

CONCRETE CONNECTIONS



Inside this issue

- See all the winners of the 2018 ACRA Awards
- CPMS: A state-of-the-art management tool for the efficient monitoring and maintenance of cathodic protection systems
- Why Concrete Temperature is Important, Especially during temperature extremes
- The dangers of festive season fatigue
- Digging in for tunnel durability
- Women in Engineering
- Crystalline Silica
- Working in Weather
- Improving mental health on construction sites

Cover photos: 2018 winner of the ACRA Repair Industry Excellence Award—SRG Limited for their Palais Theatre, St Kilda Victoria Australia project.



-Your President's message

I would like to start by thanking our individual and corporate members for their continued support for the Association. I would also like to acknowledge, appreciate and thank all the hard work, commitment and dedication shown by the Board members, the sub-committee members and the executive office for the growth of ACRA. The numbers of ACRA Corporate members have also witnessed steady growth in 2018. We have additional 7 corporate members from last year's 66 to 73 this year.

We welcome all new ACRA Corporate and individual Members and hope they benefit being part of the association and also looking forward for their active role, involvement and participation in the association.

Our fully motivated and galvanised ACRA sub-committee members are actively participating and hosting ACRA courses, seminars and trade shows successfully in their respective regions. Trade shows in VIC and QLD are well received and our next one in 2019 will be in NSW.

ACRA has conducted Seminars across the regions with diversified topics such as durability, sustainability, risk in remedial work, setting standards in repair and refurbishment, design service life, condition assessment, surface preparation, concrete disasters, welding of reinforcement to Australian standards and so on.

To achieve we must collaborate not only to be different but unique and better.

Sydney Build

Auckland Build

ACRA – CIA Joint Technical Seminars

ACRA – ACA Conferences

We had an ACRA speaker at the Sydney Build 2018 held in March and in Auckland Build 2018 in November talking about setting standards for concrete repairs.

We finally have the updated version of SA HB 84:2018 Guide to Concrete Repair and Protection available to all. The updated versions of HB84:2018 Concrete Repair and Protection Handbook, and the Standard Method of Measurement were presented at the ACRA industry breakfast seminar, June 14, at the Sydney Kirribilli Club. Special thanks to Peter Johnsson, technical committee and all those who were involved for their contribution.

It's my great privilege to share that for the 'ACRA Awards for Excellence 2018', we had the largest number of project entries spanning across several categories. Once again, on behalf of ACRA, I would like to extend special thanks to the judges of industry professionals, Fred Andrew-Phaedonos from VicRoads, David Millar CEO, CIA and Mike Rutherford from Conspectus in Qld, for their support. Winners were announced at our awards night on 19th of October 2018 at the Crown Casino Melbourne and details of the winners are inside this issue of Concrete Connections. Thanks to the VIC Sub Branch committee for their help, and thanks to corporate members who submitted entries for projects that set standard in concrete repair and remediation.

Where seminars and other ACRA events provide an excellent networking platform, our online magazine Concrete Connections plays a vital role in connecting industry professionals by sharing their innovative project case studies, solutions and informative articles. It is a very effective way of keeping all up to the speed of what's happening in the industry. I encourage all to participate actively in providing contents and articles for ACRA Concrete Connections.

With all this happening, it would be great to see more individual members joining ACRA platform. I mentioned in the beginning of year that how exponential mindset is Revolutionising the construction industry. The exponential mindset is also transforming 'Concrete' to a more innovative building material. ACRA scheduled courses and seminars help to keep up with the speed of the exponential mindset in the construction industry.

I wish to thank all the sponsors for their contribution throughout the year in ACRA events. Sponsorships work both ways. It gives great opportunity for the sponsors to be in the lime light before, during and after the Seminars, as well as it provides great support to ACRA. Special thanks to Nicole Raymond for her continued support and dedication. With a lot of hard work at the back stage, Nicole and her staff have been driving and promoting the seminars and courses and trade shows through social media so effectively and diligently.

-Hamid Khan - ACRA President 2017-2019



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ACRA Awards For Excellence in Concrete Repair and Protection 2018—The Results

The 2018 ACRA Awards night for Excellence in Concrete Repair and Protection proved to be a great success, held in the luxurious Crown Towers, Melbourne.

With well over 100 people in attendance, the who's who of the Australasian Concrete Repair landscape got together to network and celebrate the hard work and achievements we've all had over the past two years.

The night was hosted by Steve Hoskins who took the audience on a comedy journey many people never thought could exist in the world of concrete remediation.

With the drinks flowing and food rolling out we worked our way through the 18 entries put forward for this year's awards.

It was amazing to see the continuing evolution, variety and complexity of works, all delivered to the usual high standard expected of an ACRA member.

Overall honours on the night were taken by SRG with Palais Theatre Remediation project grabbing both the ACRA Award for Heritage Structures and prestigious ACRA Repair Industry Excellence Award for 2018.



SRG Limited (SRG) were engaged by the Managing Contractor Built to carry out façade remediation to one of Melbourne's most iconic and best-loved entertainment venues, the historic Palais Theatre. The refurbishment and repairs to the theatre's exterior was a critical aspect of the project requiring specialist skills and various repair methods. SRG's scope included undertaking lead paint removal from the entire façade, concrete repairs, render repairs, installation of waterproof membrane, fabrication and installation of all pressed cement heritage feature items and the application of a coating system which replaced the original wash coat on the building.

With all reports and feedback providing a very positive response to the event a huge thank you should be given to Nicole Raymond and the Victoria Sub-Committee-Brian Kaye, Alan McKenzie, Nicholas Critchely and Jackie Matich for all the effort and energy they put into making the night such a success.

Thank you to all our members who took the time to submit entries and made the effort to travel for the event. It's proved to be another great step in ACRA's and every maturing Association's history.

Other award winners on the night included:

- ♦ Marine and Civil Maintenance - Repair and Life extension of a tidal concrete culvert project won the award for Investigation and Diagnosis

- ◆ Volumetric Concrete Australia - M1 Motorway between Reedy Creek and Yatala, QLD won Research, Design and Innovation award
- ◆ MAXBuild - 1 Beach Road, Bondi - Building Structural Repair project won Residential Buildings award
- ◆ National Concrete Solutions - Wilma Sugar Stack 11 Refurbishment of the Victoria Plantation QLD, won the Industrial Structures award
- ◆ Freyssinet Australia - Port Bonython South Australia, Marine Structures award and the Mega Projects over \$10M award
- ◆ MAXBuild - Birkenhead Shopping Centre, winner of the Commercial Building award
- ◆ SRG Limited - Monash Freeway Bridge Strengthening, won the Infrastructure award
- ◆ Eywad - Brooklyn Trunk Sewer Manhole BTS001 Rehabilitation, Water and Sewer award
- ◆ RKF Engineering Services - 30 Years of Cathodic Protection within a Major Reinforced Concrete Wharf Port Hedland Western Australia, won the Long-Term Performance award.



REMINDER – DUE DATE IS 1 DECEMBER 2018

From the 8-11 September 2019 in Sydney NSW, the CIA will be holding their Biennial National Conference. At this conference there will be a concrete remediation section which will be sponsored by ACRA.

We are contacting our members to get involved in this section of the conference and submit your abstracts asap. [Click the link](#) for details and to submit your abstract. Please let ACRA know if you will be participating in this section of the CIA National Conference and we'll promote it even further for you — info@acrassoc.com.au

Deadline for abstract submissions is 1 December 2018.
<https://concrete2019.com.au/>





Meet your ACRA Board Members for 2018-2019

Following on from the AGM in October 2018 at the Kirribilli RSL Club in Lavender Bay, the ACRA Members met to confirm its leadership team for the next year.

Its great to see Corporate Members from other states getting involved with the ACRA Board.



Name	Company	
Greg Zambesi	GHD	Consultant
Peter Johnsson	ACOR	Consultant
Grahame Vile	BAAM Consulting	Consultant
Michael Batty	Dukes	Contractor
Henk van den Heuvel	Andersal	Contractor
Jason Dagg	Duratec	Contractor
Keiran Smith	Freyssinet	Contractor
Grant Dowling	SIKA	Supplier
Harvey Welman	Ardex Australia	Supplier
Daniel Rowley	CE Construction Solutions	Supplier
Hamid Khan (current ACRA President)	Fosroc	Supplier

CPMS: A state-of-the-art management tool for the efficient monitoring and maintenance of cathodic protection systems -by Remedial Technology

Reinforced concrete structures susceptible to chloride induced corrosion can be successfully protected from corrosion by impressed current cathodic protection (CP). This is a proven technology which can provide long-term corrosion protection for bridges, wharfs and other structures situated in harsh marine environments.

However, one of the main issues associated with the long-term performance of cathodic protection is the failure to establish a simplistic and efficient monitoring and maintenance program for the CP systems.

Remedial Technology has developed Cathodic Protection Management System (CPMS), which is a practical tool for the monitoring and maintenance of multiple CP systems.

The primary features of CPMS include:

- ◆ Simple and secure access for approved users through a password protected website.
- ◆ A permanent on-line database for the CP systems incorporating all key CP data which is required for long-term CP system operation and maintenance of the structures.
- ◆ Live monitoring which ensures continuous delivery of CP current to the structures at all times. CPMS incorporates a portal for 24/7 live monitoring of the CP systems. This monitoring allows real time verification of the corrosion protection of the structures.
- ◆ An online yearly maintenance program for all structures showing up-to-date work progress and recommendations for future maintenance work for planning and budgeting purposes.
- ◆ All historical CP system data is consolidated onto one platform. This allows full transparency related to the status of the systems, information sharing and easy transition of responsibilities between successive asset managers.

The web-based management system offers a simple, efficient and reliable platform for the maintenance and monitoring of multiple CP systems. The system offers a live monitoring portal which allows transmission of real time data from the cathodic protection systems to the user's PC using M2M technology. In addition, CPMS allows permanent access to all historical performance data, construction drawings, operational manuals and maintenance records for the CP systems.

CPMS allows for the immediate identification of any issues which will affect the corrosion protection of a reinforced concrete structure. Any issues are promptly identified and rectified within the appropriate time. One of the unique benefits of CPMS is the elimination of duplication of reports and documents which are irrelevant (often slow down and clutter any decision-making process). With CPMS, the asset owner is directed to only the key important facts about the CP system and the actions required, and this makes long-term maintenance planning simple, achievable and clear.

CPMS is now utilised by multiple asset owners for the monitoring and maintenance of over 35 reinforced concrete and steel structures located along Australia's east coast.

[GENERAL GLOBAL INFORMATION](#)[LIVE MONITORING](#)[MONITORING AND MAINTENANCE PLAN](#)

Structure 1



Structure 2



Structure 3



Structure 4



Structure 5



Structure 6

Status

Fully Operational

Status

Fully Operational

Status

Fully Operational

Status

T/R Unit Upgrade
Required

Status

Fully Operational

Status

Fully Operational

[SYSTEM DATA](#)[SYSTEM DATA](#)[SYSTEM DATA](#)[SYSTEM DATA](#)[SYSTEM DATA](#)[SYSTEM DATA](#)[MONITORING DATA](#)[MONITORING DATA](#)[MONITORING DATA](#)[MONITORING DATA](#)[MONITORING DATA](#)[MONITORING DATA](#)

Image 1 above: An example of the main page of CPMS showing the status of six (6) operating CP systems





Image 2, 3 and 4 above: Reinforced concrete bridges, protected by cathodic protection systems and monitored by CPMS.



Expert Engineered Corrosion Solutions for Infrastructure

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Why Concrete Temperature is Important, Especially during temperature extremes -CANZAC Ltd

The heat produced by concrete during concrete curing is called heat of hydration. This exothermic reaction occurs when water and cement react. The amount of heat produced during the reaction is mostly related to the composition and fineness of the cement.

THE FIVE PHASES OF HEAT EVOLUTION IN CONCRETE

Heat evolution in concrete is a very complex and extensively researched topic. To simplify this process, the heat evolution over time can be separated into five distinguished phases. The heat profile can change depending on the type of cement. Typical hydration for Type I cement is graphically represented in the figure below.

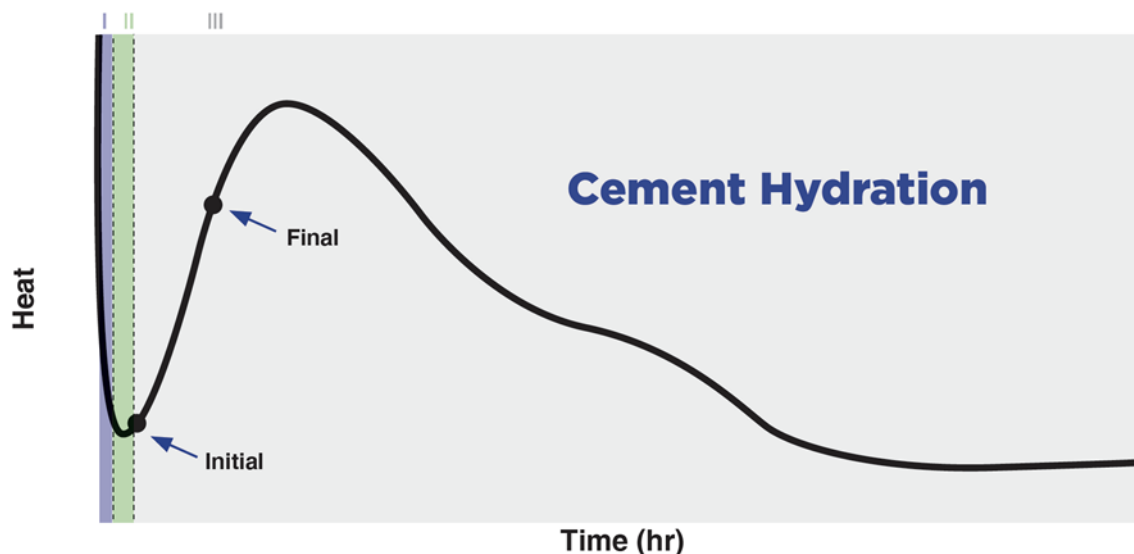


Figure 1: Heat of Hydration for Type 1 cement

PHASE I: PRE-INDUCTION

A short time after the water comes into contact with the cement, there is a sharp increase in temperature, which happens very quickly (within a couple minutes). During this period, the primary reactive phases of the concrete are the aluminate phases (C3A and C4AF). The aluminate and ferrite phases react with the calcium and sulphate ions to produce ettringite, which precipitates on the surface of the cement particles. During this phase, at a lesser extent, the silicate phases (mainly C3S) will also react in very small fractions compared to their total volume and form a very thin layer of calcium-silicate-hydrate (C-S-H).

PHASE II: DORMANT PERIOD

This phase is also known as the induction phase. During this period, the rate of hydration is significantly slowed down. Traditionally, this is believed to be due to the precipitation of the aforementioned compounds on the surface of the cement particles, which leads to a diffusion barrier between cement particles and water. Nevertheless, there is significant debate on the physical and chemical reasons behind the occurrence of this stage and the methods to predict it.

This is the period at which the fresh concrete is being transported and placed since it has not yet hardened and is still workable (plastic and fluid). The length of the dormant period has been shown to vary depending on multiple factors (cement type, admixtures, w/cm). The end of the dormant period is typically characterised by the initial set.

PHASE III and IV: STRENGTH GAIN

In this phase, the concrete starts to harden and gain strength. The heat generated during this phase can last for multiple hours and is caused mostly by the reaction of the calcium silicates (mainly C3S and to a lesser extent C2S). The reaction of the calcium silicate creates “second-stage” calcium silicate hydrate (C-S-H), which is the main reaction product that provides strength to the cement paste. Depending on the type of cement, it is also possible to observe a third, lower heat peak from the renewed activity of C3A.

PHASE V: STEADY STATE

The temperature stabilises with the ambient temperature. The hydration process will significantly slow down but will not completely stop. Hydration can continue for months, years, or even decades provided that there is sufficient water and free silicates to hydrate, but the strength gain will be minimal during such period of time.

WHY MONITOR CONCRETE TEMPERATURE?

In Phase II, the temperature of concrete can be measured as the concrete is poured. The temperature measurement is typically done to make sure the concrete is in compliance with certain specifications that define a certain allowable temperature range. Typical specifications require the temperature of the concrete during placement to be within a range of 10°C to 32°C. However, different specified limits are provided depending on the element size and ambient conditions (ACI 301, 207). The temperature the concrete exhibits during placement affects the temperature of concrete during the next hydration phase. Monitoring the temperature of the concrete during phase III and IV is a quality control component that is regularly being performed. The main reason behind this measurement is to ensure the concrete does not reach temperatures that are too high or too low to allow proper strength development and durability of the concrete. Another reason for monitoring concrete temperature during this phase is to evaluate the in-place strength, where the rate of hydration is the principal behind the maturity method (ASTM C 1074).

HOT-WEATHER CONCRETING

Generally, a limit of 70°C is specified for the concrete temperature during hydration. If the temperature of the concrete during hydration is too high, it will cause the concrete to have high early strength but consequently gain less strength in the later stage and exhibit lower durability. Furthermore, it has been observed that such temperatures interfere with the formation of ettringite in the initial stage and subsequently its formation in the later stages is promoted; which causes an expansive reaction and subsequent cracking. Additionally, high temperature issues are of concern, especially in mass concrete pours, where the core temperature can be very high due to the mass effect, while the surface temperature is lower. This causes a temperature gradient between the surface and the core, if the differential in temperature is too large it causes thermal cracking.

COLD WEATHER CONCRETING

If the ambient temperature is too low, the hydration of the cement will significantly slow down or will completely stop until the temperature increases again. In other words, there will be a significant reduction or an end to the strength development. If the concrete temperature reaches freezing before reaching a certain strength (3.5 MPa) (ACI 306), the concrete will have a reduced overall strength. This will also cause cracking as the concrete does not have sufficient strength to resist the expansion of water due to the formation of ice.

To ensure proper strength development and avoid cracking of the concrete, the general guidelines suggest that the concrete temperature must be maintained higher than a certain temperature for a specific amount of time (>5°C for 48hrs) (ACI 306).

The dangers of festive season fatigue

-Sourced from NRMA

As the year draws to a close, businesses are working hard to deliver their customers everything they need. There's often a push to get everything done before the holiday break, which can result in resources being stretched too thin.

Fatigue-related fatalities rose a staggering 49% from 2015 to 2016, highlighting the importance of employers to understand how many hours people are spending on the road and whether they're taking unnecessary risks. This also includes being aware of the dangers of fatigue and the impacts it can have on employees.

It may seem pretty self-explanatory, but it's important to note that the only solution for tiredness is sleep. It can be tough knowing whether or not your drivers have rested before they show up to work. However, highlighting the benefits of a simple power nap could do wonders. A power nap of 15 minutes can significantly reduce the risk of a crash on the road.

Indicators of fatigue

- Constant yawning
- Sore or heavy eyes
- Micro-sleeps
- Difficulty remembering the last few kilometres
- Drifting in the lane
- Changes in speed
- Daydreaming or zoning out
- Slower reaction times

In 2017, our corporate driver training instructors surveyed nearly 450 participants to better understand the threat of driver fatigue, with startling results. It showed that 65% of people surveyed admitted they had driven for more than two hours without a break within the last six months.

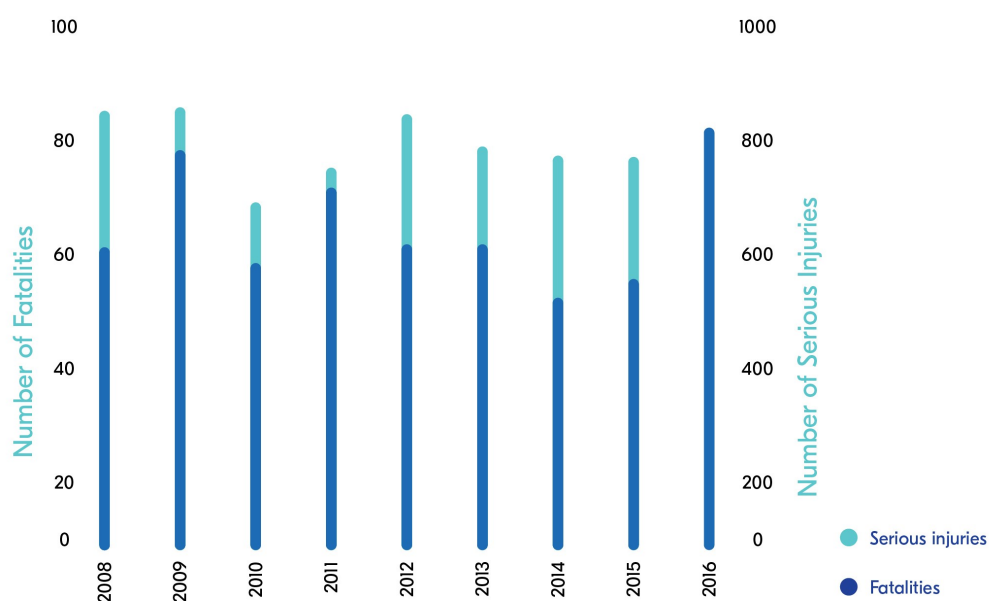


Figure 1. Fatigue related fatalities and serious injuries from 2008 to 2016

What does fatigue mean for your business?

If your workers who do a lot of driving aren't taking regular breaks at least every two hours, the consequences could be disastrous. In 2016 alone, 82 people lost their lives in fatigue-related crashes. Employee safety is not just a priority, it's a WHS obligation for any employer. By ensuring your drivers/contractors are well rested and taking adequate breaks, they're able to carry out their roles properly and safely when driving back and forth from the construction/building sites/client visits.

Creating a fatigue policy

While not mandatory under the law, an effective way to communicate to employees — and begin developing a culture of safety in the workplace — is with the implementation of a fatigue policy.

Potential fatigue policy inclusions:

- Roles and responsibilities of supervisors and workers
- Maximum shift length, average weekly hours, and total hours over a three-month period
- Work-related travel
- Control measures for specific tasks, jobs and operations
- Self-assessment checklists
- Procedures for reporting potential hazards and fatigue risks

Procedures for managing fatigued workers, including task re-allocation

Developing a culture of safety

A workplace that consistently places and promotes value on safe practices will, over time, effectively create a strong culture of safety. The culture of an organisation contributes not only to employee happiness, but also to their faith in management to make decisions that are best for their welfare. By fostering a culture of safety, leaders create a forum of support, allowing open dialogue about fatigue between employees and management. It's as simple as allowing tired employees to take a break and acknowledging requests for downtime without being dismissive. This approach can be legitimised through integration in a company's WHS policy, for example, in a no-blame attitude towards hazard reporting.

Taking action on driver safety

If you need to strengthen the driving habits of your employees and promote a safer driving culture in your workplace, it might be time to consider corporate driver training for your staff. The NRMA runs comprehensive corporate driver training programs, with an entire module focusing on fatigue awareness and management.

Participants learn about the impacts of fatigue through evidence-based learning, drawing upon statistics from 'Dead Tired', a report from the Road Safety Series. Prepared by the NRMA, the Road Safety Series aims to identify the main factors involved in road crashes, and to develop initiatives that may help reduce injuries and loss of life.

For your copy of 'Dead Tired', email the NRMA at corporatedrivertraining@mynrma.com.au.

Digging in for tunnel durability
-Australasian Corrosion Association

Tunnels that carry road, rail and utility services are usually built to minimise the cost and time it takes to move people, freight and services around a city or country. Many are built underground or through mountain ranges in order to minimise the cost of going over or around them. The longest road tunnel in the world is currently the Laerdal Tunnel near Bergen in Norway and the longest rail tunnel is the Gotthard Tunnel that was bored through the Swiss Alps.

New Zealand's longest tunnel is the nine kilometre long Kaimai rail tunnel near Apatu. In Australia, both the longest road and rail tunnels are part of high speed links to airports: rail in Sydney and road in Brisbane.

Tunnels, however, are not a modern idea; they have been an important part of public and private infrastructure for millennia. Archaeological digs through Roman ruins have uncovered evidence of tubular brick- and tile-lined hypercausts and aquifers running beneath towns and roads.

Tunnels are mostly of two types of construction. The less expensive method is referred to as “cut and cover” where a trench is dug and the road or rail or services are installed. A roof is then placed over the trench and the ground reinstated and landscaped. The alternative is to manually or mechanically dig through rock and soil and then line the inside of the tunnel with concrete for strength and stability. The road, rail or services are built or installed behind the advancing end of the tunnel.

A common design for modern tunnels is to use a boring machine to dig through the ground substrate. The development of large, mechanical machines in the mid-20th Century, simplified construction of underground tunnels. Initially, the concrete linings were cast in situ behind the excavating machine head as it worked its way slowly forward. Today, pre-cast reinforced, high-strength concrete panels are delivered to site and mechanically placed around the circumference in an interlocking pattern. Such a method is vastly different to that employed in the construction of London's 'Tube', where many of that network's older tunnels are beautiful, hand-built, brick lined constructs.

Rob Kilgour, Principal Engineer for Materials Technology at WSP - a leading global engineering consultancy, whose role covers durability planning and material selection for new projects - stated that the use of pre-cast concrete panels greatly improved quality assurance as the pieces were prepared under controlled, factory conditions.

As a tunnel is dug, a water-resistant lining system is installed to provide structural support and waterproofing. The concrete elements may be either in situ or pre-cast panels. Polymer membranes may be placed prior to installing the concrete lining—typically an approach used for cast in place linings. Where precast segments are used, a rubber gasket is used to prevent water ingress between the segments. The gaskets are made from ethylene propylene diene monomer (EPDM) rubber.

Kilgour added that it is not just the physical route that has to be checked. “When we build through brownfield sites it is essential to conduct a thorough analysis of the soil to check for contaminants,” he said. “Hydrocarbons often leak into the ground around and under industrial plants and petrol stations which can damage waterproofing membranes and the rubber seals between concrete segments.”

Building under a large modern city—such as Melbourne, Auckland, or Dubai—presents many challenges to the construction company delivering the project. The route must be carefully planned so as to avoid other infrastructure such as pipelines for gas, water and other utilities, building foundations and existing transport tunnels. When the Victorian government approved the underground rail tunnels and stations in Melbourne in the 1970s, planning the route had to take the railway deep enough to avoid much of the infrastructure and around or through the footprint of some of the city's tallest buildings. The challenge of avoiding existing transport tunnels was highlighted in the English Crossrail project when the excavating and concrete handling equipment passed just 450 mm above the roof of a platform of one of the Tube's largest and busiest stations.

One project Kilgour worked on was the underground metro train system in Dubai. “We carried out a baseline survey of all the buildings in the oldest parts of Dubai to make sure that we could prove that the tunnelling works did not cause any damage to buildings and property adjacent to the route.”

The different types of tunnelling systems are very dependent on the nature of the ground conditions.

Tunnelling through sand presents different challenges to those encountered when working through mud and rock. “A variety of techniques can be used in terrain that is soft,” Kilgour stated “These include techniques such as ground freezing or emulsification that increase the density of the ground and allow excavation and construction of the tunnel lining to be completed before the ground softens again.”

To this day, one of the greatest tunnel engineering feats is the nearly 2,000 kilometres of sewers that were dug by hand under London almost 160 years ago. Designed by Joseph Bazalgette in the mid-19th Century, the system remains a masterpiece of Victorian engineering. There are approximately 132 kilometres of main sewer where the diameter is large enough for a man to comfortably walk upright in them; while public tours were stopped decades ago, if you know the right people, it is still possible to be taken into the tunnels beneath the busy streets of central London.

Today, infrastructure requirements often call for a life expectancy of 100 years, so durability planning is starting to be incorporated into the whole design process. According to New Zealand-based Les Boulton, a Consultant to the Nickel Institute, this was not always the case. “During much of the 20th Century, it was often the case of constructing a project as cheaply as practical and letting others worry about paying for the maintenance.”

In the past, little thought was given to materials selection for durability or the potential impact this may have for the asset owners in terms of ongoing maintenance costs. This resulted in a modest construction cost but very expensive continual monitoring. Too often it was a matter of putting up with a repeating cycle of repair and replace after a structure had been built.

Boulton added “However, engineering graduates are now being taught—and then putting into practice—the concept of lifecycle costing.” Durability planning provides a method for assessing performance requirements specific to the prevailing exposure environment and required design life and controlling material selection so that the appropriate strength and grade of materials are procured and used for construction.

“In modern road and rail tunnels there is a large amount of machinery and equipment that the users rarely notice.” This equipment includes large jet fans that circulate the air in the tunnel, fixed and interactive signage, as well as the trays and brackets supporting service ducts and cables. All inaccessible or unmaintainable equipment and attachment points must be designed to last up to 100 years. According to Boulton, designs call for stainless steel to be used for casings and fixings.

Pipes for a range of services and utilities as well as servicing tunnels and large stormwater drains are often placed under the road or rail deck, in the space referred to as the “tunnel invert.”

Most tunnels—rail, communication, utility or service—are usually bare concrete because owners don't value aesthetics. “Road tunnels are often painted or tiled to give a pleasing pattern that breaks up the monotony of the view for drivers,” added Boulton.

Safety has also contributed to the move away from cheaper project options. A multi vehicle crash deep inside one of the many tunnels through the Swiss countryside in the 1980s resulted in many deaths and a fire that burned for a days. The insides were made of steel with a corrosion protection coating.

Carbon steel starts to yields at 350 degrees Celsius at which point structures can start to fail under their own weight. “You can't get excellent durability and strength from steel and paint,” Boulton said. “Everyone involved has to sign up to the planning for durability and safety.” In contrast, stainless steel can withstand temperatures of 1000 degrees Celsius.

Specifying corrosion resistant stainless steel is more expensive as a construction cost, but greatly reduces the ongoing maintenance costs. “Specifying durable materials has been slow to be adopted because maintenance traditionally is treated as an expense and is accounted for differently,” said Boulton.

To support industry, the Australasian Corrosion Association (ACA) works with private companies, organisations and academia to research all aspects of corrosion such as rubber degradation from hydrocarbons. The ACA provides an extensive knowledge base that supports best practice in corrosion management, thus ensuring all impacts of corrosion are responsibly managed, the environment is protected, public safety enhanced and economies improved.

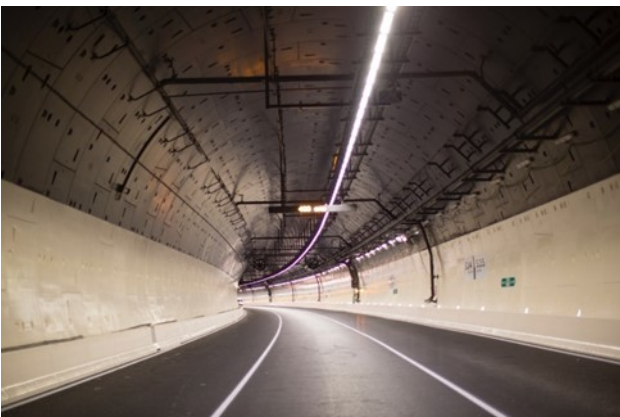


Photo: Waterview tunnel – Complete © WSP

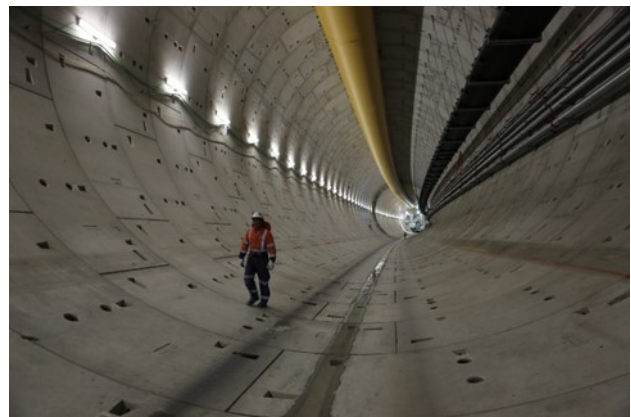


Photo: Waterview tunnel under construction © WSP

Women in Engineering

Interview with Una McKenna from Triaxial Consulting

Inside this issue we interviewed Una McKenna from Triaxial Consulting to learn a little about how she came to be where she is today within this industry.

Name

Una McKenna

Position in company/ Company name

Remedial / Legal / Insurance Team Leader at Triaxial Consulting

How long have you been working for Triaxial Consulting

Three years

What piqued your interest in the construction industry or engineering in general?

My interest in the construction and engineering industry began when I was 8 years old, each Saturday I would beg my parents to let me 'go to work' with my dad on his building sites (my dad was a builder).

Once in a blue moon I wore my parents down enough, that I was given the golden ticket to get out on site (defying all Health & Safety requirements of the time, haha). I have always loved seeing how things were constructed and how buildings worked, and this passion has increased with age.

What has been your most exciting project you've been involved in to date?

The most exciting project has been during my time with Triaxial Consulting. The project was Remedial and Upgrade works to a heritage building located in Rose Bay, NSW.

We worked along with the Architect, local Council and the Owners to complete Remedial Upgrade Works to the external facade, external walkways and balcony structures at this building. The main challenge was ensuring that the upgrade works to the superstructure and facade met current Australian Standards and National Construction codes whilst ensuring aesthetically that the finish was sympathetic to the building's era (circa 1920).

I found this project both exciting and challenging, the original investigations provided me the opportunity to reveal and understand the buildings history and the varying methods of construction used and the remedial works completed will provide longevity and additional lifetime to the existing structure.

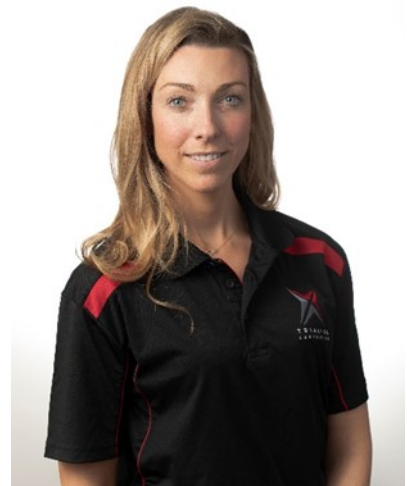
What's been your career accomplishment to date

My biggest accomplishment to date is being promoted to Remedial / Insurance / Legal Team Leader with Triaxial Consulting.

I am so proud to work for a forward-thinking company that promotes change and equal opportunity for our own people (within the company) and right across the industry.

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 real job was with Mouchel (now known as WSP) as Technical Monitor on the A4 Highway upgrade and extension, which is the single largest road scheme to date in Northern Ireland. I think my first boss would be extremely proud of my achievements to date, and how I have progressed in the industry. He encouraged me from the beginning and taught me that it doesn't matter who I am, it matters if I have the skills and capabilities to do the job.



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

Each and every day in the remedial world is so different.

I love what I do as there is never an opportunity to be bored, it can be and challenging, changing and engaging.

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

The choice, which is a memoir written by Dr Eva Edith Edgar. This book is about Edith surviving the Holocaust and overcoming its ghosts of anger, shame and guilt. Her story shows the resilience of the human spirit and the power of choice that we all have in our lives.

This book has influenced me to choose what I want to do and do it well.

If you could go anywhere in the world for a holiday or adventure where would you chose? What's on the bucket list?

Where do I start..... (haha).

Ireland will always be on my bucket list, I love going back home and exploring new parts of the country, especially the older listed (heritage) buildings and castles.

I would also love to visit Cuba to check out their Colonial architecture and vintage cars (and maybe try some of their rum).

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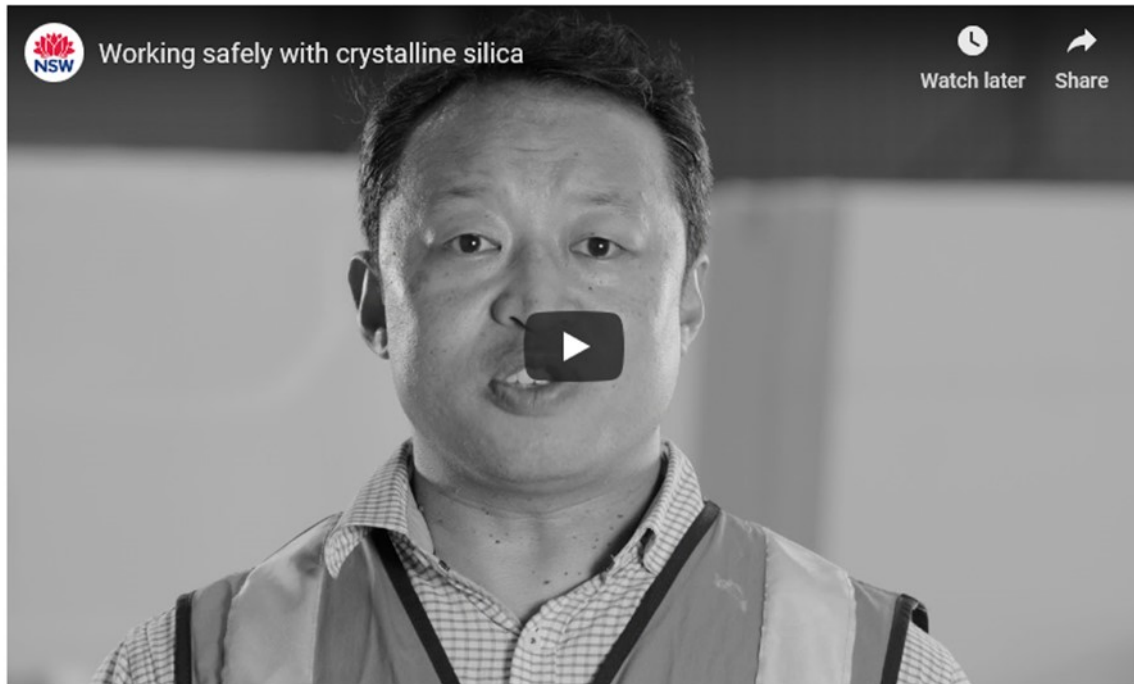
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Crystalline Silica -SafeWork NSW

Crystalline silica (quartz) is a naturally occurring mineral found in most rocks, stone, sand and clay as well as in products such as bricks, concrete, tile and manufactured stone.

Working safely with crystalline silica - [video safety alert](#)



Working safely with crystalline silica - video safety alert

Crystalline silica - a priority chemical

The NSW Work Health and Safety Roadmap has a target of a 50 per cent reduction in serious injuries and illnesses by 2022, including reducing exposures to priority hazardous chemicals and materials by 30%. Through the implementation of the [Hazardous chemicals and materials exposures baseline reduction strategy \(PDF, 3004.06 KB\)](#), the level and impact of workplace exposures to hazardous chemicals will be identified and reduced.

A priority list of 100 chemicals based on national and international research was developed, in which crystalline silica ranked the second highest priority.

Uses for crystalline silica

Crystalline silica is a very common mineral found in natural and manufactured stone as well as building products such as concrete, tiles and bricks.

Engineered materials containing silica, such as manufactured stone, are used in kitchen benches and counter tops.

Workers will also come across silica when excavating or tunnelling through sandstone

Harms from crystalline silica

Very fine particles of crystalline silica dust, which are 100 times smaller than a grain of sand, (known as respirable crystalline silica) is harmful when inhaled into the lungs. Airborne dust is most likely to occur when materials or products containing silica are cut, sanded, drilled or handled in any other way that creates fine dust.

Exposure to silica dust can lead to a number of serious illnesses such as:

- silicosis – a scarring of the lung which can result in a severe shortness of breath and is not reversible. Severe cases can be terminal or require a lung transplant
- lung cancer
- kidney disease
- chronic obstructive pulmonary disease (COPD)

Adequate controls such as limiting the generation of airborne dust and use of personal protective equipment can prevent hazardous exposures and illness in the workplace.

The workplace exposure standard (WES) for respirable crystalline silica (RCS) is 0.1 mg/m³ 8 hour Time-Weighted Average. Guidance on interpreting exposure standards is available in the [Guidance on the Interpretation of Workplace Exposure Standards for Airborne Contaminants](#) (Safe Work Australia).

Protecting yourself and others

- eliminate where possible, tasks that generate dust
- substitute where possible with safer products
- use exhaust ventilation systems to capture and remove dust at the source
- use dust capture systems on portable tools
- apply water suppression systems to reduce dust generation
- use well maintained and appropriate personal protective equipment (eg – face masks)
- use water or an approved vacuum cleaner (class M or H) to clean up dust and avoid using compressed air or sweeping
- follow instructions and controls outlined in safety data sheets and product labels

conduct regular air monitoring to confirm everyone at your workplace is working within safe levels of exposure.

Health Monitoring

Workers who may be at significant risk of exposure to crystalline silica must be offered regular health monitoring (chest x-rays and lung capacity tests) by their employer. Insurance & Care NSW (icare) offers subsidised health monitoring to businesses across NSW through its [Lung Screen service](#).

Complete our [health monitoring webinar](#) to understand when health monitoring is required and your regulatory requirements. Eligible businesses who complete the webinar can apply for a \$500 [small business rebate](#).

Other articles that may interest you on the subject are from our recent ACRA QLD Trade Show speakers-

[QLD Innovations in Concrete Repair & Protection presentations](#)

Martin Stirling from Hilti presentation, [click here](#).

For a copy of Hamid Khan of Fosroc's paper Be Prepared-Is Surface Preparation for Concrete Repairs a FAD? [click here](#).



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Working in Weather -SafeWork Australia

Around a quarter of Australia's workforce are employed in jobs that may require working outdoors for at least some of the time.

Working in bad weather

If you work outside, you're at risk of exposure to bad weather conditions including storms, wind, rain, and lightning. Your workplace must have measures in place to manage the risks to your health and safety caused by bad weather, including:

- working indoors (where possible)
- postponing outside work
- providing access to shelter
- securing structures and objects and turning power off, and
- providing protective equipment, like eye protection.

Eliminating exposure to bad weather is the best protection.

Find out more

Detailed guidance in [model Code of Practice: *Managing the work environment and facilities*](#).

Check out BOM for [weather warnings and forecasts](#) where you are working.

Working in sun

If you work outside, you're at risk of exposure to ultra violet radiation from the sun, even when it's cloudy.

Sun exposure can cause permanent and irreversible damage to the skin. Your workplace must have measures in place to prevent sun-related disease and injury, including:

- working indoors (where possible)
- working outside only during mornings and afternoons
- providing shade and shelter, and
- using sun protective clothing, hat, sunglasses and sunscreen.

Eliminating exposure to ultra violet radiation is the best protection.

Find out more

Detailed guidance in the [Guide on exposure to solar ultraviolet radiation](#).

Check out BOM for [the predicted UV index](#) where you are working.

Working in heat

If you work outside, you're at risk of exposure to heat.

Working in heat can cause heat-related illness including fainting, heat rash, heat cramps, heat exhaustion, and heat stroke. Working in heat can also cause dehydration, burns, and can even reduce concentration and change the way your medications work.

Your workplace must have measures in place to manage the risks to your health and safety caused by working in heat, including:

- working indoors (where possible)
- postponing work or scheduling it for cooler parts of the day
- using automated or remote-controlled equipment instead of manual labour
- providing access to shelter
- encouraging workers to drink water regularly
- cooling the work area with fans or misters
- scheduling frequent rests, and
- providing personal protective equipment like hats.

Eliminating exposure to heat is the best protection.

Find out more

Detailed guidance in [Guide for managing the risks of working in heat](#).

Check out BOM for [heatwave forecasts](#) where you are working.

Working in cold

If you work outside, you may be at risk of exposure to extreme cold.

Prolonged exposure to cold can result in hypothermia, a serious condition that requires immediate medical attention.

Your workplace must have measures in place manage the risks to your health and safety cause by exposure to cold weather, including:

- providing heating, for example cab heaters
- providing protection, such as a hut or the cabin of a vehicle
- providing warm and waterproof clothing, and
- enabling workers who are not used to working in cold conditions to acclimatise.

Eliminating exposure to cold is the best protection.

Find out more

Detailed guidance in the [model Code of Practice: Managing the work environment and facilities](#).

Check out BOM for [weather warnings and forecasts](#) where you are working.



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Industry News

Marine and Civil Maintenance (MCM)

wishes to announce that it has recently appointed a new General Manager, Nick Critchley, and established an office in Melbourne, Victoria, which will allow the business to comfortably continue growing and providing its clients with the highest level of service. Nick is a highly experienced and well-regarded engineer and manager, and we are delighted that he has joined our growing team at a very senior level.

“It’s been an absolute pleasure joining the strong team at MCM and working with them over the past number of weeks. MCM has operated throughout Australia since its inception in 2001 and its unique service skills and business model has seen it develop into a well-respected, specialist contractor, focused on remediating infrastructure assets to achieve a more sustainable future.

I look forward to contributing to the positive trajectory of the business by partnering with our clients to ensure that their objectives are met and exceeded. Establishing a Melbourne base supports both our clients’ and our business’s purposes, ensuring mutual benefit,” said Nick Critchley. MCM’s Melbourne Office is located at The Commons, 36 – 38 Gipps Street, Collingwood, Victoria, 3066.

All enquires can be directed to Nick Critchley - m. 0448 231 987, e. nickc@marineandcivil.com.au.



All enquires can be made at 03 9088 3633 or www.absafe.com.au/

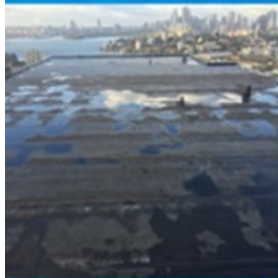
Absafe are excited to announce the official opening of their Retail Showroom at 1-3 Chickerell St, Morwell VIC.



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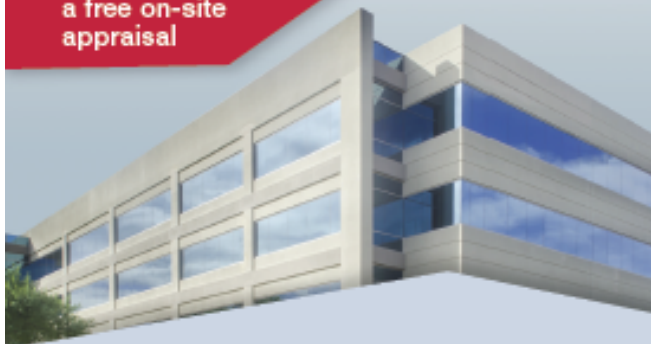


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Improving mental health on construction sites -Safety Solutions

A new mental health partnership has been forged between the [Black Dog Institute](#) and [Target Tradies](#).

It will take advantage of Target Tradies' access to construction sites and the Black Dog Institute's research into mental health to roll out positive mental health messaging across Australian construction sites.

Research has shown that, compared to other industries, those in construction are at a higher risk of experiencing mental health problems.

Under the partnership, a series of creative posters will give construction workers pragmatic, useful and relevant tips on how to support mental health. The aim is to help make thinking about mental health as normal as thinking about physical health and safety on-site.

The posters also ask readers to "mind your mates", in a bid to reduce stigma and to get readers to support their colleagues' mental health, as well as their own.

"We know that people in the construction industry have a strong culture of safety, and looking out for their mates," said Black Dog Institute research fellow Dr Mark Deady.

"We wanted to extend that way of thinking to mental health — knowing what the danger signs are, and either being there to help out a mate or knowing where to seek help for yourself."

The posters are bold and attract attention, using a play on words like "stressed and can't nail it?" to make the signs and symptoms of mental illness relatable and quickly understood.



Target Tradies founder Michael Blumberg said he and the company are excited to share the engaging messages across their construction sites.

“As a company, we are committed to improving awareness of physical and mental wellbeing of workers on-site. We hope that through campaigns like this, more in the industry will see how we can improve on-site safety and come on board with this great initiative,” he said.

“We have backed this with support and sponsorship of The Black Dog Institute since the beginning of 2018.

“Our media is uniquely placed within the construction sites, specifically in dwell spaces. Here tradies have the opportunity to read messages and hopefully act on them.”

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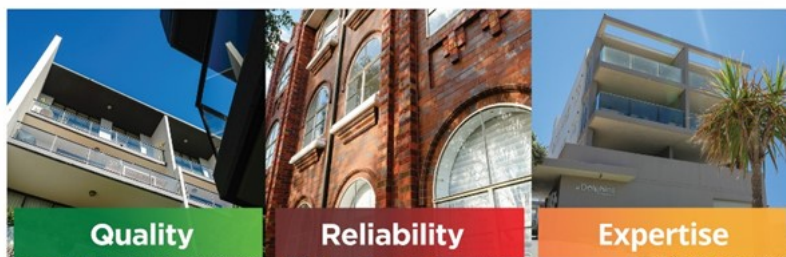
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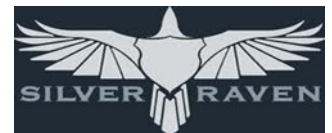
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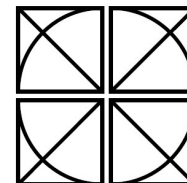


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