Summary

Objekttyp: **Group**

Zeitschrift: **Bauen + Wohnen = Construction + habitation = Building + home : internationale Zeitschrift**

Band (Jahr): **13 (1959)**

Heft 8: **Betonbau = Construction en béton = Concrete construction**

PDF erstellt am: **18.07.2024**

ceux du sud étant petits et les autres grands. Le hall d'entrée et de réception occupe le rez-de-chaussée et l'entresol. A l'entresol, une passerelle mène à l'ancien bâtiment. Les bureaux occupent 22 étages. Tout autour du rez-de-chaussée, 14 supports en acier de 48 cm de diamètre et 30 mm d'épaisseur de paroi, distants de 7,20 m sont reliés à 8,50 m de hauteur à une poutre-caisson en acier, haute de 1,20 m et reposant visiblement dans des coussinets articulés. Cette poutre-caisson supporte la construction en tubes d'acier Mannesmann distants entre axes de 1,80 m. Ces tubes sont des colonnes articulées tous les deux étages. Des poutres d'acier, formant les plafonds, mènent par des assemblages articulés au noyau où elles sont suspendues dans des sabots égalisant les tolérances entre les parties en béton et celles en acier. Toutes les parties nues en acier ont été revêtues d'un enduit Vermiculite appliqué au pistolet et ignifuge.

Summary

Systematics of Skin Constructions
(pages 262—266)

Each ordering principle is an auxiliary aid; it is, therefore, always designed for a specific purpose. The statics engineer, for example, will so order the field of skin construction that constructional forms which, from the point of view of calculation, are handled in similar ways are united into groups. An articulation is significant for the architect, on the other hand, when it arises from visible shapes and not abstract concepts, and when it describes what stems from these shapes, remaining based, however, on the visible. All possible skin shapes can be divided into two large groups according to their type of upper skin curvature: the first group comprises all skins which are only curved in one direction; the second all those which have another curvature in addition to that in one direction (Ill. 2). The double-curved skins can be shaped in the form of a dome (main curvatures running in the same direction) or in that of a saddle (main curvatures running in opposite directions). The difference between a single and double-curved surface becomes visibly apparent if the concepts of evolvable and non-evolvable (oblique) are introduced. The enclosing surface in the shape of a single circular cylinder can be evolved in a plane, whereas the evolution of a surface formed by a hyperbolic parabola is not possible. A further essential difference between single and curved surfaces lies in their different static behaviour. In the case of the ideal skin shape all external forces (own weight and useful load), including the avoidance of bending moments, are absorbed solely by means of the transverse and longitudinal forces. It is, therefore, only possible to bridge the largest spans with membrane-type constructions. This ideal tensile state is fully attained when the skin is doubly curved and the curvature itself is not too flat. In the case of single-curved skins (e. g. barrel skin, Ill. 2 lower right) a tensile state which is free of bending moments only obtains if the end tangents run off vertically to the impost (e. g. semi-circular barrel) and a weightless peripheral member is positioned along the impost area. As this peripheral member has to assume considerable tensile forces, it cannot be weightless. The given weight sets up a peripheral disturbance in the skin and produces bending moments: the ideal case of a tensile state which is free of bending moments cannot arise. The barrel skin, as a single-curved surface, is to be designated as a skin, it is true, and should also be calculated according to the laws of skin theory, but it approximates, however, in its static behaviour to a normal beam.

Single-curved skins (Ill. 2)

The barrel skin shaped like a cylindrical surface was developed by Dischinger and Bauersfeld in the twenties, in order to create a wide range of employment for skin constructions in industry (Ill. 5). From the barrel skin comes the skin shed, which allows for the unsupported spanning of larger areas and, because of its curvature, a corresponding increase in the shed's illumination (Ill. 6). The penetration of cylinder skins enables cruciform, square and polygonal areas to be bridged. Depending on the spatial effect desired, the penetration can be in the shape of a groined vault (Ill. 7) or a cloister vault (Ill. 8).

Double-curved skins

Main curvatures running in same direction (dome skins) (Ill. 3). The market hall in Algeciras built by Eduardo Torroja can be mentioned as an example of a dome skin constituted as part of a sphere. Along with rotation surfaces, the translation surfaces have a certain significance in this building. The skin constructions of the rubber factory at Brynmawr are designed in accordance with a translation surface (Ill. 10).

Main curvatures running in opposite directions (Ill. 4). The Parliament Building in Chandigarh by Le Corbusier should be mentioned as an example (Ill. 11). In industrial construction cooling towers are frequently designed in the form of a single-fold rotation hyperboloid (Ill. 12). The Radiation Laboratory in Mexico City by Felix Candela was created by the joining together of two identical hyperboloids (Ill. 13). All horizontal sections yield hyperbolas, all vertical sections yield parabolas. Another possibility of design with hyperbolic paraboloids is shown by a warehouse in Mexico City, which was likewise constructed by Candela (Ill. 14). The individual "mushrooms" are composed of four hyperbolic paraboloids which are cut along their straight generatrices.

Within the group of double-curved skins with main curvatures running in opposite directions, however, still another division is to be made which combines the guide surfaces in one group. Guide surfaces accordingly are all curved and are produced by the movement of a straight generatrix along one or two directrices. The single-fold hyperboloid, for example, is a rotation surface as well as a guide surface; the hyperbolic paraboloid is a translation surface as well as a guide surface. The general definition of generation by a straight line does not, however, suffice for the determination of such a surface. It has to be established according to what laws the straight line cuts the limiting lines. In the case of the hyperbolic paraboloid (Ill. 4 lower left) the generatrix divides two straight lines at an oblique angle to each other into an equal number of parts and on each generatrix into parts of equal length; in the case of the conoid the generatrix has to be moved in such a way that it always intersects a fixed axis and always remains parallel to a fixed plane (Ill. 4 below); in the case of the single-fold hyperboloid the generatrix divides the two identical directrices into two equal parts (Ill. 4 lower right).

Building in reinforced concrete involves high labour costs, and the reduction of outlay on skins is therefore of considerable importance. Using guide surfaces with straight lines as generatrices, the skin can be manufactured with the aid of narrower, straighter boards. If the surface has two groups of straight generatrices—this is the case with single-fold hyperboloids and hyperbolic paraboloids—the skin boarding can be laid in the direction of one generatrix and the wood stiffeners in the direction of the other. Ill. 17 shows a construction based on two hyperbolic paraboloids in which the two straight generatrices are drawn in.

Wholesale Market in Florence
(pages 267—269)

The municipality of Florence is constructing the city's wholesale market for vegetables, fruit and meat on an area of 359,000 m^2 on the plain to the west of the town where the express highways meet. So far, 123,000 m^2 have been built up. The middle hall, which measures 180 x 50 m. and has glass skylights, serves as a market hall for agricultural produce. It has been executed in reinforced concrete. The constructional elements were prefabricated on the building site.

Ice Hockey Stadium (pages 270—271)

This ice hockey stadium is, I think, our finest building; I am very proud of it. We solved the problems in a logical manner and the results came from what we were presented with. An ice hockey stadium seating 2,800 people had to be built. For occasions other than ice hockey matches it had to be possible to augment the number to 5,000 seats. The question was posed: how should this area be covered best? Working with the engineer, Fred Severup, we developed a suspended roof, which hangs from both sides of a central arch that spans the whole length of the ground. The cables are connected to the large arch and to the two curved outer walls. The convex outer walls form a counterpart to the central arch, for their ground plan is the same shape as the vertical projection of the arch. They are, therefore, inclined outwards, in order to reinforce the constructional effect and to make the rhythmic flow more easily visible. The wood covering of the roof looks like the skin of a boat. The only visible parts of the construction are the lively arches and the cables under the skin of the roof. Concrete, ice and the dazzling light complement one another and give an impression of brilliance and lightness to people, so that they feel they are floating.

Steiner House at Bellach
(pages 272—275)

The poured-concrete cellar floor constitutes the foundation on this sloping site, and a concrete pillar has been set up at each corner of the square ground plan; these pillars are connected to one another by means of peripheral girders. An inner wall was required as a supporting wall to act as a wind bracing. The reinforced concrete skeleton is provided with 1 m. wide glass elements or 50 cms. foam concrete slabs (see design sheet). The slabs are polished on both sides. The window elements consist of a wooden frame and a pane of laminated glass. The joints have been stopped with glass silk and putty. The front hall, kitchen, lounge-dining room and study are joined by means of harmonica walls—these, however, generally remain open. Uninterrupted views all round create the spatial configuration of the interior and its relation to outside. A large multi-purpose room in the basement, with windows on the south side, can be used in several ways (games room, workshop, wash room, drying room, heating room and tool room).
The house took 3½ months to build.

House of a Family of Musicians
(pages 276—279)

The Leicht house stands in what was once a quarry, at the foot of a 7 m. wall of rock. The lounge and the entrance on the north side are connected by a flight of steps; they are neither separated from each other by a vestibule, nor by an inner wall. Depending on the season and weather, the lounge and the garden serve for performances of intimate concerts. In front of the lounge is a half-covered 3.75 x 7.50 m. balcony, which at the same time acts as a cover for a grass seating-area in front of the practice room. The musicians give performances on this lawn in the open air; the balcony overhang serves as a sound encloser and protects the instruments of the players from any sudden storm. The special demands for room acoustics and sound dampening have given rise to no extra costs. The acoustics in the curtainless lounge are very pleasant, in spite of the unpolished concrete ceiling and the shiny linoleum; a wall of books and, principally, the horizontal and vertical spatial rhythms prevent too lasting a reflection of sound from the hard, shiny upper surfaces. The sensitive stringed instruments, the large windows and flat roof which combat dampness, the small amount of absorbent building materials employed, the necessity to keep the windows shut when music is being played and the heating-up of the rock in the sheltered site—all these factors made the installation of a winter air-conditioning plant necessary. The air expelled from the lounge is taken off under the steps on the ground-floor; the stream of warm air at the top of the entrance takes the place of a vestibule.

Bohler Administration Building in Vienna (pages 280—282)

Building with the materials of our time in the second half of the century is still as much an exception in tradition-laden Vienna as it is in all those European cities where the abundance of old buildings testifies to the brilliance of the past. Such examples in other places must be evaluated as are similar buildings in Milan, Geneva or Rotterdam. The supporting elements (pillars and ceilings) in the Bohler administration building are carried out in reinforced concrete. The ceilings are only 15 cms. thick; the elevation pillars from the first to the seventh floor are only 20/35 cms. thick. The loads on the pillars on the side facing the street are carried above the ground-floor by a 2 m. high granite-covered reinforced concrete girder and from there carried further on pillars which stand at intervals of 12.10 ms. from one another. The reinforced concrete slabs are covered with cork matting to dampen sound. The cold air entering is checked by curtains of warm air, instead of vestibules.

Restaurant in Pittsburgh
(pages 283—284)

The building is to be constructed on the slope of Mount Washington above the confluence of the Ohio, Allegheny and Monongahela rivers. The front part of the building is set on the steep ground with the help of three cross-shaped concrete pillars. Beneath the first floor each separate into four cantilever arms, from whose ends the elevation pillars are led three storeys up to the roof over which they pass, each again divided into four cantilever arms. 6.50 m. long reinforced concrete beams spanning the building are fitted into the grooves of the cruciform elevation pillars. The 6.50 m. longitudinal girders are laid on these lateral girders. The restaurant on two floors and the bar on the lower floor offer places for three hundred clients. The glass front is not set up as one unit, but is recessed at every second support. In this way the frontage is lengthened and the number of "places by the window" increased.

Lambert Bank, Brussels
(pages 285—286)

It is rather surprising to find architecture by Skidmore, Owings and Merril which at first looks as if it corresponds more to the work of the American "classicist" Stone. The building is sited on the Avenue Marnix and the Place du Trone, facing the statue of King Leopold II and the palace gardens. The architects are of the opinion that confronting such a monumental neighbourhood and the brick and stone fronts with a glass and metal elevation would be out of keeping. A reinforced concrete construction has been elaborated which—carried out to its logical conclusions—has led to the creation of an elevation which agrees in size and form with the buildings nearby. The loads of the elevation section are carried on prefabricated elevation pillars. The cross-sections of the pillars have approximately proportional bending moments. The horizontal element of the pillar assumes the function of a peripheral girder. Loads at half-storey height are borne by a ball joint in rustfree steel. The glass front is set 1 m. behind the pillars. At first glance the building appears to be significant and fitted for its purpose, and there is no doubt that the formal character of the elevation agrees with the construction, but it leads to a type of form which is related to that of the classicists in its formal structure—which is what the architects were aiming at, too. The preceding example shows that the unity of the formal character, of the style, has not been achieved by the agreement of constructional method and form alone. It shows, too, that deliberately historical elements can be brought about by new construction methods. However, these are usually illogical at the time of building or unfunctional when the house comes to be used. The ceiling panels, which project about 1 m. above the glass skin in front of the deeply-recessed offices, and the enlarged spans of the ceilings show this fact here clearly. The formal discrepancy between the glass skin and the advanced columns is noticeable.

It is interesting to see that Americans meeting the problem of historical environs in Europe for the first time stumble over the principles of modern architecture which have caused headaches to many an uncompromising European, who has thereby been led to glance enviously at much-praised America.

Three-Dimensional Forms
(pages 287—288)

In recent decades types of supporting structures — three-dimensional surface supporting structures—have been developed, which have extraordinary load capacities, in spite of their thinwall construction, because of the spacious vaulting employed. Their predecessors are the vaults and domes which for long periods in the history of architecture were the only means of covering spaces greater than the length of a log. Up to the present time, however, only spacious supporting structures of a pronounced beamlike character were able to be carried out on a wide basis, and for this reason we have the long cylinders and shed skins, which are nonetheless beams, but which, however, possess a certain lateral extension. For although the means are at hand for large-scale spacious structures, ideas are generally embedded in the concepts of the "beam age." In the following, a typical large construction is given as an example; the buckled skin—a three-dimensional thinwalled skin with a square or rectangular ground plan, which only has to be supported at the corners. The skin can give spans of up to 40 ms. in both directions and cover an area of 1,600 m² without support. Large complexes of sheds can be covered with a minimum of support at low cost. A block of four has only one internal support, for example. Daylight can come through large openings, in the crown of the skin into the shed. It has been found with examples already carried out that each skin only needs a five-metre opening, for the skin skylights were far more effective than windows which let light in from the sides. Domes of seamless synthetic materials are used in skylights and with them the light comes in diffused and with no dazzle-effects.

Mannesman High-Rise Building, Düsseldorf (pages 289—298)

The 48 x 70 m. building site is bounded on the west side by the street running alongside the Rhine and on the east by a park with a small lake in it. So as not to fill the gap completely between the two existing buildings with the new structure, it proved desirable to orientate the long side of the recessed building perpendicularly to the Rhine. All the east, west and south sides consist of office rooms—small offices in the core section towards the south, and large offices towards the east and west. The entrance and reception hall is located on the ground-floor and mezzanine. A connecting bridge leads from the mezzanine to the older buildings. The offices are housed in twenty-two storeys. Fourteen tubular steel supports encircle the ground-floor—each is separated from the next by an interval of 7.20 ms. and has a diameter of 48 cms. and a wall thickness of 30 mm.—they are connected to a steel box girder at intervals of height of 8.50 ms. The 1.20 m. high encircling peripheral girder rests in freely articulated plates, which are visible from outside, and which are located on the tubular supports. The tubular steel construction (which is made from Mannesman tubular steel) is built on this peripheral girder and has an axial interval of 1.80 m. These tubes are socketed stanchions and have articulated joints every two storeys. Steel girders, which form the ceilings of the storeys, are led by means of knuckle joints to the core, where they are suspended in a shoe which takes up the tolerances between concrete and steel. All open steelwork has been sprayed with plaster as a protection against fire.

Inhaltsverzeichnis