Bisalloy Steels

bulletin

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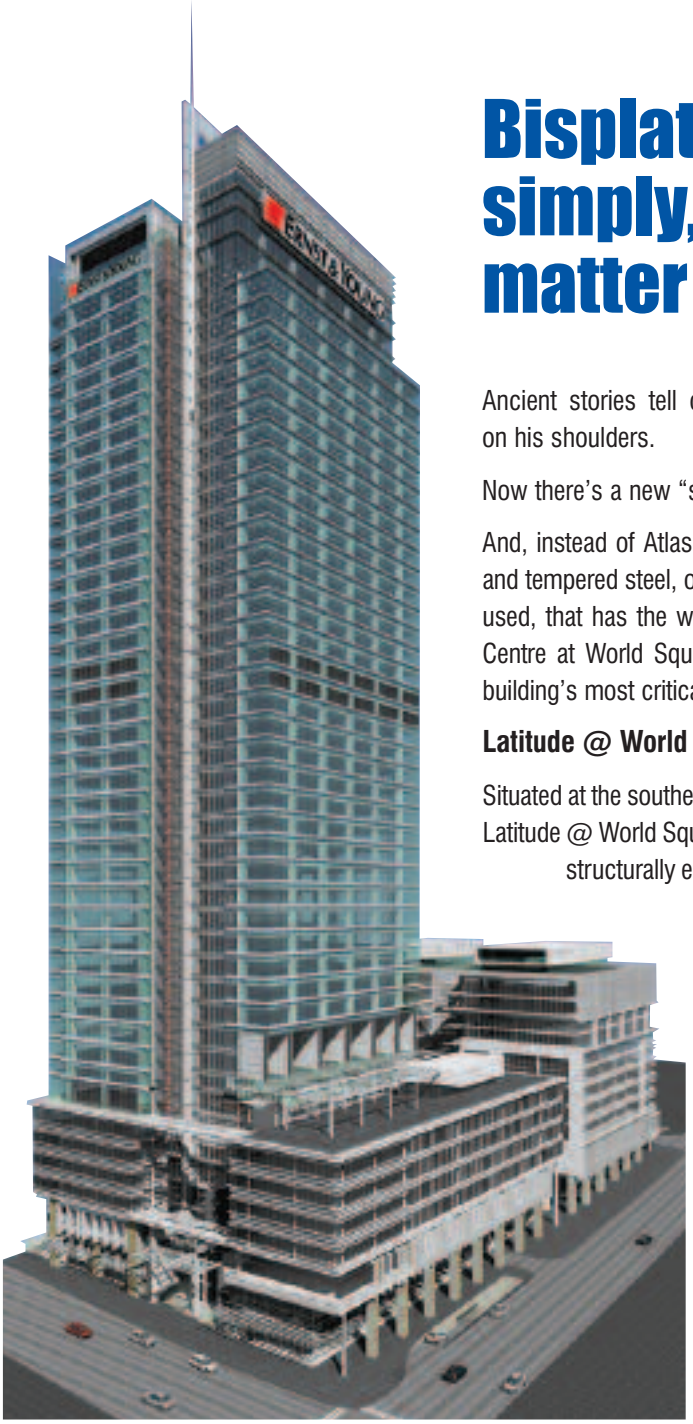

Bisplate . . . simply, a matter of truss

Ancient stories tell of Atlas bearing the weight of the world on his shoulders.

Now there's a new "storey" to tell. Or rather, 55 storeys.

And, instead of Atlas, it's just 280 tonnes of Bisalloy quenched and tempered steel, out of thousands of tonnes of standard steel used, that has the weight of the Latitude tower, Ernst & Young Centre at World Square, safely resting on its shoulders at the building's most critical stress-points.

Latitude @ World Square: The inside storey.

Situated at the southern end of Sydney's central business district, Latitude @ World Square is designed by architects Crone Nation, structurally engineered by Hyder Consulting, and is being constructed by Multiplex.

Due to be completed at the end of 2004, five months ahead of schedule, the entire World Square project is really a "storey" in two parts – the first part of which began more than 15 years ago.

But the first chapter of the "storey" didn't have a very happy ending.

Construction stopped at the World Square site with only the carpark and retail structure to level 14 completed.

It remained a concrete shell, mostly undeveloped, until 2002, when a new

Bisplate80 high strength, quenched and tempered structural steel plate is a key component in the Latitude@World Square project being completed well ahead of schedule.

vision of World Square began its renaissance – but this time with a new construction technique too – in composite steel, which represented a complete break from the original concrete design.

The change to steel, although slightly more expensive than the original concrete, came about when, during the design phase for the new World Square project, several areas of risk were identified:

- The risk of differential settlement with heavier concrete structure compared to steel.
- Increased time and cost to construct a transfer structure capable of carrying the much heavier concrete structure.
- Limited working hours on-site due to the dense residential and business development, now closely surrounding the site, that had taken place in the 15 years the original construction had lain largely untouched.

Getting a jump start on construction.

Another significant reason for the change to steel, was Multiplex's proposed "jump start" construction technique for the new design. This approach means construction can take place on multiple work faces and levels, and saves significant amounts of time.

Perhaps the best example of its advantages is shown in the fact that the existing level 13 and 14 concrete slabs at World Square were not viable with the new construction, and had to be demolished – yet this did not hold up work above those levels to the extent it normally would have.

Bisplate 80 plates, with shear studs, prior to forming into box sections.

The first level of the "jump start" was a structural deck installed at level 16 (six levels above the street) supported on concrete-filled steel tube columns, which were in turn founded on existing columns on level 14 of the previous works.

This construction deck could only have been built from structural steel because of the complex geometry and high load capacity required by the constraints of working with the existing structural support.

The success of the Latitude@ World Square construction process hinges on these huge "jump start" trusses, effective in large part due to the light weight and great strength of Bisplate 80.

From level 16, the rest of the vital transfer structure, at levels 18 to 20, was constructed, allowing construction of the upper tower floors to be started at the same time as demolition and major re-working of the old 11th, 13th and 14th levels took place below.

Andy Davids, Director of Structures, Hyder Consulting: "The 'jump start' system not only provided a new construction deck from which to launch the tower. Most importantly, it also incorporated an extensive set of steel transfer trusses, whose complex geometry allowed the new tower columns to be mated with those below level 14, which were previously unsuitable."

In Bisalloy, they truss.

As Australia's only manufacturer of quenched and tempered steel, Bisalloy is proud that Bisplate was specified by name in the design phase for use in the trusses.

The trusses themselves were fully seven metres – or two storeys – deep.

Each was composed of an innovative combination of Bisalloy high-strength quenched and tempered steel boxes and concrete-filled chords, and tension diagonals. In total, Bisplate 80 was used for the vital truss chords and nodes for levels 11, 16, 18, 20, and 34.

The manufacturing technique involved Bisplate 80 (AS3597 Grade 700) plates being cut to size, weld preparations made, and studs welded onto the inner faces, prior to the plates being formed into box sections.