

PRECASTER

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Deakin International Centre and Business Building

Completely precast – completely environmental

The new \$65M six-storey International Centre and Business Building at Victoria's Deakin University in the Burwood campus are completely precast buildings, featuring 'snow' coloured external panels and a unique air-conditioning system through the hollowcore floor planks. Designed by H2o Architects, the buildings have been designed with a distinctive curved form to give them 'landmark' status in accordance with their importance as the first buildings to be constructed on the western side of the campus.

The design consists of two simple rectangular buildings. The north building is the International Centre housing offices, teaching activities and student support facilities. The south building is the Business Building housing the business component of the Faculty of Business, including teaching spaces, academic and administrative offices and student support spaces. A new 672-space car park is located at ground level on the Elgar Road frontage, with a further two levels built to the east of the campus. These additional levels follow the downward grade of the natural landform across the site. A café for students and staff is located at the eastern end of the development, closest to the rest of the campus. Between the buildings is an open courtyard, which is an extension of the pedestrian 'spine' connecting with the eastern campus.

The project required the manufacture of 2,806 precast units which included columns, spandrels, load-bearing panels, prestressed inverted 'T' beams and prestressed hollowcore flooring planks. Westkon Precast utilised both its precast yards in Sunshine and Melton to meet the demanding programme. Manufacture took place over an eleven month period, during which an average of 15 units per day were cast.

... story continues on page 2



President's Column

As the incoming President of National Precast I am honoured to take over the responsibility from Alan Morrison who has promoted and grown the Association over the last two years. Congratulations to you Alan for a job well done.

Over the next twelve months the following initiatives are planned:

- National Precast's *Precast Concrete Handbook* being updated and reprinted.
- Precast Safety Workshops for engineers, building practitioners and project staff.
- Detailing manual presenting connections for floor and wall systems.
- Promotional programmes in the innovative use of concrete for energy saving Green Star projects adopting insulated wall panel systems and precast floor systems.
- Development of precast lecture material which will be provided at no cost to all engineering, architecture and building faculty academia.
- Participation in major construction exhibitions – Designbuild Sydney and Perth, Form & Function Melbourne, ICCX (International Concrete Conference & Exhibition) Sydney and Concrete09 Sydney.
- Participation in industry Standard and Code committees.
- Promotion of Members' Projects with publication through National Precaster (quarterly national circulation of 43,000).

The Association provides a forum for participants (being both precasters and suppliers to the precast industry) to promote their products and services and strive for excellence in the use of precast concrete. Meetings are held quarterly circulating through Australia and potential new members wanting to join the Association could contact our Executive Officer, Sarah Moore, for more information.

I look forward to assisting members in the promotion of their products throughout the industry providing safe, reliable, fast construction and efficient precast components to the industry.

Peter Healy

President



... story continued from page 1

Lorenzo Cremasco of Westkon Precast said: "A big point of difference in what we do is that on all our completely precast structures we design and certify them. This provides confidence for the client and end user that their precast building will continue to provide outstanding service over a very long time."

"Being responsible for the design gives us peace of mind as well - because we can iron out any problems well before anything is actually constructed. Additionally, because we can fine tune the structure we save both the builder and client time and money. Precast concrete is a wonderfully adaptable system given suitable pre-planning to get the best out of it - nothing else can touch it," Cremasco said.

It took less than a year to erect the entire project, using 80 tonne and 100 tonne mobile cranes to create approximately 20,000sqm of floor space. Worley Parsons were the consulting engineers to the precaster, and produced all the working shop drawings for the precast elements.

The clever design of the buildings uses the thermal mass of hollowcore concrete floor planks to reduce energy - and consequently service costs - also maximising views and natural light and facilitating community-building through soaring spaces and smaller meeting spaces.

Deakin International Centre & Business Building

Location: Burwood Campus, Victoria

Owner:	Deakin University
Design and project management:	Property Services Division, Deakin University
Design architect:	H2o Architects
Services engineer:	AHW Consulting Engineers
Structural engineer:	Property Services Division, Deakin University
Builder:	Wycombe Group
Precast manufacturer:	Westkon Precast
Consulting engineers to Westkon Precast:	Worley Parsons

Heating and cooling system using hollowcore delivers outstanding result

In line with the University's commitment to environmentally sustainable design, the IC&BB building complex was designed to minimise energy use by maximising passive design elements. The architectural design, air conditioning, ventilation and mechanical systems include special low energy features that use the thermal storage capacity of the building structure to utilise naturally occurring energy aspects of the environment in which the building is located. The advanced environmental design of the project allows Deakin University to clearly demonstrate the triple bottom line of: people, planet, and prosperity.

Features of the building include:

Delivery of air via hollowcore concrete floor planks

The thermal mass of the hollowcore planks is used to store the cooler night air in summer, which is then used during the following day by using the hollowcore voids as air ducts, thus reducing energy demand for cooling. Cooling, created at night on cheaper night electrical tariffs from the building air conditioning system is also stored and re-used in the hollowcore planks in the peak summer season. This shifts electrical demand away from peak periods and reduces demand on the State's peak power generation capacity.

Natural ventilation mode

The building has a natural ventilation operating mode for mild weather conditions. When in this mode, the building's mechanical ventilation and air conditioning systems shut down and occupants are encouraged to open the building windows and louvre vents. At the same time, motorised louvre vents within the central atriums in each building open to assist the natural air flow. This reduces energy usage and improves ventilation, hence improving indoor air quality.

Automatic control systems

The building's automatic control systems are connected via the web to the Bureau of Meteorology's weather forecasts, particularly the predicted maximum and minimum temperatures for the next day. This predictive control is used to pre-set building schedules and slab temperatures in readiness for the following day's occupation.

Building design

The building design incorporates internal light courts to maximise daylight to the interiors. The east-west orientation of the buildings and the use of sun shading will ensure minimum heat loading in summer and maximum in winter. The buildings are naturally ventilated with air tempering by ducting air through the concrete floor structure. Supplementary cooling will be provided for areas of high heat load such as computer laboratories.

Place on Brougham shows off its attractive precast

The \$120m conversion of the former Hotel Adelaide into the unique 'Place on Brougham' apartment complex in North Adelaide is now complete. The prominently located 'Place on Brougham' is the most luxurious and exclusive apartment building yet seen in the Adelaide property market - its impact will help to revitalise this grand old suburb. The existing 10-level hotel structure from the 60's has been redesigned to accommodate 98 luxury apartments with integrated 'lifestyle' facilities that have been designed to provide exceptional quality.

Exceptional quality was also sought by the architects for the façade, due to the sensitivity of the exclusive North Adelaide precinct, where bluestone abounds on historic buildings. The building design is based on the original 1960's structural grid with both the new and the old structures being expressed in the façades. Particular attention was paid to the incorporation of a strong horizontal podium in charcoal coloured precast concrete, with a texture that makes reference to the bluestone character prevalent in the locality. Façades were further broken down with vertical blades providing both façade patterning and a point of definition to the building's entry.

Douglas Gardner, Regional Principal of Woodhead International architects, describes the process of façade selection: "When we considered the façade requirements for the lower floors we were very conscious of the building's prominence on its corner site. That meant we had to integrate two street frontages in a sensitive manner to neighbouring buildings and their façades, both in materials and proportion."

"We started off with stonework, but worried that stone might fall. Then in conjunction with the engineers and builder we explored alternative façade solutions."

"One façade solution stood out above all others. We realised that precast concrete has such a surprisingly extensive range of possible finishes that we could 'reference' the bluestone on the surrounding buildings, without having to slavishly reproduce it - because we could replicate a similar texture and colour in precast concrete to give a fresh interpretation."

We took our request to Bianco Precast, where we selected a Reckli formliner in synthetic rubber that provides a very attractive 'stacked-stone' texture for the façade panels," Gardner said.

Michael Favretto of Bianco Precast explains how the pleasing finish to the precast was achieved: "The panels were cast in black concrete comprising black granite aggregate and black granite crusher fines with the addition of some black oxide. The panels were then acid etched in the factory to remove the surface laitance. The etching brings out the richness of the concrete matrix - in effect providing the interest of natural stone."

Favretto continues: "In addition to the architectural precast panels, we also supplied grey structural wall panels to the four level car park that is located at the rear of the building, making an economical solution. These panels were simply painted. It shows how versatile precast concrete really is."



"All in all, this was a very satisfying project to work on thanks to the good team relations established by Boulderstone, the consultants, and the client," Favretto said.

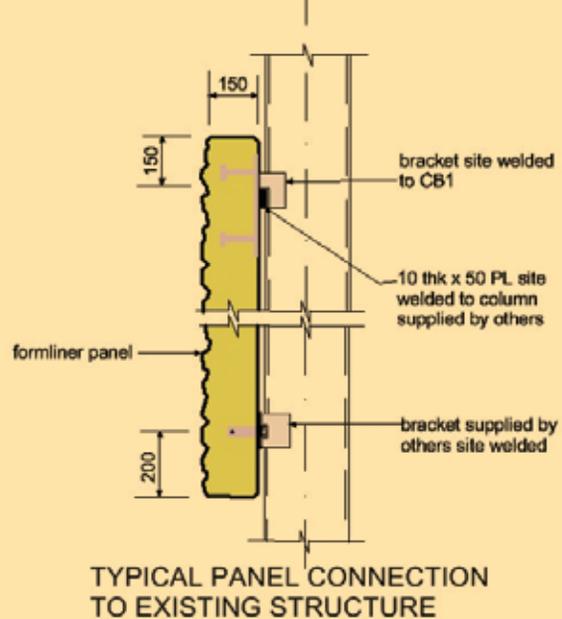
While the total of 235 precast concrete panels went together beautifully, the original structure of the building was a challenge, being of early 1960's 'lift-slab' construction. The structure needed shear walls to meet modern code requirements. The thin columns, only 270mm by 270mm, needed concrete encasement to provide acceptable shear and fire performance. With the original columns out-of-plumb, the new encasement served also to provide correction in verticality. The edges of the floor slabs were uneven with considerable deflections. The existing undulating slab edges were not the easiest to adapt, requiring a façade system able to cope with it.

With careful planning all these challenges were met – the result being a fully updated and strengthened structure and an attractive modern façade system.

Place on Brougham

North Adelaide, South Australia

Developer:	Urban Construct
Architect:	Woodhead International
Engineer:	Wallbridge and Gilbert
Builder:	Boulderstone
Precast manufacturer:	Bianco Precast



Exhibitions in 2009

ICCX - International Concrete Conference & Exhibition Oceania

30th March – 2nd April

Register before 15 February for early bird discount
Sydney Exhibition & Convention Centre

www.iccx.org

Form & Function Melbourne

30th April – 2nd May 2009

Melbourne Convention & Exhibition Centre

www.formandfunctionexpo.com.au

Designbuild Sydney

21st – 23rd May

Sydney Exhibition & Convention Centre

www.designbuilddexpo.com.au

Designbuild Perth

9th – 11th October

Perth Exhibition Convention Centre

www.designbuilddexpo.com.au



The Core Centre | Torquay

The Core Centre Torquay is a structure that incorporates two suspended concrete floors, primarily used for carparking, retail and office space. A full precast solution was offered by Hollow Core Concrete in-lieu of the originally documented in-situ scheme, to overcome a number of challenges and complexities including:

- The building was to have cantilevered beams and floors to allow large glass windows to maximise the shop front exposure.
- The ground floor consisted of the office ground floor and an external car park with a varying set-down from 1m to 1.2m over the basement.
- Irregular floor-to-floor heights, ramps and set downs were all required to achieve the complex architectural requirements of the project.
- An irregular geometry for each level resulted in a number of complicated connection details and transfer beams to allow for upper load-bearing support.
- A central stair void that was to provide a feature for the structure.

Upon review of the structure it was apparent that the proposed alternative precast structure would not only cater for the inherent complexities within the structure, but would also provide other benefits that were not possible with an in-situ concept, including:

- Over 16m spans throughout the building, allowing significantly more flexibility within the car-parking areas, office space and retail tenancies. The originally documented 18 columns within the car park was reduced to just four columns with the alternative scheme.
- A significantly reduced on-site crew, reducing the occupational health and safety risks on the site.
- A six week saving in the construction program as a result of the full precast solution. The speed of construction was dramatically improved with the entire precast structure being constructed within eight working days (over a total of just two months). This provided a significant benefit to the tenants as this allowed the retail areas to be operational for the busy Christmas period.
- The high quality finish of both the precast components and the structural screeds led the tenants to leave much of the structure exposed.
- An estimated cost saving of 10% of the structure costs was achieved by using the precast alternative. This did not include the cost benefit of having tenancies occupied six weeks earlier and the benefit of the tenants being fully operational during the busy Christmas period.
- The cantilevered beams and floors allowed large glass windows and maximised the shop front exposure.

- Irregular floor-to-floor heights, ramps and set downs were all achieved allowing for architectural freedom within the project. Precast transfer beams and associated connections were used to support the load-bearing components.
- The central stair void was created within the structure to achieve the architectural feature.
- The architectural scheme also offered very few walls within the structure so the lateral stability was a critical design requirement. The use of diaphragm action of the precast floor system, in combination with specially designed floor beams, allowed the required stability to be achieved.
- The need for significant formwork and scaffolding systems required for the in-situ system were eliminated with the alternative precast system.

This project illustrates how a complicated in-situ structure can be successfully re-designed as a total precast solution resulting in both cost and time savings to the overall project. Architectural freedom is not restricted by the use of a precast solution; in fact, it is enhanced. Challenging designs and lack of repetition are benefited by a system that allows for flexibility. The use of easy to produce component profiles, simple connections, standard products and careful detailing allow the most irregular projects to be constructed with the same benefits of other more widely accepted precast structures.

Occupational health & safety

One of the major benefits of precast on the project was the reduced risk on site. Due to the significantly reduced on-site crew, the project was not only constructed much faster than the in-situ scheme, saving some six weeks on the construction program, but was completed safely and with no on-site incidents.

The Core Centre

Location: Torquay, Victoria

Builder:	Max Findlay & Associates
Architect:	Gray Puksand
Engineer:	T.D & C
Precast design and manufacturer:	Hollow Core Concrete



Building Information Modelling and Precast

The Australian precast industry is aware of the likelihood of rapid adoption of three-dimensional building-information modelling (3D BIM) by architects and major project suppliers. Some National Precast members are already using BIM software.

Building-information modelling involves representing a building as a full, three-dimensional computer model, with an associated database. Instead of using just lines, which can only be interpreted by people, the model is based on objects, which are solid shapes or voids with their own properties. The model also includes information about the relationships between these objects, so that when one object is changed (a window in a precast panel is made bigger, say) any related objects are automatically updated (the precast panel surrounding the window gets updated). Both 3-D views and traditional 2-D drawings can then be generated from the model.

An immediate advantage of this approach is that the software can identify any mistakes within a design. As well as spotting such "spatial conflicts" and saving money, BIM can also dramatically improve the communication and co-ordination between architects and engineers, as well as the precast concrete manufacturer.

Drawings have been the main documents of a construction project. With BIM, the 3-D model becomes the main reference, and any 2-D drawings produced from it merely perform a minor role. The model also makes it possible to calculate the quantities of materials needed, and hence construction cost. As BIM software becomes more powerful, the model is no longer just a 3-D representation of a building, but is in a sense a digital prototype or simulation.

According to National Precast Member Bentley Systems, because the complexity in both the communication and coordination aspects of BIM necessitates interoperable software, it is imperative for software vendors to realize that an open platform is in the best interest of users around the world. Bentley advises that an open platform enables engineers working on concrete buildings to work on disparate components of a building using a common dataset that is automatically synchronized throughout the design process. Floors, walls, beams, columns, drawings and even the rebar schedule and details can be designed and extracted using independent applications sharing a common dataset."

Precast for Structural Engineers

One Day Seminars in 2009 for recent structural engineering graduates and engineers new to precast.

Presented by John Woodside (winner of the John Connell Gold Medal) together with local National Precast precasters and engineers.

City	Date	Cost: Members	Cost: Others
Melbourne	Tuesday 5th May 2009		
Brisbane	Tuesday 19th May 2009	\$400	\$475
Perth	Friday 9th October 2009		

The seminar will cover:

- Materials & Tolerances;
- Precast Building Design;
- Manufacture, Transport & Erection;
- Design of Elements;
- Contractual Issues;
- Connections, Fixings & Joints.

Opportunities to discuss your own precast challenge with industry representatives will be available at different times throughout the day.

Handouts include the *Precast Concrete Handbook* on disk.

For more information call Nicole at the Concrete Institute on (02) 9736 2955 or email admin@concreteinstitute.com.au.

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- Bianco Precast ■ [08] 8359 0666
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The information provided in this publication is of a general nature and should not be regarded as specific advice. Readers are cautioned to seek appropriate professional advice pertinent to the specific nature of their interest.

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