

# • NATIONAL • PRECASTER

NATIONAL PRECAST CONCRETE ASSOCIATION AUSTRALIA

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## PRECAST Crypts – Everlasting Solutions

The Catholic Cemetery Trust's Mausoleum of the Resurrection at Rookwood Cemetery is a unique and effective example of the blending of sophisticated architectural precast facade design with the functionality of providing structural precast box sections for significant burial capacity.

The Mausoleum of the Resurrection at Rookwood Cemetery is a two storey building which houses 285 precast crypt units to inter some 1900 bodies/coffins.

The outside structure of the building is clad with 160 polished and sandblasted precast concrete panels finished in white cement and white quartz aggregate.

The initial research and development of the precast crypt units was carried out by the Catholic Cemetery Trust in conjunction with the architect Bowden Associates, which set the framework for the preliminary design.

Brisbane-based Precast Concrete Pty Ltd was involved early in the design and after a study tour of USA and Italy, combined with the precaster's intimate knowledge of

*Exterior facades of the Mausoleum featuring polished and sandblasted precast panels.*

precasting techniques, shop details were prepared for early prototype work.

The manufacture of several prototypes confirmed the final mould and reinforcement design to enable high quality product to be manufactured. The precaster designed a method of handling the thin-walled elements allowing the units to be rotated from the 'legs down' casting position into the 'legs up' final installed position. Units were manufactured in multiple berth configurations from 2 berth to 7 berth, with weights varying from 1.5 to 6 tonnes. Typical 7 berth unit size was 6400 mm x 2400 mm x 750 mm depth.

*Precast box crypt modules (cast in the 'legs down' position) being installed in the 'legs up' position*



All units were manufactured from 50 MPa concrete and steam cured to allow early removal from the moulds. Five special moulds weighing 12 tonnes each were fabricated to allow the Class 1 finish to be achieved. Each mould was capable of producing the multiple berth variations between 2 and 7 berth. Wall thickness varied between 60 mm and 100 mm. Floor thickness was 70 mm. An allowance was built into the moulds to allow all crypts to drain to the rear.

All crypt units were rail shipped from Brisbane direct to site using special flat rack transporters to minimise handling damage. Typically 3 no. x 7 berth units were shipped on each load.

On site the crypt units were lifted from the transport vehicles and placed directly onto the structure using the specially designed handling frame to allow the unit to be supported at up to 16 points in order to minimise concrete stresses in the slender units.



*Final installed appearance of marble-faced crypts*

The crypt units were then stacked in a 'legs up' orientation to nine crypt levels high. The sixth level crypt was inverted in order to provide the special 'double berth Westminster' type crypt. Combinations of the double height and double length units allow up to 4 coffins in one space.

Crypt openings were sealed off with 9 mm fibre cement panels and overlaid with polished marble facing panels which were connected to brass ferrules cast into the vertical legs. ■



## SURFACE Finishes

*Previous articles on surface treatment of architectural precast concrete and finishes have covered plain off-mould and exposed aggregate (sandblasting, water-washing, chemical retarding). Paint finishes have become more popular over the last few years and this article provides some basic information in choosing paint coatings as an alternative finishing system for precast concrete panels.*

### PAINT SYSTEMS FOR PRECAST

It is best not to think of paint as a product, but as a *system*. An architect will choose the finished appearance and colour. The system is the process by which we go from the substrate through surface preparation, primers, undercoats and topcoats to achieve the desired finish appearance.

In regard to surface preparation, the surface of precast panels should be free from all dirt, dust, grease, oil and any other surface contamination. High pressure water cleaning should be used to remove dirt and dust.

Aging of precast concrete is considered to be more reliable than surface treatment as a means of conditioning concrete for painting. Recommended drying times are indicated in AS 3211 1998 *Guide to the Painting of Buildings*.

A typical texture system for precast concrete wall panels will involve three steps:

- 1 Primer**
- 2 Texture**
- 3 Finish coat.**

#### 1 Primer

Primer is the most important part of any system. It provides a sound base for adhesion of topcoats.

Water and solvent based primers are used. Water-based primers are most widely used for their convenience – low odour, water thinning and wash up.

*Prepainting of spandrel panels prior to delivery*

Solvent-based primers are used on 'difficult' surfaces eg impervious, smooth surfaces or those with residual release agents.

Water-based primers (and other water-based paints) contain emulsion as binder. Emulsions are discrete particles of resin dispersed in water. For this reason they do not penetrate smooth, impervious surfaces. In addition release agents can act as water repellants making water-based primers unsuitable for such surfaces.

Solvent-based primers have the resin in solution. Solvent can dissolve release agents allowing the primer to penetrate and gain adhesion.

In summary, solvent-based primers are preferred for precast as they are able to easily penetrate smooth dense surfaces to provide a sound base for adhesion of topcoats. In addition, they are fast drying with a two hour recoat and have excellent alkali resistance.

*Textured applied finish with dummy joints to emphasise linear nature on factory unit Glendenning, NSW*



### 2 Texture

There is a wide range of products with a variety of builds and profiles.

**Roller Applied** Roller application is quick and easy and does not require highly skilled applicators.

'Stipple' finishes are the simplest systems requiring only primer and one or two coats of texture.

**Trowel Applied** Application is slower and requires skilled applicators. After trowelling, the coating surface is worked with a polystyrene float to achieve the traditional scratch effect. Trowel coatings are available in 1, 1.5, 2 and 3 mm grades.

Other trowel applied products do not have coarse aggregate and leave a smooth render look.

**Spray Applied** Textures can be applied with a hopper gun or spatter gun to achieve a 'stucco' effect.

Spray application is fast so application costs are reduced but some skill is required.

### 3 Finish Coat

Finish coats provide colour, dirt shedding and long term decorative appearance.

They are applied with a conventional nap roller and are often referred to as 'impact' coatings.

Applied with a normal roller they provide a long life decorative topcoat over trowel or other textures.

For further guidance on precast concrete surface preparation prior to paint application, reference should be made to AS 3610 1995 *Formwork for Concrete* and AS 2311 1998 *Guide to the Painting of Buildings*.

For further information on paint systems for precast concrete, please telephone the NPCAA on [02] 9890 8853. ■



## INDUSTRIAL Wall Panels

*Precast concrete wall panels dominate the Australian construction market as architects and designers successfully apply the method for industrial cladding in factories, warehouses and shopping centres throughout the country.*

### REGIONAL DIFFERENCES

Across the industrial building market the use of precast wall panels benefits the builder and owner in terms of economy, durability and aesthetics, but there are some differences in practice and availability from one State to another.

#### Victoria

In Victoria, by far the most common cladding is flat reinforced precast panels, which are left off-form or are treated with various applied finishes to architects' requirements and customer budget restraints. Architectural features such as shape and grooves are common within the flat panel configuration, however more complicated shapes such as curves and almost anything that ones imagination desires, may be possible.

#### Queensland, WA and Tasmania

In these States the same products as in Victoria are offered, but these have yet to achieve the same market penetration as in the larger States.

#### NSW and ACT

Prestressed hollowcore cladding has been used extensively in NSW for over 25 years and has shared the market with on-site construction. In recent years flat reinforced panels, as are used in Victoria, have taken an increasing share of the market as builders move further towards off-site prefabrication.

*Factory-cast painted wall panels in industrial units, Lurnea, NSW*

### INDUSTRIALISATION OF THE BUILDING PROCESS

The standardisation of wall panels has allowed the precast industry to offer a very fast and economical service. Steel reinforced panels are produced in standard thicknesses on permanent casting beds. Hollowcore panels are produced by slipform technology on long line beds and sawn to size. Both techniques allow for high quality, efficient off-site manufacture where the quality and program are better controlled.

### ARCHITECTURAL FEATURES

Hollowcore prestressed panels can be painted on site or can be cast with an integral exposed aggregate finish. Reinforced concrete panels are usually painted. Both systems allow for incorporation of windows and doors and can accommodate gable ends and other features. Reinforced concrete panels have more flexibility for casting in of features such as dummy joints, grooves, irregular penetrations and shapes within the plane of the panels.

### STRUCTURAL CONSIDERATIONS

Fire ratings of up to 4 hours are available from precast concrete. All precast units can be attached to a portal frame, but when the roof span is less than about 25 metres, steel columns are often dispensed with and the precast panels made load-bearing. Strip footings are required for vertical panels but horizontal panels can span between column pads.

### SITE REQUIREMENTS

Precasting imposes a stricter discipline upon the construction process than applies to insitu construction. For precast to work, there needs to be clear access to the site for trucks and cranes and good coordination with other trades. The builder must ensure that all information required for shop drawings is available in good time.

### OTHER WALL PANELS

The wall panels considered here represent high quality low cost solutions to typical industrial construction needs. NPCAA members can also supply sophisticated architectural finishes and configurations as required for any type of low or high-rise buildings. ■



*Warehouse in Hallam, Victoria featuring use of precast colonnades, spandrels, and cladding panels coated with a textured paint finish*

*Over 2000 m<sup>2</sup> of fire-rated exposed aggregate hollowcore panels clad this warehouse for Southcorp at Arndell Park, NSW. A banding effect was achieved by using two colours of exposed aggregate.*



## PRESIDENT'S Column

### A BIBLE FOR PRECAST

The NPCAA is currently undertaking its most ambitious project since its inception in 1990 with the compilation of the Precast Concrete Handbook.

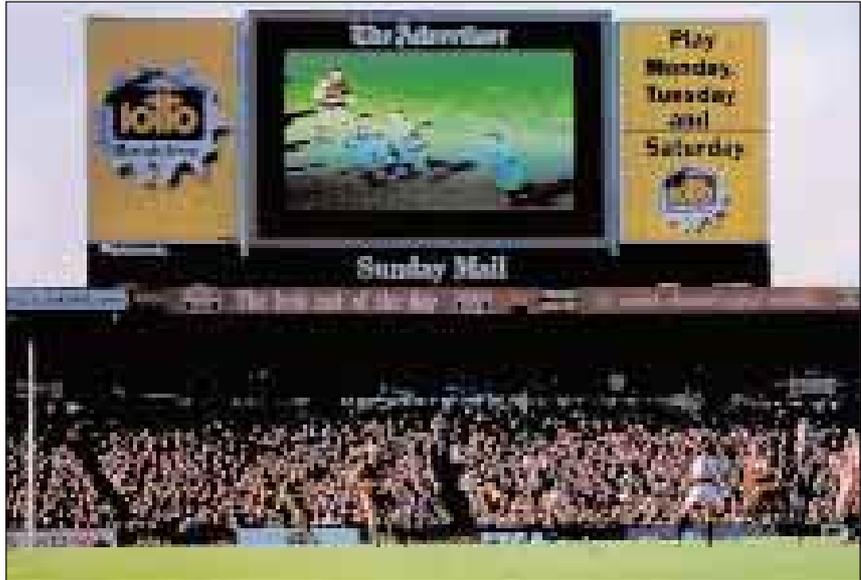
Backed by the authoritative Concrete Institute of Australia, the long-awaited NPCAA – CIA publication will provide guidance and advice on all aspects of precast concrete in the Australian building and engineering construction industry.

It is intended as a reference document for the precast industry and its clients, a design guide for architects and engineers specifying precast concrete, and a valuable learning resource for students. There is a particular emphasis on precast walling (including loadbearing, architectural facades, and hollowcore), precast flooring systems, and structural precast (embracing building frames and bridge structures).

The Handbook will contain 11 chapters covering topics such as materials, design, detailing, manufacture, handling and installation along with ancillary aspects such as specification, maintenance, contractual requirements and, where appropriate, illustrated examples.

The process for carrying out this project was the formation of a working committee of practitioners drawn from the Member Companies of the NPCAA together with resources from the Cement and Concrete Association and the Canadian Prestressed Concrete Institute. After commencing this momentous task almost one year ago, one third of the project has now been completed, with the publication date likely in June 2000.

**Ian Coulter**



Scoreboard, Football Park, Adelaide SA

## GLASS Reinforced Concrete Kicking Goals

Football Park, the headquarters of AFL football in Adelaide, now features an imposing Glass Reinforced Concrete (GRC) structure which cantilevers over the existing grandstand roof at the northeastern end of the stadium. Adelaide-based manufacturer, Glenn Industries, was engaged to design, manufacture and install GRC panel surrounds and enclosure.

GRC is a lightweight engineered material with excellent strength and mouldability and a GRC cladding system was chosen for the following reasons:

- The composite action of a 12 mm thick GRC 'skin' with integrally cast steel sub frames allowed panels to be manufactured over 7 metres in length and meet all engineering requirements whilst reducing panel weight.
  - The GRC skin is attached to an engineered steel sub frame using 'L' Flex Anchors which allow the GRC skin to move independently of the steel sub frame accommodating thermal and moisture movement differentials.
  - A pre-finished and signwritten panel was factory produced, ready for transportation to site.
  - GRC's lightweight properties increased the speed of erection on site thus reducing the construction programme and overall erection costs.
  - GRC's mouldability accommodated the frontal design criteria and provided the screen with a viewing angle of 120–150 degrees.
- Glenn Industries enveloped the giant

Superscreen (11.04 m wide x 6.24 m high) by hanging its factory finished GRC panels on the structural steelwork, then aligning and weatherproofing the joints. The simple flat sides and rear of the Superscreen enclosure were clad using Compressed Fibre Cement (CFC) Sheet. All GRC panels and CFC sheets are surface-coated with an acrylic system pioneered by the manufacturer over 30 years ago.

Launched in the middle of the 1998 football season, the Superscreen has been heralded as a huge success. ■

## NEW NPCAA President



At its recent AGM the National Precast Concrete Association Australia elected **Ian Coulter** (left) – Managing Director, Precast Concrete Pty Ltd – as its new National President, succeeding **Bob Attwater** (right) of Auscore Concrete Pty Ltd, to whom the industry extends its appreciation for his leadership and energy over the last two years. ■

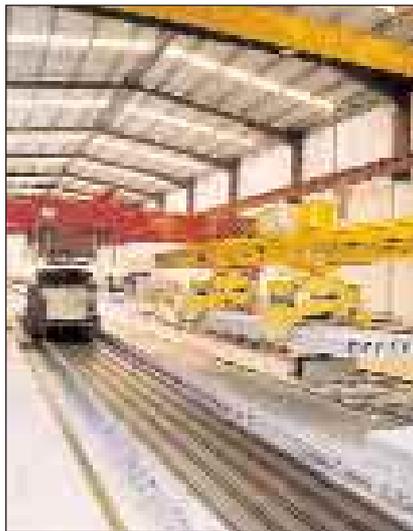
## MEMBER Profiles

**ICM 2000 PTY LTD** is a well-established precast concrete manufacturer located in Sydney's west. ICM 2000 specialises in a range of products for commercial and industrial buildings. Products include a concrete wall panel system with various options for surface finishes. This unique system of precast columns and infill panels provides fast construction with a high level of flexibility, efficiency and convenience. ICM 2000 also manufactures precast floors, columns, beams and retaining walls. ICM 2000 has the resources available to provide design and engineering advice to developers and builders.

The company has recently undergone a management restructuring process which will enable it to focus more closely on customer needs. A number of new and exciting initiatives have been put in place to enable the company to achieve a competitive edge in the market place.

ICM 2000 has become a customer-oriented company endeavouring to address all its customers needs to the highest professional standard. Recent NSW projects include the Department of Community Services building in Ingleburn, NSW.

*A three storey commercial building for the Department of Community Services in Ingleburn, NSW. Designed and built in the ICM System featuring 10 m high precast concrete columns and precast wall and floor panels*



(above) Utilisation of a hollowcore flooring system in conjunction with steel columns and masonry walling in a building under construction in Burnley, VIC (left) Hollow Core Concrete's manufacturing facility at Laverton, VIC

### ICM 2000 PTY LTD

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Plumpton NSW 2761

**HOLLOW CORE CONCRETE PTY LTD** has developed a reputation for excellence in the provision of cost efficient precast structural systems since its establishment in 1988. As an industry leader, Hollow Core has served an array of prestigious clients and has assisted them in achieving quality outcomes which are both economic and reliable.

The aim of Hollow Core is to provide cost effective structural designs and products which are of the highest standard.

With the assistance of a specialist in-house design team, they are able to provide clients and their project consultants with design and feasibility solutions which utilise Hollow Core's precast components. From the initial concept to the final design, this cooperative approach to construction reduces costs, improves quality and results in an efficient use of resources. By combining its renowned expertise with the use of precast products, Hollow Core is able to deliver a total precast structural solution that meets specific construction needs.

Hollow Core's range of precast concrete products include:

- floorpanels: hollowcore slabs, thin flat slabs
- precast/prestressed beams and columns
- precast reinforced stairs and landings
- precast/prestressed piles
- prestressed stadium seating units
- absorptive acoustic and reflective noise panels.

Hollow Core has completed hundreds of projects and has demonstrated its versatility by supplying products of the



Melbourne cinema and multistorey carpark complex constructed with all major elements designed in precast – floor and wall panels, beams and columns – and supplied by Hollow Core Concrete Pty Ltd

highest quality for use in a broad range of structures such as major shopping centres, offices, apartments, bridges, sporting facilities, schools and churches.

State-of-the-art European technology is employed in the manufacture of prestressed and precast concrete products. It has proven to be the most cost effective, safe and efficient method of construction. Hollow Core's structural system offers distinct advantages in the construction of a wide variety of projects. ■

#### HOLLOW CORE CONCRETE PTY LTD

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## Welcome to:

#### CORPORATE MEMBER

**Abby (Aust) Pty Ltd** *NSW manufacturer of precast panels and other products.*

#### ASSOCIATE MEMBERS

**Ability Building Chemicals** *National supplier of colouring pigments, powder admixtures and concrete surface treatments.*

**Bostik (Australia) Pty Ltd** *National supplier of sealants, adhesives and water-proofing compounds.*

**RJB Industries Pty Ltd** *Manufacturer and supplier of precast concrete panel fixing components.*

The President, Directors and Members of NPCAA welcome the forthcoming support of these new members in further consolidating the status of the precast concrete industry.

# National Precast Concrete Association Australia

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