

THE ROLE OF IRON IN BADEN ARCHITECTURE 1810-1860

Hans Jakob Wörner

In this paper, the relationship of the Baden architects Weinbrenner, Hübsch, Eisenlohr, Bercksmüller, etc., active between 1810 and 1860, to the constructional material iron is to be examined and some practical examples for the application of this new material in this period will be given.

In the first half of the 19th century, Baden was indisputably a major centre of Classicistic style, a focal point in Germany's architectural development. Before dealing with Baden architecture, we may briefly recall some facts important for the later application (they will, of course, be dealt with in greater intensity by other contributors to this Colloquium): in 1740 the first coke oven functioned, in 1767 the first railway rails were cast in England, in 1784 Henry Cort had introduced the trend-setting puddling process in iron smelting, in 1785 the French architect Ange employed the first known truss frame ceiling construction in his house in Boulogne. As is well known, England was initially the leading country in the use of the new building material iron. Belgium was the first country on the Continent to go into competition with England, followed soon with great success by France: in 1811, F.J. Bellanger constructed the first iron cupola over the corn hall in Paris with a span of 39 m; from about 1820 on, the use of iron in construction work was particularly widespread in France, it is no coincidence that the first double T-beam was invented there.

The application of the new building material iron reached such an extent, even in the first quarter of the 19th century, that by 1825 production could not keep up with demand and the first difficulties with supplies occurred. Even here the fact cannot be ignored that in the first half of the 19th century iron was to be regarded as a very expensive building material for the situation at the time, and this particularly so for those countries with no iron production of their own worth mentioning, something which we shall be returning to again later. The occurrence which pushed through the acceptance of the construction material iron with force in Baden was thus first and foremost railway construction, which with its bridges, station sheds, etc. imperiously demanded the use of iron.

Even the 18th century had occasionally employed iron in Baden, one of the most superb examples for this is the imposing arrangement of the Durlach Gate in Karlsruhe with metal parts manufactured by Wilhelm Jeremias Müller in 1773 (demolished, unfortunately, in 1875). The first major architect from Baden in the 19th century was Friedrich Weinbrenner (born in Karlsruhe in 1766, died there in 1826). Son of a carpenter and himself a carpenter, employed initially in the family carpentry business, he turned to architecture and undertook long study tours in this connection: in 1787, Zürich, 1789, Geneva-Lausanne, 1790, Vienna, Dresden and, in particular, Berlin (where he had contact with Langhans, Becherer, H.C. and J. Genelli, Asmus Carstens, etc.); the study tour with the most far-reaching consequences was, however, undoubtedly that to Rome from 1792 on, where he studied Roman architecture by means of thorough archaeological studies and impressive attempts at reconstruction, and there he encountered Johann Christian Reinhardt, Aloys Hirt, Karl Ludwig Fernow, etc., and in addition there were journeys to Pompeii and the temples of Paestum 1794/96; Paris 1806. From 1797 or 1800 on, Weinbrenner was in the service of the state of Baden (as senior director of building from 1807 on).

He trained more than one hundred pupils at the School of Building in Karlsruhe, which was largely his foundation, including the architects C. and F. Arnold and particularly Heinrich Hübsch who was to become his successor as the senior civil servant in charge of building in the Grand Duchy of Baden. There can be no doubt that in the course of his extensive journeys (Paris!) and as a result of his far-reaching connections, Weinbrenner had also heard of and seen the new building material. And yet there is no trace of this, either in his work or in his theoretical writings. Whereas even behind the heaviest classical entablature (such as, for instance, the cornice of the Margrave's Palace at the Rondellplatz in Karlsruhe) wooden truss constructions are concealed which are just faced with stone blocks, even in his manuals, Weinbrenner knows only an architecture in stone and wood (e.g. "On the important Parts of the Arrangement of Pillars and the present Method of Building of Italians, French and Germans", Tübingen 1809 or "Architectonic Manual", Tübingen 1810-1835). For here Weinbrenner had had considerable constructional-technical interest from the very start (cf. his efforts to save wood in the construction of roof frames), but these were concerned exclusively with stone and wood. It is particularly noticeable how he deliberately avoids the very mention of iron when dealing with England. Apart from Italy, France, etc., Weinbrenner also recommended the would-be architect a journey to England, "then mainly on account of the agricultural way of building and the wood constructions, Germany and England"; not a word about Britain's even then widely famed efforts in the field of iron construction! Weinbrenner's aversion towards iron becomes even more obvious when he does not completely exclude the use of iron by his pupils, but warns about its use because the behaviour of iron itself and in connection with other construction materials is completely incalculable: "Thus metals are also to be used with regard to their content and their integral parts for solidity, for in the case of buildings it is always better if as many materials as possible are connected and constructed with themselves, as it is not seldom the case that heat, cold, dampness, etc. have varying effects on the same and thus in a completely natural fashion, through varying effects, one material can damage the other". (1) Weinbrenner's successor as senior inspector of building was Heinrich Hübsch (born in Weinheim in 1795, died in Karlsruhe in 1863). He spent his years of apprenticeship and study in, among other places, Darmstadt, Heidelberg and especially at Weinbrenner's School of Building in Karlsruhe. Just like Weinbrenner, Hübsch also undertook long journeys and stayed in Italy for some time, whereby he admittedly -- an important difference -- studied the classical Roman period less than early Christian architecture, making painstakingly exact measurements and, in part, reconstructions (which he later published in a luxurious work on early Christian basilicas in Italy); further destinations were Paris, 1840, London (!), 1846, Vienna, 1856, etc. Even while still a student at Weinbrenner's school of building, Hübsch said that he had recognised that Classicism, for all the esteem it enjoyed when coping with building tasks of the day, could no longer be the correct attitude to style and there -- precisely for the construction of churches -- the study of the early Christian basilica would offer itself -- improved, admittedly, by the "technostatic" progress which had been made in the meantime, particularly in material saving vaulting. By "technostatic progress", the use of iron is also understood in principle, but, admittedly, only in principle, because, strangely enough, to the same degree to which Hübsch concerns himself with constructional developments in the building trade, his pronounced and at times polemically expressed aversion to the constructional material iron, or, to be more precise, aversion to according iron a

formatic influence of the structure grew. Hübsch, of course, also employed constructive iron parts as concealed parts, however, he is never prepared to leave the "complete and round", the solidity of stone construction, in favour of the "thin and pointed" of a visible iron construction.

Heinrich Hübsch did not only become known through the erection of a series of large buildings -- particularly in the field of church construction -- but also through his widely disseminated art-theoretical writings. Even if his buildings employ iron parts in a constructive connection in concealed positions (for instance for the vaulting forms invented and propagated by him, which were supposed to reflect the "technostatic progress"), in his writings he decisively rejects proper iron construction. Thus, for instance, in his work "Architecture and its relationship to present-day painting and sculpture", (Stuttgart, Tübingen 1847), he writes: "The better side of the present" has forged a new link with Christianity. Admittedly, "... here and there, threatening symptoms ... namely a brand new religion and moral bereft of belief and conscience under the aegis of superficial rough and ready education wants to proclaim the eve of a considerably different, quite new ... era. If those half-educated people with pretensions to the whole were really to attain hegemony in intellectual and aesthetic matters, then there probably need not be much further talk of real poetry and art. Instead of the monumental church, for instance, the elegant industrial hall in cast iron -- painted in the most modern lacquer and equipped with the pseudo-monumental glory of pier-glass and gold-fringed with velvet portières to attract the haute volée -- would become the architectural prototype"(2)The most noble constructional task was, even at that time, "the great mother church", one could cheerfully ignore"... the broad rooms of riding schools, industrial halls, train sheds, etc., which being for completely material purposes, cannot raise any claim to a monumental roofing"(3)The dignity of architecture required -- for instance in church construction -- imperiously a monumental, that means essentially a stone vaulting: "May our main churches thus not renounce monumental dignity to such an extent that they virtually issue a testimonium imbecilitatis to present-day technology with the use of a wooden roof, or that they copy the consumptive architecture of the English industrial foundry with an iron ceiling"(4)In other words, iron construction is to be rejected for representative architectural tasks, because it is unmonumental, im-moral and, in the last resort, anti-Christian. If it then definitely has to be so, then iron construction would, at the best, apply for purely functional construction which does not wish and could not raise any claim to be architecture.

On the other hand, Heinrich Hübsch was technical architect enough to be fully able to recognise the advantages of certain constructive iron elements. His main target as artist was the realisation of his principles of formation ("the complete, round"). As iron construction does not correspond to these principles of formation for wide stretches, it is rejected as a whole, there where it by chance approaches those principles of formation, it is tolerated in details. This would explain why Hübsch recommends the employment of iron connecting pieces.

"This task (relatively slender pillars and widely spanned arcade) can, apparently, only be solved by employing a shallow vaulted ceiling, so that the iron connecting piece is moved up as close as possible to the appropriate wall arch and it can be slightly more connected with it by short suspension pillars, and that the thread-like thin emptiness can be taken away from it by means of decoration without having to conceal much of the free view through the whole room". (5)

A work by Heinrich Hübsch which was highly regarded -- even in this connection -- in his own time, is the pumphouse erected between 1839

and 1842 in Baden-Baden, the pointed arch arcade motif of which was widely copied (see below). Heinrich Hübsch's aversion was also directed against the ornaments made in cast iron; one can almost hear this rejection when he says: "Let us beware of the narrow, regularly fluted foliage with its mathematically exact spiral twirls (where one does not know whether they are copied from the plant or the shell-fish kingdom).." (6) To summarize briefly, one can say about Heinrich Hübsch that his buildings (especially, for instance, the pumproom in Baden-Baden, the Landestheater in Karlsruhe or, indeed, the orangery with the greenhouses in Karlsruhe which represent a specifically iron architecture) cannot be imagined without Hübsch, as an architect active in the middle of the 19th century, being fully aware of the new construction material iron and its possibilities of constructional application. The important thing is that he decisively rejects iron as a constructive element, even visible iron construction with constructional artistic aspirations, and this for ideological reasons; iron was too material, lacked monumentality and architectural quality (it is almost as if Hübsch here guessed the later antipathy between architect and engineer), it was irreligious and un-Christian in church construction.

Another Baden architect was in a close, in many respects, pupil-like relationship to Heinrich Hübsch, namely the man who played a decisive rôle in the introduction of the construction material iron into Baden architecture: Friedrich Eisenlohr (born 1805 in Lörrach, died 1855 in Karlsruhe). Like the other architects in Baden in the 19th century, Friedrich Eisenlohr also undertook long journeys at the beginning of his career as an architect, including 1827/28 to Italy, in 1832 he became a teacher at the Polytechnic, in 1853 director of the school for building. Apart from his own house in Karlsruhe and a number of larger structures and designs (among others, the impressive Ortenberg Castle near Offenburg, church designs for Baden-Baden and Offenburg), the fact that became decisive for Eisenlohr and for the introduction of iron as construction material in Baden architecture was that from 1840 onwards he was put in charge of the entire construction works for the Baden State Railway, and that meant, in particular, the railway line Heidelberg-Haltingen (near Basle). (One would here recall that Baden - in contrast to other states - introduced the railway right from the start as a state institution and less through private companies). Whereas Eisenlohr designed station buildings as single structures for the large towns (Mannheim, Karlsruhe = old station, Heidelberg, Freiburg = still present as remains, which were all, however, lost again through later development and through the destruction of the Second World War), for the large majority of smaller stations, down to the block-keeper's hut, he prepared schematic plans. -- Eisenlohr, who was a superb draughtsman (for instance, views of the Black Forest, the Alps and Italy), also made a name for himself with his art-theoretical writings ("Speech on the building style of the modern period", 1833, "Wooden Buildings of the Black Forest", 1853); of particular importance -- also with regard to the rôle of the constructional material iron -- is the work "Ornament in its application to various objects of building structures", 1849-1867.

If one wished to assume that Friedrich Eisenlohr, as a railway architect, would have particularly encouraged and supported the introduction of the construction material iron -- indispensable for railway construction -- then that is a mistake. As his publication "Wooden buildings of the Black Forest" in 1853, among others, shows, - in which Eisenlohr produces, among other things, meticulous surveys of Black Forest farm houses, their construction, their constructional parts and their ornaments, - Eisenlohr is not just a pronounced supporter of wood construction, but also, in a very pointed fashion,

of the opinion that the buildings (thus, the somewhat smaller stations, block-keeper's huts, etc.) had to conform as far as possible to the surroundings, i.e. for example, the wooden structure of the Black Forest farm house. Accordingly, he also designed fretwork ornaments for external decoration or, for instance, decorative wooden links for ceilings and panelling in the interior of such buildings (e.g. designs for Baden-Baden station). In his designs (which were not constructed) for the great halls of the station in Freiburg, the visible roof structure, which would have been exposed to smoke from the locomotives, is conceived in wood. The fact that this attitude was not restricted to railway structures is shown, for instance, in the plans which were carried out for the Kurhaus in Badenweiler, envisaged for the most part as a wooden construction, with wood ornaments with reference to the Black Forest.

In other words: in the case of an architect who, as a railway architect, was confronted with pronouncedly modern and technical structural tasks -- clearly continuing in Weinbrenner's and Hübsch's tradition -- a surprising reluctance is revealed with regards to the new construction material and, put briefly, it is in most respects the ideology: Black Forest House style wood. In this connection there is also Eisenlohr's design, described as "unfortunate", for the housing for a cuckoo clock in the shape of a railway linesman's hut.

But yet Eisenlohr, the cautious, many-sided, critically sensitive architect was not able to manage to cope with the enormous tasks set for him in railway construction without iron. The most important source of information here was, as can be seen from his drawings, England (as J. Chlewing has shown, the whole introduction of railways in the Grand Duchy of Baden was in accordance with English practice): "Train shed in Manchester, 1837" is the legend beneath one of his drawings. -- The wooden construction of his platform halls in Freiburg was not carried out, in their place came a platform canopy (of which the slender cast-iron pillars with Corinthian capitals are still extant today). Finally, Eisenlohr even designed ornaments to be produced in cast iron, probably because he was of the opinion that if the (undesirable) introduction of the new construction material could not be prevented, the same should at least be given decent forms (and that meant classical ones with acanthus foliage, Corinthian capitals, etc.).

Eisenlohr's successor as head of the construction department of the Baden State Railway, Lukas Engesser, worked in close dependence on both Friedrich Eisenlohr and, especially, on Heinrich Hübsch. The structures for the Baden railway line Basle-Waldshut-Constance -- as well as the various larger church buildings which he erected in his later capacity as head of the archiepiscopal office of works in Freiburg -- are to be attributed to him. The community of interest with Heinrich Hübsch becomes particularly evident, for instance, in the railway station building in Waldshut erected in 1856, a five part structure developed in late Classicist symmetry, the central section of which repeats the pointed arch motif of Hübsch's pumproom in Baden-Baden, and even employs the iron connecting system, which Hübsch recommended, literally (still extant today), whereas the cast-iron pillars with their Corinthian capitals and struts, panelles with acanthus foliage, follow Eisenlohr's pillars in the Freiburg platform canopy as also suggestions from his ornament work (unfortunately removed a few years ago). In the later structures which Engesser erected or participated in (Lörrach St. Bonifaz, the church in Freiburg St. Georgen, the Catholic churches in Schopfheim, Mülheim, Höllstein, etc.), iron does not play any further rôle as a creative element.

Here, that development is hinted at which becomes more evident, for instance, in the development of the architecture of the Baden architect Joseph Berckmüller (1800-1879): the fact that despite the constant

rejection of iron in principle, the preparedness to actually admit this constructional material as an exception was relatively greatest around the middle of the century, that is in that phase of a certain closeness to technology in Eisenlohr's work; he was described as "Baden's Bürklein". Later development again turned away from this proximity to technology. Joseph Berckmüller in the forties, as his church in Bonndorf shows (1842-1850), is closely connected with Heinrich Hübsch; his building erected in 1865-1875, formerly for the collections of the Grand Duchy (later the State Library) in Karlsruhe, proves him to be a master of the Neo-Renaissance. Up to now, I have attempted to describe the main lines of development in the attitudes of Baden architects towards the new constructional material iron between 1810 and 1860, now, in conclusion, I should like to draw attention to the actual application of iron within this framework. The most common fields of application, even at the beginning of the century, are iron railings, the cornices of church spires, in belvederes and particularly for the balconies of profane structures (this is all already to be found in Weinbrenner's work). A rich application occurring shortly afterwards particularly of cast iron is to be found in the small lattice-work, usually decorated with acanthus foliage, in the French windows so popularly employed in bourgeois house construction from the eighteen-twenties to eighteen-fifties (e.g. in Friedrich Arnold's works; especially abundant in the Biedermeier period districts in Schopfheim, Lörrach, Freiburg, etc.).

The broadest application which iron had in Baden between 1810 and 1860 was in railway permanent way construction, particularly for the bridge structures, e.g. the Hauenstein viaduct (railway line Basle-Waldshut), and particularly in huge lattice-truss, tube structures for the Rhine bridge erected in the course of the building of the line Waldshut-Koblentz (Switzerland) linking the state railway of the Grand Duchy of Baden and the Swiss North-Eastern Railway (today Swiss Federal Railways). This bridge is not only the oldest railway bridge between Germany and Switzerland, but was also for many years the only one (the railway bridge between Gross and Klein-Basel was not constructed until much later). At the time of its completion, the next railway bridge across the Rhine downstream was in Mainz. This imposing lattice tube construction is still in use today and is in the process of being restored at the moment.

To summarize, it can be stated that in Baden architecture between 1810 and 1860 (the period under review here), the new construction material iron was certainly known from the long journeys and manifold connections among the architects, and its technical-constructional advantages had certainly been seen (for instance by Hübsch, Eisenlohr, Engesser), that iron as a constructional element had, however, been expressly rejected. And this not in a backward sense of provincialism, away from the main stream of life, but in an area which can be considered to be one of the focal points of German architecture in the 19th century. This reserve towards the use of iron was not, however, just for creative reasons: in a country without any iron production worth mentioning, iron was always an extremely expensive construction material. About 1840, it is said that it was considered completely unpromising for reasons of cost that iron would ever attain greater importance and be able to compete with brick and natural stone. In addition there were the difficulties, mentioned above, in iron supply.

In rejecting iron for design reasons, the Baden architects were by no means alone, rather the discussion about the acceptance or rejection of iron as an artistic design element in building prevailed for the whole of the 19th century. Thus, for instance, in the case of J. Ruskin, archaeological knowledge led to the rejection of iron as not being

authentic. Streiter remarked in his "Architectonic Arguments": "Wherever iron constructions of considerable size are open and appear in their own right, they appear brash towards artistic design". (7) Whereas Lübke does not see a new form of artistic construction appearing from the application of iron, Teichlein regrets the meagreness and brashness of iron construction. According to Wolff, iron lacks "... the necessary plastic fullness in order to complete the architectonic whole to an adequate degree". Semper regarded iron construction as "poor soil for art". Cornelius Gurlitt is of the opinion "The quarrel reverberated for a long time on the question as to what rôle iron ... should be accorded in architecture ... Style broke down with iron, aesthetics also broke down". (8) Just like Gurlitt, in the end the saviour of French cathedrals, Viollet-le-Duc, adopted a more conciliatory, more compromising attitude when he adopted the opinion that when restoring medieval structures, one should, for reasons of decency, also employ medieval building construction, but in cases where the problem was the erection of completely new structures, iron was to be accorded its appropriate place: "Pourquoi donc alors construire comme on le faisait pendant le dernier siècle ...? L'antiquité, le moyen âge qui, certes, ne possédaient point nos ressources matérielles, ont été plus hardis que nous, plus inventifs ...". (9)

Notes

- 1) Weinbrenner, F.: Über die Solidität von Gebäuden. Architectonisches Lehrbuch. III. Teil, 1825. Briefe und Aufsätze, hrsg. von A. Valdenaire, Karlsruhe 1926, P. 25.
- 2) Hübsch, H.: Die Architektur und ihr Verhältnis zur heutigen Malerei und Sculptur, Stuttgart/Tübingen 1847, P. 138.
- 3) Hübsch, H.: op. cit., P. 147.
- 4) Hübsch, H.: op. cit., P. 151.
- 5) Hübsch, H.: op. cit., P. 156.
- 6) Hübsch, H.: op. cit., P. 165.
- 7) Streiter, Architectonische Streitfragen (nach Gurlitt, C.: Die deutsche Kunst des 19. Jahrhunderts. Ihre Ziele und Taten, Berlin 1899, P. 465.
- 8) Gurlitt, C.: op. cit., P. 463.
- 9) Viollet-le-Duc: Entretiens sur l'architecture, Paris 1872, P. 56.

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