

CONCRETE CONNECTIONS



Cover photos: *Courtesy of Carly Van Kalker from Absafe, see interview on page 5*
NCS—Mourilyn Wharf Pile Remediation page 4

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President's message

Australasian Concrete Repair Association (ACRA) is excited to announce a new expansion! As part of the strategic plan, this year we'll be focusing on the expansion ACRA will go through to include other areas of repair such as remedial waterproofing, strengthening, coatings and remedial buildings. Our technical team is working on new courses to be added to the ACRA portfolio. All ACRA members are encouraged to come forward for their input and contribution for content planning and course delivery.



The association has played a leading role in education and training in concrete repairs. Our trade shows, seminars and courses have gained tremendous interest in different States which wouldn't have been possible without the help of our sub-committee members who are always passionate, motivated and energetic.

The association, this year, is even more committed to deliver trade shows, seminars and courses through exciting ideas showcasing our new expansion segments.

The construction industry is no more following a traditional path and is making rapid progress in embracing innovative emerging technologies such as 3D printing in construction, modular construction, smart buildings, construction drones, cloud collaboration, eco or green concrete and so on. The repair and remediation industry on parallel has also witnessed some ground breaking technologies in concrete restoration, remedial waterproofing and coatings. ACRA encourages all members from different disciplines - Engineers, installers, supervisors, students to share their projects and researches in our quarterly online Concrete Connections and technical seminar presentations.

Our next seminar is on 13 March at Quay West Suites Melbourne VIC, 28 March 2018 Colmslie Hotel Morningside QLD. With distinguished keynote speakers sharing some interesting concepts and case studies, hear all about the entire process of these major projects from investigation, design to execution of the work and of course the final product. Our events, being the right platform to learn and grow, offer great value as well as networking opportunities with the industry professionals.

On 10 April in NSW at the Kirribilli Club on Avoiding Building Defect Disputes with Clients. This will be a breakfast seminar and our presenter is Paul Jurdeczka who is a Partner at Chambers Russell Lawyers and is also a member of ACRA.

On 11 April 2019 in Perth WA, the seminar will be on Cathodic Protection and Concrete Repair Basics and beyond.

Finally, I would like to congratulate Grahame Vile for his new role as VP. Grahame's contribution in delivering ACRA courses is highly regarded in the industry and we look forward to his valuable contribution as Vice President.

-Hamid Khan - ACRA President 2017-2019

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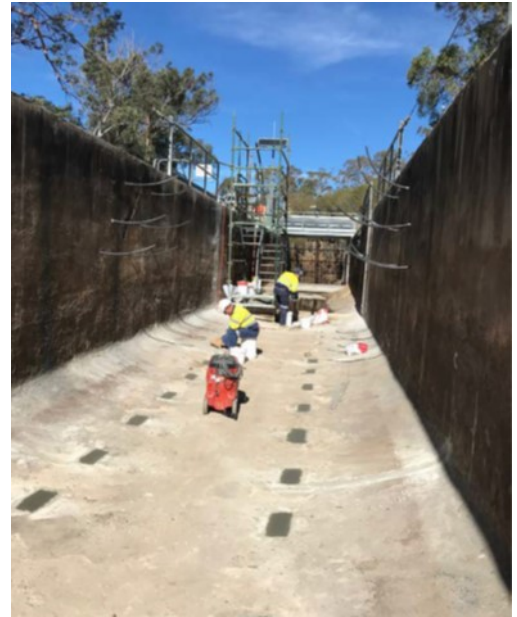
Project Overview – Canal Post-Mining Rehabilitation

Duratec and Fortec have secured post-mining rehabilitation works for Water NSW on the Upper Canal near Appin. The 120 year old heritage listed structure conveys bulk water from the Nepean and Avon Dams to Prospect Reservoir in Sydney's west.

The canal consists of open channels sections, tunnels, aqueducts and various other associated components. Due to mining operations in the vicinity, minor damage occurred to the aqueduct infrastructure and the canal.

Duratec and Fortec have been contracted to repair and restore the canal and aqueducts. The scope of works includes:

- Crack and patching repairs to the floor of the open canal, the floors and walls of aqueducts and to bellow walls
- Extending the height of the sandstone block open canal to pre-mine subsidence levels and in accordance with heritage requirements
- Removal of temporary steel strengthening installed prior to mine subsidence
- Replacement of structural bearings that support the cast iron pipe at a number of aqueducts
- Reinstatement of sandstone capping and associated repairs to all piers of the aqueducts in accordance with heritage requirements,



Patching repairs to the floor of the open



Pipe and sandstone pier with access systems in place

Project Overview - Mourilyn Wharf Pile Remediation

NCS recently completed the works on the Ports North, Mourilyn Wharf, Queensland, where they were contracted to undertake the remediation of the 46 Wharf Piles. The NCS team were tasked with surveying and documenting the structure prior to Hydro Demolition. In order to restore the structural integrity of each pile, extensive repairs above 1.5 metres Chart Datum required full hydro demolition, followed by the reinstatement of reinforcement and fabrication of custom moulds prior to the application of up to 180litres of repair mortar per pile.

It was identified that further crack repair and remediation of each pile were to be undertaken to meet the requirements of the wet, dry and harsh environmental conditions of the Asset for long term sustainable benefits.

Throughout the works the NCS team overcame a number of challenges; to ensure safe and workable access to the piles, management of unpredictable environmental aspects including tides and ship movements at the wharf, as well as, further sealing of the formwork to prevent ingress of salt water during curing, to complete this project on time and within budget.

Well done to the NCS team!



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Introducing Carly Van Kalker from Absafe

Nicole from ACRA recently met Carly at a convention in Adelaide and after learning about what she does, Nicole felt that the readers of Concrete Connections would be amazed by what this lady does in this industry. She had Nicole captivated with her abseiling stories and photos.

So, inside this issue we interviewed Carly Van Kalker from Absafe to learn a little about how she came to be where she is today within this industry.



1.Name – Carly van Kalker

2.Position within Absafe - Technical Coatings/Quality Assurance Supervisor/NACE Inspector L1/IRATA Rope Technician

3. How long have you been working for Absafe.

I would be coming into 11 years now, in 2008 I had contacted Andy Caddy to engage the services of Absafe to assist me in a Melbourne Laneways Art project called “Welcome to Cocker Alley” by artist Bianca Faye.

It was an amazing project which required us to gold leaf 9 stories of drainage pipes on the back of the Nicholas Building on Swanston St. Imagine the challenge of applying over 4800 sheets of gold leaf on ropes & EWP!

The finished project was unbelievable, it looked like a giant golden saxophone reaching for the clouds.

Not long after Andy had got in contact & offered me a Project Management position to oversee a blasting & coating contract for SP Ausnet. The first of many projects to come.

4.What piqued your interest in the construction industry or engineering in general.

I have always been quite an industrious person with a fascination for the built environment in all forms, from Architecture & Design to Engineered Industrial Structures.

I could never see myself following a career path that was run of the mill & was looking for something more challenging so I started a Painting & Decorating Apprenticeship in Sydney at the age of 15 & have worked in Construction in many various roles ever since.

5. What has been your most exciting project you’ve been involved in to date.

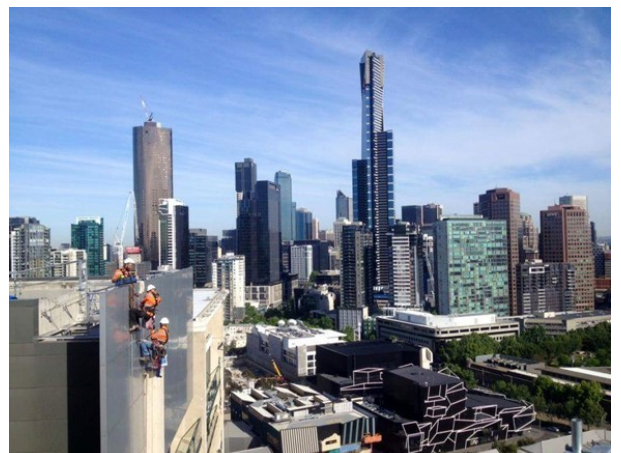
So many to choose from! The Telstra Building Spire refurbishment was pretty spectacular with views from 218 meters.

However, Narracan Dam gate refurbishment & coating project was one of the most interesting projects I have worked on. We raised the gates, drained the entire dam & took all rollers & auxiliary wheels off to restore then re-fit. The real challenge came with completely encapsulating each gate for catchment of our blasting refuse & garnet prior to protective coating works.

We are currently working on the Yallourn Power Station Cooling Towers which involves remedial concrete repair & coatings works. We have just brought in a new UHPWJ (Ultra High Pressure Water Jetting) unit & demolishing concrete at 40000psi at height? Well that’s about exciting as it gets! But to be honest every project is exciting in Rope Access, I couldn’t imagine a better office, the views are always inspiring!

6. What’s been your career accomplishment to date.

I feel I am constantly learning and growing in my career & new goals and opportunities are what keep me motivated. Every day or new project feels like a new accomplishment in this industry. I am very happy where my career is taking me in recent years, my role is evolving rapidly & since obtaining my NACE CIP I have new drive & goals in Quality Assurance.



I have also been getting more involved with ACRA & ACA which is furthering my knowledge through meeting worldwide industry specialists from varied disciplines across the industrial & commercial sectors. I endeavour to further my remedial experience, inspection skills & materials expertise over the next couple of years through study and research.

Ultimately though, if we can continue to complete projects to the highest of standards, & keep pushing the benchmark in innovation then that's the best accomplishment I could hope for.

7. We all started somewhere, what do you think your first boss would say about you now, and what was your first real job.

My first boss was difficult to work with but I stuck it out until the end of my apprenticeship as I did learn a lot from him. If he could see me now, I guess he would be impressed and would try to offer me a job.

8. What motivates you to keep doing what you're doing?

Working within Absafe's diverse & talented team of engineers, trades people & highly experienced rope technicians keeps me going. The prospects of working abroad excites me & I enjoy the constant travel to new places our projects take us. Mostly though I would say the sense of self-pride I get from producing quality work makes it all worth it.

9. What book or movie would you recommend anyone or influenced you.?

People think I am joking when I say this...but Flashdance is what inspired me to pursue a career in construction! I was a dancer as a kid & when I saw the main actor working as a dockyard welder I thought "Wow, that is a really cool job for a chick!" so I guess my mind was made up that it was possible & here I am today.

Most inspiring book? Bravo Two Zero by Andy McNab, that book just reminds me of what resilient creatures we are who can achieve & overcome anything if you just put your mind to it. It made me realise that sweating the small stuff is completely counter-productive.

10. If you could go anywhere in the world for a holiday or adventure where would you chose?

What's on the bucket list?

I have been fortunate enough to travel quite a bit but No.1 on the bucket list would be to drive all the way around South America, that would be mind-blowing!!

Also would love to experience Cuba, Mexico and Vegas. They all need to get hit up at some stage



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Protecting against bridge corrosion Written by Claire Gaynor by the Australasian Corrosion Association



The \$620 million Darlington Upgrade Project in Adelaide went through a rigorous design and construction process to ensure it was protected against corrosion and degradation. Here, the Australasian Corrosion Association outlines some of the corrosion mitigation work that was undertaken for this project.

The Darlington Upgrade Project is another important stage in the delivery of Adelaide's North-South Corridor and will deliver an upgrade of approximately 3.3km of the existing Main South Road, including:

- A non-stop motorway between the Southern Expressway and Tonsley Boulevard
- A lowered, non-stop motorway passing underneath Flinders Drive, Sturt Road, Sutton Road/Mimosa Terrace and Tonsley Boulevard
- Grade separation of the Main South Road/Ayliffes Road/Shepherds Hill Road intersection
- Main South Road (at grade) surface roads along both sides of the lowered motorway to provide connections to Flinders Drive, Sturt Road and most local roads
- Full free flow interchange at the Southern Expressway/ Main South Road with dedicated ramps providing direct access to the new motorway and Main South Road

• The \$620 million project is jointly funded by Australian and State Governments (\$496 million federally funded and \$124 million state funded) and is due to be completed in 2019. This landmark Australian owned and built project is focusing on using Australian approved and manufactured components.



Main South Rd Bridge to Surface Roads. Image credit: Timelapse Adelaide

Minimising the impact of corrosion on bridges

Roads and bridges are threatened by corrosion and degradation as they are continuously exposed to climatic elements and vibration from vehicle movements. The cost of corrosion mitigation to national economies around the world is estimated to be billions of dollars every year. The impact can be both economic through the cost of repairs and maintenance, as well as a physical threat to workers, the public and even other nearby structures. One of the two main ways to protect an asset from corrosion is to physically isolate a structure from the environment by applying a protective coating. Protection of the various structural elements was integral to the design of the Darlington Upgrade Project.

Three of the eight bridges constructed for the project consisted of a steel box girder design with reinforced concrete decks. Half of the girder sections for these three structures were constructed by Haywards Engineering in Tasmania, with McElligott's then responsible for applying a protective corrosion resistant coating to the girders. The other half of the girders were constructed and coated by Bowhill Engineering in South Australia. The 22 bridge girder sections coated by McElligott's weighed more than 1300 tonnes in total.

Weather and material challenges

According to Ivan Berry, General Manager at McElligott's, each girder was manufactured and delivered to the company's workshop. "Our facility is a continuous covered line where structures to be coated are profiled, primed and coated," Mr Berry said.

Each girder section was abrasive blasted to Class Sa2½. Profiling a substrate produces an even textured surface that increases the adhesion of a coating. Once profiled, the girders moved down the line where they were primed and then had two layers of top coat applied.

Jeremy Hawkes, Managing Director of Bowhill Engineering, concurred that moving the 48m by four metre-high units of open top box girder within their facility was a challenge. Abrasive blasting and painting in the same facility produced its own difficulties.

"For that size structure, we used a lot of abrasive garnet to profile the steel. The used garnet had to be collected and cleaned for reuse," Mr Hawkes said.

"We began using shovels and brooms to collect the material but a short while into the project we managed to acquire a surplus three stage vacuum system that automatically separates the material and prepares it for reuse." Mr Hawkes said that the weather was also a challenge.

"There was often only a small window of opportunity when the temperature was the correct level above the dew point allowing us to work within the manufacturer's specifications."

Bowhill upgraded its workshops to install ducted gas fired heating which allowed them to get the girder sections to an overall even surface temperature.

"It was important to heat the girder sections so that the coating materials adhered to the substrate and cured effectively, but the size made it difficult to evenly heat the girders," Mr Hawkes said.

The duration of the project meant that some of the coating work took place during the Tasmanian winter, requiring McElligott's to adjust its work schedule.

"To meet overall deadlines, abrasive profiling was conducted overnight and painting took place during the day in order to reduce the amount of extra heating required," Mr Berry said.

The coating system was a Zinc Rich Epoxy, followed by an Aluminium Pigmented Epoxy and the final coat was Hardtop AS, manufactured by Jotun. The total surface area coated by each coating company was approximately six and a half thousand square metres of exterior surface and nine thousand square metres of internal surfaces. Rob Butcher, State Manager – Protective Coatings (SA and Victoria) at Jotun, said the company's challenge was to specify a material that could be used by two separate companies located in quite different climatic environments.

"One company is 200km inland in South Australia where it can get very hot and dry, whereas the other is on the northern coast of Tasmania where there can be days when the temperature is close to zero. The specification of the coating material had to accommodate its application in both places," Mr Butcher said.

It was essential that the finished coatings from both applicators matched as much as practical.

"We were able to use the Australian Standard 2312.1. This standard has been tried and tested in our industry for many years and is well accepted," Mr Butcher said.

Corrosion management best practice

The Australasian Corrosion Association has been a part of the research into the performance of coatings in Australia for many decades. It was involved in the report that led to removal of lead paints from Australia in the 1990s and continued this by contributing to international standards relating to coatings safety.

"When applying the coating, the big sections made it challenging to maintain a 'wet edge'. We had to continually adjust the hardeners and thinners in order to extend the drying time of each coating layer," Mr Berry said.

A 'wet edge' refers to the process of avoiding obvious join lines between sections of coating. They also applied a 'stripe coat' over welds and other joints.

Mr Berry said that the massive girders—the heaviest weighed 86 tonnes—were the largest components that his company has been involved with. Scissor lift platforms were required to allow the applicators to safely reach the highest areas on the outside and scaffolding for those on the inside.

"These girder sections were huge and comprised 20 individual sections each. The Ayliffes Road Bridge will be a total length of 390m long, which is a pretty decent bridge in anyone's terms—especially when you have to move it," Mr Hawkes said.

The three steel box girder structures for the project were constructed using an innovative method whereby the structures were built off-site, transported and precisely manoeuvred into place using Self Propelled Modular Transports (SPMTs).

This method of bridge construction is common place throughout Europe and the Americas. However, this was the first time SPMT's have been used in Australia by the infrastructure sector to install a fully completed structure, which was an amazing achievement. When a coating is properly applied, inspected and qualified it should easily provide 25 years or more of protection, although many projects today are even specifying 50 and 100-year life expectancy. New capital investment in some areas may be slowing down, but governments around the country have recently announced plans for large-scale road and rail projects which will provide many opportunities for corrosion control and prevention companies.

The 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.

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Swarms of pipe-mending robots could keep roadworks from slowing us down
Thanks to Create Magazine – Engineers Australia
Written by Nadine Cranenburgh



Roadworks can be frustrating and time consuming for commuters, holiday-makers and road freight alike. Engineers in the UK are researching microrobotic tech that could carry out underground maintenance without disrupting traffic.

Excavations to maintain underground infrastructure can cause lengthy delays and a resulting hit to productivity. In a bid to cut costs and save time, the UK government has invested £7 million (AU\$12.5 million) into research and development of tiny robots that can swim through underground pipes to detect and repair cracks and blockages.

UK Science Minister Chris Skidmore said in a media release these robots could pave the way to fulfilling the dream of a roadwork-free world.

“These pipe-repairing robots herald the start of technology that could make that dream a reality in future,” he added.

Professor Kirill Horoshenkov from the University of Sheffield’s Department of Mechanical Engineering will lead the project, which will also include researchers from Bristol, Birmingham and Leeds Universities. Horoshenkov said the new research program will help utility companies monitor hidden pipe infrastructure and solve problems quickly and efficiently.

“This will mean less disruption for traffic and general public,” he said.



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“Keyhole surgery” for the road

The British research program will focus on intelligent ways to find and fix problems in underground water and sewerage pipes without having to dig up roads.

While other universities are commercialising swarming microrobotic tech for in-situ repairs in confined spaces such as aircraft engines, Horoshenkov said their 1 cm robots will lead the pack in this particular application.

“This innovation will be the first of its kind to deploy swarms of miniaturised robots in buried pipes together with other emerging in-pipe sensor, navigation and communication solutions with long-term autonomy,” he explained.

Horoshenkov told *The Telegraph* that the researchers would first develop an ‘inspection bot’ to search for issues in pipes, then a more powerful ‘worker bot’ to carry out repairs and maintenance. He also said the robots should be able to tap the pipes and use the vibrations to assess their condition, eliminating the need for manual external inspections.

“It is like keyhole surgery for the ground, so instead of cutting up the whole road, send a small robot down a pipe and conduct repairs and inspections,” Horoshenkov explained.

The UK also announced a £19.6 million (AU\$35 million) investment in robotic tech designed to operate in dangerous environments including offshore wind farms and nuclear decommissioning facilities.

This investment is part of the Industrial Strategy Challenge Fund, which is a £93 million (AU\$166 million), four-year program. Projects include an AI solution for inspecting undersea cable sites for offshore wind farms and an industrial-scale, self-building modular robot for hazardous worksites such as nuclear facilities.

Written by Nadine Cranenburgh



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MISCONCEPTIONS ABOUT MEMBRANE ELONGATION

INTRODUCTION & SCOPE

There is a wide misconception regarding the elongation properties of waterproof membranes and their ability to bridge cracks that form post membrane application.

This bulletin endeavours to clarify the real meaning of elongation and elasticity in relation to bridging properties

FLEXIBILITY & ELASTICITY

When a liquid membrane is applied to a concrete surface it is fully bonded to the substrate surface. Because of the elasticity and flexibility, the membrane has the ability to cope with broad span movements such as thermal expansion / contraction of the substrate as well as lateral flexing frequently experienced in construction projects. Within a structure there are two basic types of movement underlying an installed membrane and these are principally handled by two different mechanisms within the membrane coating.

TYPE OF MOVEMENT	PRINCIPAL HANDLING MECHANISM
Free movement	Flexibility
Restricted movement	Elasticity

Free movement involves extensibility and deformability where the membrane is not restricted by being bonded to an area of substrate such as over a bond-breaker or bridging existing cracks.

Restricted movement involves extensibility where the membrane is restricted by being fully bonded to the substrate. The membrane's flexibility also allows it to cope with movement of cracks existing prior to the application of the membrane and the ability to cope with significant movement can be built into the application, by properly treating the crack with a bond breaker that extends the gap, where the membrane remains un-bonded to the substrate.



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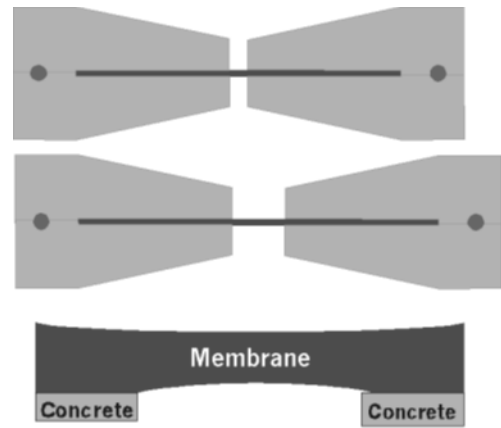
A membrane's elasticity or elastic modulus allows it to cope with small cracks such as hairline cracks that form as a result of plastic shrinkage of the concrete. It should be noted that when hairline cracks form after the application of the membrane, the membrane copes by necking or reducing its film thickness over the crack.

As the crack gets larger the membrane gets thinner to a stage where it becomes ineffective as a waterproof membrane and eventually shears or tears to break completely across the crack.

BULK MOVEMENTS & PRE-APPLICATION CRACKS

When the un-bonded gap at membrane installation is 2mm a membrane with 200% elongation will extend to 6mm, should this degree of movement occur. There will be minor necking of the membrane across the gap as the membrane is stretched and the membrane may lose some waterproofing efficiency, however as the gap reduces again the membrane will recover.

In this example once the gap movement extends beyond the limits of the elongation the membrane will fracture and fail (refer Diagram #01).



Enlarged section of membrane across developed crack showing minor necking of the membrane

Membrane 200% elongation
Original crack gap 2mm
Elongation across crack =
original gap + 200% x 2mm = 6mm
Minor Necking of Membrane

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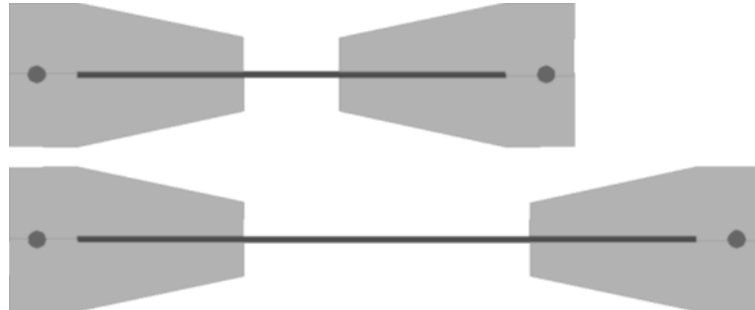


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When the same membrane is applied so that an unbonded gap of 10mm exists by the installation of a bond-breaker to 5mm on either side of the crack, the membrane will extend to a 30mm gap with no damage.

As is evident the wider the section of membrane that is not bonded to the substrate the more absolute movement can be accommodated before the membrane suffers damage. This distance can be expanded by the installation of bond-breakers over cracks to provide for greater movement capacity (refer Diagram #02). This movement is principally accommodated by the membranes elongation.



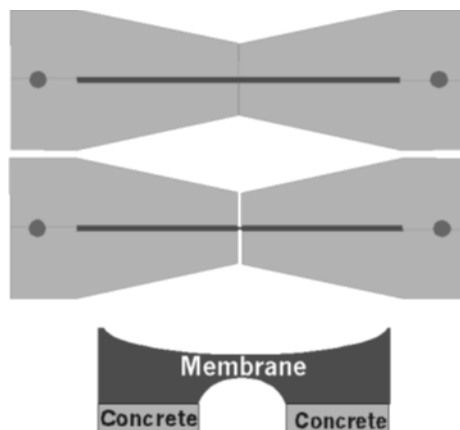
Membrane 200% elongation
 Original bondbreaker width 10mm
 Elongation across bondbreaker =
 original width + 200% x 10mm = 30mm
 Negligable Necking of Membrane

POST APPLICATION CRACKS

Cracks that form in concrete following application of the membrane obviously have no membrane distance that is not bonded to the substrate. The original gap is non-existent or 0mm and regardless of the elongation properties of the membrane post application cracks will result in damage to the membrane.

At 200% elongation – 200% of 0mm is 0mm;

at 500% elongation – 500% of 0mm is 0mm (Refer Diagram #03).



Enlarged section of membrane
 across developed crack showing
 severe necking of the membrane

Membrane 200% elongation
 Original crack gap 0mm
 Elongation across crack =
 original gap + 200% x 0mm = 0mm

When post application cracking occurs the membrane will extend but the result will be serious necking of the membrane across the newly formed gap. This will seriously impair the properties of the membrane and the membrane will tear with small movements.

Post membrane application cracks are only accommodated by the elastic modulus of the membrane.

In accommodating this crack the membrane reduces film thickness and the extent to which it will stretch without becoming ineffective as a waterproof membrane is limited.

Hairline cracking resulting from plastic shrinkage of the concrete can be accommodated, however more extensive cracking, such as structural building movement, will result in membrane fracture regardless of the elongation properties of the membrane.

CONCLUSION

Membranes do not “bridge cracks” as is widely believed and discussed. Small hairline cracks that appear from plastic shrinkage of the concrete will likely not be an issue however anything larger than this will be a problem for any membrane regardless of its elasticity. The reason for this, is the membrane is bonded to the substrate. If a bond breaker is used, then the membrane is no longer bonded to the substrate and the system can benefit from the membrane’s elasticity. This is why bond breakers should be used at joints and crack where movement is anticipated.



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Newcastle's thriving economic activity can be attributed to their bustling harbour and trade throughput diversity. In November 2017, **Port of Newcastle** awarded MCM the contract to rehabilitate Channel Berth and Dyke Berth located in the Carrington Precinct to further improve their infrastructure and capacity for future growth. Channel Berth is mainly used for cruise vessels and activity while Dyke Berth's predominant operation is for discharging petroleum products.

Both berths consist of concrete dolphins suffering chloride-induced corrosion. Scope includes concrete repair to the soffit, crack repair to the soffit and dolphin decks, and installation of galvanic anodes. The project delivery team has been challenged by heavy rains, challenging tidal conditions and operational activities without any incurring environmental or safety incidents.



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New Zealand

Dodgy earthquake rules another waste of money

NZ Herald– by David Kernohan



*On the Wellington waterfront there are/were large new buildings that failed in the 2016 Kaikoura earthquake.
Photo / Mark Mitchell*

In a RNZ report, Housing Minister Phil Twyford said dodgy meth contamination rules led to hundreds of millions of dollars being wasted, people being unnecessarily evicted and needless clean-ups ... \$100 million in the case of Housing New Zealand.

What about dodgy earthquake rules? How much are we spending on strengthening so-called quake-prone buildings? As with the meth-testing fiasco, the Government is possibly placing an unnecessary or at least excessive burden on the taxpayer.

Fewer than 500 people have been killed by earthquakes in New Zealand (landslides, rock falls and building collapses) since the Marlborough earthquake of 1848. This compares with an annual road toll of about 300 people in each of the last five years (1500 people). Some 600 people commit suicide each year in New Zealand. Of the 185 lives lost in the Canterbury earthquakes of 2010 and 2011, 115 were lost in the collapse of one building. Yes, there were 15894 deaths, and 6152 injured at Fukushima in Japan in 2011 due to earthquake and tsunami. Many buildings were lost. A nuclear reactor was damaged and continues to leak radioactive material. Damage from earthquakes in New Zealand is inevitable, but at what cost?

New Zealand is earthquake-prone (buildings are not, New Zealand is). Today, we demolish what we think is unsafe or requires expensive "strengthening", not recognising that many older buildings have already survived many quakes. We bring in rules that require our building heritage to be strengthened or demolished without any certainty that in the event of a large jolt the refurbishment or new building will be any safer.

The engineering science presents in inconsistent ways that challenge credibility. On the Wellington waterfront there are/were large new buildings that failed in the 2016 Kaikoura earthquake. And building failure is not just structural. Fixtures and fittings, service elements, construction, unrestrained parapets, balconies, decorative elements all play a role. Achieving one number, 34 per cent of the NBS, will save no one.

So, what should we do? Today, a building may be considered earthquake-prone if it is assessed to be less than one-third of the current standard for new buildings. The reality is that 34 per cent of the New Building Standard (NBS) is just a number. So is 100 per cent NBS just a number. It does not offer a 100 per cent guarantee or any guarantee.

Christchurch Cathedral is to be rebuilt to 100 per cent NBS. Why not 150 per cent NBS? What if a 400 per cent NBS quake hits? Each building needs to be considered on its merits and in its physical, topographical and geological context. We are short of expertise to do.

The current legislation may see the demise of many country towns and the older precincts of our cities as building owners choose demolition, not remediation, for simple economic reasons.

So, will we demolish the main streets of towns such as Feilding and Whanganui? The Institute of Earthquake Engineers says the risk of entering a building that is 34 per cent NBS is the same as boarding a commercial aircraft. Close the airports.

Wellington's CBD is formed on reclaimed land. Liquefaction is inevitable. Christchurch is on a swamp: Auckland on volcanoes. We live in coastal cities.

A tsunami can be devastating. What is the right balance for legislation? What can we as a country afford? What is reasonable?

While the term "resilience" is much over-used it is a suitable watch-word for the way forward. We cannot prevent quakes. Even the strongest building will succumb to a direct hit.

Our future planning should not be so much about building regulation but about civil defence and preparedness. Also, we need to build more lightweight structures in steel and timber and, yes, glass. Why are we building tilt slab concrete structures, heavy concrete panel structures in Canterbury?

The conversation about where we will be by 2021 or 2025 has not been had.

David Kernohan is a retired architect (and still worried about leaky buildings).

Disclaimer

The information provided in this article is designed to provide helpful information and readers should be aware that the views/opinions of the author are not necessarily those of the association



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Guide for safe chemical storage released Safe Work Australia

A new guide has been released by [Safe Work Australia](#) to help workplaces store their chemicals safely.

It is designed to teach businesses how to safely identify, position and manage the risks of chemicals.

“If you store chemicals in your workplace and need information on how to store them safely, this guide is for you,” said Director of Chemicals Policy Paul Taylor.

“We particularly want to help small to medium-sized businesses safely store their chemicals.

“It is important to know which chemicals are safe to store together, where you can safely store them and which ones you should separate.

“In this guide, we go into some of the common health and safety risks of storing chemicals and ways to manage those risks. We have included a handy storage checklist that sets out the standard precautions everyone should take and a detailed chart that will tell you which types of chemicals to separate and by how far.”

The guide was developed in consultation with representatives from national work health and safety regulators, unions and industry groups. To find out more about complying with work health and safety requirements in your region, contact your [local WHS regulator](#).

Read and download the guide [here](#).



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New Zealand University develops bacteria that repairs cracks in concrete

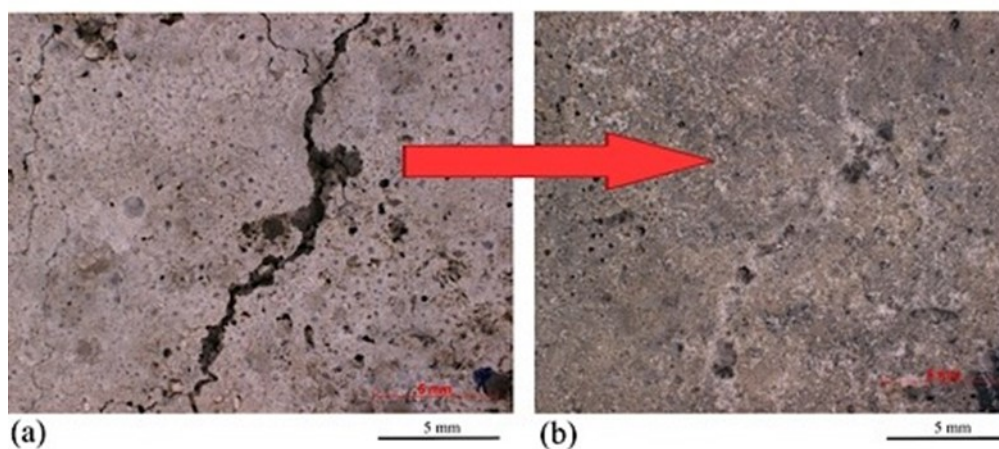
-Chartered Institute of Building

A team at the University of Waikato in New Zealand has developed a form of self-repairing concrete.

The process uses what is called “solid-state fermentation” to fill cracks as they develop.

Waikato researchers Aydin Berenjian and student Mostafa Seifan add microorganisms and nutrients to the initial mix. These then create calcium carbonate when exposed to the air by cracking.

Berenjian said the ability of the cells to keep producing calcium over time was crucial: “With the help of the unique fermentation system and nanobiotechnology, we have engineered a process that makes the calcium carbonate production very efficient even in a harsh environment like concrete.”



Lab testing has shown that the bio-concrete is more durable than traditional concrete but the barrier the cost is currently NZ\$200 (US\$145) a cubic metre.

The product will now be tested on a larger scale. Berenjian said: “We have had a lot of interest and our work has been thoroughly reviewed and published. It has huge potential for a range of other materials, industries and uses worldwide.”

Other researchers have previously developed similar self-healing concrete. UK contractor Costain is testing numerous techniques. A professor from Dutch university TU Delft has mixed asphalt with fragments of steel wool. And Binghamton University in New York State has developed a way to use fungus to heal cracks.

Images courtesy of the University of Waikato



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Industry News

BAAM Consulting business expands now includes scan & survey.

If you need a team who can provide all-round diagnostic support in the built environment, then consider BAAM Consulting. Grahame Vile joined BAAM Consulting in 2002, and became sole director a few years later. "The business was originally the longer named Building Audit and Maintenance, was founded by a strata manager and investment advisor some years before they approached me to join as technical lead", said Grahame. "After focusing on strata properties in the earlier years, we have grown into a specialist durability and remedial consultancy. I also rebranded with the much easier moniker of BAAM Consulting." Having grown a network of advisors and other specialists over the years, BAAM began working with Total Scan & Survey a few years ago, assessing concrete elements at new construction stage, like columns, headstocks and roof slabs and so on.

"We found we held mutual core values in providing sound remedial advice based on best practice, as opposed to 'smoke and mirrors' where no real value is provided. So in the second half of 2018 we acquired Jon's business and have reorganised the business next to BAAM as Total Scan and Survey Australia (TSSA)", said Grahame. "TSSA brings a synergy for supporting diagnostic work and allows us to expand nationally."

"One of the big things TSSA bring to the table is specialist application of geophysical techniques and methods to the civil and structural engineering industry for condition of concrete and timber structures. Last year we successfully completed a 12-month case study into the condition assessment of timber piers and poles," said Jon Fitzgerald, Business Development Manager. "We developed a process to obtain critical information via non-invasive methods allowing that client to consider removing unsafe lateral load testing."

The banner features the BAAM Consulting logo (a blue and red square icon) and the TSSA Australia logo (a blue and red square icon). The text is centered on a white background with a blue border. The background of the banner shows a close-up of a concrete surface with a grid of blue squares overlaid.

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Message from the CEO

We are pleased to officially announce our recent acquisition of Total Scan and Survey Australia, now working beside BAAM Consulting to extend our service offering nationally.

Together our in-house engineers, geophysicists and materials engineers specialise in concrete durability, remedial advice, corrosion assessment, foundation audits, concrete NDT, bridge condition assessments, concrete and timber pile integrity testing, structural NDT imaging and geophysics.

Call today to speak to one our engineers to see how we can assist.

Grahame Vile
Grahame Vile, CEO

This year Sydney Build 2019 has joined forces with Civenex so its bound to be a huge industry event on 14-15 March 2019 at the Hordern Pavilion & Royal Hall of Industries.
ACRA President Hamid Khan as well as ACRA Vice President Grahame Vile.

Sessions for Hamid Khan

14 March 2019—11-11.30am Durability Risks and Asset Protection—Innovations in Concrete Repair and Protection!

15 March 2019—1-1.30pm Accelerated Deterioration of Buildings– Causes and Remediation.

Session for Grahame Vile

14 March 2019—3-3.20pm—How to get it right the first time....so you don't need us.

[Click here](#) to register for your FREE entry ticket to both days.



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11:00

How to Get It Right First Time...So You Don't Need Us!
Grahame Vile, Board Member - Australasian Concrete Repair Association (ACRA)

Industry News

Winner of the 2018 Concrete Cancer Cup—2019 Save the date

On 5 December 2018, ACRA ran its annual Concrete Cancer Cup where all monies raised went directly to CanTeen. CanTeen helps teens under 25 who's world has been turned upside down due to Cancer. Between NSW and QLD ACRA Sub Branches we have raised almost \$10,000 for CanTeen via raffles.

The Concrete Cancer Cup being a lawn bowling tournament held at The Greens in North Sydney came down to two teams in the end, 2017 winners in the **Concrete Institute of Australia** vs **RM Watson**. The winner for 2018 is RM Watson.

ACRA has already locked in The Greens in North Sydney NSW for this years Concrete Cancer Cup on 5 December 2019. Will RM Watson be able to hold onto their title? I guess we'll find out when we do it all again in a few months time.

Congratulations RM Watson. The trophy currently sits in their office in Annandale until 5 December 2019.

If you would like to Donate prizes to this years raffles, give us a call.

Sponsorship available for all states.

All states have locked in their Christmas Drinks dates for 5 December 2019. Some will be holding seminars with 2 hour net working drinks, free for ACRA members.

Call if you're interested in sponsoring **02 9645 3692**



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Industry News

Raw Worx - Structural | Civil | Marine | Rail

The signs are up at our new office & the team has been flat out moving office and meeting client deadlines onsite. [Raw Worx](#) are now located at 1b/7 Waterway Drive, Coomera.



Duratec Australia—New Melbourne Office

Duratec have outgrown their Dandenong Office and are now closer to the city and to their clients in the Melbourne Central Business District.

They can now be found at Suite 201, 1 Crescent Road, Glen Iris VIC 3146

Phone: 03 8787 5865



Industry News

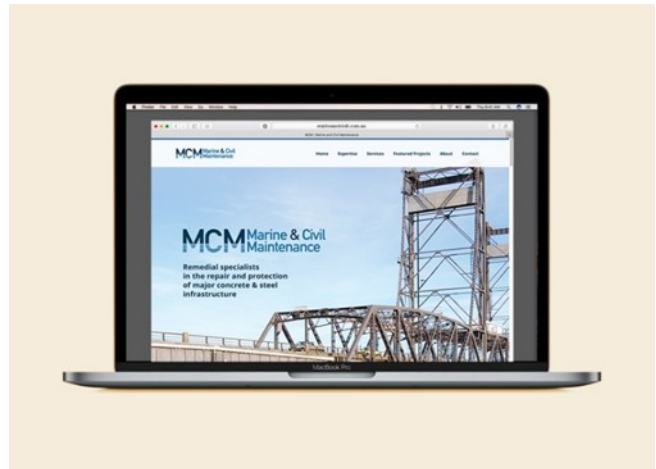
MCM new website

MCM is proud to announce the launch of our new company website that coincides with our expansion into Victoria with the opening of our Melbourne office and continued project portfolio growth nationally.

The team have been working hard behind the scenes to create a new website that shares more about the unique MCM service offering and provides detailed insights into our recent and upcoming project work.

Moving forward, be sure to follow us on [LinkedIn](#) and [Instagram](#) for up to date company announcements and project developments.

www.marineandcivil.com.au



Peter Johnsson started as an Associate with ACOR Consultants in August 2017, a little over a year later his been promoted to Associate Principal - Facades, Condition Audits, Building Diagnostics, Remedial.

ACOR's Remedial Engineering Team are specialist consultants in the area of facilities management and the rehabilitation and maintenance of buildings, including litigation support for architects, private companies, the Public Sector and individuals.

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Buildcorp Asset Solutions recently announced the promotion of Yann Guihard to Project Manager. Promoting from within, nurturing talent, mentoring and support are core principles at [Buildcorp](#) Asset Solutions. Wishing Yann all the best in his new role delivering complex facade and remedial projects with Buildcorp.

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Photo: (left) Noel Bowden, Operations Manager, (right) Yann Guihard, Project Manager

Industry News



MAX Build

Congratulations to Caroline for being promoted to Chief financial Officer at MAX Build.

Phone: 02 8033 4725

Web: www.maxbuild.com.au

MAX Build will be one of our speakers at ACRA NSW 7 March 2019 Seminar at the Kirribilli RSL Club NSW. [Click here](#) for more details.

ACRA VIC Sub Branch Committee

ACRA welcomes its newest ACRA Sub Branch Committee members in Victoria. Njego Lalic from Arup Australia and Paulson Chelliah from Fosroc.



Njego Lalic is a chartered Senior Civil Engineer with over 11 years' experience in condition assessment, asset management, development of rehabilitation solutions and construction phase supervision of both new build reinforced concrete structures and remedial works.

He has performed diagnostic testing and non-destructive assessments on various concrete structures, from which he has gained a strong understanding of their deterioration mechanisms and required remedial options to ensure the assets can achieve their required service life. He has construction experience with maritime and civil structures, particularly overseeing concrete repairs in aggressive environments.



Paulson Chelliah from Fosroc has over 15 years of experience in Construction Chemical companies like BASF, Henkel, W R Grace in Middle East and Asia. Offered Technical and Commercial solutions to structures across a gamut of clients operating in commercial and residential buildings, highway structures, rain infrastructure, water and sewage treatment plants, power generation, multi-storey car parks, F&B industries.

Active involvement in specification for new projects related to anticarbonation coatings and façade, remedial solutions for protecting water & sewage industry assets in Middle East and Australia.

Well versed in concrete repair methodologies and corrosion control systems for highway structures, heritage buildings and industrial assets.

Worked on high profile projects like Shuweihat Power Plant – UAE, Doha Metro (cut and cover tunnels), Kahramma Water Security Mega Reservoir to provide comprehensive solutions for structural durability.

ACRA Victoria will be holding their next seminar on 13 March 2019—Rehabilitation of Transport Structures.

[Click here](#) for more details and to register. Sponsored by **SIKA Australia**

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Who Should Attend: This course will provide essential training for Asset Managers, Port Engineers, Bridge Maintenance Managers, Building Managers, Heritage Structure Engineers, Plant Engineers, Consulting Engineers, Architects, Specialist Contractors, Construction Material Suppliers, Asset Condition Inspectors and Overseers.

28-29 March 2019 - VIC ACA/ACRA Course on Corrosion and Protection of Concrete Structures and Buildings - 2-day member only course.

29-30 July 2019 - QLD ACA/ACRA Course on Corrosion and Protection of Concrete Structures and Buildings - 2-day member only course.

28-29 October 2019 - NSW ACA/ACRA Course on Corrosion and Protection of Concrete Structures and Buildings - 2-day member only course.

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[11 April 2019](#) - WA Seminar - Cathodic Protection, Basics and Beyond-the Science of Sacrifice

[13 June 2019](#) - VIC Seminar - Industrial Infrastructure Rehabilitation - Sponsorship opportunity.

[28 August 2019](#) - WA Seminar - Modern Tools for Concrete Repair Seminar - sponsorship opportunity.

National ACRA Members Christmas Drinks

5 December 2019 - Concrete Cancer Cup NSW

5 December 2019 - WA Seminar and Christmas drinks

5 December 2019 - VIC Christmas drinks

5 December 2019 - QLD Seminar and Christmas drinks





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Inside Strata magazine the National seasonal publication for the Strata Community Association is offering ACRA members, suppliers and contractors a special 20 % off advertising in the special Autumn 2019 issue.



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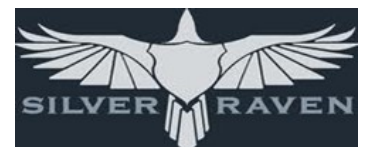
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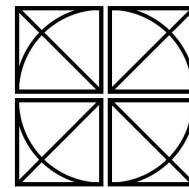
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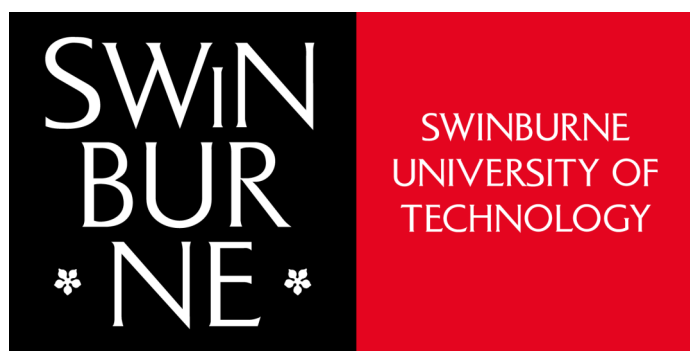
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