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Innovative use of Hollowcore in Brickpit Ring Walk

Opened late last year, a spectacular new aerial walkway has transformed the historic Brickpit at Sydney Olympic Park into an ecological attraction that is proving very popular with visitors. The elevated circular walkway using hollowcore concrete decking on a steel frame sits more than 18 metres above ground. It encourages visitors to access the Brickpit from above while preserving the habitat of the endangered Green and Golden Bell frog. The new Ring Walk, which has a circumference of 550 metres, provides visitors with interpretive material linking the history of the Brickpit with the evolution frog's habitat along with the unique geology and the innovative water recycling initiatives at Sydney Olympic Park. The interpretive material is digitally printed directly on to the outer panel of the ring and includes soundscapes of frog and birdcalls and actual workers recounting their experiences to create a strong human connection to the place. The walk incorporates high-powered binoculars to spot birds in the water below, or even the elusive bell frog.

The park itself is more than a thousand acres. Surrounding the 2000 Sydney Olympics at Homebush Bay, the site is slightly larger than New York City's Central Park, The Brick Pit is composed of some seventy acres of deep excavated layers of shale with a limestone quarry below, a reminder of the historic development of Sydney, a beautiful spatial feature of the site, and along with residual wet land surrounds. The Brickpit Ring Walk opens up one of the last remaining restricted sections of Sydney Olympic Park to the public and provides visitors with a close-up view of the connections between the past, present and future of this historic site. Built nearly a century ago, the Brickpit employed hundreds of skilled labourers and produced some three billion bricks during its operational years, providing the raw building materials for much of Sydney's suburban housing as well as many of the city's public buildings including hospitals, schools and civic centres.

Scott Williams of GMW Urban proposed the use of smooth finish hollowcore for the walkway, for its functional and economic benefits. The 150mm deep hollowcore concrete planks used extensively for the walkway deck were supplied by Hanson, and bought on site when needed to obviate any storage problem on a constricted site area. Unusual and attractive, the hollowcore planks were supplied by Hanson in two colours using standard grey concrete and off-white concrete.

How can rectangular planks form a curve?

Answer: Every third plank was cut to a wedge shape (cut within 24-hours of being extruded) to create the required curvature. All up there were around 600 planks, each weighing 0.7 tonne. The Ring Walk is a delicate circular viewing platform on a braced cruciform structure comprising a series of light, thin, flat steel poles that are designed to lightly touch the base of the pit. Due to the extremely refined structural design of the Ring Walk, loading of the structure with the concrete walkway could not commence until the ring steelwork was complete, therefore making speed of the deck installation critical to the project. The steelwork was refined by using the precast planks in a composite fashion with the steel beams, the planks being seated on top of the steel beams and then grouted to form a solid compressional zone.

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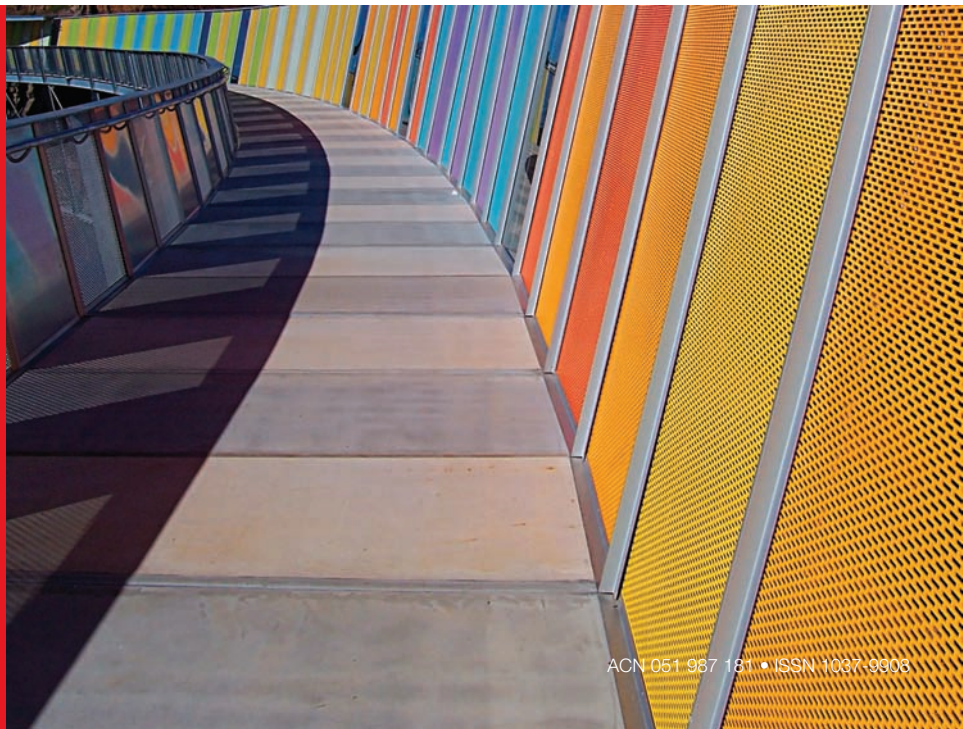

This close-up photo shows the innovative use of two colours of hollowcore precast to contribute to the overall exciting colour effect.

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Freshwater Place takes a Fresh Approach to Precast

Melbourne's $750 million Freshwater Place, located at the intersection of Queensbridge Street and the Yarra River, represents the final piece of absolute riverfront development in Southbank. Consisting of a residential tower and a commercial office tower, it is situated between Southbank and the Crown Casino, and is one of the last river frontage sites to be redeveloped from its former industrial past.

Freshwater Place is a mixed residential, commercial, retail and civic project built around lanes and squares, restaurants and meeting places. The ground level includes an internal piazza with four radiating laneways that are home to a variety of shops, cafes and restaurants. Two towers rise above respective podiums, a commercial tower of 38-levels and a residential tower of 63-levels, both buildings use several types of specialist precast concrete and concrete finishes to advantage. Freshwater Place was designed as a staged development, the first stage comprising the 205-metre tall Northern Residential tower, and the 161-metre tall commercial building at 2 Southbank Boulevard with the internal Piazza.

Developer for Freshwater, Australand, has recently announced that it will proceed with the construction of the second stage of its $1 billion Freshwater Place development. The Freshwater Place Stage II Tower has an estimated end value of $180 million and will comprise a new 30,000 square metre office building over 22-levels, to be completed in 2008.

The commercial building, which commenced construction in 2003, is a 163-metre tall tower, rising from an 8-storey architectural polished and acid washed precast concrete podium facade. Builder, Baulderstone Hornibrook, speeded the podium construction, taking advantage of the use of fully prefabricated components, including the innovative use of greywall precast concrete columns and precast concrete shear walls for the tower structure. These were supplied by Westkon Precast Concrete Pty Ltd. These saved the considerable time that would have been required to place the formwork, tie the reinforcement, and pour the concrete for the tower columns that a conventional in-situ concrete building would have required. Westkon supplied precast to Baulderstone Hornibrook for the basement to Level 8 podium structure of the commercial building, totalling 253 grey panels (area 2477 m^2), and 30 columns (208 lm).

The precast column spacings at six metre centres around the perimeter, with the 12 metre span from the core to the perimeter band beams, gave a six metre by six metre grid all around the building, subdivided further in a 1.5 metre ceiling grid and partition module. This gave a very efficient structure, combined with an equally efficient office layout. The tower floors were prefabricated in 4.5-metre wide prefabricated formwork lift-up panels that spanned from the core to the precast concrete perimeter columns. The combination of precast columns and prefabricated formwork made for a construction system that had the simplicity of 'Lego'. The result was a very clean and professional site with the virtual elimination of conventional formwork. The Commercial Tower has typical floor plates of a generous 1,700 square metres. The imposing tower has three lift rises and an overall 4.5 star energy rating.

The second and later building, which began construction in 2004 by Multiplex Constructions, is a 206-metre tall residential tower with a 10-storey podium. The tower includes residential apartments, retail services, two swimming pools, and a sauna. The podium architectural precast façade had to match the polished and acid washed reconstructed granite panels used on the earlier building. Westkon Precast Concrete also supplied precast concrete shear walls for levels 41 to 62 of the tower. In all there were over 2,100 precast panels for the façade. Westkon supplied precast to Caelli (Subcontractor to Multiplex) for levels 41 to 62 of the residential tower. This involved 111 grey panels (area 1678 m^2).

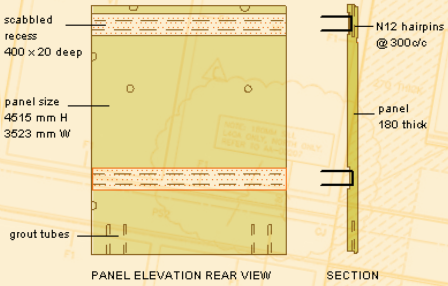
The Residential Tower is believed to be Australia's 'thinnest' tower, with its height of 206 metres and a width of 25.5 metres giving it a height to width ratio of 8.0.

Project design director for Bates Smart, Roger Poole, said: "Consistent with Melbourne's urban character, the pedestrian environment at Freshwater Place is defined by a sophisticated five-storey precast concrete façade to create a masonry and glass podium which encompasses the entire site. Within this podium we have created new pedestrian streets and arcades, focused on a 60-metre by 30-metre urban square, which we call Freshwater Place. This is a new and unique urban space for Melbourne."

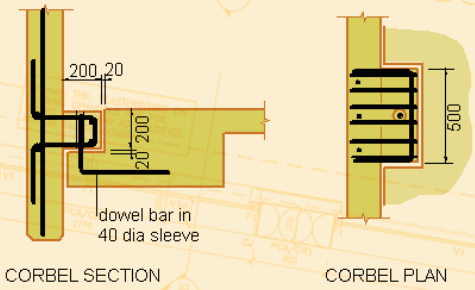
"Never before has Melbourne experienced the creation of a new high-density urban neighbourhood comprising residential, commercial, retail and urban space in a single co-ordinated and staged project. This development provides both a new focus for Southbank and a key urban linkage," he said.

Why is the site called Freshwater Place?

It is always of interest how buildings get their names. In this case 'Freshwater Place' has always held significance as a key part of Melbourne's development. It gets its name because the site marks the point where a series of small rapids separated the saline water of the lower Yarra from the fresh water upstream.



Caption ?



Caption ?

Freshwater Place has established a new urban neighbourhood for Melbourne, with its innovative combination of residential, office, and urban facilities. Freshwater Place is being recognised by the people of Melbourne as a fine new landmark that adds grace to their city. Nice to think that precast concrete for its appearance, quality and durability helped in this achievement.

Specialist feature precast elements for the podiums were supplied by SA Precast Pty Ltd and Bianco Precast. SA Precast supplied 143 polished and acid washed panels.

Westkon Precast Concrete Pty Ltd supplied the innovative precast columns and shear walls to the office tower. All precast elements supplied by Westkon to the project were manufactured to Westkon's Quality Assurance system that complies with AS/NZS ISO 9002. Westkon has been involved with other prominent Victorian projects such as City Link, Federation Square, Telstra Dome, Liberty Tower, MAB Towers Docklands, Bridge precast for the Geelong Freeway Widening, Calder Freeway, Craigieburn bypass, MCG Northern Stand and Eastlink… just to name a few.

Freshwater Place

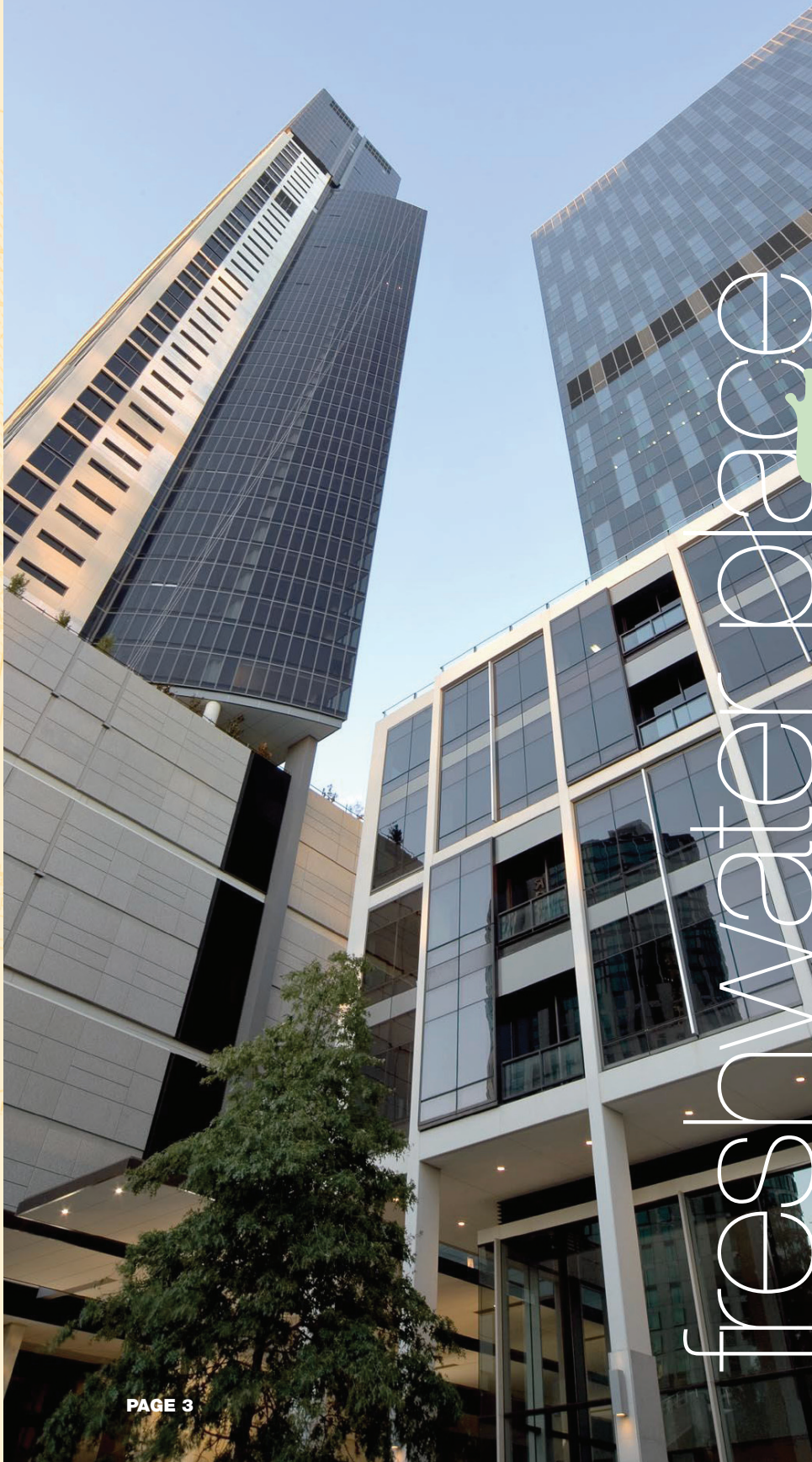
Southbank Boulevard, VIC
Commercial Tower 38-levels

AREA (NLA):	55,000sqm
DEVELOPER:	Australand
TENANTS:	Pricewaterhouse Coopers
ARCHITECT:	Bates Smart
STRUCTURAL:	Winward Structures
FAÇADE:	Arup Facade Engineering
BUILDER:	Baulderstone Hornibrook
CONSTRUCTION TIME:	Mar 02 – Apr 05

Residential Tower 63-levels

DEVELOPER:	Australand
ARCHITECT:	Bates Smart
STRUCTURAL:	Winward Structures
FAÇADE:	Arup Facade Engineering
BUILDER:	Multiplex Constructions

Photographer: John Gollings



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As a result the choice of precast decking was the obvious solution, with the advantage that installation was completed in less than ten days from start to finish, and no formwork being required. Quality control during manufacture and installation ensured that the last wedge of the 550 metre circular ring fitted within the 10mm tolerance. Cranage of steelwork and hollowcore was generally achieved using a 20-tonne mobile crane. However, the associated Marjory Jackson Bridge of 48-metre span in two sections required the use of a 230-tonne crane.

Work on the aerial Ring Walk was carried out by GMW Urban and was designed by the award winning team of Durbach Block Architects, and Sue Barnsley Design, Landscape Architects. Complete Urban Solutions was the Project Manager for GMW Urban, and S+L Steel was the installer of the precast.

Background – Thank the frogs

Built nearly a century ago, the Brickpit employed hundreds of skilled labourers and produced some three billion bricks during its operational years, providing the raw building materials for much of Sydney's suburban housing as well as many of the city's public buildings including hospitals, schools and civic centres. Plans to develop the Brickpit site as a tennis centre for the Sydney 2000 Olympic Games were abandoned after the discovery of an endangered Green and Golden Bell frog on the site. On the threatened species list, the Green and Golden Bell frog had established a natural habitat in the Brickpit, and thrived. The giant brickpit at Sydney Olympic Park with its colony of green and golden bell frogs has been a difficult environmental problem for many years. With a daring and incredibly simple solution, Sydney Olympic Park has placed an Olympic ring to hover across the brickpit.

Ring Walk wins Top Awards

2006 RAIA State Award Winner

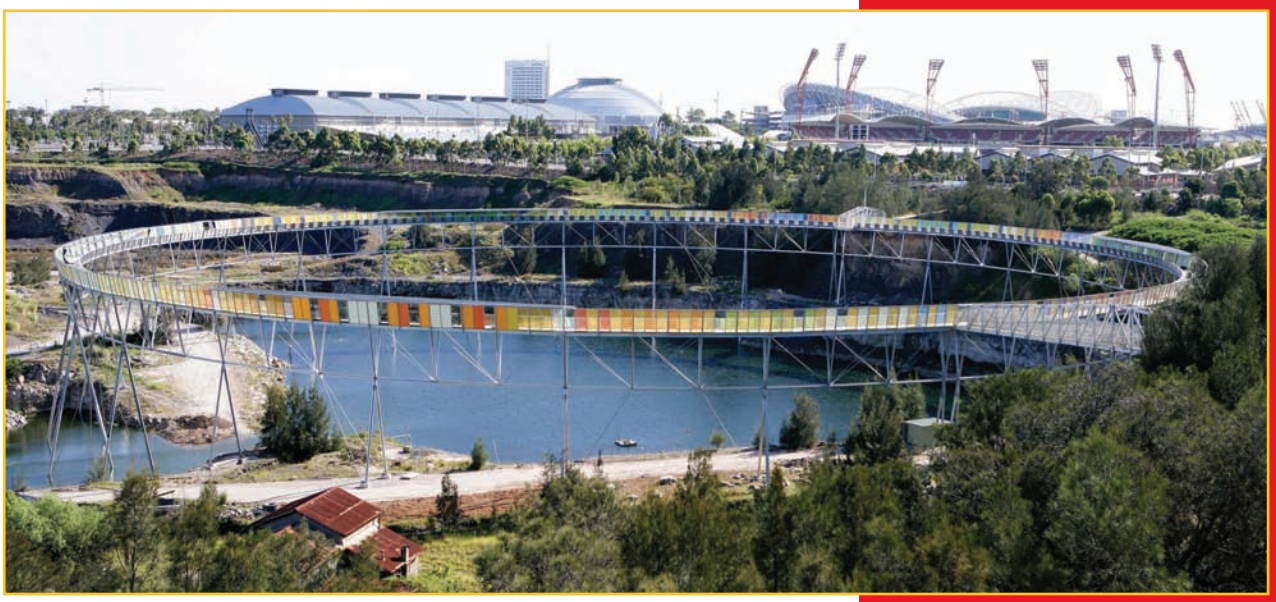
The elegance and sophistication of the Brickpit Ring Walk was recognised in the 2006 Royal Australian Institute of Architects NSW State Awards, where the project was awarded the prestigious Lloyd Rees Award for Civic Design. It is rather ironic that a site associated with a brick pit should now be noted for the innovative use of precast concrete.

2006 National Trust Heritage Awards Winner

The Brickpit Ring Walk was one of four entries in the 'tourism projects' category of the annual awards, which encourages the conservation of Australia's natural, built or cultural heritage, and was judged the winner. NSW Minister for Tourism and Sport and Recreation Sandra Nori said "The aerial circular walkway is the best way of combining public access while at the same time complying with the many ecological and public safety constraints within the Brickpit. This new, elevated circular walkway offers visitors a spectacular view of the Brickpit from above while preserving the habitat of the endangered Green and Golden Bell frog,"

"The Brickpit Ring Walk opens up one of the last remaining restricted sections of Sydney Olympic Park to the public and provides visitors with a close-up view of the connections between the past, present and future of this historic site," she said

The Ring Walk – The Ring Walk is 550 metres in circumference and is raised 18.5 metres above the sandstone floor of the Brickpit. Photo courtesy of Sydney Olympic Park Authority.



Specification of Surface Finishes under AS 3610

Introduction

Precast concrete offers designers opportunities to achieve a high standard of surface finish. It however encompasses a wide range of products – from below ground pits to polished reconstructed granite facades. This data sheet deals with those precast concrete components which are exposed to view and which are required to have a finish meeting certain architectural criteria and which are not adequately dealt with by AS 3610. This will include facade units other than those with an applied finish, some structural components such as bridge units, building columns and beams and street furniture.

There are two broad categories of architectural precast concrete – *off form* and *exposed aggregate* finishes. The latter category includes sandblasted, polished, honed, water washed, acid etched and like finishes where the off form surface layer of fines is removed.

The Australian standard which covers surface finish is AS 3610 – 1995, *Formwork for Concrete*, and its Supplement 1 – 1990. These documents cover only off form surfaces and do not apply to unformed or subsequently treated surfaces.

Difficulties with AS 3610 – 1995

Specifiers often call for inappropriate classes of finish based on AS 3610. The most common of these are calling for a class of finish concerned with off form concrete when exposed aggregate is specified, calling for a class of finish where the surface in question is unformed, and calling for a Class 1 finish which is impossible to achieve in all but a minority of cases.

A further difficulty is the administration of the AS 3610 specification for colour control. The colours in the code are grey and difficult to translate to typical precast concrete colours and therefore especially difficult to use for the evaluation of individual precast units.

This data sheet seeks to provide a basis for rational specification of surface finishes.

Applicability of Surface Classes Class 1

Class 1

should not be specified except as allowed by AS 3610. The restrictions covered by the code include:

- Class 1 is the highest standard with the most rigorous specification and is only recommended for use in very special features of buildings of a monumental nature.
- Selected small elements
- Areas of special importance in limited quantities
- Elements contained in a single pour. *This of course implies that finishes from different pours will differ from one another.*

It is clear therefore that, as much as all concerned would have a preference for specifying what seems to be the best, Class 1 must never be specified for areas such as a facade, for structural units in a project or for other instances which fall outside of the restrictions quoted above.

Class 2

Class 2 is that which will be specified for most good quality architectural precast concrete.

Class 3

Class 3 has application for buildings and structures where visual quality is important but which is of less importance architecturally. It provides a perfectly acceptable standard for many industrial and civil structures and will result in cost savings for the owner.

Classes 4 and 5

These classes are for situations where the visual quality is not important and apply to surfaces which are concealed from general view or are never seen. They are outside the scope of this data sheet.

Controlling Surface Finishes in Practice

The specification of Class 1 finish can only be for a very important element in a very important structure. It will rarely occur. It is essential that the specifier be completely confident of what can be achieved or that trials are carried out before an order is let.

The overwhelming majority of finishes will be Class 2 and 3. These are simple to specify and achieve for flat or uncomplicated precast units but far more difficult for complex units. AS 3610 is very difficult to apply to off form finishes for blowhole and colour control. It will often lead to a greater range of colour variation or blowhole size and number than is desirable. By far the best result in these areas comes from the provision of samples from the manufacturer and by reference to existing buildings with similar characteristics.

Sophisticated polished, sandblasted and other such architectural finishes must be controlled by samples and by reference to good practice as found on existing buildings. Samples made from moulds incorporating any complex shapes or other details may be required if the outcome cannot be confidently predicted. The designer must then inspect the first panels from the production moulds to ensure that variables such as the depth of sandblast are satisfactory.

Above all it must be remembered that perfect colour, segregation and blowhole control cannot be achieved. Precast concrete is made from natural materials and subject to variation for a host of reasons. For absolute uniformity in these areas precast units should be painted.

Hollowcore

Prestressed hollowcore wall and floor units are widely used in Australia with over 500,000 square metres being produced per annum. They are an exceptionally efficient product which use a minimum of steel and concrete.

Hollowcore units are manufactured with slipform or screw feed technology with a standard of finish determined by the characteristics of the machine. Hollowcore units will generally be in the range of Classes 2 and 3 but each manufacturing method will give different results and it is therefore imperative that specifications which are available from the manufacturers be used instead of specifications for conventional concrete.

Paint Finishes

Precast concrete which complies with good practice and AS 3610 may nevertheless require further treatment of airholes or other minor but normal imperfections prior to application of some paint finishes. This work, unless otherwise agreed, is normally the responsibility of the customer.

Summary

Precast concrete can deliver exceptional architectural results but in order to achieve that designers and specifiers must understand the product rather than relying solely on prescriptive specifications.

AS 3610 –1995 is a useful document but is not suitable for specifying classes of surface finish for most architectural precast concrete and does not deal at all with the specific characteristics of hollowcore. In particular the term 'Class 1' implies that other classes are inferior to it. This is not the case.

The *Precast Handbook* currently being produced by the CIA and NPCAA will deal with the subject of this data sheet in more detail.

All precast concrete facades can be painted as these hollowcore wall panels have been.

Top quality Class 2 off-form finish in industrial building representative of best industry practice.

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Specification of Surface Finishes under AS 3610

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