

Discovering Construction as an Art – The ‘Cologne Bridge Quarrel’

Roland May
Darmstadt, Germany

ABSTRACT: It is commonly known that modern architecture became deeply influenced by the severe beauty inherent in the engineers' structures since the beginning of the twentieth century. But it is far less known that at the same time also a noticeable change in engineering occurred. A central occurrence for this shift of paradigms in engineering is the *Cologne Bridge Quarrel*, which developed subsequently to the design competitions for the *Hindenburgbrücke* in 1913. It is the aim of the author to discuss the main arguments that were given by the experts in the course of this fascinating judicial proceeding about the *artistic qualities* of an engineer's construction, and by this, to revive our knowledge of what can be identified as a milestone in Construction History.

INTRODUCTION

Where does science end, where does art begin,
what is applied technology, what belongs to pure knowledge?
Sigfried Giedion (Giedion 1928, p. 10)

At the beginning of the twentieth century many architects, such as *Walter Gropius* (1883-1969) or *Le Corbusier* (1887-1965), discovered the severe beauty inherent in the engineers' structures as a tool to create a world both modern and aesthetic. But, while this impulse of the engineers on the development of twentieth-century architecture is nowadays widely acknowledged, it is far less known that many engineers at the same time tried to step out of the shadows of the architects, claiming for themselves what was unquestioned for their half siblings: that their constructions should be recognized as works of art.

One of the main fields in which engineers tried to gain this recognition was the most prominent discipline of engineering: bridge building. Chances to fulfil this desire seemed good around 1900, as the development of bridge building at this time was intensely followed by the whole intellectual world. Yet, particularly when it came to building big bridges inside of cities, the gigantic steel structures of the engineers – though enthusiastically praised as vivid visualisations of human progress – were still considered to lack both representational qualities and respect for the historic surroundings.

ARCHITECT AND ENGINEER IN BRIDGE BUILDING AROUND 1900

In Germany, the prestigious bridges over the Rhine in particular attracted a growing public attention. For that reason, since the end of the nineteenth century most of these bridges were commissioned through nationwide competitions. As the juries were often dominated by architects and laymen, an appealing design considerably improved the chances of winning, and thus the bridge companies usually collaborated with architects to guarantee an 'artistic status' for the designs through elaborated 'architectural treatments'.

In 1927 the engineer *Karl Schaechterle* (1879-1971) remarked retrospectively that the "big competitions for the Rhine bridges in Worms, Bonn, Mannheim, Cologne, Ruhrort brought lots of important stimuli and led to exemplary solutions in both technical and aesthetic aspects" (Schaechterle 1927, p. 19). However, it can not go un-

acknowledged that a real collaboration of architect and engineer did not take place in the development of these buildings. Both professions were merely concerned with their own well-defined responsibilities. Normally, the architectural intervention was not reaching much further than creating romantic-defiant bridge gates, usually inspired by middle-age castle architecture. While the bridge-heads of the first big German iron river bridges actually had to fulfil some military functions, the bridge towers had lost this task during the course of the nineteenth century and developed mainly into a fancy accessory without a real functional purpose. Furthermore, the architects reacted only marginally to the distinct change of the engineers' superstructures, which became dominated to such an extent by the tied trussed arch that they were soon known as "German arches" (Hertwig 1922, p. 75).

Surprisingly, many engineers did not question this situation, as their sole responsibility for the design of the superstructure stayed thereby largely untouched. This mindset makes it understandable that the influential engineer *Theodor Landsberg* (1847-1915) could call the design for the *Ernst-Ludwig-Brücke* in Worms (1897-1900) a "crowning achievement of unified architecture and art of the engineer" (Landsberg 1896, p. 58) – even if the elegant steel construction by the company *Maschinenfabrik Augsburg-Nürnberg AG, Werk Gustavsburg (M.A.N.)*, seemed to live a parallel life to the ponderous bridge towers by the architect *Karl Hofmann* (1856-1934). The culmination of this obvious state of dichotomy was marked by the *Hohenzollernbrücke* in Cologne, erected for the German railways between 1907 and 1911 as a replacement for the overburdened *Dombrücke* (1855-59). Meanwhile however, opinion about this way of 'artistic enhancement' for engineering structures was changing and – despite the bridge's combination of 'German arches' and colossal neo-Romanesque bridge-heads by the architect *Franz Schwechten* (1841-1924) being only the most dramatic interpretation of a common disposition – heavy criticism had already arisen prior to its inauguration:

The foreigner, coming by boat from Mainz, besides the grey towers of the cathedral and the tangled rooftops of the holy Cologne is welcomed now by the imperious donjon-like bridge towers in 'strictly Romanesque' style [...], which have been patched by Schwechten to the marvellously bended iron arches of the new *Dombrücke*. Cloister motives and middle age merlons, loophole-like window openings and all romanticism from '*Des Knaben Wunderhorn*' in combination with the gigantic achievement of modern engineering! A people of dreamers? (Walter Cohen 1910, qtd. in Bohny 1927, p. 82)

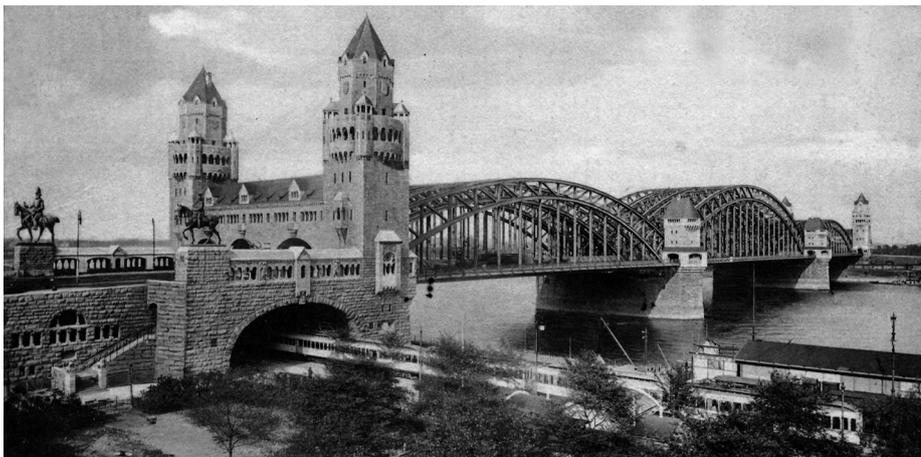


Figure 1: *Hohenzollernbrücke*, Cologne, 1907–1911; (postcard, Cologne: Verlag Heinrich Worringer, 1912)

COMPETITIONS FOR A ROAD BRIDGE BETWEEN COLOGNE AND DEUTZ

The dichotomy between engineers and architects was by no means restricted to a certain bridge type. For instance, one of the most important German suspension bridges of this time, the *Kaiserbrücke* in Breslau (1908–10), likewise showed intensely elaborated decorative portals and abutments. Thus, it did not give a better example for a corporative design philosophy based on the idea of emphasising its technological character. But, only a short time later the architects' 'treatments' of important bridges showed the beginning of a noticeable change towards a growing involvement in the engineer's work. Bridge historians may be aware of the important role played in this process by the *Hindenburgbrücke* between Cologne and its suburb Deutz.

Since the middle of the nineteenth century Cologne possessed a fixed railway bridge over the Rhine. The street traffic, however, had to cross the river for another half a century mainly via a floating bridge. Finally, in 1898 a competition for the erection of a steady road bridge was carried out between four companies. Yet, none of the proposed designs met with the approval of the city council, and it lasted another decade before the invitation for a new competition could be announced in 1910. Due to the fact that this time the city arranged an open contest, all important German steel construction companies took part in this prestigious challenge. Furthermore, to enhance their chances, they cooperated with numerous well-known architects, such as *Peter Behrens* (1868-1940), *Theodor Fischer* (1862-1938), *Bruno Möhring* (1863-1929), or *Hans Poelzig* (1869-1936); *Franz Schwechten* also took part, looking for the chance to cooperate on another bridge in Cologne.

In order to create a contrast to his neighbouring *Hohenzollernbrücke*, the call for bids clearly favoured suspension bridges; furthermore, it explicitly asked for a design in accordance with the edifice's technological character:

The main focus of the artistic treatment has to be that it appears as an engineering structure and that the form of the superstructure system fits harmonically into the townscape under aesthetic aspects. (Mehrtens 1913a, 457)

This unusual approach towards a bridge in an urban context was outstandingly unconventional for a time when public opinion was still mainly following the clear position that "construction is not art" (Scheffler 1907, p. 10). Nevertheless, a surprising two thirds of the 29 projects that had been handed in by 1 April 1911, the final date of the competition, tried to fulfil the goal of an engineering structure without conventional 'architectural treatment' (Hertwig 1922, p. 75). However, the jury was once again unable to declare univocally a winner, and thus a third competition was enacted in July 1912 by the city council of Cologne between the five prize-winning companies. Handing in 30 different projects with another 21 variants, the participating companies once again delivered a bulk of possible solutions. Finally, in March 1913, the project *Freie Bahn*, jointly designed by the companies *M.A.N.* (superstructure) and *Grün & Bilfinger* (substructures) under consultancy by the Cologne architect *Carl Moritz* (1863-1944), were named as winners of the competition.

THE COLOGNE BRIDGE QUARREL

Even though the *Hindenburgbrücke*, erected from 1913 to 1915 on the basis of the winning project *Freie Bahn* (Fig. 6), was destroyed in the Second World War, it still is referred to in many books dealing with bridges to this day. Widely unknown however is the fact that the edifice had a dramatic back-story, known to contemporaries as the *Cologne Bridge Quarrel* (*Cölner Brückenstreit*).

The Cologne Bridge Quarrel developed subsequently after the jury had come to its decision. Just some days after the outcome of the competition had been publicly announced, the company *Deutsch-Luxemburgische Bergwerks- und Hütten AG, Abt. Dortmunder Union* (*Dortmunder Union*) and its consulting architect *Peter Behrens* sent a letter of protest to Cologne's mayor *Max Wallraff* (1859-1941), which was also published in several newspapers. In this open letter they claimed that the winning project *Freie Bahn* was to a large extent a copy of their own proposal *Kunst und Technik* from the competition of 1910/11:

All merits, for which the prize-winning design is praised now, such as clear roadway [*freie Bahn*] and free outlook on river and bank, further and above all the system of a self-anchored suspension bridge with equalised horizontal thrust, which we had utilized as the sole company in the first competition, further the arrangement of the stiffening girders as solid-walled, externally placed and only about 1.20 m above the roadway protruded plate girders, further the solid-walled chain, in short all outstanding features as well as even the particular details are directly copied from our design. (Mehrtens; Bleich 1913/14, p. 214).

The aforementioned design *Kunst und Technik* was an elegant suspension bridge with slender and plain steel towers. Even though it had been complimented on its thorough detailing and dynamic appearance, *Behrens* and *Dortmunder Union* nevertheless had been expelled from the price-winning group in the competition of 1910/11 for some smaller breaches of the tender conditions (Mehrtens; Bleich 1911/12, p. 406). Their deep frustration caused by this decision, which furthermore resulted in the loss of the chance to compete in the final competition, must have culminated in the moment they saw the renderings of the winning design *Freie Bahn*: At first glance, it actually looked more than similar to *Kunst und Technik* (Fig. 2). This observation was shared by many contemporaries, such as Dresden's city architect, *Hans Erlwein* (1872-1914):

The fact that both companies kept their projects free of all architecturally decorative additions and only operatively designed the constructive necessities evokes in both projects a common trait of plain beauty. (MAN c, p. 4)



Figure 2: Renderings of the designs *Freie Bahn*, 1913, and *Kunst und Technik*, 1911; (MAN e, Pl. 1)

Unsurprisingly, *M.A.N.*, by far the most renowned German steel construction firm in those days, protested sharply against such a publicly announced severe accusation. Nevertheless, both the jury and the Cologne city council assembly were concerned with this topic in extraordinary meetings. A few days later, on 2 April 1913, the parliamentarians and the jury members had been convinced by the arguments of *M.A.N.* and supported once more the jury's original nomination. At the same time *M.A.N.* obtained an interim injunction, forbidding further public statements by *Dortmunder Union* in connection with this matter. Subsequently all involved companies and architects brought charges against the other party in different trials. Finally, the whole case was referred to the regional court of Cologne to find a clear and univocal decision.

Both companies mobilized an impressive *armada* of all in all not less than thirty experts, among them many of the most famous German architects and engineers of their times. But, even before the trial had started, *Georg Mehlertens* (1843-1917), the grand old man of German steel construction, could easily disprove the main accusation of copying technical details in a thorough study published in the *Deutsche Bauzeitung* (Mehlertens 1913b). Nevertheless, the trial went on, as *Peter Behrens* and *Dortmunder Union* changed their strategy by accusing M.A.N. and *Carl Moritz* now mainly not any more for plagiarism in technical but in artistic respect.

Legal basis for such a lawsuit was the controversially discussed interpretation of the so-called *Kunstschutzgesetz* (Art Protection Law, official title *Reichsgesetz betreffend das Urheberrecht an Werken der bildenden Künste und der Photographie*), which had been enacted in January 1907. Explicitly also covering edifices "as far as they pursue artistic aims" (Mehlertens 1913a, 457), it was virtually inevitable that – in a time of growing interest in the engineer's works – the law immediately provoked numerous commentaries about its validity also for engineering structures (cf. Bernhard 1907; Mehlertens 1913a, p. 457-458). Furthermore, some engineers, such as *Franz Czech* (active around 1910/1926), had taken this chance to question the role of architects in bridge building in general and observed contented that the "emancipation endeavours of the engineers [...] seem to encroach upon the field of architecture" (Czech 1911, p. 136).

In fact, the case of the Cologne Bridge Quarrel seemed to prove the engineer's claims to be accepted as artists in their own right. As both designs, *Kunst und Technik* and *Freie Bahn*, were nearly free of any conventional 'architectural treatment', it was the construction itself that had to be examined as a copyrighted piece of art. Anyhow, notwithstanding the growing self-confidence of the engineers in those years, it cannot be ignored that the architects clearly held the majority beyond the experts. For understanding this somewhat curious situation, one has to keep in mind that in those days existed an increasingly criticised but nevertheless still "tacitly accepted monopoly: the architect delivers the beauty for engineering structures, especially for bridges" (Czech 1911, p. 136). In addition, the architects' interest in engineering structures had increased by leaps and bounds because of the famous designs for the industrial buildings of the company AEG by the outstanding figure of *Peter Behrens*. Obviously, *Behrens* was considered to have been the mastermind behind a design, which already claimed through its programmatic title to be a new kind of engineering structure: an edifice which finally unified *Arts and Technics*.

To prove if there was evidence (or not) for the accusation of an illegal take-over of intellectual property, the first phase of the trial was mainly dominated by discussions about concrete questions, mainly concerning the detailing. This owed to the fact that *Dortmunder Union* had marked out clear examples of copying in their statement of claim from 24 May 1913. In his expertise from 28 June 1913 *Heinrich Kaiser* (1873-1949), professor for civil engineering at the polytechnic of Darmstadt, summed them up as follows:

1. The use of the system of a self-anchored suspension bridge [...].
2. The arrangement of the stiffening girder of the suspension bridge namely in respect of the following points:
 - a) The use of a plate girder in dimensions that were unusual so far,
 - b) The curved alignment of the top flange and the haunch-like lines of the bottom flange at the pier;
 - c) Arrangement of a longitudinal connection splice plate in the middle of the web plate and its use as artistic motif,
 - d) The perpendicular stiffening and structuring of the web,
 - e) The constructive rounding of the girder's end, and
 - f) the connection of the chain to the stiffening girder.
3. The design of the pylons.
4. The design of the suspenders as round iron rods with turnbuckles placed in the middle.
5. The artistic design and utilisation of the suspension bridge system. (MAN e, p. 1).

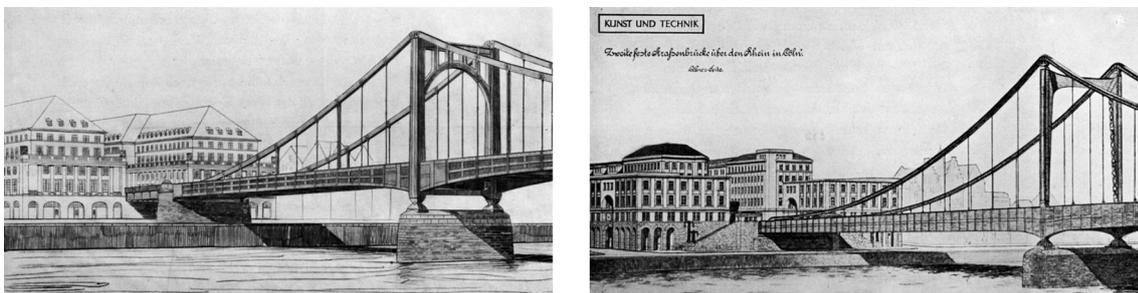


Figure 3: Bridge ends of the designs *Freie Bahn*, 1913, and *Kunst und Technik*, 1911; (MAN d, fig. 8, 9)

The experts of M.A.N. utilized different ways for the refusal of the respective points, reaching from detailed discussions of the different aspects to the opinion that construction details should be treated as common property. However, it would be going too far to follow each line of argumentation. In our context it is much more interesting that now, as observed by the famous bridge builder *Friedrich Engesser* (1848-1931), *Dortmunder Union's* "attack was edged closer from the technical to the aesthetic field" (MAN b, p. 1). Simultaneously, also the tone of the discussion got more aggressive as *Behrens* and *Dortmunder Union* compared their own project

and *Freie Bahn* with a masterpiece of a Madonna and a bad copy of it, having been “cobbled together by a dilettante” (MAN a, p. 2).

This shift from the tangible question of copying towards the far broader accusation of stealing an *artistic idea* surely had to do with the fact that the experts of M.A.N. did not have problems in disproving each of the single concrete accusations. In addition, a big problem for *Dortmunder Union* was the fact that in the second competition M.A.N. had already handed in a variant of their then main project *Neuzeit*, which showed as many similarities to the parallel-developed *Kunst und Technik* as it did to their own later design *Freie Bahn* (Fig. 4). Consequently, the second wave of expertises presented in favour of *Dortmunder Union* in summer 1913 apparently exhibited more the character of art critics than of contributions for a copyright trial by stressing the aspect that, as cynically quoted by the world famous engineer *Heinrich Müller-Breslau* (1851-1925), only *Kunst und Technik* was an “artistically purified engineering work” created out of “the modern spirit of an intimate correlation between constructive and aesthetic principles” (MAN f, p. 5). In doing so, *Dortmunder Union*’s experts – besides the steel bridge specialist *Friedrich Bohny* (1867-1939) mainly architects – not only clearly vilified *Carl Moritz*’s competence to design modern engineering structures in comparison to *Peter Behrens*, but also questioned the ability of M.A.N.’s engineers to create a piece of art by themselves.

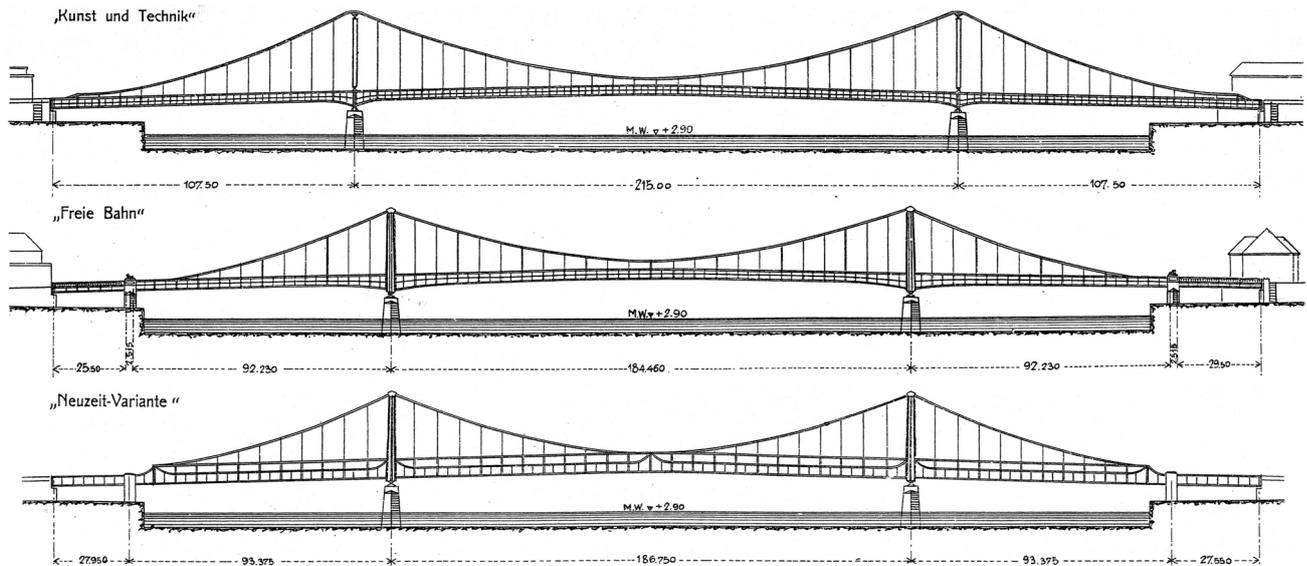


Figure 4: Elevations of the designs *Kunst und Technik*, 1911, *Freie Bahn*, 1913, and *Neuzeit (variant)*, 1911; (MAN h, fig. 33; MAN e, Pl. 1)

Predictably, the increasingly insulting statements of *Dortmunder Union*’s experts provoked a heavy backlash, especially in the faction of the engineers. Noticeably annoyed was particularly *Gottwalt Schaper* (1873-1942), head of the bridge department of the railway directorate in Stettin (Szczecin) and author of *Eiserne Brücken*, the German standard reference on steel bridges in those days. In his expertise from 6 July 1913 he attacked the architects’ reports for declaring connection splice plates and angle brackets on the plate girder as “architectural decoration” or comparing the plate girders of both bridges without the knowledge that only M.A.N. had taken the integration of mounting hinges into account (MAN h, p. 4, 7). Therefore, *Schaper* postulated that solely an engineer could enter “into the depth of the nature of an engineering structure” and arrived at the conclusion:

For this reason it has to be rejected that an architect or an artist is put in charge of judging or acting as an examiner of an engineering structure. (MAN h, p. 9)

Schaper’s radical postulation directly found its echo in the second expertise for *Dortmunder Union* by the architect *Hermann Muthesius* (1861-1927) from 20 November 1913, where the co-founder of the *Deutscher Werkbund* contrarily denied that an engineer could have the capability to give a relevant opinion in a case of artistically enhanced engineering structures:

To the same extent that such evaluators may be brilliant in pure scientific engineering they are incompetent for the present case. (Hermann Muthesius, qtd. in Mehrrens 1914, p. 254-5)

Thus, at the end of the year 1913 the whole trial was in danger of ending in an insolvable struggle about the artistic sovereignty in structural engineering. This potential development was mainly prevented by the lawyer *Albert Osterrieth* (1865–1926), a specialist on copyright questions and patent laws, who picked the expertises in favour of *Dortmunder Union* into pieces in an intellectually brilliant response that dealt solely with the original question of copyright infringement (MAN g). The final blow against *Dortmunder Union* was launched by interrogations of engineers from M.A.N. as well as *Wilhelm Haerter* (1880-?), chief architect of M.A.N., and *Manfred Faber* (1879-1944), office manager of *Carl Moritz*, which took place on 6 and 7 March 1914. By explaining the whole design development through internal preliminary drafts, they could rebut even the most general accu-

sations of copying an artistic idea in such an obvious way that the situation of *Dortmunder Union* and *Peter Behrens* got pretty hopeless. Consequently, they had to accept an out-of-court settlement arranged by *Hans Erlwein* on 17 April 1914, forcing them to totally abandon their accusation of plagiarism (Mehrtens 1914, p. 255).

THE HINDENBURGBRÜCKE

With the end of the Cologne Bridge Quarrel, the way was cleared for the realization of the project *Freie Bahn*, which was opened to traffic in 1915 under the name *Hindenburgbrücke*. Besides all struggles during the trial, the self-anchored chain suspension bridge with a middle span of 184.46 m soon was commonly praised not only for being the largest, but also the “most beautiful suspension bridge of Germany” (Schaechterle 1927, p. 20). Just a stone’s throw away from the *Hohenzollernbrücke*, the *Hindenburgbrücke* demonstrated impressively the shift of paradigms that had taken place in just a few years in the design philosophy for Germany’s wide span bridges.

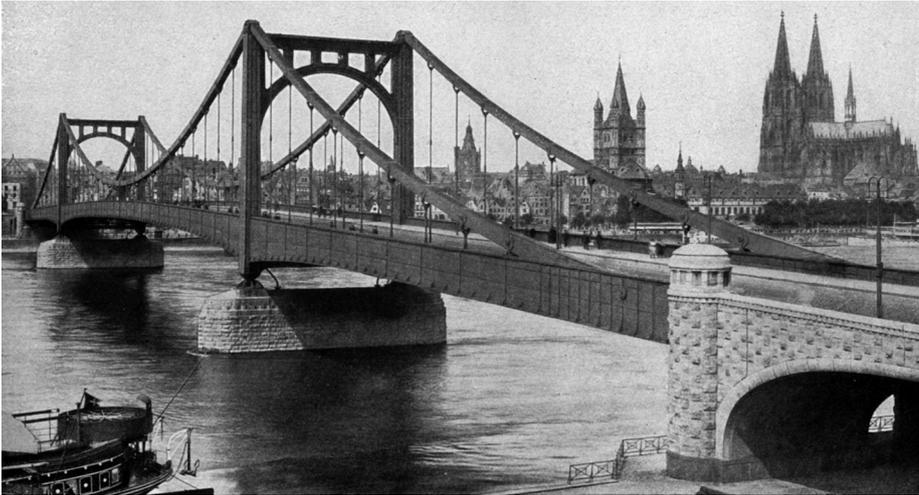


Figure 5: *Hindenburgbrücke*, Cologne, 1913–1915; (Reiners 1925, p. 126)

With its steel towers and plate stiffening girders, the bridge looked like a sort of technical sculpture only generated out of the functional premises. Surprisingly, for some German contemporaries the appearance of the *Hindenburgbrücke* even did not go far enough in this direction. Especially the “tasteful framing” (Müßigbrodt 1923, p. 335) of the bridge through the approaches in stone, which had been adjusted in the course of the erection process by *Carl Moritz*, reminded several critics too much of nineteenth-century ‘architectural treatment’:

Unfortunately the bridge’s beginnings at the river banks are not free of certain anxiousness: by placing a stone scenery in front of the approaches’ reinforced concrete construction in order to gain a linkage to the stone architecture of the surrounding, they lost sight of the bridge’s enormous scale and brought an impure element into the form. (Feige; Riezler 1922, p. 29)

As late as 1928 the young engineer *Franz Kollmann* (1906–1987) still criticized the bridge’s stone compartments and underscored in contrast the steel construction’s “outstanding beauty” (Kollmann 1928, p. 72). But, in fact, exactly the bridge’s technical aesthetic, praised by the German contemporaries for seeming “as cast in a single mould” (Müßigbrodt 1923, p. 335), did not find the same euphoric accordance everywhere. Bridge builders in the United States in particular initially had problems to accept bridges of such sober clarity in urban contexts. Many of them agreed with *Wilbur J. Watson* (1871–1939), who in his influential publication *Bridge Architecture* did not hide his preference for Budapest’s suspension bridges with their elaborated beaux-art features in comparison to the far more ‘technical’ *Williamsburg* and *Manhattan* bridges of New York. Consequently, he only paid tribute to the Cologne bridge because its design reminded him despite its sober steel towers of the Budapest bridges (Watson 1927, p. 174). Also one of the grand masters of American bridge building, *Gustav Lindenthal* (1850–1935), characterized the *Hindenburgbrücke* during a visit to Germany only pejoratively as “plain and featureless” (Müllenhoff 1925, p. 23).

Nevertheless, after a good decade the bridge found several followers around the whole world, such as the *Kiyosu-bashi* over the Sumida River in Tokyo (1925–28). Also some American bridges, like Pittsburgh’s so-called “Three Sisters” – the *Sixth*, *Seventh*, and *Ninth Street Bridges* over the Allegheny River (1925–28) – clearly followed the older German model. Thus, the aesthetic change in urban steel bridge design finally also made its way to America, and in 1936 the American engineer *Howard Mullins* even characterized the *Hindenburgbrücke* as “one of the most beautiful suspension bridges ever built” (Mullins 1936, p. 45).

Actually, the *Sixth Street Bridge* had been already granted in 1928 the first *Most Beautiful Bridge Award* by the American Institute of Steel Construction (AISC 1929). Besides its grace, simplicity, and harmony, the jury also explicitly honoured its originality – apparently unaware of the fact that it came so close in appearance to the

Cologne antetype that *M.A.N.* and *Carl Moritz* could have had good reason to start a plagiarism trial themselves now.

While other countries just started to discover the beauty of the *Hindenburgbrücke*, it already seemed somewhat old-fashioned in the Germany of the late 1920s. A main reason for this perception was the fact that the once ground-breaking bridge had found a spectacular follower. Constructed between 1927 and 1929 under the consultancy of city architect *Adolf Abel* (1882-1968), the *Straßenbrücke Köln-Mülheim* set a new benchmark in the development of an expression which was both elegantly elaborated and in accordance with the engineering character of a bridge (Fig. 6). Curiously, the outstanding bridge was not only erected in Cologne and constructed once more by *M.A.N.*, but also only came into being after another heavy 'Cologne quarrel', as the majority of the competition jury originally had voted for another design handed in by the companies *Fried. Krupp AG* and *Franz Schlüter AG* under the consultancy of the unfortunate architect – one hardly dares to mention his name – *Peter Behrens*.

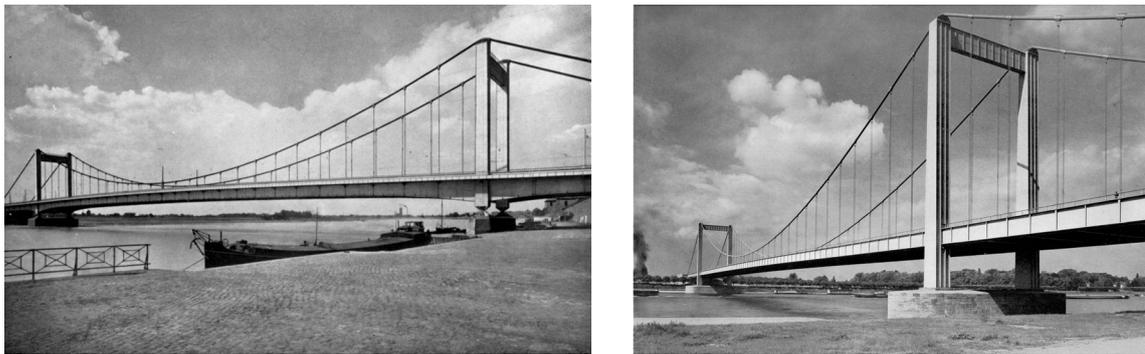


Figure 6: *Straßenbrücke Köln-Mülheim*, 1927-29, and *Autobahnbrücke Köln-Rodenkirchen*, 1937-41; (Roš 1940, p. 37; Tamms 1942, p. 227)

The story of the outstanding suspension bridges of Cologne even continued ten years later with a bridge that brought the process, which had been commenced by the *Hindenburgbrücke*, to some form of conclusion. Even though it was inaugurated almost unnoticed during war-time under the inauspicious name *Adolf-Hitler-Brücke*, the appearance of the *Autobahnbrücke Köln-Rodenkirchen* (1937-41) soon gained unanimous international admiration, as illustrated here through a quotation from the landmark publication *The Architecture of Bridges* by *Elizabeth B. Mock* (1911-98):

Its beauty was wholly a matter of terse, highly articulate structure and exquisite proportions. There was not one empty gesture or superfluous word, and each smallest part was dignified by its coherent relationship to the whole. (Mock 1949, p. 62)

CONCLUSION

In trying to recapitulate, it seems reasonable to recall at first the common mindset towards the artistic potentials of engineering structures, as it was distinctly articulated by the influential art critic *Karl Scheffler* (1869-1951) in 1907:

The work of the engineer can never become art, as it is lacking freedom. Further, there is no cause for enhancing these constructions artistically, as it is solely a matter of the duty of utilitarian purposes and practical needs. The hopes, which are pinned by the most modern and serious minds on the importance of the engineer's activity, are understandable; nevertheless, we have to realize that in this case the wish was father to the thought. (Scheffler 1907, p. 16)

If we contrast *Scheffler's* pessimistic view with the fact that *Elizabeth B. Mock's* essential valuation of the aesthetic value of the *Autobahnbrücke Köln-Rodenkirchen* had been written in a book published by New York's *Museum of Modern Art*, it is easy to detect the impressive transformation that the perception of the artistic qualities of engineering structures underwent in the first half of the twentieth century

In a period of rapid change about the ideas on engineering structures, the Cologne Bridge Quarrel set an important benchmark through the fact that the elite of both German engineers and architects agreed on the artistic qualities of edifices, which no longer showed any trace of traditional *Baukunst*. The consequences of this new stance over the artistic design of engineering structures could be observed in countless German bridges built since the end of the First World War.

Surprisingly, architects were intensely involved in this process. It seems as if the passionate conflicts between engineers and architects in the course of the Cologne Bridge Quarrel actually awakened the interest of German architects in taking part in the design of 'artistic' bridges based on the philosophy of developing the expression of the edifice solely out of its construction. This 'German *Sonderweg*' climaxed in the outstanding design quality of the bridges of the *Reichsautobahnen* and their 'coronation', the *Autobahnbrücke Köln-Rodenkirchen* (cf. May 2006). It may be more than a strange coincidence that the mastermind behind the so-

ber and technical appearance of this bridge, the architect *Paul Bonatz* (1877-1956), had not only been a jury member in the competition for the *Straßenbrücke Köln-Mülheim*, but had also acted as an expert in the Cologne Bridge Quarrel.

Doubtlessly it would go too far to allege that the Cologne Bridge Quarrel was a kind of nucleus for our modern day understanding of the beauty of engineering structures. In fact, the sources for this appreciation are dating back much further in history. Furthermore, especially in France, one can discover contemporary developments, where engineers – predominantly without the consultancy of architects – were following a comparable path towards what has been named "structural art" by *David P. Billington* (cf. Billington 1983). Yet the question may be raised whether the usual concentration on outstanding engineers, such as *Gustave Eiffel*, *Eugène Freyssinet*, or *Robert Maillart*, may have led to an underrating of the German efforts in 'artistic enhancement' of engineering structures in hitherto bridge history. It is apparent that further scholarship is needed on this barely researched field. Anyhow, it is the hope of the author that this article has proven at least that the Cologne Bridge Quarrel, according to *Georg Mehrrens* a "case that never had occurred before in the history of iron construction" (Mehrrens 1913a, p. 453), deserves to be brought back into the corpus of construction history.

REFERENCES

- American Institute of Steel Construction (AISC), 1929: *The Artistic Bridge: 1928 Award*. New York: s.n.
- Bernhard, K., 1907: Das Urheberrecht an Werken der bildenden Künste und der Photographie. *Zentralblatt der Bauverwaltung* 27, pp. 608, and 644.
- Billington, D.P., 1983: *The Tower and the Bridge: The New Art of Structural Engineering*. New York: Basic Books.
- Bohny, [F.], 1927: Der Umbau der Rheinbrücke bei Düsseldorf im Düsseldorfer Stadtbild. *Der Bauingenieur* 8, pp. 81–83.
- Czech, [F.], 1911: Brückenarchitektur und Brückentore. *Der Eisenbau* 2, pp. 136-139.
- Feige, A.; Riezler, W., 1922: Das Problem der Form im Eisenbrückenbau. *Die Form* 1, No. 2, pp. 18-30.
- Giedion, S., 1928: *Bauen in Frankreich. Bauen in Eisen. Bauen in Eisenbeton*. Leipzig: Klinkhardt & Biermann.
- Hertwig, A., 1922: Der deutsche Eisenbrückenbau, ein Beispiel für die Zusammenarbeit von Theorie und Praxis. In: Gesellschaft Harkort (eds): *75 Jahre deutscher Brückenbau*, Duisburg, pp. 33-90.
- Kollmann, F., 1928: *Schönheit der Technik*. Munich: A. Langen.
- Landsberg, T., 1896: Der Wettbewerb für eine feste Straßenbrücke über den Rhein bei Worms, III. *Zentralblatt der Bauverwaltung* 16, pp. 56–58.
- Lohmer, G., 1979: *Gerd Lohmer. Architekt – Brückenbauer. Das Werk – 1979*. S.l.: s.n.
- May, R., 2006: Paul Bonatz and the Search for an Art-Form for Motorway Bridges. In: Dunkeld, M. et al. (eds): *Proceedings of the Second International Congress on Construction History*, Vol. 2. Cambridge, pp. 2139–58.
- Mehrtens, G.C., 1913a: Ästhetische Fragen der Ingenieurkunst, besonders des Eisenbaues. *Der Eisenbau* 4, pp. 452-458.
- Mehrtens, G.C., 1913b: Zum Streit um das geistige Eigentum an dem preisgekrönten Entwurf im zweiten engeren Wettbewerb um eine Rhein-Straßenbrücke in Köln. *Deutsche Bauzeitung* 47, pp. 324-326, 332-335.
- Mehrtens, G.C., 1914: Ästhetische Fragen der Ingenieurkunst, besonders des Eisenbaues. *Der Eisenbau* 5, pp. 251-259.
- Mehrtens, G.C.; Bleich, F., 1911/12: Der Wettbewerb um den Bau einer Rheinstraßenbrücke in Köln. *Der Eisenbau* 2, pp. 399-412, and *Der Eisenbau* 3, pp. 65-76, and 188-193.
- Mehrtens, G.C.; Bleich, F., 1913/14: Der zweite Wettbewerb um den Bau einer Straßenbrücke in Köln. *Der Eisenbau* 4, pp. 213-229, 254-266, 291-302, 317-329, 361-367, 428-440, and *Der Eisenbau* 5, pp. 58-67, 136-147, and 194-204.
- Mock, E.B., 1949: *The Architecture of Bridges*. New York, NY: The Museum of Modern Art.
- Müllenhoff, [A.], 1925: Der Brückenbau der letzten fünfzig Jahre. *Der Bauingenieur* 6, pp. 22-24.
- Müßigbrodt, P., 1923: Das Ingenieurbauwerk in seiner Umgebung. *Die Bautechnik* 1, pp. 321-323, 333-335, and 344-346.
- Mullins, H., 1936: The Self-Anchored Suspension Bridge. *Engineering News-Record* 116, pp. 45-49.
- Reiners, H., 1925: *1000 Jahre Rheinischer Kunst*. Bonn: Verlag der Buchgemeinde.
- Roš, M., 1940: *Die Straßenbrücke König Alexander I über die Save zwischen Belgrad und Zemun*. Zürich: s.n.
- Schaechterle, K.W., 1927: *Die allgemeinen Grundlagen des Brückenbaues*. Berlin; Leipzig: de Gruyter.
- Scheffler, K., 1907: *Moderne Baukunst*. Berlin: Bard.
- Tamms, F., 1942: Paul Bonatz. *Die Baukunst [=Die Kunst im Deutschen Reich, Ausgabe B]* 5, pp. 218–237.
- Watson, W.J., 1927: *Bridge Architecture*. New York: William Helburn.

Historisches Archiv der MAN-Aktiengesellschaft, Augsburg (Lawsuit Dortmund Union % Augsburg-Nürnberg, without Reg. no.)(MAN):

- MAN a, Expertise by H. Billing, Karlsruhe, 6 June 1913.
- MAN b, Second Expertise by F. Engesser, Karlsruhe, 28 July 1913.
- MAN c, Expertise by H. Erlwein, Dresden, 29 July 1913.
- MAN d, Expertise by W. Franz, Charlottenburg, 7 July 1913.
- MAN e, Expertise by H. Kayser, Darmstadt, 28 June 1913.
- MAN f, Second Expertise by H. Müller-Breslau, Berlin, 6 July 1913.
- MAN g, Supplementary Expertise by A. Osterrieth, Berlin, 15 November 1913.
- MAN h, Expertise by G. Schaper, Szczecin, 6 July 1913.

Note: Quotations in German have been translated into English by the author.