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ment. La maille des planchers (2,40 m) est prévue pour une charge de 500 kg/m². Les parois extérieures et les murs intérieurs sont des panneaux sandwich avec isolation thermique ou phonique intermédiaire.

Hansjürgen Sontag, Berlin

Le gros œuvre de l'université libre de Berlin

(Pages 401–404)

Le plan proposé par les architectes Candilis, Josic et Woods est remarquable par un certain nombre de notions nouvelles:
1. Une manière de penser l'université. Celle-ci se compose à la fois d'individus isolés et de leur propre groupement, auxquels correspondent des fonctions opposées mais également essentielles telles que: Calme et activité, isolement et échanges, individualité et collectivité.
2. Un style d'organisation spatiale qui est le reflet construit de l'idée précédente. Le binôme individu-collectivité semble trouver sa forme bâtie la plus idéale dans un complexe de hauteur réduite (2 étages) et un système de voies intérieures (Tous les 66 m) définissant clairement des unités fonctionnelles.
3. Par l'intégration du facteur temps dans un programme forcément éphémère et fixé, ce dernier devient un élément évolutif à quatre dimensions, riche en possibilités d'extension et de variabilité, ce qui correspond bien à une université en transformation permanente.
4. Une langue technique adéquate doit être trouvée qui exprime les quatre dimensions de ces volumes en mouvement qu'elle doit concrétiser.
Le gros œuvre est tel qu'il ne comporte pas de points durs, pas de contraintes de trame hormis les contingences statiques.
La structure est démontable et ses éléments sont préfabriqués avec une grande précision (Tolérance ± 1 mm). Par son interespace de 1 mètre entre la dalle et le faux-plafond, le système convient très bien aux nombreux équipements techniques.

Stéphan von Jankovich, Zürich

Ordre modulaire dans le bâtiment

(Pages 405–409)

La révolution dans l'industrie du bâtiment de l'après guerre qui inventa la préfabrication n'a pas tenu ses promesses. Actuellement 90% des logements européens sont édifiés à l'aide de méthodes traditionnelles. L'organisation atavique des entreprises et de la profession contraint l'architecte à disperser son énergie en «management». De nos jours l'architecture est une affaire déficitaire, constatation d'autant plus aberrante qu'elle se situe à notre époque.
Il existe actuellement de nombreux systèmes de construction par éléments préfabriqués. Mais pour être valables ils doivent être complets et assez universels pour conquérir un large marché.
La variabilité et l'adaptabilité sont tout aussi importantes. En un mot ils doivent donner à l'architecte le moyen de créer librement des formes géométriques à l'aide d'éléments peu nombreux et peu spécifiques. De toutes les méthodes existantes, celle des grands éléments lourds sans direction privilégiée est la plus favorable, c'est à dire la moins limitative. Toutes les grandeurs doivent être comprises dans un ordre modulaire aussi universel que possible. Mais depuis des décades de recherches on n'a pas trouvé un système qui soit idéal pour le logement. Le «Modulor» de Le Corbusier avec ses deux séries ne fut jamais utilisé conséquemment. La série bleue semble pourtant être très proche de cet idéal et le système Jankoswiss s'en approche de très près. Basé sur les grandeurs de 0,20, 0,60, 0,80, 1,40, 2,30, 3,60 et 6,00 m il laisse toute liberté quant au choix des matériaux. Le nombre des éléments types se réduit en principe à 2 plateaux de plancher et 6 panneaux de murs intérieurs. Les équipements techniques y sont incorporés mais les escaliers sont exclus du système. Une grandeur de 20 cm détermine les appuis et les épaisseurs constructives.
Grâce aux quantités importantes d'éléments produits, on a pu en registrer des moins-values de 8 à 14% sur les méthodes constructives traditionnelles sans parler d'avantages tels que: Gains de temps, simplification de la planification par réduction du nombre de grandeurs et grande liberté dans la composition architecturale. L'étude des détails se trouve très simplifiée, les travaux de descriptif, devis et décompte peuvent être présentés sous forme de tableaux et de listes.
En un mot le système Jankoswiss grâce à son universalité permet la composition de caractère individuel au milieu des contingences de la standardisation industrielle.

Planification d'une université à l'aide d'un système de construction par éléments préfabriqués

Planification d'ensemble: Universitätsbauamt Erlangen

Faculté technique de l'université d'Erlangen

(Pages 410–414)

La faculté technique d'Erlangen-Nuremberg fut fondée en 1962 et inaugurée en 1966. Les buts et la forme de son enseignement ont un caractére bien particulier.
En raison du manque de place on l'a implantée à 3 km de la ville sur un terrain de 30 hectares. Le programme de la 1ère étape comprenait 20 chaires d'enseignement avec équipements généraux, centre d'ordinateurs, informatique, en tout 15 hectares bâtis devant être achevés en 1974. Grâce au système de préfabrication il fut possible de respecter les délais très courts et de parer au manque de main-d'œuvre de chantier.
Le système basé sur une trame de 1,20 m × 1,20 m répond aux exigences suivantes:
- Fabrication en usine ou sur place.
- Construction et aménagements distincts.
- Possibilité d'édifier jusqu'à 8 étages avec une charge unitaire de 2000 kg/m².
- Plancher en dalles plates sans poutre, les installations étant réalisables sans plafonds suspendus.
- Petit nombre de pièces différentes.
- Pas de direction constructive privilègiée.

Développé par l'ingénieur V. Luft d'Erlangen, le système a fait ses preuves à tous points de vue malgré des formes constructives très différenciées telles que planchers à cassettes à poutrelles, balcons de fuite etc. ...

Werner Lutter, Gelsenkirchen

Urbanisme et circulation

(Pages 415–418)

Les besoins humains fondamentaux, habiter, travailler, se reposer et se distraire ne peuvent être correctement satisfait si l'on ne résoud parallèlement les problèmes de déplacement.
Les bases légales qui définissent les éléments à prévoir pour la circulation existent, mais il faut les compléter par un plan général qui tiennne compte d'un développement futur toujours difficile à estimer dans des ensembles résidentiels nouveaux. Un bon exemple de plan nous est donné par celui de la ville de Stuttgart.
Depuis la voie romaine jusqu'au damier de New York en passant par les villes résidentielles historiques, le réseau des voies de communication à connu bien des développements. De nos jours, il se différencie et se complique toujours plus. Le plan établi pour le territoire de la Ruhr est significatif à ce sujet. Il englobe toutes les catégories de circulation: métros, routes de différentes classes etc. Il en définit les caractéristiques et ceci non seulement pour les voies rapides, mais aussi pour les voies d'accès aux quartiers sans omettre le nombre de places de parking et de garage à prévoir. Comme la distance qui sépare ces derniers des habitations doit se limiter aux alentours de 100 mètres, des problèmes d'implantation ardus sont posés à l'urbaniste architecte.
Mais la ville idéale pour l'automobile n'existe pas, il importe aussi de tenir compte des transports publics. La notion de domaine réservé aux piétons, d'abord accueillie avec réserve, semble maintenant acceptée comme allant de soi. Cette énumération ne peut épuiser un problème aussi complexe. Par exemple que penser de l'introduction de nouveaux systèmes de transports en commun (train sur coussin d'air, monorail etc.). Il faut en poursuivre les études même si aucun d'eux n'a encore dépassé le stade expérimental.
L'urbanisme est un processus évolutif permanent. La Charte d'Athènes (1933) a perdu de son actualité. Certaines propositions comme les maisons collines de Marl prévoient des formes d'habitat nouvelles intéressantes, mais qui présupposent une évolution dans notre conception de la propriété foncière.
Il est certain que de nouvelles formes urbaines naîtront, mais il n'y fera «bon vivre» que si les problèmes de circulation y sont résolus.

Ensemble résidentiel à la périphérie d'une ville

Wolf Irion, Stuttgart

(Pages 419–422)

L'ensemble de logements de Lauchhau près de Stuttgart est situé sur la plaine Filder entre Vaihingen et Büsnau, auprès d'une forêt. Il se compose d'une série de bâtiments différenciés où, pour échapper à la monotonie, on a évité tout processus purement additionnel. Comme équipements on trouve une école maternelle, un groupe de boutiques et des parkings divers.
Le type d'habitat standard est un immeuble est-ouest à deux couloirs où chaque appartement se divise en une zone diurne et une zone nocturne. Les immeubles tour et les habitations individuelles sont conçus de manière similaire.
Les bâtiments portent sur des murs transversaux. En collaboration avec la société Wolfer et Goebel, Heimsheim et au moyen d'une standardisation élaborée, les architectes ont pu réaliser des économies importantes.

Lothar Stock, Karlsruhe

Système de meubles

(Pages 423–424)

Développé en 1967–68, ce système se compose d'une unité de structure en acier standard pouvant être équipée d'éléments de remplissage variés correspondants à la fonction à laquelle est destiné le meuble.

Summary

On this Issue

The term "building system" nowadays occupies an important place in the discussion of architectural problems; for many it is synonymous with progressiveness. What are we to think of this? Where is the difference between this method and the traditional construction system or the notion of the carrying structure?
As a general rule, in scientific theory, what is understood by a system is a multitude of things with at least one relation among its elements. Element is, in this connection, defined as a basic part, it no longer being possible to make any sub-divisions if it is desired to retain the intrinsic qualities of the system.
Since we have to do with building systems, the elements involve not only the construction, the carrying structure, but all elements of the building: rough construction and finishing. We can understand, accordingly, by the term building system the total range of all building elements which stand in at least one relation to one another.
In architectural practice, the concept of building system is usually restricted by its connection with the notion of prefabrication and, in part, with that of industrialized construction.
Building systems, however, which correspond to this definition are rare in actual practice. In most cases, what we have are prefab part-systems for the carrying structure, i.e. those building parts which are necessary to the solidity of the building.
The examples given in this Issue show prefab systems with partial fill-in elements. On the other hand, Schulitz' proposal, the SCAG project, is to be regarded as a proposal for a possible building system in the full sense of the term.
The theme of the Issue is enriched by two contributions on the subject of town-planning, with Lutter examing the relationship between town-planning and traffic. The Lauchhau residential complex is an urban peripheral colony with relatively high density.
In the column "Furniture and Decoration" we present a furniture system by Lothar Stock.
The discussion for this month takes up the problem of architecture competitions, and the article on building research the definition of characteristics as part of the planning process. Jürgen Joedicke

Helmut C. Schulitz, Los Angeles

SCAG

(Pages 389–393)

SCAG is a residential project for Los Angeles which tries to respond to changing user requirements and changing levels of desired performance by change in the hardware assemblage. SCAG implies resident participation in constructing and changing the individual environments.
User requirements cannot be measured on an absolute scale. The desired level of performance is not only different for

different users, but it also changes over time as a result of new technological advances and potentials.
The life span of buildings has decreased rapidly as the cycles of obsolescence have shortened. The main problem arises out of the discrepancy between physical deterioration and functional obsolescence.
Total flexibility has proved to be very expensive and therefore not practicable, since it could not take into account the real needs for differing degrees of adaptability at an economically justifiable cost.
The adaptability may be too sophisticated because the need for change of some components might not occur for the whole time of their useful life, and at the same time it might not be sophisticated enough to accommodate the needs for the rapid change of certain other components.
It is the method of assemblage which allows us to determine the degree of adaptability. In the development of the SCAG project two concepts of assemblage have been established: indeterminate assemblage-determinate assemblage. The indeterminate assemblage suggests a non-hierarchical assemblage system of components which are not determined for a special location, but can form an indefinite number of configurations and can be replaced independently. The determinate assemblage is a way of combining elements or components in such a manner that they are determined for a special location and form a rigid and more or less unchangeable object.
The two concepts of assemblage seem to be contradictory but they coincide with the trends of today: the desire for wider choice and the desire for a more packaged environment.
SCAG uses both methods of assembly in order to achieve the highest possible overall adaptability at the lowest possible investment.
The SCAG assemblage structure forms an unspecified space accommodating those functions for which the equipment is more important than the enclosure. The enclosure cannot be too closely tailored to these functions. The unspecified space has no identity by itself; it is given identity only by the equipment and enclosure components.

Hans G. Riehle, Freiburg i. Br.

Prefabricated school. Primary school and high school at Herbolzheim i. Br.

(Pages 394–396)

This school complex grouped about a polyvalent central hall with adjoining gymnasium had to meet the needs of a highly exacting building program in order to be eligible for public subsidies. Bearing this in mind, however, it was also necessary to make allowances for future alterations (interchangeability of rooms, various extensions, etc.). This was attained with the aid of a prefab construction system, with adequate modules, utilizing honeycomb girders. As it is light in weight, it requires only limited foundations, and at the same time it accommodates the technical installations. Reinforcing is provided by a service core forming a compact unit with the foundations. The elevations are composed of prefab sandwich panels and eloxidized windows.

Steel construction system 665 Homburg

Development of the system:
Konny Schmitz, Dillingen-Saar,
in association with Homburger Stahlbau GmbH, Homburg-Saar

Junior High School, Saarlouis

(Pages 397–400)

The basis of the system is a carrying skeleton of steel, whose elements, reduced in number, are mass-produced. The problem was to get the structural parts assembled by an only partially skilled labour force. A universal system of sections for unions and facing resolves the problem in a very elegant fashion.
In this way a school with a volume of 30,000 cubic meters was erected in 7 months. The thin folded sheet-metal sections reduce assembly difficulties and greatly eliminate construction errors.
The building rests on standard foundations, and the structural elements, having a span of 2.40 meters, rest on their uncovered supports. The floor grid measurement (2.40 m.) is provided for a load of 500 kg/m^2. The external partitions and the internal walls are sandwich panels with intermediate thermal or acoustic insulation.

Hansjürgen Sontag, Berlin

Steel construction system of the Free University of Berlin

(Pages 401–404)

The plan proposed by the architects Candilils, Josic and Woods is remarkable for a certain number of new features:
1. A special way of conceiving of the university. The latter consists both of isolated individuals and of groups, to which correspond equally important though contrasting functions, such as: quiet and bustle, isolation and merging, individuality and collectivity.
2. A style of spatial organization which is the structural reflection of the preceding idea. The individual – collectivity polarity seems to attain its ideal constructed form in a complex of reduced height (2 floors) and a system of internal communication routes (every 66 meters) clearly defining the functional units.
3. By the integration of the time factor in a program that is perforce ephemeral and fixed, the latter becomes an evolving element in four dimensions, rich in extension and modification potentialities, which exactly fits the case of a university in constant transformation.
4. An adequate technical procedure ought to be found which expresses the four dimensions of these volumes in movement that it ought to concretize.
The rough structure is conceived in such a way that it does not comprise any stiff joints, as it were, or any modular restrictions aside from the static contingencies.
The structure can be dismantled, and its elements are prefabricated with a high degree of precision (tolerance ± 1 mm.). Owing to its 1 meter interspace between the ceiling deck and the suspended ceiling, the system can easily accommodate any number of technical installations.

Stefan von Jankovich, Zurich

Modular order in the building

(Pages 405–409)

The revolution in the building industry in the post-war period, which saw the beginnings of prefabrication, has not lived up to its promises. At the present time 90% of all housing in Europe is erected by means of traditional methods.
The outmoded organization of construction firms and of the architectural profession compel the architect to scatter his energy in management. In our time architecture has become a deficit business.
There now exist many construction systems using prefab elements. However, to be valid, they ought to be complete and universal enough to win a wide market.
Variability and adaptability are just as important. In one word, they ought to give the architect the means to create freely geometric shapes with the aid of elements that are few in number and non-specific. Of all the existing methods, that employing large heavy elements that can be freely assembled is the most favoured, that is to say, the least restrictive. All the sizes ought to be comprised within a modular order that is as universal as possible. However, after decades of research there has not been found a system that is ideal for housing. The Modulor of Le Corbusier with its two series was never used consistently. The blue series, nevertheless, seems to draw very close to this ideal, and the Jankoswiss system approximates it very closely. Based on the dimensions 0.20, 0.60, 0.80, 1.40, 2.30, 3.60 and 6.00, it leaves full liberty regarding choice of materials. The number of normed elements is reduced in principle to 2 floor plates and 6 interior wall panels. The technical installations are incorporated, but the stairways are excluded from the system. A dimension of 20 cm. determines the supports and the structural thicknesses.
Thanks to the considerable amounts of elements produced, savings of from 8 to 14% have been registered as compared to traditional building methods, not to mention advantages such as: time saved, simplification of planning by reduction of the number of dimensions and great flexibility in architectural composition. Detail studies become greatly simplified, and there are financial advantages in that data can be reduced to tables and itemized lists.
In one word, the Jankoswiss system, owing to its universality, permits individualized design within the context of the requirements posed by industrial standardization.

Planning of a university by means of a prefab element construction system

Engineering faculty of the university of Erlangen

(Pages 410–414)

The engineering faculty of Erlangen-Nuremberg was founded in 1962 and inaugurated in 1966. The aims and the structure of the training offered here possess a highly special character.
Owing to lack of space, the complex was sited 3 km. from the city on grounds having an area of 30 hectares. The program of the 1st stage comprised 20 professorships with general equipment, computer center, etc., a total of 15 hectares to be built over in 1974. Thanks to the prefabrication system, it was possible to stick to the very brief deadlines and to save labour on the project.
The system, which is based on a grid of 1.20 m. × 1.20 m., meets the following requirements:

- Production at works or in situ.
- Structural frame and fill-in separate.
- Possibility of building up to 8 floors with a uniform load of 2000 kg/m^2.
- Flooring of flat slabs without girders, installations being possible without suspended ceilings.
- Small number of different elements.
- Flexible construction approach.

Developed by the engineer V. Luft of Erlangen, the system has stood the test from every standpoint in spite of the highly differentiated structural shapes involved, such as coffered floors, escape balconies, etc.

Werner Lutter, Gelsenkirchen

Town-planning and traffic

(Pages 415–418)

The basic human needs, clothing, work, rest and recreation cannot be properly met unless the traffic problem is resolved at the same time.
The legal bases defining the elements to be provided for in a traffic plan exist, but they have to be complemented by a general plan which takes into account future development, which is always difficult to estimate in the context of a new residential complex. A good example of a plan is that of Stuttgart.
From the Roman road to the street grid of New York, with all sorts of street plans in between, the communications network has undergone many developments. In our times it is becoming differentiated and is becoming ever more complicated. The plan set up for the Ruhr is significant in this respect. It embraces all types of traffic: underground railways, different types of roads, etc. It defines their characteristics, including not only the express roads but also the local feeder roads, plus number of parking sites and garages to be provided. Since the distance which separates the latter from the residences ought to be limited to around 100 meters, the town-planner is subjected to arduous problems.
However, the ideal city for the motor-car does not exist; it is also important to take into account public transport. The idea of a zone reserved for pedestrians, at first coolly received, now seems to be regarded as self-evident. This brief enumeration of problems cannot exhaust such a vast subject. There is, for instance, the notion of introducing new joint transportation systems (air-cushion train, monorail, etc.). It is necessary to pursue research in this direction, even if no plan has as yet got beyond the experimental stage.
Town-planning is a permanent evolutionary process. The Charter of Athens (1933) has lost its timeliness. Some ideas, like the residential hills of Marl, envisage interesting new types of residence, but they call for a change in our conception of real estate ownership.
It is certain that new urban forms will come into being, but the "good life" will not be possible there until the traffic problem is resolved.

Residential complex on the periphery of a city

Wolf Irion, Stuttgart

(Pages 419–422)

The residential complex of Lauchhau near Stuttgart is situated on the Filder plain between Vaihingen and Büsnau, in the vicinity of a forest. It is made up of a series of differentiated buildings, in which, to avoid monotony, any purely additive procedure has been eschewed. There are a nursery, a shopping center and various parking sites.
The standard dwelling unit is a building oriented east and west on two corridors, where each flat is divided into a day and a night zone. The high-risers and the individual units are designed in a similar way.
The buildings rest on transverse walls. In association with the Wolfer and Goebel firm, Heimsheim, and employing elaborate standardization, the architects have succeeded in effecting considerable savings.

Lothar Stock, Karlsruhe

Furniture system

(Pages 423–424)

Developed in 1967–68, this system is made up of a standard steel construction unit which can be equipped with various fill-in elements corresponding to the function to be served by the furniture.