

SAYNER HÜTTE AND ITS PLACE IN ARCHITECTURAL HISTORY

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Building History

The Trier Prince Elector, Clemens Wenzeslaus, had founded ironworks in the valley of the River Saynbach in the years 1769-70 which very soon supplied the Middle Rhine area with pig iron and ornamental castings. After the Treaty of Lunéville the ironworks had become the property, first, of the House of Nassau and, in 1815, of the Prussian State. At that time it consisted of two blast furnaces, several hammer mills, the moulding shop and various ancillary buildings spreading along the hill and assigned to two working levels.

After the takeover of the ironworks by Prussia the plant had to shoulder greater responsibilities, especially for the expansion of the fortifications of Coblenz and Ehrenbreitstein, for which the Sayner Hütte had to supply all kinds of iron parts, such as structural iron, pipelines and tracks, but also machines and guns (1). The volume of foundry work and the increased importance of the plant caused the Prussian Mines Inspectorate in Bonn to establish the office of the new Supervisor of Mines and Ironworks on the right bank of the River Rhine, in the town of Sayn, in 1817. This position was taken up by Karl Ludwig Althans, a young man of 29 who initiated the prime of the ironworks. In addition to reorganizing plant operation and supervising Prussian ironworks in the Siegerland district, one of his first major duties was the construction at Sayn of a new blast furnace and a large foundry hall in which to manufacture the required parts. There is not time enough now to trace the vita of Althans in more detail. However, it should be mentioned that in later years he made a name for himself as an industrial builder, ironworks expert and mechanical engineer in a multitude of technical installations and inventions so that, in retrospect, he can be numbered among the leading engineers in the first half of the 19th century (2).

Also the production of ornamental castings, which had been one of the activities of the ironworks already in the Kurtrier period, now became a large-scale operation at Sayn. For this purpose, close contacts had been established with the two other important Prussian ironworks, those of Berlin and Gleiwitz (3).

The building history of the ironworks in the following years up until 1830, when the foundry hall made of cast iron was completed, has not yet been completely elucidated. However, it has been possible to shed some light on new facts not previously known (4). Soon after taking up service Althans must have worked on the expansion of Sayner Hütte. As early as in February 1821 he reported to the Mines Inspectorate of Bonn, his superior authority, that some part of the ironworks not specified in more detail had been completed, most probably the small foundry hall with the high chimney shown on the 1821 New Year's medal. On November 26, 1824 he submitted to the Mines Inspectorate his plans and cost estimates for another new building of the ironworks, and on January 8, 1828 he sent "the latest redrafted version of the blueprint for reconstruction of Sayner Hütte". At the same time he indicated that "the plan of the whole ironworks and the different load bearing members meeting the increased requirements" had already been authorized by the Berlin Building Inspectorate to allow the "castings needed for construction" to be fabricated. In order to be able "to cast in the vertical position large pieces and also the columns for construction of the ironworks", a deep pit tapering off at the bottom had been excavated in the later hall area with a wall made up of

concentric cylindrical sections. The draft plans by Althans must have passed through various stages and must have been submitted to the supervisory authorities at Bonn and Berlin more than once before their final form had been found. Also building the hall in cast iron does not seem to have been planned from the outset, as was indicated by Althans in 1828. When drafting the final version of his plans he asked the Mines Inspectorate for a copy of the "Sammlung architektonischer Entwürfe" bei Karl Friedrich Schinkel (5); this request becomes very significant when one traces the form of the hall and the motivation of the "Greek" and "Gothic" building details. For, Althans first seems to have been undecided whether to design his building in the Classicistic or Gothic Revival styles, a phenomenon encountered frequently also in the work of Schinkel (6). This assumption is confirmed by two views of the ironworks before 1828 and around 1830 drawn by the mining official Carl Osterwald. Osterwald, an excellent draftsman who also supplied drafts for ornamental castings (7), on the first drawing shows a three-nave solid foundry hall with a portico in front at the place of the later cast iron hall. It is doubtful whether this is only a draft inserted into the environment in anticipation or whether the ironworks actually existed that way, even if only for a short period of time. For, already on March 12, 1830 Althans submitted to the Mines Inspectorate the drawings of the completed cast iron hall and the ironworks building. After a very short time the hall had to be expanded by four trestles, which activity was completed by 1844.

A different report deals with the fate of the ironworks, which took another sudden upswing in the following decade when it came under the management of Krupp, but then experienced a major decline in the course of this century (8).

Description of the Building

Let us first turn to the building as completed: In order to increase the capacity of the ironworks and to be able to cast the long pieces required, a new blast furnace facility with sufficient technical ancillary rooms and a spacious wide foundry hall had to be built. Althans had them erected close to the blast furnace as a three-nave basilica of six trestles spanning an area of approximately 24 x 29 m, which was later extended by another four trestles in the western direction. The glazed area of the upper loft and an additional attachment for ventilation in front of the blast furnace admitted light to the hall and allowed the flue gases to escape. The three trestles in front had been broadened by another nave with a penthouse ceiling in order to accommodate two air furnaces and technical supporting systems. Inside the hall there is the overwhelming light cast iron truss structure freely spanning the room between the hollow pillars 6.50 m high, with Doric capitals in the longitudinal and transverse directions. Slender three-centred arch trusses extend from wall to wall in the transverse direction, carrying the overhanging roofs of the aisles. Their self-supporting central areas, like the trusses in the longitudinal direction, primarily serve to secure and reinforce the whole system. Above them there are the elevated trusses of the upper loft almost Gothic in appearance; they are reinforced by broad window bands in the transverse direction. Above the front trestle of the nave the skylight, already referred to above, rises as the third level above suspended fish-bellied girders.

The entire hall is traversed in the longitudinal direction by a conveyor train suspended from the trusses of the upper loft and the centre area and additionally reinforced by diagonal braces. It could be walked on and was connected by staircases with the furnace throat

and the casting level, terminating in a connecting bridge in front of the facade. Eight swiveling jib cranes attached to the round pillars were available to transport castings into the aisles (9). In the west, the hall terminated in a high glass wall with cast iron ribs formed as delicately pointed arches in front of the aisles and as a large half sun in the nave. When the hall was expanded, it was advanced, while the centre field receded by one pillar axis; around 1870 it was destroyed when a new cross hall was built.

Classification in Architectural History

We shall not try to decide whether two completely different ironworks followed each other in a very short period of time or whether the first version of the draft was never executed. In fact, the two solutions involve completely opposite aesthetic principles: the Classicistic and the Gothic Revival styles. In their functional assignments, dimensions and cubic forms the two solutions are similar: in the rear there is the high blast furnace building with its aisles, in front of it a three-nave foundry hall with an elevated nave. Transverse gables lean against the solid walls of the aisles. Also the way in which light is admitted and windows are assigned to the areas of the buildings and the flanking chimneys of the foundry furnaces are similar in both designs. But there are tremendous differences in the details: on the one hand, there is a massive building structure of a rigid cubic outer shape which owes to Friedrich Gillys' architecture. The windows show geometric forms, mostly based on circles. Particularly striking features are the wide arched windows of the machine rooms resembling half suns and the large semi-circular opening in the blast furnace building. In addition, there is a simple Doric portico. It is quite possible that the Classicistic version of the ironworks had the structural elements of the interior already planned for implementation in cast iron in order to prevent fire hazards. The two Doric columns of the portico are erected roughly in the axis of the later cast iron principals.

By contrast, let us consider the hall as it was implemented: a filigree lattice of cast iron supports and trusses constitutes a structure which is inherently stable and reinforced on all sides, while the lateral walls only enclose the rooms. In between there are the large glazed western wall and the broad windows of the upper lofts as a thin network. Even if the design of the hall and the iron structure can still be explained on technical grounds, the subdivision of the windows and the design of the trusses in the Gothic Revival style must have been due purely to aesthetic reasons.

Strangely enough, Althans did not link these details to examples from the High Gothic period, although ornamental castings from Sayn in that period had mainly been based on such concepts, following the models of K.F.Schinkel. In a way, Althans went back beyond Schinkel, returning to the early years of Prussian Gothic Revival under Gilly and Langhans. Reference must be made here to an example often quoted, although it is much less important: the drill hall built by David Gilly on Berlin's Keibelstrasse (before 1790) (1), whose tympanum had been closed by a glass wall with steep intersecting timber ribs. The hall had been spanned by a pointed barrel vault of timber planks which must have influenced Schinkel's concept of the riding hall of Prince Albrecht in Berlin, which was completed in 1831 (11). K.G.Langhans also used these steep intersecting ribs for the spire of Marienkirche of Berlin and in the "Gothic" Angelhaus (12) in Charlottenburg Park. That even in the sixties of the 19th century the more sophisticated ornamental castings were based on models of the High Gothic period, whereas

simple bars ending in multiply intersecting pointed forms were used for such uncomplicated iron parts as balcony balustrades, is evident from the catalogues of ironworks of that time (13). So, the windows of the hall were done in a kind of "naive" Gothic Revival style, while the slender round supports of the hall had Doric capitals, probably relicts from the earlier design by Althans. Also the short cast iron columns carrying the round blast furnace shaft are Doric elements, and so are the intermediate supports of the upper loft windows.

Let us come back to the overall spatial impression created by the building: slender round columns subdivide the hall into three naves approximately equal in size. They are spanned by a single-piece truss the shape of a basket handle which actually is attached above the columns. The self-supporting centre, which makes an even stronger impression now, without the former crane rails, only served for stressing. Above it is the sequence of trusses of the upper loft which rests on high pillars and has a Gothic appearance. In fact, we find a mixture of two systems: a sequence of flat trusses closely related to bridge building, and the trusses of the upper loft in a pseudo-Gothic style based on church buildings. No comments by Althans about the shape of the room have been preserved. Accordingly, in trying to trace back the examples of the three-nave hall with its six trestles we must rely on conjectures: Since there were no large halls of comparable size in early industrial architecture, and since the mostly single-nave riding halls and ballhouses of the princes were much smaller, Althans must have found his models in church building. The Berlin Building Inspectorate may have suggested, perhaps in connection with the intended use of iron, that he have a look at Schinkel's designs. Issue 5 of this series of publications contains plans for St. Gertraud's Church on Spittelmarkt of Berlin, a three-nave hall with six trestles, a campanile, and a separate, almost circular choir, a building in the Gothic Revival style whose floor plan shows a striking resemblance to the foundry hall of Sayn. In the place of the vault of the choir of St. Gertraud's we find the circular blast furnace shaft over a rim of Doric cast iron columns, and instead of the slender granite pillars planned by Schinkel there are the round cast iron columns.

Another influence is conceivable: In those years the state Supervisor of Building in the district of Coblenz was the Municipal Building Surveyor of that city, Johann Claudius von Lassaulx. Bendorf and Sayn were in his area of responsibility. Contacts between the two builders are not referenced in the literature, but they should not be excluded, because both men were involved in the construction of the fortifications of Ehrenbreitstein (14). Lassaulx had just completed his plans for the Neo-Gothic Catholic parish church of Treis-on-Moselle, a three-nave hall church with a slightly elevated centre, whose naves were separated by round pillars. With five trestles of an overall length of about 27 m, an overall width of approx. 20 m and round columns 7.85 m high the dimensions were similar to those of the foundry hall of Sayn. The basilica form, which initially stemmed from practical reasons of admitting light to the upper loft, can probably be traced back to an example of the abbey church of Marienstatt which Althans must have passed quite frequently on his trips to the Prussian ironworks along the River Sieg. Again, strong round columns separate the nave and the aisles, which have a total width of 22 m, i.e., a building as wide as that of Sayner Hütte. If one compares the structure with the Cistercian abbey of Altenberg, with the same basic elements of the nave, the dependencies on church building of Sayner Hütte become more and more evident. The towering nave with light coming in through the upper loft, the curved longitudinal and transverse trusses supported

on round columns and the western front made of glass are identical basic elements. If we add the large wall of glass, the broadening of the hall into a transept, and the connection of the blast furnace, which takes the place of the altar room and whose brick access arch plays the role of a triumphal arch, these connections become even more pronounced.

Details of the transverse trusses allow direct links to be established to early English bridge constructions. In 1776-79 the first cast iron arched bridge with a span of 31 m had been built over the River Severn at Coalbrookdale which Althans probably saw when he was in England (15). Comparing the bridge with the cross section of the hall of Sayn clearly shows a relation in some details of the trusses. The first cast iron bridge on the European continent had been built in 1796 over the Striegauer Wasser near Laasan in Lower Silesia. The iron parts had been manufactured by the Melapane ironworks which Althans had visited on one of his study trips in 1817.

The form of a Gothic church building and the technical details of bridge construction merge into a grandiose unit in the hall of the Sayner Hütte. Even if Althans absorbed very diverse influences, the spacious, almost Gothic design of the room is to his credit, an effect which was achieved again only in the second half of the 19th century in French church buildings employing iron (16). Whether the hall even was to have been regarded as "a cathedral of work", intended to sublimate and raise ideologically the processes of iron smelting and casting (17), is not for me to decide. It has not yet been possible to trace any records of the builder's ideas. On the whole, the foundry hall of Sayn is the earliest hall with a structure made all of cast iron. It has no direct ancestors, as far as the overall facility is concerned. However, it may well be regarded as a forerunner of a multitude of railway halls, greenhouses and buildings for international exhibitions to come.

Notes

1. Since 1818 Althans had been called in as a technical consultant for fortification construction by General von Aster (quoted from Erlenmeyer, loc.cit., p.8).
2. From Sayn, Althans developed a rich activity; he designed machines for mining and smelting facilities, measuring equipment and hydraulic hoists. He also acted as a consultant for steamship navigation on the River Rhine. From 1843 onwards he was responsible for the whole Rhenish district of the Mines Inspectorate. He was appointed Oberbergrat and then Baurat in 1844, raised to the rank of Geheimer Baurat and died at Sayn in 1864 (quoted from Erlenmeyer, loc.cit.).
3. It is not possible within the framework of this paper to give a more detailed account of ornamental casting (for references, see Clemen, loc.cit., p.339 and Röder, loc.cit.).
4. One more reference: Historical archive of Friedrich Krupp GmbH., Essen, Villa Hügel, Dept.WA IV 1866, 1821. The author again wishes to express his gratitude for the kind permission to study these documents.
5. Krupp Archive, WA IV 1867: The reference is contained in issues 1-9 and the second volume of issue 2.
6. For instance, in the projects for Werder Church of Berlin.

7. Osterwald also made the drawing on the basis of which the Igel column was reconstructed in 1828; from A. Thiele, Der Kunstguß auf der Sayner Hütte, in Krupp'sche Monatshefte, 1, November 1920.
8. P.G. Custodis, Zur Baugeschichte der Sayner Hütte und ihrer Restauration, in:Denkmalpflege in Rheinland-Pfalz, Jahresberichte 1976-77, XXXI - XXXII.
9. The various production steps and the technical system can be referred to only briefly. For details, see also Röder, loc.cit. and Slotta, loc.cit.
10. See J. Sievers, Bauten für den Prinzen August, Friedrich und Albrecht von Preußen, Berlin 1954 = K.F. Schinkel, Lebenswerk, edited by P.O.Rave, pp.207.
11. As above.
12. M. Kühn, Die Bauwerke und Kunstdenkmäler von Berlin, Schloß Charlottenburg, Berlin 1970, p. 218.
13. Krupp Archive: Excerpts from the catalogue of Sayn castings, no date, probably published in the sixties of the 19th century on the basis of older drawings.
14. As "commissioner in charge of the construction of fortifications" Lassaulx participated in the construction of military installations at Coblenz and Ehrenbreitstein (from Schwieger, J.C.von Lassaulx, Neuß 1967, p. 9).
15. Information contributed by the Landesmuseum Koblenz-Ehrenbreitstein.
16. For instance, in the Paris churches of St. Eugène by L.A.Lousson and S.A. Boilleau (1854-55) and St.Augustin by Th.Baltard(1860-68). See E. Schild, Zwischen Glaspalast und Palais des Illusions, Frankfurt/Berlin 1967 = Bauwelt Fundamente 20.
17. Slotta, loc.cit.