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Summary

Heinz Isler, Burgdorf

Tests on models for shell constructions

(Pages 197–199)

Modern technology depends for its continued existence on tests carried out on models which generally allow the following points to be determined:

1. Choice of type of model, position of the assignment, determination of the desired goals, selection of model technique, size and materials.
2. Execution of the test, construction of the model, measurements, interior controls, precision tests, duration of test.
3. Interpretation of the results.
4. Study of the results and of their consequences after termination and examination of the construction. Experiments for plans and future tests.

Roger Taillibert, Paris

Swimming-pool at Deauville

(Pages 204–207)

This project is not limited merely to the creation of a covered and heated pool. The latter, fed by sea-water, comprises a training pool and an olympic pool. This complex, with the surrounding beaches, the entrances, the supervision facilities and the bar extends over an area, 3800 sq. meters of covered surface. On the basement level, around the pools, there have been grouped the cloakrooms and the private cubicles, the sanitary facilities and the technical installations. Outside this building, the underground heating system will likewise serve the bathing therapy centre, now being finished, the hydrotherapeutic facilities being clustered around the diving-pool and semi-subterranean; this plant went into service at the same time as the swimming establishment proper.
The vault, 84 meters long and with a span of 46 meters, is made up of five shells and two semi-shells. These shells are portions of elliptical cylinders, whose oblique axis is set in such a way that the vertical sections produce an arc of a circle having a radius of 52.75 meters. At their peak, instead of converging in the shape of arcs of circles, the shells are sectioned by another elliptical cylinder, with a horizontal axis, cutting out the future emplacement of the skylights. The two shell supports do not rest on a horizontal plan, but there is an incline of 1.10 meters between their bases, which are 46 meters apart. In transverse section, a shell forms a V, whose two rectilinear branches are the generatrices of the elliptical cylinders. At the valley, in the continuous part, the shell has a thickness of 40 cm., while the sheet follows the same process, out to its edge, where it then measures 31 cm. thickness. Given the level where the tie members were to be placed, it was necessary to create inclined abutments in such a way as to prolong the resultant of the forces transmitted by the arc to the centre of gravity of the piles, at tie member level, bearing in mind the weight proper of the mass and of the earth or installations covering it, so that none of the piles would pull and so that their supporting strength would not be overtaxed.

Rolf Störmer, Bremen; Frei Otto, Bernd-Friedrich Romberg and Uwe Röder, Berlin; Fritz Leonhardt, Stuttgart

Proposal for covering a swimming-pool by means of an assemblage of lattice shells

(Pages 208–211)

In 1966 there was proposed a new construction of the shell type to cover a sea-water pool comprising swimming and diving areas. This construction is capable of covering the entire interior area, is at the same time economically feasible, light and solid.

Its special feature is the technique of construction: a supporting shell made up of two layers of rods converging in the shape of a cross and originally conceived in the shape of a shell by means of a spatial deformation.

This construction principle was employed for the first time in a trial construction with a span of 15 meters and a height of 8 meters for the German Building Exhibition in Essen in 1962 (ill. 1). A second trial construction was realized in the same year at the University of California in Berkeley (ill. 2).

In principle, it is possible to prefabricate in entirety such shells and to transport them to the work-site. However, this solution requires very exacting preparation on the work-site, especially when the shell construction is set up on concrete foundations (ill. 3, 4).

As a consequence of these experiments, there was made the proposal to cover the large surface of the swimming-pool concerned with such a construction (ill. 5–8). In this case the diving-pool has to be available for use in winter as well, while the big swimming-pool proper is used in summer only. The result is a separation into two parts of the whole complex, and this fact had to be borne in mind in the construction of the shells. The totality of the roof surface is divided into six isolated shells, of which five small ones cover the area of the large pool and the sixth, which is larger, forms the roof over the diving-pool. The connection between the large shell and the five small ones produces, in plan, the seam between the winter and the summer pools. The construction is made up of mobile partitions in such a way that the tracts can be separated or connected as desired. The ceiling is partially glazed.

Rudolf Brylka, Essen

Observations on the Construction of Inflatable Halls

(Pages 212–216)

Inflatable halls are pneumatic constructions of synthetic fabric covered with plastic. These halls are "supported" on the inside by a slight excess pressure. The latter is produced by means of blowers that continuously function. In general, this excess pressure measures 10 to 30 mm. of water corresponding to 10–30 kp./m^2 or 0.001–0.003 atm rel.

Since 1959, several hundred halls have been erected in Germany. Most of them consist of a half-cylinder, embedded, with a hemisphere added. This shape of construction is easy to calculate and economic in fabrication. Moreover, there are halls whose rectangular plan was adopted to cover, especially, swimming-pools and tennis courts. To house exhibitions, hemispherical shapes are preferred.

At the present time, the principal materials utilized in Germany are synthetic fabrics, often polyester covered with polyvinyl chloride on both sides and then partly laquered.

Inflatable halls are nearly always fabricated in one piece. If the anchoring line is at grade level, the hall can be delivered rolled up. On the other hand, if it is anchored at different levels, it is indispensable to fold the skin carefully in a way that is perfectly predetermined.

Inflatable halls constitute the ideal solution wherever the problem is to build structures whose objects, shape, utilization, etc. are subject to change after 5 or 10 years. Moreover, inflatable structures are easy to move, and they permit better ground utilization.

Achille and Pier Giacomo Castiglioni, Milan

Mobile Information Pavilion of the RAI, the Italian Radio-Television Company

(Page 217)

In addition to its undeniable aesthetic qualities, this building has a number of interesting structural characteristics.
Its special features are:
- frequent and short-notice assembly and dismantling,
- adaptation to varied ground conditions,
- large number of visitors.

To meet these conditions, there was adopted a solution combining the advantages of several different construction methods (roof structure pneumatic with pressure and guy elements), while the disadvantages of the different systems are avoided. A truck is all that is needed to transport the structure.

René Sarger, Paris

The Construction Revolution in Europe and Cable Constructions

(Pages 218–220)

For a long time Europe forgot the meaning of Technology. Little by little, technology, in fact, came to be seen as something opposed to art, as something rational opposed to the irrational. Structure, the art of organizing material, had become merely a technical means unworthy of the artist. This development, known in architecture, all marks the end of a stylistic period.
In Europe the contemporary emergence of new structures is overturning the formal way of organizing constructed volumes. The great European innovators of the three-dimensional are not missing. They have put over the idea that the span of a building can be 10 and 30 times the height of the support, whereas the Egyptians had as their golden rule the principle that the span could not be more than $^1/_{10}$ or $^1/_5$ of the height of the supporting column. Many builders are now saying that, if the new techniques permit large spans, it is perfectly useless, for 'aesthetic'' reasons, to add false columns in order to preserve the ancient proportions. A lattice-girder or a tridirectional deck is superior to a solid beam or to a solid-plate deck for the purposes of spanning a large area. Structural organization is becoming per se an architecture. The walls, the floors, are no longer solid structures, of the kind scrawled by a schoolboy, but, rather, express stresses in space. The architectural volume, like the architectural detail, is being renewed.
The field of vaulted roof structures is still larger. Little by little, industrial progress has been placing at the disposal of builders durable materials. Thus, the weight of the vault, for a constant span, has considerably diminished.
The inversion of stresses owing to the diminution of the weight proper has created the inversion of the curves of contemporary vaults. The "supports" of these vaults ought to be "anchor-points", the foundations ought to serve as ballast, the roof tends less and less to rest on its supports, it can also exert a pulling force and the "columns" become tie elements.

D. Darvich, Teheran
R. Sarger and J. P. Batellier, Paris

The Stadium of Farahabad

(Pages 220–224)

This stadium, planned for the outskirts of Teheran, is intended to accommodate 30,000 spectators. It is made up, principally, of a reinforced concrete structure in the shape of an ellipse around the main field and the track. A covered gymnasium abuts on its large northeast face.
This structure of reinforced concrete is composed essentially of vertical pilings, radiating, of variable heights, serving as a kind of toothed rack for the support of the prefab grandstands.
In order to accommodate around 10,000 seats, the architect had envisaged stretching a prestressed sheet, in the shape of a crescent moon, between the reinforced concrete structure supporting the stands and a peripheral cable suspended from two poles.

Roger Taillibert, Paris

Experimental Swimming-Pool in Paris

(Pages 225–226)

This is the first large-scale swimming-pool installation of its kind, which can be covered and uncovered within a few minutes, a light structure without walls, which will offer all the advantages of an open-air pool, the whole being contained within a volume heated at a temperature that is ideal for bathing.
After numerous studies carried out on models constructed by the architect, three solutions to the problem were elaborated both mechanically and statically. One was adopted owing to its mobility.
Despite the restricted ground available, a complete building program was laid out. It comprises the following: 1 pool measuring 50×15 meters, 1 diving-pool 1 to 3 meter in depth, 1 wading-pool, sunning benches and a cloakroom complex for 700 persons. The entire architecture of the installation is the outcome of the requirements inherent in the cable construction system.
The geometry applied to this complex has to take into account the difficulties arising in operation, after opening or closing, the conditions governing the calculations varying according to the efforts required. Simultaneity of movement has been obtained by the variable study of the displacement relations on a volume whose linear traverses of the different spatial points are not identical. The result obtained corresponds therefore to the application affecting all these givens. A tele-mechanical complex coordinates all movements. Self-driven carts transport the awning, attach it or carry it away as need requires. Very different shapes can be realized. The membrane is of tergal reinforced with a mechanical resistance of 300 kg. per 5 cm^2.

Georg Lippsmeier, Starnberg
Associate: Walter Kluska

Exhibition pavilion designed for repeated use

(Pages 227–229)

Since there was needed an exhibition pavilion that could be used at different places in the tropics, there was built under the auspices of the IMAG (International Fair and Exhibition Service, in Munich) and for the account of the German Federal Republic such a pavilion.
What was required was a construction which, exhibition stands included, allows for rapid and convenient assembly and dismantling. Moreover, the construction material employed had to be resistant to corrosion and to be capable of standing up to frequent transport. What's more, the job of the planners was to determine the design of a pavilion adapted to the conditions prevailing in the tropics, and its external skin, of constant shape, had to be variable as regards the exhibition area. Up to the present time, this pavilion has been installed in Bangkok and in Madras.
The roof structure (surface around 1000 sq. meters) is a membrane structure with minimal corrugated surfaces and with edge and throat cables. The entire construction was prefabricated in Germany. Assembly is effected in 11 days.