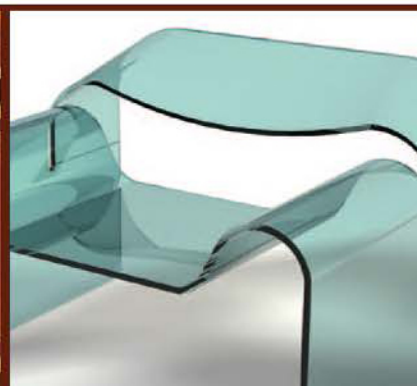# Furniture Design

Second Edition

Jim Postell

Furniture Design

FigureTI-1 Danish Institute for Study Abroad Furniture Design workshop. Drawing and sketching at full scale. *Photography: courtesy Erik Skoven, DIS.*

Furniture Design

Second Edition

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Preface

ALVAR AALTO (1898–1976), Charles Rennie Mackintosh (1868–1928), and Frank Lloyd Wright (1867–1959) were architects who integrated custom furnishings into their buildings and interior spaces (Figure P-1). Interior designers such as Eileen Gray (1878–1976), Yoshiharu Hatano (b. 1946), Eva Maddox (b. 1944) and Andrée Putnam (b. 1925) are renowned for their skill in blending textures and furnishings with interior space. Henry Dreyfuss (1904–1972) and Bill Stumpf (1936–2006) were industrial designers who utilized industrial manufacturing processes in their furniture designs. Woodworkers and artisans such as Wendell Castle (b. 1932), Sam Maloof (1916–2009), George Nakashima (1905–1990), and Pierluigi Ghianda (b. 1926) worked throughout their lives to create furniture with remarkable handcraft and finish (Figure P-2). Charles (1907–1978) and Ray (1912–1988) Eames, Poul Kjærholm (1929–1980), Pierre Paulin (1927–2009), Charlotte Perriand (1903–1999), Gatano Pesce (b. 1939), and Hans J. Wegner (1914–2007) developed professional careers designing furniture. Regardless of their academic background or professional affiliation, these individuals are renowned for innovative furniture designs (Figure P-3). Consider the viewpoints brought to furniture design by these individuals and the unique disciplinary qualities within the fields of art, architecture, interior design, and industrial design. There are pronounced differences in the way architects and interior designers create a sense of place by designing, selecting, and locating furniture; in the way industrial designers seek to resolve industrial fabrication processes and integrate utility, human factors, and ergonomics in design; and in the way that artists are trained in their craft. Many individuals and disciplines to contribute to the body of knowledge of furniture design.

Figure P-1 Experiments with bent and laminated wood—furniture components for the Paimio Sanatorium and the library in Viipuri, Finland. Designed by Alvar Aalto. *Photography by Jim Postell, 2006.*

Figure P-2 Three-seat settee, designed and fabricated by Wendell Castle (1968). Stacked-laminated, carved cherry wood. *Photography by* Jim Postell, 2011.

Think about the influence that material properties, use, applied forces, the surrounding environment, and ergonomics have on furniture design. Reflect upon the historical, cultural, political, and societal conditions revealed in the way people sit, rest, work, and play, or the human factors research and anthropometric data on which furniture designers rely. Many factors should be considered when designing furniture. Most are situated within personal, cultural, disciplinary, and professional frames of reference.

This second-edition textbook is written to serve students and furniture designers as a comprehensive survey and resource to give a deeper understanding and provide knowledge and inspiration for designing and making furniture. It has been rewritten to deliver a more extensive overview of furniture design through further documentation and analysis, with focus upon the stories and design intentions behind the furniture examples presented in this book. There are broader examples of furniture presented throughout the book, in-depth material specifications, and updated material covering digital design and fabrication technologies. The primary intention of this book is to articulate how ideas, use, design process, materials, and fabrication methods contribute to furniture design. This was a central theme in the first edition. This edition attempts to be more effective in achieving that goal.

Revisions have been made to each of the 10 chapters, which include:

Figure P-3 Stacked Tongue 577 chairs, designed by Pierre Paulin (1967), tubular steel armature surrounded with rubber webbing and expanded foam, upholstered in polyester stretch fabric. Manufactured by Artifort. 33½ inches wide; 35½ inches deep; 24 inches high; 13⅜ inches seat height (85 cm wide; 90 cm deep; 61 cm high; 34 cm seat height). *Photography by Jim Postell, 2011.*

- Chapter 1, "Introduction to Furniture Design," presents an expanded overview to the discipline and introduces threads of disciplinary-centered research and research methods. Basic relationships are outlined between furniture and design, setting the stage for a comprehensive and extensive survey.
- Chapter 2, "Function and Social Use," describes social-use categories, notions of utility, ergonomics, and function.
- Chapter 3, "Form, Spatial Organization, and Typological Orders," addresses a range of physical, compositional, and spatial characteristics in furniture design.

- Chapter 4, "Furniture Case Studies," presents 25 furniture studies organized in chronological order with new sustainable and digital design updates. In addition to the case studies, selected furniture projects by students highlight unique ways of thinking about furniture design, whose pedagogy and methodology were drawn from this book.
- Chapter 5, "Furniture Design Theory," examines the nature of furniture design, focusing on aspects of comfort, performance, structural integrity and composition, how furniture works and feels, green design, and digital fabrication, and includes expanded discussion on human factors, ergonomics, and aesthetics.
- Chapter 6, "Design," presents an overview of design principles and focuses on the phases, processes, tools, skills, and ethics of designing furniture. This edition introduces more designers, further examples of furniture pieces, and more specific working methods of design—including digital design technologies.
- Chapter 7, "Materials," outlines an updated palette of natural, composite, and synthetic materials and discusses material properties and surface characteristics relative to furniture design.
- Chapter 8, "Processes and Methods of Fabrication," discusses ways of fabricating furniture (beyond woodworking technologies), with an overview of hand, power, and digital tools.
- Chapter 9, "Professional Practice and Marketing," covers professional aspects related to the marketing, branding, and business of designing, making, and selling furniture. Furniture companies are included as both a source and resource for the reader. Expanded content is given to economic forces, global markets, professional outlets, and venues, in which the public and the discipline interact.
- Chapter 10, "Historical Overview," highlights how societies have thought about, designed, fabricated, and used furniture from ancient Egypt up to the present. Revised content has been added to include recent furniture designs produced or fabricated within the past 10 years.

Designing furniture relies upon judgment, theory, and technical knowledge from several professions and disciplines. The breadth and depth of knowledge necessary to design, specify, select, fabricate, and arrange furniture in space is extensive. This book draws on this knowledge and, in doing so, reaches out to students, faculty, the general public, and professionals in allied fields of design.

It remains a challenge for some individuals to acknowledge furniture design as a stand-alone profession or even as a vocation because it is intertwined with several disciplines. It is difficult to formulate a collective dialogue about furniture design because each discipline approaches design and fabrication from unique perspectives and each perspective is tethered to specific assumptions, frameworks, and agendas.

Look back to the time when interior design was an emerging field and consider its historical beginnings. One can determine that interior design developed from several fields, the work of key individuals, unique professional practices, and established academic programs. The fields of architecture, design, fine arts, and the decorative arts, in conjunction with the professional practices of James Adam (1732–1794) and Robert Adam (1728–92), Elsie de Wolfe (1856–1950), and Florence Knoll (b. 1917) would deserve recognition for their contribution to the emergence of interior design as a discipline and emerging profession.

In the 1950s, the discipline of industrial design began to emerge. The work of Norman Bel Geddes (1893–1958) and Raymond Loewy (1893–1986) helped to promote interest

in the discipline, as did emerging industrial fabrication processes and new mass customization and digital fabrication technologies.

It is important to acknowledge the collective influence architects, interior designers, industrial designers, and fine artists have had on the disciplinary and academic stature of furniture design, but one should also consider the important roles that entrepreneurs, fabricators, craftspeople, engineers, human factor researchers, and the general public have played as well.

It is the author's hope that this book will remain a useful survey for students and faculty, and continue to serve as a resource for designers and fabricators interested in furniture design.

Acknowledgments

Yoshiharu Hatano in Castelleto Ticino (Italy); Mario Bellini, Achille Castiglioni, and Ettore Sottsass, all of whom have had offices in Milan; and Emiliano Godoy of GODOYLAB in Mexico City.

To those who have written about furniture design, I am particularly indebted, especially to Mark Hinchman, Anne Massey, John Pile, David Pye, and Edward Lucie Smith.

To those companies that make furniture, including, B & B Italia, Cassina, Vitra, Giogetti, Fritz Hansen, Rud Rasmussen, and to those individuals who craft furniture, including Pierluigi Ghianda, Mario Terraneo, Soren Holst Pedersen of PP Mobler Design, and the late George Nakashima, you and your work have been sources of inspiration.

To the readers of *Furniture Design*, it is a special satisfaction for me to introduce this second edition. I hope this book complements those books in the classroom and on your shelves and continues to inspire students and designers in their quest to better understand the comprehensive and extensive nature of designing and making furniture.

I thank Paul Drougas, acquisitions editor at John Wiley & Sons, for the opportunity and encouragement to write a second edition of this book. This edition has provided an opportunity to make changes both substantial and marginal in response to suggestions from students, teachers, and designers who use the book.

Shortly after John Pile agreed to write the foreword for the first edition of this book, he passed away. His books on the subjects of modern furniture and interior design are marked by their balance of technical information and thoughtful insight about design, supported by great images. John had a remarkable career as a teacher, author, and practitioner— always with focus on design. He contributed significantly to the study of furniture design and interior design and was influential in the development of this book. He was a source of inspiration, a mentor, and a supporter for the book. I wish to dedicate this edition in his honor.

Foreword

FEW OBJECTS CARRY with them the historical and technical heritage of furniture. A chair is not only an object for seating but also a flag-bearer for the cultural specificities of the society where it was made and used. Furthermore, the magic of furniture is that, through daily use, social context is influenced in an ongoing and evolving two-way dialogue.

Given the fact that basically everyone is in constant contact with a wide variety of furniture pieces on a daily basis, it is very strange that designing furniture is not the core theme of several undergraduate and postgraduate programs. One would think that after thousands of years of making, using, repurposing, and disposing of furniture we would have a comprehensive and structured understanding of the lifecycle of these objects. But this is not the case. Furniture is designed by architects, industrial designers, craftsmen, or engineers who learned little about it in school and most of it working with the industry, studying on their own or by good old trial and error.

That was my case. While in my BA I had one amazing design studio with Óscar Hagerman that centered on furniture design and seating ergonomics—but that was it. Even in my ergonomics and materials courses, furniture was merely a footnote. After graduation, I had no option but to improvise. Truth be told, I improvised a lot—and in many areas—as my undergraduate degree in industrial design was as broad in scope as any, therefore only scratching the surface of everything I should've learned to become an expert in any field of design. That's how it is, and one could say fortunately, as one of the great qualities of an industrial designer is being a generalist. If we wanted to be an expert in every field an industrial designer might work in, we would need decades of training.

However, something's different about furniture design. With such objects as computers, medical equipment, transportation, or even lighting, the designer is but one of many experts in a team where each discipline collaborates on the realization of the product. Furniture designers, however, usually work by themselves and only sometimes at the final stages of the process do engineers or manufacturers get involved in migrating the design to the production floor. Therefore, the designer nowadays needs a very particular combination of knowledge in aesthetics, ergonomics, manufacturing processes, materials, finishes, marketing, and cost analysis, to name a few areas.

After my BA and five years of working independently, I enrolled in a postgraduate degree program, where I had a fantastic furniture design course with Mark Goetz and another one in Denmark with Flemming Steen Jensen, Erling Christoffersen, and Bjorli Lundin. These hands-on courses were magnificent in advancing my understanding of what furniture design and manufacturing was all about. A few years later, I started a furniture brand aimed at creating an environmentally and socially responsible manufacturing platform where designers could learn, discuss, and create furniture that was green, useful, and beautiful. In this context, I frequently encountered designers who were lacking in one area or another,

thus proposing pieces that were not feasible in technical or economic terms, or who were not aware of historical and formal references they are expected to know.

Furniture design is indeed a demanding discipline, and acquiring the necessary knowledge is not an easy task.

Jim Postell has compiled in this book a powerful tool for both students and professionals that addresses all aspects of furniture design, from materials, fabrication, and functionality to history, theory, and professional practice. Most importantly, it relates these issues to the design process, thus bridging the gap between the isolated knowledge of specialized courses and the real-world necessities of the furniture designer. With this extended second edition, the author brings us closer to the understanding of this fascinating discipline and the role and responsibilities of the designer in their social sphere.

Emiliano Godoy

Foreword to the First Edition

THE FIELD OF furniture design is strangely diverse. It does not have a well-established definition and is not regularly studied in colleges or universities.

It is also odd to remember that most of the world's population does not make use of furniture except, perhaps, for a few stools or benches. Western civilization, however, beginning thousands of years ago, has become addicted to the use of furniture of the most varied sort. In the modern world, we are in touch with furniture at almost every moment. We sit in chairs, work and eat at tables, sleep in beds, and are hardly ever out of sight of a number of furniture items, for better or for worse.

Furniture is now produced and distributed for homes, for offices, for schools, for hospitals, and for every other situation in which people are to be found. In spite of this near glut of furniture, the sources of the designs that are so ubiquitous are obscure. Most furniture now comes from factories, but the designs factories produce are generally anonymous, the work of staff that exists mostly to develop variations on earlier designs whose origins are lost.

There are, of course, some exceptions. Most historic furniture can be traced to cabinet-makers such as Chippendale and Sheraton or to architect-designers such as the Adam brothers, but these are rare exceptions mostly to be found only in museums and auction galleries. In the modern world, we know the names of the designers of those special creations we call classic: Eames, Breuer, Mies van der Rohe, Bertoia, Rietveld, and Le Corbusier. If we look into the backgrounds of these famous figures, we find that they were not trained to be furniture designers. They were architects, sculptors, or, in some instances, industrial or interior designers. When they turned to furniture, they had to rely on their background knowledge of structure, materials, human body mechanics, and the many other issues that relate to successful furniture design.

Design history is full of examples of many efforts by distinguished designers that have fallen by the wayside, while a few highly successful designs have come from unexpected sources—one thinks of the Rowland stacking chair, the Pollack office chair, or the Noguchi coffee table. Efforts to establish some form of training for designers who wish to work on furniture have not met with much success. A brief course in furniture design is offered in some interior and industrial design programs, but architectural training is too demanding to include even limited exposure to the field. Some schools with major programs in furniture design are oriented toward craft techniques and train master woodworkers who produce a single, one-of-a-kind effort demonstrating craftsmanship but offering little to the broader world of furniture. In the end, it must be admitted that furniture design is generally self-taught, whether the learner is also a craftsperson, architect, sculptor, or layman.

To turn at last to this book, we find an author determined to give aid to the would-be furniture designer, whatever professional background or lack of professionalism that person

may have. In this one volume, we can confront issues of function, materials, structure, production techniques, and whatever philosophical and theoretical matters may have a bearing upon the realities of furniture.

Although many books deal with furniture (as this book's bibliography can attest), most are histories, picture books, or studies for collectors. Very few even touch on furniture design as a process, a skill, or a matter for serious study. Here we have a book determined to make up for the furniture design shortage. It is hard to imagine a more complete and comprehensive coverage of this neglected subject brought up-to-date with such tireless effort!

John Pile

1

Introduction to Furniture Design

DICTIONARY AND ENCYCLOPEDIC sources use words like *accessories, equipment,* and *movable objects* to define furniture.[1] Words can describe the performance and physical characteristics of furniture, but those who design, make, and use furniture know that furniture design extends far beyond dictionary or encyclopedic definition. Furniture design concepts lead to the production of useful items that result in **tactile** experiences (Figure 1.1). In nearly every case, furniture is something people experience through direct human engagement. In addition, one's understanding and knowledge of furniture evolves with use and over time.

Designing furniture relies on intuition, judgment, design skills, engineering principles, and knowledge in a broad range of disciplines helpful with problem solving. Designing furniture requires inspiration, a concept or idea, and the commitment to give pleasure to those who use it.

The inevitable shift from designing furniture to fabricating furniture generates an appreciation for both the obvious and subtle ways in which *making* can influence the design process. Through the process of making furniture, one will learn about hand, power, and digital tools, material properties and working methods, assembly processes, and the time required to finish a project. Fabricating furniture demands precise skill and workmanship and often results in a sense of craft for those directly involved in the process. Making furniture does not necessarily guarantee an ability to design furniture, but it will result in an expanded knowledge of materials, tools, and joinery, which in turn generates a broader appreciation and respect for furniture design.

Furniture design is deeply rooted in the human condition. It is a social science that belongs to the humanities, an applied art that draws upon many design disciplines, and is dependent upon a working knowledge of materials and fabrication techniques. It is a holistic and interdisciplinary field of study.

Figure 1.1 The Knit chair in use. Designed by Emiliano Godoy (2004). This chair was awarded a Bronze Leaf at the International Furniture Design Competition Asahikawa 2005 in Asahikawa, Japan. *Photography courtesy of John Curry, GODOYLAB, 2005.*

Before delving into the nature of furniture design, consider the terms *furniture* and *design* and reflect upon the fundamental and symbiotic relationships bound in the meaning and etymology of these two words.

FURNITURE

> **furniture**
> • *noun* **1.** the movable articles that are used to make a room or building suitable for living or working in, such as tables, chairs, or desks. **2.** the small accessories or fittings that are required for a particular task or function: *door furniture.*[2]

By many accounts, furniture includes a broad range of moveable objects organized in four main categories:

- Human body support devices (Figures 1.2 and 1.3)
- Surfaces and objects to support various activities (Figures 1.4 and 1.5)
- Storage and display pieces (Figures 1.6 and 1.7)
- Spatial partitions[3] (Figures 1.8 and 1.9)

Furniture pieces are designed and fabricated to assist in the many ways people sit and rest, work and play, organize or display items, and partition space. This view suggests a broad utilitarian framework, in which *function* is perceived to be the primary intended purpose of furniture. Although function, utility, and social use are important aspects of the performance of furniture, rarely does function alone inspire great design. Furniture design draws upon ideas of beauty, principles of design, theory, material properties, fabrication technologies, business economies, environmental design matters, and the surrounding spatial context in which it is placed, all of which are integral and intertwined with function, utility, and social use. Considerations that influence what we think about and feel regarding furniture design include:

- Aesthetics (the meaning of form)
- Historical precedent (examples from the past)
- Principles of design (i.e., unity, harmony, hierarchy, spatial order)

- Function and social use (ergonomics, comfort, proxemics)
- Design processes (sketching, iterative overlays, model studies, digital modeling, full-scale working prototypes, collage assemblies)
- Material (classification, characteristics, properties, availability, cost)
- Fabrication processes (hand, power, digital)
- Environmental design matters (sustainability, renewable materials, off-gassing)
- Surrounding context (the spatial setting for furniture)
- Professional practice (economic, legal, and business decisions)

A goal in designing furniture is to consider all design aspects in a comprehensive and integrated manner, while maintaining focus and critical engagement upon the primary concepts and ideas that inspire design.

Figure 1.2 Reclining with the chaise longue at Villa Savoye, Poissy, France. *Photography by Stephan Dober, 2011*.
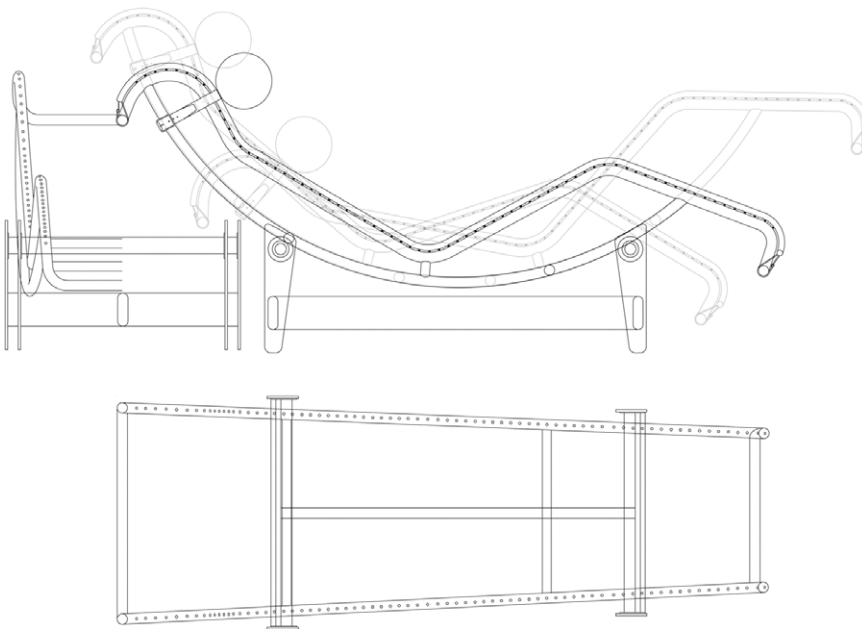
Figure 1.3 Plan side and front views of chaise longue (known as LC/4) designed by Charlotte Perriand, Pierre Jeanneret, and Charles-Édouard Jeanneret (Le Corbusier) (1928–1929). Originally manufactured in chrome-plated steel, fabric, and leather by Thonet Frères, Paris, then by Cassina, Italy since 1965. 22¼ inches wide; 63 inches deep; 28¾ high (56.5 cm wide; 60 cm deep; 73 cm high). *Drawing by Ashley Hermann, 2006, courtesy of Jim Postell.*

Figure 1.4 Outside café tables and chairs, Paris, France. *Photography copyright © William A. Yokel, 2005.*

Figure 1.5 Drawing table, designed by Robert Mallet-Stevens (1927) for professional use in his Paris office. Made with tubular metal, poplar wood, and hard lacquer paint. *Photography by Jim Postell, 2011.*

Figure 1.6 Case goods (cabinet and bookcase) designed by Mogens Koch, fabricated by Rud. Rasmussen (since 1932), Copenhagen, Denmark. *Photography courtesy of Rud. Rasmussen, Denmark, 2006.*

Figure 1.7 Cabinet, designed by Ettore Sottsass (1948–1949). Made with lacquered wood and brass-plated tubular steel. *Photography by Jim Postell, 2011.*

Utilitarian considerations can channel the development and refinement of design ideas but rarely inspire them. Utility is grounded by specific categories of social use, associated with the broader classifications of building and zoning nomenclature. In this book, categories of social use include:

Figure 1.8 Furniture as space–space as furniture. Dupont Corian exhibit, designed by SOM, 2005. *Photography by Brian F. Davies, 2004.*

Figure 1.9 Living Sculpture in nine components, designed by Verner Panton (1970–1971). Made using mass-polyethylene, with an internal armature supported by expanded polystyrene foam, upholstered in wool. Overall size: 86 inches wide; 201 inches deep; 169 inches high (220 cm wide; 510 cm deep; 430 cm high). Fabricated by Mira-X. *Photography by Jim Postell, 2011.*

- Health care
- Hospitality
- Institutional
- Office
- Recreational
- Religious
- Residential
- Retail
- Storage

Broad categories of social use are dependent on particular activities and affected by specific circumstances, which are nearly always influenced by place, occupancy, and time. As an example, day care furniture is a specific type of furniture cross-linked with institutional and residential categories. A law firm is a specific type of office classification, as is an accounting firm or a telemarketing company. Furniture for a Catholic church, a Jewish synagogue, or Islamic mosque, falls under a liturgical classification. These factors and circumstances are discussed in Chapter 2.

The word *furniture* is derived from European verbs, nouns, and adjectives. The French verb *fournir* means "to furnish." Furniture provides a place setting for work, rest, and play. It also contributes to the ambiance and style of interior space (Figure 1.10). Furniture provides people with desired items and necessary equipment that complement and complete interior space.

The Latin adjective *mobile* means "movable," which is an important characteristic of furniture. The French *meubles*, the Turkish *mobilya*, and the Danish *møbel* all translate into the English word *furniture.* Freedom from the physical structure of a building provides designers with an opportunity to create spatial relationships between movable elements and built-in

Figure 1.10 The dining table and chairs (with retractable leaves) complement the recessed circular soffit and surrounding millwork in Eliel Saarinen's residence at Cranbrook Academy, Bloomfield Hills, Michigan. *Photography by Jim Postell, 2009.*

components. The creation of spatial relationships through the size, location, and orientation of furniture pieces places furniture design within the disciplines of architecture and interior design.

Spatial order and spatial organizations include:

- Grid: a regular tessellation that divides space into a series of contiguous cells, which can then be used for spatial indexing purposes. Grids can be generated from square or rectangular cells, triangular, circular, or, hexagonal formations.
- Linear: relating to, consisting of, or using lines in form or in spatial sequence.
- Centralized: drawing spatial relationships into, around, or toward a central area or point.
- Radial: elements radiating out from a central area or point. (spiraling or swirling) in a circular, lineal, or spiral path.
- Cluster: a small group of elements gathered closely together (Figure 1.11).

Though furnishings are nearly always freestanding and movable, some pieces challenge the conventional **paradigm** by being mechanically attached to a floor, wall, or ceiling (see Figures 1.12 and 1.13) and therefore lose the characteristic of their mobility. In either scenario, interior space is made complete through the size, location, orientation, and surface treatment of tangible built-form and intangible use.

Figure 1.11 Clustered furnishings within the Salon Théâter, (Appartements Napoléon III), Musée du Louvre. *Photography by Jim Postell, 2011.*

Figure 1.12 Built-in manicure stations at Alverno Salon and Spa, Cincinnati, Ohio. The storage units and manicure stations are mechanically attached to the floor and wall, enabling internal and continuous space for electrical power and air return ducts. *Designed by Jim Postell, 2003. Photography copyright © Scott Hisey, 2004.*
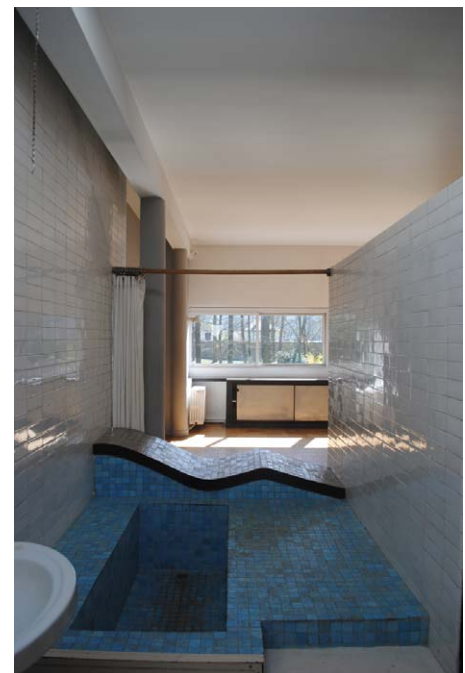
Figure 1.13 Built-in and tiled reclined seating in the master bathroom at Villa Savoye, Poissy, France. Designed by Le Corbusier (1928). *Photography by Jim Postell, 2011.*