

Bridges of Modernity



THE engineer is an inseparable part of the Modern Movement. He has fulfilled its request of working unprejudiced. But he was driven to his most magnificent works by a mental concentration on technique excluding many other influences. Therefore, John Ruskin called the engineer a human beaver. Rarely the ambition of synthetic Modernism to suspend the difference between culture and civilization was converted. In the writer's opinion, this is no reason to abandon this ambition and engineers should keep up the Modern tradition and continue to work on it.

By Jürg Conzett

THE engineer is an integrated part of Modernity. He has prepared, is grown up with Modernity, and has carried its triumphs and defeats. Unlike the architects, the profession of engineers has no past going back before the modern era. Modern engineering is the unprejudiced mind that invents any new structure, based on a common theory which is the same all over the world. What other discipline has achieved this? There are no dissenters among engineers, no homeopaths questioning the medicine, and even the most inveterate historicist who pretended to construct his arch bridges according to Alberti's methods would certainly check his work in secret with a thrust line. The most vehement disputes about methods, such as the calculation of spatial structures between Otto Mohr and Heinrich Müller-Breslau, seem a hundred years later like a child's play—finally it was only a different number of equations which led to the same, undisputed result.

The developments of the 19th century reveal a characteristic element: the greatest achievements came about in a way where you concentrated more and more on the work of analysis, hereby excluding manifold influences. The precisely calculated works from the late 19th century seem abstract (among others Behrens and Gropius criticized their lack of corporeality when comparing with e.g. Isambard Brunel's opulent works whose ship hulls and bridges were closely related. You might turn Schwedler's truss of the Vistula Bridge at Dirschau (Poland) upside down and still it would stand (tension and compression differ only by plus and minus), what you could never do in case of the Royal Albert Bridge (United Kingdom) with its overlay of tension chains and a compression tube. You could not make precise calculations of the latter bridge, its powers and course which, however, thanks to the robust system did not play an important role, while after several weeks Schwedler identified the secondary stresses of the rods due to the rigid riveted connections of the frame-

work of the Vistula River Bridge. Consequently Culmann demanded the separation of the engineering schools from the schools of architecture so that the candidates were able to devote themselves to the study of projective geometry before they were allowed to solve structural engineering problems. And the splendid isolation of the engineers bore fruit: fantastic buildings, machinery, and *apparatus* which sometimes touched the viewer to tears as David Nye describes it vividly in *American Technological Sublime*.¹

However, the criticism of the engineer began early: in 1853 John Ruskin invites the reader to come to a construction site with the following, impressive passage from *The Stones of Venice*: "Suppose, for instance, we are present at the building of a bridge..." In several paragraphs he, as a great critic of technique, shows us that he knows well about how to build a bridge. First he encourages you to recognize how much the person who drew the curve of the bridge and numbered the stones had to know: "There is no saying how much wit, how much depth of thought, how much fancy, courage presence of mind, and fixed resolution there may have gone to the placing of a single stone of it." And he admires further "this grand power and heart of man in that thing", but, as Ruskin concludes, ultimately, the bridge builder is nothing but a human beaver with an "intricate bestiality—nest or hive building in its highest development. You need something more than this ..."²

Here at last you are able to distinguish between culture and civilization, often provoking you when reading major literary works: from Thomas Mann, Joseph Roth to Simone de Beauvoir there is a list of prominent writers and intellectuals for whom the engineer is a symbol of the hardworking, active, and intellectually limited man. Now these statements by Ruskin and his followers are not simply wrong because how often were the engineers not tools of highly problematic projects, disregarding social, and ecological aspects, be it road construction or the building of power plants, but they show one aspect only. The engineer, like the pioneer, had to concentrate on his works, closed off from disturbing influences, on his way to Modern society; there was no alternative, first the means of Modernity had to be developed.

< Dorfbrücke, Vals, Switzerland. **Conzett, Bronzini, Gartmann** (engineers). Conceptual collaboration: **Peter Zumthor** (architect), 2010.

But then the real goals of Modernism were synthesized: culture and civilization should be one. In the years around 1900 an ongoing discussion about the integration of bridges in urban and natural areas began. On the one hand, discussions by representatives of the *Werkbund* (German association of artists, architects, designers, and industrialists, 1907–34) and the *Heimatschutzbewegung* (a movement concerned with preserving the German regional heritage), led to a wide popularisation of engineering structures, e.g. in the books by Werner Lindner.³ On the other hand, there is a series of more job-specific texts such as that of Hermann Jordan and Eugen Michel, who received the first prize in a competition on the artistic design of iron constructions arranged by the German emperor.⁴ A good example of these discussions is the Hohenzollern Bridge (1911) in Cologne which has become an inseparable part of the city due to its axial location to the cathedral, the static system of the *German arch* and the ascending sequence of their piers and arches with sculptural decorations. That this bridge after the Second World War, against strong opposition in the name of a vulgarized objectivity (*Sachlichkeit*), was robbed of its architectural parts, illustrates the conflict between integrating and divisive tendencies of Modernism.⁵ There were two sides: the iconoclastic impulses while in nearby Düsseldorf the great family of bridges emerged.

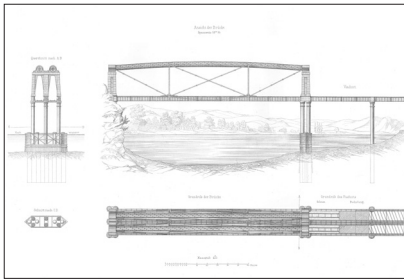
Even where bridge builders behaved conservatively, their works are unerringly Modern: the natural stone arch bridges in the *Alpenstraße* (the German Alpine Road) with their side walls in their curved design; there is no difference between the side walls and adjacent retaining walls, the side walls are also the parapets which are topped with a thin cover plate, a subtle and effective decoration. Conceptually compared to Robert Maillart's bridges there is only small difference since they have the following elements in common: flowing lines, seamless access to parts of the abutments, and integrated parapets.

But then again pioneers appeared. The construction of the post-war highways was rapid and often uncompromising. These outstanding individual performances of the bridge emerged but often the beavers were at work: in 1961 Bruno Zevi called them the "*dittatori dell'asfalto*" in a newspaper article which got very much attention, and in which he criticized the uncoordinated formal lack of concepts in the construction of bridges and tunnels of the *Autostrada del Sole*.⁶ The *Sihlhochstraße* in Zurich, an elegant design of bridge with two parallel point-based hollow boxes stabilizing each other through the elastic deck and lines across the river, symbolized the brutality of modern road construction. Like eighty years ago when in the beginning the urban elevated railways were constructed, the engineers had to concentrate on their

technical work and they did not consider in before how the world would respond to their work. Still the claim of Modernity on a comprehensive quality in the design of the human environment could not be met: the construction of the road network on a large scale happened too rapidly, the social and political pressure on its implementation was too big, and, unprepared for the consequences, the engineers being under heavy pressure had seen no reason to ask more fundamental questions.

The highways which at the same time were unloved and well-tried may have played a role, now that Modernity as such was considered critically from very many sides. Although these works of the engineers, not being able to step out of Modernity, were directly criticized, surprisingly few attempts were made to defend the Modern values from the engineer's perspective. Once Max Bill had written on Robert Maillart, he succeeded in overcoming the pure technical through the intensification of the technical, and Hermann Czech demanded in connection with a lecture by Theodor W. Adorno that one had to be even more factual (*sachlich*). Rarely this attitude, expressed by architects, corresponding to the engineer and his understanding of the engineering career was discussed. Instead, the engineer remained either defensive in his isolated corner of the intricate bestiality, or he confined himself, being interdisciplinary or alone, to produce sculptural forms.

In my opinion, both attitudes are unworthy because they are too superficial, and they satisfy neither spirit nor sense. You need to reply, quoting Ruskin, "We need more than this". I plead for a further work on the synthetic Modernity: this includes a patient, comprehensive analysis of the circumstances, the unbiased investigation of the possible solutions with a large tool box, the critical compression of the approaches into a coherent concept that governs each of the measures. Modern is that this method begins openly, that it considers all aspects of a task, that it produces a result whose parts are so very much related to each other that nothing can be changed. A sign is a certain aesthetic compactness. The interest in the history of your own discipline sharpens your mind, and thanks to education and local experience, it helps you to overcome limits and to find all possible solutions. So in retrospect this design process could be more or less rationally described. This rationality belongs to the engineering profession and it is necessary as a condition of getting a valid result. Whether this rationality is sufficient, however, is a matter of emotion—eventually your emotion tells you when you have completed a design process.



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Notes

1. Nye, David, *American Technological Sublime*, MIT Press, Cambridge MA, 1994.
2. Ruskin, John, *The Stones of Venice*, Smith, Elder Co., London, 1853, vol. 1, 39f.
3. Lindner, Werner, *Die Ingenieurbauten in ihrer guten Gestaltung*, Berlin, 1923.
4. Jordan, Hermann; Michel, Eugen, *Die künstlerische Gestaltung der Eisenkonstruktionen*, 2 Bände, Berlin, 1913.
5. Hammer, Lothar, *Köln: Die Hohenzollernbrücke und die deutsche Brückenarchitektur der Kaiserzeit*, Köln, 1997.
6. Zevi, Bruno, *Dittatori dell'asfalto. Le superstrade della disunione nazionale*, L'Espresso, Feb 19, 1961, and *Cronache dell'architettura*, vol. IV, Laterza, Bari, 1970.
7. Conzett, Jürg; Linsi, Martin, *Landschaft und Kunstbauten / Landscape and Structures*, Zürich, Scheidegger & Spiess, 2010, 44, 46, 78, 114, 190, 192.

Jürg Conzett

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Figure 1. Wye Bridge in Chepstow (Wales), **Isambard Kingdom Brunel**, 1852, destroyed in 1962. The beginnings of Modernity, a bridge with no precedent, with no structural designation. Simultaneity of past and future: a work we have still not reached. Image from *Sammlung ausgeführter Constructionen schmiedeeiserner Brücken*, Mannheim, Verlag Friedrich Balsermann, 1863.

Figure 2. German Alpine Road bridge in Ramsau, according to **Alwin Seifert's** regulations, 1927-1937. The continuous curvature of the bridge body, the continuity of the slope of the side walls at the abutments and arch, and the integration of the bridge parapets make it a work of Modernity. Photo by Jürg Conzett, Chur.

Figure 3. Dorfbrücke, Vals, Switzerland, **Conzett, Bronzini, Gartmann** (engineers), conceptual collaboration: **Peter Zumthor** (architect), 2010. An enriched regionalist Modernism. Through its position and by avoiding the sidewalks, the bridge creates a portion of the village square. The side walls consist of load-bearing gneiss from Vals in conjunction with the concrete slab. Photo by Martin Linsi, Einsiedeln.⁷

Figure 4. Sihlhochstraße in Zurich, **Soutter and Schalcher, Hans Eichenberger** (engineers) and **E. Schindler** (architect), 1974. An elegant structure construction fell into disrepute due to its location. Photo by Martin Linsi, Einsiedeln.⁷

Figure 5. Widening of the Valemberbrücke, Cinuoschel, Switzerland, **Conzett, Bronzini, Gartmann** (engineers), 2006. A Modern concrete design frames the old bridge using prefabricated supports and upholds at the same time a respectful distance. Photo by Martin Linsi, Einsiedeln.⁷

Figure 6. Goldach Viaduct, Switzerland, **Weder & Prim**, 1971. A powerful work of classical Modernism. Large, elaborately produced spans frame the landscape. The two bridges are defined by their position and the proportions of the pair of pillars. Photo by Martin Linsi, Einsiedeln.⁷