

Centennial Hall: design, structural solutions, material

Max Berg's Centennial Hall is the principal feature of the Exhibition Grounds. Its conception originates soon after Max Berg had become City Architect (*Stadtbaurat*) in late 1909-early 1910. In 1909 the City Council considers the construction of a monumental exhibition hall occupying the area of 6000 m² and the following year the decision is made to allocate the area of 14 000 m² for that purpose. In early 1910 Berg begins to design the Festhalle, developing several variants but already his preliminary designs comprise the basic features later implemented in the final version.

Berg's designs were being usually elaborated by his collaborators, among them architects Richard Konwiarz and Paul Heim and the aforementioned painter Hans Leistikow (perspective and presentation drawings). In terms of style, the earliest drawings of the Festhalle known today refer to the last phase of the architect's work in Frankfurt and his first designs originating in Wroclaw. The gigantic hall with its dome covered by a stepped roof with eight tiers is rendered in the spirit of Art Nouveau asymmetry. The ornament-free elevations are filled with monumental windows divided into smaller panes. In late 1910-early 1911 Berg modifies his design, changing the Festhalle's dimensions. The dome is to span about 72-73 metres – 8 metres more than the one actually erected. Compared to the preliminary conception, this version emphasises clarity and objectivity, the exposed structural elements suggesting the influence of contemporary engineered structures. Perhaps responding to suggestions of structural engineers, Berg reduces the size of the dome to 67 metres already in the model presented at the East-German Exhibition in Poznan.

On 28 June 1911 the City Council consents to the Hall's construction and the preparatory stage begins. Because Berg's design seems so daring and risky, the construction work is given a green light only after the stability calculations had been verified by Professor Heinrich Müller from Berlin. Günther Trauer is responsible for stability analysis on the behalf of the City Building Department (Hochbauamt) and on the contractor's side – structural engineer Schulz under the supervision of Director Willy Gehler from Dresden. The fourth stability test is performed by the engineers of City Building Police: Ernst Reissmüller and Erienkämper. Berg prepares the design's final version in July 1911. He alters the Main Entrance, presumably in response to Hans Poelzig's layout of the Centennial Exhibition. The drawings depicting this version, today also in Erkner, provide the basis for the works site execution scheme finished by Berg in August 1911 and approved by the City Council on 25 August of the same year - that is when the earthwork and laying of the foundations are already in progress.

The Centennial Hall has been laid out on a symmetrical quatrefoil (tetrakonchos) plan with a circular central space into which open four semicircular apses forming four "lobes". The inner circular space corresponds to the dome and has the same diameter of 65 metres which is roughly three times the radius of the apses. The quatrefoil unified space is surrounded by an ambulatory repeating its outline - its width approximates the radius of the apses. Like the church, the Centennial Hall is orientated. The side entrances, laid out on a rectangular plan, have been located on the two perpendicular axes (north-south and east-west); the main entrance - on the western side - has an elliptical termination. The side entrances lead into spacious square lobbies while the lobby behind the main entrance has been laid out on an oval plan. The four arcades supporting the drum correspond to the corners of two interpenetrating rectangles circumscribed about the quatrefoil's inner circle. The "pillars" supporting the arcadee

s have trapezoid cross-sections. Each arcade is enclosed by six ribs acting as relieving arches. Opposite the arcades four halls have been laid out in the ambulatory, each on the plan of a dodecagon circumscribed about an ellipse. The length of the domed interior (between the bases of the ribs of the opposite arcades) is 95 metres; the distance between the east and west entrance is about 152 metres.

Analysis of geometrical proportions suggests that the floor plan of the Centennial Hall is based on the module equal to the diameter of the dome (and of the quatrefoil's inner circle which corresponds to the dome). The size of other elements has been determined by the system of overlapping equilateral triangles circumscribed about the circle corresponding to the base of the dome and defining the arrangement of six-point stars. Thus determined, the proportions of the layout approximate the "golden rule". The same principle seems to inform the Centennial Hall's architecture, likewise based on the module equal to the diameter of the dome's base and at the same time the arm of the equilateral triangle which has been multiplied to form the system of six-point stars.

The hall's reinforced-concrete structure comprises two self-supporting complementary structural systems: the 19-metre-high cylindrical base (span 41 metres, height 16.7 metres), consisting of four massive arcades opening into the apses and topped with a massive ring which has been divided up into sections for structural reasons; and the 23-metre-high ribbed dome placed on the drum. The dome, of a slightly flattened shape, consists of 32 ribs resting on a stretched ring of the diameter of 65 metres which are held together with a compressed ring of the diameter of 14.4 metres. The ribs are stabilised by means of three concentric rings arranged at regular intervals at different heights; these form the bases of four tiers of glazed walls in a terraced arrangement covered with a ceiling. The dome is topped with a lantern composed of four stiff frames and has the form of a small dome of steel and glass with side windows (invisible from the inside) and a glazed ceiling built of large glass blocks. Thus, the light can enter the interior directly through the roof and through the side windows. A similar arrangement of windows has been used above the four arcades, while the tiers of windows placed between the concentric rings holding together the ribs of the dome support the ceiling above each respective level. The two structural systems (dome and base) are connected by means of 32 brass bearings. The interior is 42-metre-high, with the base rising to the height of 19 metres and the 23-metre-high 'proper' dome. The domed interior is a unified space; in the northern and southern apses two small galleries have been built, each laid out on a sector of ellipse. The eastern apse accommodates the "musical gallery" (stage) with the aforementioned monumental organ (no longer there) while the western apse houses the "Imperial Lodge" connected with the amphitheatre. The ambulatory is also a unified space.

The ferro-concrete structure has been left just as it left its mould, unplastered and revealing the characteristic pattern of wooden framework (planking) impressed in the wet concrete. Originally, the concrete was of a warmer, yellowish hue that wonderfully contrasted with the rusty shade of windows and doors. The walls consist of monolithic concrete frames, each accommodating a casement with three sashes. The windows are made of exotic cassowary wood imported from Australia. In order to improve the acoustics, the stepped ceilings have been covered with an insulating layer of concrete mixed with cork.

The architecture of the Centennial Hall is monumental, volumetric, static and symmetrical, its expression emphasised by horizontal accents of the stepped tiers of windows. This symmetry has been disturbed by a staircase built west of the main entrance in the late 1930s. Horizontally, the Centennial Hall is divided into two spheres: the sprawling bottom section and the stepped upper section whose design has been dictated by the need to illuminate the domed interior. The horizontal emphasis is reiterated by the projecting cornices above each of the nine tiers of windows of gradually (and rhythmically) decreasing height which provides a dynamic counterpoint to the massive structure, its enormous volume relieved by the glazing of the upper section. Originally, mat glass was used giving the light entering the interior a soft, diffused quality.

The main entrance is framed by a semicircular portico with eight tall concrete columns supporting a massive concrete architrave. Originally, the architrave was inscribed and was decorated with a relief by the sculptor Alfred Vocke depicting St Michael vanquishing the devil. The side entrances have a rectangular layout; each has five openings which are topped with a smooth expanse of concrete wall. The northern entrance is connected with the former restaurant building by means of a roofed pergola.

Panel IX/15

1. Structural design for the underpinning of the Centennial Hall's dome (after: G. Trauer, W. Gehler, Die Jahrhunderthalle in Breslau, Berlin 1914)
2. Structural design for the ribs of the dome and lantern of the Centennial Hall (after: G. Trauer, W. Gehler, Die Jahrhunderthalle in Breslau, Berlin 1914)
3. Structural design, cross section of the dome and lantern of the Centennial Hall (after: G. Trauer, W. Gehler, Die Jahrhunderthalle in Breslau, Berlin 1914)
4. Structural design for the Centennial Hall's lantern (after: G. Trauer, W. Gehler, Die Jahrhunderthalle in Breslau, Berlin 1914)

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