Summary

Tihamér Koncz, Zurich

Building with spatial cells

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The industrialization of building is a logical consequence of the development of the other sectors of industry. This trend has several aspects. From the building standpoint, there is observable a shift from linear elements to surface elements, which will become, in a later phase, spatial elements. Thus, skeleton–suspended partition construction becomes the supporting partition board; the beams and the boards are transformed into ceiling elements; then the synthesis takes place, and we get the spatial cell. At the same time, the whole conception undergoes a modification. Elements are no longer prefabricated in the rough construction, but combinations are made of spatial cells finished one with the other.

The spatial cell is a building element which permits the composition of different apartment units. This cell, then, reveals the characteristics of an apartment unit and of a prefabricated element. Like every industrially prefabricated product, this spatial cell is designed to be mass-produced. That is why it is subject to the mass production, or serial, conditions obtaining for building elements and housing units. The mass production of elements is possible, then, if it is based on a dimensional coordination allowing elements to be added one to the other at will, exchanged and combined. These features all working together produce flexibility in the final construction. The characteristics determining cell building are as follows:

a) the structural and static system,
b) the combination of the spatial elements with one another,
c) the finishing stage,
d) the methods of fabrication and assembly.

Following these aspects, a fundamental distinction can be made among three main groups of ways of building with spatial cells:

a) mixed method stemming from the combination of spatial cells and large panels,
b) open spatial cells limited by the partitions on two sides,
c) closed spatial cells forming a complete housing unit, limited on all four sides by means of partitions.

In most systems of building, the chief problem is presented by the double partition. The double ceiling can be avoided if the element is closed above only, so that the ceiling constitutes part of two units.

Moshe Safdie, Montreal

Fort Lincoln project

(Pages 164)

This housing project, part of the 221–D3–FHA housing program, contains flats for people of low and medium incomes. The project is part of a larger complex comprising three groups. Each part, entrusted to a different architect, contains around 120 units.

Moshe Safdie, Montreal

"Habitat Puerto Rico"

(Pages 165–168)

This project is part of the 221–D3–FHA housing program. For it there have been developed housing units having the advantages of the "Habitat 67 Montreal", and they are adapted to the climatic conditions and to the cost schedule of this program.

However, in comparison with "Habitat 67", it was necessary to introduce so many modifications, mainly technical in nature, that it was impossible to keep the project within the limit of the specifications. Moreover, the weight of a unit has been lowered from 90 to 22 tons, the dimensions reduced, the technical installations simplified, the number of prefab pieces cut down.

"Habitat Puerto Rico" is intended to demonstrate the potential of industrialized building and at the same time to develop a type of architecture that is adapted to local conditions.

Arthur D. Bernhardt, Los Angeles

Building with components

(Pages 169–173)

Industrialization is conquering ever new domains. The industrialization of the building trades thus constitutes a logical and inevitable process. Moreover, industrialized building does not entail difficult technical problems. It demands simply the application of principles of production and organization which have long been developed. However, industralization does remain a complicated business. Although the method is relatively easy to employ, the checking and supervision of the complex system of direct and retroactive factors present numerous problems.

According to estimates by demographic experts of the United Nations, the world's population will be 15 billion in the year 2050. The simultaneous increase in the volume of building is forcing us to accept the principle of mass production, which is closely bound up with the concept of industrialization. Nevertheless, to keep open all the potentialities of industrialized building, it is necessary to come to terms with this relatively new phenomenon.

In the near future, building will employ a series of elementary, universal, interchangeable components, which, based on a large modular coordination, offer an unlimited range of designs, thanks to combinations, additions and different types of assembly. These components will be put on the market the way bricks are now. The author of the project has no influence on the way in which the components are utilized and combined by the "consumer". The final result, i. e. the finished building, is outside his control. The actual process of the project, for its part, becomes more complicated, the architect's influence more marked. Each decision entails effects on the large-scale town-planning level, that is to say, hundreds of thousands of mass-produced elements will hundreds of thousands of times constitute part of the constructed environment. The architect will be obliged to learn how to work with abstract criteria.

The application of components, elementary and neutral from the point of view of architecture, holds out great hope for the architecture of tomorrow. These theoretical observations lead on to a very concrete approach, which comes from England. The London architect Oscar Singer has developed, in association with the engineering firm of Jan Bobrowski, two structural components which it is possible to produce on a mass basis and thanks to which most of the typical problems connected with building can be resolved. By means of his system, Singer shows how organic dimensional coordination can be achieved in line with the principles of industrialization. He considers the structure as being the vertebral column of a building. A modular coordination derived from a number of primary structural components ought to determine the development of a multiple series of secondary components applicable in the following stage.

The Singer project, known as "Universal Precision Structures", consists of two components tied together by means of a hinge directly subject to the force of gravity. We have here a square steel strut (15×15 cm) one storey high combined with a concrete slab measuring 600 × 300 × 20 cm. The hinge itself has two parts of precision-worked steel. The double casing and the pivot, which are the precision hinge elements, call for automatic mass production. The struts can also be fabricated in series. The concrete slabs are poured at a constant temperature into precision – prefabricated steel moulds following the process developed by Singer and Bobrowski. This structural principle offers an opportunity of cutting building costs. Because of the vast field of application for components, there can be no doubt that the market would guarantee the continuity of orders that is indispensable for mass production.

Erich Rossmann, Karlsruhe

The potentialities of prefabrication

(Pages 180–185)

The new buildings of the Federal Engineering School, in Karlsruhe, are ideal as a basis for a discussion of prefabrication, a question that comes up constantly in connection with defining the role of medium-scale buildings. The development and the application of a prefab building system was not a result, but it constituted one of the means made available to resolve a complex assignment.

The industrial building process, i. e. prefabrication, has been chosen because of the advantages of rationalization in execution and for other reasons as well; for example, this system ensures incomparable flexibility. Moreover, the construction program called for on ordered repetition of several classrooms of equal size, i. e. double or triple the size of the smallest spatial unit.

At the time of the construction of the buildings of the Engineering School of Karlsruhe, there was developed a system in which the rough construction is largely integrated in the following stage. The widths of nearly all the rooms are multiples of a surface of 32 sq. m. This fundamental unit of the functional structure can be a strut surface and also the basic unit of the supporting structure. It possesses the width required by the spatial conditions and also serves as a basic element of the formal design. The integrated system offers sufficient flexibility to allow for proceeding to possible transformations, thanks to the functional structure of the program. In addition to the economies made possible, the integrated system requires, for the rough construction, only a few different pieces, but many series of equal pieces.

All the dimensions of the rough construction are determined by the grid of the following stage. They are multiples of 60 cm. The basic rough construction unit has an axial measurement of 7×60 =420 cm.

For the construction there has been selected a system of box panels and carrying ceiling having the width of the axis. This system represents a mixture of two main building possibilities: solid construction and skeleton. The faces are made up of suspended prefab parts. The classroom partitions are removable. The entire school enjoys automatic ventilation and lighting.

B. Calame & J. Schlaeppi, Lausanne

Operation Pont des Sauges – Lausanne

(Page 186–191)

A building complex with 6, 7, 12 and 18-storey buildings containing around 700 flats, a business and administration centre, kindergartens, underground garages, as well as a partly subterranean remote heating plant.

The first building stage comprises buildings housing 476 flats, an underground garage and a remote heating plant.

The site has a total area of 32,000 sq. meters. The average gross area per flat is 84 sq. m., per room 28 sq. m. Since the number of residents is estimated to be 1500, each person will have at his disposal an average area of 36 sq. m. The total cost of construction is estimated to be 25 million francs. The prime cost, average, of a flat is 52,520 francs.

The "Pont des Sauges" study group, made up of architects, engineers and technicians, was set up in June 1965. From the preliminary stage, the dimensional coordination theories were applied for all stages. Thus, each building element is integrated in a modular system of reference: basic module 1 m = 10 cm., working module 3 m. and 6 m., modular spaces 36 m. and 60 m.

The rough elements have been typified as follows: floor slabs 3 types, interior walls 12 types, gable ends 13 types, stairways and balustrades 7 types, parapets 1 type, cornices 4 types, various 14 types, representing a total of 54 types. From the rationalization point of view, the general conception has been studied in terms of application in situ by means of dry assembly of all elements in both stages.

Buildings 11, 12 and 13; 74, 193 and 115 m. in length respectively; are located on the northeast part of the site, along the service road. The serrated plan is obtained by staggering the 27 buildings. On the ground floors, which are partly open, there are integrated 24 flats. They are constructed on both sides of construction joints.

The quality of the flats from the standpoint of comfort, livability and acoustic insulation, was made the object of profound study taking into account a second stage entirely dry-assembled with light materials.

Each flat has a balcony, except for the 2 rooms on the northeast. The livingrooms, dining-nooks and kitchens are treated as one single living space, with partial separation obtained by means of furniture arrangements. The bedrooms have an average area of 10, 14 and 17 sq. meters. All the living rooms have wall-to-wall carpeting glued directly to the concrete floor slab, without top dressing. Since some of the site is of bad quality, it was necessary to base 12 of the 27 buildings on piling.

The infrastructures, the technical installations, the ground-floor frames and the stairwells are of conventional reinforced concrete. However, above and including the deck over the ground floor, the entire rough construction is prefabricated at the works, transported and assembled on the site. The static principle comprises supporting corner walls, with axial intervals of 6.20 and 3.80 meters. The decks of equal span and 1.80 m. in width rest on 2 supports, the horizontal joints taking the place of tie-irons. The stability of the buildings is ensured by the stairwell and lift shafts, whose end walls provide the required longitudinal bracing.

Hendel+Haseloff, Berlin

Household refuse incineration plant in Berlin-Ruhleben

(Pages 192–198)

This installation is intended to be used for the incineration of kitchen refuse, market waste, etc., as well as industrial scrap material. The residue of incineration, i. e. the cinders, are separated from the metal in a treatment plant and are thus prepared for the following operation, calcination.

The annual capacity of this installation will be 380,000 tons approximately, which corresponds to 1.6 million cubic meters of refuse. That represents the quantity envisaged for the years 1972/73. This volume constitutes about half the waste material of West Berlin.