

**Zeitschrift:** Trans : Publikationsreihe des Fachvereins der Studierenden am Departement Architektur der ETH Zürich

**Herausgeber:** Departement Architektur der ETH Zürich

**Band:** - (2017)

**Heft:** 30

  

**Artikel:** The "Rotatable drum window" study : Siegfried Ebeling's 1962 manifesto

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**DOI:** <https://doi.org/10.5169/seals-918678>

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# THE ‹ROTATABLE DRUM WINDOW› STUDY: SIEGFRIED EBELING'S 1926 MANIFESTO Matina Kousidi



fig. a Siegfried Ebeling, 'Raum als Membran', Dessau 1926, Cover;  
Reprinted in: Siegfried Ebeling, Spyros Papapetros (Ed.), 'Space as Membrane', London 2010, p. XIII



It is colour that introduces the reader to Siegfried Ebeling's visionary book entitled *«Raum als Membran»*, published in Dessau in 1926. Not unlike the vibrant covers of the *«Frühlicht»* magazine, through which Bruno Taut disseminated his campaign pro colour, or the ones of the *«Bauhausbücher»*, curated by László Moholy-Nagy<sup>1</sup>; Vivid yellow, red, and black shades align here with the visual art currents of the early twentieth century. Upon a careful reading of Ebeling's text however, the impression that the use of colour underlines spatial dynamics surfaces. In the course of the modern architectural historiography<sup>2</sup>, Ebeling – an alumnus of the Bauhaus State School with a rich educational formation<sup>3</sup> – would become mostly known for this particular publication. A complex, resourceful, and at times mystic exploration into an energy efficient stance of architecture, addressing and embracing physiological principles, the book forms part of a wider movement that saw the intersection of modernity with concepts of organicism. In similar fashion to the explorations of El Lissitzky, Hannes Meyer, and Mies van der Rohe<sup>4</sup> – all of whom had been associated with the Bauhaus – Ebeling's outlook on architecture was influenced by the nature philosopher and biologist Raoul Francé.<sup>5</sup> In the spirit of Francé, who «conceived of the world as an intricate system of nested and interlocking ecosystems»<sup>6</sup>, Ebeling identified a link between architecture and biological processes.

More precisely, he envisioned an uninterrupted skin for architecture – one that would be organically intertwined with the various technological apparatuses, the surrounding human, environmental, and cosmic spheres. Through this prism, the arrangement of walls and openings is determined by the things that are found in both the living world and in the environment, as well as by the relationship that architecture is envisioned to establish with the latter.<sup>7</sup> In this context, the red and black waves on the book's cover, which support the abstract model of a house, can be interpreted as energy forces. The lines that traverse its envelope can be conceived as light and cosmic rays, while one of the model's facades – coloured red – can be regarded as potent to emit energy itself.<sup>8</sup> As much as these shades complement the visual identity of the book, the literal references to colour throughout Ebeling's text tint his reflection on the necessity of a plasmatic, rather than a merely functional, architectural expression. «The planar, quasi-pictorial application of colour on walls and ceilings may become obsolete, as iridescent effects or other reflections are created by a systematically attuned exchange of radiation between their surfaces and the light source of the interior»<sup>9</sup>, Ebeling writes in *«Raum als Membran»* – colour being an integral element of the built environment, in combination with illumination, thermal and energy radiation.

The year that the *«Raum als Membran»* came to light saw Ebeling being fervently occupied with an additional task; Serving as a member of Hugo Junkers<sup>10</sup> main research team – together with a broad range of architects and artists, such as Wassili and Hans Luckhardt, Alfons Anker, and Friedrich Peter Drömmer – he had the opportunity to rehearse his theoretical observations in an applied context. The team shared Junkers' interest in developing standardised, inexpensive, soft and light residential units made of steel, after the integration of aircraft engineering techniques into the architectural field, so as to address the housing shortage following the First World War. «Stahl überall!» exclaimed the advertisement in a 1927 issue of *«Die Woche»* magazine, which can be retraced in Junkers' surviv-

ing research folder<sup>11</sup>, highlighting the potential of the material to be durable and practical, healthy and homely, hygienic and economical at the same time. If the organicist roots of the Bauhaus have had an effect on Ebeling's thinking – as he had studied in the school on the verge of Moholy-Nagy's directorship, between 1922 and 1923<sup>12</sup> – then his interaction with Junkers had enabled him to combine his theoretical pursuits with technology-driven inquiries.<sup>13</sup> One such inquiry was articulated through the *Einraum-haus* project, developed in collaboration with the artist Friedrich Peter Drömmer.

The research into the *Einraum-haus* structure was indeed intimately tied to questions of illumination, of considering artificial lighting, not least of questioning how to let the natural light in.<sup>14</sup> Testament to these questions is a 1:10 scale drawing that dates back to 13 April 1926; It is signed by Siegfried Ebeling and represents the study of a rotatable drum window in diverse light situations. The drawing features an array of geometrical patterns, symbolising impressions of the window under different lighting incidences, as well as a variety of colourations which range between red, green, and blue nuances, standing for different material surfaces. The window's overall circular frame circumscribes a prismatic part, which consists of two sides: a metal-mirror surface and a milk-glass pane. Aiming at a homogeneous distribution of natural light via its combined glass and mirror sides, the window is intended to receive the maximum amount of direct sunlight possible. Entering through the glass, the light is being reflected on the metal-mirror surface and is subsequently being filtered through the milk-glass pane, thus intensifying the illumination effect in the interior space. According to the angle of the sun – at bright light or at noon light – the window can become repositioned, enhancing the performance of its reflective and diffusive surfaces. Parallel to the exploration into the applications of steel in architecture, it was the advances in glass technology which allowed for the experimentation with various window and illumination types in those days, as «no material got better control of matter than glass»; In it matter was being recast and remodeled and could assume a wealth of colours, styles, and shapes.<sup>15</sup>

Dating back to April 1926, the window study anticipated the publication of *«Raum als Membran»*, which would eventually become circulated in December of the same year, and cannot be regarded separately from the latter. With regard to the theoretical work of Ebeling, which stressed the importance of the physiological extensions of building, one cannot perceive the drawing as a merely formal exercise based on glass panels that would filter processed light only for aesthetic reasons. In a report to the Junkers Hauptbüro, Ebeling clarifies that «in addition to its physical properties, light is also examined for its physiological effects», going on to affirm that «the colour and severity of the light, as well as the materiality of the surface to which it falls, are just as important»<sup>16</sup>. To the physiological effects of light, the ventilation function of the window can also be included. As shown in the drawing, the drum window was destined to engage in an interactive relationship between inside and outside; Not only did it serve an illumination purpose, but it was also destined to perform as a ventilation element, engaging in the research into the energy-sufficient house. Four cylindrical tubes – placed symmetrically around the window's inner periphery between its circular frame and its prismatic part – were designed to admit air in the interior space, as the cross-section of the window indicates.





fig. b Siegfried Ebeling, Rotatable drum window in diverse light situations [Drehbare Trommel-Fenster bei verschiedenen Lichtsituationen], in: Walter Scheffele, Das leichte Haus. Utopie und Realität der Membranarchitektur, Leipzig 2015, p. 40



Through a 'respiration' function, the window can be additionally considered as a cog in Ebeling's wider theory on a 'breathing, wall skin [Wandhaut]'<sup>17</sup>.

The window study forms part of a wider experimentation with window designs that the eight one-room cubic houses, comprising the Einraum-Haus project, rehearse.<sup>18</sup> Featuring conventional, horizontal, prismatic, or ribbon windows, the windows are juxtaposed with the generic form of the models, occupying their entire facade or cutting them asymmetrically along the horizontal axis. It is an interplay between flat and prismatic, full and void, permeable and rigid, horizontal and vertical, transparent and opaque elements that the models reveal. The study also forms part of a broader enquiry of Ebeling into a window that assumed different colours through the use of fabric- or glass-thread filters, which were to be unrolled in front of the glass pane, so as to diffuse an artistic stance of lighting in the interior space.<sup>19</sup> «Whenever light is refracted through prismatic filters, it creates overlaid bands of coloured shadows – a quasi-dematerialized medium corresponding more closely to the nature of colour and light, which can be systematically deployed as a means for giving form [Gestaltungsmittel] to the objective qualities of a space»<sup>20</sup>, Ebeling writes in 1926, in a way that informs his designed inquiries.

In combination with glass, colour in architecture during that period was concerned with the stimulation of optimism, the expression of emotions, and a sense of revival following the dark years of the war. Both of these elements featured in the prismatic dome of Bruno Taut's 1914 Glashauss; They furnished Paul Scheerbart's 1914 novel 'Das graue Tuch und zehn Prozent Weiß', in which the characters occupied a glass building flooded in coloured reflections; And they filled the main entrance of Walter Gropius' 1921–22 Haus Sommerfeld, through the stained, geometrical glass panels designed by Josef Albers. Through this prism, the 1926 study on the rotatable drum window can be interpreted, on the one hand, as aligned with the general aim to internalise artistic emotion. On the other hand however, more than developing an eye for colour, it aspired to cultivate, through the interaction of different material surfaces with the intensity of natural light, a physiological and psychological impression as an integral part of the future architectural skin. Beyond its elusive impact on the spatial environment, colour – as an embodiment of function – can be admired here in its ability to participate in Ebeling's broader discussion on the architectural content and inherent performance. In contrast to their monochromatic framework made of steel, the coloured elements of the study on a rotatable drum window appear as vehicles of spatial, performative, and perceptive influence. It is colour that introduces the reader to Ebeling's 'Raum als Membran' manifesto, and it is again colour that illuminates his conception of architecture as the receiver of «organisms subject to both physiological and psychological laws»<sup>21</sup>.

- 1 In the afterword of the English translation of 'Raum als Membran', Spyros Papapetros underlines the similarity of the book's cover with Farkas Molnar's design for the cover of the 'Internationale Architektur' by Walter Gropius published in 1925, as well as with László Moholy-Nagy's curations for the Bauhausbücher. Siegfried Ebeling, Spyros Papapetros (Ed.), 'Space as Membrane', London 2010, p. XIV.
- 2 See: Walter Scheiffele, 'Das leichte Haus. Utopie und Realität der Membran-architektur', Leipzig 2015; the recent publication by Walter Scheiffele has shed fresh light on Ebeling; Siegfried Ebeling, Spyros Papapetros (Ed.), 'Space as Membrane', London 2010; And Fritz Neumeyer, 'The Artless Word. Mies van der Rohe on the Building Art', Cambridge, Massachusetts 1991: Neumeyer's exploration into Mies' close reading of Ebeling brought into light the importance of Ebeling's text for the outlook of the former on modernist architecture.
- 3 «Ebeling was a man of many interests. A student in turn of philosophy, theology, Christian archaeology, art history and experimental physics at Heidelberg, Jena and Leipzig, he would become a student of Paul Klee and Wassily Kandinsky at the Weimar Bauhaus only after having first studied dance with Rudolf Laban in Berlin». Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., p. XIII.
- 4 Oliver A.I. Botar, 'The Origins of László Moholy-Nagy's Biocentric Constructivism', in: Eduardo Kac (Ed.), 'Signs of life. Bio Art and Beyond', Cambridge 2007, pp. 315–344, here p. 315.
- 5 Bettina Vismann, Jürgen Mayer, 'The Perspiration Affair, or the New National Gallery Between Cold Fronts', in: 'Grey Room', No. 9 (2002), pp. 80–89, here p. 82.
- 6 Oliver A.I. Botar, 'Biocentrism and the Bauhaus', in: 'Structurist', No. 43–44 (2003), pp. 54–61, here p. 58.
- 7 Detlef Mertins, 'Where Architecture Meets Biology. An Interview with Detlef Mertins', in: Joke Brouwer, Arjen Mulder (Ed.), 'Interact or Die!', Rotterdam 2007, pp. 110–131, here 124.
- 8 Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., XVI.
- 9 Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., p. 31.
- 10 Hugo Junkers was the founder of the Junkers Flugzeug- und Motorenwerke AG; He held a close connection with the Bauhaus State School, even before the relocation of its premises to Dessau, and from the mid-1920s onwards orchestrated a profound research into steel building construction, in the context of the Stahlbau project.
- 11 'Materialsammlung Presse, DMA Deutsches Museum, München, Archiv, FA Junkers, Juhaus No. 1287.
- 12 As Ebeling had himself stated in a letter to Junkers Hauptbüro already in November 1925, in the context of the Stahlbau project, he was approaching architecture wholeheartedly from the standpoint of biology. Siegfried Ebeling, Letter to Dipl. -Ing. Dr. Büscher in the Junkers Hauptbüro, 3 November 1925, DMA Deutsches Museum, München, Archiv, FA Junkers, Juhaus.
- 13 From within the Junkers research environment, Ebeling experimented widely with the possibilities of steel; He signed, for instance, the Ganz-Metallhaus über dem Kreis project in 1926 – a circular all-steel house characterised by the absence of internal walls, so as to allow for an equal diffusion of natural light. A clipping from the 'Illustrierte Technik für Jedermann' journal, in the team's surviving archives, depicts the metal Rundhaus designed by Carl Fieger in 1924, the spatial layout of which echoes in Ebeling's project.
- 14 An article by Fritz Förster, entitled 'Künstliches Tageslicht', focusing on the advances of artificial lighting; The reading list themed 'Bücher-verzeichnis für Beleuchtungsanlagen', including titles on prismatic glass panels, roofs and casings; As well as the various correspondences with lighting technology experts at the Lichttechnisches Institut in the Hochschule Karlsruhe, all support the research on illumination for the Stahlbau project.
- 15 Adolf Behne, 'Die Wiederkehr der Kunst', Leipzig 1919, cited in: Winifried Nerdinger i.a., 'Bruno Taut 1880–1938', Milano 2001, p. 59.
- 16 Report on the meeting of 21.07.26, focusing on a discussion on general situations, technical problems, and areas of work, DMA Deutsches Museum, München, Archiv, FA Junkers, Juhaus No. 1075.
- 17 Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., p. 8.
- 18 As it turns out, the window element was also a core part of the wider research of Junkers in steel buildings, with the aim to question its well-established rectangular shape and transparent single-pane glass filling. Walter Scheiffele, 'Das leichte Haus. Utopie und Realität der Membranarchitektur', Leipzig 2015, p. 235.
- 19 As the development in artificial lighting technologies saw the union of red, orange, green, blue, indigo and violet rays in its uniform white colour, in order to allude to the emission spectrum of natural sunlight, Ebeling envisioned natural light as capable of assuming various colours through its contact with filters added on glass. An undated sketch of his, entitled 'Fenster mit verschiedenen Filtern (rot, gelb usw.) Stoff oder Glasfäden', depicts a series of coloured filters intended to be 'unwound' in front of the window pane. Walter Scheiffele, op. cit., p. 199 (my translation).
- 20 Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., p. 31.
- 21 Siegfried Ebeling, Spyros Papapetros (Ed.), op. cit., p. 33.

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