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8. Sport Stadium at Karlsruhe (Fed. Rep. of Germany)

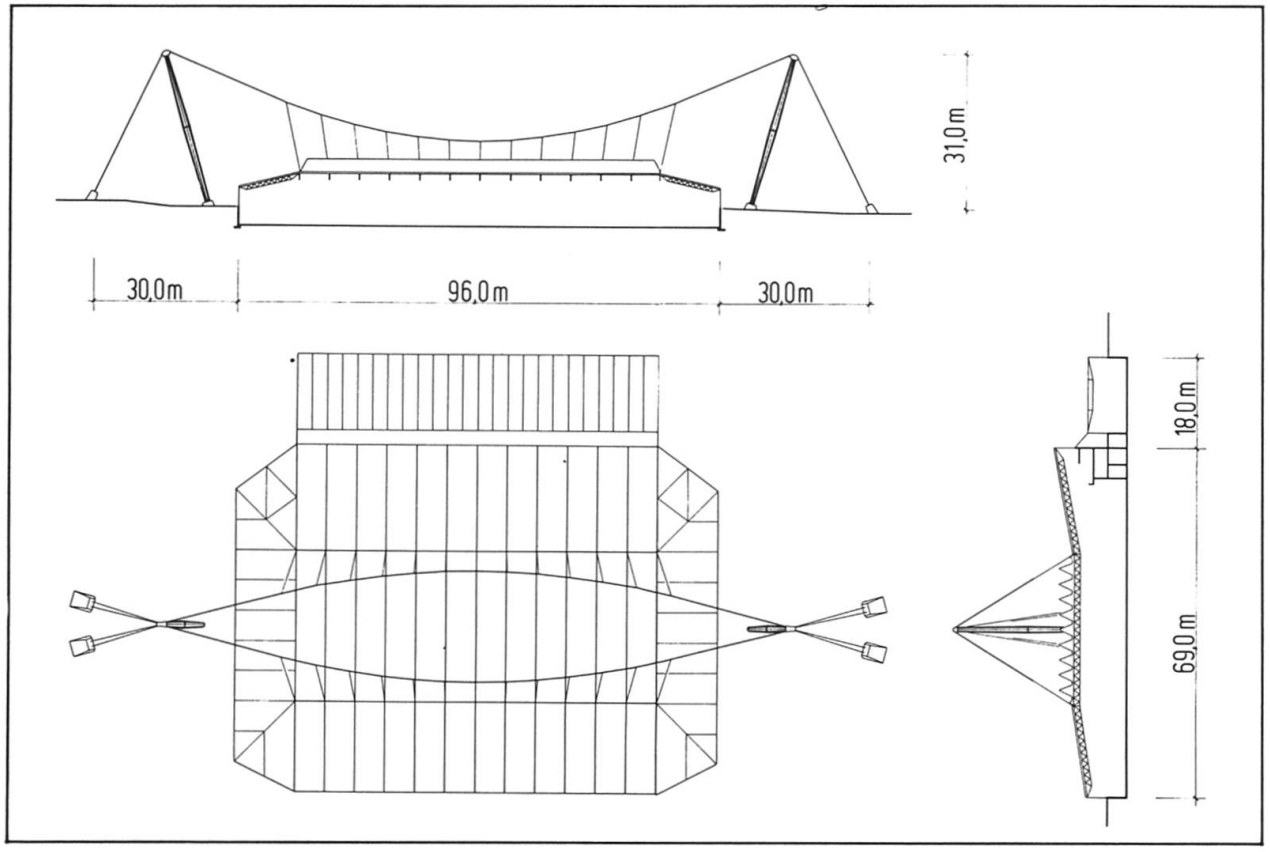
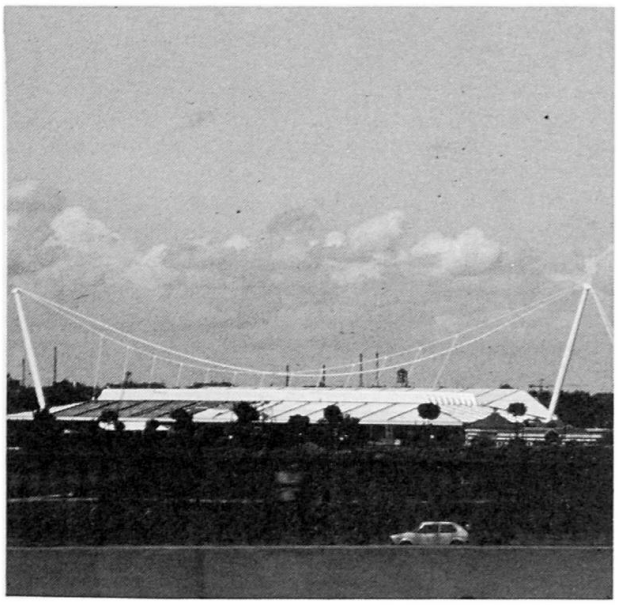
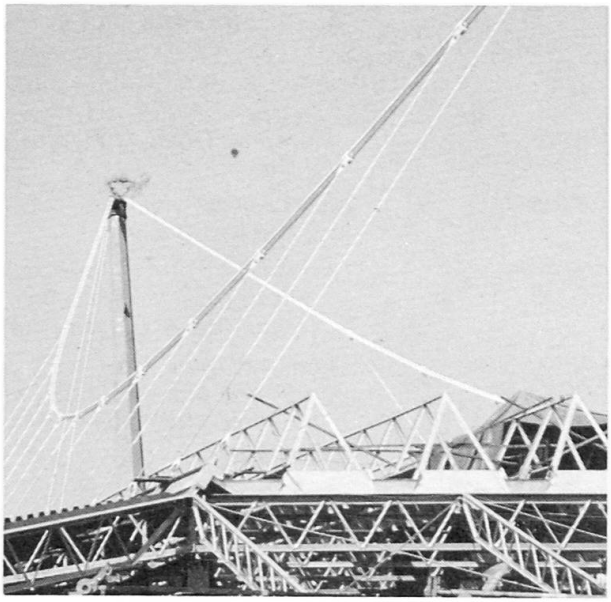
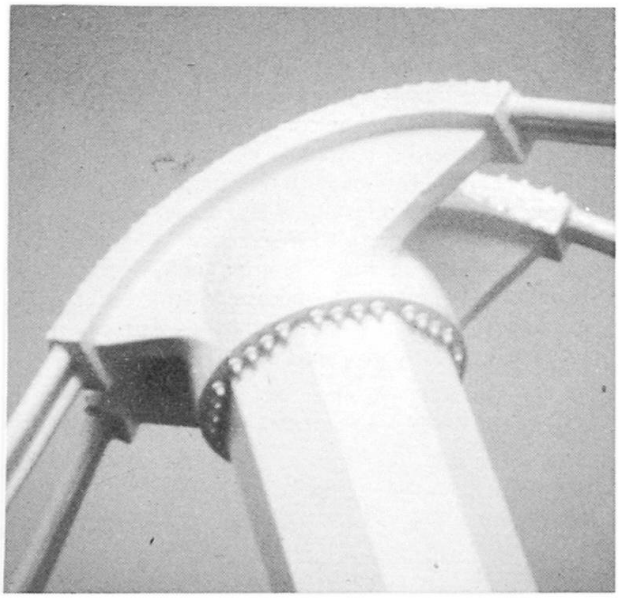
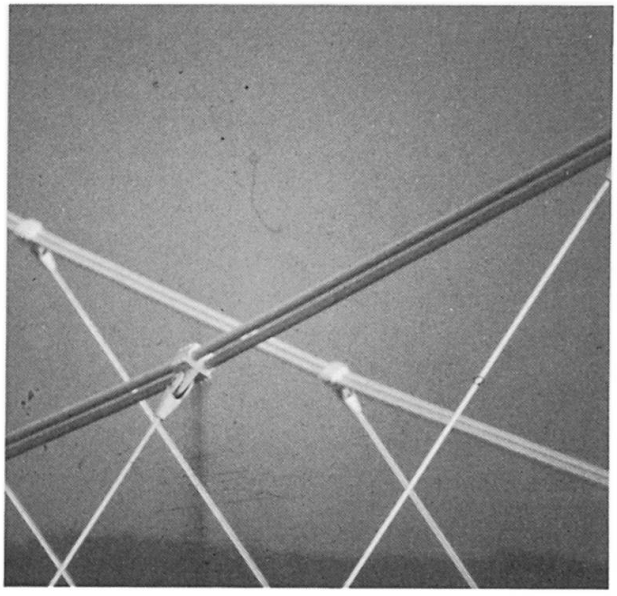
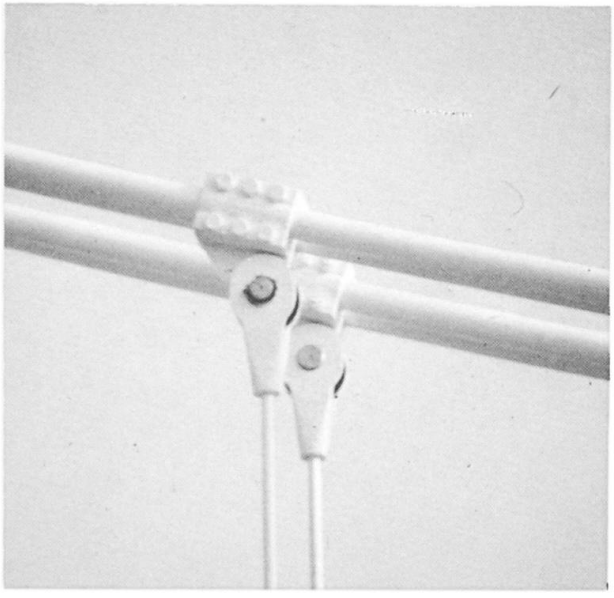
Owner:	*City of Karlsruhe*
Architects:	*Schmitt, Kasimir und Partner, Karlsruhe*
Engineers:	*Schlaich + Partner, Stuttgart Prof. Dr. Ing. J. Schlaich, Dipl. Ing. R. Bergermann*
Contractors:	*Steel and cable work: Lavis, Offenbach Pfeifer, Memmingen*
Duration of work:	*18 months*
Service date:	*October 1984*

The 69 m span of the main stadium could have easily been covered by simple steel girders requiring a depth of about 2.5 m. However by suspending this roof by means of a cable structure and hence creating in addition to the end supports two inner supports for these girders, their depth could be reduced to half of that, i.e. 1.25 m. Thus the whole structure becomes much less heavy with favourable architectural consequences as well for the interior impression as for the outer view of the hall. Detailed comparison revealed that this improvement of the design could be achieved without additional costs.

The cable structure is of the same type as a self-anchored suspension bridge. Its two masts are octagonal and tapering steel tubes carrying 15,000 kN each. The two main cables and the two guy cables of each mast, which are anchored by soil anchors, consists of two locked coil ropes of 82 mm diameter each. The suspender cables' diameters are 33 mm. All saddles, joints and anchorages are made from cast steel.

The steel grid consists of girders with 1/2 IPB chords and tubular diagonals with diameters between 42 and 70 mm. They are fully welded without any gusset plates. Horizontal stiffening of the grid is provided at its periphery by four vertical trusses having prestressed diagonals made from thin rods. The outer columns following the facade are hinge supported at their base and their top. The grid is covered with corrugated sheets.

The grid was conventionally erected on temporary trestles and loosely connected with the cable structure. The whole roof was simultaneously lifted from its temporary supports and prestressed by hydraulically jacking up the two masts.

The total structural steel quantity for the main hall, including the cables and masts, is only 65 kg/m². For the appendix with its extremely light suspended girders of 18 m span, even 28 kg/m² are needed only.

(J. Schlaich, K. Horstkötter, G. Ludescher)