Williams, North Dakota State University.

As an added benefit to instructors and students, an Interior Design Swatch Kit has been designed to parallel this text. It is available from Textile Fabric Consultants, Inc., 521 Huntly Industrial Blvd., Smyrna, TN 37167; www.textilefabric.com; telephone 800-210-9394.

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Photo courtesy of Christian Fischbacher,
www.fischbacher.com.

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The Fundamentals of Textiles for Interiors

UNIT ONE focuses on the fundamentals of textiles in the interior design industry. Chapter 1 reviews the nature of the industry, including the sequential flow of product manufacturing and distributing. Economic and environmental factors affecting the industry are also discussed. Chapter 2 identifies criteria influencing interior textile product selection. Scientific and technical associations serving the industry and organizations establishing model building codes are identified. Chapter 3 examines generic fiber names and classifications. Fiber properties related to aesthetics, durability, appearance retention, comfort, and health/safety/protection are identified. Physical external features are also discussed.

Following the normal sequence of production, Chapter 4 examines both natural and manmade fibers. Fiber engineering, fiber modifications and fiber developments are also examined. Chapter 5 focuses on yarns and yarn production. Chapter 6 and 7 examine various methods of fabric production including weaving, knitting, and tufting. Color related variables and methods of color application are discussed in Chapter 8. Conversion or finishing operations, the final process in fabric manufacturing, are discussed in Chapter 9.

The Interior Textile Industry



Major Segments of the Industry

Fiber Suppliers and Producers
Yarn Producers
Fabric Manufacturers
Textile Colorists, Designers, and Stylists
Converters
End-Product Producers
Distributors
Design Professionals
Consumers

Associate Members of the Industry

Trade Associations
Publishers
Advertising Firms
Service Organizations for Maintenance

Economic Factors Affecting the Industry

Inflation
Income-related Variables
Energy Costs and Concerns
Mortgage Interest Rates and Building Costs
Mergers and Acquisitions
Other Factors

Environmental Factors Affecting the Industry

Developments in the Textile Industry
Design Considerations
Environmental Agencies

■ **The interior textile industry**, like the apparel and industrial textile industries, encompasses several segments, each of which is an important link in the chain of production and distribution. Although these segments are composed of many independent firms, there is mutual dependence among firms in different segments: firms in **downstream segments** need suppliers, and firms in **upstream segments** need purchasers. Furniture producers, for example, must have a supply of fillings, linings, and finished fabrics. In turn, they must also have interior designers and architects who are willing to recommend their upholstered products to clients and retailers who are willing to offer them to their customers.

Sharing a common goal—operating profitably—all members of the industry work cooperatively to ensure that the end products offered are widely accepted by contemporary consumers. To secure this acceptance and realize their goal, suppliers, producers, and distributors often support and seek assistance from such auxiliary enterprises as trade associations and advertising firms. While such groups are not directly involved in the manufacturing sequence, they can have a major influence on quality, awareness, and selection of the industry's goods.

Although consumer acceptance or rejection of the products available primarily determines the economic health of the industry and its members, it is also directly affected by such variables as environmental issues and economic factors. Industry executives must be aware of and respond to these variables if their firms are to be financially viable.

Major Segments of the Industry

The major segments of the interior textile industry and their positions in the flow of production and distribution are shown in Figure 1.1. Natural fiber suppliers and manufactured fiber producers initiate the work of the industry; it culminates with the residential and commercial consumer.

Fiber Suppliers and Producers

Natural fiber suppliers recover already-formed or “readymade” fibers, principally from sheep, silk caterpillars, cotton bolls, and flax plants. The responsibility of the supplier is to assist nature and ensure the production of high yields of quality fibers. To be successful, suppli-

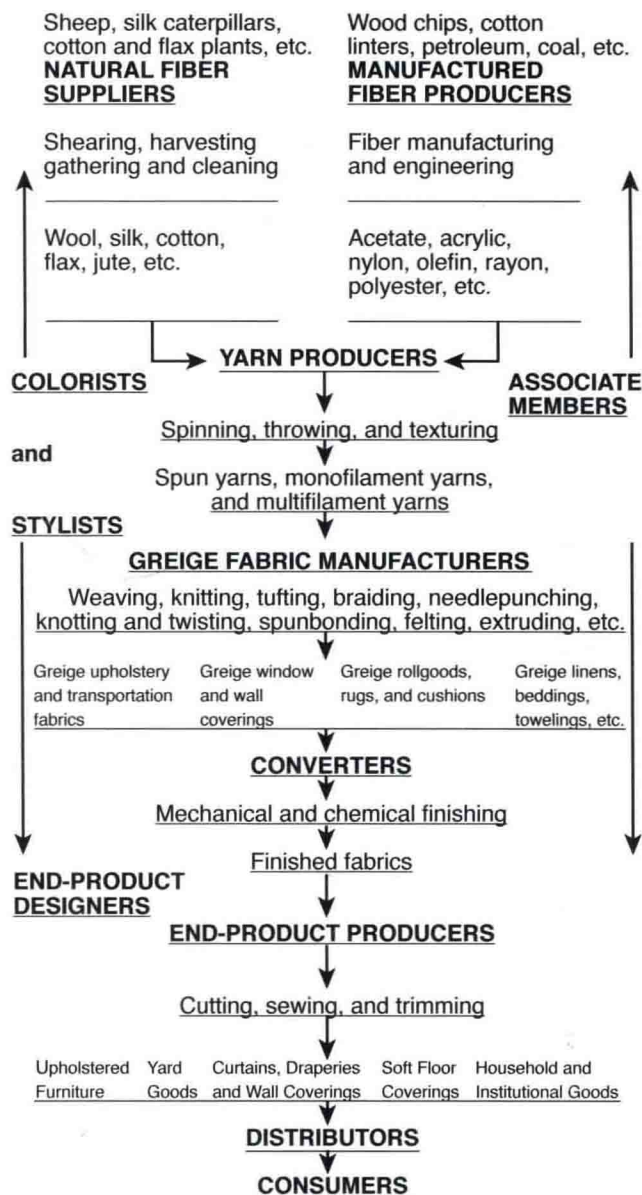


Figure 1.1 The interior textile industry.

ers must cope with the challenges of today's rising costs of labor, feed, pest-control agents, fertilizers, and transportation. They must also contend with growing competition from foreign suppliers and from manufactured fiber producers who are constantly seeking to capture a larger share of the fiber market. Increasingly, natural fiber suppliers must respond to concerns for the environment (e.g., limit runoff of pesticides and fertilizers into water supplies), and they must seek to protect the health and safety of their employees (e.g., reduce pesticide

residue on workers' clothing). Also, they must alleviate the apprehension of animal rights activists (e.g., use humane treatment for the fiber-producing animals in their care).

Beginning with such natural materials as wood chips, cotton linters, bamboo, sugar beets, and corn, **manufactured fiber producers** make rayon, PLA, and acetate. Beginning with such natural substances as petroleum and coal, they manufacture acrylic, nylon, polyester, olefin, fiberglass, vinyon, and other fibers used in the interior design industry. Manufactured fiber producers are challenged by the rising costs of petroleum and labor, changing trade balances, and persistent competition from natural fiber suppliers. Like natural fiber suppliers, manufactured fiber producers must be concerned for any negative effects the byproducts of production have on the environment, as well as ensuring the health and safety of their employees.

Fiber suppliers and producers forward staple fibers, filament fibers, and tow to yarn producers. **Staple fibers**, such as wool, cotton, and flax, are relatively short fibers, measured in inches or centimeters. **Filament fibers**—silk and manufactured fibers—are relatively long fibers measured in yards or meters. **Tow** is a bundle of manufactured filaments that has been given a two- or three-dimensional crimp or coil but no twist.

Yarn Producers

Yarn producers are responsible for combining fibers into usable yarn structures. **Spinners** align, spin, and twist staple-length fibers into spun yarns, and **throwsters** combine filament-length fibers into untwisted or twisted multifilament yarns. Tow may be directly combined into yarns or it may be reduced to staple-length fibers (Figure 5.3, p. 87), which are then spun. Yarn producers frequently employ multiple twisting or plying operations to expand the assortment of yarns available to fabric manufacturers.

Fabric Manufacturers

Fabric manufacturers use a variety of **fabrication techniques**, including weaving, knitting, knotting and twisting, braiding, and tufting, to combine yarns into fabric structures. They use such techniques as felting, spun-bonding, and needlepunching to produce fabrics directly from fibers, bypassing the yarn stage, and they use extruding to produce polymer film sheeting directly from solutions, bypassing both the fiber and yarn stages. With extrusion operations, the manufactured fiber/film producer is functioning as the fabric manufacturer.

Fabric producers and textile machinery engineers work cooperatively to develop new equipment and devise more efficient fabrication techniques, continually striving to fulfill two major goals. First, they seek to reduce production time and energy consumption and thus to reduce their manufacturing costs. Second, they work to engineer textile structures that will be accepted by and perform satisfactorily for the ultimate consumer.

After fabrication is completed, the results are still unfinished and often bear little resemblance to fabrics selected by professionals and consumers. These unfinished fabrics, known as **greige goods**, are forwarded to converters for finishing, or they may first be sent to dyers and printers.

Textile Colorists, Designers, and Stylists

Textile colorists and fabric stylists may be involved at any stage in the production sequence. Manufactured fiber producers may incorporate dye pigments within filaments as they are extruded; dyers may immerse fibers, yarns, or fabrics in a solution of dyestuff. Printers generally apply colorful patterns to greige goods, although they can produce some unique color styles by printing sheets of yarns and tubes of knitted fabric.

Textile chemists and colorists constantly strive to reduce their utilization of water: the copious amounts of water used in dyeing operations must be purified to minimize pollution. Drying hundreds of pounds of fiber or yarn or thousands of yards of fabric requires sizable amounts of often-costly utilities.

Well in advance of production, **textile designers** and **fabric stylists** must identify the aesthetic features preferred by contemporary consumers. They must be alert for slight shifts in the selection of such fashion-related qualities as fabric weight, textural characteristics, and drapability. They must tally the selections of woven-in patterns and printed patterns, noting preferences for simple and elaborate design motifs, for small-scale and large-scale repeats, and for fiber, yarn, and fabric color styling. Stylists must also accurately interpret and forecast trends and anticipate variations, making certain they are suitable for large-scale production operations. To protect their creative work, textile designers can copyright their work.

Stylists face another challenge: they must ensure that the fabric's service-related properties meet requirements and expectations. This means that stylists must work