Glass Pavilion at the Zenith Centre.

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1. INTRODUCTION

The Zenith Centre is a large commercial complex in Chatswood, a major regional suburb of Sydney. It consists of two 25 storey towers above a podium and was completed in 1988.

Owing to the desire of the owners to create a common entry – focal point for both towers and to eliminate the effect of the wind creating turbulent conditions for pedestrians when walking between the buildings, they decided to add a glass pavilion between the two towers.

The architectural concept of a fully glass clad building element linking the two towers was proposed by Scott Carver. The pavilion is 5 storeys high (20 metres), 16m x 24m in plan and clad completely with 12mm thick toughened glass – roof and walls. Each panel of glass (2.1m x 2.1m) in the walls is supported only at its four corners – there are no mullions. The structure supporting the glass is fully exposed and forms part of the architectural effect.

Significant effort by Taylor Lauder Consultants and Spacetech, was devoted to minimising the number of structural members to create a minimalist clean appearance to the whole pavilion.

2. THE STRUCTURE

The structure consists of a three dimensional ring truss 4.5m above the podium and another similar truss at the roof level with 219mm diameter vertical members and four diagonal tension members (high strength steel stressing rods – minimum proof strength = 920MPa) in the plane of the vertical members connecting these two trusses. The diagonal tension members support the corners of the bottom ring truss and transfer all vertical load to the two columns located in the mid length of each side wall creating a balanced cantilevered beam structure centred on the columns. The roof consists of a minimal space frame structure. All member connections are made using the OKTALOK nodal system.

All structural elements are set out on a 2.1m x 2.1m grid to match the glass panel size. The structure is restrained laterally at four points, two on each of the towers. There are only two columns which continue to the podium level and which are visually ”lost” against the Tower columns, the effect created gives the impression that the structure is floating in mid air.

The individual steel members were fabricated from high strength steel tubes (grade 350), ranging in size from 42mm to 114mm in diameter, with the patented end connections made from machined forged steel.

3. GLAZING–PATCH CONNECTIONS

In the walls stainless steel patch fittings cantilever from space frame nodes or ferrules on the 8.4m long members to connect with respective corners of glass panels via a single stainless bolt per corner. Each of these glass panels hangs from its top connections to the structure. The arrangement of the various connections for each glass panel permit each panel to rotate and move vertically and horizontally relative to the adjacent panels so that no loads, which could cause cracking, are transferred between glass panels. Glass panels span from the lower space frame ring truss to ground, 4.5m below with finned support at slab level and a sliding joint at the ring truss permitting differential vertical movement.

4. ASPECTS OF CONSTRUCTION

These are some aspects of the construction which are worth noting:

(a) The individual steel members were fabricated with a length tolerance of ±0.3mm which facilitated the installation of the large glass panels, and were finished ”off site” with an automotive paint (high gloss metallic polyurethane) to give a high quality finish.

(b) Each glass panel in the walls is supported only at the corners by stainless steel patch fittings connected directly into the spherical space frame jointing detail.

(c) The pavilion was constructed over the podium while pedestrian movement was maintained between the towers and through the development.

(d) All the works were carried out from a scaffold which filled the internal space of the final structure and which also provided access to the full height of the exterior walls and roof.

(e) The construction work was undertaken with minimal disruption to the operation of the building complex both at the podium level and the basement levels.

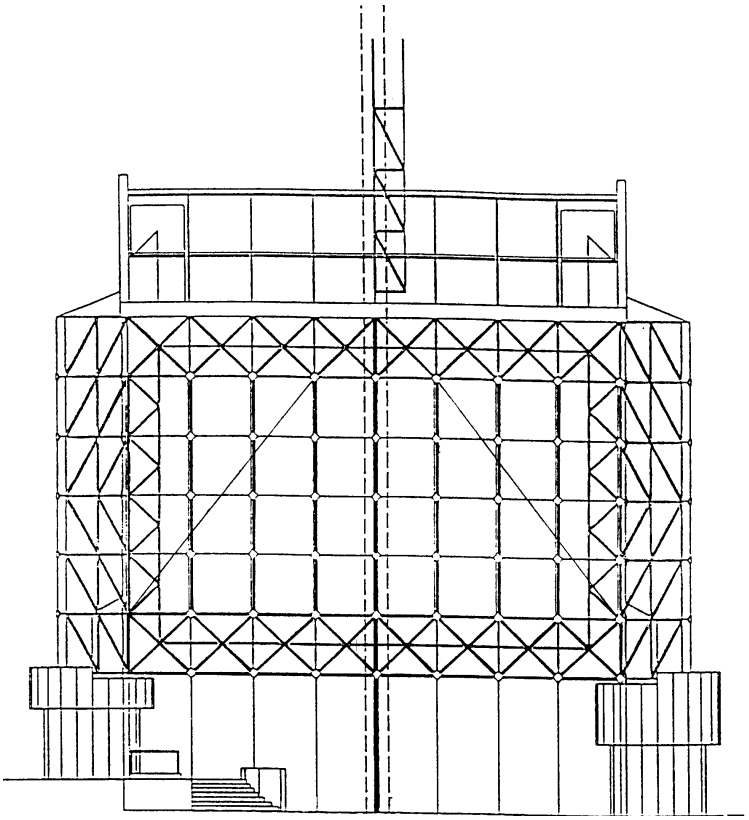
(f) Except for the 214mm dia x 8.4m long members in the walls all other members could be easily erected by two men without the use of a crane. This minimised the cost of cranage on the project as the only suitable locations to set up a crane were distant from the work site requiring a large reach high cost crane.

5. OVERVIEW

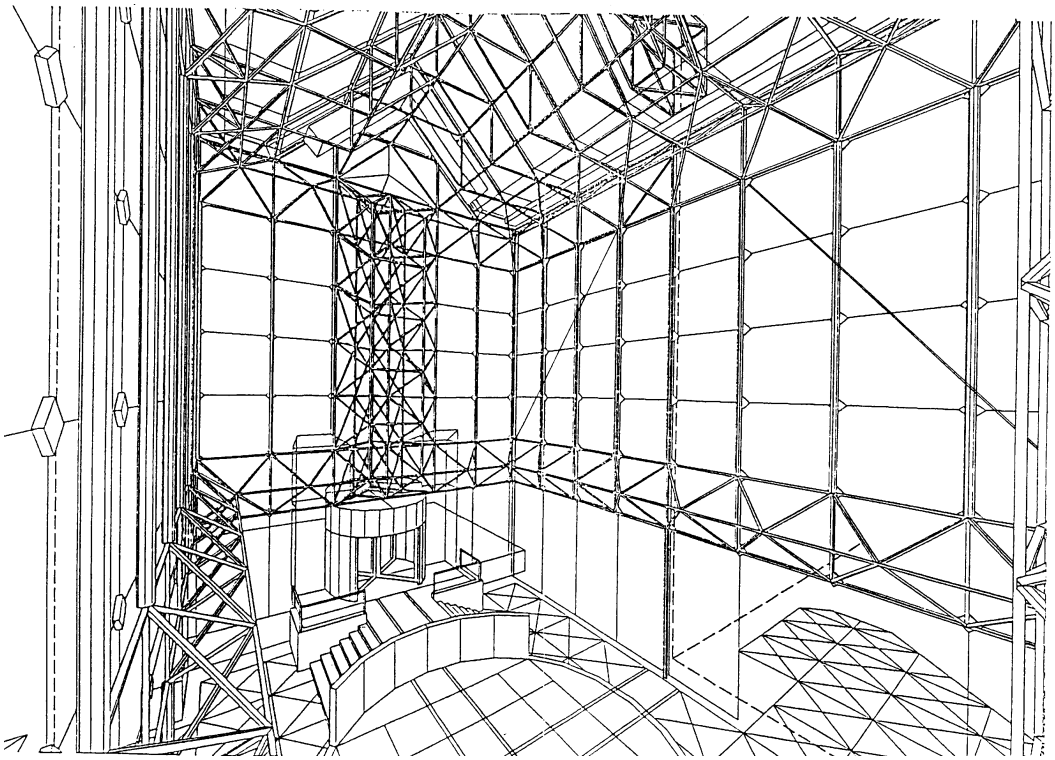
The structural concept illustrates the capability of steel spaceframe structures to create a stunning effect. It shows that lightweight structures in steel can be used to great advantage and are part of the technological age in which we live. The Zenith Centre Pavilion is a good example of an innovative structure forming part of the architecture. It has left a strong impression in the minds of many people who have admired the building and wondered ”How did they do that?” ??

6. MAJOR PARTICIPANTS:

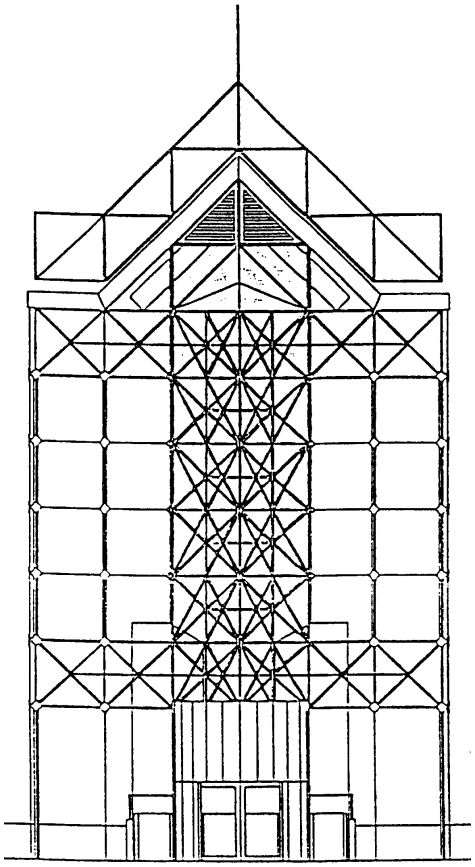
Taylor Lauder Consultants Pty Ltd – Structural Engineers
Spacetech Pty Ltd – Spaceframe Contractors
Scott Carver – Architect

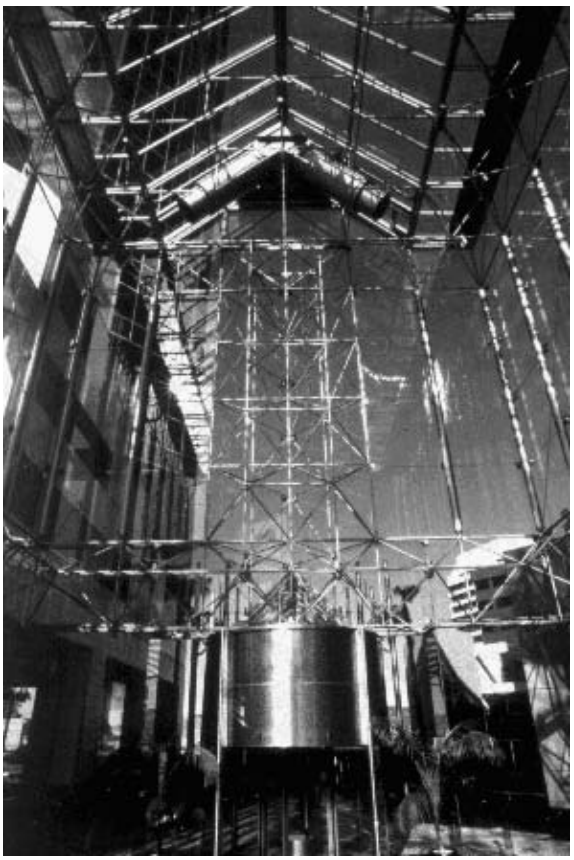


Section Through Pavilion

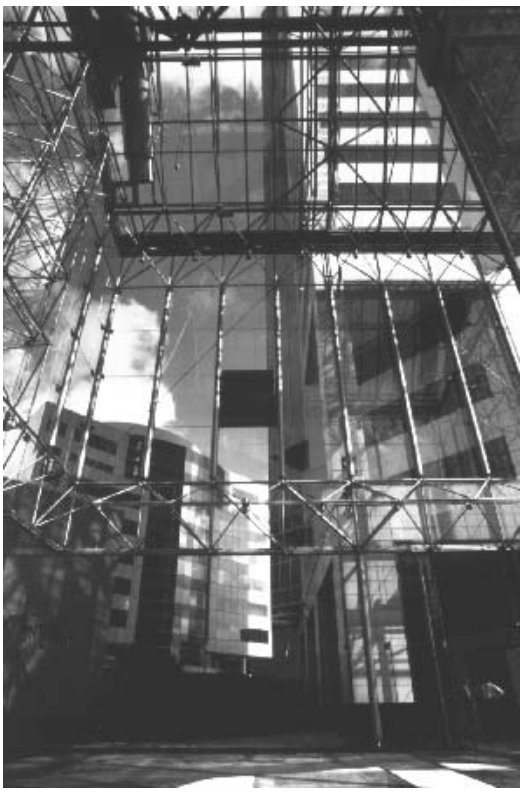


Interior Computer Generated View





End Elevation and Interior Photograph



Exterior and Interior Views