

HYPAR–ACTIVE DESIGN

An introduction to the new Brisbane Convention & Exhibition Centre

South Bank, Brisbane

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Brisbane's Convention and Exhibition Centre is, I believe, most importantly part of a grand tradition of exhibition centres which have expressed the technical capabilities of their age and pushed the frontiers of lightweight structural technology.

That tradition began in 1850 with Paxton's design for the renowned Crystal Palace and as carried through numerous strong but skeletal exhibition buildings separating this type of building, along with railway stations, glasshouses and the occasional cathedral, from all others. Continuation of that tradition was what previously generated the Sydney Exhibition Centre, with its cable-stayed action, by the same team in 1988 and which we were determined to pursue again. The main challenge was therefore to create an original form in line with a tradition where the main exhibit is the exhibition centre itself.

This philosophical desire to meet such a challenge was reinforced in Brisbane by a number of specific constraints. Firstly, Government virtually forbade a building from looking like any other exhibition centre, wanting a highly marketable identity for Brisbane. Secondly, we weren't working on an open site like most early such buildings and like Sydney, where the cables could anchor down outside the perimeter of the building, confined as we were by streets and railway. Thirdly, we were building over 400,000 cubic metres of space in a context of much lower buildings not to mention Brisbane's prized South Bank Parklands with its character of small scale markets, cafès, shops and themed attractions.

Our idea of a series of sculptural lightweight canopies generated from these influences, and from the former presence of the white soaring tensile structures which graced Expo '88 here. The concept, using paraboloid shells was Philip Cox's and Tristram Carfrae's solution simultaneously meeting all of our objectives, translating what has fundamentally been part of reinforced concrete tradition as in Oscar Niemeyer's 1946 Assisi church in Brazil, to a lightweight steel one, and really creating an unprecedented scope in design for large span shell structures.

Directly applicable to the five square format halls which most readily fit the site, the geometry produced considerable advantages. Here you see the main floor plan with the 5 halls, concourse and dock down each side, and the convention hall to the left adjacent to the main foyer. Finishing on a flat edge on all four sides, it enabled us to add verandahs along each longitudinal edge to bring the scale down, especially to the street. These also turned out to be 'hypars' formed from folded plates and supported on single splayed columns at each hall entrance. Inside the public concourse which they cover, they produced an undulating rhythm helping to diminish, by creating a series of waves, the scale of this 400 metre long space. Outside they serrate the building into a series of connected individual pavilions rather than one volume which, for instance, the Melbourne Centre design chose to express. From afar these verandahs appear contiguous with the main hypar roofs collectively giving the centre its overall civic identity.

Certainly the building stands out in a crowded environment sandwiched between railway and streets, metres from the significant Cultural Centre buildings and from South Bank. Nevertheless, it could be said to be in contrast with the more hi-tech and brutalist trends in large scale structural design like the Berlin Centre and this is the beauty, I believe, of the hypar lightweight shell technology.

Internally, these structures produce interesting results. Spatially, the halls are direct reflections of their external form giving them a character which even Sydney doesn't have. Structurally, their

inherent stability we found could be used to hang quite heavy exhibits from loading points at each grid connection. And most importantly the grid is geometrically made up of straight lines enabling it to be fabricated in standard steel sections.

The standardisation of materials is a key design ingredient. The ceilings are comprised entirely of perforated corrugated iron with excellent acoustic performance even above the Great Convention Hall where they are enhanced by suspended perforated metal baffles. In here, the roof is made to support the hinged seating bays which lift up on cables to the underside of the ceiling to create alternative banquet and exhibition spaces. On the exterior, the roof decking is entirely standard kliplok able to be used because of the gradual curvature in both directions. The roofs themselves are supported on precast clad steel framed pods which house the mechanical equipment but as importantly create a reference back to the adjacent Cultural Centre which is now a Brisbane icon.

That language is carried around the Centre with a stronger expression to the Gardens side facing the Cultural buildings. This side supports the 2000 guest ballroom on a plaza elevated above the railway, the ballroom being a late addition to the design brief. For it, we developed smaller versions of the main hyper roofs without the central trusses which split those roofs. The forms here appear even more tent-like, and inside they are clad with simple perforated plywood panels, the geometry accentuated by rows of budlights along the lines of structural force.

To complete this introduction, I would like to mention one other feature of the Centre, not related to the roof forms, but which I think is important to its character. It is the inclusion of major scale civic artwork, the most important being John Olsen's terrazzo foyer, truly enlivening the space which is roofed in a more conventional vaulted form than the halls. Like the roofs, the formation of this floor is testimony to advancements in computer technology, its pattern derived from this painting and transferred via CAD into colour matches for laying.

But as I have shown, it is the versatility and effectiveness of lightweight design, in this case of the hyper shell, which creates the great difference of this centre in the world, and I believe still has many exciting and yet unexplored horizons for future large span building design.