

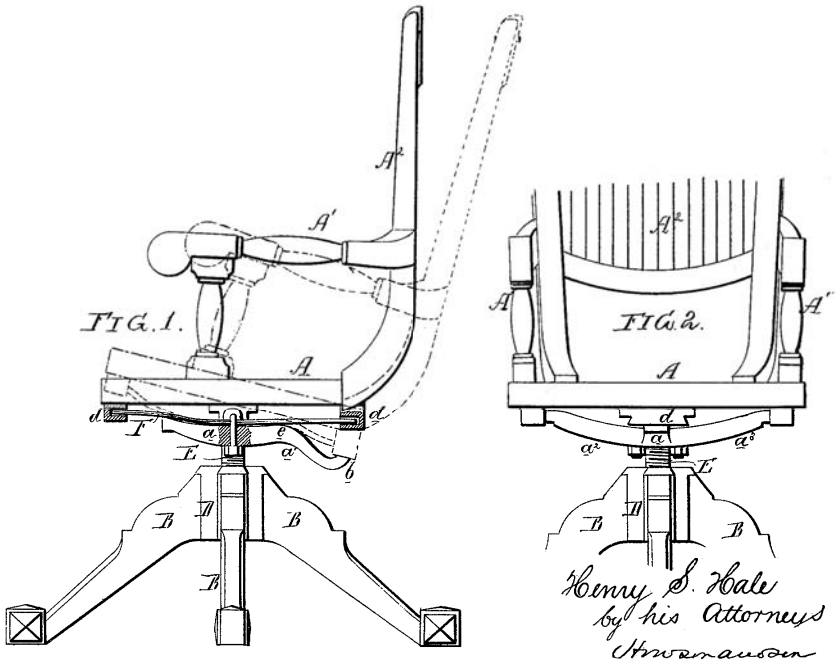
Our urban civilization is witness to an ever-accelerating procession of generations of products, appliances and gadgets by comparison with which mankind appears to be a remarkably stable species. This pullulation of objects is no odder, when we come to think about it, than that to be observed in countless natural species. Species which man has successfully inventoried.

...everyday objects proliferate, needs multiply, production speeds up the life-span of such objects - yet we lack the vocabulary to name them all. How can we hope to classify a world of objects that changes before our very eyes and arrive at an adequate system of description?

– Jean Baudrillard, *The System of Objects*

# Contents

Foreword .....	7
Preface .....	9
<b>The Evolving Office Chair .....</b>	<b>15</b>
<b>Catalogue of Chairs .....</b>	<b>27</b>
<b>Taxonomy .....</b>	<b>81</b>
Headrest .....	83
Backrest .....	93
Armrest .....	131
Lumbar Support .....	155
Seat .....	163
Seat-Stem Joinery .....	175
Stem .....	187
Base .....	193
Floor Contact .....	205
<b>Methods of Movement .....</b>	<b>213</b>
<b>Appendix .....</b>	<b>225</b>
Chronology of Chairs .....	227
Outline of Taxonomy .....	229
Record of Personal Interviews .....	231
Bibliography .....	233
Index .....	235



Patent diagram of a 'tilting chair'  
Henry S. Hale, United States, 1875

# The Evolving Office Chair

In the mid-nineteenth century business management was not yet taught in universities, the first prototypes of calculating machines weighed 15 tons, offices were lit with gaslights, and Windsor chairs were considered acceptable office seating. These circumstances have changed dramatically and office chairs have undergone an extensive design evolution as they have been adapted to the changing world around them.

An interrelated and dynamic set of factors motivates office chair design. Work habits, production technologies, ergonomic ideals, and broad social goals change frequently and considerably and affect the features and functions of office chairs. While an increased concern for consumer safety in the 1970s resulted in the sophisticated chair movement mechanisms of the 1980s and 1990s, our recent preoccupation with sustainability is delivering an array of easily recyclable chairs.

Office chairs have become ubiquitous products, sold in the millions to corporations and institutions the world over. While capitalist society runs on productivity, the human body requires rest and comfort to function optimally, which has guaranteed not only continued business for the office chair industry but also the continued evolution of office chairs.

## The advent of the office chair

There is no single inventor of the office chair: the elements that define it – a movement mechanism, adjustable features, and casters – all appeared on different chairs at different times. According to Sigfried Giedion, the roots of the kinetic office chair can be found in the comforts of rural American life. He writes in *Mechanization Takes Command*:

*The American farmer, at the end of the day, will instinctively move to the rocker on his porch. The European peasant sits immovable through the twilight as if nailed to the bench before his cottage. These simple differences must be understood, for more profoundly than one might think, they change the course of inventive fantasy. They underlie the divergence of American and European comfort in the nineteenth century. As soon as mechanization became a decisive power in furniture, these differences began to show.*

The first movement mechanisms for office chairs were developed in the United States in the 1840s and 50s with steel coils, cast-iron components and steel leaf springs. Thomas E. Warren's Centripetal Spring Arm-



US Government Bonus Bureau, Computing Division  
Washington D.C., 1924

chair of 1849 features arched steel leaf springs that allow the chair to flex in any direction and Peter Ten Eyck's 1853 Sitting Chair has a cast iron pivot point under the seat, which is kept in tension with leaf springs. The earliest known example of a chair on wheels was a William-IV-style armchair modified by Charles Darwin for his study in Kent, England in the 1840s. He replaced the legs of his armchair with cast-iron bed legs mounted on casters so that he could move from specimen to specimen with greater ease. The exact origin of adjustable features is unknown, but by the 1880s CWS Keighley produced models on which the resistance against the reclining of the chair could be adjusted.

These early models anticipated the needs of a changing society. American offices of the early nineteenth century were small and privately owned, until westward railroad expansion allowed businesses to operate in multiple cities and grow into corporations that employed dozens or even hundreds of people. The majority of chairs used in nineteenth-century offices were four-legged dining chairs, but clerical work and factory labor often required extended periods of sitting, for which these chairs were poorly suited. A growing need for mass-produced workplace seating gave manufacturers the social and financial incentive to develop adequate solutions.

### **Hierarchy in seating**

In 1911, Frederick Winslow Taylor, a mechanical engineer and management consultant, published *The Principles of Scientific Management*, which became the foundation of organization for the twentieth-century workplace. Under Taylorist work methods, specific tasks were divided among specialists, who could operate without any awareness of how their work fit into the larger productive efforts of their employer. These workers were often separated spatially and sat in different types of chairs, according to their rank. Hierarchical organization had a long-lasting effect on chair design: from the early-twentieth century up until the 1990s, executives, managers, and secretaries typically sat in chairs that reflected their status.

As well as being more robustly constructed, executive chairs tended to be made using costlier materials and sometimes more sophisticated movement mechanisms than chairs designed for managers or administrative staff. Because each variation had to look and in some cases function differently, hierarchy had an accelerating effect on the evolution of office



Heinz offices  
London, 1962

chairs. Frank Lloyd Wright designed separate chairs for the managers and executives of the 1956 Price Tower, the headquarters of an oil pipeline and chemical company in Bartlesville, Oklahoma. A larger base and an adjustable reclining mechanism distinguish the executive chair. The 1979–80 Diffrient series for Knoll is a clear expression of Taylorist hierarchy, with the Executive, Advanced Management, and Basic Operational chairs ranging from largest and most expensive to smallest and least expensive. By the late 1980s, it was common for an office chair series to offer at least three hierarchical distinctions, and sometimes four or five.

In his 1969 book *Utopia or Oblivion*, Buckminster Fuller predicted that the computer would curb the repetitive and specific tasks we associate with scientific management theories such as Taylor's. Since the personal computer became common in offices in the early 1980s, the Taylorist workplace has been slowly dissolving into collaborative and communal organizations of multifaceted workers. It's no coincidence then that the Aeron Chair of 1994, which was developed around postures for computer use, was the first model to deviate from the accepted hierarchical structure. When it was introduced, it was offered in a single color and three sizes designed to accommodate varying body sizes, not indicate varying status levels. If hierarchy is expressed in office chairs today, it is typically done with material; for executive seating, plastics and textiles are often replaced with die-cast aluminium and leather.

### **Advancements in manufacturing**

Production advancements and the development of new materials have changed almost everything about how a chair is made: the heavy cast-iron base was superseded by the lightweight die-cast aluminium base, which was used less frequently after the introduction of the super-light injection-moulded plastic base.

The earliest office chairs were made with wood, cast iron, and steel bar or sheet, and they were upholstered with batting and fabric. In the early twentieth-century materials such as steel tube, sand-cast aluminium, aluminium sheet, and Bakelite began to be employed in chair production. Technologies developed during World War II were applied to office chairs in the decade that followed the war; die-cast aluminium, moulded fibreglass and plastic resin, rubber mounts, industrial-strength glues, and compound-moulded plywood allowed for great



Material evolution of chair bases, 1885–1984  
Wood, aluminium, plastic

progress in chair design. In the 1960s, transparent thermoplastic and injection-moulded plastic were first employed on chairs such as the D-49 and Pollock chair. Since then, plastics have undergone a rapid evolution, with frequent introductions of higher-performance plastics. Many variations of injection-moulded plastic with a plethora of physical properties have been released since the 1970s, and there isn't an office chair on the market today that doesn't employ some form of this material.

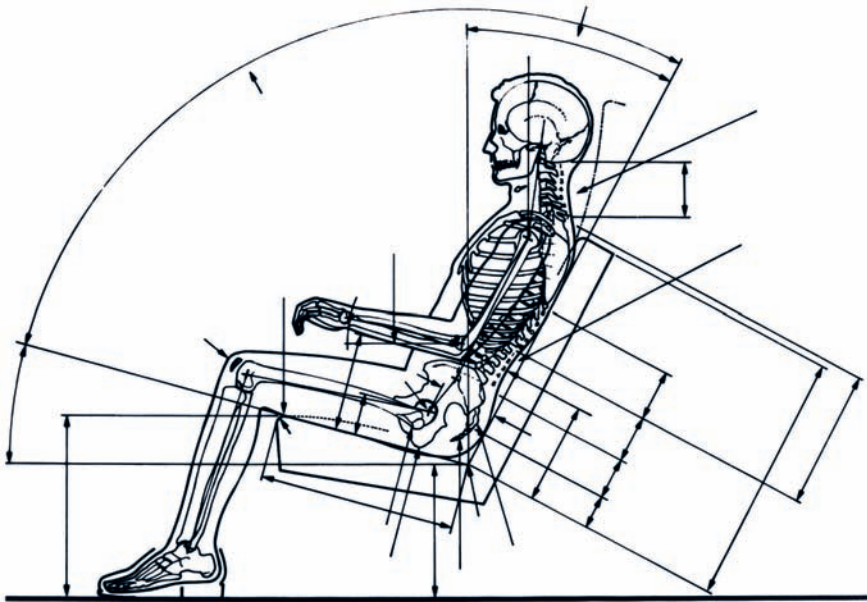
As production processes have become more advanced and chairs more complex, the initial investment required to produce the tools to manufacture a chair has greatly increased. Such tools are only accessible to furniture companies with millions of dollars of annual revenue and suitable distribution networks. Most of the family-owned office furniture businesses are gone as a result, and there are fewer opportunities for makers of bespoke chairs.

Sigmund Freud's office chair was custom-made, as were the chairs that Frank Lloyd Wright designed for his various buildings. Over time custom jobs became less frequent, or they were only used to develop a chair in a test environment that could eventually be distributed to a larger market. The padded leather chair Charles and Ray Eames designed for the lobby and executive floors of the Time-Life building in New York City in 1960 has also been sold to the public by its manufacturer Herman Miller ever since.

### **The ergonomic office**

By the 1970s, designers such as Niels Diffrient, Wolfgang Müller Deisig and Bill Stumpf were designing chairs that supported the contours of the body with moulded polyurethane foam. Much of the focus of office chair design had shifted to ergonomics, as information gathered about the human body during the war entered the public domain and was widely published in books such as Henry Dreyfuss's *Measure of Man* (1960) and Diffrient's *Humanscale* (1974).

At this time an increased public demand for consumer health led to raised safety standards in everything from packaged food and automobiles to office chairs. By the late 1980s the Council of the European Union had begun to put legislation in place that demanded minimum ergonomic standards be met in the workplace, and forced manufacturers to make suitable designs. Despite the lack of similar legislation enforcing ergonomic



'Seated 50th percentile male' from the book *Humanscale*  
Niels Diffrient, MIT Press, 1974

design in the American workplace, US corporations soon realized that it was less expensive to buy ergonomic office chairs than to pay higher insurance rates to cover workers suffering from back and neck injuries.

When the personal computer was introduced to offices in the 1980s professionals began spending significantly longer periods of time seated at their desks. Before personal computers, files and machines were located throughout the office, and employees would move around far more than they do with their own PC. While the ergonomic design of the 1970s and early 80s focused on supporting the body, ergonomic design from the mid 80s on focused on supporting the body for eight consecutive hours of seated PC use. Extended seated time only heightened the regulations placed on chair ergonomics by governments and insurance companies, and as a result the 1990s and 2000s saw an explosion of ergonomically designed chairs.

A checklist of features that determines whether or not a chair is ergonomic and safe enough first emerged in the late 1980s and has continued to expand. These features vary from institution to institution and country to country, but some common elements are height- and depth-adjustable armrests, depth-adjustable seats, height-adjustable lumbar supports, and large quintuple bases for stability. The adjustable features are required to accommodate varying body sizes, but all these extra features and additional mechanisms tend to make office chairs more robust, and have contributed to the gradual increase in size of the office chair over the last twenty years.

### **Sustainability and the shifting workplace**

Although the search for new ergonomic solutions continues to motivate the design of office chairs, the factor that has contributed most to recent changes in how they are made is sustainability. European and American office chair manufacturers are striving to eliminate aspects of the manufacturing process that are harmful to the environment, such as volatile organic compound emissions, hazardous waste, and waste to landfills. This affects not only the materials used, but also how the chairs are assembled. One of the first office chairs to be promoted as a sustainable design was the Mirra of 2003. It is 96 percent recyclable by weight, made with 42 percent recycled content, and is designed to disassemble easily for recycling or to have its parts replaced.



Various postures supported by the Generation chair  
Designed by Formway for Knoll, 2009

This move toward sustainability has been accompanied by a tendency to make office chairs support a range of postures, from leaning or sitting sideways to sitting backward. Today's mobile devices allow us to work just about anywhere and in any position. In 2009 three chairs were released that accommodate a broader range of movement: the ON allows users to shift their weight from side to side, the Generation encourages them to sit sideways or backwards, and the 360° has no fixed orientation, enabling the user to adopt any number of postures. These chairs encourage human interaction and accommodate the collaborative spirit of contemporary offices.

### **Societal change and the future of office seating**

The office chair has evolved through four key phases. During its first phase in the nineteenth century, designers invented the office chair archetype and the movement mechanism to suit the needs of expanding businesses. The early twentieth century and immediate post-war years ushered in a range of new materials and manufacturing technologies that industrialized chair production, taking it away from its craft origins. A third phase, beginning in the 1970s and ending only recently, brought about ergonomically advanced office chairs designed for sitting at computers for extended periods. Finally, we see the introduction of sustainable chairs that suit the shifting and impromptu postures adopted by today's workforce. In the span of seven generations of office workers, the office chair has evolved into a complex organism. Despite this healthy evolution, the office chair's natural habitat – the office – is anything but stable. The contemporary workplace is undergoing transformations of its own as more work is brought into the cloud: we can only speculate what will happen as an increasing number of people work from home, as 40 percent of IBM's employees do now, and mobile devices continue to allow us to work without a fixed location. As specialized a subject as the office chair may be, its evolution and story are indicative of the broad and rapid changes that our society has undergone and will continue to undergo.