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5. Fair-Ground Roof, Milano (Italy)

Owner:	*Ente Auton. per le Fiere di Milano*
Architects:	*Studio Tecnico Majowiecki & Assoc.; Arch. Dept. Plasteco Milano*
Structural Engineers:	*Studio Tecnico Majowiecki & Associates; Ing. L. Antonietti*
General Contractor:	*Canobbio S.p.A., Milano*
Cable Structure	*Redaelli Tecna S.p.A., Milano*
Steel Structure:	*Nuova Italsider, Genova; CO.ME.F. S.r.l., Milano*
Total Floor Area:	*6000 m²*
Construction Period:	*January – April 1986*

Introduction

On the occasion of the main fair manifestation called April's Fair, the International Fair of Milano decided, in 1986, to cover the main square (Piazza Italia).

The design hypothesis required that the following objectives be aimed at

- absence of internal supports;
- convertibility;
- impressive light architectural image;
- translucent covering material;
- easy and fast execution and erection.

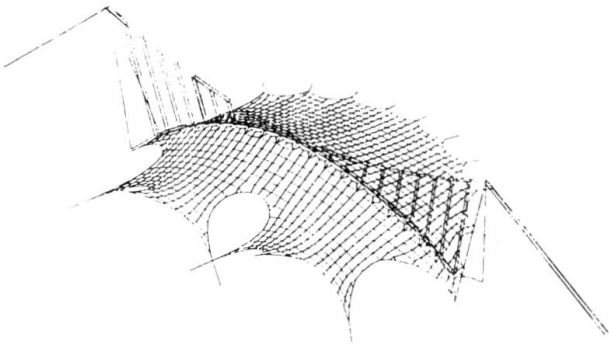

Fig. 1 Interactive graphic design

The covering remains in place from springtime to autumn and is dismounted during wintertime.

Several new open-air exibitions and shows will be possible with this light, versatile, impressive and low-cost tension-membrane construction.

The building site was opened in January and finished in the beginning of April 1986.

Outline of the Structural System

The main system, oriented along the principal axis of the roof surface, is formed of a pre-stressed cable-truss which has a span of 125 m.

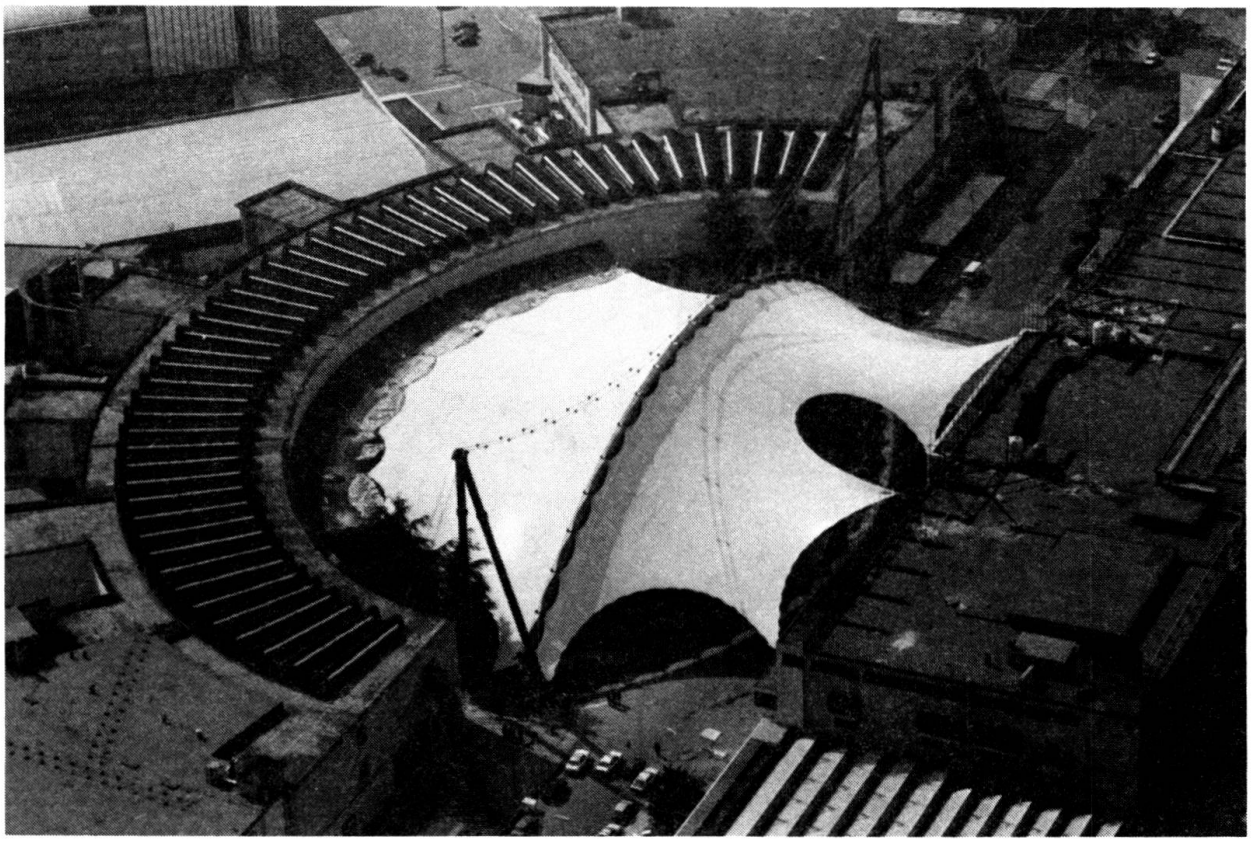

Fig. 2 Aerial view of the construction

The upper carrying rope has a sag of 13 m. It is made of four spiral zinc-coated (class B) cables of 42 mm diameter, construction 127 wires of 3.2 mm with 1600 N/mm^2 breaking strength. The lower stabilizing rope, with the same cable data, ist anchored directly in the ground with a span of 105 m and a sag of 23 m. The upper and lower cables are diagonally connected with 2+2 12 mm spiral strands, through special friction steel cable fittings.

The anchorage system is realized with a tripod that consists of two V-shaped steel columns and an external back-stay obtained with the same carrying rope. The columns are 900 mm diameter and 12 mm thickness made with FE 510 B steel grade.

At the top there is a saddle with a ratio between saddle radius to strand diameter of 20. At the bottom of the columns, spherical hinges are placed in order to facilitate erection and permit in-service rotations.

Foundation systems were obtained with high diameter piles. The membrane, realized with polyester coated with P.V.C., has been designed in order to satisfy border conditions and an initial pre-stressing condition.

(M. Majowiecki)

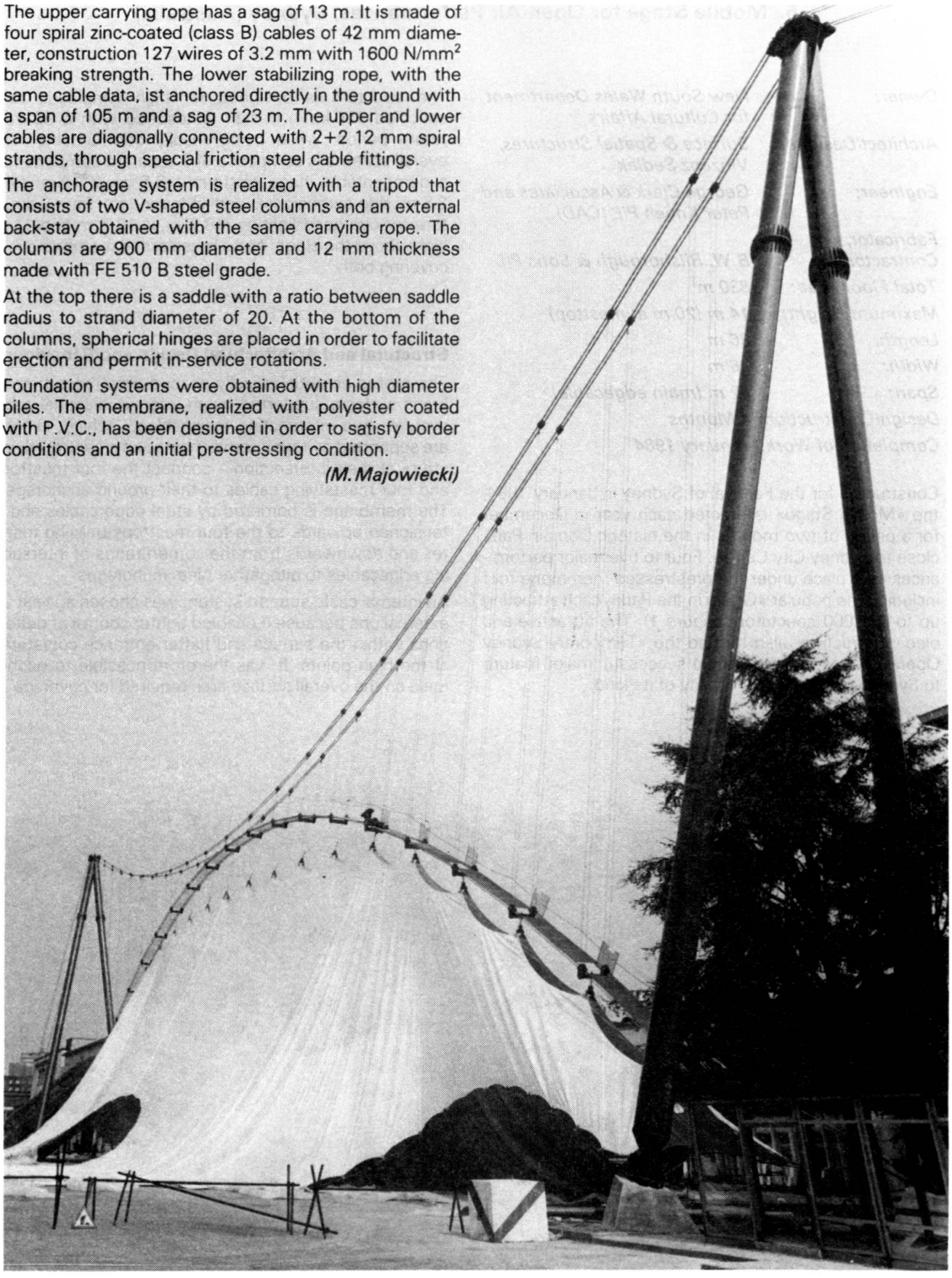

Fig. 3 Main rope truss and membrane during erection