

Hollow sections:

The new Advertiser and Sunday Mail Building

Arun Syam, Smorgon Steel Tube Mills

Adelaide, a city renowned for construction innovation and its prolific use of steel in structural framing for buildings, has done it again! Like many Australian capital cities, Adelaide has a dynamic cityscape but, unlike many of its counterparts, it has a disproportionately higher use of structural steel framing – much of which is currently coming out of the ground.

Several new buildings are now using an innovative form of steel framing. One is the new Advertiser and Sunday Mail building known as the Advertiser Building for the South Australian Head Office of Advertiser Newspapers Pty Ltd. Situated at 31 Waymouth Street in Adelaide's CBD, the building is to house the office staff of the Adelaide operation.

Built at a cost of \$50 million from 1200 tonnes of structural steel, the construction is a five storey, steel-framed office building, utilising composite steel beams, with a basement level and two storey plant mezzanine above the roof. The structural engineers, Peter McBean and Loreto Taglienti of Wallbridge & Gilbert, chose an overall steel solution as this proved to be economical and much faster to build. The 8.1 metre span floor beams used composite (steel-concrete) beams with Fielders KingFlor® steel-profiled decking and in-built steel formwork. Typical composite floor beam sections included OneSteel 310UB, 530UB, 410UB, 460UB, 530UB, 610UB, 700WB and 800WB. Other floor beams included 150UC, 200UB, 310UB, 530UB, 800WB and 400 x 300 x 12.5 RHS. The primary beams have slotted fin plate connections through the columns.

Left: Model of the project showing the roof site.
Right: Artist's impression of the foyer.

The 3.5 metre cantilevered floors to the south and in particular north ends of the building also influenced the selection of structural steel. Steel framing allowed this to be achieved. The design of the north and south perimeters are column free. The façade is glass with an inner skin curtain wall and a cantilever glass wall another metre away. Deflection control of the cantilevered floors was very tight in order to service the façade weather seal. Consequently, Wallbridge & Gilbert considered steel the appropriate solution because of the greater deflection predictability, compared to a concrete structure subject to significant long term creep deflections.

The column framing grid is typically 8.1 x 8.1 metres. The structural innovation embraced in the Advertiser Building uses hollow section columns which provided an efficient, cost effective and time saving solution. Concrete filled 400 x 400 x 10.0 square hollow sections (SHS) were used around the perimeter of the building. In what are some firsts for Adelaide and Australia, these larger, thicker and stronger columns used Smorgon Steel Tube Mills' DualGrade® C350L0/C450L0 SHS, designed to the higher strength grade of AS 1163-C450L0. This provided up to 30 percent savings in steel mass and fabrication costs.

All internal columns were concrete-filled 508.0 x 10.0 circular hollow sections (CHS) and 508.0 x 12.5 CHS from Smorgon Steel Tube Mills and achieved a two hour fire rating. They were designed to AS 1163 grade C350L0 with the engineering, contracting and fabrication teams readily embracing the reported results for structural (not linepipe) applications. The guaranteed L0 impact properties for the hollow section columns,

standard for all Smorgon Steel Tube Mills tubular products, provided peace of mind to the design and delivery team as the structure is subject to static, quasi-static and earthquake design loads. The architect elected to use circular columns from an aesthetic and functionality perspective. However, the overall preference for hollow section columns was to create an attractive building with a high quality finish.

Connections of the floor beams to the hollow section columns took several forms. CHS columns with discontinuous (i.e. simply supported) beams were connected by a single line of bolts to a web side plate welded to the column face. Continuous cantilevered beams utilised stub beams welded to the column face with (top and bottom) flanges welded to ring stiffeners around the column perimeter. Bolted moment end plate connections joined the stub beam to the suspended cross beams.

The building perimeter SHS columns were either continuous with web side plate connected beams or discontinuous at every floor with cap and base plates connected to continuous beams when such beams were cantilevered beyond the column line. Lateral bracing for the building was provided by the floors being tied back to the two service cores.

The structural design loads were based on the building being used as a post-disaster facility after a significant earthquake event. In the office areas there are 3kPa and the plant 5kPa design load. The building is mainly configured for an office environment and boasts five storey double-glazed façades, mezzanine and basement floors, and combines both a high quality finish and functionality for a predominantly IT dominated



workforce. It also features a gymnasium and a large atrium entrance.

Sprinklered floors and concrete-filled hollow section columns provide significant efficiencies to enable concessions on fire ratings to make the final framing system economically competitive. Intumescent coatings sprayed onto the steel beams increased those elements' fire resistance. Fire engineering design was done to Australian Standards and British guidelines. The finished floor area will be approximately 3000 square metres.

Wallbridge and Gilbert found designing with structural steel hollow sections to be relatively easy. Both engineers noted the useful design aids available from Smorgon Steel Tube Mills were a distinct advantage for quick, correct and efficient designs.

A new and novel idea for tracking the construction of this site has been the addition of live webcam images available from three vantage points. The images have been live since the building's initial stages and will be broadcasting right through to completion in September, 2005. The webcam images can be found on the Adelaide Advertiser website: www.theadvertiser.com.au.

Further information contact Smorgon Steel Tube Mills: www.smorgonsteel.com.au/tubemills

Below Left: The circular hollow sections can be clearly seen in this construction shot.

Below Right: Internal column head with web side plate slotted through the CHS column for primary beams and web side plate welded to the CHS face for secondary (not shown) beam.

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| Project team | |
| Client: Advertiser Newspapers Pty Ltd | Steelwork Contractor: Manuele Engineers |
| Architects: Fender Katsalidis | Steel Detailer: USDSA |
| Project Manager: E G O. Group | Steel Distributor: Smorgon Steel Metals Distribution |
| Structural Engineer: Wallbridge & Gilbert | Tube Supplier: Smorgon Steel Tube Mills |
| Building Contractor: Boulderstone Hornibrook | |

Left: East side wall of the building showing DualGrade SHS concrete-filled columns designed with strength grade C450L0.
Right: Column (top) cap plate connection with continuous primary beams and discontinuous secondary beams.

