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Summary

On this Issue

A few years ago prefabrication was still only an area of experimentation for a few scattered architects. It has now become workaday routine. The majority of German and Swiss enterprises have their system and are about to prefabricate elements in their own plants. One of our issues last year dealt extensively with the development of these systems. We are here mainly interested in actual applications. In a future number devoted to prefabrication we shall take up certain new developments, especially that of spatial cell structures.

The introductory article by Arnim Neumüller treats fundamental problems having to do with the development of structural systems. In this context we are presenting university buildings, office buildings, government buildings and housing. Our flashback is concerned with the high school of Ludwigsburg, an interesting example employing prefab elements and dating from the 60's. This is the first school of this type in Baden-Württemberg.

Gernot Minke furnishes information on his pneumatic structures, classifying them and giving a survey of inflated thin membranes.

The subject of Interior Design takes us to Vienna with the installation of the OSPAG information centre in a 19th century building.

Our feature for this month is the Regional Council building of Backnang by Roland Ostertag.

Jürgen Joedicke

Arnim Neumüller, Düsseldorf

Structural systems on the basis of axially modular networks or on structural grids in depth

(Pages 481–483)

The planning and the development of modular structural systems with plane elements or spatial cell structures are based on a certain number of fundamental investigations:

- Study of modules
- Determination of static principles
- Systematic development of structural nodes
- Problems of transport and assembly
- Selection of materials.

The architect is obviously present at all levels of this research. Here are some essential planning elements:

- Horizontal 2nd order network: redivides the 1st order network units with a view to establishing the structure
- Vertical network: establishes the levels.

All these networks are dependent on the human scale, on the character of the given location, on the factor of profitability as well as on existing modular systems (Modulor, etc.).

- Structural nodes: They are essential for tying together the elements, they transmit stresses and have an influence that is determining on the networks and the structural system.

A distinction can be made between two fundamental network principles:

- The system of modular axes which gives rise to closed structural systems; i. e., no carrying element can be dismantled, which reduces the flexibility of the 2nd order elements.
- The system of structural grids in depth, where the static function is ensured by a primary structure. Each element is therefore capable of being removed, which permits unlimited flexibility.

Closed reticulated structure

Heinle, Wischer + Associate, Stuttgart

Departments of physics and biology and pre-clinical department of the University of Regensburg

(Pages 484–489)

This complex is situated on the south side of the university between the department of mathematics and the athletic installations.
In the competition program (May 1967), the client required that the pre-clinical and biology departments constitute a flexible whole composed of rhythmically disposed zones favouring interdisciplinary contacts. Moreover, the communications routes had to be so laid out that the students do not disturb research activity.
To resolve these problems, the architects avoided vertical development. The complex is made up of buildings of two or three floors lighted and ventilated naturally. Each level is devoted to a specific function:
Basement: service, deliveries, storage, technical installations, etc.
Ground floor: teaching staff, students, auditoriums, practical projects, collections, cloakrooms.
Upper level: research and classrooms.
The structure is composed of prefab elements on a grid of 7.20×7.20 m. The interior partitions are of light concrete. The easily accessible and alterable technical installations are without suspended ceilings.
Despite its strictly functional character, the complex remains on the human scale owing to its low-silhouette volumes and its numerous interior courtyards and its highly differentiated fittings.

Total cost of the operation:
approx. DM 200,000,000

Built volume:	m^3	353,500
Utility area:	m^2	37,900

Office building with prefab wall elements

Yoji Watanabe, Tokyo

New Sky Building, Tokyo

(Pages 490–492)

This building is situated in the Shinjuko district on an especially narrow site. Every unit, however, opens on to a south balcony, owing to the arrangement of the wall elements. The problem for Watanabe was to express a symbolic shape tending to show that structural cell units can be arranged like the leaves of a tree.
The program called for the installation of offices and flats. Ground floor and first floor converge in an entrance zone. Above, there are 3 office floors topped in turn by flats, 4 units per floor.
The building has a steel skeleton construction. The outside walls are composed of sheet-metal panels 2.3 mm thick plus insulation.
This building appears to be constructed of industrially standardized spatial cell units. In reality, these elements are not used consistently from the structural point of view.

3 residence groups and a system

(Pages 493–496)

In our Issue last year devoted to prefabrication we presented the Jankoswiss system. Out of the buildings realized since with the aid of this system we have selected 3 examples, located in Switzerland.
Cf. construction details on p. 14.
Niederwil: This complex comprises 5 houses in a continuous strip. Each house, with a surface of 130 m^2, is conceived on its own separate plan, with identical program. 3 workers and a crane operator can assemble a house in one day.

Trübbach (arch.: W. Schlegel)
This group of 3 units in series was executed with the aid of the Jankoswiss system in order to cope with the difficult terrain, which does not permit the construction of ordinary cellars.

Structural details
These details apply to the Swiss variant, which comprises 5 floor elements, 6 wall elements and 2 connecting elements.

Pneumatic constructions

Gernot Minke, Ulm

Definition and classification

(Pages 501–503)

Pneumatic constructions are all structures whose design and stability are obtained by means of the inflation of a skin which is thus kept tense. However, this general concept includes many systems which ought to be classified.
In the first place, we have to limit the notion of carrying structural cell. There should be eliminated all objects which are not buildings (containers, furniture). Finally, we ought to exclude all constructions where the difference in pressure between the media separated by the membrane is not really a structural element (sail, parachute, balloon). When all these limitations are taken into account, we get down to a more precise definition: stabilized thin shell structure. In fact, the word pneumatic indicates only that the stabilizing medium can be either liquid or granular. These differentiations and exclusions are clearly expressed in Ill. 1.
A distinction is made between low pressure systems (differences ranging between 0.001 and 0.01 at. or 100 kg/m^2 on the membrane) and high pressure systems (differences ranging between 0.02 and 7 at. or pressures on the membrane ranging from 2000 to 70,000 kg/m^2).
closed or open, carried by the medium
The membranes can be simple or multiple or filled with it. The presence of supporting elements or supplementary stabilizing elements is also important for the classification. In wide spans there are either support points or linear elements (cables). Ill. 2 shows 16 different systems. Low and high pressure systems differ moreover in their shape and carrying function. The former have, in general, a primary function and transmit stresses directly to the foundation. The latter are, in general, made up of juxtaposed elements which carry loads like girders (ill. 3). The sketches represent 64 possible combinations of simple or double membranes.

Gernot Minke, Ulm

Membrane stabilized by inflation with supplementary stabilization by support point or linear system

(Pages 504–508)

In projects of this type, the size of the building is an essential factor in the selection of the carrying system and of its design.
The tension on the membrane being proportional to the interior pressure and to the radius of curvature, it is often necessary to reduce this tension with the aid of secondary carrying elements. If, in addition, account is taken of wind effects, of the heating system, of maintenance of internal pressure, it can be seen that the difficulties increase rapidly with increase in span. These problems are resolved by the utilization of supplementary stabilizing elements. Cf. Ill. 1, A, B, C, D. With spans of over 30 meters it begins to be advantageous to employ these elements.
In this type of structure, it is aerodynamic forces and not interior pressure which are the dominating factors, especially the effects of wind suction.
The examples illustrated give an idea of the different technical and formal potentialities for structures of this kind.

Interior design

Emil Donau, Vienna

ÖSPAG information centre, Vienna

(Pages 509–512)

The ÖSPAG company manufactures "Austrovit" sanitary equipment and "Lilien" porcelain known throughout the international hotel industry. It also is the Austrian representative of the Swiss company "Schweizer AG für Keramische Industrie, Laufen". The information centre is installed in the former "Rappaport" palace. It is open to private customers as well as to wholesalers, retailers and specialized dealers. Its main function is not so much to engage in publicity as to advise those who require solutions to their problems.

The historic classical façade facing the Opernring demanded a great deal of tact and sensitivity of the architect. There is no visible advertizing sign of any kind, and the new centre is well integrated within its historic setting. The bays, which are semicircular, have been stripped of their wooden mullions and equipped with glass panes giving the passer-by a clear view into the interior of the centre. On the inside the elimination of a central cross-wall permits sufficient depth. A gallery was added and the basement extended and fitted out. There is available a total of 620 m^2 on 3 levels connected by stairways and a lift.

On the ground floor and on the gallery, the porcelain products are displayed, in the basement the sanitary equipment and the products of the Swiss company. A small conference room is available for orientation meetings.

The construction materials, natural coloured eloxidized light alloy, cork facing, orange-red wall-to-wall carpeting, and the correctly placed lighting fixtures contribute to the optimum presentation of the articles.

Feature

Roland Ostertag, Leonberg
Associate: J. Bertz, R. Haisch

Regional council of Backnang

(Pages 513–516)

The site is located southwest of Backnang and is steeply sloping; it is very exposed from the town-planning point of view.
The new building was intended to centralize all the local administrative services. There was organized a competition, for which Roland Ostertag, in 1965, won 1st Prize.
The architect concentrated on tying in the new volume with the existing building to form a complex that harmonizes with the skyline of Backnang. All the services accessible to the general public had, moreover, to be grouped on the ground floor.
The new volumes are on an L plan and with the old building enclose an inside courtyard. The main wing is perpendicular to the slope and descends in tiers towards Erbstetterstrasse.
On the ground floor, an entrance lobby gives access to all the public services. The council hall is connected up with the main building by means of a transverse wing housing the department of motor vehicles.
The construction is a reinforced concrete skeleton braced by a stairwell and a vertical wall.