

■ Shell game

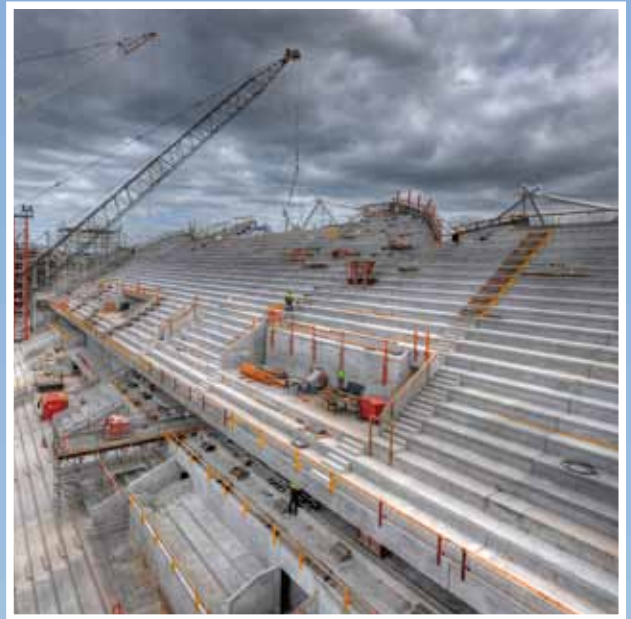
With its distinctive geodesic dome roof and its rectangular playing field, AAMI Park has reinvigorated Melbourne's world famous sporting precinct, attracting new international teams and sporting codes to this already sports mad city.

The \$267.5 million, 30,050-seat stadium was built on the historic Edwin Flack field, after an agreement between Melbourne Victory and the Football Federation of Victoria to extensively refurbish the grounds, expand the seating capacity and build a state-of-the-art stadium to attract soccer, rugby union and rugby league fans.

The partially covered stadium boasts a bioframe design that eliminates the need for pillars, walls or other support structures, offering spectators unobstructed views of the action.

The stadium called for extensive use of hollowcore precast flooring supplied by Hollow Core Concrete, and seating plats supplied by Westkon Precast. Both precast suppliers had experience on sporting venue projects, and moved onto the job after completing the refurbishment of the nearby Melbourne Cricket Ground.

The standard pre-stressed seating plats for the project were manufactured using specialised proprietary hydraulic self-stressing standalone moulds. Two other specialised plat moulds were also used. The first was the mould for the pre-stressed double plat seating units that also form the front row of the upper grandstand. This purpose-built mould was built in the ground. These double plats have a mass of over 20 tonnes per unit. The other specialised moulds were the pre-stressed cantilevered plats that were created to form both the upper back rows of the stadium and the all-important foundation of the stadium's unique roof profile. This was a complex challenge because the plats themselves formed the curves that ran in line with the roof detail.



The project also incorporates some 20,000 square metres of hollowcore flooring, a job that required strict attention to detail to ensure that the integrity of each level was retained.

For both precast contractors, the sheer volume of materials together with the extreme time intensity of the program and some unexpected delays, created some real challenges.

The specialised seating plat moulds required extensive planning, time and resources to set up. The casting schedule meant producing 12 plats a day, sometimes up to 20 tonnes each. When there were delays with construction on site, the plats had to be stored – not an easy task due to their shape which was not conducive to stacking. At one point, a total of 15 acres of factory and yard space was dedicated to storing the plats for the project at Westkon's Sunshine and Melton plants.

However, once the initial delays were resolved, both precast manufacturers were able to swiftly complete their work. Both agree that all in all it was a smooth job, with their prior experience with sporting venues having been a definite advantage.

The slew of awards the project has received since its completion is also testimony to its success.

Contractor: Grocon Constructions

Architect: Cox Architects

Engineer: Arup; Norman Disney and Young

Precast manufacturer (flooring): Hollow Core Concrete



International recognition for SA precaster

Little did Bianco Precast realise when they bid to supply 3D BIM modelling services for the South Australian South Road Superway project, was that they would not only win the bid, but also an international award.

The South Road Superway project is a total re-design of the existing road network, planned to improve access for local businesses and the surrounding residential and commercial areas. It will feature an elevated transit corridor with multiple lanes in each direction, and is due for completion in December 2013.

To date the South Road Superway is the largest, single investment in a South Australian road project - at \$812 million. It is also the most complex engineering road construction project to be undertaken in South Australia.

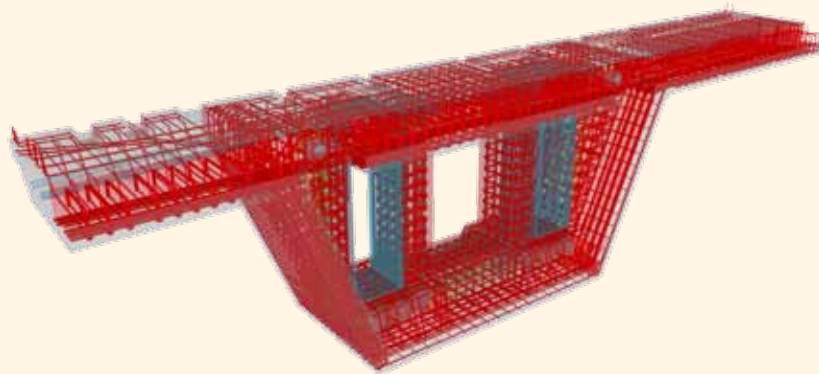
What makes it so complex is the pier and segment reinforcements, post tension ducts, and services; which all need to be checked carefully to prevent clashes and costly re-work. Ramil Martin, a draftsman at Bianco, credits the software used for the success of the project. "Tekla, hand in hand with Pacific Computing helped us to detail and coordinate this project."

He used the BIM technology, with its 3D capabilities, to virtually review the potential issues. "Tools like 'clash checking' and simply being able to see the 3D view of what's happening on the model is truly a great benefit." It was these 3D capabilities that impressed the client and won Bianco Precast the work.

When the model of the South Road Superway was complete it was entered into the annual Tekla modelling competition, run in Australasia by Pacific Computing. It won its category – the Precast Concrete category - with over 70% of the votes.

As the winner of its category, the model was automatically entered into the product's global competition, based in Finland. The model competed in the 'Concrete and Other' category, and was up against models from all over the world. Again, the entry came out on top, winning its category, proving that Australian precast manufacturers definitely are competitive on a global stage.

The 2012 Australasian Tekla Modelling Competition begins in the second half of the year, and details can be found closer to the date on the Pacific Computing website www.pacificcomputing.com.



CORPORATE MEMBERS

- Asurco Contracting** ■ [08] 8240 0999
- Austral Precast** ■ [03] 9794 5185 (VIC) or [02] 9604 9444 (NSW) or [08] 9493 5116 (WA) or [07] 3265 1999 (QLD)
- Bianco Precast** ■ [08] 8359 0666 (SA)
- Delta Corporation** ■ [08] 9296 5000 (WA)
- Duggans Concrete** ■ [03] 6266 3204
- Hanson Precast** ■ [02] 9627 2666
- Hicrete Precast** ■ [08] 8260 1577 (SA)
- Hollow Core Concrete** ■ [03] 9369 4944
- Humes** ■ 1300 361601
- MJB Industries** ■ [08] 9797 0999 (WA)
- PERMAcast** ■ [08] 9525 1380 (WA)
- Precast Concrete Products** ■ [07] 3271 2766
- Reinforced Earth** ■ [02] 9910 9910
- Rocla** ■ [07] 3331 3515
- SA Precast** ■ [08] 8346 1771 (SA)
- Stresscrete** ■ [07] 4936 1766
- Ultrafloor (aust)** ■ [02] 4015 2222 (NSW) or [03] 9614 1787 (VIC)
- Waeger Precast** ■ [02] 4932 4900
- Westkon Precast Concrete** ■ [03] 9312 3688

ASSOCIATE MEMBERS

- Actech International** ■ [03] 9357 3366
- Active Minerals International** ■ [07] 4059 0648
- Ancon Building Products** ■ [02] 8808 1111
- Barossa Quarries** ■ [08] 8564 2227 (SA)
- BASF Australia** ■ [03] 8855 6600
- Bennett Equipment** ■ [08] 8268 1199 (SA)
- Building Products News** ■ [02] 9422 2929
- Cement Australia** ■ [03] 9688 1943
- Composite Global Solutions** ■ [03] 9824 8211
- DesignBuild Source** ■ [03] 8844 5822
- Everwilling Cranes** ■ [02] 9892 3377
- Fuchs Lubricants (Australasia)** ■ [03] 9300 6400
- Grace Construction Products** ■ 1800 855 525
- Nawkaw Australia** ■ 1300 629 529
- OneSteel Reinforcing** ■ [02] 8424 9802
- Pacific Computing (Australia)** ■ 1300 769 723
- Parchem Construction Supplies** ■ 1800 624 322
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- Reid Construction Systems** ■ 1300 780 250
- RJB Industries** ■ [03] 9794 0802
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- Sunstate Cement** ■ [07] 3895 1199
- Tilt-Lift Equipment** ■ 1300 845 854

PROFESSIONAL ASSOCIATE MEMBERS

- Aurecon Australia** ■ [02] 9465 5751
- BDO** ■ [02] 9286 5850
- Inhabit Group** ■ [02] 8003 6333
- Moray & Agnew Solicitors** ■ [02] 4911 5400
- Tekdraw Drafting** ■ [08] 8342 0500 (SA)

AFFILIATE MEMBERS

- Baseline Constructions** ■ [02] 9080 2222
- British Precast** ■ +44 (0) 116 254 6161
- Precast New Zealand** ■ [64] 09 638 9416

OVERSEAS MEMBERS

- Golik Precast Ltd (Hong Kong)** ■ 852-2634 1818
- OCV Reinforcements** ■ [66 2] 745 6960
- Srivari Metal Works** ■ +91 4344 321 106

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Published by
National Precast Concrete Association Australia

6/186 Main Road Blackwood SA 5051
Tel [08] 8178 0255 Fax [08] 8178 0355

Email: info@npcaa.com.au
Executive Officer – Sarah Bachmann

www.nationalprecast.com.au

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In This Issue

Pg 1 Oracle Apartments

Pg 3 182 Pitt Street

Pg 5 AAMI Park

Pg 1 Working Smarter

Pg 4 Eastern Front

Pg 6 Urban Superway

■ Ahead of the curve

Two landmark highrise apartment blocks that are now part of the famous Gold Coast skyline are testimony to teamwork, innovation and design that's literally outside the square.

The \$850 million Oracle luxury apartment development at Broadbeach comprises 'twin' 52-storey and 42-storey buildings set at 180 degrees from each other, the taller facing the beach, the other overlooking the hinterland.

One of the most striking features of these two buildings is their flowing, kidney-shaped curves formed with precast concrete panels, which clearly mark them out from neighbouring buildings.

According to Ian Coulter from Precast Concrete Products, which supplied the 1540 precast exterior panels used in the building facade, the graceful simplicity of these curves belies the extraordinarily complex planning, modelling and moulding required to achieve it.

Just one of the challenging features of this job was the unusual 'hammerhead' shaped panels. These comprised a 'shaft' and a 'head', a slender part and, within that, an elevation of 300, 600 or even 900 mm. Then there were the transition panels, which were an 'S' shape incorporating both concave and convex curves.

A further degree of difficulty was that the bulk of the panels had subtly different shapes, due to the shaft and the head size changing on each level, requiring use of more than 20 moulds and calling for a mould change in one out of every three panels cast. In fact, the project called for a staggering 518 different panel shapes.

...story continues on page 2

■ Are we really working smarter?

The smart use of online project document management systems is rare, with many builders simply using the facility to provide vast amounts of information which is irrelevant to the sub-contractor. This overflow of information can require considerable time by the detailer to download, sort, review and then reject all of the unnecessary information. This adds nothing to the process except unnecessary time and cost.

The ideal would be a return to the practice where sub-contract documentation packages are assembled by the project design team and then, using smart technology, issue the packages to the appropriate people. The best of both worlds!

...story continued from page 1

Meeting the program required casting 10 panels a day, a high enough work rate in itself, but also a huge logistics exercise, requiring tight teamwork with the builders and architects. Close collaboration was essential to decide the optimum order for transporting and erecting the panels. This in turn determined the sequencing of the casting and associated mould changes that were required to ensure construction was not interrupted.

“The complicated thing was that there were typical hammerhead panels up to a certain point and then the kidney shape of the structure began truncating as we got higher, which gave a third dimension to the panels,” says Ian. “This was not a job where you could cast and then store the panels, because their shapes meant they could not be stacked.”

The project’s constantly changing floor plan meant that at any given position in the building, the same place on the next floor was different. So while there was a uniform number of 18 panels per floor, this might require a vertical stretch of 10 identical panels in a row on one floor, then another stretch of 40 panels, each different from the next.”

In addition to creating the shapely façade of the building, the precast panels formed the edge of the structural formwork. These contained cast-in 600 mm galvanized starter bars which were used to attach the panels and form the perimeter of the building and the structural balcony elements.

The hammerhead panels, placed on a complicated stepped formwork, required specialised lifting gear to position them around the floor area. Once all was in place, the insitu concrete floor was poured.

Landmark GRC

Another striking feature of the buildings is the expanse of glass-reinforced concrete (GRC) walling which is lit with coloured lights to provide an iridescent landmark at night.

The GRC used in the project was supplied by Asurco Contracting. GRC was selected by the architects because of its light weight – at 100 kg per square metre, GRC panels were supported on the edge of the first level slab without large structural supports.

GRC features in the screen panels to the four-storied podium north building – the ones that are lit up at night. This comprised 24 panels 1.0 m high, 3.2 m wide and 0.2 m deep, which were fixed to the level one slab 0.6 m in front



of the curtain wall to create an architectural feature and sun screen. The 12 mm GRC skin was overlayed over a hot dipped galvanized RHS steel frame that provided the structural support.

There are also 26 distinctive ‘fins’ made from GRC in the podium south commercial building. These hood-shapes are 9.0 metres high and 1 metre deep and have been painted in a vivid green to create a featured entrance to the commercial area.

“There was a real sense of collaboration and teamwork on this site, with every challenge addressed and overcome through creative thinking and planning each step to the finest degree,” says Ian Coulter. “And I think the end result speaks for itself.”

Developer: Niecona

Contractor: Grocon

Architect: DBI Design

Engineer: Robert Bird

Precast manufacturer (panels): Precast Concrete Products

Glass-reinforced concrete manufacturer (podium): Asurco Contracting



Diary dates... **2012**

Build & Design Queensland
9th – 11th May 2012
 Brisbane Convention & Exhibition Centre
www.bdqexpo.com.au

DesignBUILD Melbourne
27th – 29th June 2012
 Melbourne Convention & Exhibition Centre
www.designbuildexpo.com.au

DESIGN BUILD

Overnight success

Erection of a four-storey, high-end retail outlet in a jaw-dropping 72 hours right in the heart of one of Australia's busiest and most prestigious shopping precincts has made construction history.

Set right at the mouth of Sydney Westfield's new, \$2 billion flagship shopping centre in Pitt Street Mall, the record-making construction is located squarely in one of the world's most expensive rental-per-capita retail strips.

The build took place in the dead of night over two weekends to cause minimum disruption to passing shoppers and surrounding tenants. With the shell completed in the equivalent of just three days, the aim was to have the four-storey outlet tenanted, open and recouping rental returns in time for Christmas. The astonishing speed of precast delivery and construction put the rest of the project squarely on track to achieve this aim.

According to Paul di Cristo, from project manager Cerno Management, completion of the project using conventional methods would have taken three to four months. Specialist precast builder Baseline Constructions worked hand-in-hand with the project manager and with Hanson Precast, which supplied and erected the 100 per cent precast structure to ensure the on-time, on-budget completion.

To maximise floorspace, the architect designed the structure without columns, so key walls are load bearing, while the façade is frameless glass, providing optimum stock exposure. With a gross floor area of 180 square metres, and floor-to-floor heights of 4.5 metres, the project comprises 69 wall panels in 180 mm, 200 mm and 220 mm thicknesses. Four suspended floors were constructed using 106 hollowcore floor planks with 60 mm topping. Stability under lateral loading was achieved by grouping together the vertical wall panels at the front and back of the building, to act as one structural element using welded steel connections cast into the precast. The engineered and accurate positioning of the temporary bracing of the double height wall panels to allow construction access to the floor planks was important in achieving the five day turnaround between the two weekends.

"We manufactured the wall and floor components to the tightest specifications after extensive consultation with the architect and builder" says Chris Parsons, from Hanson Precast. "This significantly reduced labour, materials and other costs and wastage associated with a conventional build of this style. There was no room for error on the project, and no second chances, with installation from 10:00 pm Friday to 8:00 am Sunday over two weekends. It was a precision job from concept to execution."

In addition to complying with strict planning controls and tight timeframes, the project team had to contend with serious site constraints – access was tight and extremely limited with the one exposed face of the structure fronting on to the busy pedestrian mall and no significant vehicular access.

Precision craneage therefore became crucial to the project's success, with Everwilling Cranes engaged from an early stage to ensure that all tolerances and margins were correctly assessed then addressed for a swift, problem-free result.

"This project represents the future of inner-urban construction and is testimony to a whole host of factors – but especially the close teamwork involved," says Nicholas Bettar, Managing Director of Baseline Constructions.

"It's the outcome not only of meticulous design and planning but also close liaison with the Sydney City Council. Councillors had a very strong grasp of the vision and understood the major advantages that this mode of construction offers. It is our firm belief that what we consider to be exceptional today will become much more the norm in the future, as awareness of the possibilities offered by the intelligent use of precast for these kinds of applications grows."

Client: Goddard Nominees

Project manager / Developer: Cerno Management

Building contractor: Baseline Constructions

Architect: Buchan Group with input from Baseline Constructions

Engineer: Waterman

Precast manufacturer: Hanson Precast

Precast erection: Everwilling Cranes





■ Eastern front

Completion of a 10-year development at the iconic Australian War Memorial in Canberra, was celebrated in style when the project won the Sir Zelman Cowen Award for Public Architecture in the 2011 National Architecture Awards.

The major development involved the refurbishment and new additions to the War Memorial's eastern precinct, comprising construction of a signature staircase linking the courtyard with the renovated cafe, a 200-place underground carpark, amenities block, bus parking bays and extensive landscaping works including a distinctive retaining wall.

Precast concrete features in the project – with elements supplied by S.A. Precast - include the retaining wall, staircase and the architectural elements of the landscaping works. Each called for an entirely different surface treatment.

First was the 40-panel, black reconstructed granite retaining wall. "The challenge here was to make sure the finish on the new wall exactly matched that of the existing walls," explains Troy Pincin from S.A. Precast who oversaw much of the project, including the transportation of some 15 truckloads of precast from South Australia. "We also supplied the wall panels for the two previous stages but even so, this was a very specialised finish and there was a real art to getting it right. We used a very coarse diamond rub to expose the aggregate, which gives a polished finish that's very distinctive."

The staircase called for an entirely different approach and presented different challenges. The architect required a special non-slip treatment for the grey off-form steps: grey stainless steel strips running the length of the stairs. Each step was cast, then saw-cut with four grooves. Stainless steel strips that were raised about 3mm

above the finished concrete were then epoxied into the steps to provide the non-slip finish. This required pinpoint accuracy because the 1.7 metre-wide steps were laid 15 abreast and the non-slip grooves had to line up perfectly. The end result combines both form and function, forming a striking feature of the finished project.

The precast landscaping elements in the development were also custom-made to the architect's specifications, because the mass-produced alternative would not give the desired finish. This included bollards, planter boxes and a number of grey, off-form class one precast steps.

Throughout the job, the War Memorial remained open to the public, with contractors required to work in with the opening hours of the museum and to ensure minimal disruption on the site.

"All in all, the job went exceptionally smoothly and I think it's been a credit to all involved," says Troy. "When the project received the award it was like the icing on the cake – it's always great to be involved with a project that earns that kind of recognition."

Client: The Australian War Memorial

Architect: Johnson Pilton Walker

Builder: PBS Building

Precast manufacturer: S.A. Precast