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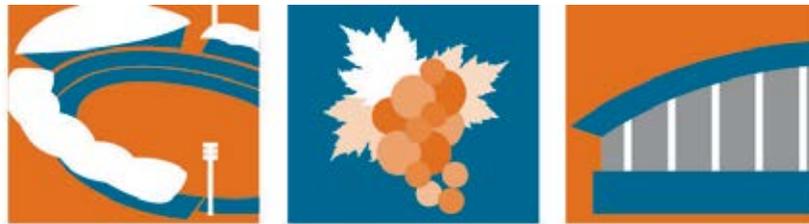


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Invited Speakers

Mr Mike Schneider | Dr Stuart Matthews



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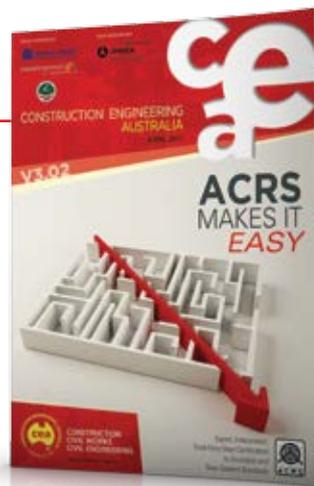
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ACRS certification makes checking for compliance with the relevant Australian and New Zealand Standards easy. ACRS certification demonstrates independently and expertly that the supplier consistently meets the Standards stated on the certificate.

Beyond checking the supplier's ACRS certificate, product markings and tags, there's no need for you to make any further checks on certified materials.

► Turn to Page 10 for the full story.



Urban Design for Climate Change (Take Two)

Dear Readers,

While at first glance, the title of this editorial may seem to make no sense – or for that matter, may appear to be an editing note that we forgot to delete prior to printing – it actually alludes to the fact that this is the second editorial that I have written on this subject for this issue of *Construction Engineering Australia (CEA)* magazine.

To expand: the first editorial alluded to some of the design issues associated with many modern buildings, particularly in relation to the lack of shelter they offer pedestrians and passers-by in inclement weather. More specifically, it discussed the impact that this lack of shelter can have on Business Activity Districts – especially given the obvious increase in the number and severity of major storm and rainfall events across much of Australia.

So, the editorial was written and ready to publish – and then it happened... Cyclone Debbie.

A slow moving Category 4 cyclone that turned the paradise of the Whitsunday Islands, together with much of the central Queensland coast and south-east Queensland into 'hell on earth' for 36+ hours.

As if that wasn't enough, the slow moving low-pressure system that started its life as Cyclone Debbie continued to dump hundreds of millimetres of rain on south-east Queensland and across the border into NSW, resulting in some of the most severe flooding seen in many areas for over 50 years.

What's more, even as I type this – more than a week after the initial fury of Cyclone Debbie has subsided – the floodwaters continue to wreak havoc as they move

downstream through rural and regional areas, throughout both Queensland and New South Wales.

Needless to say, considering the widespread devastation caused by Cyclone Debbie and the subsequent extreme rainfall event – including, most tragically, a human toll which currently stands at 3 dead and 3 missing – the idea of publishing an editorial which discussed the economic impacts and 'inconvenience' of not having buildings which provide shelter for pedestrians during rain events seemed, at best, disingenuous and at worst, completely disrespectful to those who have lost so much... and to those who show such unbelievable strength, character and compassion to help those in need.

Recent years have clearly shown a significant change in weather patterns, especially in terms of major storm and rainfall events. And according to most experts in the field, all evidence points to these events becoming more common and more severe.

Our seemingly never-ending 'flood and repair cycle' carries a staggering financial and emotional cost, with many regions barely getting an opportunity to recover from one event before the next disaster occurs.

While there have clearly been many improvements in building regulations and design standards since the days of Cyclone Tracey – with many buildings now able to withstand the devastating winds of a Category 5 cyclone – it would appear in terms of flood mitigation, there is still much to be done.

Whether it's building larger, permanent levies near waterways that are prone to flooding, investing in temporary flood barrier systems, expanding the stormwater

system to provide increased capacity and temporary retention capabilities, or rethinking land use strategies to prevent over-development of flood prone areas, there are clearly many things that can be done when attempting to minimise the impact of these extreme weather events.

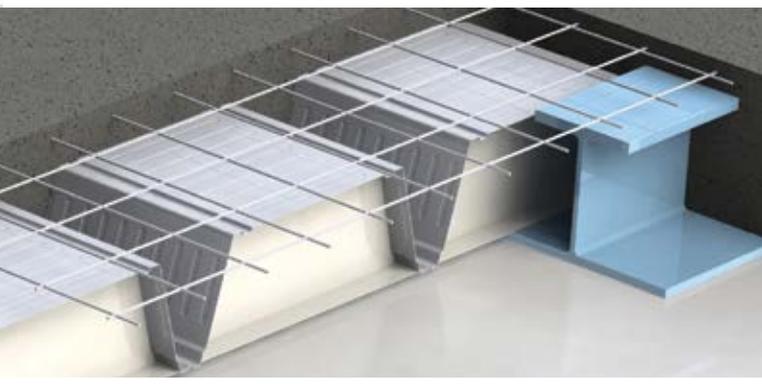
Please don't misunderstand. I don't wish to in any way denigrate the many excellent flood mitigation strategies that have been, and continue to be, undertaken by councils, State and Federal authorities across Australia.

What I am saying, however, is: given the current 'state of play' – especially in terms of the apparent increase in both the regularity and intensity of extreme weather events – we made need to rethink what we consider a 1 in 100, 1 in 50 and 1 in 5 year storm event, and adjust our expectations and goals accordingly.

In short, without wanting to appear 'alarmist'; I believe that we need to be planning towns, cities and suburbs, and building infrastructure, which is able to cope with weather conditions that are significantly 'more extreme' than our calculations from the 80s and 90s may have projected.

Importantly, I also recognise that as with all things, these works will carry a significant cost. However, I believe, given the staggering cost of repairs and reinstatement following a major flood, that funding these works will prove to be a most prudent investment in our future.

Anthony T Schmidt
Managing Editor



MATERIALS: SlimFlor® CF210® 1.21mm
BUILDER: Daniel Jordan Developments
ENGINEER: Bonacci Group
ARCHITECT: Alexander Wilkinson
PROJECT SPECS: 1500m² of SlimFlor® CF210® 1.21mm



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FIND OUT HOW TO FUTURE-PROOF CITIES

Speakers announced for the Ecocity World Summit, Melbourne, July

- *Cooling urban heat islands: in Australia, India and Spain*
- *Urban transport politics: how did Canadian cities get through it?*
- *Australian housing: we're (sadly) getting what we paid for*
- *Women leading sustainable and resilient cities*
- *How will India's coastal megacities cope with climate change?*

100 sessions with 300 speakers from 30 different countries will explore these and many other topics.

How do cities become resilient, and how do you measure it? What are the hidden costs of cheap buildings? Can we increase density without losing green space? Can we grow food on rooftops? And what can cities and sub-national governments do when national governments don't want a piece of the climate action? All this and more are on the agenda of the *Ecocity World Summit* in Melbourne this July.

"In Australia, we've just come through Cyclone Debbie, and seen severe storms and flooding across the Eastern states," says Brendan Gleeson, Director of Melbourne

Sustainable Society Institute and Summit co-convenor.

"We urgently need to safeguard our cities, towns and their people, in Australia and across the planet. The *Ecocity World Summit* program is designed to bring leading thinkers, researchers and practitioners together to share the evidence, strategies and tools we need to keep our cities liveable and sustainable in the face of global challenges."

The *Ecocity World Summit* brings leading international thinkers to Australia to share their expertise, including:

- Mr Mark Twidell, Managing Director, Tesla (Asia-Pacific)
 - Dr Debra Roberts: Climate Change Adviser to ICLEI Local Governments for Sustainability (South Africa)
 - Mr Aromar Revi: Director, Indian Institute for Human Settlements
 - Mr Rachmat Whitoealar: Indonesian President's Special Envoy for Climate Change
 - Prof Harriet Bulkeley: Professor of Geography, Durham University (UK)
 - The Hon AI Gore: Former US Vice President and Chair of The Climate Reality Project
- The program includes three streams - *Urban Leadership, Academic* and *City Practices* - tailoring sessions and workshops to the

interests of people from government, university, business and community sectors.

"Melbourne is famous for being the world's most liveable city, but we also know that this is time dependent—we won't remain liveable if we're not also sustainable," says Arron Wood, Deputy Lord Mayor of City of Melbourne and Chair of the Summit Advisory Board.

"As the host city, we're looking forward to showing visitors the gardens that are part of our Urban Forest Strategy and stormwater management, and our smart, efficient buildings, such as Council House 2."

Keynote speaker and ACT Commissioner for Sustainability and the Environment, Kate Auty, says this will be a once-in-a-lifetime opportunity for academics and advocates alike: "This is the place to show we care about climate change and our future."

The *Ecocity World Summit* also features optional site visits and a cultural program, including the immersive 360-degree art installation EXIT, at the Ian Potter Museum of Art at the University of Melbourne, as part of the ART+CLIMATE=CHANGE 2017 festival.

The *Ecocity World Summit* will be held from 12 to 14 July at the Melbourne Convention and Exhibition Centre. Register now until 28 April for early bird registration rates.

To view the preliminary program, and for details and registrations, please visit:

www.ecocity2017.com



JAMES HARDIE SYSTEMS PURCHASES RITEK WALL SYSTEMS

James Hardie has acquired the Ritek Wall Systems business as part of the company's strategy to expand its product offering into the growing medium to high density construction segment.

The Ritek Wall Systems business will operate through a company called James Hardie Systems Pty Ltd, which forms part of the James Hardie group and is headed up by General Manager, Steven Terzian.

"Permanent formwork is approximately 30 per cent of the medium to high density construction market," says Mr Terzian.

"The Ritek permanent formwork walling

system is a quality product that enables the delivery of a durable finished wall. The speed of wall construction allows our customers to optimise their construction budgets and improve building timeframes."

James Hardie Systems will be focusing on complementing the premium Ritek wall system by further enhancing customer experience to deliver a leading permanent formwork system across the Australian market.

To support growth, the company will be expanding the sales and marketing teams - Kristy Harder has been appointed marketing

manager and Bassem Francis in the Finance Manager role.

"James Hardie has had a long term partnership with Ritek Wall Systems, as the supplier of quality fibre cement products for the manufacture of the Ritek permanent formwork walling systems. Ritek Wall Systems now benefits from James Hardies' strong support network and we welcome the Ritek team to our organisation," says Mr Terzian.

"James Hardie Systems will continue to operate from the Cooroy manufacturing facility and serve our Australian customers. It's business as usual," he added

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HIRE FOR A HIGHER PURPOSE WITH KENNARDS FOR KIDS

Leading equipment hire brand, Kennards Hire, has kicked off their annual charity initiative, 'Kennards For Kids'. Running throughout March and April, the company aims to help sick and disadvantaged children across Australia and New Zealand, helping to give them the best chance at life they can.

For almost 20 years, the family owned business has raised millions of dollars for carefully selected children's charities through the Kennards for Kids charity campaign. This year, \$2.00 from every hire, both in branch and online, will again be donated to some very worthy organisations.

In 2017, Kennards will be donating Kennards for Kids proceeds to Variety - the Children's Charity in both South Australia and Victoria, The Constable Care Child Safety Foundation (WA), HeartKids (ACT), Red Kite (NSW), the Children's Hospital Foundation (QLD), Kidsafe NT and KidsCan in New Zealand.

In previous years, the funds donated to these charities have provided a real and tangible difference. They have helped purchase Variety Sunshine Coaches, supported at-risk children and families with the supply and installation of

age-appropriate child car restraints through Kidsafe NT and contributed to building the Nundah Cottages in Queensland, which provides specialist mental health services to children and young people.

"The Kennards team has a strong and generous community spirit and we believe that we are in a position to help those that need it the most," said Angus Kennard, CEO of Kennards Hire.

"Kennards for Kids first took place back in 1998 to raise awareness and funds for those organisations and volunteers that are out there day in and day out helping sick and disadvantaged children and their families"

"Every one of us that work at Kennards are proud to get behind the campaign. Every hire will definitely have a higher purpose during March and April and with the help of our customers, we aim to crack our record annual donation of over \$367,000," Angus said.

Anyone can throw their support behind Kennards for Kids and its charity partners. Simply visit your local Kennards Hire branch or online and hire some equipment for any building, renovation or DIY project you might have coming up throughout March and April.



WA's Constable Care Child Safety Foundation is one of seven Australian and New Zealand charities to benefit from this year's 'Kennards For Kids' fund-raising initiative.

For more information on the Kennards for Kids charities, or to find your closest Kennards Hire branch, visit:

www.kennards.com.au/kennardsforkids

About Kennards

With almost 170 branches across Australia and New Zealand, Kennards Hire is the #1 family-owned supplier of high quality, hire equipment. From DIY through small-medium projects to large construction sites, Kennards' equipment range is available to hire and make your job easy. Visit: www.kennards.com.au

TRIAL OF NEW POSITIONING TECHNOLOGY FOR CONSTRUCTION INDUSTRY

Geoscience Australia and the Cooperative Research Centre for Spatial Information (CRCSI) are looking for Australian businesses in the construction industry interested in improving the capability of their positioning technology.

Geoscience Australia and the CRCSI are planning to spend around \$400,000 on the user testing of a *Satellite-Based Augmentation System* (SBAS) for the construction industry in Australia.

Businesses selected for the user testing will work closely with international positioning experts to trial technology that has not been widely tested in Australia before.

Improved positioning technology has the potential to enhance a range of applications

for the construction industry, including building information management, precision guidance and drone applications.

The user testing is part of a two-year project to trial SBAS in the Australasian region. The Australian Government has committed \$12 million in funding to the project and the New Zealand Government an additional \$2 million.

The SBAS technology trial will potentially result in a number of safety, productivity, efficiency and environmental benefits for a range of different industries in Australia.

The project will be conducting user testing across nine different industries – agriculture, aviation, construction, maritime, rail, resources, road, spatial and utilities.



Interested businesses can apply for the trial by completing an application form available from the CRCSI website:

www.crcsi.com.au

The call for Expressions of Interest closes on Friday, 28 April 2017.

For more information about the SBAS trial and National Positioning Infrastructure Capability visit the Geoscience Australia website: www.ga.gov.au

MANNINGHAM CITY COUNCIL RECEIVES TOP ENGINEERING AWARD

Manningham City Council in Melbourne's north-east has received a prestigious Engineering Excellence Award in recognition of its lead role on the Bolin Bolin Integrated Water Management Project.

The annual award by the Institute of Public Works Engineering Australia (Victoria Division) was presented to Manningham City Council at a special conference dinner in Melbourne on Thursday, 30 March. The event coincided as construction on a 3.3 mega litre basin began on the Freeway Golf Course.

Manningham City Council Acting CEO Jill Colson said the Innovative Practice and Service Delivery award was a wonderful and worthy recognition of the work Manningham was doing to maintain its network of open space in an environmentally friendly way.

"The Bolin Bolin project aims to sustainably capture and treat storm water for irrigation on sports grounds in Bulleen Park and the Freeway Golf Course," he said.

"The award recognises the complex nature of the project, managing a significant number of stakeholders including state and federal agencies, adjoining municipalities and private businesses and education institutions."

Manningham City Council is working in partnership with the City of Boroondara and Carey Baptist Grammar School on the construction of the integrated water facility. Once completed, rainwater will be captured and treated, preventing local flooding and reducing the impact of sediments and contaminants entering the Yarra River.

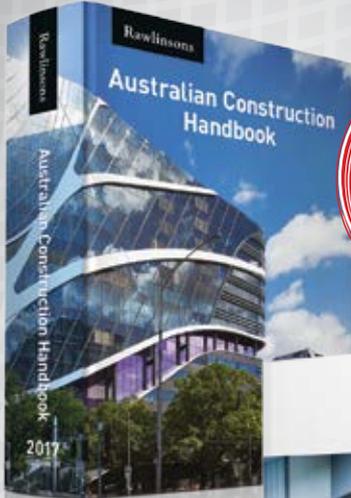
The project will treat more than 35 mega litres of storm water per year and will meet close to 99 per cent of irrigation demand.



Members of Manningham City Council's Engineering and Technical Services Team with the IPWEA (Victoria Division) Engineering Excellence Award.

The project involves construction of:

- a 1.5ML combined wetland and storage lake at the Crown Land site
- a 3.30ML storage within the Freeway Golf Course
- two 214KL storage tanks in Bulleen Park
- a distribution pipeline managing water supply to the three sites




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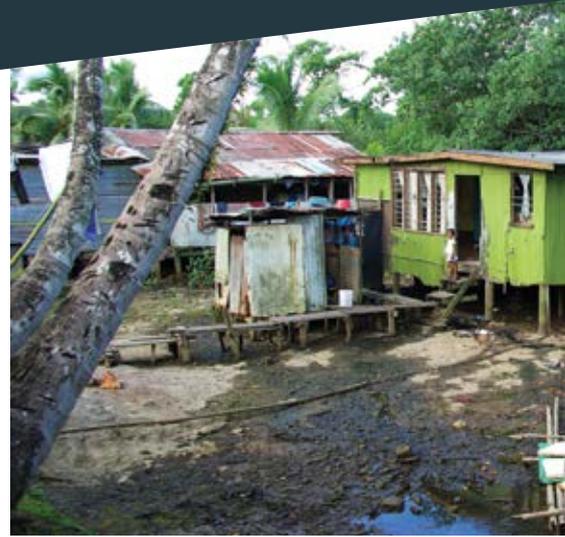
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MONASH AWARDED GRANT TO LEAD GLOBAL SLUM REVITALISATION RESEARCH

A global charitable foundation has awarded an AUD \$14 million grant to an international research consortium led by Monash University. The announcement was made by the Hon. Josh Frydenberg MP, Minister for the Environment and Energy.

In one of only four such successes selected from over 600 applications worldwide, the Wellcome Trust (UK) awarded the prestigious grant to the Monash-led team for a research project that will potentially improve the lives of the more than a billion people living in urban slums globally.

Part of the Wellcome Trust's 'Our Planet Our Health' funding program, Monash will use the grant for a five-year research project that will significantly advance human health and well-being in slums – or informal settlements – by transforming water infrastructure, water management,

and sanitation practices.

The research project will deliver the first ever public health and environmental data on the outcomes of an alternative water management approach. The outcomes could potentially provide the basis for new water infrastructure policies and investment strategies for urban informal settlements worldwide.

The research, which will focus on informal settlements in Fiji and Indonesia, will commence this year. It will also be integrated in those countries in two infrastructure projects, which are currently being prepared for financing by the Manila-based Asian Development Bank.

The two infrastructure projects will upgrade 24 settlements in Fiji and Indonesia, chosen because they represent typical challenges to providing water management in the Asia-Pacific region. The

new practices and approaches developed there could be replicated elsewhere in the world to transform health and livelihoods of people in informal communities.

The research will build on lessons learned from the successful water management programs pioneered by Monash and the Cooperative Research Centre for Water Sensitive Cities in Melbourne, China, Israel, and Singapore.

Monash University President and Vice-Chancellor, Professor Margaret Gardner AO, said the informal settlement revitalisation research project was of great importance to help combat the pressures caused by the rapid rise in global population.

Introductory Corrosion Seminar Protective Coatings & Cathodic Protection

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SPEAKERS ADELAIDE: Mark Weston, Corrosion Consultant (Coatings) and Kingsley Brown, INCOSPEC (Cathodic Protection).

SPEAKERS PERTH: Matthew Burkett, PAINTINSPEC (Coatings) and John Grapiglia, Principal Engineer Corrosion Control Engineering (Cathodic Protection).

Overview of Program:

The ACA is conducting this one day seminar to investigate the basic concepts of both protective coatings and cathodic protection. This seminar is aimed at people starting off in the corrosion industry or those requiring a refresher.

9:00am – 12:30pm

Protective Coatings (includes 30 min morning tea)

Highlights:

- Types of Coatings
- Coating Inspection
- Coating Maintenance
- Coating Selection

12:30pm – 1:30pm

LUNCH

1:30pm – 2:00pm

Corrosion of Steel and the Protection Afforded by Coatings Presented by International Paint

2:00pm – 5:30pm

Cathodic Protection (includes 30 min afternoon tea)

Highlights:

- Cathodic Protection
- Measurement Equipment
- Field Measurement Techniques
- Cathodic Protection Demonstration

Register online via the ACA website Events tab at www.corrosion.com.au



“Rapid urbanisation and the effects of climate change have a devastating effect on people around the world who live without adequate access to the most vital requirement for a healthy, stable and prosperous community – clean water,” Professor Gardner said.

“Monash already has a strong reputation for leading major, multidisciplinary, international research projects which have the ability to transform lives. Through our work, we have become recognised as a world leader in urban water research, influencing policy, regulation and practice.

The revitalisation work at each urban informal settlement will be designed

through a community consultation process, and introduce a range of site-specific initiatives to deliver safe water and a healthy environment, such as:

- Individual site assessment and surveys including modelling flood risk and identifying mosquito supporting habitats
- Upgrades to dwellings
- Faecal-contaminated water conveyed to biofilters and surface wetlands for cleaning
- Rainwater tanks
- Toilets to dwellings or communal latrines
- Communal septic tanks
- Capturing and cleaning storm water and waste water for use in urban agriculture
- Containing environmental contamination from livestock.

The research project will be led by Professor Rebekah Brown, Director of the Monash Sustainable Development Institute (MSDI). The consortium also includes Professor Tony Wong, CEO of the Cooperative Research Centre for Water Sensitive Cities, and Professor Karin Leder, Head of

Infectious Disease Epidemiology, School of Public Health and Preventive Medicine at Monash University.

Project team members include engineers, sociologists, architects, economists, public health experts and biologists from both Monash and partner institutions including Stanford and Emory Universities in the United States and the University of Melbourne.

Professor Brown explained the context for this research project, which will apply the Water Sensitive Cities model successfully used in a number of developed cities to urban informal settlements in Asia-Pacific.

Professors Brown and Wong were part of a Monash team that pioneered the Water Sensitive Cities concept, which has a decentralised, site-specific focus, combining green technological innovations and urban design. Initiatives include strategies like biofiltration gardens and stormwater harvesting, complemented by deep sociological, governance and economic insights.

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Beyond checking the supplier's ACRS certificate, product markings and tags, there's no need for you to make any further checks on ACRS certified materials.

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- No more checking batch numbers against the test certificates.

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- AS 3600 - Concrete structures
- AS 5100.5 - Bridge design – Concrete
- AS/NZS 1163 - Cold-formed structural steel hollow sections
- AS/NZS 1594 - Hot-rolled steel flat products
- AS/NZS 3678 - Structural steel - Hot-rolled plates, floorplates and slabs
- AS/NZS 3679.1 - Structural steel - Hot-rolled bars and sections
- AS/NZS 3679.2 - Structural steel - Welded I sections
- AS/NZS 4671 - Steel reinforcing materials
- AS/NZS 4672 - Steel prestressing materials - General requirements
- NZS 3109 - Concrete construction
- Government specifications and/or manufacturers' specifications.

THE ACRS DIFFERENCE

ACRS is an independent, not for profit, expert certification body formed in 2000. ACRS specialises in verification of construction steels and associated products.

All ACRS auditors are fully-qualified metallurgists with many years experience working with steels.

In addition to factory production control audits and independent testing, the ACRS scheme provides regular review and analysis of all products manufactured and supplied by the certified supplier.

This makes matching material to conformity documentation simple and effective for the customer and for any verifier.





Another commonly encountered industry problem is mixed supply (sometimes called “shandying”), where conforming supply is declared but either only a portion of the product supplied is sourced from a compliant supplier (and the rest sourced from a non-compliant supplier), or alternatively, the material is sourced from a supplier but the product delivered does not consistently meet the Standard.

By providing effective continuous review of both the manufacturer and the fabricator/processor, ACRS certification plays a major role in reducing the risk of ‘shandying’.

AREN'T TEST CERTIFICATES THE SAME THING?



Test Certificates, ARE NOT the same as ACRS independent certification.

Test certificates from the supplier are simply a “snapshot” of the manufacturer’s own test results of the material on the certificate, not its regular supply.

ACRS certification demonstrates independently that the supplier manufactures consistently to the Standards stated on the certificate.

Unless you are going to check and validate every single test certificate against every delivery, you should check the ACRS certificates

for the manufacturer and supplier instead.

For further information about the validity of certification for any materials being supplied into your project, please visit the ACRS website: www.steelcertification.com, or contact ACRS, Phone: (02) 9965 7216.

WHAT ARE YOUR TAGS REALLY TELLING YOU?

Your products may arrive with tags, but what do they really tell you?

While at first glance the example on the left may appear to tell you all you need to know (there’s even a reference to an Australian Standard) it’s missing some CRITICAL information, including the manufacturer and point of origin.

The example ACRS tag on the right provides all of the information needed and, most importantly, the validity of the certificate number and other information can be checked and verified online quickly and easily at: www.steelcertification.com



THE ACRS CHAIN OF CERTIFICATION

Construction steels manufactured to AS/NZS Standards can be rendered non-conforming by poor transformation, e.g. through such processes as cutting, bending and welding. Certification systems that only assess the mill of manufacture do not provide for validated performance to Standards of the as-delivered product.

In steel reinforcing materials, the ACRS scheme, through its certification of steel reinforcement (“rebar”) processors and the mills of manufacture, provides a rigorous mechanism for “bookending” the manufacture and transformation.

This ‘chain of certification’ provides a vital link between the steel manufacturer and the construction site.

For any steel to be ACRS certified, it must have been manufactured by an ACRS Certified supplier. Any break in the ‘chain of

certification’ of the mill and the processor means the steel delivered to site is not ACRS certified.

For steel reinforcement, ACRS certifies BOTH the steel mill that manufactures the steel AND the steel reinforcement processor and mesh supplier. Verification of the outputs of both these supply streams is essential for any steel reinforcing materials claiming to conform with the Standards.

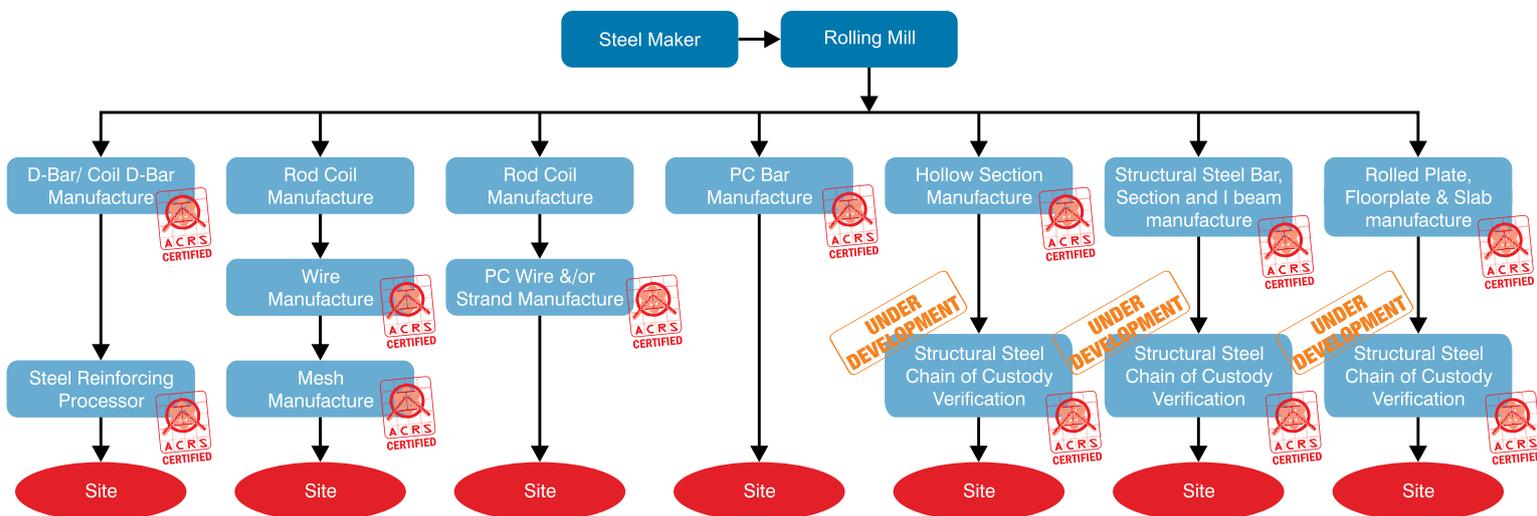
With structural steels, ACRS certifies the steel mill of manufacture, who must actively demonstrate traceability of their supply to the steel distributor. ACRS is working with Steelwork Certification Australia to develop “end to end” certification from mill to site that will provide confidence in fabricated structural steels from the purchase of verified steel from ACRS certified mills right through to delivery of the finished fabricated steel to the project site.

ABOUT ACRS

Established in 2000 with the support and endorsement of leading engineering and construction groups, such as Austroads, Engineers Australia, Consult Australia, Master Builders Association, and the Housing Industry Association, ACRS (Australasian Certification Authority for Reinforcing and Structural Steels) has become the leader in the field of steel conformity assessment and certification to Australian and New Zealand Standards.

Indeed, with over 1,500 audits and 4,500 materials assessments now completed, ACRS is recognised locally and internationally for both its rigorous and practical scheme, and its expertise in the compliance of construction steels to AS/NZS Standards.

JAS-ANZ accredited, ACRS is a not-for-profit independent Authority that provides expert, impartial assessment and certification that gives specifiers and customers the widest available choice of construction steel materials demonstrably compliant with Australian and New Zealand Standards. ACRS presently certifies 56 steel mills and processors, in over 150 production locations in 17 countries.



“This ‘chain of certification’ provides a vital link between the steel manufacturer and the construction site.”





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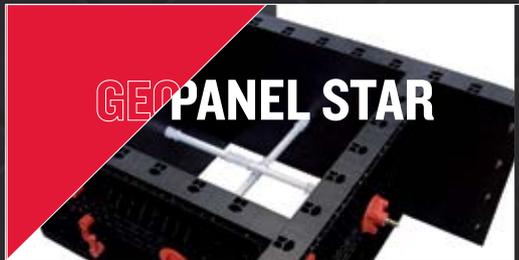
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DESIGN UNVEILED FOR THE STATE LIBRARY VICTORIA VISION 2020 REDEVELOPMENT

During March, the State Library Victoria in Melbourne unveiled the designs for its forthcoming \$88.1 million redevelopment plan, *Vision 2020*.

The plan will return 40% more space to public use, transforming the library to meet current and future needs

Schmidt Hammer Lassen Architects and local partners Architectus and Andronas Conservation Architects have created the new contemporary design that aims to unlock possibilities, create connections and act as a framework for the Library's ongoing and future evolution.

As the oldest and busiest public library in Australia, attracting 1.9 million visitors and more than 4 million online users each year, State Library Victoria is a rich and celebrated cultural institution in Melbourne utilised by a broad cross-section of users.

The architectural design concept puts these users at its centre, providing an open, accessible and welcoming experience for people of all ages and cultural backgrounds. During the design process a series of co-creation workshops were held to engage users directly. Input and feedback from children, teens and their families have helped the design team to understand the future user needs. That valuable feedback will translate into the creation of their dream library.

"Our goal is to create spaces that foster learning, exploration and innovation, expanding the Library's reach and relevance and transforming this popular landmark into a true urban hub - a place where people in Melbourne naturally gravitate to in order to engage, learn, socialize and be inspired," says Founding Partner Morten Schmidt.

The new design unlocks physical aspects of the Library in order to expand its functionality. While spaces like the Ian Potter Queen's Hall and Galleries are literally "unlocked" and released to the public, the Trescowthick Information Centre (TIC) and the Courtyards have been redesigned to bring their architectural and functional potential to life.

Spaces such as the new 'Kid's Quarter' aim to foster learning, exploration and innovation, expanding the Library's reach and relevance and transforming this popular landmark into a true urban hub.





TOP: The new design unlocks physical spaces such as the Ian Potter Queen's Hall to expand its functionality.

ABOVE: Areas such as the Trescowthick Information Centre (TIC) have been redesigned to bring their architectural and functional potential to life.

"We are stripping off the layers and revealing the original architecture, of which we are being very respectful, so that State Library Victoria can continue to function as a modern library".

New and engaging spaces for children, families and youth will be created to nurture creative learning, literacy and play. The design

also includes new technology-enabled spaces for entrepreneurship and innovation to support and stimulate the creative economy.

The design concept further enhances the permeability and navigability of the Library site by creating a sense of arrival and clear hierarchy of thresholds and spaces, connecting the different zones of the Library physically and visually. This will ensure visitors are aware of what the Library offers and can more easily explore the impressive collections. "We are increasing the use of the building through reassessment and flexible building strategies". The architectural interventions highlight the inherent qualities of this cherished institution while inviting the visitors to experience a range of spaces with different atmospheres and uses.

The Library is over 160 years old, and the various renovations the building has undergone are characterized by distinct styles and approaches. "Our concept provides a strong 'design line' that will act as a framework to guide present and future works," concludes Morten Schmidt.



IN BRIEF

Architects

Schmidt Hammer Lassen Architects
Architectus
Andronas Conservation Architects

Client

Major Projects Victoria (MPV)
State Library Victoria (SLV)

Area

13,532 m²

Engineers

Irwin Consult
Steensen Varming
Arup

Other Consultants

ID Lab
McKenzie Group
Salus

Status

Construction starts 2017 and is expected to conclude in 2020



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The floor of a production facility is often the biggest non-revenue producing expense in a business.

Business owners and managers can usually see the benefit in upgrading equipment to streamline production or improving their labour efficiency to bring a new product to market, however, when it comes to flooring it's often a different matter altogether. Surprising really, given that increased production demands often lead to additional or longer shifts, which in turn results in higher on-floor traffic and increased wear and tear.

In short, whatever the industry, it is the floor surface of your production facility which is working the hardest.

Your production floor is used by every staff member and visitor to your site every day, and in many facilities, that means working hard 24 hours a day 7 days a week. Needless to say, when it comes to production facilities, both the initial selection and the on-going cleaning maintenance of the floor plays a critical role in the overall performance of the facility.

Ascoat has been helping its clients to maximising the return on their flooring investment for over 25 years, working closely with engineers, builders and facility owners across numerous industries and specialist sectors, including; Food, Pharmaceutical, Manufacturing, Research, Medical and Packing & Warehousing. Bringing together years of specialised industry experience, Ascoat's professional team of flooring specialists focus on delivering high quality, long lasting flooring solutions, working with their clients to deliver the right flooring solution to meet the specific needs of the facility.

Importantly, Ascoat does not take a 'one size fits all' approach to flooring, and is not tied to a particular material supplier. Every flooring solution is a considered recommendation, formed after listening to and understanding each individual client's specific requirements. Be that food industry specific safety and/or hygiene requirements, the complex installation of a "Very Flat" insulated floor, or a seemingly impossible combination of maintenance and production schedule constraints. They have the experience and expertise to deliver the optimum flooring solution - even for the toughest environments. From fast, cost effective concrete sealing solutions, through to high build epoxy, self-levelling, chemical, temperature and static resistant seamless installations, Ascoat has the solution.

Not surprisingly, Ascoat's focus on quality and performance has been the primary catalyst in the company's ongoing success and exponential growth. And as their clients have grown - both in number and requirements - Ascoat has responded by continuing to expand its core business offerings, to include:

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- Industrial Painting
- Line Marking
- Floor Cleaning Services





SAFETY AND AESTHETICS

Floors, of course, are not only about safety and performance - there's also the matter of aesthetics.

Ascoat's Michael Bell, explained:

"Take a look at the overall condition of your facility from an outside perspective are you happy with your floors? If not, consider the image you wish to portray to clients and visitors, imagine the potential ongoing benefits and cost savings to your business and staff."

"Our team can come out and inspect your floors and provide your business, at no cost, with options and a flooring plan to go forward with, including detailed technical specifications and pricing if appropriate," he added.

"Our team is supported by a dedicated team of specialist contractors - all highly experienced across many industries - and we work together to complete each project on time, on budget and to the agreed standard."

"Needless to say, Quality Assurance (QA) is also a core protocol of our Standard Operating Procedures. In combination with our fully compliant Occupational Health & Safety (OH&S) systems and Environmental systems, it forms part of a complete documented end-to-end process," Michael Bell added. "Working to a proven methodology on every project, whether large or small, Ascoat sets high standards that are recognised through-out the industry."

For further information on Ascoat's range of products and services, or to discuss your specific flooring requirements, please contact Ascoat Industrial Floor Surfacing, Ph: (03) 9587 7433 or visit www.ascoat.com.au



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GOOD FLOORING CHOICES MAKE FOR A HEALTHIER WORKPLACE

As industrial facilities get larger and production processes get faster to cope with increasing global demand, plant designers still have to make sure that they adhere to regulations and guidelines set down by standards agencies, accreditation bodies and health and safety organisations.

There are challenging conditions and demands on modern business. One very important one is ensuring that the workplace is safe and comfortable for staff and visitors. The floor covering of any workplace is a key component that is increasingly being seen as a vital part of meeting certification requirements.

Some industrial workplaces, such as research laboratories, food processing plants or hospitals, place a range of additional stresses on any flooring used. Flooring may be exposed to corrosive substances such as fats, hot oils, blood, sugar solutions and food acids. In addition, there may be multiple sources of thermal shock, such as blasts of -25°C air from an open cold storage unit or steam cleaning at 120°C. Rigorous cleaning processes using caustic solutions also place a lot of stress on any floor covering.

Preparing a floor and applying a coating requires a special range of skills and understanding of the physical nature of the material being handled. "It is essential that time is spent at the planning stage to ensure that the customer's expectations are matched," said Peter Morgan, General Manager of Rhino Linings Australasia (RLA).

For the majority of its flooring projects, RLA produces a range of 100 per cent solids epoxy coatings. "The term '100 per cent solids' means that whatever is put on the floor is what stays there, nothing is lost as solvent," Morgan said.

The structure of the polymer used for industrial flooring has to be resistant to abrasion and chemical attack. The good mechanical, chemical and heat resistant properties of an epoxy coating are obtained by reacting the linear epoxy resin molecules with suitable curatives to form three-dimensional cross-linked thermoset structures in a process commonly referred to as curing.

In principle, curing can be achieved using any molecule containing a reactive hydrogen that can react with the epoxide groups in the resin. Epoxy can either react with itself (homopolymerisation) or by forming a copolymer with polyfunctional curatives or hardeners. Common classes of hardeners for epoxy resins include amines, acids, acid anhydrides, phenols, alcohols and thiols, all of which have varying relative reactivity.

Some epoxy resin/hardener combinations will cure at ambient temperature but many need to be heated for the most effective curing. Insufficient heat during the curing process will result in a network with incomplete polymerisation, and thus reduced mechanical, chemical and heat resistance.

There are many constraints to be considered for a successful floor coating project. It is essential that the floor is clean, dry and free from contaminants. Prior to applying any coating, a floor must be properly prepared which usually means that it should be 'scarified' or 'shot blasted' to give it the correct profile to ensure optimum adhesion.

While the ideal situation would be to apply a floor coating to the clear, open expanse of a new warehouse, the majority of projects are remedial, where the coating has to be applied around, under or through existing equipment or furniture. "Our applicators are highly skilled and experienced," Morgan added. "As long as these guys are able to access it, they are able to coat it."

Being able to be applied in one application to any thickness, along with the rapid curing properties of the products, dramatically reduces down time normally associated with multi-coat flooring systems. A RLA flooring system will not need "re-painting" in the short term and will provide many years of service which also saves money by reducing maintenance expenditure and minimising interruptions to operations. "All our customers want a quick return to service, with no smell and a rapid cure time," said Morgan. "This is even more important where food is handled."

"Some floor coating materials have a high solvent content," said Morgan. "This is usually because they are less expensive and easier to spread on the substrate." Methylmethacrylate is one high solvent coating that is still used by some applicators.

For many years there has been extensive research carried out on water-based coatings. The earliest ones did not have the same strength or durability, but technology and materials have greatly improved the quality and usability of water-based versions.

It is also possible to adapt epoxy floor coatings to also provide a non-slip surface for safety, but this usually involves a compromise because bacteria and other contaminants can be caught in the textured surface of the flooring. Non-slip properties are achieved by incorporating sand/filler to bulk out the epoxy mixture and give it a 'porridge' consistency which can be trowelled and brushed onto the substrate.



The floor of a refurbished abattoir protected by Rhino Linings' ArmaFloor 200 SC.

The appearance of the flooring can be made an integral part of the health and safety régime of a workplace. Bright colours can differentiate between various zones and can be used to highlight hazardous areas while glossy tones can make the working environment more pleasant for the staff.

For the food and beverage industry, flooring materials must be able to withstand the sector's fast pace while effectively minimising contamination risks. Seamless, impervious finishes, such as epoxies, stop contaminants hiding within hard to clean gaps where they can multiply. Durability goes hand-in-hand with this, as the floor will be subjected to many causes of damage that could turn into an unsightly, unsafe and unsanitary surface. RLA's range of coating products meet these requirements.

The company's superior spray or brush-applied industrial surface coatings will not crack, peel or warp. The coatings are highly resistant to impact and abrasion, in addition to being almost impervious to oils, fuels and a wide range of chemical solvents.

When changing the flooring of an industrial site, another consideration is the cleaning protocols required. The cleansing agents and application methods are very different for traditional tiles and a non-slip, epoxy-based floor coating. For detailed recommendations, customers should contact the RLA Technical Department. "We have experienced technical staff who have extensive knowledge of our products," stated Denis Baker, Special Projects Engineer at RLA.

Based on the Gold Coast, RLA is the only manufacturer of spray applied coatings in Australia. The company sources all its materials from Australian suppliers except for some very specialised chemicals which are imported from the parent company in America. Being a local manufacturer allows the company to be more responsive to customer requests. "We are not dependent on delivery schedules from an overseas supplier," Baker said. "Our applicators and customers can 'tool up rapidly' for large projects and not have to wait months for supply of material."

All coatings developed by Rhino Linings are regularly tested to ensure they comply with the latest standards. "The staff here really understand the chemistry of the product," Baker said. "They have a great depth of knowledge and experience about which products can be used and in what situations."

For more information, please visit www.rhino linings.com.au

ABOUT RHINO LININGS AUSTRALASIA (RLA)

RLA has been formulating and manufacturing superior pure polyurea, modified polyurea, polyurethane and polyaspartic protective coatings for commercial and large industrial applications for more than 20 years. Spray applied linings provide superior solutions to industrial abrasion, impact, containment, corrosion and chemical attack problems.

Australasian customers are solidly supported by a manufacturing and distribution facility in the Gold Coast Queensland, Australia and through Distributors in New Zealand, Indonesia, Singapore, the Philippines, Korea, New Caledonia, Oman, UAE and Sri Lanka.

Rhino Linings provides premium spray applied protective coatings and linings for corrosion resistance, impact, chemical and abrasion resistance, waterproofing solutions, tank linings and pipe linings in addition to polyaspartic and epoxy floor coatings.



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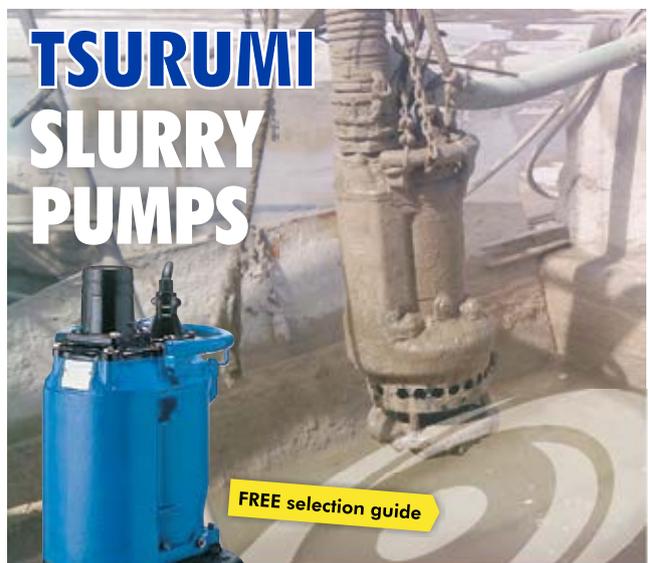
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HOW DO CONCERT HALLS MAKE MUSIC SOUND SO GOOD?

By Jackie Randles

Room acoustics expert Cameron Hough says a good concert hall behaves like an instrument, subtly changing the tone quality of a performance and making it even more beautiful in a hall with good acoustics. From as early as at least the 1700s, composers have demonstrated a sound understanding of acoustics that evolved in tandem with an era of private concerts and music composed for particular occasions.

Hough, who is an engineer working primarily as an acoustics and theatre consultant with Arup, says that in the days before the public concert, classical composers always responded to the environments in which their music would be performed.

“Early music was generally written for a particular occasion and acoustic. There wasn’t the same expectation of music entering a ‘repertoire’ and being performed in multiple places,” he says.

“If you listen to symphonies composed by Haydn, there are striking differences between those created for his patron, Prince Esterhazy, for the drier acoustic ambience of the castle music rooms at Schloss Eisenstadt or Schloss Esterhaza compared with the symphonies for London written for a more-reverberant acoustic in the Hanover Square rooms.”

In early Eisenstadt symphonies, Hough says that Haydn introduced fast notes immediately after a loud chord because the room was dry

and the sound would die away rapidly, allowing the fast notes to be heard. By contrast, in the London symphonies, Hough explains that Haydn left a bar of rest after a loud chord because the room was much more ‘live’ and needed time for the sound to get out of the way.

“You see the same technique applied in some of Beethoven and Schubert’s symphonies, indicating that the site specific nature of each one was inherently understood by the composer,” he adds.

Similarly, church music was typically developed for a particular acoustic language.

“Compare Allegri’s Miserere or Gregorian chant to Bach’s cantatas: the text is in Latin rather than the day-to-day language of the congregation, so they wouldn’t have necessarily understood the text. But the effect of these overlapping and blending musical phrases – particularly in the extremely live acoustic of a cathedral – is intensely beautiful and would certainly help add an emotional dimension to the experience of worship,” he says.

Styles developed in response to the spaces in which they were performed too, with congregations being able to understand the words being sung adding to the overall experience.

“Bach’s compositions for the Thomaskirche in Leipzig and other northern-European Protestant churches had a much-drier

acoustic than those composed for Catholic cathedrals, and this may have been influence by the text being sung in the language of the congregation.”

“The drier acoustic of the churches he was writing for allowed Bach to write much more complex music, with interlocking parts and faster passages of notes, while still being confident that the individual parts could be heard.”

Hough says that the acoustic of the Thomaskirche in Bach’s time, before renovations in the 1880s, was probably closer to the City Recital Hall than to (say) St Mary’s Cathedral here in Sydney. The idea of public concerts became a new phenomenon in the early 1700s, with the first musical societies being formed.

“For example, the Collegium Musicum in Leipzig was one for which Bach wrote much of his orchestral music. Initially held in theatres or ballrooms, public performances were soon delivered in purpose built rooms like Holywell Music Room in Oxford (1748), Hanover Square in London (1774) and the Altes Gewandhaus in Leipzig (1781).”

Hough says musical tastes changed as rooms developed too, with late Romantic music written for the modern concert hall relying on having a longer reverberation than in Mozart and Beethoven’s day.

“This development is the reason why Mahler

can sound a bit "lifeless" in a theatre, and Mozart can sound "overwhelmed" in a large concert hall if not played sensitively. But this also means that modern concert halls have to deal with a wide variety of repertoire, including some that was not written with the same acoustic in mind."

During the Romantic period in the second half of the 19th century, the rectangular "shoebox" concert hall emerged, leading to the world-famous concert halls of Vienna Musikverein (1871) and Amsterdam Concertgebouw (1888), which still set what Hough refers to as the "gold standard" for concert hall acoustics.

Closer to home, Hough cites Sydney Town Hall as a good example of this style of room. Modelled on the proportions of the palace ballrooms which were previously used as concert venues, several features of this style of room contribute to its renowned acoustic quality.

"Firstly, the rooms are narrow (due to structural limitations of the time – a wider room with a wider roof simply could not be supported), which means that there are plenty of reflections from the side-walls which add richness to the sound, particularly because our ears are very sensitive to sound coming from the side."

The room's modest size also helps.

"Listeners are closer to the orchestra, and are closer to the room boundary surfaces which provide supportive sound reflections."

This is interesting when you consider that the Musikverein seats almost 1000 people fewer than the concert hall at the Sydney Opera House.

"The architectural style of the day, with highly-decorated rooms full of columns, statues and moulded plaster details, also helps to mix

and blend the sound together so that in many of the seats the audience feels surrounded by the performance from every direction," says Hough.

Looking at the complex science of modern day concert hall design, Hough says that understanding how audiences hear and localise sound is essential – as is understanding that we actually much prefer to be hearing different things in each ear.

"The remarkable ability of the ears to keep track of and combine together the thousands of sound reflections that arrive at our eardrums explains much about how the sound in a room translates into our emotional impression of the room," he says, adding that our ears are remarkably good at distinguishing between sounds that arrives from different directions, even when the sounds are almost exactly at the same time.

"Even if the sounds are so close together that our ears don't hear them as distinct notes, they still register the fact that they are arriving from different directions."

This is what provides a room with a sense of space, giving us the impression that sound is arriving from all over the room and not just from in front of us.

Hough says that if reflections arrive at our ears later and later, eventually the ear is able to hear them as a separate sound.

"If there are lots of reflections that all arrive in a smooth sequence and get slowly quieter and quieter, we hear this as 'reverberation' that can add richness and 'fullness' to a musical performance."

But if there's a reflection that is too loud, it can be heard as an echo.

"This can be distracting to both the musicians and the audience, so we want to avoid echoes."

Our ears also keep track of which frequencies are arriving in the reflected sound, and this helps account for the 'timbre' of the room

"Whether a room sounds 'warm' or 'thin', 'brilliant' or 'dull' has to do with how much bass and treble sound is arriving at our ears. And while a lot of this comes from the instruments on stage, the hall itself also plays a part by adding its own particular 'colour' to the sound."

Keeping track of how sound behaves through thousands of reflections and making sure there is the right amount of sound reaching ears at the right loudness from the right direction is the key challenge for engineers in designing a concert hall.

"It's made even more challenging in that this balance has to be achieved across each of thousands of seats," says Hough, who adds that technology helps considerably.

"Computer software allows us to track the behaviour of sound in a room and explore the effect of changing its size or shape. But ultimately, how it sounds is the key test for a new concert hall."

Through a process called "auralisation" (the acoustic equivalent to visualisation) Hough and his colleagues can now listen to an "acoustic rendering" of how a new concert hall will sound before it is built in a purpose-designed listening room known as the Arup SoundLab.

Part of the Arup team that is currently designing the new concert hall for the Australian Chamber Orchestra (ACO) in the Walsh Bay Arts Precinct, Hough has been using auralisations as part of the design process.

"When you invite musicians into the SoundLab and invite them to react to different versions of the room design, they pick up on such subtle changes. If you have a group of musicians all listening together, they have these really interesting discussions about which versions they prefer."

Hough says that how a room feels to is the perspective designers need to keep in mind.

"All the science and technology is in the service of providing a particular experience in a room, of making it sound a particular way. And ultimately that's the test for good acoustics – how does it make you feel? And if the musicians and audience are enjoying how the room sounds, then that's when you know you've done your job right."



Used extensively in the interior of the Ukaria concert hall (formerly Ngeringa) in the Adelaide Hills, Hoop Pine not only brings a rich golden colour to the interior, it also plays a vital role in the acoustical performance of the hall.

Jackie Randles is Manager Inspiring Australia (NSW).



SERVITISATION: HOW IT IS CHANGING THE CONSTRUCTION INDUSTRY

By Kenny Ingram, Global Industry Director, Construction, Engineering and Infrastructure, IFS

The concept of servitisation is not a new phenomenon. The term was formally defined in the 1980s, but its essence – bundling service packages with products to add value – goes back several decades earlier, with the introduction of the “power by the hour” concept of Bristol Siddeley, a British aero engine manufacturer later acquired by Rolls Royce. Despite its presence for more than half a century, servitisation has recently come to the fore as a shaping force in a range of industries, including construction.

A number of factors have driven this recent renaissance in service provision and development, including globalisation, high market volatility and a rising pressure for innovation as a means of attaining and sustaining advantage in increasingly competitive markets. A recent study by the University of Cambridge points to five principal drivers of this trend:

- 5–10 percent increase in service revenue
- Maintenance cost reductions of 25–30 percent
- Improving product and asset performance
- Increasing data gathering (e.g., volume, quality, data types)
- Increasing and improving access to information

Increasingly, asset owners are looking to outsource the services required to maintain

their assets over their lifecycles. Service or facilities management contracts are often offered by construction companies for assets they have built, or for assets that some other contractor has built. These service-based commercial contracts have evolved over time, typically based on, for example, asset availability or response times. There is a trend toward “contracting for outcomes” with the construction firms that build these items. These performance-based contracts are changing the business models that construction firms use to approach the market.

When talking about buildings, the term facilities management is generally what is used today. The contract is about making the facility available. A five-to-ten-year contract is awarded to a construction company to build and maintain the asset. As part of the contract, they may also have scope to rebuild, refurbish or build new assets. It’s about services as much as construction per se; so it is very much the same thing as servitisation in the manufacturing sector.

SERVITISATION: WHY IS IT TRENDING?

So what’s required of construction companies who want to servitise their business? Like any other major innovation in the industry, servitisation means that enterprises will need to confront change to be able to grasp the

opportunities it presents. Some of these will be technology-based. The Cambridge study found consensus among capital equipment manufacturers (CEM) on five key technology requirements to enable servitisation in the future:

- 1. Predictive analytics** to anticipate specific failure modes
- 2. Remote communications** to resolve issues from a distance
- 3. Consumption monitoring** to create customer-specific service offerings
- 4. Pushing information** to employees/suppliers/sub-contractors/customers via mobile platforms or the Internet
- 5. Mobile platforms** to access business software remotely for maintenance techniques, production outputs, etc.

Businesses will need to assess the individual value of these and other technologies for their operations to ensure medium-term service competitiveness.

The construction industry has traditionally been slow to adopt digital technologies. But today there is a strong drive for construction companies to use digital design tools and models, and to integrate that data so it can be handed over at the point the asset is completed.

There’s a huge drive for a digital handover as part of the construction process. There are thousands, if not millions, of pieces of data associated with an asset that used to be paper-based in spreadsheets, drawings and other information on paper. It’s not only hard to gather and transfer that data; it’s hard to integrate and make sense of it.

This issue has fuelled the fire for the industry’s building information modelling (BIM) initiatives. BIM involves the generation and management of digital representations of the physical and functional characteristics of assets. Building information models are files that can be exchanged or networked to support decision-making about an asset throughout its lifecycle.

There are huge efficiency gains with the use of BIM. Companies taking on maintenance contracts haven’t necessarily known what they’re being asked to maintain. So by using BIM technology to build and capture the digital information throughout the process, there is greater visibility into the asset and improved ability to optimise cost of ownership over its life. The focus is now about designing the asset so that it can be maintained at minimum cost and to provide the outcome it was intended to deliver.

Other emerging technologies driving this digital transformation of construction include:

- **The Internet of Things (IoT)**, which enhances asset performance and asset assessment. The IoT helps empower construction firms to digitise, optimise and automate processes that previously were not connected to IT systems.
- **Drones and robotics**, which are employed for inspection and maintenance of complex assets and infrastructure. They help meet the physical challenges associated with many assets.
- **3-D printing (additive manufacturing)**, which speeds development and delivery of components in the construction phase. It supports delivery-to-promise.
- **Mobile and social technologies**, which improve communications and increase the flexibility of the workforce. They facilitate collaboration across companies and cross-functional departments.

Companies adopting these technologies need to assess them individually as contributing components to an expanded service and asset management orientation. They also need to

understand the importance of organisational change, as culture, risk and infrastructure must be aligned if these technologies are to be fully and effectively leveraged.

WHAT'S NEXT: GETTING THE FOUNDATION IN PLACE

For construction companies looking to add innovative service and asset management capabilities to their offerings, the benefits are straightforward: enhanced revenue, better margins, sustainable business growth, predictable income streams and higher levels of customer satisfaction. But many lack the foundational IT software to take full advantage of the technologies driving the change that realises those benefits.

Too many companies have a shambolic set of unintegrated systems. It hardly makes sense to plug technologies into something that isn't working well to begin with. Consequently, the essential step for leveraging the technologies enabling the dynamic development of service as a fundamental business driver is having an integrated, full-featured enterprise software solution in place.

In the construction sector, IFS has a long history of providing this solution. Facilities management provides an effective and cost-efficient IT foundation for those in construction looking to expand the service and asset management component of their business. Our customers are successfully employing these tools to keep on the right side of change as the industry evolves.

For further information, please visit: www.ifsworld.com/au

ABOUT THE AUTHOR



Kenny Ingram is the Global Industry Director for Construction, Contracting, Engineering, Infrastructure and Shipbuilding at enterprise applications company IFS and a key member of its Product Direction Board. Kenny has been with IFS for

16 years and is now regarded as one of the top specialists in Project Based Business systems.

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PROTECTIFLEX BLASTS OPPOSITION

The blast test at
RAF Spadeadam.

- Concrete reinvented
- Proven against car bombs
- NATO accredited for highest level of threat for ballistics
- Made from recycled materials

An Australian engineer has played a pivotal role in developing a revolutionary world-first building material that is blast and ballistic resistant.

ProtectiFlex is set to revolutionise the security of key infrastructure around the world, a vital consideration in today's political climate, says structural engineer Gary Bullock.

Sydney-based Bullock, managing director of Enviromate, the UK company behind ProtectiFlex, brought 30 years' experience with leading engineering consultants SKM (now Jacobs) to the product's development.

"Our walls have been tested for both blast and ballistics and proved superior to much heavier concrete masonry blocks," says Bullock.

"ProtectiFlex also has NATO accreditation for the highest level of threat from direct artillery fire."

SUPERIOR RESULTS FROM BLAST TESTING

In terms of blast, ProtectiFlex outclassed other comparative concrete blocks previously tested by the UK's Centre for the Protection of National Infrastructure (CPNI).

A recent blast test at RAF Spadeadam in the UK saw ProtectiFlex walls face a charge equivalent to a standard car bomb at a range as close as 12 metres. Wall thicknesses varied from 100mm to 280mm.

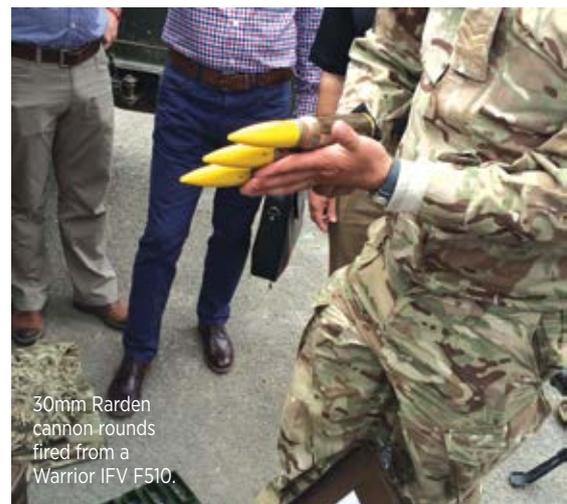
The aim of the Spadeadam trial was to push the blast pressures endured by ProtectiFlex to the limit. The blast was equivalent in size to a Vehicle Borne Improvised Explosive Device. The test was undertaken by DNV GL and managed by UK-based TPS blast engineers.

SUCCESSFUL BALLISTIC TESTING

The product has four levels of NATO accreditation for ballistics, including the stringent STANAG (Standard Agreement) 4569 Level 4, which endorses its effectiveness against the highest level of threat from direct artillery fire.

ProtectiFlex was also tested for ballistics in June last year by the Royal Engineers at COTEC (Cranfield University Ordnance Test and Evaluation Centre). ProtectiFlex, alongside competing ballistic and blast-resistant walls, faced:

- nine rounds of 30mm Rarden cannon shells fired from a Warrior IFV F510 at 800m



30mm Rarden
cannon rounds
fired from a
Warrior IFV F510.





ProtectiFlex wall absorbs energy from repeat 30mm Rarden cannon rounds.

As well as defence and security, ProtectiFlex has direct application in oil and gas, critical infrastructure protection and industry.

As an example, an international well flow testing company has already adopted ProtectiFlex as the optimal design solution for its high pressure testing enclosures (70,000 kPa).

ProtectiFlex precast concrete panels have also undergone successful ballistic and blast trials in the US, with further tests scheduled there in the next few months.

All ProtectiFlex products can be manufactured using existing concrete plant. Good to know that Australian engineering know-how is making a concrete contribution on the global stage.

For further information on blast and ballistic performance, please contact Gary Bullock, T: 0418 793 701, E: flexiroc-australia@bigpond.com or visit: www.protectiflex.com

- 105mm artillery shell detonated at 1.5m
- 122mm rocket detonated at 1.5m
- repeat fire of HMG 50 Calibre at 100m.

ProtectiFlex was the only wall left standing.

MULTIPLE APPLICATIONS

Bullock was introduced to the material three years ago. Its original application was as a flexible base for sportsfields. With his engineering background, Bullock saw the potential to develop the product for use against blast and ballistics and also for earthquake-resistant buildings.



ProtectiFlex is the only wall left standing after the 122mm rocket blast.



Gary Bullock with the charge equivalent to a standard car bomb at Spadeadam with test wall in the background.

The earthquake product, Tremorflex, is being tested at Western Sydney University and results will be available in May.

"It is an exciting material that has many applications," says Bullock.

ProtectiFlex is a patented formula combining concrete with recycled non-biodegradable materials.

Masonry units used in the Australian trials were manufactured and supplied by Adbri Masonry.

MARKET POTENTIAL

The product has been rigorously tested over the past three years in readiness to bring it to market.

"Our walls have been tested for both blast and ballistics and proved superior to much heavier concrete masonry blocks. ProtectiFlex also has NATO accreditation for the highest level of threat from direct artillery fire."



THE CLEAR SOLUTION TO WATERPROOFING

Preventing Dampness with an Invisible Wall Treatment

Frequently, external walls are exposed to rain and adverse weather conditions, allowing water to enter the porous masonry surface and penetrate into the internal walls, creating damp areas. Dampness also encourages mould growth, as condensation on internal walls builds up, deteriorating the walls even further and posing potential health risks. In stone buildings that predate the introduction of cavity walls, damp problems are particularly commonplace. In the winter months, external walls can also be affected by freeze-thaw cycles, where water penetrates the masonry and freezes, creating cracks and gradually eroding the wall. Evidently, to protect walls from external and internal degradation for the long term, they need to be shielded from water penetration whilst simultaneously letting internal moisture escape.

Some commonly used waterproofing materials permanently seal the external wall, trapping existing moisture within, making the wall susceptible to cracking during freeze-thaw cycles. An alternative to sealing would be to impregnate the substrate with a clear waterproofing treatment. This method lets the treatment penetrate deep into the building fabric, allowing any moisture to evaporate, while keeping the water out. The difference between sealing and impregnating can be seen in the diagram below. An additional benefit of a clear treatment is its absence of colour, so the appearance of a treated building can remain as it was intended.

A range of waterproofing treatments is currently available on the market with varying expected lengths of service. One of the more enduring materials has been developed by Belzona, a UK-based global chemical company

LEFT: Belzona clear cladding has been used on this school in Wales to waterproof and protect the brickwork and natural stone.

specialising in protective coatings and repair composites.

Going by the name of "Clear Cladding", Belzona 5122 forms an invisible, micro-porous, water repellent barrier that allows the passage of air and water vapour, ensuring that moisture is not trapped in the substrate. This single component material is supplied as a concentrate, for dilution with water prior to use and can be brush- or spray-applied.

In addition to waterproofing the building, clear cladding also reduces dirt retention. This water repellent treatment for masonry protection can be applied onto concrete, limestone, brick, sandstone and other natural materials and dries within 2 hours under normal climatic conditions.

Em Robinson from Anglesey, North Wales, commented on her experience with clear cladding: "We first used this product 19 years ago and have only needed to reapply after some ingress of water last winter, which was an exceptionally bad one. We are especially pleased with the finish as it is invisible, not altering the look of the stone or mortar in any way. The only noticeable difference is, when raining, the stone remains its dry colour and you can see the water 'beading' off the surface. The other advantage of this product, as opposed to other waterproofing methods, is that you can see when it is no longer working by splashing water onto it and only have to reapply the areas no longer repelling water. Also you only need one application."

This breathable and impermeable treatment has been used to protect commercial, industrial and private buildings and structures against dampness whilst reducing the effects of erosion and efflorescence.

For further information, please visit:

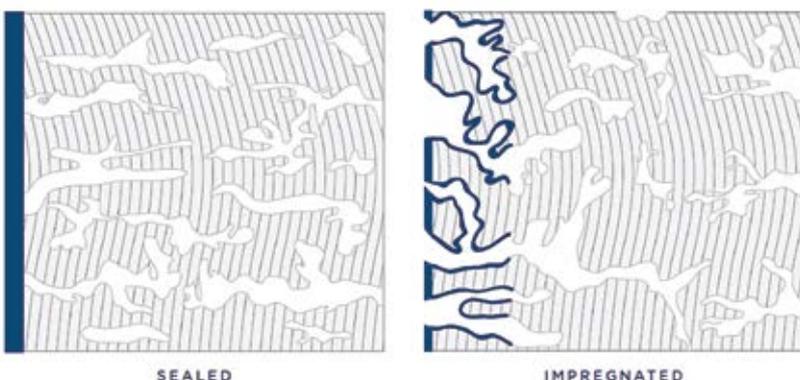
www.belzona.com

ABOUT BELZONA

Established in 1952, Belzona has pioneered innovative polymer technology that has revolutionised industrial repair and maintenance procedures. Belzona is a leading company in the design and manufacture of polymer repair composites and industrial protective coatings for the repair, protection and improvement of machinery, equipment, buildings and structures.

The full Belzona product range is manufactured at Harrogate in the UK to stringent quality and environmental control guidelines complying with the requirements of ISO 9001:2008 and ISO 14001:2004. The company has over 140 Distributors in more than 120 countries ensuring not only the availability of Belzona materials, but also specification support, project management, application and supervision services. Distributorships and their teams are supported by Belzona Corporate offices in Europe, North America and Asia.

The Difference Between Impregnation and Sealing



Temporary Movement Joints in Post-Tensioned Concrete Frames

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DESIGNED FOR SAFETY

- Low ride down accelerations on vehicle occupants in end-on impact
- Reduced spare parts inventory: In almost 50% of all resets to date the only replacement parts needed are two 1/4" shear bolts
- Increased crew safety: The average reset/repair time (often with just a one man crew) is 56 minutes
- Reduced call out increase crew safety: to date there has been no call outs for side angle impacts, a similar pattern to that in the USA
- Reduced lane closure time: Fewer call outs and faster repairs keep traffic lanes open for longer
- Happier motorists: Fewer lane closures, less blockages and faster repairs
- SMART DESIGN, SAFER SITES FOR ROAD CREW and SAFER MOTORING

ROAD SAFETY DESIGN AT ITS BEST

The SMART CUSHION Spare parts detailed record to date for the first 47 resets.

| | | | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| sci-01 07/15 | sci-02 07/15 | sci-03 09/15 | sci-04 10/15 | sci-05 10/15 | sci-06 11/15 | sci-07 11/15 |
| 1st SP |
| sci-08 11/15 | sci-09 11/15 | sci-10 12/15 | sci-11 04/16 | sci-12 05/16 | sci-13 05/16 | sci-14 06/16 |
| 1st SP+DP | 1st SP | 1st SP | 1st SP | 1st SP | 1st SP+DP | 1st SP+DP |
| sci-15 07/16 | sci-16 07/16 | sci-17 10/16 | sci-18 10/16 | sci-19 11/16 | sci-20 11/16 | sci-21 11/16 |
| 1st SP+DP | 1st SP+DP | 1st SP | 1st SP+DP | 1st SP | 1st SP | 1st SP+DP |
| sci-22 11/16 | sci-23 02/17 | sci-24 02/17 | sci-25 02/17 | sci-26 02/17 | sci-01 09/15 | sci-02 02/17 |
| 1st SP | 1st SP | 1st SP | 1st SP+Sd | 1st SP+Sd | 2nd SP+DP | 2nd SP |
| sci-06 11/15 | sci-07 07/16 | sci-08 12/15 | sci-09 12/15 | sci-14 07/16 | sci-25 11/16 | sci-01 11/15 |
| 2nd SP+DP | 2nd SP+DP | 2nd SP | 2nd SP+DP | 2nd SP | 2nd SP+DP | 3rd SP |
| sci-06 11/15 | sci-09 05/16 | sci-01 12/15 | sci-06 09/16 | sci-09 12/16 | | |
| 3rd SP | 3rd SP | 4th SP | 4th SP+DP | 4th SP | | |
| sci-01 12/15 | sci-01 01/16 | sci-01 01/16 | sci-01 05/16 | sci-01 06/16 | sci-01 06/16 | sci-01a 08/16 |
| 5th SP+DP | 6th SP | 7th SP | 8th SP+Sd | 9th SP+DP | 10th SP | 11th SP |

| Code for Unit number / date / sequence | |
|--|-----------------------------|
| sci-XX | unique Smart Cushion number |
| MM/YY | Month reset/repaired |
| 1st / etc | Reset sequence per unit |

| Reset/Repair required | |
|-----------------------|-------------------------------|
| SP | only Shear Pins were required |
| SP+DP | Delinator panel also replaced |
| SP+Sd | Sled panel also replaced |

GAME CHANGER

To date 26 Smart Cushions have been impacted, one of these has been impacted 11 times. **The total cost of all Spare Parts used in 47 resets is \$7,338.00 at an average of \$160.00 per reset.**



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DOUBLING BATCH PRODUCTION

The key challenges in batch plants are faster production and increased efficiency. A major bottleneck in production is caused by the time taken to fill the overhead batch water tanks.

The average agitator load uses 800-1000 litres of water. The speed at which the weigh hoppers are replenished directly affects the number of agitators loaded, or cubic metres of concrete produced, per hour or day.

One solution being implemented in bigger plants is upgrading the batch water pump to a Tsurumi KTZ411 submersible. The 4" high head, high flow pump has the capacity to overcome long pipe runs, bends and possible restrictions in the pipework.

The Tsurumi KTZ411 is powered by an 11kW 3-phase motor and has the capability to deliver 1,000 litres per minute at 35 metres head. Some batch water pumps take up to five minutes to produce 1,000 litres at that head. Plants that convert to the KTZ411 ensure that the water supply does not restrict future production capacity.

Another advantage of using the KTZ411 in this application is the ability to back flush the pump at the end of the day. This prevents

sediment build up in the pump overnight.

The KTZ range of Tsurumi dewatering and slurry pumps was developed in response from demand in North America and Japanese markets for super tough pumps for batch plants applications.

Tsurumi designed the KTZ series to efficiently pump cementitious laden liquids. The pumps incorporate a wear resistant hi-chrome iron impeller that enable solids in suspension to pass smoothly through the pump.

Cast iron pumps like the KTZ series are ideally suited to the pH of batch water. Aluminium pumps are generally eaten away in these conditions and fabricated stainless steel pumps can fail due to fatigue in rigorous settings.

Tsurumi KTZ pumps include a number of features that enhance the life expectancy of the pump. A unique anti-wicking cable gland makes it virtually impossible for water to enter the motor through the cable. Twin, double silicon carbide mechanical seals, with all seal surfaces protected in an oil chamber, is also a standard Tsurumi feature.

"We believe that these two simple features knock out the biggest single failure points on any submersible pump," said Aussie Pumps Neil Bennett.

"They are the reasons why Tsurumi submersibles deliver lower maintenance costs and longer life expectancy!" he added.

The pump has a side flow, top discharge design that uses the pumped water to cool the motor. That extends the life of the pump and enables it to operate even in shallow liquid. A multi-directional discharge port simplifies installation.

"These high head pumps are proving to be a real cost saver in batch plants around Sydney," Neil added. "Any plant looking to boost production can changeover the batch water pump and dramatically cut agitator loading times."

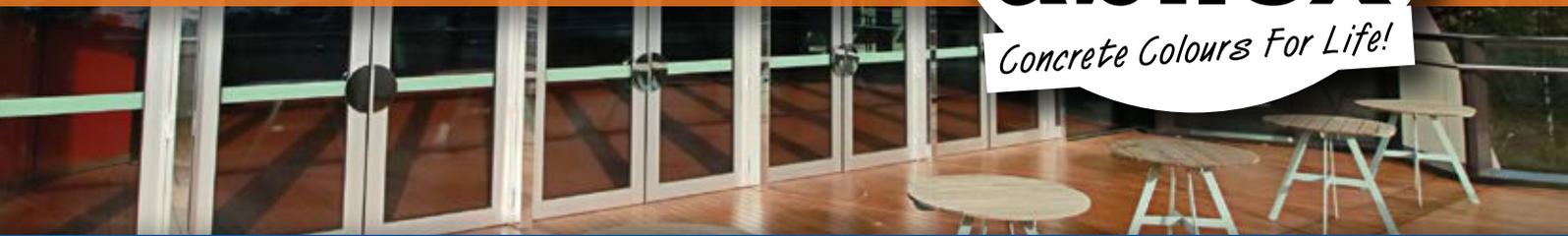
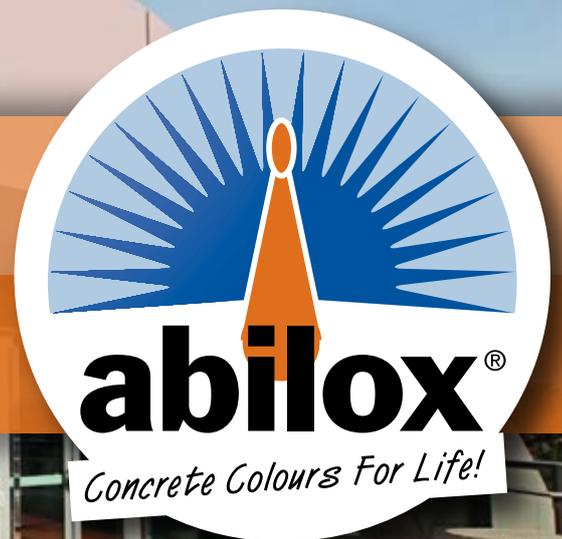
Further information on the Aussie Pump Tsurumi series is available from Australian Pump Industries or Aussie Pump Industrial Dealers throughout Australia or from:

www.aussiepumps.com.au

Installing a high capacity batch water pump cuts weigh hopper replenishment times and enables more agitators to be loaded per hour.



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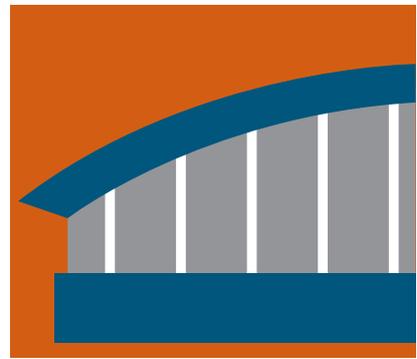
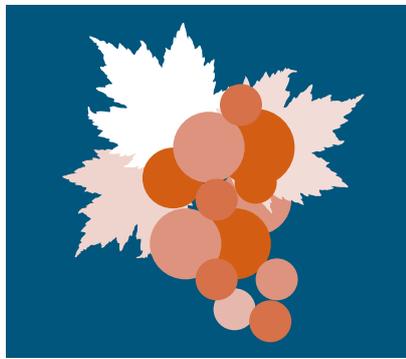
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CONCRETE 2017

Advances in Concrete Materials and Structures
22 - 25 October 2017 | Adelaide Convention Centre

Concrete 2017, the 28th Biennial National Conference of the Concrete Institute of Australia, will be held in Adelaide at the Adelaide Convention Centre from 22nd October to 25th October 2017. The conference will also be held in conjunction with the 3rd International Congress on Durability of Concrete (ICDC).

The Conference Organising Chairs, Professor Julia Mills and Associate Professor Rebecca Gravina, invite people from both Australia and the rest of the world, to be part of this historic joint event which will provide delegates with valuable exposure to cutting edge research and development as well as the chance to network in a truly international forum. Concrete 2017 will focus on the theme **'Advances in Concrete Materials and Structures'** and is dedicated to bringing together global leaders in the concrete industry, covering all aspects of concrete design improvements, research, construction, maintenance and repair of concrete projects. The ICDC will also focus on the progress of concrete durability with respect to materials, modelling, specification, and testing. The wonderful array of key note and invited speakers certainly represent the themes associated with Concrete 2017 and ICDC, and will present on topics that show advances in the field of concrete across these topics. The conference will also offer participants

from around the world the opportunity to connect face to face and share innovative and interesting ideas on valuable research outcomes and latest construction practices with a wide variety of industry experts.

The Chair of the Technical Committee, Mr Tom Benn from the University of South Australia, noted "We were overwhelmed by the number of abstracts we received, both locally and from overseas. We will only accept quality technical papers for the Conference, but the standard has been extremely high and the program will be prepared to ensure that the delegates get to hear from as many authors as possible".

The multidisciplinary theme of Concrete 2017 will provide an excellent forum for networking and education and an opportunity to meet and interact with practitioners, engineers, scientists, researchers, academics, practitioners and professionals, and also to engage with international delegates connected with ICDC and in the durability field. Whether you attend technical sessions, sit in on multiple committee meetings or network with friends and colleagues, this conference will provide you with ample opportunity for professional growth.

The Organising Committee and the Concrete Institute of Australia look forward to meeting you at Concrete 2017 and the 3rd ICDC in Adelaide.



DELEGATE REGISTRATION IS OPEN

Registration for Concrete 2017 and 3rd ICDC is open and can be made via the conference web site www.concrete2017.com.au. Early Bird registration is available but you need to hurry – this closes on 26th June 2017.

There are many categories of registration available, as well as significant discounts for CIA Members. There are also reduced fee options available to Young Industry Professionals, Academics, Retired CIA Members and Students.

Don't miss out - Early Bird Registration Fees close on 26th June 2017.



CONCRETE 2017 KEY NOTE & INVITED SPEAKERS

The 28th Biennial Conference of the Concrete Institute of Australia, Concrete 2017, is to be held in October in Adelaide.

The conference theme **'Advances in Concrete Materials and Structures'** will give concrete researchers, designers, and practitioners from all over the globe an opportunity to showcase innovation and trends in the design, research, construction, maintenance, and repair that are making a difference around the world.

We are fortunate to have some fantastic key note speakers who will provide us with a local and global perspective on how concrete materials and structures are advancing in this day and age.

KEY NOTE SPEAKERS



Louise Adams

Louise is a Chartered Civil Engineer with over 15 years' experience in multi-disciplinary

projects in land development and technical advisory for project planning and is Regional Director for Aurecon in Victoria & South Australia, and Executive Director on the Aurecon Group Board. Prior to her current role, she was the Country Manager for Aurecon in the UAE and was responsible for the operations and performance of Aurecon's Dubai and Abu Dhabi offices.

Louise will open the conference with an industry thought provoking topic - "Disruption and technology - is the consulting/design/construction industry moving forward quickly enough?"



Professor Karen Scrivener

Professor Karen Scrivener is Professor and Head of the Laboratory

of Construction Materials at EPFL, Switzerland, which focuses on the sustainability of building materials. She is also the founder of Nanocem and

Editor in Chief of Cement and Concrete Research

Karen will present a paper titled "Eco-efficient Cements: potential Solutions for a Low CO₂, Eco-efficient Cement Based Materials Industry" which will outline the findings of a specific UNEP Sustainable Building and Climate Program task group established to investigate several innovative approaches to CO₂ mitigation with the expected increase in the demand for cement based materials in the future.



Professor Tim Ibell

Tim Ibell is Professor of Structural Engineering at the University of Bath.

He was the 2015 President of the Institution of Structural Engineers, and he is a Fellow of the Royal Academy of Engineering. He has won six awards for his research into innovative concrete structures.

Tim's plenary presentation will be on "Extraordinary Possibilities for Concrete Structures". An extract from his abstract reads:

"Why do we usually cast wet concrete into rectangular and prismatic moulds? After all, we know that stress resultants vary across structures, so why do we not exploit the mouldability of concrete more profoundly in its design? We can, and we should. Were we to do so, we would place concrete only where we needed it, leading to savings in concrete use and leading to architecturally-beautiful concrete structures. This presentation covers the possibility of using fabric as the formwork for concrete structures, and demonstrates that fabric-formed concrete holds all sorts of opportunities for our built environment."



Professor Doug Hooton

Professor R. Douglas Hooton is NSERC/Cement Association of Canada, Senior

Industrial Research Chair in Concrete Durability and Sustainability in Civil Engineering at the University of Toronto. His research over the last 38 years has focused on durability performance of cementitious materials in concrete as well as on performance testing and specifications. He serves on the ACI Board of Directors and chairs committees at ACI, ASTM, CSA and RILEM.

Doug's key note address will be focused on the physical sulfate attack on concrete and he will also update the delegates on work being undertaken by the American Concrete Institute's 201 Durability committee.



Professor Des Bull and Mr Peter McBean

Des Bull is Technical Director of Holmes Consulting Group LP, Civil and Structural Engineers and the Holcim Adjunct Professor in Concrete Design, Department of



Civil and Natural Resources Engineering, University of Canterbury, New Zealand. He serves on review committees for NZS 3101: Concrete Structures and NZS 1170.5: Earthquake Loads. Des has written or co-written some 150 papers and 8 design guidelines/manuals.

Peter McBean has 30 years' experience as a consulting structural engineer and is Joint Managing Director of Wallbridge & Gilbert. His professional interests are in structural dynamics and earthquake engineering, where he is National Vice President of the Australian Earthquake Engineering Society and member of the Standards Australia Code Committees responsible for AS1170.4 "Earthquake Actions in Australia" and AS3600 "Concrete Structures".

Together Peter and Des will discuss current issues in seismic design drawing on

findings from the Canterbury Earthquakes Royal Commission and research recently conducted in Australia and New Zealand. The talk will highlight a number of seismic design issues in AS3600 and suggest practical strategies for dealing with them, together with improving the overall robustness of our structures. Key differences between wind and earthquake design actions will also be discussed.

INVITED SPEAKERS



Dr Stuart Matthews

Dr Stuart Matthews is Chief Engineer Construction at the Building Research Establishment

(BRE). Stuart is also Convenor of the new *fib* (International Federation of Structural Concrete) *Commission 3: Existing Concrete Structures*, concerned with the operation, inspection, assessment, maintenance,

repair, strengthening, redesign of existing concrete structures. Stuart has a long and distinguished history with *fib* was recently recognised with their 2016 Medal of Merit for his contributions to structural concrete.

Dr Matthews will introduce the durability provision in Model Code 2010 and discuss the foreseen developments for MC2020 in a session on durability provisions in codes. MC2020 will for the first time include provisions for existing structures in a comprehensive way. This will bring repair and restoration design in step with reliability and performance based design concept as included in MC2010. Debate on inclusion in codes of specific features affecting durability will be encouraged.



Mr Mike Schneider

Immediate Past President of the American Concrete Institute (ACI),

Mike Schneider is Senior Vice President and Chief People Officer at Baker Concrete Constructions. With over 30 years' experience in the concrete construction industry Mike is also an active member of the American Society of Concrete Contractors, has served on numerous ACI committees and in 2005 was named as one of the ten most influential people in the concrete industry.

Mike will present on some of the more interesting concrete construction projects that Baker Concrete Constructions has been involved in recently, the challenges they have experienced, and how they have overcome them to construct innovative buildings and infrastructure in the USA.

Concrete 2017

Advances in Concrete Materials and Structures

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SPECIFICATION OF STRUCTURAL CONCRETE

The specification of structural concrete is a vital ingredient in the process of construction to ensure we achieve durable, sustainable, and serviceable infrastructure. However, the Australian heavy construction materials industry is facing a number of technical challenges in maintaining the position of concrete as a material of choice for the construction industry, and this is having an impact at the specification stage.

With increasing pressure and expectation on suppliers, specifiers, and construction companies to complete projects within small time frames and budgets, and without key personnel and resources, it means that specifications are not being developed to allow for continued superior performance of concrete structures. Many specifications are just repeating historic properties and benchmarks with little understanding of their purpose and potential implications. Of more concern is that there are often perverse outcomes arising from this confusion.

At the same time, new and innovative materials are being introduced into the concrete supply chain, which must be shown to perform in a manner that equals or better the existing suite of materials, yet at the same time improve the environmental performance of the project in which it is utilised. In many cases, this can only be ascertained from a performance approach to specification, with appropriate tests and performance specified to ensure desired outcomes and durability in the structure.

Recently the Concrete Institute of Australia ran a series of seminars around the country that attempted to address some of the issues being raised in these areas. To provide a global perspective on concrete specification, the Institute brought Michelle Wilson, Director of Concrete Technology at the Portland Cement Association, USA, to the country to present. With over 20 years of experience relating to concrete materials, specifications, performance, troubleshooting and repair, Michelle was able to offer her vast knowledge in these areas to our

delegates, as well leaning on her role which sees her responsible for the development, content, and delivery of PCA's education and training programs and technical products covering the entire spectrum of concrete technology.

Michelle was supported throughout the seminars by one of Australia's eminent concrete materials experts, and Concrete Institute of Australia Life Member, Dr Daksh Baweja. Together they were able to:

- Review modern approaches to the specification of concrete and its constituent materials.
- Outline the vital properties of concrete, how they are applied, and how this information can form a practical specification for the supply of concrete.
- Compare and critique Australian and USA concrete codes and standards.
- Provide guidelines on specification detail for the inspection and construction of concrete.
- Present real-life problems caused by inadequate design, construction, and maintenance practices, and based on various problems, show delegates how to come up with suitable solutions.
- Look at how durability specification can be considered in conjunction with this, with particular reference to planning and testing.

Feedback from the seminars showed that this type of technical content was much sought after by designers, specifiers and suppliers. It also raised many questions on areas that included time limitations for placement, aggregate gradations, who is responsible for ensuring durability and service life, the impact of imported materials, alkali-silica reaction and delayed ettringite formation research, field cured and lab cured concrete cylinder testing, and the differences between road authority specifications and other specifications.

If you didn't manage to attend one of the seminars, it will be available as an Online Learning Module from the Concrete Institute

of Australia in May. However, there continues to be some work to do to bridge the gap between acceptable and appropriate specification of concrete, and the reason this is important can be summed up by National President, Michael van Koevorden:

"Correct specification of concrete is essential to ensure the right concrete is used in your construction. Have you ever wondered what would happen if the wrong concrete was specified? Legal matters exceeding \$20million AUD have been about just that. Design notes like 'concrete to be N32 to AS1379' may be acceptable in some design elements but what about when your structure has more complex interactions. Designers may not be aware that they can be directly liable for drawing notes that have been used over and over that simply should not apply in some situations. There is also an expectation that professional engineers have a duty of care to ensure their designs can be adequately constructed to their specifications. So instructions must be clear and unambiguous, as 'room to move in a spec. means room to lose in construction.'

It is vital to practicing professional engineers to have up to date and relevant specifications and as you only get one chance to get concrete right, correct specification is essential."





CONCRETE CPD ON-LINE

The Concrete Institute of Australia understands that continued professional development is critical for all engineers in Australia, and also understands the importance of an online learning platform being available to those who cannot commit to full day seminars.

The Institute has developed an On-Line Learning Portal for those who want to fulfil their CPD requirements either at their desk or at home with a series of concrete related Learning Modules (LM). The LM's are web based seminars or workshops, delivered by industry experts, featuring popular concrete topics and recorded to be made available for on-demand viewing. Two of these are quite topical at present with the extreme weather and physical activities taking place in our region.

DESIGNING CONCRETE STRUCTURES FOR EXTREME EVENTS

With the recent extreme weather conditions experienced in Northern Queensland, along with other parts of the east coast, design and construction of resilient structures to keep the community safe and protected has again come to the forefront.

More than ever in Australia today there are any number of events that can lead to sudden or progressive failure of concrete structures. Earthquake, bushfire, and cyclone are just a few examples of the extreme conditions faced in this country. As such designers are expected to deliver concrete structures to meet these extremities and reduce the risk of sudden or progressive failure as a consequence.

Structural robustness has been defined as the ability of a structure to withstand events like fire, explosions, impact or the consequences of human error, without being damaged to an extent disproportionate to the original cause. Designing for structural robust concrete structures is an approach

that focuses on the overall behaviour of structures, rather than the behaviour of individual components. The intention is to provide structures with the ability to have the maximum resistance to collapse under extreme loads, without an excessive increase in the cost of design or construction.

This learning module brings together two of Australia's leading experts in the design and understanding of robust concrete structures – Professor Stephen Foster (UNSW) who looks at design for robust structures in accordance to AS 3600 and Professor Jose Torero (UQ) who considers the impact of fire on concrete, how to behave, predicting structural failure, and designing for fire safe structures.

For more details go to: <http://www.concreteinstitute.com.au/Online-Learning-Portal/LearningModule-List/Designing-Robust-Concrete-Structures>

SEISMIC DESIGN AND DETAILING

While there is a statutory requirement under the National Construction Code (NCC) to design and detail the majority of buildings in Australia for earthquake loading, the seismic performance and design of reinforced concrete buildings is an area that is generally not understood well by structural engineers in Australia. Combined with conflicts between the concrete structures and earthquake loading Standards, and the reinforcement detailing requirements within the Standard often being difficult to interpret and apply with confidence, there is a need for further training in this important area.

To address the need for education in this often overlooked area, the Steel Reinforcement Institute of Australia (SRIA) published a document titled - Guide to Seismic Design and Detailing of Reinforced Concrete Buildings in Australia.

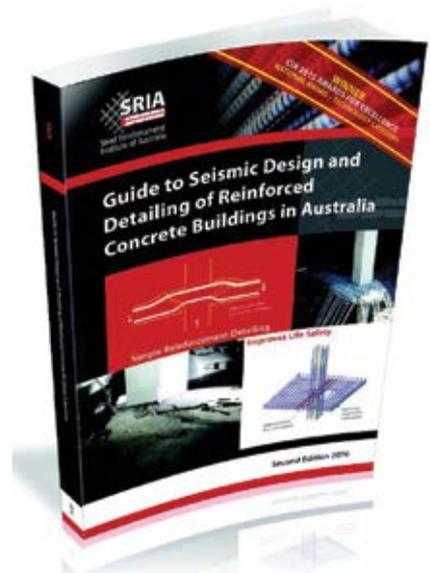
This Learning Module (LM) includes a number of Australia's experts in earthquake

and seismic design such as:

- Dr. Paul Somerville – AECOM, Risk Frontiers and President of AEES
- Mr. Peter McBean – Joint Managing Director, Wallbridge Gilbert and Aztec, Vice President of AEES
- Mr. John Woodside – Principal, J Woodside Consulting
- Mr. Eric Lume – National Engineer, SRIA
- Dr. Helen Goldsworthy – Associate Professor, School of Engineering, University of Melbourne

This LM addresses a wide range of topics that deal with some of the most common issues faced when designing and detailing buildings for earthquake loading, from the seismic hazard in Australia and how earthquakes impact buildings (including the valuable lessons learnt from past earthquakes and current research), to design recommendations that can be taken to ensure that reinforced concrete buildings provide the important life safety in these extreme events.

For more details go to: <http://www.concreteinstitute.com.au/Online-Learning-Portal/LearningModule-List/Seismic-Design-Detailing>



3RD ICDC



INTERNATIONAL CONGRESS on DURABILITY of CONCRETE

Concrete 2017 is also hosting the 3rd ICDC (International Congress on Durability of Concrete) from 22nd to 25th October 2017

The 3rd ICDC is jointly organised by the Norwegian Concrete Association and the Concrete Institute of Australia. The ICDC durability streams will be held over the entire 3 days and delegates will be able to attend sessions in ICDC and Concrete 2017 as well as attend social events for both events.

The International Congress on Durability of Concrete (ICDC) series is built on the heritage of the former CANMET/ACI Conferences on durability of concrete and Mohan Malhotra is the Honorary Chair of this series. The 1st ICDC

was held in Trondheim, Norway, in 2012, and the 2nd ICDC was held in New Delhi, India, in 2014. ICDC serves as a forum for exchanging current research results and for displaying how concrete will continue to ensure durable buildings and structures for sustainable development in both local and global contexts.

The 3rd ICDC is a great chance for participants from around the world to connect face to face and to share information and experiences related to advances in concrete durability. Congress themes include:

- Durability design
- Durability planning
- Exposure assessment
- Deterioration mechanisms

- Good practice
- Modelling of deterioration processes
- Performance of existing structures
- Concrete penetrability
- Cracking and crack control
- Maturity and matched curing
- Sampling and laboratory tests
- In service inspection and testing
- Structure health monitoring
- Concrete repair
- Cathodic protection
- Quality assurance.

This will be the biggest congregation of worldwide concrete durability experts ever to come to Australia, and ICDC Chair, Mr Rodney Paull (Chair, CIA Durability Committee) invites you to be in Adelaide in October to take part in the congress.



The Bracing Experts






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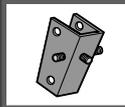
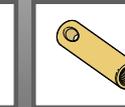
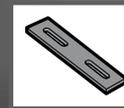
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SUSTAINING THE WAY

SARAH BACHMANN, CEO, NATIONAL PRECAST



Sarah Bachmann,
CEO, National Precast

I came across an article recently about the development of an exclusive resort in Canada – Scenic Trails. While I’ve written many pieces over the years about why precast concrete is a superior method of construction when it comes to sustainability, that particular article hit the nail on the head. It articulated well why, in this case, precast was the material of choice for its construction.

STARWARD PICKS PRECAST

Developer Starward Homes evaluated all materials’ options and wanted to deliver a structure that would require minimal maintenance over its life, be fire resistant, and which would not emit harmful chemical emissions or VOCs over its life. Durability was high on the agenda as well, for the executive condominium.

The Starward experience isn’t foreign to our shores. A myriad of structures have been built here using precast concrete for similar reasons. Indeed, many have contributed to achieving five or six Green Star ratings.

We all know that sustainability is about three pillars – the economy, people and the environment. For structures to be sustainable, they need to stand the test of time. If they don’t, the fallout is real, having a costly impact on all three of those ‘pillars’. Essential services are disrupted, maintenance costs blow out and operational costs are prohibitive. Communities and the environment suffer the consequences.

CARBON EMISSIONS: THE WHOLE STORY

While concrete has been criticised for the carbon that is produced during the cement manufacturing process, something has to be said about the relevance of the whole of life approach. It has been well documented that most of a building’s carbon emissions are actually emitted over its life; as opposed to that which is emitted during the manufacturing and construction process.

The sustainability of a structure is not – and should not be - just about its construction at a point in time, made up only of a sum of the parts required to build it. The sustainability of a structure is about what happens from when a structure is first conceived to when it is finally decommissioned. In the case of a precast structure, there are benefits over the whole of the structure’s life that must be factored in to the sustainability equation.

Carbon may well be emitted when cement is produced, but specifically on this topic, there are some significant offsets offered by precast.

“It has been well documented that most of a building's carbon emissions are actually emitted over its life; as opposed to that which is emitted during the manufacturing and construction process”

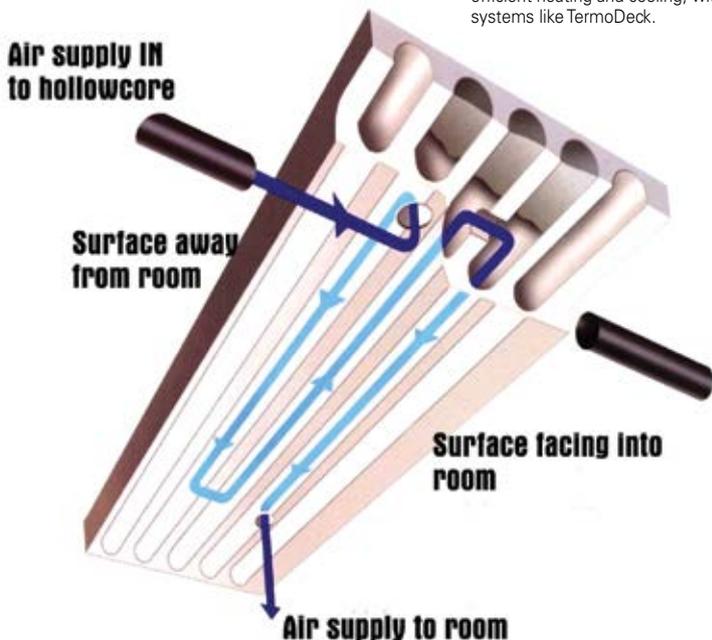
Sustainable principles and passive solar design have been incorporated into Sydney’s University of New South Wales Village. The structure features insulated sandwich panels and hollowcore flooring, where cores are used for ventilation.
Photographer: John Gollings.



The solid, high thermal mass afforded by precast buildings, means that when well designed, their ‘thermal mass benefit’ reduces the need for insulation and likewise, reduces the amount of energy needed for heating and cooling.

Insulated sandwich wall panels are a brilliant solution here, where the insulated thicker concrete layer is on the inside of the building to deliver superior R-values, but is protected externally by an external thinner concrete layer. That thermal mass benefit can be taken one step further when it is incorporated into hollowcore flooring, where the cores through the planks are used to ventilate and deliver energy efficient heating and cooling. Speaking of precast flooring; the clever designs that are available incorporate voids which offer a ‘dematerialisation’ benefit. That means up to 30 percent less concrete is used in a suspended floor when compared to an insitu floor, and that has to be a win for the environment.

Hollowcore’s clever design delivers not only a dematerialisation benefit but also can be used for energy efficient heating and cooling, with systems like TermoDeck.



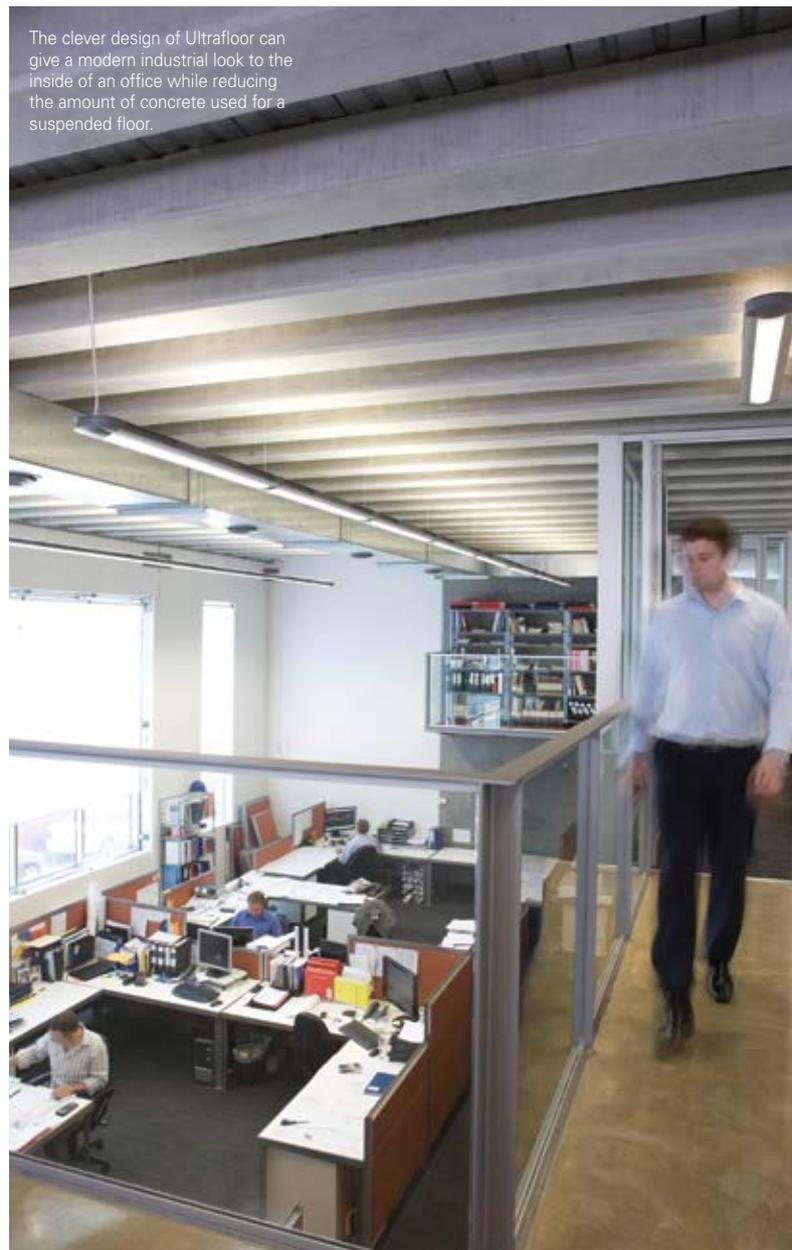
Precast buildings are comfortable to live in and need almost no maintenance. Plus, an added bonus is that over their lives, concrete structures reabsorb up to 40 percent of the carbon that is produced during the cement manufacturing process.

OTHER BENEFITS

There are other spin-offs too that tick all three economy, people and environment boxes over a precast concrete structure’s life.

Locally made, specifying precast supports our local manufacturing industry and maximises construction productivity. Construction is much faster and construction sites much safer. Waste is reduced, recycled products are used in mixes, moulds are reused. Importantly, precast structures require no chemical treatment to protect against water, termites, fire and flood. Even better, structures have long lives and they don’t emit toxic fumes when exposed to extreme heat.

Of course, materials’ selection is a case of horses for courses, and different applications will require different materials. But to me, precast’s track record, combined with the vast benefits it offers, makes the choice a no-brainer.



The clever design of Ultrafloor can give a modern industrial look to the inside of an office while reducing the amount of concrete used for a suspended floor.

“Locally made, specifying precast supports our local manufacturing industry and maximises construction productivity. Construction is much faster and construction sites much safer. Waste is reduced, recycled products are used in mixes, moulds are reused.”



NO ORDINARY SYDNEY BRIDGE

PROJECT: Camden Valley Way Bridge

LOCATION: Narellan, NSW

PRECASTER: Waeger Precast

BUILDER: Mainbrace Constructions, Waeger Constructions

CLIENT: Dart West Developments

ARCHITECT: Buchan Group

ENGINEER: Bridge Design

As well as linking the old and new sections of Narellan Town Centre shopping centre, a new precast concrete skybridge over the busy Camden Valley Way will also add up to 100 new shops for local shoppers and take pedestrian traffic off the busy roadway.

Joining two sections of shopping centre across a main arterial road without too much disruption to busy commuters and shoppers was never going to be easy, but precast has proved the answer. NSW construction company Waeger Constructions was contracted by Mainbrace Constructions to design and construct the bridge. While abutments were poured insitu, the precast division of Waeger Constructions, National Precast member Waeger Precast, manufactured the project's bridge beams and other miscellaneous precast elements for the project.

MINIMAL IMPACT ON TRAFFIC AND SHOPPERS

According to the company's Managing Director Michael Waeger, it was critical that construction worked around traffic on Camden Valley Way and shoppers, with minimal impact on the Centre's trading hours. "Working adjacent to a major arterial road necessitated night closures to install the bridge beams. Added to that was restricted site access with the shopping centre at either end of the bridge, and the north side of the centre opening to customers part-way through construction. We worked around it though," he explained.

The project necessitated both precast and insitu concrete. "Because of all the benefits of offsite prefabrication, we generally do as much precast as we can, but given the sheer scale of the roadside abutments for this project, they had to be poured in-situ. In fact, at almost 800 cubic metres each, the pour was the biggest in our company's history," he commented. The abutments have been post-tensioned and cantilevered to support the precast beams for the bridge deck.

GEOMETRIC DESIGN POSSIBLE WITH PRECAST

According to architect Buchan Group's principal Anthony Palma, the project pushes design to the limit. "Externally the bridge and its two entry lobbies and sweeping green form of the facade will create a gateway landmark which embraces a restaurant precinct and civic plaza which we envision to become the new heart of the Narellan community."

Mr Waeger said the geometry of the bridge added to the project's design complexity. "One side of the bridge is straight but runs at an angle across the road, while the other side of the bridge is curved. That integrated well with the architectural design of the building", he said.

The precast bridge deck consisted of 23 pre-stressed concrete beams up to 27-metres long and weighing 32 tonnes each. Due to the geometry of the design, they have been laid in a splayed fashion between in-fill precast panels.

BESPOKE SHALLOW BEAMS GIVE ROAD CLEARANCE

A key issue for the client was also the finished levels of the whole project. It was critical to have the appropriate clearance over the road, but the bridge also needed flush levels above. Mr Waeger said his team came up with a clever solution. "We were able to design and construct the beams to be as shallow as possible, effectively tailor-making the precast to suit the requirements of the job," he explained. For this type of bridge span, the precast beams would typically be about 1200mm deep, but in this case they were designed and manufactured at 900mm deep.

OPEN FOR BUSINESS

"Looking back at the project and what we achieved, it was very challenging. The team at Waeger was glad to build it, and it's very satisfying given all the requirements". The retail bridge is due for opening in August, 2017.



BUILDING A SUSTAINABLE AUSTRALIA



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Sustainability Benefits for the Environment, Society & Economy**

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- Uses recycled aggregate, water etc
- Uses less concrete
- Reuses moulds
- Locally transported
- Minimises on-site waste
- No chemical treatment
- No fumes emitted
- High thermal mass saves energy
- Absorbs CO₂

SOCIETY

- Safer construction sites
- Less disruption to surrounds
- High quality
- Fire, termite, flood safe
- Long lasting
- Strong and durable
- Maintenance free
- Thermally efficient
- Low energy costs
- Adaptable structures

ECONOMY

- Locally manufactured
- Supports Australian manufacturing
- Maximises construction efficiency
- Cost savings from fast construction
- Low on-site labour costs
- Low on-site waste costs
- Low operational costs
- Low maintenance costs
- Long-lasting structures
- Reuseable structures



STRIKING BOUTIQUE INNER CITY LIVING

PROJECT: The Alex apartments

LOCATION: Alexandria, NSW

PRECASTER: Hanson Precast

BUILDER: Newtown Constructions

ARCHITECT: Project Services

ENGINEER: LMW Design Group

Stylish. Edgy. Unique. That's how The Alex residential apartments are being described. The premium development offers boutique living over five levels in the inner Sydney suburb of Alexandria. With its striking geometric façade design, the building's street view is bold and contemporary - and constructed using precast concrete.

3D PRECAST SOLUTION

With the architect intent on using precast concrete, Sydney-based precast manufacturer and National Precast member Hanson Precast was approached at the outset by the architect to explore what could be achieved.

According to Hanson's Project Engineer Robert Aldrich, while the geometry of the design was complex, the precaster identified a relatively simple solution and was awarded the contract to manufacture 240 panels, each of which had a 3D panel profile.

Senior Drafter with Hanson, Ben Peers, played a critical role in designing the panels. His team used 3D software and models to develop the precast solution. "The 3D drafting process is critical for a project of this nature. Being able to model a structure in three dimensions allows us to almost 'pre-build' the building, iron out any problems at the outset, and from that, identify the optimal mould design," said Mr Peers.

The design of the three-dimensional panels that make up the building's geometrical façade posed a challenge in that three of the four panel corners are not at right angles.

CLEVER PLANNING MINIMISES MOULD COSTS

Mr Aldrich explains that while the geometry of The Alex looks complicated, in fact it was quite simple. "The secret was in developing the façade layout so identical panels could be placed at various locations on each elevation thus reducing the number of panel types required". The company's in-house mould-makers were then able to design three versatile moulds to manufacture all the panels. "Shutters were designed to enable the myriad of different combinations of sloped and straight edges, toothed panels and different panel sizes to be accommodated. Smart planning and our mould fabrication skills allowed us to minimise the mould costs for the project," he says.

PAINTED OFF-FORM PANELS FORM WINDOW OPENINGS

Each of the 240 panels had a Class 2 off form finish that was painted with a low-build white paint to achieve a crisp aesthetic. Another aspect was the load bearing design of the panels with each having a positive connection with the suspended concrete floor at each level. When installed, the panels stack on top of one another in a clever design that forms the window openings.

DELIVERY ENABLES FAST ERECTION

A tower crane was selected because of the construction restriction of the tight inner city site. Special transport frames were designed to accommodate all of the unusual shapes so the panels were delivered in their as-installed orientation. This saved significant time on site as the panels didn't require offloading or turning during the erection process.

EARLY ENGAGEMENT GIVES OUTSTANDING RESULT

According to Mr Aldrich, The Alex demonstrates how smoothly a project can run when a team approach is taken. "This project is a great example of when the architect and precaster work together from early on, to plan and innovate for an excellent result. What we've ended up with is a very impressive building".



SCHOOL FOR THE FUTURE

PROJECT: Bellevue Hill Public School

PROJECT VALUE: \$12 million

PRECASTER: Precast Concrete Products

BUILDER: Richard Crookes Constructions

ARCHITECT: Group GSA Architects

ENGINEER: Northrop Sydney

A school should inspire, excite and encourage learning. That's exactly what a new four-storey precast building at Sydney's Bellevue Hill Public School will do as it doubles the school's capacity.

COLOUR CONSISTENCY CRITICAL

According to Colin Ginger, Manager of Precast Concrete Products, "Achieving a high quality off-white finish takes significant expertise and experience to achieve colour consistency. It's a complicated process that really demonstrates the skill of a good architectural precaster". With



a visually stunning façade, the result is modern, stylish and eye-catching.

PRECASTER INITIATIVE REDUCES PROJECT COST

The 'window' wall panels were converted from their original single-storey height to double-storey, which reduced the number of panels and installation time. The larger wall panels were originally designed to be erected as cladding but were changed to be structural wall panels, which saved formwork on site.

TRANSPORTED FROM BRISBANE TO SYDNEY

As often happens, precast concrete elements can easily be transported around the country to meet

market needs. In this case, the booming Sydney market created an opportunity for Brisbane-based Precast Concrete Products to manufacture, supply and transport panels to Sydney. After their journey of almost 1000 kilometres, the panels were delivered to site two at a time on special transport frames.

TECH SPECS:

Products supplied: 36 architectural 'window' wall panels, 16 architectural wall panels
Finishes: Off-white off-form
Design: Single storey panels converted to double storey panels; cladding panels converted to loadbearing panels.



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QUICK & SIMPLE INSTALLATION

NONDRILL is extremely quick and easy to install and doesn't require any specialist tools. Indeed, hand tightening the posts is sufficient for most temporary handrails.



1 Unscrew the clutch approximately 120mm



2 Hold the post at an angle to connect the clutch to the lifting anchor



3 Move the post to the upright position



4 Tighten the post by turning clockwise



NONDRILL
Pty Ltd

FAST AND EFFICIENT HANDRAIL SYSTEM FOR PRECAST CONCRETE STRUCTURES

Lauded by engineers, contractors and construction workers alike, the innovative new NONDRILL system significantly reduces the time and effort required to install handrails, chain-wire fencing and 'gawk' screens along precast concrete structures.

Developed and manufactured in Australia, NONDRILL's Patent Pending design utilises precast 2.5 or 5 tonne lifting anchors to provide a safe and secure fixing point for the fence posts.

Suitable for both temporary and permanent installations, NONDRILL is extremely quick and easy to install and can be used on:

- RE Walls
- Culvert Cells

- Precast Concrete Bridge Decks
 - Concrete Jersey-style Barrier Units
- In fact, the NONDRILL system is suitable for use with any concrete precast concrete component with appropriately positioned 2.5 or 5 tonne lifting anchors.

NONDRILL eliminates the need to drill into the concrete to secure posts. This not only reduces the risk of damaging the precast component during the drilling and installation process, it also avoids the problems associated with accidentally exposing and/or damaging the reinforcing steel, which can be a major contributing factor in the development of corrosion - commonly referred to as 'Concrete Cancer'.



HELPING THE NEXT GENERATION TO JOIN THE WORKFORCE

NONDRILL Pty Ltd also donates part-profits from the sale of the NONDRILL system to help support *Productivity Bootcamp*.

Productivity Bootcamp is an intensive 8-week training program that helps to prepare young people for the workforce - providing them with the foundation skills they need to become productive employees in the infrastructure and construction industries. These include skills in formwork, steel, concrete and general groundworks.

Although this program is based around infrastructure and construction, the course incorporates valuable skills training to improve labour productivity across all industries, with training modules covering safety, injury prevention, attitude, work ethic, communication skills, dealing with different personalities, punctuality and even nutrition.

For further information, please visit: www.productivitybootcamp.com.au



Together with the standard NONDRILL posts, the system is also available with dropdown posts, which allow for easy adjustment of the handrails as backfilling progresses. NONDRILL can also provide 6.5m length handrail tubes, wedge joiners and scaffold clips.

Once the posts have been installed, it's simply a matter of attaching the post rails, fencing mesh or screen hoardings. NONDRILL

posts are also available with optional stickers with markings at 450mm and 900mm for placing handrails.

NONDRILL anchor supports can also be used for the installation of 'Gawk' panels on Jersey barriers, and have been engineered to secure panels up to 3m in height in windy conditions.

For further information on the NONDRILL system, including a video showing NONDRILL in action, please visit: www.nondrill.com.au

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Come see us at
the Diesel, Dirt & Turf
Penrith Panthers, NSW
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NSW GOVERNMENT EMBRACES POCKET SALLY

Pocket Sally is a young lady with a growing reputation in the engineering and construction business. She has important friends, and gets around!

Pocket Sally represents a commitment by the infrastructure and engineering industries in New South Wales to encourage young women and men to consider taking up engineering as a career, regardless of ethnicity, gender, religion or whether they are city or country dwellers.

Because Pocket Sally won a *2016 NSW Minister's Award for Women in Local Government*, her co-creator, John Roydhouse, was invited to share the Sally story at the 2017 Awards held in March as an *International Women's Day* event at the NSW Parliament House.

Mr Roydhouse, the Chief Executive of the Institute of Public Works Engineering Australasia - NSW division (IPWEA-NSW) said that two years ago the Institute's all-male Board decided to embrace diversity and expand engineering out from its traditional white male background, and Pocket Sally was born.



IPWEA-NSW CEO John Roydhouse with Pocket Sally and Petrina Nelson from the City of Canada Bay.



IPWEA NSW CEO, John Roydhouse, with NSW Minister for Women, The Hon Tanya Davies MP, Pocket Sally, and NSW Minister for Local Government, The Hon Gabrielle Upton MP, at the 2017 Ministers' Awards for Women in Local Government.

This followed on from the successful initiative of creating an under-35 year age group networking body called, *Young IPWEA*, to develop the next generation of leaders in the rapidly changing engineering sector. Members of the Young IPWEA Executive were involved in devising in Pocket Sally project.

Mr Roydhouse said the Board was also concerned at the time that women accounted for just 11% of the total construction workforce and a departure rate of women from the industry was almost 40 per cent higher than men.

Since then the IPWEA-NSW has recorded some milestones, notably:

- Nicola Daaboul becoming the first female chair of the Young IPWEA
- The IPWEA's Asset Management Panel in 2016 comprising of four women and three men.
- Petrina Nelson, City of Canada Bay Council who was the 2017 winner in the "Non-Senior Staff Member – Metropolitan Council" section in the Minister's Awards is a member of Young IPWEA and last year was a nominee for the internal IPWEA Excellence Awards.

In addition, Melinda Pavey has been appointed as the first female NSW Minister for Roads.

Mr Roydhouse was accompanied to the 2017 Women in Local Government Awards presentation by engineer, Julie Garland-McLellan who was dressed as Pocket Sally in a high-visibility vest and safety helmet.

"Julie is an example of what engineering careers can offer to woman, having started her career in the United Kingdom and worked in several countries in different fields before moving to Australia," Mr Roydhouse said.

Mr Roydhouse usually carries with him a small cardboard cut-out of Pocket Sally.

Pocket Sally is an excellent conversation starter which ensures the issues of diversity in engineering is raised and discussed. She has been photographed with some of the most senior parliamentarians in the country including current NSW Premier, Gladys Berejiklian, and former Premier Mike Baird. When she met Foreign Minister Julie Bishop, the conversation quickly revolved around the need for better international airport infrastructure!

"Recently, Pocket Sally helped Deputy Prime Minister Barnaby Joyce open a bridge at Tenterfield."

"At the 2017 Ministers' Awards for Women in Local Government IPWEA, Pocket Sally expanded her parliamentary contact list being photographed with the NSW Minister for Local Government, Gabrielle Upton MP and the Minister for Women, Tanya Davies MP.



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THE IPWEA NSW REGIONAL FORUMS

IPWEA NSW have travelled all over New South Wales for 5 weeks producing extensive one day conference programs and delivering them to public works practitioners and industry experts on key topics including road repairs, water solutions, innovation and more.

It was a full day, with presentations from Boral who discussed how sustainable and effective products can be provided to the benefit of local government, community and stakeholders. The presentation highlighted work on solutions that help ensure pavement materials, bituminous surfacing and asphalt mixes are designed using best and current practices, and as a result, deliver the best value,

There were also presentations from Roads & Maritime Services, Local Government Procurement, Slashertek and Roads & Transport directorate.

Pinpoint also gave a great presentation, sharing views of Telematics Technology and common use cases including; Field worker safety, improving customer service and proof of service, measuring fleet utilisation and productivity.

The IPWEA NSW team travelled as far north as Yamba, as far south as Thredbo and as far west as Bourke where they were shown a great deal of appreciation and hospitality from the locals and Council, who provided IPWEA NSW Staff and Sponsors with a Bourke River Cruise which was a great success and thoroughly enjoyed by everyone. They took 3 flights and have driven around 4,500 kilometres to bring the Regional Forums to each corner of New South Wales.

As well as attracting a large number of delegates and sponsors, the forums were also attended by Members of Parliament from across NSW. The Hon Melinda Pavey MP, NSW Minister for Roads, Maritime and Freight, gave the Opening Address at the Mid North Coast Regional Forum held in South West Rocks. A number of Mayors also attended the forums, including Mayor of Thredbo, Cr Neville Kschenka.

The opening address at IPWEA NSW Regional Forum at Genia McCaffery Centre for Sustainability in North Sydney on Monday 3rd April 2017 was presented by the newly appointed NSW Minister for Local Government, The Hon Gabrielle Upton MP.

Mr John Roydhouse, IPWEA NSW CEO, said it was encouraging to see the Minister supporting a not-for-profit association like IPWEA NSW, whose mission is to enhance public works excellence, particularly in New South Wales.

"It's great to have the Minister for Local Government attend our Regional Forum in North Sydney and address the members of IPWEA NSW," Mr Roydhouse said.

"I am fortunate in my position to travel right across the state and see the excellent work that our members undertake to drive change and deliver better outcomes to NSW communities."

"The Minister's presence at the forum shows the commitment from State Government in recognising the achievements of local councils in making a real difference to the lives of NSW communities," he said.

The Forums were also very well received by IPWEA NSW members across the state - a sentiment that was perhaps best put by IPWEA NSW member, Mr Murray Thompson, who congratulated IPWEA NSW on its efforts.

"IPWEA should be congratulated for continuing to take the effort to travel around and engage with its regional members," Mr Thompson said. "The Regional Forum format is excellent and the IPWEA NSW does this extremely well," he added.



TOP: John Roydhouse IPWEA NSW CEO, with Janina Bramm IPWEA NSW Events Coordinator and Mick Savage, Manager for Roads and Transport Directorate.

CENTRE: NSW Minister for Local Government, The Hon Gabrielle Upton MP

BOTTOM: The Regional Forums covered a range of key topics including road repairs, water solutions, innovation and more.



EMERGING TECHNOLOGIES IN PUBLIC INFRASTRUCTURE CONFERENCE

IPWEA (NSW) is proud to announce and launch its inaugural *Emerging Technologies in Public Infrastructure Conference* taking place on 15-16 June 2017 at the Doltone House Jones Bay Wharf in Sydney.

The conference will bring together national and local thought leaders across government, private sectors and suppliers to discuss how to build stronger public infrastructure solutions through emerging technologies.

Don't miss out on 12 practical case studies and insights to effectively plan the road to a smart city, IoT and data analytics, practical applications of drones and UAVs, virtual and augmented reality best practices and future directions of automated vehicles and connected transport.

Delivering new and existing national infrastructure is always a challenge and we look forward to welcoming you to the conference in June to ensure we meet Australia's future public infrastructure needs.

For further information or to register, please visit:
www.publicinfrastructure.com.au

LOCAL ROADS CONGRESS 2017

The *Local Roads Congress* presented by the IPWEA NSW Roads & Transport Directorate is taking place in Parliament House in Sydney again this year sponsored by Mr John Sidoti MP.

The theme is '*Making our Roads Work*' and the date is Monday 5th June 2017.

It is a full day event covering relevant topics, a panel session, adoption of congress communiqué and concludes with a formal dinner allowing for networking.

Invited speakers include: The Minister for Roads and Maritime, the Hon Melinda Pavey, The Minister for Local Government, the Hon Gabrielle Upton; Mr Keith Rhoades, President of Local Government NSW; and Mr Ken Kanofski, Chief Executive, Roads & Maritime Services.

The Panel session on 'Management of Risk' consists of Councillors, CEO's, NSW Highway Patrol, Solicitors and more.

For further information, please visit: www.ipwea.org/nsw



CIVENEX 2017 EVENT POSTPONED

The CIVENEX 2017 public works and construction trade fair event due to be held at the Hawkesbury Showground on May 17-18 has been postponed due to a lower than expected take-up response by exhibitors this year.

Given the response rate, the event organisers Institute of Public Works Engineering Australasia (IPWEA NSW) have acted as quickly as possible to avoid any unnecessary impacts and costs on exhibitors, suppliers and patrons.

John Roydhouse IPWEA (NSW) CEO said that while CIVENEX has been a cornerstone event in the infrastructure industry for 60 years, IPWEA (NSW) had taken a firm decision to postpone the event and offer a full refund for any exhibition space bookings for the 2017 event.

"We are proud of the CIVENEX brand and the outcomes it has delivered for the thousands of exhibitors and purchasers who have attended the event during those 60 years" he said.

"CIVENEX has been the leading trade show event for new and innovative solutions for infrastructure machinery for both government and private contractors, and as a result we have built close relationships with exhibitors, suppliers and purchasers.

"To avoid unnecessary impacts on those people and firms, postponing this year's event was a decision that was not taken lightly but is the right thing to do.

"In the coming months, we'll be talking to suppliers and exhibitors across the country about the future direction of the trade show given there is still a strong demand in the works and infrastructure space for new equipment.

"However, we do recognise that procurement processes by government have evolved in recent times, some local councils have merged and for some suppliers marketing priorities have changed.

"Ideally, we would like to see the CIVENEX event continue in the future in a revised format, which better suits the market's procurement needs.

IPWEA (NSW) wish to thank the Industry for their understanding and will offer a full refund for any exhibition space bookings. The institute will contact all exhibitors to facilitate the necessary arrangements promptly.

In the meantime, IPWEA (NSW) will continue to manage and produce professional development courses, regional forums, state conferences, excellence awards and cutting edge conferences to educate and inform the infrastructure industry.

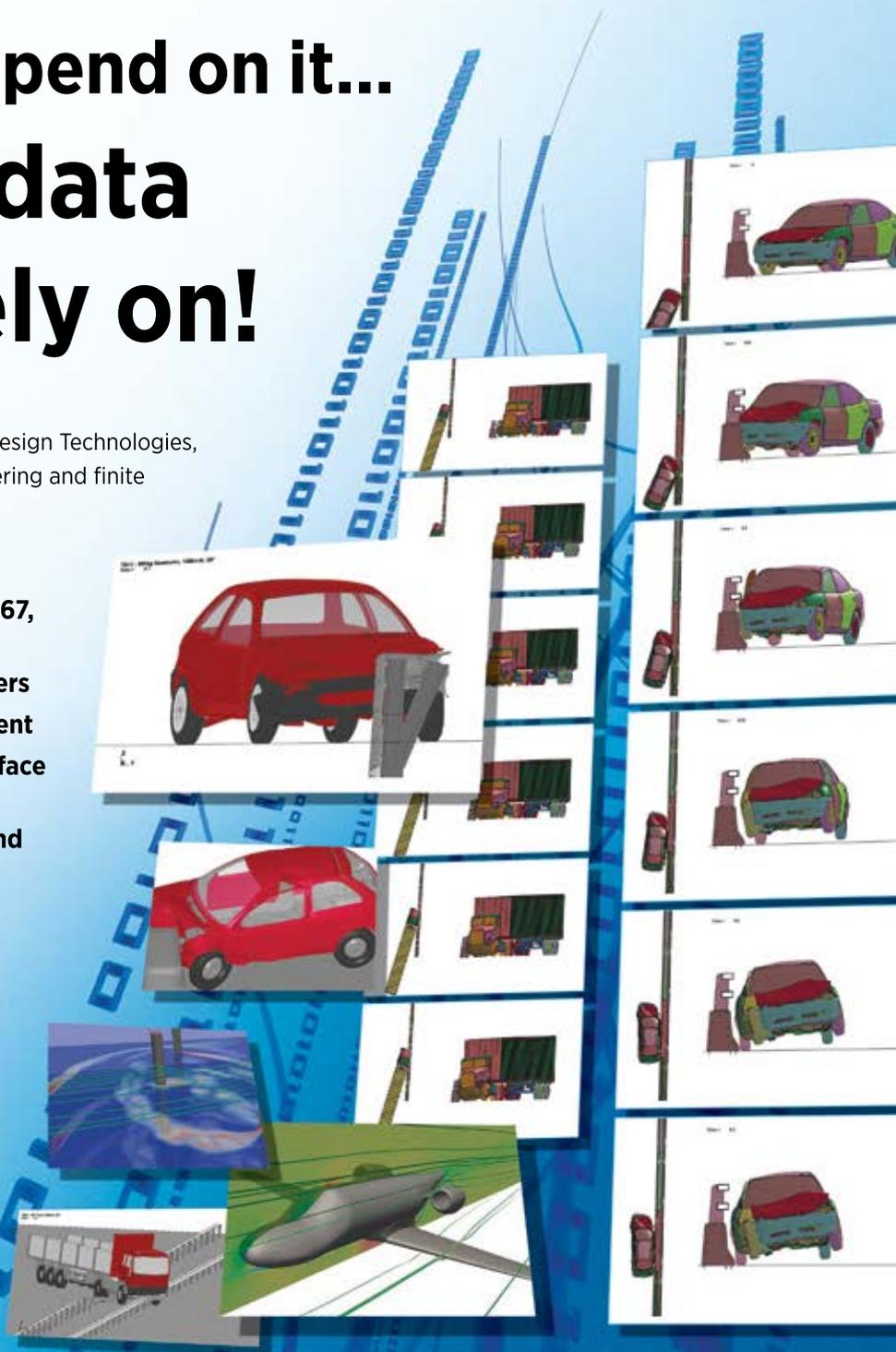


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Melbourne will be playing host to the ACA Brian Cherry International Concrete Symposium on 26-27 July.



MELBOURNE TO HOST INTERNATIONAL CONCRETE SYMPOSIUM IN JULY

Corrosion affects all concrete buildings and structures around the world and they deteriorate at varying rates over time, depending on the material used, the types of corrosive agents in the environment and the physical processes and mechanisms involved. Globally, the estimated annual cost of concrete corrosion to industry is billions of dollars.

It is important that owners of high-value assets understand the cost implications of ignoring the effects of corrosion on concrete buildings and structures. Organisations require effectively trained staff who have an understanding of the numerous types of corrosion that affect their industry and of the preventative and remediation technology available. Two of the main advantages of planning for corrosion control are that the life of an asset is extended and maintenance time and costs are reduced.

The Australasian Corrosion Association (ACA) works with industry and academia to research all aspects of corrosion in order to provide an extensive knowledge base that supports best practice in corrosion management, thereby ensuring all impacts of corrosion are responsibly managed, the environment is protected, public safety enhanced and economies improved.

As part of its charter, the ACA presents a continual program of technical seminars and training courses each year. In July, the ACA will be presenting the *Brian Cherry International Concrete Symposium* at the Marriott Hotel in Melbourne. The two-day event on 26-27 July will highlight and pay tribute to the work of a tireless and well respected researcher and educator in the field of concrete corrosion.

If Percival Faraday (P F) Thompson is considered 'the Grandfather' of corrosion

science and engineering in Australia, then Professor Brian Cherry of Monash University can be considered 'the Father'. Prof. Cherry has made significant contributions to the areas of: reinforcement corrosion in concrete; condition assessment; modelling & deterioration prediction; concrete repair & protection; cathodic protection, and concrete durability.

Prof. Cherry has not just been at the forefront of academic developments, educating many of the leading corrosion science and engineering practitioners, but has been a regular contributor to the wider profession through presentations at conferences, seminars and symposia around the world.

The symposium will feature 11 prominent Australian and international speakers from countries including New Zealand, the USA, Spain and the UK. These international speakers are the best in the world on reinforced concrete corrosion, protection, repair and durability and will publish high

quality technical papers to form a hard-copy take away book for delegates. At the end of each day there will be a panel discussion and open forum where delegates will be able to take part in spirited debates on the topics of the day and other corrosion related subjects. There will also be small number of trade exhibitors at the event displaying some of the latest tools in the field of corrosion management. Networking drinks will be held at the end of each day, with a further highlight being the Symposium Dinner on the Wednesday evening.

ACA technical events have earned a reputation for providing a valuable learning experience together with great networking opportunities with other like-minded companies to discuss technical issues with the prospect of positive solutions. The Brian Cherry International Concrete Symposium is one not to be missed.

Places are still available for the symposium and bookings can be made via the ACA website at www.corrosion.com.au/events. The full program will be made available through the web site.

The ACA is a not-for-profit, membership Association which provides training, seminars, conferences, publications and other activities to disseminate information about corrosion and its prevention or control.



ACA training seminar.



Warren Green of Vinsi Partners, the driving force behind the symposium.

Brian Cherry

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TECHNICAL PROGRAM & REGISTRATION INFORMATION

OVERVIEW OF EVENT

The Australasian Corrosion Association (ACA) is holding an International Symposium to highlight the achievements of Brian Cherry in the areas of:

- reinforcement corrosion in concrete
- condition assessment
- modelling & deterioration prediction
- concrete repair & protection
- cathodic protection
- concrete durability options

If Percival Faraday (P F) Thompson is considered 'the Grandfather' of corrosion science and engineering in Australia, then Professor Brian Cherry of Monash University can be considered 'the Father'.

Brian has not just educated in the tertiary space many of the leading corrosion science and engineering practitioners, but he has also educated others in the profession at conferences, seminars and symposia. It is not just his educating abilities that we should be thankful for, but also his research and investigative works in various fields of corrosion science and engineering.

One of the fields that Brian has educated, researched and investigated over many decades is 'Reinforced Concrete Corrosion, Protection, Repair & Durability'.

High calibre International and Australian speakers will present a keynote of 45 minutes duration. A panel discussion and open forum will be held at the end of each day. Technical papers of high quality and of substantive length will form a hard-copy book for delegates.

PROGRAM DAY 1

| Time | Session | Speaker |
|---|---|---|
| 8:20 – 8:50 | Registration Day 1 | |
| 8:50 – 9:00 | Welcome & Seminar Opening | Organising Committee |
| Overview Presentations | | |
| 9:00 – 9:50 | 'Up-to-Date Overview of Aspects of Reinforced Concrete Corrosion' | Warren Green/Frank Collins/Maria Forsyth (Aust) |
| 9:50 – 10:40 | 'Up-to-Date Overview of Repair & Protection Aspects' | John Bromfield (UK) |
| 10:40 – 11:10 | Morning Tea & Exhibition | |
| Condition Assessment of Structures | | |
| 11:10 – 12:00 | 'Specialist Examination & Diagnosis' | Jack Tinnea (USA) |
| 12:00 – 12:50 | 'Corrosion Rate Measurement & Modelling' | TBC |
| 12:50 – 13:40 | Lunch & Exhibition | |
| Modelling & Deterioration Prediction | | |
| 13:40 – 14:30 | 'Modelling Durability of Reinforced Concrete Structures' | Rob Melchers (Aust) |
| 14:30 – 15:20 | 'Modelling of Reinforcement Corrosion Risks in NZ Structures – Experiences of Theory into Practice' | Neil Lee (NZ) |
| 15:20 – 15:50 | Afternoon Tea & Exhibition | |
| Concrete Repair & Protection | | |
| 15:50 – 16:40 | 'Concrete Repair & Protection – 30 Years of Onsite Performance Experiences in the UK' | John Drewett (UK) |
| 16:40 – 17:25 | Panel Discussion & Open Forum | |
| 17:25 – 17:35 | Day 1 Closing Remarks | Organising Committee |
| 17:45 – 18:45 | Networking Cocktail Function & Exhibition | |
| 18:45 – 22:00 | Dinner | |



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PROGRAM DAY 2

| Time | Session | Speaker |
|---------------|--|---------------------------|
| 8:20 – 8:50 | Registration Day 2 | |
| 8:50 – 9:00 | Welcome Remarks | Organising Committee |
| | Concrete Repair & Protection (continued) | |
| 9:00 – 9:50 | 'NZTA Experiences with the Protection & Repair of Concrete Road Bridges' | Barry Wright (NZ) |
| | Cathodic Protection | |
| 9:50 – 10:40 | 'Cathodic Protection of Reinforced Concrete: Is There Anything Still to Learn?' | Jim Preston (UK) |
| 10:40 – 11:10 | Morning Tea & Exhibition | |
| | Cathodic Protection (continued) | |
| 11:10 – 12:00 | 'ICCP for Reinforced Concrete Structures – State of the Art' | Paul Chess (UK) |
| 12:00 – 12:50 | 'Cathodic Protection, Cathodic Prevention & Electrochemical Chloride Extraction Experiences' | Zita Lourenco (Portugal) |
| 12:50 – 13:40 | Lunch & Exhibition | |
| | Organic Corrosion Inhibitors | |
| 13:40 – 14:30 | 'Organic Corrosion Inhibitors – New Build & Existing Structures Performance' | Jessi Jackson-Meyer (USA) |
| 14:30 – 15:20 | 'Organosilane Corrosion Inhibitors – New Build & Existing Structures Performance' | Neale Berke (USA) |
| 15:20 – 15:50 | Afternoon Tea & Exhibition | |
| | Alternate Metallic Reinforcement | |
| 15:50 – 16:40 | 'Stainless Steel Reinforcement Performance in Concrete' | Graham Sussex (Aust) |
| 16:40 – 17:25 | Panel Discussion & Open Forum | |
| 17:25 – 17:35 | Day 2 Closing Remarks | Organising Committee |
| 17:45 – 18:45 | Networking Farewell Cocktail Function | |

Program subject to change by the ACA

Registration Fees (inclusive of GST)

| | |
|---|--------------|
| Full Registration Member | \$950 |
| Full Registration Non Member | \$1,150 |
| Full Registration Student Member | \$320 |
| Full Registration Non Student Member | \$350 |
| Day Registration Member | \$575 |
| Day Registration Non Member | \$625 |
| Day Registration Student Member | \$180 |
| Day Registration Non Student Member | \$195 |
| Networking Drinks Wednesday (included in full registration) | \$40 |
| Dinner Wednesday (included in full registration) | \$130 |
| Networking Drinks Thursday (included in full registration) | \$40 |

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The Australasian Corrosion Association Inc

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www.corrosion.com.au



To Register online go to www.corrosion.com.au/events

INDUSTRIAL COATINGS FOR STEEL STRUCTURES

Owners and operators of high-value assets need to understand the cost implications of ignoring the effects of corrosion that poses a threat to all infrastructure through the degradation of structures such as buildings, roads, bridges, pipelines and towers. The economic impact of corrosion represents an annual cost of many billions of dollars to the economy.

Some of the advantages of planning for corrosion control and mitigation at the design phase include extending the life of an asset - thus making it more profitable - and reducing maintenance time and costs thereby increasing an asset's utilisation.

According to Craig Ross, Director of Napier Sandblasting (NSB) in New Zealand, some construction contractors sought to save money on infrastructure projects by using substandard coatings with the result that some buildings, towers and bridges are already showing signs of fatigue and distress. "While the majority of the cowboy coatings applicators that applied poor coating systems have gone, many of their structures already require remediation," he said. "Luckily changes in regulations and better enforcement of standards means that new designs should have a much longer operational life."

Justin Rigby, coatings consultant at Remedy Asset Protection, added that steel structures within industrial facilities are usually located in 'aggressive' environments. "Domestic steel buildings do not face the same stresses as offshore or maritime structures," he said. "Owners of offshore platforms or dock cranes exposed to the marine environment cannot afford for corrosion to degrade their assets."

"Coastal and maritime areas are harsh and corrosive environments for all structures, but more so for steel ones," Ross added.

Rigby stated the best way to protect an asset from corrosion is to select a corrosion resistant metal or to apply a protective coating as a barrier to separate the structural steel from the corrosive parts of the environment, such as moisture, oxygen and pollutants.

Ross added that even relatively non-reactive stainless steel requires protection in certain situations. "NSB does a lot of work in the hide tanning industry and other really severe environments, generally where acid attack or abrasion is an issue," he said.

Cathodic protection is one technology that can be used to impress a current into a structure to alter the surface reactive characteristics of a metal to minimise corrosion.

According to Rigby, it is important that a protective coating project is carefully planned. Protective coatings projects are usually unsuccessful for relatively simple reasons. Planners often do not fully comprehend the technical complexity of many coatings projects, especially if the coating is to be applied to an existing steel structure; even more so if the site is in a remote location. As a consequence, they fail to invest the time and resources to manage it effectively which results in substantial cost implications when things go wrong.

Protective coatings are not just paint. Coatings are engineered products that undergo rigorous testing and refinement to provide specific properties that will protect a structure from its service environment. "The most important considerations are the operating environment and choice of the appropriate coating," said Rigby. "A simplistic analogy would be that a structure is plastic coated."

There is a wide selection of coating products available to the market so it is essential that the appropriate coatings system is chosen. There is no single product that meets every coating situation as the desired attributes may be mutually exclusive; so during the planning of a project, a compromise may need to be made, but is important to not be fooled by a 'one size fits all' approach made by some manufacturers.

Modern technology has developed active pigments which are being incorporated into primers to provide additional protection. Active anti-corrosive pigments are added to primers which can give further protection for areas with coating damage in addition to their barrier effect. These pigments prevent corrosion of a metal substrate by building up permanently passive conditions at the metal surface and/or by a build-up of solid compounds which fill the damaged area of the coating.

It is important to be flexible and adaptable when developing protective coating projects. While identifying areas of risk at the start of a project is an extra expense, it will help ensure a project's success. Managed well, a protective coatings project can provide owners with great outcomes.

The Australasian Corrosion Association (ACA) works with companies like Remedy and NSB, along with academia, to research all aspects of corrosion in order to provide an extensive knowledge base that supports best practice in corrosion management, thereby



Spray coating a pipeline in-situ
 (Image supplied by Justin Rigby of Remedy
 Asset Protection - www.remedyap.com.au)

ensuring all impacts of corrosion are responsibly managed, the environment is protected, public safety enhanced and economies improved.

“The quality of the finished project is dependent on how skillfully and effectively a coating is applied,” Rigby said. The technicians chosen to apply a coating must have the appropriate skills. Obvious selection criteria are experience with the protective material and the equipment used to apply it to a structure. A less obvious criterion, especially for any sort of tower structure, is abseiling skills; technicians might have to be in a harness and suspended in mid-air which requires a particular mix of physical and psychological attributes.

There are many standards relating to the application of protective surface coatings but sometimes compromises may need to be made. When planning protective coatings it is important to take account of factors such as the geography, access to the structure and climate, all of which impact the cost of the project.

According to Rigby, there are a range of quality tests available that comply with Australian and international standards, many of which are covered in the ACA's NACE Inspector courses. A good coating specification will reference AS/NZ 2312 as a minimum and categorise the service environment according to its corrosivity and then nominate a coating system based on the desired design life of the coating.

One vital aspect of coatings projects is to have certification that the job complies with all the appropriate legislation, regulations and standards. There are two ways to achieve this; to pay for third party inspection and engage a contracting firm that has a PCCP accreditation. This ensures they have staff with the necessary skills and accredited processes, providing peace of mind to customers that quality is 'built in' throughout project planning and execution.

The cost to coat a structure with an appropriate and effective protective material varies depending on whether it is applied in a workshop or on-site and averages between \$80 and \$300 per square metre. “This is a relatively minor cost, compared to the cost of not coating the steel,” said Ross. “However cost is very much relative to what the required durability expectation is, the level of aesthetics required and how harsh the environment is.”

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