Snaidero new buildings at Majano, Friuli (Italy)

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3. Snaidero New Buildings at Majano, Friuli (Italy)

Owner: Snaidero Rino S.p.A., Majano
Architect: A. Mangiarotti, Milano
Engineer: G. Ballio - G. Colombo - A. Vintani, Milano
Contractor:
Concrete Structures: Edilcisa, Udine
Steel Structures: F.lli Collet - Pieve di Soligo, Treviso
Works' duration: Concrete Building: 36 months
Steel Buildings: 10 months
Service date: 1978

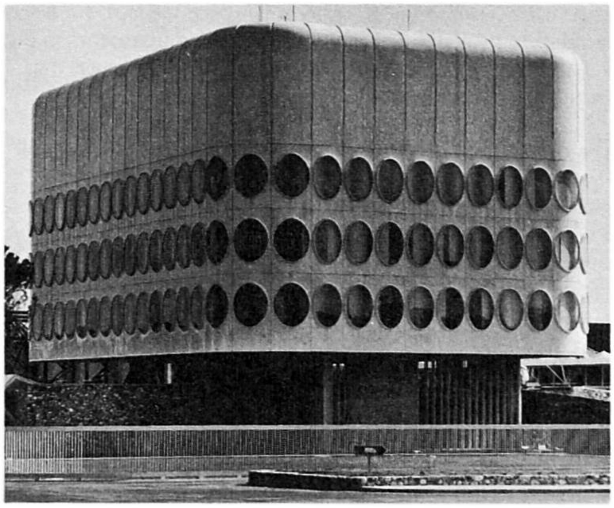

Fig. 1 Office Building

Snaidero S.p.A. is established at Majano, in Friuli; it is an industry making kitchen furniture; about 900 employees are working there. The works for the construction of the new offices and canteen building were started in 1974.
The structures of the two buildings were almost completed when, in May 1976, an earthquake caused light and heavy damages in the construction of the industrial complex. In detail: the office building (Fig. 1), although damaged, had resisted very well; the canteen at the side of the office building made with a heavy reinforced concrete roof leaning on slender columns was completely destroyed; the first floor of the storage and shipping building was completely irrecoverable. As soon as the structures of the plant had been readapted and production completely restarted only 3 weeks after the earthquake, the problem of rebuilding the canteen arose, as well as the problem of replacing the old shipping department with a building for exhibition of the manufactured goods and a meeting room for the commercial and promotional activities of the Company.
In order to build within a short time it was decided to use steel structures which, by their very nature, satisfied also the psychological needs of people who had gone through the experience of a strong destructive earthquake (Fig. 2).

The Office Building

The office building is made of reinforced concrete; its middle floors hang from the roof structure for a large extent (Fig. 3). This particular solution was chosen to provide a large area, free from columns, on the ground floor and not to exceed the height limitations of habitable top floors: technical volumes above it were not subjected to such limitations.
The vertical structure is constituted by 4 columns (each designed to hold axial load of about 12000 kN), a core, composed of reinforced concrete walls, which contain the lifts, the stairs, the vertical technical utilities and the toilets.
The horizontal structure of the roof is made of a network of 4 main cantilever beams resting on 4 columns only. The extremities of all cantilevers are connected by an edge beam distributing the loads from the prestressed ties.
Such a structure was conceived disregarding earthquake as the area was not considered among the seismic ones according to Italian regulations in force in 1974. Nevertheless the behaviour of the structure was quite good; its explanation and a survey of the damages were presented at the International Meeting on the Friuli Earthquake Udine - December 1976.

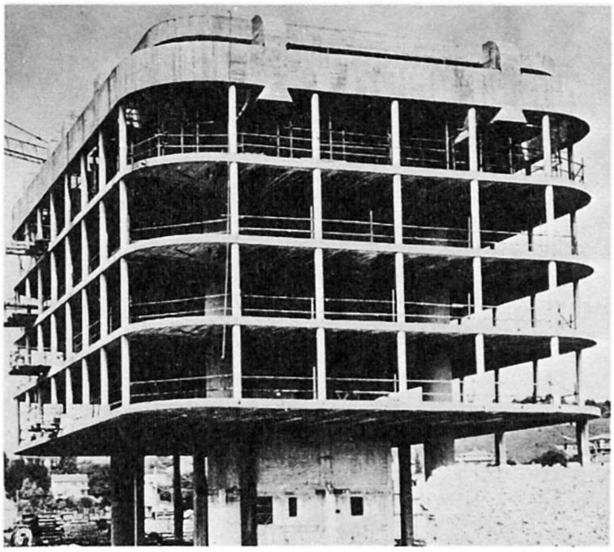

Fig. 3 Office Building Structure

The Canteen Building

The building is constructed over a total area of 45.00 x 82.50 m and it is distributed with a modulus of 7.50 x 7.50 m equal to the one of the former foundations. The main elements of the structure are schematically shown in Fig. 4.
The columns form a closed section. They end with an upper cross, and one pyramidal capital. By means of a flanged bolted joint the 4 edge beams are assembled to the upper cross and the capitals.
The four triangular perimeter beams support, by means of a bolted joint, a grid made with four perpendicular beams welded to each other in order to substain the roofing panels.
The result is a structure made with preassembled monodimensional elements with a behaviour almost near to that of a space structure. The high degree of hyperstaticity involves a great ductility of the system and therefore makes the complex particularly suitable for a seismic zone.

Fig. 2 Canteen and Exhibition Building

The Exhibition Building

The building is constructed over an area of 56.25 x 45.00 m and it consists of six large tubular portals having 45 m of clearance set at a distance of 11.25 m. from centre to centre. The main elements of the structure are schematically shown in Fig. 5. The portals have a triangular grid section made with round tubes. They lean over two spherical hinges over concrete plinths. These rise from the ground and from an integral part of the building.

The lower chords of the portals support every 7.50 m the secondary beams. These are of the same shape as the main ones of the canteen structures and hold the tertiary beams which sustain the covering deck.
The frames are designed to absorb the seismic forces working on their level: in order to resist the transversal forces there are two vertical bracings, also made with welded tubes. Also in this case the high hyperstaticity of the structure and the construction details used offer the guarantee of a good ductility and therefore a good seismic behaviour.

(B.C.V., Milano)

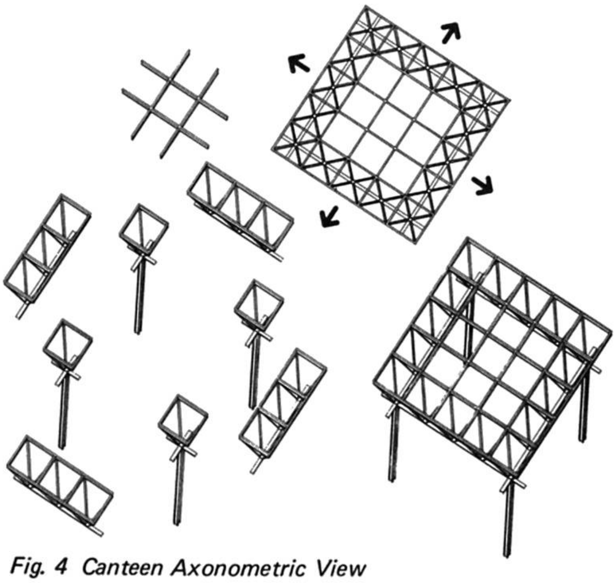

Fig. 4 Canteen Axonometric View

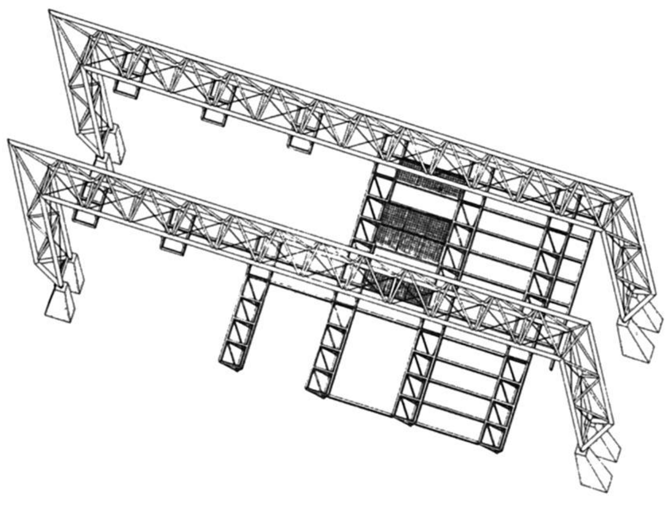

Fig. 5 Exhibition Axonometric View