The 100 Years of Bauhaus - The Neufert Building in Weißwasser, Germany

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Abstract. The 1919 marks a 100 years since Walter Gropius founded Bauhaus, one of the most influential design schools of all times. Numerous buildings (and artefacts) still exist today and some of them are considered heritage, submitted to architectural and urban conservation. Within Bauhaus concept, which seem to be initiated already with Fagus factory (designed between 1911 and 1913), there was, inter alia, an emphasis on industrial building design and standardization. In this article, we revised industrial building complex designed by architect Ernst Neufert in Weißwasser (North Saxony – 140 km south of Berlin) regarding challenges of structural conservation. It consists of six-story warehouse and a single-story loading bay. The warehouse and dispatch center (which were originally used by glass manufacturer), have both a load-bearing steel frame and a brick infill. The visible steel frame gives a rudiment rhythm and order to the façade. The interior is shaped by pattern defined by steel columns, resting on the beams with intervening strained system ceilings out of stone iron. We discussed the state of this industrial complex, a project of renovation and the form in the context of its relevance for the legacy of its author who is widely known for his book *Architects' Data* and for legacy of Bauhaus, in general.

Keywords: Neufert · Industrial heritage · Bauhaus · Steel building · Standardization · Normative rules

1 Introduction

The industrial complex, warehouse and dispatch center, in Weißwasser (Fig. 1) was designed by architect Ernst Neufert in the period while he was working on the book *Architects' Data* for which he is widely known. The complex is located in the countryside of North Saxony, 140 km south of Berlin, in a town named Weißwasser, close to the current border with Poland. The building was designed and built in 1936 for glass manufacturer Vereinigte Lausitzer Glaswerke (VLG, in English: United Lusatia Glassworks). Neufert became the resident architect there in 1935/1936, and in the same year came out the first of many editions of his *Architects' Data,* which has been published since that time worldwide, translated into numerous languages. This book is *de facto* accepted as most comprehensive and best known normative book for architects. Neufert was educated in Bauhaus, which was apparently of great importance for his professional development and legacy.

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Fig. 1. The Neufert building in Weißwasser

2 The Architect Ernst Neufert and Normative Rules

Ernst Neufert (1900–1986) was born in Freyburg, on the Unstrut, near Weimar. He was educated in Baugewerksschule in Weimar (1918–1919) and immediately after in Bauhaus first generation of students (1919–1920). Before that, during his teenage years, Neufert worked as bricklayer apprentice, which seems to be important for his interest in contemporary architectural standardization and normative rules. Neufert came to VLG upon invitation of the former fellow-student from Bauhaus Wilhelm Wagenfeld who became the artistic director of VLG in 1935. During his Weißwasser period, Neufert designed many buildings (various housing, office, and factory buildings) in the town itself and in nearby Tschernitz and Kamenz.

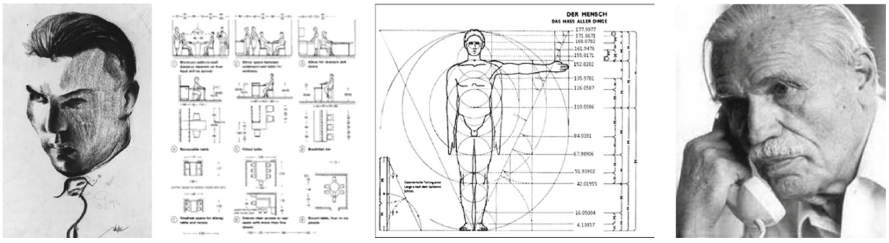

Fig. 2. Ernst Neufert as young man (left) author: Gyula Pap, 1930, samples of normative rules from his book Architects' Data (middle) (Neufert et al. 2002), and photo of himself as elderly man (right)

After the Bauhaus was closed, as well as two other schools where he was employed (Bauhochschule, known as "the other Bauhaus", also in Weimar, where he worked 1926–1928, and private school for art and architecture founded by Johannes Itten in Berlin where he worked in 1933–1934), being a family man, Neufert chose a safe job in the countryside in those politically turbulent times. Neufert used that time wisely: he worked as architectural practitioner and on shaping research on normative rules in architecture into a book. The book made him famous both in Europe and in USA already after the first edition (Fig. 2). From 1939, Neufert worked with Albert Speer, Hitler's General Building Inspector on typology, standardization and rationalization of Berlin's housing.

Fig. 3. Examples of Neufert's work in cooperation with his son Peter (Prigge 1999)

In the last phase of his career, Ernst Neufert was professor of architecture at the Technische Hochschule Darmstadt (1945–1965) and, at the same time, he kept working as freelance architecture practitioner. In this period, with his son Peter he designed several industrial buildings (Fig. 3). In his entire career, industrial building design, standardization and normative rules remained main foci.

3 Impact of Bauhaus

3.1 Legacy Regarding Architectural Design and Standardization

Bauhaus was founded the same year as German Workers' Party (soon after renamed into National Socialist Party) i.e. they were both established immediately after the World War I, the biggest and the most devastating war the World had seen by then. Germany was heavily impoverished, and in response to lack of resources, famine, under employment, in need to meet basic needs of population, minimum standards became one of imperatives of Bauhaus. A year after the National Socialist came to power, in 1933 they established one-party rule by changing Weimar Constitution, the Constitution of German Reich according to which Germany was democratic parliamentary republic, and that marked the end of what had name Weimar Republic (1919–1933). Bauhaus was not at any point isolated from those events, not the least for being originally located in Weimar, which, has also an obvious symbolic connotation.

Gropius and his partner in architectural studio Adolf Meyer were apprentices of Peter Behrens, and it is generally considered that "all started" from the design for AEG Turbine factory (Fig. 4). Industrial building design was among main foci in Bauhaus.

Fig. 4. AEG Turbine Factory in Berlin by Peter Behrens studio (left) Doris Antony, Berlin, Germany; Fagus pencil case Factory in Alfeld on the Leine by W. Gropius/A. Meyer in (middle) Carsten Janssen (Jaeggi 1998): and Van Nellefabriek in Rotterdam by Johannes-Andreas Brinkman and Leendert-Cornelis van der Vlugt.

When Walter Gropius changed location of Bauhaus in 1925, he chose Dessau which, by coincidence or not, had reputation of industrial town. While Bauhaus was led by Hannes Meyer, a Marxist, in 1928–1930, social ideals including minimum standards and affordable housing became prevailingly important over aesthetics. However, need for standardization was widely recognized. Ernst May's huge projects in Russia (20 cities in 3 years, the utopian city for 1 million citizens and more) were, de facto, standardization in practice. Standardization of kitchen by Margarete Schutte-Lihotzky (who was part of May's team and friend of Bruno Taut) has had enormous impact on home design ever since. The Dessau period ended in 1932, and for one semester Bauhaus existed in Berlin – situated in an old telephone factory (again a factory) in Berlin-Steglitz, but it was ultimately closed on the August 10th 1933, while directed by Mies van der Rohe who was, by common opinion, mostly interested in aesthetic. It all proves what is commonly known: industrial architecture was highly relevant of for Bauhaus. Further, it implicated preferences in materials used for designs, among which metal was often favored, and there are numerous proofs of that from design of artifacts to architecture. Last, but not least among key impacts of Bauhaus to Neufert's work, due to Bauhaus Neufert was acquainted with many prominent architects and historical figures of his time and he successfully cooperated with number of them: Walter Gropuis, Adolf Meyer, (1919–1920, 1921–1925), Ricardo Magdalena (1920–1921), Paul Klee, Wassillie Kandinsky, Georg Muche, Otto Bartning (1926), Frenk Loyd Right (1936), Albert Speer (1939–1944) and more. Neufert is said to have met Antonio Gaudi in 1921, during his sabbatical in Spain as well as to be impressed by his approach to architecture. It indicates that Neufert was driven by creative individuals and had interest in diversity.

3.2 Legacy Regarding Artefacts

Bauhaus artefacts contributed immensely to its fame, and among them Wagenfeld lamp stands justly (Fig. 5). Wilhelm Wagenfeld (1900–1990) studied with Laszlo Maholy-Nagy at Bauhaus in 1924. His career (also) had hard impact from political side, which caused several twists, however he worked at United Lausitzer Glass in Weißwasser from 1935–1947, except the period while he was involved in combat of the WWII (which he mostly served as military prisoner in Russia). Some of Wagenfeld designs are produced until today, and they won several awards. His design for United Lausitzer Glass won recognized internationally: it won prize of Exposition Internationale des Arts

et Techniques dans la Vie Moderne (International Exposition of Art and Technology in Modern Life) in 1937, and a prize at the 1940 Milan Triennial VII. Wagenfeld was among those students of Bauhaus who changed forever common attitude to everyday household objects. They become affordable and beautiful at the same time. They were made of cheap materials and created by technics suitable for mass industrial production, and they spread the glory of Bauhaus worldwide.

Fig. 5. Wilhelm Wagenfeld and his designs (Wagenfeld 1948), (Scheiffele 1994)

4 The Industrial Complex

4.1 Specifications

The building complex consists of a six-story warehouse and a single-story loading bay. The building construction (Fig. 6) is essentially formed by a steel structure and brickwork infills (12 cm wall thickness) in the outer walls, which is still largely original today, as well as between the cross bars exciting steel stone ceilings. The steel structure is composed of columns arranged in a regular pattern (HEA profiles) and floor-to-ceiling hinges connected to them as floor-to-floor units. The individual ceiling panel of the steel

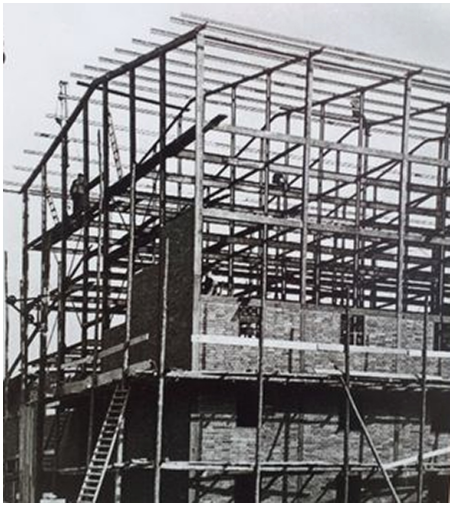

Fig. 6. Warehouse during assembly (www.neufertbau.de)

stone ceilings are resting on the lower flange of the steel cross bars. The warehouse is accessed by a staircase and two larger freight elevators (in practice out of service) and has about 700 m^2 of storage space per floor.

The functionality of the supporting steel skeleton is not only visible in the façade, but also serves as a basic system of order. The interior is characterized by a steel column grid, on which beams with interlocked system ceilings ("stone-iron ceilings") rest with shingled brick formwork. The steel columns are tapered - for reasons of rationality - visible on the upper floors the steel frames of the east and west façades were hung so that the building could actually be "pulled up" like a construction kit. The loading hall, which adjoins the warehouse at right angles, has a direct functional connection and takes up the formal idiom of the warehouse. Noteworthy is the off-center column, which increases the functionality of the hall and which found its way into Neufert's Architects Data. From the loading hall there is direct access to the two freight elevators, here are loading ramps for the truck delivery of glassware and a loading ramp for shipping by rail.

4.2 Current State

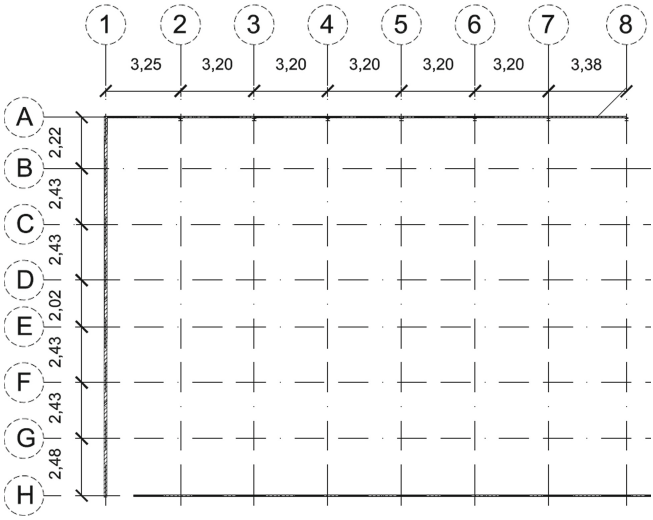

Fig. 7. Ground floor (Fehrmann 2017)

The building was erected as a warehouse in the years 1935 to 1937. It was partly damaged in 1945. Those war damages affected the building in axes 1–5/C-H in levels 3–6 (Figs. 7 and 8) and they were repaired in 1954/1955. The outer brick walls and the ceiling, including the steel structure, were completely rebuilt. Being vacant for years and neglected by changing owners coupled with the widespread image of "obsolete" (simple storage without purpose, in addition to bad condition). The current state of the construction requires urgent action: the roof and the roof drainage have been mostly

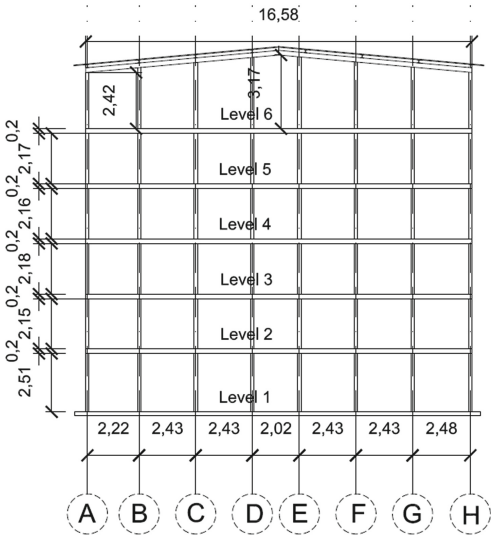

Fig. 8. Cross-section (Fehrmann 2017)

destroyed which leads to large-scale drenching on all floors. Part of the vertical glass window band on the south facade has collapsed, many windows on the east and west front are broken. Some props also lack the force-fit, so that now there is a risk that parts of the building go out.

4.3 Renovation

The destroyed roof and the windows have to be fixed urgently to keep moisture and other weather conditions outside. After fixing of the outer cover, the whole steel skeleton structure is to be checked. A damage from corrosion is largely visibly (Fig. 9) and it will continue to progress unless counter action is provided. Most columns and bars will need a surface blasting with new coating.

Fig. 9. Outer steel skelleton with corrosion damage

Fig. 10. Column in the building with corrosion damage

The connections, which have been already damaged due to the expansion of corrosion, must be completely rebuilt (Fig. 10). Those damaged connections already cause many problems in other parts of the building like the façade. The bolted joints are no longer effective and will jeopardize the carrying capacity. The bolts will get additionally to the planed tensile and shear forces also bending forces which weakens the connection and changes the original transfer of loads. To refurbish the inner columns joints, it is not possible to have an outer scaffold construction. For this reason, an inner auxiliary construction is necessary and should be arranged among each other in every floor to support the ceiling. To take the load off the columns, a counterweight presses the ceiling beams upwards is required, while fixing the joints (Fig. 11).

The preservation requires comprehensive intervention and finding new purpose for the building. Providing new purpose, which could be most efficient preservation, is action constrained by very small story height (2.15 m) and small distance between columns

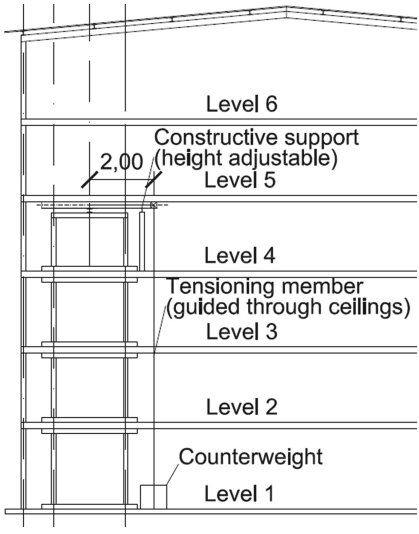

Fig. 11. Cross section with counterweight presses and supports during fixing

(2.02–2.43 m), according to contemporary standards. Windows are immediately under the ceiling, and parapet is high and in disproportion of interior, serving the rhythm of the façade. Some efforts for using building with new purpose were made in the past. Behind the building, a swimming pool and other details were added, in attempt to change the industrial complex into cultural hub.

5 Outlook, Heritage Value and Preservation Prospects

Currently, an association - Neufert-Bau Weißwasser e.V. - is collecting funds for refurbishment, therefore the future use is not clear yet. There are several evident problems which make reuse difficult: ceiling is too low for contemporary standards; windows are too small and position of windows seem to be in favor of façade, shaped by means which are as modest as possible. The building itself has primarily historical value because one of the chapters of the epic story of Bauhaus and its students was related to it. A small town Weißwasser in Germany is to be remembered as the place where one of the best known architectural books was written. It certainly has memorial value (regarding history of construction for early contemporary application of modular system), scientific value (for a constant application of normative rules) and more. In ideal case, the building would be reused with original purpose – as a warehouse. It could be beneficial to keep part of the building open for public and present it as museum. It could bring additional means which could cover at least some maintenance cost. Such model of management (which was promoted by its Canadian authors under the name *Economuseum*) may give good results in a countryside as such, far from areas which grossly attract tourists.

6 Discussion

Bauhaus gave enormous contribution to analyses of minimum standards in architectural design from its beginning. Under Hannes Meyer, social aspects, standardization and affordable housing became even more important. Concerns of social impact of how we built already had history in Germany, which can easily be traced (at least) to Deutscher Werkbund and Herman Muthesius. Having that in mind, Neufert had significant share in Bauhaus legacy. In the Weißwasser phase, it seems that Ernst Neufert experimented with application of his ergonometric normative rules and possibilities of different material. The design of the factory proves dedication to minimum standards as well as to Bauhaus design principles within low budget and using simple materials, which were at disposal locally. Besides brick and concrete, Neufert used metal and glass. His design keeps promoting genuine values and preferences thought at Bauhaus. We can easily recognize order, rationality, outlook determined by structural elements, respect for functionality, use of materials suitable for industrial production etc. Generalizing from historical distance, one can notice two streams of architects within Bauhaus according to their interest in normative rules vs. aesthetic, and Neufert definitely belongs among architects who rely on standardization and typology in architecture. However, compared to some other architects of the 20th c, e.g. Christopher Alexander, Neufert is more into standardization than typology, and between standardization and optimization, more into the second. Neufert's approach brings greatness by modesty; he does not seem to be imposing or

overambitious, but rather comprehensive, practical and into optimization. It seems that in his case, normative rules are there to assist and serve, not to lead or constrain the individuality, or to falsely simplify architectural design. As consequence, Neufert's own designs differ among each other and reveal personal development and permanent search, which deserves full respect from practitioners, in addition to gratitude from countless generations of architectural students who used his Architects' Data to enter the world of Architecture. Therefore, the didactic value of Architects' Data for architectural students can be hardly overestimated, or its value as reference for practitioners.

7 Conclusion

The Neufert building in Weißwasser is an industrial building in the formal language of the "classical" modern response of the New Objectivity of the 1930s. It was planned and built as a central warehouse and logistics center of the "Vereinigte Lausitzer Glaswerke" (VLG), for the storage of glass products, among other designs by Wilhelm Wagenfeld - famous for the Wagenfeld lamp, as well as to the envelope production warehouse rail. Bauhaus, was founded in 1919 by Walter Gropius in Weimar as art and craft school and today, on its 100th anniversary, it is celebrated worldwide as *alma mater* of European 20th c avant-garde design. Nowadays, many Bauhaus designs, from households to industrial buildings, are considered contemporary design classics, and such achievement of Bauhaus is most surprising considering its short existence (all three phases of its existence together lasted less than 15 years). Neufert gave exceptional contribution to dissemination of knowledge regarding minimal standards based on architectural analyses. His Architects' Data set reference for all normative rules in 20c. His industrial complex design in Weißwasser proves that his written works and his architectural design were consistent. In regard to his overall legacy in architecture, we could not help association to Bach's contribution to music: predictable but in spite of that beautiful and diverse. Therefore, we conclude the world of architecture would be impoverished without legacy of Ernst Neufert and the effort should made to preserve his industrial complex in Weißwasser as standing testimony of that.

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