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224-235 **DINA VULIN ILEKOVIĆ**
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CHAIR ARCHITECTONICS

ARCHITECTS IN THE DEVELOPMENT OF THREE TYPOLOGICAL AND MORPHOLOGICAL CHAIR DESIGNS

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FIG. 1 (FROM TOP TO BOTTOM):
 VLADIMIR ŠOBAT AND VLADO PETRIČEVIĆ, KOREX ARMCHAIR, DRAWING AND PHOTOGRAPH, 1971
 BORIS KRSTULOVIĆ, METAL CHAIR, DRAWING AND SPATIAL REPRESENTATION, 1983
 BORIS ILEKOVIĆ AND DINA VULIN ILEKOVIĆ, ZAGREB 1 CONFERENCE CHAIR, DRAWING AND PHOTOGRAPHS, 2017



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CHAIR ARCHITECTONICS ARCHITECTS IN THE DEVELOPMENT OF THREE TYPOLOGICAL AND MORPHOLOGICAL CHAIR DESIGNS

CANTILEVER CHAIR
CHAIR ARCHITECTONICS
OFFICE CHAIR
RECLINING CHAIR

Chair design is one of the most demanding and most challenging tasks for designers, to which creative efforts of numerous architects have been continuously linked. Since the beginning of the twentieth century the intensity of these efforts has not diminished. By creating an ideal microcosm around an essential everyday object, architects also express their understanding of space and time. A chair, like architecture, occupies a position in space that it also defines. The paper analyses three groups of chairs characteristic of the 20th century, different in terms of typology and morphology. Their architectonics are

marked by a specific functional, formal and constructive idea, by concrete production possibilities and by technological procedures in the working of individual materials.

Notably, reclining chairs, cantilever chairs with steel tube constructions and office chairs. The model of analysis put forward could also serve as a point of departure for future more extensive research into the same, or different, typological and morphological design. Three Croatian chair models are placed in the context of the pertaining design.

INTRODUCTION

The form of the chair defines how one sits and determines the person's spatial experience, constructive logic and formal elements, providing opportunity for a systematic approach to historical development, analysing the similarities of models. The typological and morphological features can be identified and evaluated as the characteristic architectonics of the evolutionary path generated by the original model. A symbolic graphic representation of the development and the number of elements, or the pertinent original approaches, depends on the scope of research and the interpretation of the interrelations of form, function and construction. This paper sketches a system of depictions in tabular form in which new rows begin with those models that introduced significant innovative characteristics. Similar models are placed in chronological order. The analysis shows beyond any doubt that creators of key models of chairs in the whole of the twentieth century were most often architects – the forerunners and originators of numerous new conceptual departures. Their work does not consist of a mere search for variations of a form, they are rather aimed at discovering genuine and lasting solutions that will balance the formal concept or idea with the construction, function and productive capacities, always taking into account their economic feasibility. Architects design chairs for several reasons. It might be a way of furnishing their own buildings, a challenge to authorial expression in the absence of building commissions combined with the possibility of a relatively simple production of a prototype, or, sometimes, just a one-off creative excursion into a small but testing design assignment.

A chair is a very difficult object. A skyscraper is almost easier. That is why Chippendale is famous.

(Ludwig Mies van der Rohe,
cited in: *Time*, 1957: 82)

It could be said that when we design a chair we make a society and a city in the small.

(Peter Smithson, 1985,
cited in: Bruchhäuser, 1986: 86)

The most difficult thing is to design a really good chair! Is it constructive? Is it functional? Is it natural in the sense of the tools with which it is made, the materials of which it is composed? Are the materials that make it up compatible? Is there any hope of elegance? Does colour live in it as if in some natural form?

(Mladen Kauzlaric,
cited in: Sekulic-Gvozdanic, 1991: 26)

Chair design undoubtedly keeps up with architectural directions and movements, with changes in society and technology. The basic level of function/form/construction is enhanced with levels of meaning, interpretation of social value, as well as with the potential relation with the context of the space for which the chair is primarily intended. Numerous models came into being precisely for particular spaces designed by the same architects, and only subsequently found themselves in general use in completely different environments. Josef Hoffmann designed model 322 (Side Chair) and model 607 (*Sitzmaschine*) for his Purkersdorf Sanatorium opened in 1905. Mies van der Rohe in collaboration with Lilly Reich designed the very famous Barcelona chair specifically for the German Pavilion at the 1929 International Exhibition in Barcelona. The same authors conceived the Tugendhat and Brno chairs for the Tugendhat house built in Brno in 1929/30, while the design-icon Paimio armchair by Alvar Aalto was made for the Paimio Sanatorium

built in 1933. The key Arne Jacobsen models were originally made for the SAS Hotel completed in 1960 in Copenhagen. These are just some of the best-known examples.

However, models that were created independently of a given architectural framework also reflect the creator's architectonic sensibility and achieve the potential creator/user/society-as-a-whole communication that according to Buchanan is at the centre of the design process. The nature of this communication is rhetorical – it can work on convictions and value systems, and comprises three interlinked elements: the technological solution, character and emotion (Buchanan, 1985: 4).

THE ROLE OF THE ARCHITECT AND WATERSHEDS IN CHAIR DESIGN DURING THE TWENTIETH CENTURY

For the architect, chair design marks the sublimation of his or her role in the definition of the space. The architectural design moves on from plan, cross section and façade of the structure towards the scale of furnishing, of interior equipment, and sometimes will include the selection of use objects and artistically valuable artefacts. This means that the architect is engaged continuously with the relation of architecture, design and art, and the interpretation of this relation will vary between two extremes with a number of nuances in the approach to and understanding of the role of the architect. The stance according to which all of these things should be in the same spirit, subordinated, that is, to the same formal vision, is counterpoint to the aspiration for a whole, consisting of heterogeneous, formally independent elements. The co-existence of high quality but diverse and temporally disparate elements with which one wishes to achieve an impression of continuity and traces of heritage was affirmed by Adolf Loos at the very beginning of the century. He thought that a contemporary living style was not well served by a space shaped in the spirit of a single aesthetic that comprehended even the smallest detail (Sarnitz, 2016: 15). This way of thinking referred in particular to chairs, which in residential premises should be diverse, for different models facilitate different ways of sitting. Into his own interiors, Loos brought the Ancient Egyptian model of stool, as replica of a model more than 3000

years old. Similarly, purists Le Corbusier and Amédée Ozenfant used the term *objets-types* to refer to successfully and functionally designed items the form of which had been verified by being used over a long period of time – like glasses, guitars, plates, books and chairs (Marcus, 2000: 24).

Starting off from premises similar to those of Loos, but moving away from historical styles, Le Corbusier's and Pierre Jeanneret's interiors of the 1920s are akin to sets of carefully selected independent elements in terms of their composition: furniture, pictures, sculptures, use objects as if in a *three-dimensional still life* (Rüegg, 2012: 9). The authorship of chairs, or as Le Corbusier puts it, machines for sitting (Rüegg, 2012: 280) is shared by Le Corbusier, Pierre Jeanneret and Charlotte Perriand. Classic chairs that today enjoy an uncontested iconic status were typically first designed for a known client and a defined space – Villa La Roche and Villa Church.

Rietveld's classic lounge chair of 1918 was originally produced from beech wood and made in various colours. It was only in 1923 that it began to be painted in primary colours, called *Rood-blauwe*¹ so as to fit into the De Stijl aesthetic (Küper and van Zijl, 1992: 76), influenced by Cubism and Constructivism. It was the only European avant-garde movement whose aim was to achieve a formal unit in the *Gesamtkunstwerk*² concept. The intention of Gerrit Rietveld was to produce a chair without volume or mass, one that did not shut off space but enabled its perceived continuity. In his words the chair *is made to show that it is also possible to make something beautiful that functions plastically in space using pure taut machine-produced things* (Küper and van Zijl, 1992: 74). Clearly, the aesthetic concept prevails over utility. Rietveld emphasized the leading role of painting in the development of a new style. His interest in art was influenced by other members of De Stijl - Bart Van der Leek, Theo van Doesburg, Vilmos Huszár and obviously Piet Mondrian. The lounge chair reflects their use of primary colours, cubic shapes and flat surfaces. It has the effect of being broken down to its basic components reduced to minimally dimensioned elementary forms, as Rietveld imagined it as both metaphor of and metonym for the human body (Overy, 1991: 138), simultaneously wanting the chair to be an expressive object. In the words of Theo van Doesburg – *an abstract and realistic sculpture in the interior of the future* (Küper and van Zijl, 1992: 76). Excited by the idea of a chair that should primarily ensure spiritual satisfaction in consonance with the aesthetic ideal of the space, Rietveld printed the first stanza of the poem *Der Aesthet* by Christian Morgenstern, in original German on a label

1 Red Blue

2 *Gesamtkunstwerk* means a total art work, or the concept of seeking formal consonance between a spatial unit and all its details, from architecture to furniture, objects and artworks. It was used in the nineteenth century but has been more widely used since the early twentieth, mostly in connection with the Art Nouveau, Jugendstil and Secession movements.

that he, as a rule, pasted onto the underneath surfaces of the seats of his chairs (Küper and van Zijl, 1992: 26):

*Wenn Ich sitze, möchte Ich nicht
sitzen, wie Mein Sitzfleisch möchte
sondern wie Mein Sitzgeist sich,
säße er, den Stuhl sich flöchte.*³

[Christian Morgenstern]

Architects Heinz and Bodo Rasch called their model of cantilevered wooden stool designed for the *Weissenhofsiedlung* exhibition in Stuttgart in 1927 the *Sitzgeiststuhl*, after the same poem by Christian Morgenstern (Mácel, Küper and Burge, 1993: 30); examples of it were placed in the interior of a residential building designed by Mies van der Rohe.

A cantilever chair with a flexible structure of steel tubing is undoubtedly a synonym of the modern pre-war formal sensibility characterised by the ambition for lightness, clean lines and transparency, as well as for a clear, constructive and functional expression. A number of architects experimented in their search for the best approach to the cantilever chair, very often fighting for their own authorial rights and for the possibility of mass production. The following creators certainly deserve to be singled out: Mart Stam, Marcel Breuer, Ludwig Mies van der Rohe, Heinz and Bodo Rasch, Vladimir Tatlin, Willem Hendrik Gispen, Alvar Aalto.

On the other hand, social, constructive and formal premises quite different from the Gesamtkunstwerk principle found acceptance thanks to interiors that were part of the architectonic expression of the *Neue Sachlichkeit*. The Co-op Interieur of Hannes Meyer of 1926 used a radical reduction of elements of furniture to illustrate a well-nigh apocalyptic vision of a future oriented exclusively towards collectivism. In the rooms of an imaginary residential unit, Meyer put just a single chair – his version of what was called the director's chair – foldable and light, with a construction of beech and striped canvas for the seat and backrest.

However, out of fear of dogmatic universalism and the assumption that standardisation might make people uniform, in the following decades the Scandinavian approach to design was accepted at international level as a developmental point of reference – with organic form and the use of wood at the centre of interest. The humanist principle of free forms coincided with social sensitivity, and modernism was interpreted as a comprehensive understanding of function and a richer and more poetic experience of space. Once again there were architects among the most influential figures: Alvar Aalto, Arne Jacobsen, Finn Juhl. During the 1930s the Finnish

architect Eliel Saarinen drew up the syllabus for Cranbrook Academy in Bloomfield Hills, and initiated the flowering of formal ideas characteristic of the trend called Mid-Century Modern (MCM), symbolised by the works of Charles and Ray Eames and Eero Saarinen – designers of globally popular models of chairs that are still current.

Gio Ponti, Carlo Mollino, Franco Albini, Marco Zanuso, Achille and Pier Giacomo Castiglioni belong to the generation of Italian architects to be credited with the international take-off of Italian design, primarily thanks to chair models that were produced in the 1950s. At the same time there was also the industrial approach, which made use of opportunities provided by new materials and production processes, as well as traditional craft production in small series or one-off pieces. The co-existence of the two visions resulted in architects making a modernising contribution to the process of craft production, as well as profiling the profession of architects-designers who became deeply involved in industrial production.

Concern for the aesthetics of the object was backed by the care for the aesthetics of its purpose (Ambasz, 1972: 11). Archizoom's and Superstudio's pieces marked the 1960s and 1970s and contributed to the later foundation of the design groups Alchimia and Memphis. Mainly produced in small batches, their chairs visibly bypassed the criteria of practicality and arose with the intention of experimental use and the establishment of emotional relationships with the users. The designers played metaphorically with traditional formal motifs, sometimes deliberately skirting kitsch. A chair was looked upon as a means of communication capable of criticising or commenting on society. A period of rich pluralism ensued, of total freedom of expression. Formal restraint alternated with formal provocation, approaches along the lines of post-war Modernism and experimental forms, high-technology production and craft fabrication, natural and synthetic materials.

Towards the end of the century, there was increasingly wide acceptance of the *less is more* principle, which in the well-known proclamation called Ten Principles of Good Design was listed by Dieter Rams in the 1970s (De Jong, 2017: 92). Together with advocating formal purity and simplicity, Rams's points included the idea of sustainable development, in other words, the desirable ethical

³ *When I sit, I sitting, tend
to sit a seat with sense so fine
that I can feel my sit-soul blend
insensibly with seat's design.*
[Translated by Jerome Lettvin]

dimension of using the smallest possible amount of resources. In consequence, the emphasis was placed on the essential, and design featured a formal reduction and parsimonious use of materials, adumbrating the future aesthetic-ethical line in thinking about space and objects of use. Ergonomic approach was dominant, preponderantly conditioning the design of office chairs.

Today, when architects with global reputations are designing the interiors of yachts, high-speed trains and aeroplanes, the design of chairs might seem relatively insignificant. However, if we recall the models that characterised the last century in extremely tight correlation with the tumultuous events in architecture, it becomes clear why chair design is still addressed with such remarkable enthusiasm and sensitivity. The very long list of architects that have tried their hand at chair design speaks for itself and contains names linked with very different architectural discourses. To illustrate the scope of the theme one might quote more or less at random some of the authors whose designs went on into the 21st century: Frei Otto, Frank Gehry, Peter Eisenman, Norman Foster, Toyo Ito, Tadao Ando, Rem Koolhaas, Jean Nouvel, Steven Holl, Jacques Herzog and Pierre de Meuron, Shigeru Ban, David Chipperfield, Daniel Libeskind, Zaha Hadid, Kazuyo Sejima and Ryue Nishizawa, David Adjaye, Bjarke Ingels...

RECLINING CHAIR

There are numerous versions of the lounge chair, a symbol of comfort for several hundred years, but what is common to them all is the possibility of adjusting the angle of the backrest (Fig. 2). The search for furniture permitting a greater degree of comfort dates back to the late seventeenth century. The transition from formal and dignified upright sitting towards more relaxed positions, particularly in private spaces, favoured the development of models with adjustable backrests. The basic principle of lowering the backrest, and in some cases of raising the legs, was taken from orthopaedic practice. But it was only in the nineteenth century that a division was made between chairs meant for people with disabilities and those meant for wider application, the primary condition of comfort being backed by aesthetic requirements (Edwards, 1999: 33).

The numerousness, quality and comfort of English and American models of chairs in the late nineteenth century delighted Adolf Loos and must have contributed to his promotion of Anglo-Saxon and Anglo-American lifestyles, in which he saw a template for high-quality contemporary living.

A reclining chair, colloquially termed the Morris chair was in wide use from around 1869 (Edwards, 1999: 47). The model was made according to the design of architect Philip Webb and produced by the firm Morris, Marshall, Faulkner & Co, subsequently Morris & Co. The angle of the backrest could be adjusted by moving a horizontal rod into one of seven positions (Fig. 2).

The twentieth century brought in a new approach to design and new materials as well. In 1905 Josef Hoffman produced his *Sitzmaschine* (Fig. 2), an avant-garde interpretation of the concept. In 1928, Marcel Breuer designed his B25 lounge chair, made out of steel tubes, and also given the name *Sitzmaschine* (Fig. 2). The seat was suspended on a pair of springs that enabled the rattan surfaces to be adjusted to the position of the body.

At the end of the 1920s, Jean Prouvé created the *Grand Repos* model with an integrated seat and backrest (Fig. 2). Changes in position were facilitated by ball-bearings sliding between two guides incorporated into the construction of the interior side of the legs. On the left, there was a key for fixing the position. Two springs were located beneath the seat enabling an easy transition to a semi-reclining or an upright position, with a simple movement of the body. A different way of shifting the backrest and seat was designed by Marcel-Louis Bagniet (Fig. 2). Resting on a fixed tube located below the seat were steel sections enabling different positions, and the tubular constructions of seat and backrest were jointed so that the angle between the two surfaces could be changed.

René Herbst designed a number of chairs using taut elastic rubber straps fixed with springs and hooks to a tubular steel frame. The angle mechanism was located discreetly at the foot of the chair and linked with the construction of the seat with its dynamic contour lines (Fig. 2).

In the 1930s Mladen Kauzlaric, like Stjepan Planic, created versions of the reclining chair made of wood with a horizontal rod that had 3 or 4 possible positions. In Planic's version, the rod and the details with which the backrest could be adjusted were wooden, but in the Kauzlaric's one they were metal (Fig. 2). Both versions were very close to the version of the Viennese architect Ernst Plischke who in his approach from 1928 combined wooden slots and a metal rod, providing 5 possible positions (Fig. 2).

The Korex reclining chair was designed in 1971 by Vladimir Sobat and Vlado Petricevic while they were employed in CIO, the Centre for Industrial Design. There are two variants of this approach – with a wooden construction and a

FIG. 2 RECLINING CHAIR TYPOLOGICAL AND MORPHOLOGICAL DESIGN

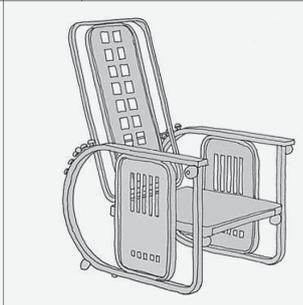
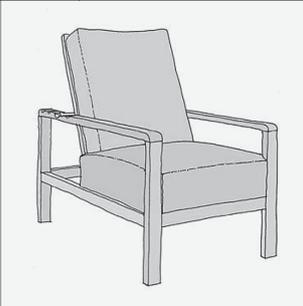
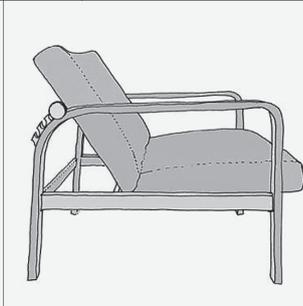
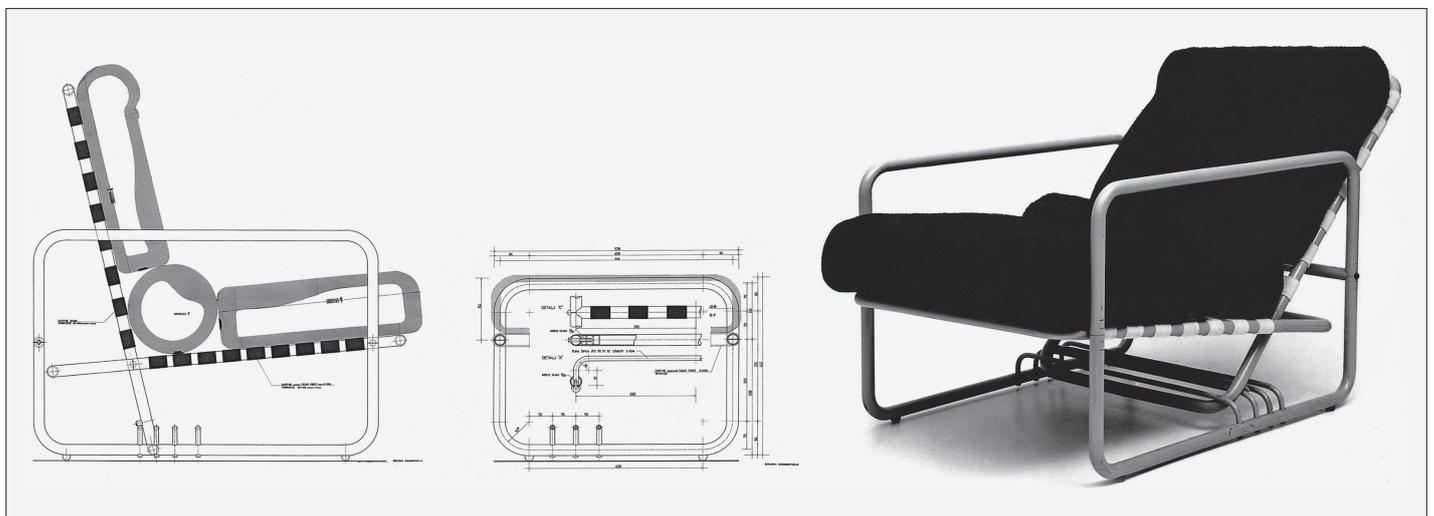
1883.	P. WEBB & W. MORRIS ARMCHAIR	1902.	F. L. WRIGHT ARMCHAIR	1905.	J. HOFFMANN SITZMASCHINE
					
1928.	M. L. BAUGNIET ARMCHAIR	1928.	R. HERBST FAUTEUIL DE REPOS	1928.	J. PROUVÉ GRAND REPOS
					
1928.	M. BREUER SITZMASCHINE - B25	1928.	E. PLISCHKE KANADIER	1935.	M. KAUZLARIĆ ARMCHAIR
					

FIG. 3 VLADIMIR ŠOBAT AND VLADO PETRIČEVIĆ, KOREX ARMCHAIR, DRAWING AND PHOTOGRAPH, 1971



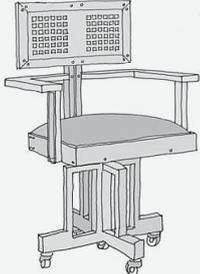
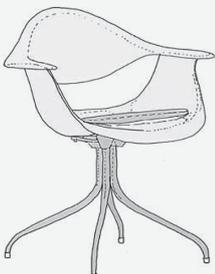
1904.	F.L. WRIGHT LARKIN	1926.	M. BREUER B7 A	1930.	K. HOFMANN & F. AUGENFELD SIGMUND FREUD
					
1953.	C. & R. EAMES PACC	1954.	H. KÖNECKE D -49	1958.	G. NELSON DAF
					
1996.	W. AISSLINGER JULI	1997.	R. LOVEGROVE SPIN	2013.	KiBiSi SCOOP
					

FIG. 6 OFFICE CHAIR TYPOLOGICAL AND MORPHOLOGICAL GROUP, 2023

metal construction of steel tubing. There are three possible positions for the angle of the backrest axially connected to the construction of the seat, which also changed angles according to the position of the backrest selected (Fig. 3). The basic support frame consisted of tubes 2.8 cm in diameter. The suggestion of a cubic volume was a formal connection with pre-war models, but the spirit of the time in which it was created was undoubtedly present in the general impression of the chair.

CANTILEVER CHAIR WITH TUBULAR STEEL CONSTRUCTION

A special place in the historical development of the chair belongs to tubular steel cantilever constructions (Fig. 4). It is not quite clear whether Marcel Breuer and Mart Stam pro-

duced similar designs independently of each other or as the result of the discussions and meetings they had (Mácel, 1990: 125). In fact, a role might have been played by the seats of the Tatra T12, Mercedes or Hanomag cars (Mácel, 2020: 197-198) as well as by the bicycle construction. It is held that the cantilever construction for chairs had its origins in the architectural designs of El Lissitzky, who was involved in the group of architects engaged in De Stijl, with whom Stam founded the journal *ABC* in Basel in 1924. As long as it was appropriately constructed, the architecture that gave the impression of levitating and defying the natural force of gravity, (Doesburg, 1924: 79) affected the design of cantilever chairs, potentially meant for man liberated of social conventions.

According to Heinz Rasch, Mart Stam sketched his construction for a cantilever chair on November 22, 1926 at a dinner held for negotiations concerning the *Weissenhofsiedlung* exhibition in Stuttgart (Fig. 4). The dinner was held in Hotel Marquardt and was attended, among others, by Ludwig Mies van de Rohe and Willem Hendrik Gispen (Bruchhäuser, 1986: 116). At the beginning of 1926 Stam produced a prototype made of gas pipes joined with knee joints, which gave the chair a markedly cubic outline and made it inelastic. He worked out the idea and presented it in Stuttgart in 1927 at the same *Weissenhofsiedlung* exhibition. The smallest possible radii were used, 4.5 cm, with a tube diameter of 2 cm. Not long after that dinner, Gispen presented a very similar design that he designated 101. Mies van de Rohe showed his models designated MR10 and MR20 in 1927 in the residential premises of the *Weissenhofsiedlung*⁴ (Fig. 4). The construction of the Mart Stam chair had been heavy and stiff, but Mies's models were lighter, elastic, partly due to the rounded geometry of the legs. The innovativeness of the chair led to court proceedings and a copyright battle, the right to further production (Mácel, 1990: 127-129). In 1927 Marcel Breuer also designed a cantilever chair (Fig. 4) and thanks to the accomplishment of the Wassily lounge chair in 1925, Breuer can claim the primacy in the use of bent steel tubes as a constructional framework for chairs as well as other elements of furnishing. The diagonal motif in the construction of the cantilever chair is character-

⁴ Although most sources ascribe the authorship to Mies van der Rohe exclusively, recent research has revealed the essential role of Lilly Reich, who worked extremely closely with Mies on interior designs but also designed some of the elements for Mies's structures by herself during the second half of the 1920s and in the 1930s.

⁵ According to Tecta of Lauenförde, the manufacturer.

istic of German architects Heinz and Bodo Rasch. Rietveld used tubes that intersected forming an X looked at from the front, and a Z from the side. The join of diagonally placed tubes was a weak point in the construction and production was halted, but this model is inseparably associated with versions of the Zig-Zag chair – Rietveld's popular wooden chair (Overy, 1991: 152-153).

Although the cantilever chair literally symbolises the formal sensibility of Modernism, the interest in this kind of chair construction has not substantially waned over the course of time. During the post-war decades there was no shortage of diverse interpretations of the basic idea – the *Alessia* chair of Giotto Stoppino of 1970, *Sapper Visitor* of Richard Sapper of 1978/79 and the *Sing Sing Sing* of Shiro Kuramata of 1985.

Boris Krstulovic did his study of the chair made with bent metal tubing in 1983 (Krstulovic, 1984). It innovated older models by having a construction with arm rests composed of a single bent tube. The tube diameter was 2.5 cm, and all of the bends had identical 5 cm radii. The construction was made rigid with a single horizontal of flat steel. It was imagined to have a backrest and seat made of leather, canvas or synthetic material (Fig. 5).

In 1960 Heinz Rasch attempted to form all constructional parts of a chair with a single tube, while in 1981 Stefan Wewerka succeeded in the construction of a cantilever chair with just one leg. The tube of his *Einschwinger* model was 3.3 m long and was bent six times with the same radius⁵ (Fig. 4).

OFFICE CHAIR

Starting in the early twentieth century, when office work gained importance in the global economy, the theme of office chair design got increasingly topical, with a number of models still on an upward trend (Fig. 5).

The desk chair by Charles Darwin is thought to be the oldest known example of the office chair on wheels. It was created in the 1840s with the replacement of the ordinary wooden legs of a lounge chair with bed legs made of cast iron with castors. The purpose of this intervention was to make it easier to get the samples placed in the cupboards of his study. The first mechanisms for office chairs, capable of tilting and swivelling, were developed in America with steel coils, parts of cast iron and steel leaf springs during the 1840s and 1850s. In 1849 Thomas E. Warren invented the Centripetal Spring chair on wheels, able to tilt in any direction under the weight of the user. In 1952, Peter Ten Eyck made a chair making it possible to tilt backwards and also rotate around the central axis (Olivares, 2011: 15-16).

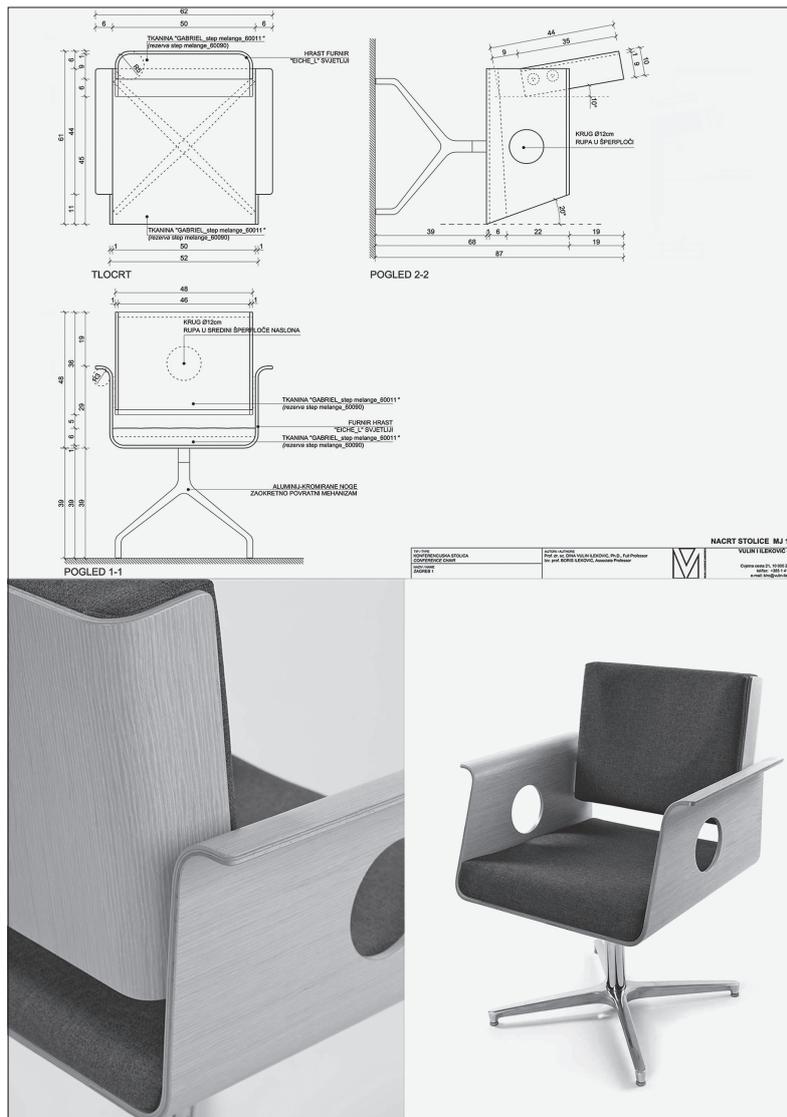


FIG. 7 BORIS ILEKOVIĆ AND DINA VULIN ILEKOVIĆ, ZAGREB 1 CONFERENCE CHAIR, DRAWING AND PHOTOGRAPHS, 2017

Consideration was paid in chair design not only to comfort but also to the characteristics of space where it would be placed. Frank Lloyd Wright designed an office chair for the Larkin Building which he had designed in 1904 (Fig. 6). Among other things, the choice of materials was conditioned by the requirement of the client for the provision of the highest possible standards of fire prevention and resistance and an innovative mechanism was incorporated for a small adjustment of height. The characteristic backrest was made of perforated metal sheeting, while the main constructive frame in part consisted of cast iron and in part of bent metal sheeting. This chair unerringly transcended the then prevailing Revival styles and in its design bore out Wright's viewpoint according to which it

was not possible to consider a building one thing, and its furnishing another.

Technological advances and the development of new materials changed the manner in which office chairs were made: heavy cast iron was replaced with light aluminium, which in turn was used less after the introduction of plastics. A turning point here was model D-49, made by architect Hans Könecke with the construction of backrest, armrest and seat from transparent thermo-plastic polymer, PMMA (Olivares, 2011: 21; Fig. 6).

Hierarchical organisation had a long-lasting effect on the design of office chairs; until the end of the 20th century almost all of them were designed in different versions for jobs of different statuses. Ergonomic criteria were at the focus of interest in the conception of the office chair during the 1970s. A few factors had an important role in the popularisation of the ergonomic approach, among the most significant ones publications that popularised the understanding of ergonomics and made them widely available. Henry Dreyfuss is the author of the book *The Measure of Man* published in 1960, while the essential handbook of Niels Diffrient *Humanscale* came out in 1974. The criteria to be satisfied in determining whether a chair was ergonomic and safe appeared in the 1980s and with time these were supplemented, depending on the given institution and country.

In 1994 Bill Stumpf and Don Chadwick designed the Aeron chair, without any versions to conform with hierarchical expectations, but with different dimensions adjusted to different statures.

In line with the greater support for ergonomic criteria a distinction arose between desk and conference chairs, the basic difference being the length of use. In the case of desk chairs, it is desirable to have a number of adjustable parameters to respond to individual requirements and the assumption is that they would be used during the whole of working time. Conference chairs are meant for sitting during meetings, the necessary number of identical specimens being placed in a common space – the formal criteria in this case transcending the ergonomic, foregrounding the idea about space and its function in the widest possible interpretation of the concept.

The Scoop conference chair of 2013, produced by the design firm KiBiSi with which Bjarke Ingels works contains a suspension system like a gyroscope and gives a feeling of free floating, while the constructive profile in the shape of a Y provides a visual and functional connection between the seat and base. The innovative technical component is com-

plementary to the simple design of the upper part in the shape of a continuous outline of a shell with a clear reference to post-war Scandinavian design approaches (Fig. 6).

The basic characteristics of a locally produced example of a conference chair, Zagreb 1, by Boris Ileković and Dina Vulin Ileković are a construction formed by two shells of bent veneered plywood 10 mm thick joined at two points and an anatomically shaped backrest (Fig. 7).

How the office chair will develop as a type is an intriguing question. It would seem that the most demanding period with respect to length of use has already passed, for studies have shown that most office workers should sit ever shorter periods. In parallel, a tendency has emerged to support a range of positions – from reclining via side sitting to sitting back, and the theme of sustainability is getting ever more important.

CONCLUSION

Creative efforts of numerous architects, the originators of numerous conceptual departures, are hardwired in chair design. In this paper their historical role in the twentieth century has been analysed. There has been a more detailed illustration of the following characteristic typological and morphological chair designs: reclining chair, cantilever chair with a steel tubing construction, and office chair. A particular functional, formal and constructive idea characterizes the architectonics of a given design, as do the appearances of new materials and the available possibilities of the technological procedures for their treatment. Architects endeavour in all this to balance the formal concept or idea with construction, function and production capacities. Some chair models were created as an integral original part of the interior equipment of particular buildings. Other models emerged as creative responses to the challenge of a small but demanding design assignment without any relationship with particular space in which they shall be placed. But in this case too, the architectonics of the chair can be located in the context of current architectural trends and movements, as well as of technological and social changes. Locally designed examples have been associated with the analysed typological and morphological designs, employing archival records published for the first time. The model of analysis put forward can be used as point of departure for more comprehensive future research into the same or different typological and morphological features.

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ILLUSTRATION SOURCES

- FIG. 1 Archives of Vlado Petrićević, Boris Krstulovic and Vulin & Ilekovic, Zagreb
- FIGS. 2, 4, 6 Authors' drawing, 2023
- FIG. 3 Archives of Vlado Petrićević, Zagreb
- FIG. 5 Archives of Boris Krstulovic, Zagreb
- FIG. 7 Archives of Vulin & Ilekovic, Zagreb

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