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Summary

Supplementary Remarks (page 225)

To This Issue

Steel, and later, reinforced concrete construction drastically altered structural methods and therewith architecture as well. In spite of a hundred years' experience with the new construction materials and methods we are still far from being able to say that the conditions have been recognized in their totality by architects and that the viewers of buildings are aware of them.

And now there are new construction materials at our disposal which cause the confusion to increase still more: synthetic materials. Not when they are in the form of floor tiles, wall elements and pipes for leads—in these forms they are highly prized, for they behave correctly and have not given rise to great disappointments. It is quite otherwise though when they are in the form which is adequate to their properties: multidimensional skins which no longer permit an angular positioning of surfaces relative to one another, but which appear as a surface with countless curved levels. Categorization into right, acute or obtuse angles is no longer effective.

Whether or not the difficult new problems posed by new construction materials will be solved depends on human creativity. The chapel at Ronchamp and the Philips Pavilion are possibly trailblazers for such achievements. Perhaps the skin structure with reinforced concrete will stimulate the best minds in the field to the serious study of the formal problems presented by surfaces with manifold curvature. The manufacture of synthetic materials will bring about a further alteration to economic structure, because it requires large amounts of capital, far-reaching studies and costly models.

Synthetic materials as products and their manufacture and modes of employment are pre-eminently characteristic of the second industrial revolution. In contrast to wood, which is grown and brings its own unalterable properties with it, the properties of a synthetic material can be chosen as desired. The question can no longer be asked, "Where can I use wood; in what way must it be processed?," but "What properties must be incorporated in the synthetic material, in order that it correspond to the demands I make on it?." A complete reversal of approach has thus come into effect, which the consumer, to be sure, does not remark, but which he nevertheless induces. Arnold Gehlen writes in "The Spirit in the Age of Technology" (Berlin 1957): "The continually increasing replacement of the organic by the inorganic can be regarded as one of the essential results of the totality of the history of culture" (page 9). Inorganic nature is, in effect, more recognizable than organic ... Our rational powers of thought, the abstract models which they develop and their mathematical conceptual structures fit in with inorganic nature with unerring precision ... (op. cit. page 10). Gehlen then shows that today the position has been reached where "one must see science, technology and the industrial as functional correlatives" (op. cit. page 14).

Research has to come before the manufacture of synthetic materials, unlike the case of wood production. In contrast to wood production and processing the handworker is excluded. The efforts made to industrialize the building-trade, which are confronted by great and insurmountable difficulties, are immeasurably advanced by the use of synthetic products as building materials, because not only do they fulfill the manufacturing and technical requirements for prefabrication, but demand them. Prefabrication necessitates a division of various constructional roles and the transfer of each role to a particular building element. A brick wall carries a load at the same time that it forms a mechanical and thermal protection. Wall elements in synthetic materials, on the other hand, are not able to support unusually heavy loads—these must therefore, of necessity, be borne by steel or reinforced concrete pillars. Mechanical protection demands a hard, slightly-porous material; thermal protection, a porous material. All these functions have, for a long time, been fulfilled by wood (the conventional building material). (Construction with stanchions with double-sided boarding and thermal insulation in between.) With synthetic materials it is possible to weld the three protective layers into one large slab; the number of joints is lessened, the assembly time is shortened, the constancy of shape and weather-resistance is increased.

Expressions like "construction," "building," "construction site" and "building trades" are no longer acceptable.

The fundamentals of the building industry have so changed within recent times that these changes probably exceed those involved in the transition to steel and reinforced concrete a hundred years ago. It will be necessary to revise the concept of architecture as well, to the extent that it has been clarified at all in our century. Franz Füeg

Aspects of a New Material
(pages 226—232)

The manufacture and employment of synthetic materials in the building industry is not a question of originality, but rather a concatenation of events.

The properties of the new synthetic products differ from those of previous building-products. They impose a vaulted skin-type form. They are very light, not subject to alteration, can when necessary be burnt without deposit traces, are watertight, colour-impregnable and extraordinarily constant in shape; they require no delay and can be translucent or non-transparent. Above all, the several functions which a wall has to perform can be separated and assigned to sandwich panel of several layers.

Right angles are no longer necessities. Joint and expansion problems can in nearly all cases be brought to a vanishing-point. Synthetic materials are mouldable and the desired shape—according to its properties—can be manufactured hundreds and thousands of times. Manufacture can still only take place, however, with the help of industrial methods: on the conveyor belt.

The final result of such a development will no longer be single elements such as slabs and tubes, but large spatial elements which come on to the building site welded into one piece. In the first instance, the building material trade will sell synthetic material elements in small, individual parts, which can be joined to other building materials and constructional elements on the building-site.

The onus is on the architect to ensure that synthetic materials are not employed as surrogates and imitations and also that they are no longer made for these purposes. Useful building elements, such as partitions, flat slabs, pipes, etc., which are joined to building elements of other materials can be easily accepted during a longer transitional period. It is necessary, however, that the architect proceeds to employ the new constructive possibilities, which synthetic products offer in every respect, for the corresponding alterations to the structural articulation, and remains open to the other aesthetic ideas which the new methods of building demand.

The manufacture of building elements and the application of construction methods on the basis of the far-reaching industrialization necessary if synthetic products are to be used in building, the conversion of raw materials into consumer goods in the factory, therefore, will not only bring another form of architecture into being, but also another formal harmony, which will be carried on to the human level and, ipso facto, to the economic level.

We pay all too high a price for the normalities of the many, when it is a question of using a material, a technique, honourably for the sake of that beauty which is directed towards sensitive souls. A clear insight into the qualities of the new building materials is needed; courage is needed to reject a false application of them. Otherwise they will contribute—more dangerously even than was the case with concrete—to the further proliferation of shapes, taste and ways of life.

Art Museum in Antwerp
(pages 233—235)

The cells have an internal cross-section of 4 x 10 m. and are laid on steel-skeleton girders and connected at the sides with one another. They can be separated from one another in an upwards direction, because all the cells, unlike traditional building-style, do not have common floors and ceilings.
The cell itself is formed by an aluminium core, which is enclosed and protected by polyester panels. The leads and different types of air are led into the cavities of the aluminium cores.
The cells can be increased, separated or grouped in ways corresponding to altered spatial requirements. The separation and exclusion without something being destroyed does not, it is true, represent a new possibility, but these actions are to be accomplished to such an extent and with so much ease, that in the future they can be perfectly usual operations and not exceptions.

Residence (pages 236—239)

The house was described in detail in Bauen + Wohnen in 1957.
Norsodyne polyester resin reinforced with fibreglass was employed for the building and the sanitary blocks, and plexiglass for the transparent surfaces and some parts of the interior.
Polyester resin is a viscous substance that can be hardened with the aid of a catalyst without gas developing. The hardening or polymerization is effected without pressure and can be done at room temperature. In order to increase the resistance of the panels and their rigidity when curved they are reinforced with fibreglass fillers.
If the panels also act thermically and acoustically in addition to serving as partitions, they are 3 cms. thick.
Heavily-loaded elements, such as floor tiles, have filler of cells in the form of a honeycomb made from synthetic products. These elements are 4 cms. thick and can be joined together to make double panels 8 cms. thick.

Monsanto House (pages 240—242)

The house consists of four projecting wings and a centre which rests on a concreted basement. The wings are made up of two upper and two lower plastic skins.
Investigations into the temperature constancy, the watertight qualities and the static properties of these skins went on for five months. The roof surface was sprayed with hot water and steam. When it was 46°C on the surface of the roof above the under surface registered 1°C. The lower skin was loaded with 490 kg./m.² and the upper surface with 390 kg./m.² (13.2 tons, the two skins together) without damaging results ensuing.

"Bow-legged" Furniture
(pages 243—247)

The George Nelson team tried some time ago to make pieces of furniture, the legs of which are bowed and joined to the unit at one point.
Small models for a desk and two tables were tried out first of all, to see how things must go with bow-legs if it is intended to join them as a unit at one point of the supported frame. The rigid joining of the hard round chromium-steel tubes to the soft wood was one of the first problems—solving it was no easy matter. The main question was: How were the tubes to be connected to one another?
Joining three or four legs seemed to be extraordinarily difficult. As the joining of four legs seemed to be the most tricky, this was investigated first. If two tubes were provided with the same screw hole, it was possible to introduce the screw into one hole, put the second tube on the screw and screw up. In this way the two-tube-problem was solved, but the four-tube-problem, on the other hand, was made unsolvable, because it is not possible to turn one tube round another.

For this reason, the four-tube join, so it seemed, was finally given up, until one day it was found that the tubes and screws can be assembled over the cross if the tubes are provided with two holes, one lying above the other.
The fixing of the screws in the thread of the tube walls was a job in itself, for the tube wall turned out to be too thin for the tread. But it was discovered that the holes did not have to be punched or bored in the tube but pushed in, so that the fractured wall remained and could be threaded.

The actual model of the chair with curved legs is the plywood chair of Eames. In this chair the rubber buffers create a certain elasticity. The connection between seat and back in the Nelson team's chair has lately made a greater flexibility possible, whereby the sitter moves and takes up another sitting position. This experience, together with the properties of fibreglass, which in itself is already elastic, has encouraged the designers to use the possibilities of flexibility to the utmost.
The danger should be prevented, however, of the back rests breaking away from the rubber covers under a heavy load. Rubber buffers were designed because of this, which, it is true to say, are firmly joined to the metal connecting-elements of the arm rest, but which hang out if there is too great a strain.
The four legs are attached to the seat with the help of a web-shaped sprayed casting and four rubber discs. The great flexibility which has been obtained by means of these fittings led at the same time to the next step, namely, the chair's automatic adaptability to the bodily position of the sitter.
A pivoting connecting-arm was devised in which a spherical head is likewise apparent, so that it can be connected to the buffer at the back. The casting with the buffers can turn at the end of the bar and thus around the roundings at the back.

RZ 57 element furniture (pages 248—250)

The furniture can be assembled with a few simple parts. They demand only a slight manual effort.
The frame of the cabinet consists of 4 perforated aluminium battens which are connected to the upper and lower shelves.
The sides are attached to the aluminium battens and sliding doors and backs are so fitted to the upper and lower shelves that they can easily be taken away. The connections at the front and back are the same, so that the doors are mountable on both sides.

Office Annex of the Architects' House
(pages 251—253)

The architects had to enlarge their office. A one-storey wing at the corner of the house was required for this purpose. In addition to the draughting and lunch room, a washroom and sauna (see design sheet) have been fitted up. The outer walls are executed in raw concrete and covered on the inside with brick scrap and wooden panels. The roof is designed for summer and is covered with a wooden skin and galvanized sheet metal. Rebated beading is nailed to the ceiling beams under 10 cm. thick glass-wool matting.

Forest House in Venauen near Cologne (pages 254—255)

The outer and inner walls are of wooden lattice structure, and are fitted with a wooden shell on both sides and insulated with 3 kg./m. rockwool. Bitumen boarding is put behind the outer wood covering. All the wood is impregnated to prevent damage from dirt and worms and to ward off the danger of fire.
The roof has an interior pitch and consists of nailed beams. The lower beam plate carries the ceiling. The roof covering consists of a double layer of bitumen boarding on 26 mm. thick planking. In addition, the roof is designed to be a summer roof; it will be ventilated by means of round boreholes, which are visible in the roof.

Fishermen's Lodge on Lake Como
(pages 256—260)

The building is made of wood, except for the two raw brick walls which delimit two sides of the lounge-space and sleeping-space. Partitions are diagonally covered on two sides with stiffening. The fir roof is covered with roofing felt. All the wood is left in its natural state.
The building may appeal to the romantic sentiments of city people. It has come into being, however, without romantic phrases, artificial primitivism, "adaptation to Nature," and without strained emphasis on the natural way of life of those who use it, to whom romanticism, in the sense that the word is understood by town-dwellers, is completely foreign. It is just for this reason, however, that it is suitable for its functions. It is, therefore, architecture in the best sense of the word, because it has been created as a unity based on functional and constructional considerations, using clearheadedness, reason and good taste.