

SUPREME COURT

The building mass of the new Supreme Court is segmented into distinct blocks which separately house the high courts, administration offices, the major tenant - Singapore Academy Law and the Appellate Courts.

To give the courtblocks the flexibility to expand and reconfigure the internal layouts, large structural spans were required, whilst high headroom was needed for better quality of space.



The challenge of slender column and beam sizes, with long structural spans (12m and 16m in the Court Blocks) and shallow structural space required that the building's weight be designed as light as possible. Steel construction with composite steel decks was the logical choice. To meet the aesthetic requirement of concrete frame with unblemished off-form surface finish, the steel beams and columns were integrated with precast concrete. The use of precast concrete also served to provide fire protection to the steel members.



Composite floor construction using steel deck and minimal concrete topping



Prefabricated composite columns and beams

For the disc shell roof, it was built entirely in steel which helped to create the desired curve roof form and was economical to build. The disc is a two-storey high, 67m diameter circular structure. The two-storey disc structure was framed as a three dimensional structure using outer and inner virendeel trusses as the primary structural system. Design of the shell roof of the Appellate Courts was relatively simple despite the long structural span. The main roof structure comprised 64 numbers of radial steel spine beams located at the perimeter of the highest floor of the disc. To minimise deflection, an intermediate ring beam near the centre of the floor supported the spine beams before they met at the roof apex. Circular tension ring

members were incorporated at the base and at regular intervals along the span of the spine beams to ensure lateral stability of the roof structure.

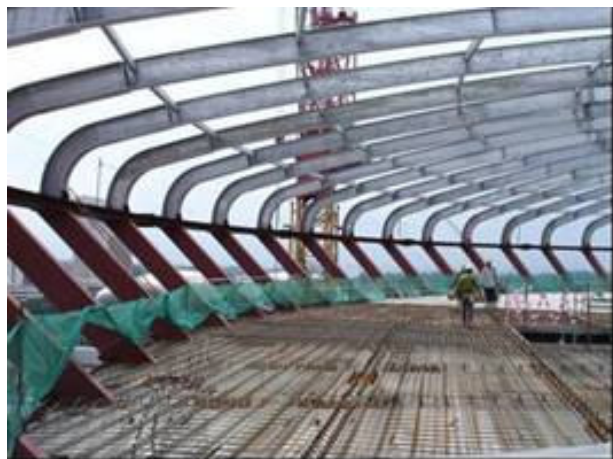
Fire protection to resist structural collapse of the dome was achieved by two protective systems i.e. intumescent system for exposed steel structure and sprayed system for hidden structural elements.

A thin-film, intumescent paint fire rated coating was used for the exposed supporting columns. This allows designers to expose the structure in its purity with the appearance of painted steel, yet provides fire-resistance ratings up to 90 minutes.

The remaining unexposed structural steel beams and columns were protected via vermiculite-based sprayed systems. The required degree of fire resistance was achieved by specifying various thickness of coating. Inspection of the quality of the coating and thickness checking were done immediately after the spraying operation. These sprayed materials were chosen due to the high speed of application, inexpensive and can be adapted to cover complicated shapes including the voids between metal deck floors and steel beams.



Aerial view of the shell roof



Disc's radial steel spine beams