THE PROJECT: CAPITA CENTRE, SYDNEY, AUSTRALIA

The Task

Glenn Industries was engaged to design, manufacture and install factory finished Glass Reinforced Cement (GRC) panels to transform the square structural steel brace frame into a round column with a stainless steel appearance. The GRC panels were to be designed as permanent formwork to provide corrosion and fire protection to the external brace frame on the 30-storey Capita Centre in Sydney, designed by world-renowned architect Mr Harry Seidler.

The Solution

Glenn Industries formed a specialist design and engineering team to develop a GRC panel system to meet the architectural brief and the stringent criteria of the building design codes.

The GlennGRC™ panel was required to:

- Be manufactured perfectly round in two halves, 1.5 metre high by 1.2metre in diameter
- Provide a 4-hour fire rating and corrosion resistance to the structural steel brace frame
- Be structurally fixed to the steel brace frame with no visible fixings
- Provide a permanent formwork system capable of retaining the pressure from one tonne of concrete mix filling the void between the square brace frame and the round GRC panels without leakage
- Have a factory-applied surface coating system to simulate the appearance of stainless steel, be resilient to vandalism graffiti and long life with minimal maintenance.

The Capita Centre's main architectural feature is the unique 30 storey high stainless steel external brace frame standing one metre forward of the buildings façade. The brace frame provides lateral stability to the 30-storey building and consists of three vertical columns and diagonal bracing. The outer two columns extend to ground level and provide support to the building structural weight whilst one of the diagonal braces projects 30 meters above the roof level and houses a hydraulic flag pole.

The third column, in the centre of the outer two columns, starts at level six of the building. The area below the central column, which is supported from two diagonal braces radiating from ground level, is a spectacular landscaped entrance foyer.

The horizontal steel floor beams supporting the concrete floor slabs project through the curtain wall and connect to the three vertical columns of the brace frame. These protruding steel floor beams (nib beams) were also clad with GlennGRC™ factory finished panels as permanent formwork.

Glenn Industries design team identified that the structural steel brace frame, when fully loaded, had elastic shortening of up to 70mm. To compensate for the shortening and to not affect the long-term performance of the GlennGRC™ panels, Glenn's design incorporated a 5mm rubber bearing system placed between each panel.

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To provide the fire rating and corrosion protection for the steel brace frame, Glenn Industries pumped a specially formulated concrete mix into the void between the square steel brace frame and round GlennGRC™ column cladding, as each panel section was installed. This process required the use of a specially designed, hydraulically driven portable concrete pump.

Glenn Industries identified GlennFlon™ PVf3 as the ideal surface coating system. GlennFlon™ met the architect's requirements to simulate a satin stainless steel finish, and provide outstanding durability, exceptional colour retention, graffiti resistance and 'self-cleaning' characteristics to minimize dirt retention. GlennFlon™ provides a surface finish with a 80% gloss and colour retention after 20 years exposure.

Glenn Industries wrote the application procedure and developed a specialist coating line to pioneer the application of GlennFlon™ PVf3 to the GlennGRC™ panels.

As a project requirement, the entire panel system had to be 'proofed' before commencement on site. Glenn Industries produced and assembled a prototype, which had to hold its own volume in water. This test was to ensure the horizontal and vertical panel joints would retain the limewater from the concrete mix. The excess water in the concrete mix drained out of the panel system vertically via a specially designed internal drainage system. The system was tested and approved for construction by independent engineers Connell Wagner (now Connell Mott MacDonald).

Connell Wagner's engineers were also required to inspect the quality of daily production, checking 'roundness' and dimensional accuracy of the 1100 GlennGRC™ panels produced.

The 'roundness' and manufacturing tolerances were critical as the 10mm engineered vertical joints between each of the half panels, and the 10mm expressed half lap horizontal panel joints, were required to produce a water seal when placed around the steel brace frame to prevent cement slurry leakage. The expressed vertical panel joints were also required to alternate 90 degrees from one panel to the next. All panels were produced without rejection.

The complexity of the installation of the GlennGRC™ panels, with no exposed fixings, required Glenn Industries to design specialist mechanical handling equipment. This was essential to ensure the panels were correctly aligned and globally positioned around the structural steel brace frame prior to progressively filling the void with concrete mix.

Glenn Industries progressive panel installation was undertaken from a "Trojan Horse" - a working platform scaffold that used the sheer studs of the structural steel columns to progressively climb the steel brace frame.

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The Result

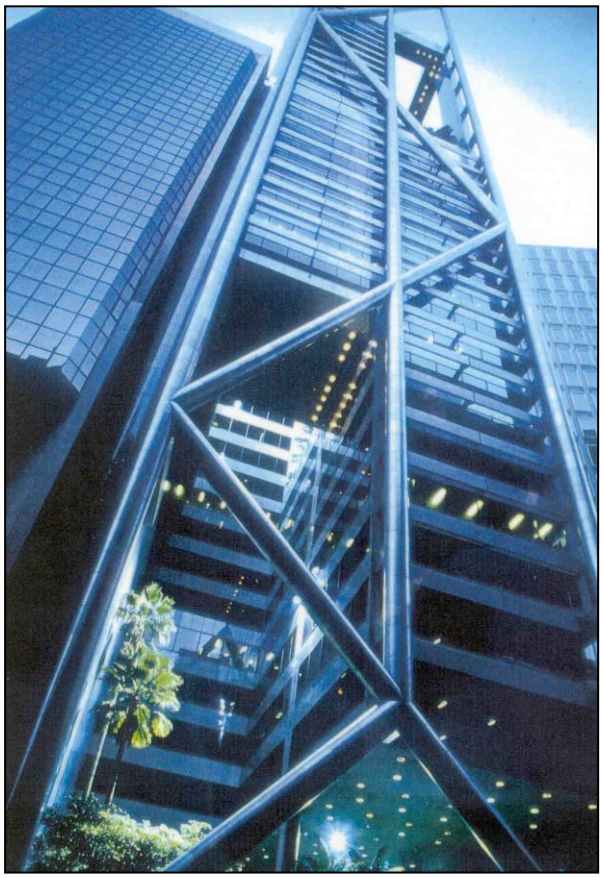
The Capita Centre project is testimony to the consistency and accuracy to which Glenn Industries can manufacture and install GlennGRC™ factory finished panels.

The innovation and leading edge technology Glenn Industries developed for this project lead the client, Capita Finance, to commission world leading engineers Wiss, Janney and Elstner Associates from the USA to review, prior to commencing on site, the design manufacture, surface coating and installation methodology. They confirmed the high quality of manufacture of the GRC panels, the excellent adhesion of the GlennFlon™ PVf3 surface coating system and the professional approach of the Glenn Industries team to the project.

The Project Managers – Hartcorp provide the following commendation:

"We searched the world to find a specialist in Glass Reinforced Cement who could handle this complex project and were delighted when we found the expertise and technology right in our own backyard".

Robert Hart, Hartcorp Pty Ltd



Other Applications

Southland Building, New Zealand
Melbourne Underground, Melbourne Australia
Equatorial Hotel, Ho Chi Minh City, Vietnam

The Client:

Capita Finance

The Architect:

Harry Seidler

The Engineers:

Structural Engineer – Miller, Milston and Ferris
Checking Engineer - Connell Wagner