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About the Cover

The only TL-2 TMA currently available in Australia to have been successfully tested, passed & certified to MASH Standards, the Scorpion II® METRO delivers the ideal combination compact manoeuvrability and live-saving MASH TL-2 protection for work crews on suburban streets and local roads..

► Turn to **Page 12** for the full story.



Local parking critical for local small business

Dear Readers,

How many times have you decided to have dinner at a restaurant in one of the many popular restaurant strips that now adorn most, if not all, of our major capital cities, only to find that when you arrive in the vicinity of the restaurant - there is nowhere to park.

The street spaces in the immediate vicinity are all taken, the only parking station in the entire area (if there is one) is displaying a 'Full' sign, and perhaps worst of all, after travelling down the nearby side streets for what seems an eternity and finally finding what appears to be an available parking space, you are greeted by a parking restriction sign that informs you that the long sought-after available space is reserved for 'Permit Holders Only' or is restricted to 15, 30, or 60 minutes parking at all times.

For those of you who have had a similar experience to the above scenario (and I would be surprised to find someone who hasn't been in a similar situation at least once), I'm sure that you'll agree that even just recounting an experience such as this is enough to elevate the blood pressure.

In short, for all the convenience and ease of access that our motor vehicles provide, there is nothing quite as inconvenient as having a motor vehicle for which you cannot find a parking space.

While there can be no doubt that the rapid growth in the number of dining establishments

throughout many Australian cities and suburbs over recent years has delivered a significant range of benefits (including increased employment opportunities, improved amenity for locals and visitors and a significant increase in secondary revenue flows within the surrounding areas), the associated increase in traffic flows and demand for local parking often result in traffic and parking chaos.

In a country such as ours, where most are fortunate enough to have the financial resources and time to take advantage of a range of entertainment options, dining out has become a popular choice, and for the most part, the rapid growth in the number of restaurants throughout Australia is simply a case of supply attempting to keep up with demand.

The majority of councils throughout Australia invest a significant amount of time and effort encouraging business growth and economic development within their municipalities. Needless to say, for many councils, establishing a 'restaurant/dining precinct' makes good commercial sense. After all, only successful businesses are demand driven, and when it comes to eating out, there would seem to be an almost insatiable demand.

One only has to look at the massive rebound in the 'dining out' economy following the end of Covid-related lockdowns to see how much Australian's love to dine out!

While there can be no denying the devastating impact the Covid has had - and continues to have - on the hospitality sector, for many businesses the lack of appropriate traffic and/or parking infrastructure nearby remains a serious threat to their ability to rebuild their businesses in the aftermath.

Vehicular access and parking are critical issues when it comes to sustaining a business in the suburbs - particularly in restaurant and entertainment precincts. And with so many businesses still attempting to rebuild in the wake of Covid-related limitations, ensuring easy access for patrons has perhaps never been more critical.

With that in mind, it is clear that more needs to be done to overcome these issues. Even though there is clearly no 'magic solution' to these issues, one thing is clear, doing nothing and ignoring the problems of poor vehicular access and a lack of available parking spaces will cost businesses and jobs. People will eventually tire of the traffic jams and the seemingly endless search for a parking space, and when that happens... most will end up going elsewhere.



Anthony T Schmidt
Managing Editor

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MASH TL3 Compliant Roadside Safety Barrier

Introducing MashFlex, a member of the Flexfence family, the next generation wire rope safety barrier (WRSB), providing superior motorist safety and more metres of barrier for your dollar. The superior design and clean lines of the FlexFence WRSB have seen it become the road safety industry's preferred wire rope barrier. These design characteristics have continued in this next generation of the product, MashFlex, with an improved design and simplified assembly sequence.

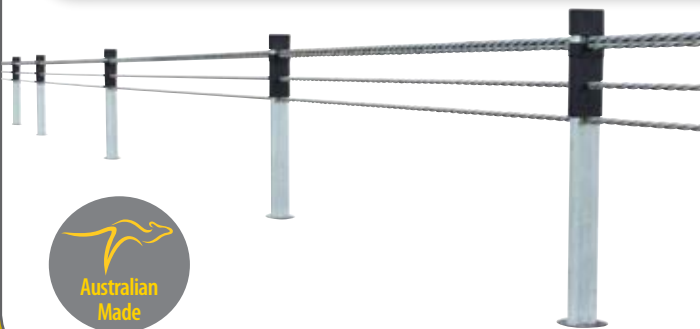
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AustStab announces its 2021 Conference

After the disappointment of having to cancel its 2020 conference, AustStab is very pleased to advise that registrations are now open for the **2021 Australian Pavement Recycling and Stabilisation Conference**, which will be held at the Novotel Brighton Beach, Sydney on Wednesday 28th July 2021.

The theme of this one-day technical conference is *Pavement Recycling for Sustainable Roads* and will cover research outcomes, stabilisation for Local Government, construction excellence and sustainability.

"The Pavement Recycling and Stabilisation Conference will be an important opportunity for road pavement asset managers to learn more about the sustainability and resiliency benefits of stabilised pavements," said AustStab CEO Stuart Dack.

"It is being increasingly realised that pavement recycling and stabilisation, particularly through insitu processes, brings increased resiliency and associated whole-of-life benefits on top of those attributes already recognised by pavement engineers, including significant up-front cost savings, speed of construction and associated lack of public disruption and, most importantly, environmental benefits derived from reuse of existing insitu pavement materials."

"This will be the 26th Anniversary of AustStab and having missed the chance last year to celebrate 25 years, we're looking forward to the opportunity to both recognise the unique nature of AustStab as an organisation, but also to focus at our conference on the important attributes of sustainability and resilience that are able to be delivered by pavement recycling and stabilisation processes."

"This will be a conference not to be missed by anyone involved in pavement design and construction that has an interest

in pavement recycling and stabilisation."

The full three day program also offers the opportunity to play as well with a social, but very competitive golf and putting competition preceding the conference.

Following the conference will be the **AustStab Annual Awards Gala Dinner** at which the 26th Anniversary will be celebrated and presentations made of the annual *AustStab Awards of Excellence*, sponsored by Caterpillar.

AustStab will also conduct its Annual General Meeting the following day for those interested in the activities of AustStab.

Full registration details for the conference and associated AustStab AGM and social events are available on the AustStab website at: www.auststab.com.au/conference-and-agm/

About AustStab

AustStab was established in 1995 to provide a unified approach to the recycling and stabilisation of road pavements across Australia and to develop national standards of research and performance.

AustStab is considered to be the only national industry association in the world that is solely dedicated to stabilisation of pavements using insitu and plant-based modification of pavement materials and has been instrumental in bringing together the experience of road authorities, contractors, consultants and suppliers to develop unified specifications and design and construction methods.

The pavement recycling and stabilisation industry has developed under the stewardship of AustStab to become a sophisticated pavement management process undertaken by specialised plant and equipment. Modern processes are capable of the full range of pavement recycling and stabilisation, including deep-lift construction, and can deliver a range of benefits to pavement design and road maintenance engineers.

The objectives of AustStab are to:

- promote the benefits of pavement recycling and stabilisation,
- set national standards of performance,
- assist and coordinate research, and
- educate and train people in the industry.

Quality Assurance

AustStab provides independently assessed assurance of quality through an accreditation scheme run in collaboration with the ARRB Group. The *AustStab/ARRB Accreditation Scheme* focuses on ensuring pavement recycling and stabilisation works are carried out to best practice.

Training Courses

AustStab, in conjunction with the Centre for Pavement Engineering Education (CPEE), runs *Stabilisation Fundamentals* courses across Australia every year. This course briefly reviews the types of stabilisation before more detailed presentations on types of binders, material characteristics, structural and mix design detailing, with sessions on specifying and case studies for practical outcomes.

Technical Publications

AustStab provides detailed technical information on design, testing and construction for pavement recycling and stabilisation. AustStab also engages in research and trials and shares the results throughout the industry to increase the knowledge base and promote improved outcomes.

Available technical resources include national model specifications, national guidelines, construction tips, technotes, research reports and comprehensive guides, including the popular *Pavement Recycling and Stabilisation Guide* and the *Insitu Stabilisation Construction Guide*.



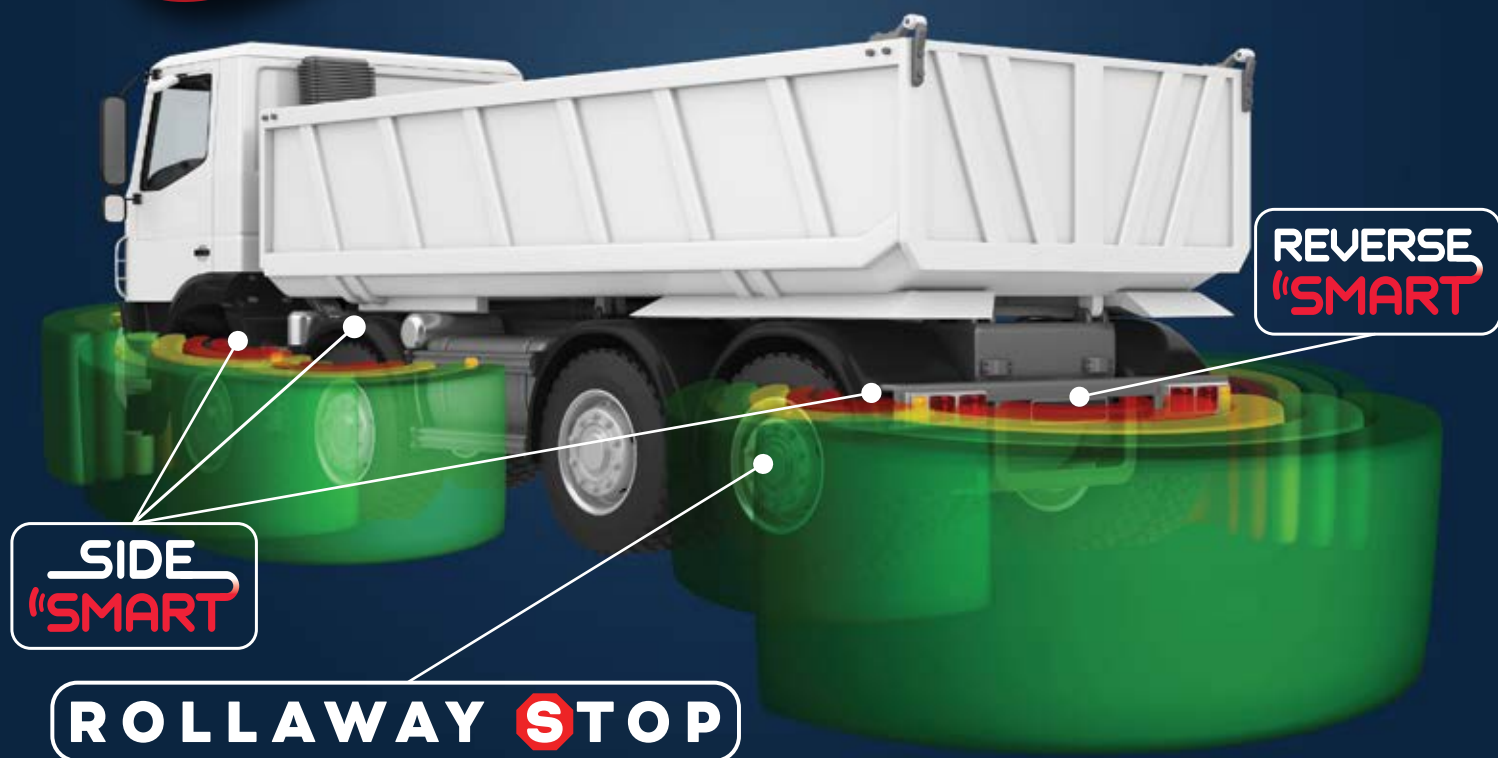
Australian Pavement Recycling and Stabilisation Conference

Pavement Recycling for Sustainable Roads

Novotel Brighton Beach, Sydney • 28th July 2021



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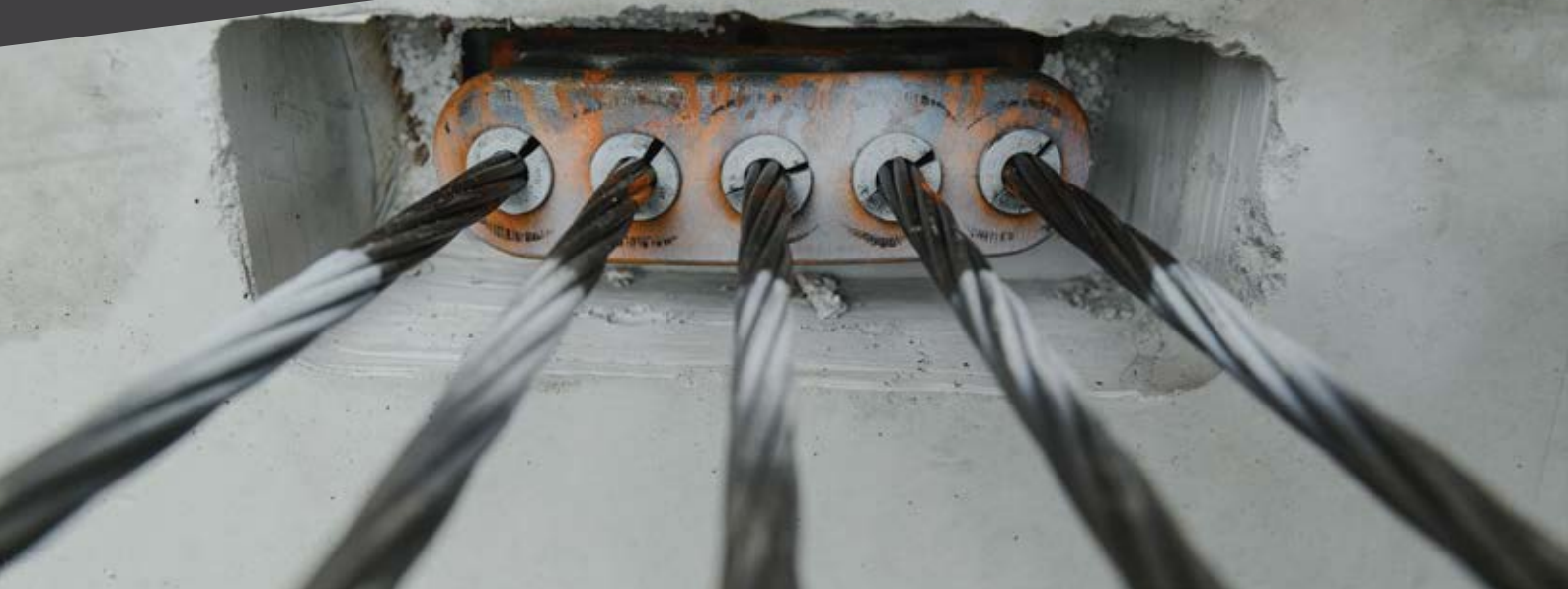
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New post-tensioning scheme launched to boost infrastructure and construction sectors

Australia's infrastructure and construction sectors are set to benefit from the introduction of rigorous new standards for post-tensioning – the method of reinforcing concrete with high-strength steel strands or bars. Post-tensioning is widely used in commercial buildings, infrastructure and residential apartment blocks as it provides greater design flexibility and speed of construction. It also reduces the amount of concrete or other materials required in construction processes, representing a more economical and environmentally friendly solution.

The new standards, which are specifically designed to provide greater assurance in construction supply chains nationwide, are backed by an independent certification scheme – providing complete transparency and clarity for manufacturers and contractors.

In developing the scheme, CARES has engaged with all stakeholders including structural engineers, major contractors, clients, the Post-Tensioning Institute of Australia (PTIA) and the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS). This new product certification scheme includes both safety-critical installations as well as products entering the supply chain covered by ACRS certification.

Along with enhancing industry expertise, the scheme will complement ongoing activities by State and Territory governments to enhance quality control in built structures through digitalisation of supply chains and proven assurance measures.

The PTIA and CARES are now engaging with structural engineers, major contractors,

clients and other key stakeholders, including ACRS, to build awareness and engagement in the local market.

PTIA CEO James Woods and CARES CEO Lee Brankley said today's announcement was expected to lead to ongoing improvements in the consistency of construction nationwide, following two years of detailed discussions between the organisations.

"Our overriding goal has been to secure continuing improvements in product standards, materials specification, design and onsite installation," Mr Woods said.

"We are delighted to have been involved with CARES on this, and I am confident our members and the wider industry will seize the opportunity to tap into the vast experience and knowledge that CARES is bringing to Australia.

"The scheme will bring much-needed certification and independent regulation to the industry, and is a workable solution at a time of increased scrutiny on building quality."

Mr Brankley said working with the PTIA was a natural evolution of long-standing collaborative relationships and reflected CARES' commitment to effective multi-stakeholder engagement with clients, consultants and contractors.

"We are confident this scheme will work well for the good of the industry. Thanks to CARES' long track record it is already a proven success in the UK, and as well as Australia is also now being adopted in several other countries."

"We expect colleagues will quickly see improvements in quality through transparency in supply, installation and

performance, and much greater clarity around the provenance of critical materials sourced for Australia's built environment," Mr Brankley added.

The new scheme covers contractors installing post-tensioning systems, producers of prestressing anchors and pre-bagged grout, plus firms that carry out remedial grouting of post-tensioned tendons.

ABOUT THE POST-TENSIONING INSTITUTE OF AUSTRALIA

The Post-Tensioning Institute of Australia (PTIA) was formed to represent the post-tensioning contracting industry in Australia, seeking to maintain a viable and competent industry with high standards in design and construction of post-tensioning systems for the benefits of its members, their employees, and their clients. Post-Tensioning Institute of Australia

ABOUT CARES

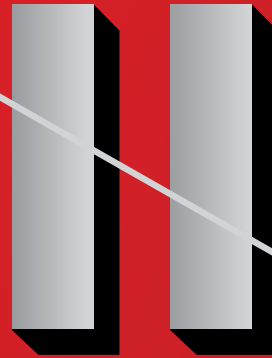
CARES is an independent, not-for-profit certification body, established in 1983 to provide confidence to the users, purchasers and specifiers of reinforcing steel through a regime of regulation, testing and inspection. It operates for the benefit of the construction industry offering certification schemes for companies that produce materials, components or offer services, primarily to the reinforced concrete industry. Clients can specify CARES approved companies and products with confidence that they will comply with the relevant product or system standards and without the need for verification testing by the purchaser or contractor. There are over 100 producers of reinforcing steel in more than 40 countries around the world already approved by CARES.



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Hamish Kerr
GradIEAust





Image courtesy City of Sydney

Sydney pop-ups to go permanent as rider numbers rocket

Sydney's pop-up cycleways will be in place for up to two years and two popular cycle routes will become permanent under plans approved by the City of Sydney.

The City is now drawing up designs for permanent separated cycleways on Pitt Street in the CBD and Henderson Road, Railway Parade and Bridge Street in Erskineville. The remaining cycleways on City-controlled roads will stay in place further monitoring, consultation and evaluation takes place.

Concept designs for a cycleway along the missing link on Liverpool Street outside the Downing Centre and the return of the popular College Street cycleway have also been given the green light.

Lord Mayor Clover Moore said Sydney's pop-up cycleways were offering people more transport options, while helping to reduce road congestion and over-crowding on public transport.

"When Covid hit, we worked with the state government to install pop-up cycleways – a key element of its emergency transport response," the Lord Mayor said.

"These cycleways have shown us we can make roads safer for riders, calm traffic and create attractive environments that leave room for people, provide space for outdoor dining and support surrounding businesses.

"Recent Covid outbreaks underscore how important our investment in wider footpaths and separated cycleways will be in helping to prevent the disease from spreading.

"Across Greater Sydney there has been a 40 per cent increase in people riding since

the pop-ups were installed, and many who took to cycling through the pandemic will continue to ride.

"The growth in people using the Pitt Street cycleway is unprecedented, with a 500 per cent increase in the number of people riding there."

The cycleways are part of the planned bike network in the City's cycling strategy and action plan 2018-2030.

Justin Hamley has been a bicycle courier for 10 years and has seen the installation of Sydney's cycleway network firsthand. He says the Pitt Street cycleway has "transformed" the inner-city for people on bikes.

"Before the pop-up cycleway it was very difficult for bike riders to navigate the area safely. The Pitt Street path is great and is now a favourite route for commuters, couriers and food delivery riders," Mr Hamley said.

"10 years ago there were no bike paths and only very confident riders were on the roads. The Sydney network still needs work to connect, but there a lot more people of all levels enjoying riding."

Jo Lees, construction manager at global property firm Hines, regularly cycles to her Hunter Street office from Rockdale. She says Pitt Street provides a "missing link" in her journey and welcomes it becoming permanent.

"As cycleways become more prevalent, people are more educated about safety. You still get some phone zombies and people turning never seem to look, but I think people are getting better at sharing the roadways and by and large there's growing tolerance of people on bikes," Ms Lees said.

"I started riding to work when I lived in Marrickville to get fit. Since Covid, I've chosen to ride to avoid public transport. It's 50 minutes door to door, which is not much more than public transport, and I really feel it's the healthiest transport choice."

Extensive monitoring, evaluation and rider surveys show a rise in cycling across all the pop-up cycleways, including:

- **Pitt Street**

- o This two-way separated cycleway sees 6,000 weekly bike trips on average
- o Before the pop-up cycleway was installed, around 89% of people riding a bicycle on Pitt Street were using the footpath
- o The road space changes have significantly enhanced the amenity for people walking and provided more outdoor space for businesses to operate
- o A survey of pop-up cycleway users found the perceived safety of people has also improved, with 97 per cent of people surveyed feeling safer riding on the separated cycleway.

- **Henderson Road, Railway Parade and Bridge Street, Erskineville**

- o This route was selected to address a missing link between Erskineville-Ashmore and the city
- o Since the first week of opening in July 2020, the number of bike trips has increased more than 30 per cent to an average of 2,900 trips a week and the number of women riding has increased
- o A survey of pop-up cycleway users found perceived safety has also improved. Over 90 per cent of people surveyed felt safer riding on the separated cycleway.

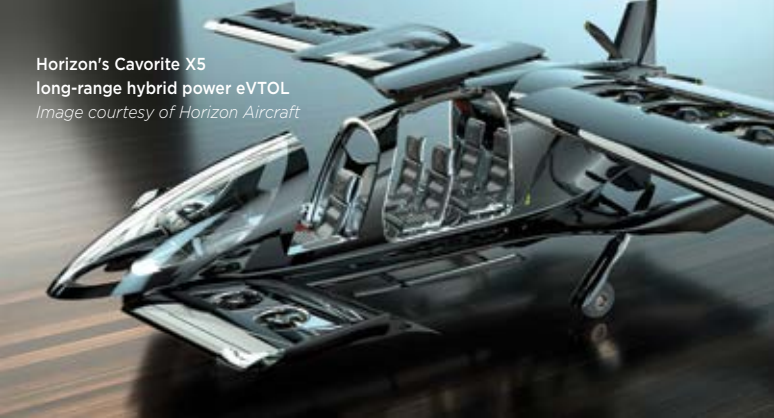
- **Dunning Avenue, Rosebery**

- o The pop-up cycleway on Dunning Avenue connects to Green Square town centre and to George and Bourke streets cycleways, which are key connections into the city centre. It also connects to the south with a shared path on Gardeners Road
- o Plans for a permanent cycleway in a different arrangement are being developed following monitoring and feedback from riders. Consultation on the concept plan is planned for later this year.

- **Fitzroy Street and Moore Park Road**

- o The City of Sydney is working with the state and federal governments and Woollahra Council to develop a cycleway on Oxford Street between Hyde Park and Centennial Park. The community will be consulted on concept designs
- o Once the Oxford Street cycleway is completed, the City of Sydney plans to remove the pop-up cycleways on Moore Park Road and Fitzroy Street.

A free Sydney cycling map, including all pop-up and permanent cycleways, can be ordered from the City of Sydney's website or download as a digital copy. Visit: www.cityofsydney.new.gov.au



Commercial urban air mobility passenger routes predicted by 2025

New research with eVTOL professionals, reveals 56% believe the first commercial urban air mobility passenger routes will be operational by 2025. A further 15% think this will happen between 2026 and 2029, and only 25% think it will happen after 2030.

The research was commissioned by Horizon Aircraft, the advanced aerospace engineering company that has developed the Cavorite X5, the world's first eVTOL (Electric Vertical Take-off and Landing) that can fly the majority of its mission exactly like a normal aircraft.

In terms of which countries will have the biggest and most advanced eVTOL markets by 2030, respondents predicted Canada, China and America would be the top three.

The Aerospace Industries Association estimates that the US mobility market will create 280,000 jobs by 2035. Globally, 48% of eVTOL professionals interviewed as part of Horizon Aircraft's research believe the sector will create between 350,000 and 500,000 jobs by then, 12.5% believe the figure will be between 500,000 and 600,000 and 28% think it will be higher than this.

Brandon Robinson, CEO and Co-Founder of Horizon Aircraft said: "Our research shows huge optimism amongst those working in the eVTOL sector. Many believe it is only a few years before the first commercial urban air mobility flights will take place, and this will generate a huge number of jobs and create significant revenue globally."

On 18th February 2021, Astro Aerospace, a global leader in eVTOL aerial vehicles and drones, entered a binding agreement to acquire Horizon Aircraft Inc. The transaction is expected to close on or before the beginning of 2nd Quarter pending customary closing conditions.

Astro, a pioneer in the eVTOL market, has developed one of the market's safest and most efficient eVTOLs in the world. In 2018, the Company's drone, 'Elroy', was one of the first to seamlessly fly with humans on board. Astro continually defies traditional aviation design, and the acquisition of Horizon will only push the Company further, with the ability to reach greater heights working in tandem with Horizon's exceptional team.

ABOUT HORIZON AIRCRAFT INC.

Horizon Aircraft is an advanced aerospace engineering company that has developed the world's first eVTOL that can fly the majority of its mission exactly like a normal aircraft. This has resulted in industry-leading speed, range, and operational utility.

Our unique designs place the mission first and prioritize safety, performance, and utility. Our Cavorite X5 eVTOL will enter the market quickly, and will service a broad spectrum of early use-cases that will generate revenue immediately.

Our mission is to produce an eVTOL for real-world applications that provides a safe, efficient, and sustainable mode of aerial transport.

Visit www.horizonaircraft.com for more information.

ABOUT ASTRO AEROSPACE

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PAVING THE WAY: Australia's largest environmental road project using Reconophalt underway at Stockland Minta

Berwick in Melbourne's outer south-east will be home to Australia's largest environmentally friendly road project using surfacing material made from *Reconophalt*. The project, currently underway at one of Australia's largest diversified property groups' latest communities, Stockland Minta, will deliver more than two kilometres of roadway.

Reconophalt is a road surfacing material that contains highly recycled content derived from waste streams (soft plastics, toner, glass and reclaimed road) that would otherwise be bound for landfill or stockpiled. It is a type of asphalt that does not cause any harm to the environment or exude harmful fumes.

The Minta *Reconophalt* project is a combination of work between Stockland, City of Casey Council, Downer Road Services and Winslow Constructors Australia. The *Reconophalt* product is currently being laid in stage 15 at Stockland Minta, a master-planned residential community located in Berwick, south-east of Melbourne. The community will comprise traditional home sites, house and land packages and townhomes with over 22 hectares of conservation area, drainage reserve, tree reserve and public open spaces with lakes.

Stage 15 is forecasted to be completed in early 2021. Upon completion, and combined with stages 17 and 18, the total length of road will be 2,430 metres and the total area of pavement will be 17,800 square metres. Stage 15 alone is using 980 metres of the material.

The material from Stage 15 will divert from landfill approximately 1,356,000 plastic bags,

39,610 printer cartridges and 724 tonnes of recycled asphalt – saving the equivalent of 23.08 tonnes of carbon dioxide and 9.5 cars coming off the road for one year. Stockland worked closely with the City of Casey to achieve approval to use *Reconophalt* for the Minta project.

Kerry Balci, Stockland Project Director, said: "Stockland is committed to using sustainable materials. Our sustainability approach focuses on our opportunity to deliver shared value; specifically through our responsibility to create the right balance of social, environment and economic outcomes for our stakeholders, now and into the future.

"We're proud to put Minta firmly on the map with this movement. This environmental initiative is one of the first of many Stockland projects that will be using recycled asphalt - helping grow our communities while being as kind to the environment as possible," Mrs Balci said.

Karen Winsbury, Downer, Group Manager Corporate Affairs said: "There has never been a greater need to reduce the amount of waste going to landfill with soft plastic, tyres, glass and excavation waste being major issues globally.

"We needed to minimise the extraction of natural resources for use in this much needed infrastructure development - that's why Downer has invested heavily over the past 10 years to create economic, social and environmental benefit for our customers and their communities by pulling products, not pushing waste. The project at Stockland

Minta is a great example of forward-thinking, large scale projects that use these materials," Ms Winsbury said.

Earlier this year Stockland brought forward their commitment to achieve Net Zero Carbon emissions by 2028, two years earlier than the original target of 2030 as part of their sustainability strategy.

***Reconophalt* can contain range of recycled content, including:**

- Soft plastics from plastic bags and packaging collected by the community and deposited in collection bins at Coles and Woolworths Supermarkets under the Redcycle Scheme
- Waste glass diverted from landfill
- Waste toner from used print cartridges collected under the Planet Ark Scheme
- Reclaimed asphalt pavement (RAP) from end-of-life roads
- Crumb rubber from end-of-life tyres
- Coarse aggregate and sand from street sweeping and hydro-excavation materials processed at Downer's and Repurpose It's detritus processing facility.

Importantly, *Reconophalt* brings no increased environmental risk compared to standard asphalt while providing considerable sustainability and performance benefits.

Whether it's a TL-2 or TL-3 attenuator, your first question should always be: **IS IT MASH APPROVED?**



With the Austroads Safety Barrier Assessment Panel (ASBAP) 'Transition to MASH' final transition date of 31st December 2020 looming large, there's never been a more important time for equipment purchasers to ask the critical question: **"Is it MASH Approved?"**.

When it comes to **Scorpion® TMA's**, the answer is a resounding **YES** – for BOTH TL-2 and TL-3 attenuator.

In fact, the Scorpion II® Metro MASH TL-2 TMA is not only **THE FIRST** TL-2 TMA to be fully tested and approved to the latest MASH Standards, it is currently **THE ONLY** TL-2 Truck Mounted Attenuator to be successfully **TESTED, PASSED & ELIGIBLE** to the current MASH Standards.

So, whether it's TL-2 or TL-3, when it comes to selecting a fully MASH tested, passed and eligible TMA that has also been **ASSESSED, APPROVED & RECOMMENDED FOR ACCEPTANCE** throughout Australia by ASBAP, the only name you need to remember is Scorpion® from A1 Roadlines.



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SMALL SIZE *BIG PROTECTION*



**LIFE-SAVING MASH TL-2 PROTECTION FOR WORK CREWS
ON SUBURBAN STREETS AND LOCAL ROADS.**



Is it MASH Approved?

YES!



While the world-renowned Scorpion II® MASH TL-3 Truck Mounted Attenuator (TMA) has gained an enviable reputation across Australia for saving lives and protecting road workers and maintenance crews at worksites along the nation's highways, motorways and major arterials, it's also clear that it is not always practical - or for that matter, possible - to have a TL-3 rated (for impacts up to 100 km/h) TMA at every worksite. This is particularly true when it comes to worksites on suburban streets and local roads.

Now, thanks to the innovative Scorpion II® Metro MASH TL-2 TMA, councils, road authorities and contractors are able to provide their work crews with the same high level of MASH-approved life-saving protection on worksites along suburban streets and local roads with a maximum speed limit of 70 km/h.

As the only TL-2 Truck Mounted Attenuator currently available in Australia to have been successfully tested, passed & certified to MASH Standards - the Scorpion II® Metro TL-2 TMA delivers the ideal combination of a compact size and outstanding MASH TL-2 certified protection.

Needless to say, since being approved for use and recommended for acceptance throughout Australia by ASBAP (Austroads Safety Barrier Assessment Panel) early last year, the Scorpion II® Metro has been rapidly gaining in popularity with councils,

contractors, road authorities and traffic management professionals alike, with units now in service around the country.

Janine Bartholomew, Manager with A1 Roadlines - the exclusive Australian distributor of Scorpion TMA's - commented:

"As a fully MASH certified and ASBAP approved unit, the Scorpion II® Metro TL-2 TMA provides the ideal worksite protection solution for councils and contractors with crews working on suburban streets and rural local roads."

"In fact, these units are ideal for use along any road with a speed limit of 70 km/h or less - providing the perfect combination of compact manoeuvrability, ease of operation and, most importantly, MASH TL-2 certified protection."

"What's more, the fact that it can be fitted to any suitable compliant host vehicle with a minimum vehicle mass of 3000kg (including ballast), means that in some jurisdictions, the Scorpion II® Metro TMA vehicle can even be driven on a car license," Janine added.



MASH APPROVED TL-2 PROTECTION

With the MASH testing and assessment standards now being referred to in the Australian / New Zealand Standard AS/NZS 3845.2:2017 in place of the previous NCHRP-350 testing, it's extremely important that newly designed equipment is tested, passed and eligible under the MASH requirements. Indeed, the Austroads Safety Barrier Assessment Panel (ASBAP) *Transition to MASH* program for safety barrier systems and devices mandates that all such products - including Truck Mounted Attenuators (TMA's) - MUST now be tested and approved to the newer MASH standards before they can be approved for use and recommended for acceptance throughout Australia.

With that in mind, when it comes to selecting and purchasing a TMA, the most important question for equipment purchasers to ask is: ***"Is it MASH Approved?"***

When it comes to the new Scorpion II® Metro TL-2 TMA the answer is a resounding **YES**.

"Whether it's a TL-2 or TL-3 rated unit, ensuring that your new TMA is fully MASH tested and approved, and subsequently Approved and Recommended for use throughout Australia by ASBAP are critical factors in ensuring that it can be used on Australian roads," Janine said.

"But it's not just about compliance," she added.

"...when you purchase a TMA that has been successfully tested and certified to MASH standards, you can be sure that it's going to perform as expected when you need it most... during an impact."

"MASH testing and certification is specified for a reason. It involves a series of strictly controlled crash tests and a fully-audited reporting and compliance process that ensures the accuracy of results and data reporting."

"In short, when you purchase a TMA that has been successfully tested and certified to MASH standards, you can be sure that it's going to perform as expected when you need it most... during an impact."

"After all, out on the worksite, the difference between a TMA working as it's supposed to and failing can quite literally be a matter of life and death," Janine said.

"With the new Scorpion II® Metro TMA, equipment owners can be confident that their TL-2 TMA is fully MASH tested and certified, ASBAP Approved and Recommended for use throughout Australia, and is capable of delivering reliable life-saving protection for workers on suburban streets and local roads with a speed limit of 70 km/h or less," Janine added.





'INFINITY TESTING'

THE ULTIMATE TEST OF PERFORMANCE

The Scorpion II® Metro TL-2 TMA underwent a total of four MASH crash tests, three of which (MASH 2016 Tests 2-50, 2-51 & 2-52) were conducted as 'Infinity Tests' – widely regarded as *'the ultimate test of performance'* for TMA's. Janine Bartholomew explained: 'Infinity Testing' is without a doubt the harshest method of testing the performance of a TMA during an impact."

"In short, testing the TMA on a host vehicle which is anchored in place makes it much more difficult to meet the pass criteria for *IS values*, as all of the Ridedown Acceleration must be provided by the TMA absorbing the energy from the impact."

"It's a much tougher testing regimen and is considered a worst-case scenario test condition from the perspective of testing the TMA's capacity to absorb and dissipate 100% of the impact energy without the benefit of the host vehicle roll-ahead," she said.

"Using 'Infinity Testing' not only confirms that the TMA alone is capable of absorbing the energy of the impact without having to rely on the host-vehicle rolling forward, it also means that the Scorpion II® Metro is the only TL-2 TMA to be MASH certified with no upper weight limit for the host vehicle."

"What's more, the fact that the tests were conducted at 'TL-2 Plus' levels,

means that this performance has been proven at 80km/h – which is a full 10km/h above the MASH TL-2 requirements," Janine added.

Needless to say, the Scorpion II® Metro passed all four MASH tests with 'flying colours' and has been certified as 'fully tested, passed and eligible' – or in common terms, fully tested and certified – to MASH 2016 testing and assessment standards. The official eligibility letter (CC-158) is available from the U.S. Department of Transportation website for all to see.

All of the documentation, including full details of the MASH tests, is also available on the A1 Roadlines website: www.a1roadlines.com.au

MASH 2016 Test 2-50

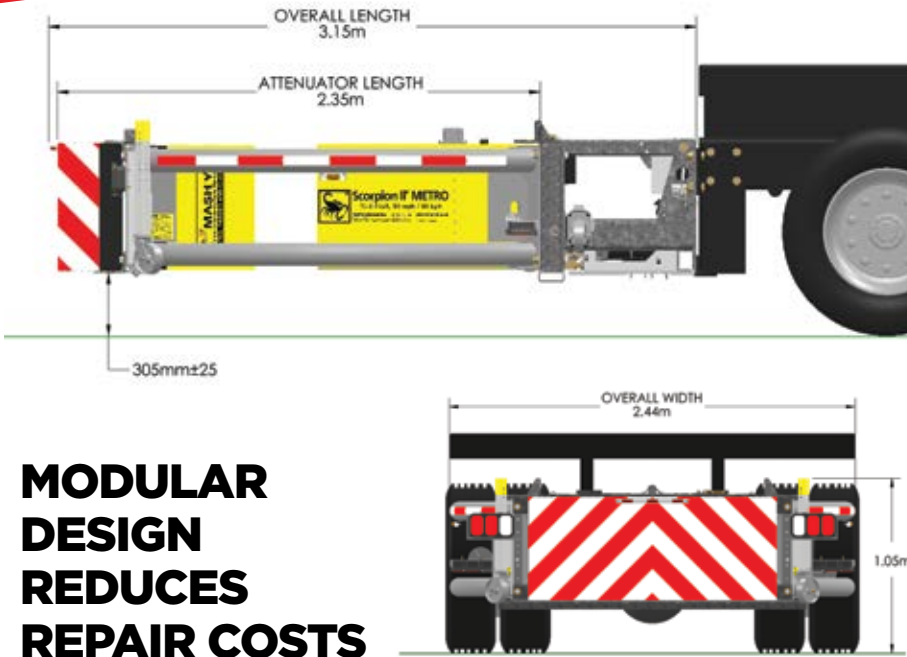


MASH 2016 Test 2-51



MASH 2016 Test 2-52





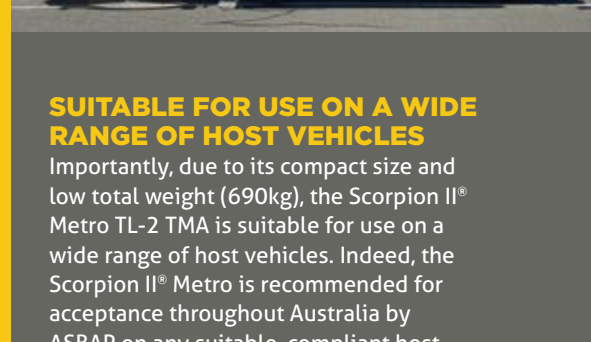
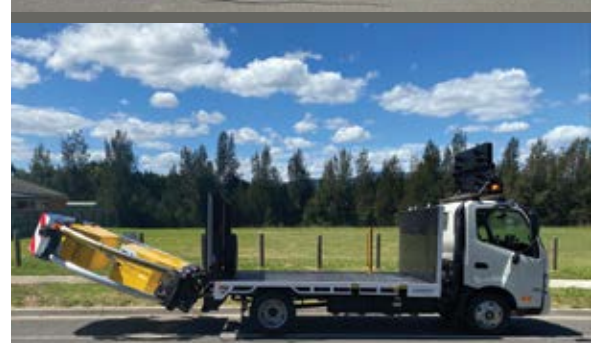
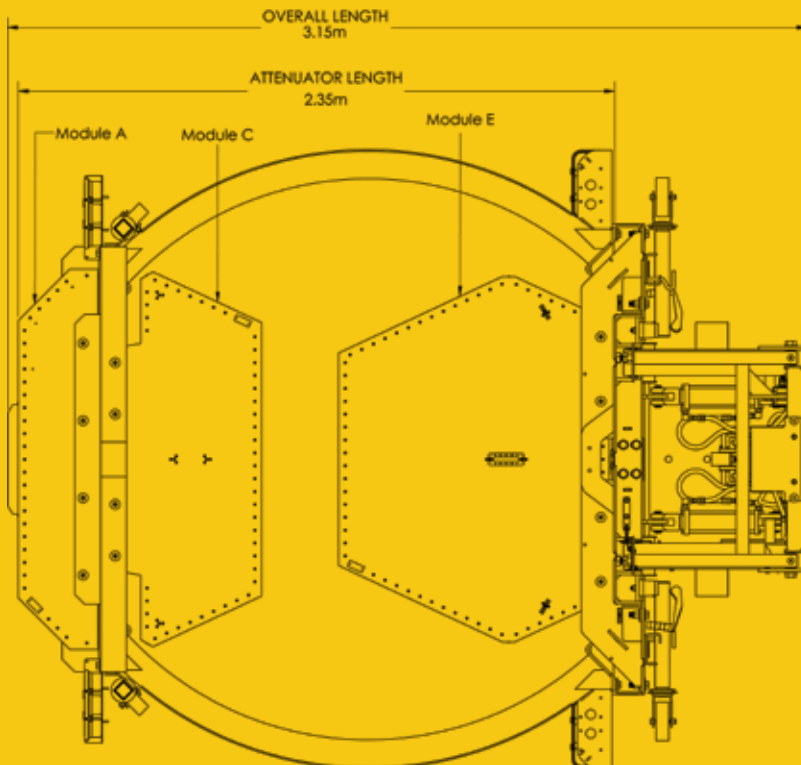
MODULAR DESIGN REDUCES REPAIR COSTS

As with the larger TL-3 model, Scorpion II® Metro TL-2 TMA incorporates Scorpion's unique modular design. This not only plays a critical role in absorbing energy during an impact, it also plays a major role in helping to reduce the cost of repairs - particularly after moderate impacts and/or in the event of accidental damage - with only the damaged components requiring replacement.

With most non-modular units, even minor damage caused by a driver inadvertently reversing into an object or colliding with a stationary object while positioning the vehicle, can have extremely costly consequences.

In fact, with some units, even minor impacts can result in having to replace the majority of the TMA unit. Needless to say, with very low speed and minor impacts accounting for around 80% of the total impacts into TMA's, the cost and inconvenience of having to replace an entire unit or the majority of a unit any time minor damage occurs can be considerable.

The Scorpion II® Metro is extremely quick and easy to repair, and with the greater majority of repairs coming in at only a fraction of the cost of a replacement unit, it also delivers outstanding 'whole of life' value.



SUITABLE FOR USE ON A WIDE RANGE OF HOST VEHICLES

Importantly, due to its compact size and low total weight (690kg), the Scorpion II® Metro TL-2 TMA is suitable for use on a wide range of host vehicles. Indeed, the Scorpion II® Metro is recommended for acceptance throughout Australia by ASBAP on any suitable, compliant host vehicle with a minimum vehicle mass of 3000kg including ballast.



MASH 2016 Test 2-53



MINIMAL ROLL-AHEAD DISTANCE

While 'Infinity Testing' is clearly the most demanding testing regimen for TMA's – and a critical factor in certifying the Scorpion II®

Metro with no upper weight limit for host vehicles – it's important to note that the Scorpion II® Metro also performed extremely well in standard 'Roll-Ahead' type MASH testing.

For the fourth MASH crash test (MASH 2016 Tests 2-53), Scorpion II® Metro TL-2 TMA was fitted to a stationary unrestrained host

vehicle in second gear and with the park brake engaged. The TMA was then impacted at an angle of 9.9 degrees by 2014 Dodge RAM 1500 with a curb mass of 2295kg travelling at 81.6km/h.

Impressively, even during this extreme impact, the host vehicle measured a roll-ahead distance of only 12.4 metres.



What's more, thanks to the fact that the Scorpion II® Metro has been successfully tested and approved to MASH TL-2 Plus (80 kph impact) using 'Infinity Testing', there is NO MAXIMUM HOST VEHICLE WEIGHT LIMIT. As long as the support vehicle meets the minimum weight requirement and is compliant with local vehicle regulations, and the TMA mount is structurally certified, the

Scorpion II® Metro TL-2 TMA can be used – regardless of the brand of host vehicle.

A1 Roadlines are able to supply the Scorpion II® Metro on a wide range of cab-chassis models from leading manufacturers including ISUZU, UD, FUSO and HINO to name a few, with trucks available in a range of body and wheelbase configurations to suit any application.

FOR FURTHER INFORMATION, CONTACT:

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The Aussie GMP range of cast iron self-priming semi trash pumps are ideal for Batch Plants.

Post COVID infrastructure boom

With all three branches of government, Federal, State and Local, working hard to drive the economy, it looks like our 4.5% GMP is in the bag. Projects like Badgerys Creek are proliferating, and mining, exploration and construction are bringing new life into many regional centres.

Even country sub-divisions are blossoming as the six year drought becomes a memory.

This is good news for concrete manufacturers, the mainstay of Australia's construction industry. In fact, predictions are that this year we'll pour up to 3.3 million cubic metres of concrete as new projects get underway.

BATCH PLANT RELIABILITY...CUT CONCRETE COSTS

One Australian Pump supplier, Australian Pump Industries, has become the prime specialist in supplying batch plants with reliable pumps for this tough and demanding application.

"We know the conditions that batch plant pumps have to endure," said Aussie Pumps' Product Manager, Mood Ellahi.

"We've found that Aussie GMP heavy duty cast iron semi trash pumps can outperform and outlast submersible pumps," he said.

Aussie GMP semi trash pumps are available in a wide range - from 2" in both high and low pressure pumps, all the way through to big 6" long coupled motor pumps, capable of handling up to 4,500 litres per minute.

Australian Pump, known in the industry as Aussie Pumps, has worked closely with big and small concrete producers to help improve batch plant productivity. Large capacity semi trash and trash pumps are available from the company in both electric and diesel drive configurations.

Pumps with capacities of up to 6,000 lpm are part of the range.

The best news is that although the pumps are designed for semi trash applications, they are suitable for pumping abrasive liquids. The

Aussie GMP product line offers simple self-priming cast iron construction, and a choice between big open non-clog style cast iron impellers and 316 stainless steel equivalents.

"We've found that Aussie GMP heavy duty cast iron semi trash pumps can outperform and outlast submersible pumps."

A recent addition to the range were high head trash pumps that will not only lift water out of a sump through a vertical lift of 6 metres but, also have the capability of pumping up to a 70 metre head - making them ideal for batch water systems. The pumps are mounted above the sump where they can be easily serviced in the event of a failure.

Being trash pumps, they offer a front clean-out port mounted below the suction inlet. That means that the pumps can be cleaned out without having to uncouple pipework or remove the pump from the sump, as is required with submersibles.

"We're finding more and more batch plants seeing the attraction of these big surface mounted cast iron pumps," said Mood.

CONTINUOUS PRODUCT DEVELOPMENT

Although the pumps are manufactured in Northern Italy (in one of the most advanced pump-works in Europe) a lot of the design work is done in Australia. Aussie Pumps engineers worked with the concrete industry and associated quarrying operations to better understand the requirements of the market.

"We were surprised to find that many highly experienced engineers and plant managers didn't clearly understand pump selection and application," said Aussie Pumps' Chief Engineer, John Hales.

"The beauty of the system is its simplicity. There is nothing to go wrong, no priming devices."

"For example, there was little understanding of the advantages of surface mounted self-priming trash pumps," he said.

An example of this is the principle of the self-priming pumps. Aussie's GMP range is designed with an integrated water tank built into the pump like a pair of big shoulders. The pump also has a high quality check valve, weighted so that it hangs shut in the event of the pump being filled with water, preventing backflow.

To prime, all the operator needs to do is fill the pump bowl with water through a top mounted priming plug, and then start the motor. As the power kicks in, the water is expelled through the discharge port of the pump, creating a vacuum inside the casing.

"The vacuum created acts like a straw, drawing the liquid up through the suction

and into the pump bowl where it is in turn expelled through the discharge by the heavy duty cast iron, or cast 316 stainless steel impeller," said Hales.

"The beauty of the system is its simplicity. There is nothing to go wrong, no priming devices," he added.

HIGH HEAD TOO

Using one of these 3-phase motor driven 2", 3" or 4" pumps, provides a degree of versatility and in the event of pump failure, no need to drag the pump out of the pit (as is needed with submersibles). The pumps feature a stainless steel wear plate, mounted inside the pump body as well as a silicon carbide mechanical seal.

This combination of features and benefits - particularly their high performance capabilities - makes them ideal for batching and a number of other applications in or around the plant.

Further information, including a free GMP Selection Guide, is available from Australian Pump Industries on 02 8865 3500, distributors throughout Australia, or by visiting:

www.aussiepumps.com.au

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Third Party Accreditation: the May, the Has, the Does and the Verified

Andrew Wheeler, ABES Australia

Traditionally when purchasing a manufactured item or product the “Brand” has been a significant indication of the quality as the two tend to be related. However, today with greater globalisation and the emphasis on costs there has been a significant move towards the manufacture of “commodities”. Consequently, when purchasing a product, we have a wider range of producers with significantly varying and competitive costs. Can we have confidence that they all meet the required standards?

It is normal for these products to have markings and guarantees indicating that they meet the relevant codes and standards. These may be the provision of manufacturer test certificates or the provision of printed warranties. While test certificates do provide some confidence, it is recognised that falsified test certificates are on the rise. Recently there have been cases of internationally well-known manufacturers with the reputation for high quality admitting to falsifying test records

for numerous years. This raises the question then are manufacturers warranties and manufacturers test certificates a guarantee of the desired quality? And how does third party accreditation assist in ensuring quality?

Non-conforming products being introduced into the Australian and the New Zealand building construction industries have increased significantly in recent years. There have been some notability high profile cases demonstrating significant risks to the general public, coupled with high corrective action costs that are primarily born by the owners. It is evident that self-regulation in its current form is not the appropriate tool to ensure that “conforming” and “fit for purpose” products are being provided to the construction industry. In response to these events recent moves by regulators has seen legislation introduced that places the responsibility of nonconforming products on supply chain participants. This goes beyond the supplier to include the builders, the designers and the specifiers.

In the construction industry, systems, products and materials being utilised are becoming more and more complex, resulting in the certifier relying on certificates supplied by the builder, sub-contractors or in some cases from third party product certifiers to ensure quality standards are met. While the builders and sub-contractors are in the best place to certify compliance to the various standards for their works, they are generally at a loss to certify prefabricated components and ensure the quality of materials being supplied. Hence, the use of and specification of third-party assessments are becoming more prevalent.

In the marketplace today, there are numerous certifying companies and various certifying schemes. This raises the questions. Whom are these third-party assessors? What are they certifying? What standard are they using in their assessment? Do they have the required expertise to assess the quality of the product/process? Do they all assure the same quality outcomes? How can we be

assured that the product being provided is equivalent to what was specified?

In this article we will look at third party certification, identifying that there are differing levels of third-party certification and that it is important the specifier/designer/builder understand what they require from certification: and what scheme their product is being certified to. A certification scheme may be managed by statutory boards or developed within the individual companies/organisations. In evaluating the appropriateness of a third party certificate, it is important to understand how the scheme operates, including to what are they certifying to (is it to a standard or is it performance based), ongoing requirements (is it a compliance check at the time of certification only or are there ongoing checks carried out), whom is carrying out certification and do they have the required technical expertise.

“In evaluating the appropriateness of a third party certificate, it is important to understand how the scheme operates, including to what are they certifying to (is it to a standard or is it performance based), ongoing requirements (is it a compliance check at the time of certification only or are there ongoing checks carried out), whom is carrying out certification and do they have the required technical expertise.”

When looking at the schemes currently available in the Australian/New Zealand marketplace, they fall into one of the following four categories of quality compliance:

Four Levels of compliance:

1. **May** comply - the processes and operation of the facility mean that it can produce the product to the required level, but no checks have been carried out on the final product.
2. **Has** produced - the processes and operations of the facility produced the product to the desired quality verified at the time of certification inspection.
3. **Does** produce - the processes and operations of the facility and procedures result in a product of the desired quality which was verified at the time of certification, with regular audits and internal testing to ensure quality systems maintained.



4. **Verified production** - the processes and operations of the facility produces the product to the desired quality verified at the time of certification with ongoing reporting and regular independent audits to verify and ensure quality of product.

It should be stressed that all four levels of compliance are legitimate and have a role to play in the wider building and construction industry. It is however critical that those whom are specifying, installing or certifying building products have a good understanding of differences in compliance levels and the associated level of risk that they may be exposing to themselves, their clients, building owners, insurers and the public.

To enable a better understanding into these various compliance levels, a description for each follows.

Level 1

May comply - in this case the manufacturing facility has been assessed as being capable of producing the product to the level required. The facility being assessed as capable of producing is the key component in this system. There is no supporting evidence to say that they do actually produce to the standard, they have simply demonstrated that they have the equipment and associated procedures to do so. Cost to obtain this type of certification is generally low as the assessment typically involves a one-off assessment and does not require any technical assessment.

A limitation of this certification is there is no independent verification that the product actually meets desired quality and there is no requirement for ongoing assessments or verification.

Level 2

Has produced - in this case the compliance assessment has verified that the process and operations undertaken to produce the product has resulted in the quality required by the specification at the time of the assessment. The keyword here is produced. While certificates are typically dated with an expiry date, there is no expectation of ongoing external or internal audits to maintain this quality, only an assumption that the process and systems will remain unchanged. So while the assessment has demonstrated that the processes and operations are able to produce the quality required, it could be argued there is no guarantee that the quality will be retained with changes in the system. Similar to the previous level of certification, the costs are relatively low due to the minimal involvement of the certifying authority.

It would be considered that both the Level 1 and Level 2 certifications are acceptable where risks and costs associated with a failure are manageable. Examples of these would be items that could be replaced with relative ease if the standard of quality was not appropriate.

Level 3 and Level 4 are different to Level 1 and 2 in that they provide not just an initial verification of the quality produced by the processes and systems, but an ongoing check on the quality. The primary difference between these two levels is the rigour and the independence of the quality audits.

Level 3

Does Produce - the assessment is generally carried out with some input from a technical expert, looking at the systems and the end product ensuring that the specified quality is obtained. This assessment is generally based on internal verification methods that are provided at the time of assessment. It should be noted that this level of certification may also require some ongoing audits from the certifying body, such as annual quality audits and possibly review of internal test results. This level of certification generally provides a good level of confidence that the product does meet the required standards. It does however require a fair degree of self-regulation, as the ongoing assessments are based on results provided by the manufacturer. In such a system there is a significant reliance is on the manufacturer self-regulating that the product does meet the quality requirements.

Level 4

Verified Production - the certifying authority utilises external audits and other verification systems. While the extent and expertise of the external audits may vary depending on the product, they will all include regular audits conducted by technical experts looking at the technical aspects of the product and reviewing the internal quality systems. Additionally, verification that quality is being maintained is achieved through sampling and independent testing. This type of system also typically has full traceability of the product being delivered, enabling the purchaser to determine the source of all materials and identification of the facilities that the product has passed through. In this case the confidence in this product meeting the specified requirements under this certification scheme are excellent and the quality has also been verified by regular third-party testing.

To understand the applications for each compliance level let look at a few examples from the construction industry.

An example of a Level 1 certification would be a lighting fixture. The manufacturer may hold a third-party certification obtained by providing the third-party certifier with manufacture procedures outlining the materials and configurations used along with any testing and compliance requirements the manufacturer may have also undertaken internally. The assessor will have reviewed this information to the relevant standards (typically a desk-based audit), and if appropriate a compliance certificate will have been issued stating that if fabricated in

"It is recognised that the levels of certification do have cost implications, and these need to be weighed up against the exposure to risk."





accordance with the installation manuals and using the specified materials the components comply with the relevant standards. Under this arrangement reliance is on the manufacturer to ensure quality. A lighting fixture would be considered not to be a critical element and could be easily replaced in the effect that the fitting was shown not to be compliant with the specification, hence the associated cost/risk with non-compliance is low and this type of certification is appropriate.

An example of a Level 2 certification would be a waterproofing system. In this case the manufacturer may obtain third party certification by providing the installation procedures configurations, and materials to be used along with any testing for compliance. The manufacturer would carry out the required type testing to validate the systems works and submit this as part of the certification. When reviewed the certifier can issue the certificate that the system if applied as documented it should meet the required standards. In this case there is no requirement for ongoing checking that the system works. It is noted that as a rule the installers will carry out testing (checked by builders) but the certifier of the system would not carry out the inspection. So for this system there is verification that the system can work, but the final check to ensure that the quality is maintained is on the builder, and failure can be rectified at minimal costs.

Structural components would typically fall under a Level 3 and Level 4 compliance where standards require initial and ongoing compliance checks of the products. In these cases, the certifying authority would be undertaking audits to ensure that the procedures and testing as outlined in the standards have been met. Typically, the testing requirements for compliance are carried out by the manufacturer to ensure that the quality is maintained. One of the key additional requirements of this level of

certification is the requirement for ongoing checks on the quality standards through both internal audit and external audits. The regularity and extent of these audits either internal or external is a measure of the assurance of the quality.

An example of a Level 3 certification would be an accessible fastener, in this case there is an assumed performance specification that needs to be guaranteed to ensure the overall system is fit for purpose. The associated cost/risk of non-conformance is high and so a level of confidence in the behaviour of the fasteners is required, however in this case as the fasteners are accessible if non-compliant, they could be replaced thus Level 3 certification would be considered appropriate.

The Level 4 certification of this system would involve additional quality assessments carried out by independent experts in the field and external testing. Hence, not only would the company be ensuring compliance throughout their systems on a continuing basis, but an external expert is also reviewing compliance of the products and compliance to the systems being managed by the company. The significant advantage of the Level 4 over the Level 3 certification is that by utilising the independent parties for testing and assessments, systemic problems that affect the quality are identified and resolved through the auditing procedure.

As an example, if we take the previous example of a fastener, but position it so that it is inaccessible (i.e. encased in concrete or within the structure). Then non-conformance may render the structure not fit for purpose, hence all measures possible should be taken to ensure that the produce meets the requirements and the compliance is independently verified.

It is recognised that the levels of certification do have cost implications, and these need to be weighed up against the exposure to risk. Hence some question the

specifier, builder, owner should be asking are:-

- what are the implications if the quality standards are not achieved?
- how critical is component to operations and structural integrity?
- what level of third-party certification is required?
- is independent testing required?

Once the level of certification has been identified, it is then critical during the specification and procurement process to review the proposed third-party certification and ensure that it meets the requirements to ensure that the quality specified is achieved.

ABOUT THE AUTHOR

Andrew is currently the Acting Executive Director of the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS), a chartered professional engineer working in the building construction industry for over 25 years as a consultant, a researcher and senior project manager. Andrew has been involved in design and construction of steel, reinforced concrete and composite structures, and has been involved in both short term and long term monitoring of these structures. Andrew has been involved with the development of several building standards, with his technical expertise and understanding of standards and understanding, Andrew has been involved with the technical assessment of numerous products for use in the Australian and international construction industries. Andrew has an extensive research background in structural engineering with over 60 technical publications. He is actively involved in the dissipation of new research to the engineering community and has been involved in the implementation of quality systems within the building industry. He has extensive practical knowledge in the set up operating and auditing of Quality Assurance systems and has been involved with the quality audits for NATA and SAI Global. His experience in the construction industry has led involvement in a number of international research projects and engagement as technical expert within Australia and abroad.

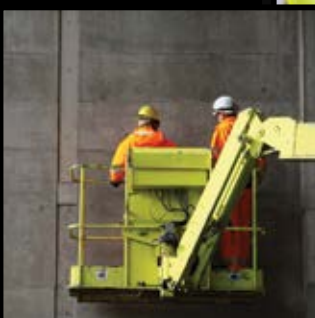
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INNOVATION
TOWARDS ZERO



HELPING BRIDGES LAST LONGER WITH MIGRATING CORROSION INHIBITORS

Many concrete bridges in Australia are at a natural disadvantage when it comes to achieving long service lives. With tens of thousands of miles of coastline, a large portion of Australian cities, roads, and bridges are located on or near the ocean in tropical or subtropical environments. The combined exposure to higher relative temperatures, chloride-laden air, and sometimes even direct contact with seawater creates an excellent recipe for accelerated corrosion and early deterioration of reinforced concrete.

While a bridge cannot be moved out of its corrosive environment, altering one small factor during bridge maintenance and repair can have a significant effect on counteracting corrosion. This is thanks to the strength and versatility of *Migrating Corrosion Inhibitors*, a technology that can be streamlined into routine maintenance and repair activities.

Migrating Corrosion Inhibitors (MCIs) are typically considered “mixed” or ambiodic corrosion inhibitors that form a protective molecular layer on metal reinforcement in concrete, hindering corrosive reactions at both the anode and cathode of a corrosion cell. The chemistry can be applied directly to existing concrete as a liquid that migrates through the concrete pore structure via capillary action and vapor diffusion. It can also be combined with water repellents or incorporated as an admixture into new concrete mixes or repair mortars. In this way, it offers a minimally invasive method of adding corrosion protection to existing bridges.

MCI® as Preventative Maintenance

A common best practice is to apply a sealer to concrete bridge decks about once every five years or so. Actual frequency can vary from sealer to sealer depending on the chemistry and concentration used and from bridge to bridge depending on the environment. While sealers

or water repellents can themselves do much to prevent the intrusion of moisture and chlorides into the concrete matrix, they cannot actively fight corrosion at the level of the rebar if chlorides do get in or if they are already present prior to application. This is where MCI® demonstrates its forte.

MCI® maximizes the protective benefits of routine water repellent application by providing active corrosion protection against pre-existing chlorides in the concrete or those that may come in through cracks after application. It typically only has to be applied once every 10 years on average (give or take five years depending on factors such as coverage rate and severity of the environment). With either MCI®-2018 or MCI®-2019, maintenance crews can apply a two-in-one water repellent and corrosion inhibitor using a single product. MCI®-2018 is a 100% silane option, while MCI®-2019 is a 40% silane option.

MCI® to Fortify Repairs

MCI® can also be used to fortify repairs. Precautions are especially important at this time because of the potential ring anode effect that can take place with the placement of a fresh concrete patch that could shift a higher corrosion potential to adjacent concrete. MCI® is believed to help minimize this effect. It can be applied as a surface treatment (with or without water repellent) or incorporated into repair mortar or new concrete overlays.

MCI®-2020 is a “pure” inhibitor (i.e., no water repellent) frequently used on bridge repairs to deliver a high dose of corrosion inhibitors that can migrate as much as 7 cm deep into the concrete within 30 days of application. MCI®-2020 (covered with a standard water repellent) was tested along with MCI®-2018 and 2019 according to the US Bureau of Reclamation M-82 (M0820000.714) *Standard Protocol to Evaluate the Performance of Corrosion Mitigation Technologies in Concrete Repairs*.

The study found all three surface treatments to effectively reduce corrosion rates in the already corroding test sample slabs. Interestingly, this was done from a higher corrosion current starting point than the test normally requires before application of the treatments, demonstrating protection with a higher initial chloride content.

MCI®-2006 is an MCI® powder admixture that can be added directly to the repair mortar onsite. Since MCI® naturally tends to delay set time—usually a beneficial side effect for workability—a normal set version called MCI®-2006 NS is perfect for adding to shotcrete, which is ideal for concrete repairs on vertical or overhead surfaces of bridges. For extensive bridge overlays, MCI®-2005 is an excellent liquid admixture that can be added to the concrete mix right at the batching plant. These admixtures add corrosion protection directly into the new material without comprising the key properties of the concrete mix.

Bridges are an asset that should be maintained and repaired with the intent to maximize service life long-term. MCI® is a simple way to do so by adding corrosion protection into routine tasks. For Australian bridges in corrosive environments, it is an especially important consideration to fortify bridges for extended use.

For more information on MCI® Technology, please visit:
<https://www.cortecmci.com>

“MCI® maximizes the protective benefits of routine water repellent application by providing active corrosion protection against pre-existing chlorides in the concrete or those that may come in through cracks after application.”



Applying MCI®-2018 to a bridge deck during a repair in a marine environment.
Image courtesy Cortec® (Case History 347)

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SEA electric launches Australia's first locally assembled electric trucks

In an Australian first, Melbourne based company SEA Electric has commenced volume commercial production of electric trucks that will cost under \$14 per day to charge from the grid, and even less if depot solar is used, with the first of the vehicles currently on the SEA Electric production line in Melbourne.

Proudly Australian since its inception in 2013, SEA Electric has grown a global reputation for its innovative electric power system solutions for commercial vehicles.

Two SEA Electric-badged vehicles, the SEA 300 and SEA 500, based on the Hino 500 Series and Hino 300 Series models, are now available for purchase.

"SEA Electric is privileged to be able to bring this Australian first to the marketplace," said Glen Walker, SEA Electric Regional Director for Oceania.

"These trucks truly meet a need in the marketplace, and prior to this launch, we have received pre-orders for 46 vehicles from some of Australia's biggest companies and councils."

"It represents an exciting phase in global EV development, and this places SEA Electric at the forefront," Mr Walker said.

The trucks are propelled by SEA Electric's SEA-Drive® Power-System, which is available in various performance and range packages to suit applications from 4.5 tonne car licence vehicles through to 22.5 tonne 3 axle trucks. Previously only available as a retrofit option for existing diesel vehicles, the trucks are assembled from Semi Knocked Down (SKD) kits, complete with a fully integrated SEA-Drive® Power-System from new.

Real world testing of in-service vehicles that travel up to 1000 kilometres per week has revealed daily recharging costs of less than \$14 per day using standard off-peak electricity prices of 15c per kWh.

Future proofed with an upgradable plug and play architecture, the SEA-Drive® Power-System can be charged using the world's biggest charging network, which is 415V 3-phase power via the truck's standard on-board charging equipment, with optional DC fast charging also available. The fast charging option enables a charging rate four times faster than standard, and offers range extending top-ups during lunch hour or vehicle loading.

From an operational perspective, lower maintenance and running costs are possible, with diesel consumption eliminated and fewer moving parts minimising service costs.

"Our electric Power System features a host of key features, including smooth application of torque, industry-leading range, whisper quiet operation, and importantly, a reduction in the truck's carbon footprint, with zero emissions of carbon dioxide, nitrous oxide and methane," Mr Walker said.

Another highlight of the trucks are the improved workplace health and safety conditions for operators, with the powertrain producing no noise or fumes while reducing vibrations, which combine to limit driver fatigue.

"SEA-Drive® technology performs exceptionally well in congested urban environments, where pollution reduction is needed most, and as demonstrated by real world experience from our global vehicle deployments it provides competitive whole

of life operating costs when compared to traditional diesel vehicles," Mr Walker said.

"As demonstrated with vehicles already fitted with SEA-Drive® Power-Systems, the trucks are extremely quiet, perform well, while also providing a powerful yet smooth ride."

"They also have a flexible architecture which will future-proof their ownership," he added.

"There are a range of advantages provided by the SEA-Drive® Power-System, including reduced service costs, with a routine four-hour inspection required every six months, and minimal wear on service brakes due to the use of regenerative braking."

"In Australia, carbon dioxide emissions from transport are now the second highest behind electricity generation, and are forecast to continue rising," he said.

"With this announcement, the freight industry can now react – safe in the knowledge that their freight product offering will be enhanced in their clients' eyes."

"Mass uptake of electric trucks in urban Australia has the potential to save up to millions of tonnes of CO₂ each year, and provide up to 40,000 MWh of mobile battery storage, which is a potential future revenue stream," he added.

The trucks are currently on sale from 15 fully accredited SEA Electric dealers nationwide that can also provide service and parts support, including any work carried out under the standard three-year warranty.

"Having a strong dealer network and nationwide support structure in place, we are excited for the range to hit Australia's roads," Mr Walker concluded.

Roadside Assistance will be available via industry leading provider NTI for the life of the warranty period.

For further information, including details of the dealer network and SEA Electric SEA-Drive® Power-Systems, please visit: www.sea-electric.com/en_au

ABOUT SEA ELECTRIC

SEA Electric is an Australian company, with global reach, that specialises in the assembly and electrification of 100% electric commercial vehicles around the world. They deal directly with companies (and work alongside automotive OEM's) to supply and licence our patented technology.

SEA Electric was founded in 2013. After four years of product development and testing, SEA Electric launched their commercial operations in early 2017, triggered by the reduction in battery kWh pricing that would allow commercial feasibility in offering electric drivetrains to the global market.

Isuzu, Hino and Toyota to accelerate case response



Isuzu Motors Limited, (Isuzu), Hino Motors, Ltd. (Hino), and Toyota Motor Corporation (Toyota) have announced that they have agreed on a new partnership in commercial vehicles. The three companies intend to combine Toyota's CASE (Connected, Autonomous, Shared, Electric) technologies with the commercial vehicle foundations cultivated by Isuzu and Hino.

Through this collaboration, they aim to accelerate societal implementation and dissemination of CASE technologies and services and to help address various difficulties facing the transportation industry as well as help achieve a carbon-neutral society.

Specifically, the three companies plan to jointly work on the development of battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs), autonomous driving technologies, and electronic platforms centred on the domain of small commercial-purpose trucks.

While working together on BEVs and FCEVs to reduce vehicle costs, the three companies plan to advance infrastructure-coordinated societal implementation, such as by introducing FCEV trucks to hydrogen-based society demonstrations in Japan's Fukushima Prefecture, and accelerate their dissemination initiatives. Also, Isuzu, Hino, and Toyota plan to link their connected technology platforms to build a platform for commercial vehicles that can help solve customers' problems. Through this platform, they intend to provide various logistics solutions that not only help improve commercial vehicle transport efficiencies but also contribute to reducing CO₂ emissions.

To promote their partnership, Isuzu, Hino, and Toyota are establishing Commercial Japan Partnership Technologies Corporation, a company for planning CASE technologies and services for commercial vehicles based on discussions among its three parent companies.

Going forward, Isuzu, Hino, and Toyota intend to deepen their collaboration while openly considering cooperation with other like-minded partners.

Capital partnership between Isuzu and Toyota

To smoothly construct and advance the collaboration announced today, Isuzu and Toyota have agreed on a capital partnership.

By way of Isuzu's cancellation of treasury stock through a third-party allotment, Toyota is scheduled to acquire 39 million shares of Isuzu common stock worth a total of 42.8 billion yen (resulting in Toyota having 4.6 percent ownership of Isuzu in terms of total issued shares as of the end of September 2020 and a post-allotment voting rights ratio at Isuzu of 5.02 percent).

Also, Isuzu plans to acquire Toyota shares of the same value through a market purchase.

Partnership background

With the CASE revolution, as the automobile industry enters a once-in-a-century period of profound transformation, Isuzu and Hino have been working on responses to CASE that match the unique characteristics of commercial vehicles, with a focus on electrification and connected technologies & services.

Toyota has been accelerating upfront investment in CASE technology and establishing partners with the aim of transforming into a mobility company.

In the area of vehicle electrification, it has been engaging in all-around technological development and advancing vehicle electrification through the dissemination of hybrid electric vehicles and the early commercialisation of FCEVs, among other initiatives.

To promote the reduction of CO₂ emissions toward the Japanese government's goal set last year of achieving a carbon-neutral society by 2050, the significance of electrifying both passenger and commercial

vehicles in a way that responds to the energy situation in each region will grow more important than ever, as will the significance of energy-saving technologies.

Also, with the progress of digitalisation, expectations are increasing for new services that make people's lives safer, securer, and happier by linking vehicle data and various types of information.

CASE technologies can only contribute to society once they become widespread. Commercial vehicles can play important roles in dissemination, as they travel long distances for extended periods of time to support the economy and society and can be easily linked with infrastructure development.

From the standpoint of carbon neutrality, commercial vehicles can especially fulfil a key function.

In the transportation industry where commercial vehicles are used to support the movement of people and goods, expectations are that the power of CASE, centred on connected technologies and services, will deliver improvements in addressing transport inefficiencies, driver shortages, long working hours, and other issues facing the industry.

Solving these kinds of social issues is not something that one company can accomplish alone. It is necessary to seek a wide range of like-minded counterparts, apply their different strengths, and work together for those supporting transportation and for society.

Considering this situation, Isuzu, Hino, and Toyota have come to believe that Isuzu and Hino must cooperate in promoting CASE support for commercial vehicles and that Toyota must accelerate the societal implementation of its CASE technologies through the commercial vehicle businesses of Isuzu and Hino. Recognizing such, the three companies decided to engage in a new partnership in the commercial vehicle business.



New strategy to power electric vehicles in Western Australia

The Western Australian Government is steering towards a cleaner future, with the recent release of the State's first ever *Electric Vehicle Strategy*. The strategy will be accompanied by the almost \$21 million *Electric Vehicle Fund* - including the largest single investment in EV charging infrastructure in Australia by a State or Territory Government.

The strategy is a key element of the *Western Australian Climate Policy* that commits to delivering a cleaner, more sustainable environment through the increased uptake of low and zero-emission vehicles.

The strategy will facilitate the creation of Australia's longest, and one of the world's longest, electric vehicle charging infrastructure networks - from Perth to Kununurra in the North, Esperance in the South and Kalgoorlie in the East. Western Australians and visitors will be able to access fast charging stations along major travel routes in the regions, town and city centres, and tourism sites. Construction of the network will also create jobs in metropolitan and regional areas.

The State Government will lead by example by increasing its own fleet of electric vehicles, committing to a target of acquiring at least 25 per cent electric vehicles across eligible vehicles in the State fleet. To support the State Government's electric vehicle fleet target, electric vehicle

charging stations will be installed in government buildings.

"Electric vehicles provide a pathway towards decarbonising road transport and improving air quality in Western Australia," said WA Premier Mark McGowan.

"The industry also has huge potential to create jobs for Western Australians."

"Western Australia has the skills, infrastructure and standards to become a key player in the global battery value chain, the Premier said.

Global and domestic uptake of electric vehicles also presents significant opportunities for industry and jobs growth in WA. In recognition of this, the strategy supports the uptake of hydrogen fuel cell electric vehicles, aligned with the *Western Australian Renewable Hydrogen Strategy*, as well as the initiatives in the *Future Battery Industry Strategy* released in 2019.

"The global uptake of electric vehicles is one of the most exciting opportunities for Western Australia to create jobs and support economic growth the economy as part of the low-carbon transition," the Premier added.

The strategy will also facilitate EV uptake by developing and updating standards, guidelines, and requirements for planning approval, as well as improving levels of consumer awareness and knowledge.

Western Australian Minister for Innovation and ICT, Dave Kelly said the announcement represents an exciting

time in Western Australia, with the state contributing some of the most significant funds of any Australian jurisdiction towards charging infrastructure that will facilitate the uptake of this environmentally sustainable technology.

"The EV Strategy will see Western Australia become home to one of the world's longest electric vehicle charging infrastructure networks in a single state, enabling drivers of low or zero emissions vehicle to travel from Perth to Kununurra in the north, Esperance in the south and Kalgoorlie in the east," Minister Kelly said.

In 2019, the McGowan Government committed to working with all sectors of the economy to achieve net zero greenhouse gas emissions by 2050. The adoption of electric vehicles powered by increasing levels of renewable energy will be fundamental to reducing greenhouse gas emissions in the transport sector.

WA Environment Minister, Stephen Dawson, said that the actions outlined in this Strategy are an important element of the Government's Western Australian Climate Policy.

"Increasing the uptake of electric vehicles is an important element to achieve a reduction in greenhouse gas emissions and achieving the State Government's aspiration of net zero greenhouse gas emissions by 2050," Minister Dawson concluded.

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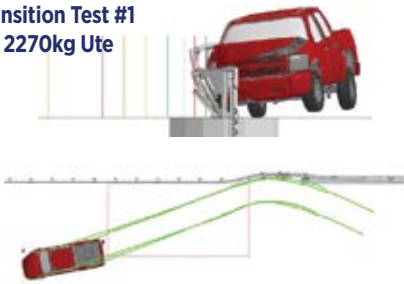


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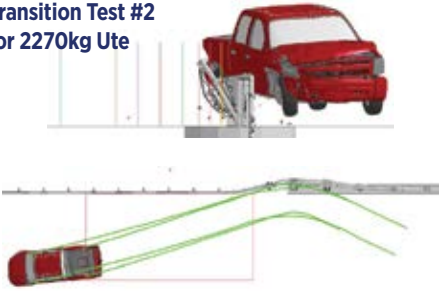
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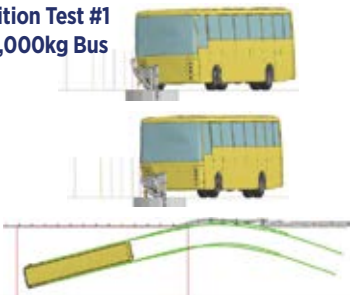
Transition Test #2
for 2270kg Ute



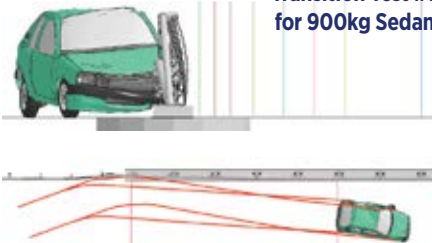
Transition Test #3
for 2270kg Ute



Transition Test #1
for 13,000kg Bus



Transition Test #1
for 900kg Sedan



The DOLRE bridge traffic barrier development demonstrates how the incorporation of FEA into the design process can optimise a solution that is vastly different from the solutions that traditional Engineering methodologies would produce.

A problem was identified and through the iterative use of FEM combined with Eurocodes for structural analysis a solution was found and optimised that was vastly different to the direction that traditional engineering was leading.

Once the bridge barrier design was optimised, the same process was used to assess **transition designs** to various European roadside barriers in accordance with EN1317 and TR16303-2011 requirements.

Australian authorities required product assessment to Australian bridge standards. Future finite element modelling in accordance with MASH standards and NCHRP179 validation requirements satisfied ASBAP's analysis for both traffic barrier and transition designs.



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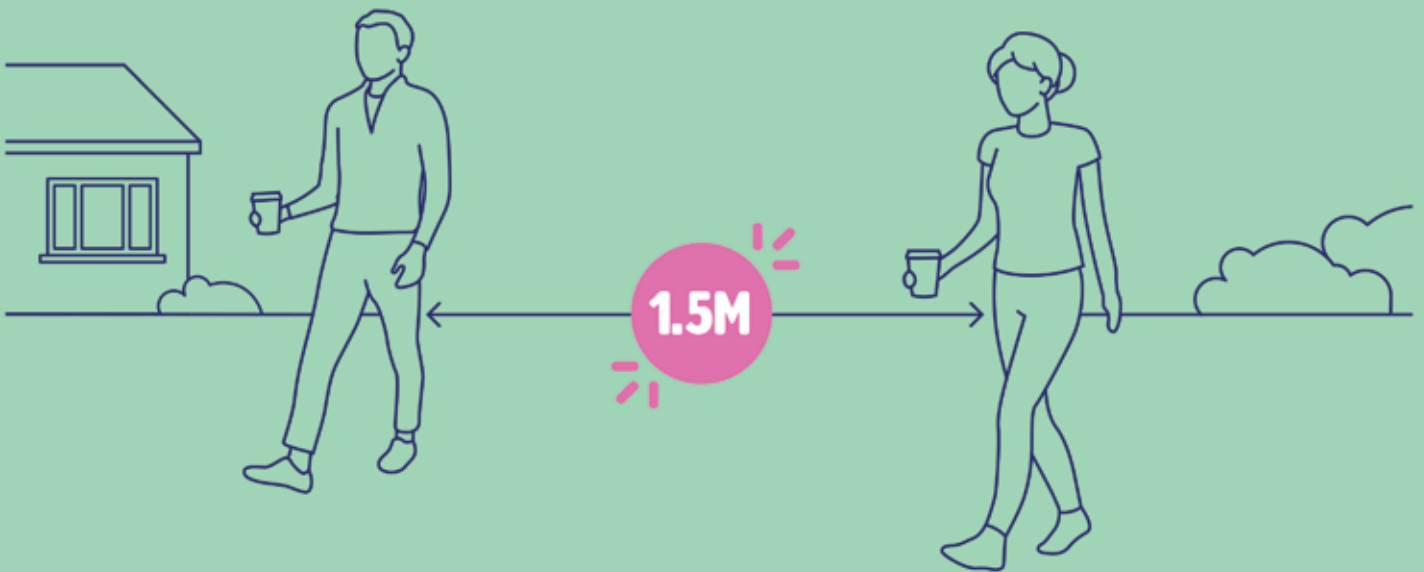
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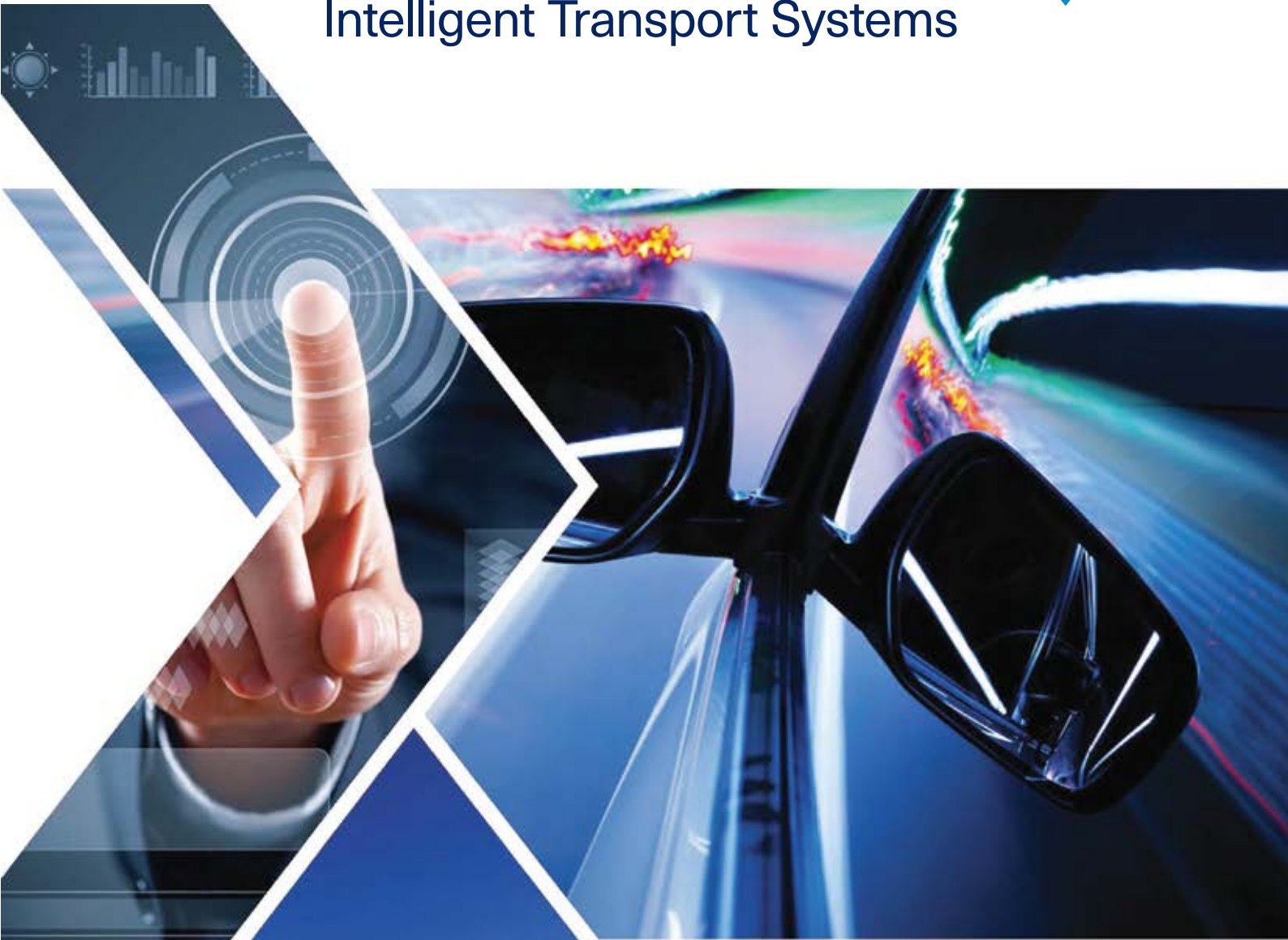
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USING AI TO PREDICT THE FUTURE OF TRANSPORT AND EASE CONGESTION

Launched during May, a world first project seeks to use artificial intelligence (AI) to predict traffic congestion up to three hours ahead, optimising traffic in large cities and improving road safety as part of the University's smart cities ecosystem.

University of Melbourne's Australian Integrated Multimodal EcoSystem (AIMES) brought together PeakHour Urban Technologies, the Victorian Department of Transport, and Telstra to create a large-scale AI application hosted on Amazon Web Services (AWS), which can predict traffic conditions across Melbourne.

Transport engineering expert and AIMES Director Professor Majid Sarvi said the application can also optimise traffic signals for

on-road vehicles, freight, and public transport such as buses and trams.

"The application observes the nature of traffic and figures out complex traffic patterns across the network through machine learning built into the technology," Professor Sarvi said.

"If we can upscale the application to provide more accurate prediction with machine learning and real-time data, it will soon be possible to substantially reduce delays in hotspots across Melbourne and many locations across the globe."

Industry partner PeakHour Urban Technologies developed the application's AI core engine which runs on AWS and powers the engine's predictive capabilities.

AWS provides PeakHour Urban Technologies the scalability to ingest, store, and process large amounts of traffic data, the ability to adapt to an ever-changing transport network, and the breadth and depth of cloud services to support PeakHour Urban Technologies with its AI solutions.

"Pioneering AI in forecasting real-time traffic lies at the heart of this effort. We are using a multidisciplinary approach, combining deep knowledge of mobility with vast amounts of real-time data analytics to predict and optimise traffic in large cities," PeakHour Urban Technologies Founding CEO Omid Ejtemai said.

The Victorian Department of Transport provided traffic data and insight to support the creation of the application.

Victorian Minister for Transport Ben Carroll who attended the launch said managing a complex transport network presents many real-time challenges.

"Not only does this world first technology help Victorians navigate congestion by predicting traffic patterns hours in advance, but it paves the way to the future of connected and autonomous vehicles," Minister Carroll said.

The project is an ongoing collaboration between University of Melbourne, PeakHour Urban Technologies, the Victorian Department of Transport, and Telstra, leveraging AWS.

CUBIC ENHANCES ITS PRODUCTS WITH SYNTHETIC DATA FOR AI MODELS

Cubic Corporation recently announced its Cubic Transportation Systems (CTS) business division has partnered with CVEDIA, an artificial intelligence (AI) solutions company to enhance its GRIDSMART products. CTS will utilize CVEDIA's synthetic data technology to continue to rapidly scale deep learning models for GRIDSMART omnidirectional cameras and other intelligent transportation systems (ITS) solutions. The GRIDSMART product pioneered horizon-to-horizon, computer-vision tracking for ITS applications and is installed in nearly 10,000 intersections in more than 1,500 communities globally.

"Safety is the most fundamental need for all drivers and vulnerable road users traveling through intersections. CVEDIA's AI and synthetic data expertise allow us to both augment our existing AI models and rapidly iterate for new applications," said Jeff Price, vice president and general manager of Cubic Transportation Systems' ITS unit.

GRIDSMART is a complete omnidirectional-imaging, real-time computer vision product

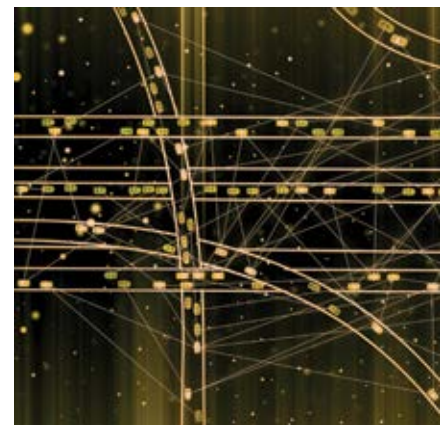
comprising hardware and software that works with traffic controllers to actuate intersections and provide rich analytics data. GRIDSMART uses real-time computer vision technology and deep neural net classification to track and discriminate vehicles, bicyclists, and pedestrians as they approach, enter and exit intersections. The system improves safety for bicyclists and pedestrians while simultaneously allowing for improved intersection efficiency with multimodal traffic.

CVEDIA will enhance and build new AI models for object detection and classification, support vulnerable road users (VRU) and safety efforts, and improve vehicle detection and high-resolution localization. CVEDIA's synthetic technology puts an end to the need for training data, thereby eliminating training bottlenecks such as manual labeling while dramatically improving algorithm performance.

"CVEDIA is excited to expand our relationship with CTS and GRIDSMART," said Arjan Wijnveen, CEO and co-founder of CVEDIA. "We are the only

company that has solved the 'domain gap' issue of synthetic versus real data performance. By using our technology for GRIDSMART products, we will further our mission to create a new generation of AI."

The partnership began as a consultancy in 2019 after Cubic acquired GRIDSMART Technologies, Inc.



BEAM AND MOOVIT ANNOUNCE AUSTRALIAN PARTNERSHIP

Beam, the leading APAC micro-mobility company, and Moovit, an Intel company, a leading Mobility as a Service (MaaS) solutions provider and creator of the #1 urban mobility app, are announcing a partnership that will offer Moovit users more convenient first and last-mile options. With a shared vision to get more cars off the road, Moovit will show users in real-time where nearby Beam e-bikes can be found in Sydney, and where e-scooters can be found in Canberra, with more cities to be added soon.

Since the start of the COVID-19 pandemic, the reliance on bikes and scooters to get around has boomed. Moovit's *2020 Global Public Transport Report*, found that on average, 59% of cyclists and scooter users in Sydney prefer to connect their rides with public transport for more efficient first and last segments of a journey. However, many people still drive their private vehicles to connect with main transport hubs or drive directly to their destination.

That's why Beam and Moovit are partnering up to better connect Australian citizens with micro-mobility services and ultimately take more cars off the road. Moovit will show its users in real-time where a Beam vehicle is available nearby in Sydney and Canberra, including how long it will take to walk there.

"Offering more alternative transport options that can easily get people to their destination,

especially during the COVID-19 pandemic, is a critical component of any Mobility as a Service (MaaS) ecosystem," said Juan Carbonell, Moovit's Head of Solutions in Australia and New Zealand. "That's why we are excited to partner with Beam. From Sydney to Canberra, riders can now find several alternative mobility options to enjoy the most convenient ways of getting from A to B."

"Our partnership with Moovit will make it even easier to find and ride Beam vehicles," said Tom Cooper, Beam's General Manager for Australia and New Zealand. "We are excited to partner with Moovit and be a leader in bringing integrated and creative transportation options to Australian cities."

Moovit simplifies urban mobility all around the world, making getting around town via transport easier and additional multi-modal services more convenient. By combining information from public transport operators and authorities with live information from the user community, Moovit offers travellers a real-time picture, including the best route for the journey, service alerts, and get off notifications. Moovit has guided more than 990 million users in getting around town, using any mode of transport.

Moovit recently partnered with Ventura Bus, Victoria's largest bus provider, and Department of Transport Victoria to launch FlexiRide, Melbourne's first Demand Responsive Transport

service, to bring more convenient and efficient mobility to people traveling to major local transport hubs.

Moovit can be downloaded on Google Play and the App Store.

ABOUT MOOVIT

Moovit, an Intel company, is a leading Mobility as a Service (MaaS) solutions provider and the creator of the #1 urban mobility app. Moovit was acquired by Intel in 2020 to join forces with Mobileye and advance its MaaS strategy. Together, Moovit and Mobileye will accelerate the global adoption of autonomous transportation.

Moovit's iOS, Android, and Web apps guide people in getting around town effectively and conveniently, using any mode of transport. Introduced in 2012 it now serves over 950 million users in more than 3,400 cities across 112 countries.

Moovit amasses up to six billion anonymous data points a day to add to the world's largest repository of transit and urban mobility data. For governments, cities, transit agencies, and private companies, Moovit offers AI-powered MaaS solutions covering planning, operations, and optimization with proven value in reducing congestion, growing ridership, and increasing efficiency and asset utilization. Industry leaders such as Microsoft, Uber, and Cubic have partnered with Moovit to power their mobility offerings.





ARRIVAL SELECTS HERE SDK FOR ITS ELECTRIC VEHICLES

Arrival, the company reinventing the automotive industry with its entirely new approach to the design and assembly of electric vehicles (EVs), has selected HERE Technologies, the leading location data and technology platform, to power its in-vehicle Human-Machine Interface (HMI) navigation solution.

Arrival has been developing its own proprietary hardware, software and robotics since 2015 and is using these technologies to enable electric vehicle production through its unique Microfactories, which are small-footprint, low CapEx and can be deployed quickly to serve local communities. Electric vehicles benefit from predictable routes and overnight depot charging, fitting seamlessly within commercial fleets. With the rise of e-commerce, accelerated by COVID-19 and the demand for same-day-delivery, the global market for commercial fleets is expected to grow. Tackling the urgent need to reduce carbon emissions, Arrival's integrated transportation ecosystem provides the tools for cities and businesses to achieve their sustainability goals.

HERE's software development kit (SDK) goes well beyond standard mapping, routing and search functionalities. It provides real-time visibility into the geographic location of mobile assets and offline capabilities that include route calculation,

location search and turn-by-turn navigation.

Thanks to a highly compressed data format, HERE SDK provides fast upload times and a seamless user experience that can be customized by incorporating private points of interest (POIs).

"After a comprehensive benchmarking process, Arrival came to the conclusion that the navigation SDK from HERE is one of the best on the market. The quality of the location data coupled with the customisation capabilities of the SDK means that HERE is the perfect partner for us. As a result, we're delighted to provide drivers of Arrival vehicles with the best technology to do their jobs comfortably and efficiently," said Valentin Anisimov, HMI System Lead in Technology at Arrival.

"We are extremely proud to be partnering with Arrival on tackling the challenge of our times – zero-emissions transport. With HERE SDK, Arrival can now offer their drivers a best-in-class routing experience. We look forward to helping Arrival realize its goal of making cities cleaner and deliveries faster," said Knuth Sexauer, Vice President for Automotive at HERE Technologies.

Together, Arrival and HERE are poised to enhance the performance of electric commercial fleets and have a radical impact on climate change as a result.

ABOUT HERE TECHNOLOGIES

HERE, a location data and technology platform, moves people, businesses and cities forward by harnessing the power of location. By leveraging our open platform, we empower our customers to achieve better outcomes - from helping a city manage its infrastructure or a business optimize its assets to guiding drivers to their destination safely.

To learn more about HERE, please visit here.com and 360.here.com

ABOUT ARRIVAL

Arrival is reinventing the automotive industry with its entirely new approach to the design and assembly of electric vehicles. Low CapEx, rapidly scalable Microfactories combined with proprietary in-house developed components, materials and software, enable the production of best in class vehicles competitively priced to fossil fuel variants and with a substantially lower total cost of ownership. This transformative approach provides cities globally with the solutions they need to create sustainable urban environments and exceptional experiences for their citizens.

Arrival is a global business founded in 2015 and headquartered in London, UK and Charlotte, North Carolina, USA, with more than 1,900 employees located in offices across the United States, Germany, the Netherlands, Israel, Russia, and Luxembourg.

ABOUT ITS AUSTRALIA

Intelligent Transport Systems (ITS) Australia is the peak body for advanced transport technology in Australia. Formed in 1992, we have partnered with government, industry, and academia to shape future transport for more than 25 years.

Australia is a global leader in intelligent transport, and ITS Australia works on behalf of more than 130 member organisations to promote the development and deployment of technologies that enable all Australians to move more safely, efficiently, and sustainably through the nation's transport networks.

ITS Australia is an independent not-for-profit incorporated membership organisation. Affiliated with peak ITS organisations around the world, ITS Australia is a major contributor to the development of the industry across all public and private transportation modes: air, sea, road, and rail.

Our key activities include convening national and international conferences, facilitating dialogue between transport modes and across government jurisdictions, promoting

research and development, and supporting the export of Australian technologies.

ITS Australia advocates the application of communication, data processing, and electronic technologies for in-vehicle, vehicle-to-vehicle, vehicle-to-infrastructure, and mode-to-mode systems to increase transportation safety and sustainability, reduce congestion, and improve the performance and competitiveness of Australia's networks.

To find out more, please visit: www.its-australia.com.au

itsaustralia 
Intelligent Transport Systems



COHDA SOLVING VEHICLE POSITIONING ACCURACY CHALLENGE IN THE BIG APPLE WITH V2X-LOCATE

Cohda is delivering unrivalled vehicle positioning accuracy in the most inhospitable of environments for Global Navigation Satellite Systems (GNSS) to operate in – the urban canyons of New York City!

A three-stage, 75-month project, the *New York City Connected Vehicle Pilot* is a milestone development in the adoption of connected vehicle technology. It is the largest of its kind in the world, encompassing three distinct areas in the boroughs of Manhattan and Brooklyn and comprising over 3,000 vehicles consisting of cars, buses, and fleet vehicles. Its goal is to reduce the number of fatalities and injuries resulting from traffic crashes through the deployment of connected vehicle technologies that allow vehicles to communicate with each other to extend their perception horizon far beyond that of human capability.

Whilst Cohda's full *Vehicle to Everything* (V2X) stack and applications are being applied in the project, it is Cohda's *V2X-Locate* positioning

solution that is inspiring ultimate confidence in the potential for a connected intelligent transport system to be deployed in city environments, where systems reliant on GNSS operate poorly. After all, with so many people living and working in and around cities, it is critical that the operational benefits of V2X technology are underpinned by highly accurate vehicle positioning in cities and not just open roads. Accurate vehicle positioning is a key requirement for the successful deployment of smart transport systems given the nature and complexity of vehicle interactions in a city environment.

Cohda's *V2X-Locate* product uses ranging measurements between vehicles, satellites and equipped road-side infrastructure (RSUs) to enable enhanced positioning accuracy. The RSUs need only be deployed at signalised intersection with spacing typically aligned with V2X coverage requirements.

The ranges from RSUs are fed into Cohda's enhanced *V2X-Locate* positioning engine on board the vehicle to accurately position the vehicle. Through the advanced processing capabilities of Cohda's stack, the *V2X-Locate* solution is able to counteract the impact of non-line-of-sight and multipath signals brought about by tall buildings or underground car parks and tunnels.

Ultimately, *V2X-Locate* fuses satellite-based ranging and RSU-based ranging into one complete positioning solution with sub-metre positioning accuracy 95% of the time everywhere, in real time.

Cohda believes that the New York Connected Vehicle Pilot has proven the importance of a connected intelligent transport system and revolutionises road transport as we know it – saving lives and reducing negative impact on the environment.

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Driving towards better sleep: Save time, money and lives in the transport industry

by Integrated Safety Support, CEO, Dr Adam Fletcher

Australians are inundated with confronting horror stories about the dangers of speeding and drink driving, but fatigue is a major contributing factor that often slips under the radar.

In fact, the National Road Safety Action Plan says, "fatigue is four times more likely to contribute to impairment than drugs or alcohol".

For those in the Australian transport industry, feeling safe and supported on the road fundamentally relies on healthy sleeping habits. Drivers are at particularly high risk of fatigue during lengthy and irregular shifts – a common reality for many who work on the roads. For contract workers, this risk is even higher with unknown and potentially lengthy commutes before they even get behind the wheel for work.

As our roads return to pre-COVID congestion levels and the reliance on road freight continues to grow, it's time for the transport industry to focus on building more positive sleeping cultures to keep workers safe.

Fatigue hits hardest in the transport industry

Fatigue can severely impact employees across all workplaces and industries, but attention-critical workers are particularly high risk.

Long hours, insufficient downtime between shifts and unpredictable work schedules impact a driver's ability to get good quality, managed and routine rest. Research suggests long-distance drivers sometimes enter a semi-conscious state while behind the wheel for long periods, while others face circadian rhythm interruptions that can lead to sudden onset drowsiness.

With lives genuinely at risk, combatting fatigue and building productive sleep cultures using evidence-based training and the latest technology should be a top priority for all transport executives.

Emergency services are seeking support

Emergency service workers are deeply committed to their communities and are often faced with high-risk driving tasks during extraordinary shift work, but a recent partnership between Integrated

Safety Support and St John Ambulance Service (NT) shows the industry is working towards a higher standard.

The Northern Territory organisation signed up for our *Eclipse Subscription Service*, which offers courses on healthy sleep training that deepens people's understanding of sleep, creates healthy boundaries between work and home and enables personal fatigue management. Drivers are also armed with two smartphone apps to stay on top of their personal alertness and manage their fatigue while on the road.

St John Ambulance NT Director of Ambulance Services, Andrew Thomas, said the investment came after the impacts of fatigue on performance and productivity were highlighted during 2020.

"The safety of our staff is our highest priority," Thomas said. "Ensuring that our frontline emergency workers have the very best access to the latest thinking and understanding of fatigue management and occupational alertness is extremely important to us. The Eclipse Subscription Service from Integrated Safety Support now delivers training and resources suitable for implementation across the whole team."

Trucking sleep culture at the fore

In a move that sparked outrage, the Australian Federal Government briefly closed truck rest stops during COVID-19 lockdowns last year. Anybody in the industry would know that essential amenities like showers, lounges and rest spaces are vital to the proper and safe functioning of drivers. While closures during the pandemic were quickly remedied, what hasn't been addressed is the ongoing issue that there simply isn't enough rest stations in Australia to combat sleep deprivation.

This is particularly true in remote parts of the country, where dedicated rest zones are few and far between. Drivers are often forced to sleep in high-density parking bays that are exposed to road noise and lack sufficient amenities. This environment is not conducive to quality sleep.



The tell-tale signs of poor sleep and fatigue

SIGNS OF POOR-QUALITY SLEEP

- Taking longer than 20 minutes to get to sleep
- Not getting a regular minimum of 7 hours
- Waking up without feeling refreshed
- Noticeable behaviour changes (restlessness, snoring, breathing stopping)
- Not getting continuous sleep and waking during the night

SIGNS OF FATIGUE

- **Physical**
 - o Yawning
 - o Microsleeps
 - o Head nodding
 - o Difficulty keeping eyes open
- **Mental**
 - o Forgetfulness
 - o Slowed response times and reaction times
 - o Carelessness and risk-taking
 - o Bad mood and inability to control emotions

Cost analysis for businesses

While many workers across all industries think they can maximise profits by getting the job done as quickly as possible, fatigue has been proven to cost businesses hundreds of thousands of dollars. The latest Sleep Foundation report found the total cost of inadequate sleep in Australia is \$9000 per worker annually. That adds up to a whopping total of \$66.3 billion, comprising of \$26.2 billion in financial costs and \$40.1 billion in the loss of wellbeing.

This dramatic financial burden is mostly avoidable if workers are given dedicated support, tools and training that empowers a healthy work culture and rewards individual decision-making around their sleep health and habits.

Support is out there

Growing demand for fatigue management tools is an encouraging sign that sleep health is starting to be taken seriously.

In the wake of COVID-19, industry leaders have woken up to the reality that managing fatigue can improve the bottom line, increase productivity and staff retention, but most importantly, keep workers safe and healthy.

Transport leaders need to ask themselves, 'are my drivers armed with the adequate training and tools to recognise and manage fatigue to keep themselves and others safe?'

Dr Adam Fletcher is an ex-US military sleep researcher with more than 15 years' experience training high-performance teams, soldiers, airline pilots, CEOs and safety-critical workers how to optimise productivity through engaging online training programs and patented apps.

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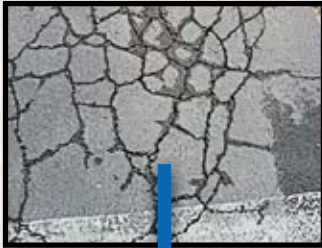
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- Cut to size or shape on-site as required
- Sheets can be easily butted together for large areas
- Available with various aggregate sizes to match existing surface conditions
- Also adheres to a range of other surfaces including steel, timber and concrete
- Open to traffic immediately after installation
- Storage shelf-life of 10+ years





ROAD MAINTENANCE

The BRP Road Patch can be cut to size. Pieces can be butted together, ensuring zero wastage.



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Early intervention with a proven seal will result in safer roads and cost savings.



Long-life Repairs

By sealing off the defects using a waterproof seal, the BRP Road Patch delivers a high quality, long-lasting repair. Sealing 100mm beyond any visible defects eliminates perimeter cracking and hidden stress cracks, thereby reducing the possibility of rework.



BRIDGE MAINTENANCE

The BRP Road Patch is ideal for small bridge maintenance jobs, and can be used on range of surfaces.



Bridge Joints

The BRP Road Patch provides a cost-effective solution for constructing and waterproofing bridge joints.



Deck Sealing

The resilience of the bitumen rubber provides a durable binder for flexible structures, including timber decks, vehicle and pedestrian bridges.



Minimal Disruption

Installation is quick and easy. The BRP Road Patch offers a cost-effective solution for deck sealing with minimal disruption to traffic.

SIMPLE INSTALLATION PROCEDURE REQUIRING MINIMAL LABOUR AND TOOLS



1

Sweep all loose particles from area. Demarcate 100mm beyond any visible defects.



2

Evenly apply emulsion to the demarcated area and to the back of the of the BRP Road Patch.



3

Wait for the emulsion to break (e.g. turn from brown to black). Place the BRP Road Patch onto the emulsion treat area.



4

Apply a small quantity of emulsion to the edges and along any joints. Blind edges and joints with crusher dust or sand.



5

Driver over the BRP Road Patch with construction vehicle on-site (several passes recommended). Open to traffic immediately.

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TECHNOFAST TENSIONERS TOWER OVER NATURE'S FURY IN A GLOBAL LOW- MAINTENANCE MASTERCLASS

Versatile Technofast cable tensioners supporting Sydney Airport's control tower have delivered a master class in low-maintenance engineering and construction technology after faultlessly withstanding the worst conditions nature could throw at them for 25 years.

The Australian-engineered stainless steel tensioning innovations – used in architectural, construction, infrastructure, energy, oil and

gas, mining and crane applications globally – were installed in 1994. They tension the tower's stay rods, using precise hydraulic force rather than torque to tension pairs of bolts supporting the slim, elegant structure overlooking the three runways of Australia's busiest airport, which handles 44 million passengers in a typical year.

Since installation, the cost-effective, trouble-free and safe way of securing the stay

rods to the foundation and post-tensioning the rods to ensure the tower's stability has withstood winds exceeding 200kph in the nearby Sydney CBD (in 2015); daily rainfall exceeding 200mm (1998); constant deluges of salt from the seaside location and the heat of one of the worst droughts in Australia's history.

"The nuts have been so trouble-free in service that, after 24 years from the last contact we had with the tower's operators, we got a request from Arup Partners for information about the nuts so they could continue safeguard the ongoing stability of the structure. The nuts were so reliable in service that it was easy to forget they were there," says Technofast CEO John Bucknell, whose company sequentially removed, refurbished and reinstalled the tensioners to extend their safety and performance even further into the future.

"The tensioners enable the tower to be moved 30mm in any chosen direction to ensure perfect alignment using with the hydraulic control we established, says John Bucknell.

"Their future and past performance demonstrates the longevity of the versatile product and the range of extreme applications which can be addressed using them," says Mr Bucknell.

"They are so quick and easy to use that many power plants use them to minimise downtime and service time on generators," he says.

Different designs of rapidly actuated sets of Technofast hydraulic nuts – including the latest EziTite designs – are used in applications as diverse as architectural and construction projects, oil and gas vertical structures, cable stays on mining and lifting equipment including draglines, and wind power generators. They are ideal for difficult or confined spaces, where vibrational or torsional stresses are a problem and where regular maintenance requires repeated adjustment or removal of nuts.

The latest EziTite designs are further enhancing the durability of the original hydraulic tensioners used at Sydney Airport.

EziTite features and benefits

- Reduced maintenance downtime
- Improved safety on the job
- Reliable and precise tensioning across multiple nuts
- Accurate and reliable loading
- User-friendly, requiring little physical effort
- Fast to fit and remove

Refurbishment of precision adjustment of the Technofast tensioners was simply accomplished by a two-man team using hydraulic power to release, refurbish and replace each of the twin nuts tensioning each cable.



Safe and Durable Solution for Sydney Airport

Technofast hydraulic nuts were originally selected for Sydney airport control tower because installation of them was so simple, safe and time-saving, while delivering a long-term durable and adjustable tensioning solution. Twelve 50mm Technofast nuts were used on the 45m-high control tower to anchor its stay rods to three concrete buttresses at its base.

After being screwed into place by hand until the base of the nut was against the working face, hydraulic pressure was applied to extend the nut's piston and push the nut body apart. This stretched and tensioned the 80mm steel stay accurately.

The threaded locking, mounted on the piston, was then tightened to retain the

induced load and the hydraulic pressure was released. The three control tower stays were tightened simultaneously by three personnel, each using a single Hydraulic hand pump with spider hoses attached to four Technofast tensioners. Pressure was raised in steps of 35bar/500psi until the designated tension of 840bar/12,000psi was reached. Once the tensioners were pumped up to the required pressure, the lock rings were nipped tight with a C spanner.

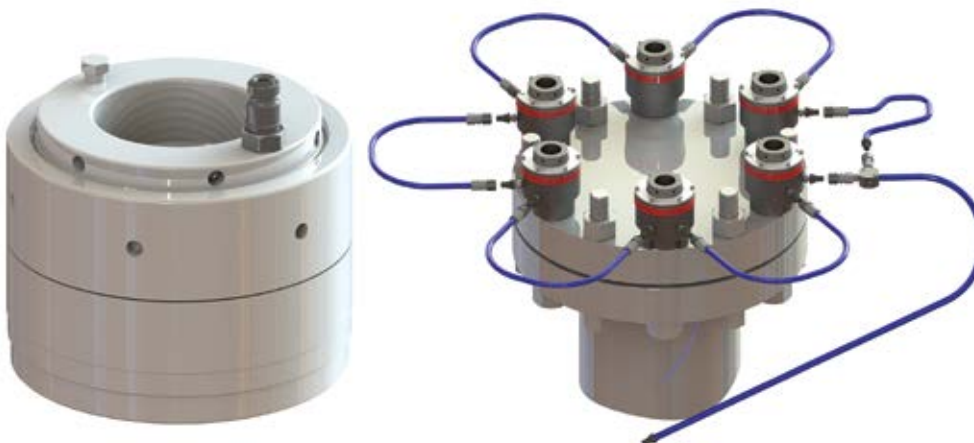
About half a day was spent on the original tensioning operation, with none of the customary problems associated with conventional torque-tightened fasteners, such as metal friction and heat build-up. The Technofast nuts were safe to install because they were locked mechanically at each step of the tensioning process.

“Their future and past performance demonstrates the longevity of the versatile product and the range of extreme applications which can be addressed using them.”

The three stays were checked and tightened if necessary every three months for the first 12 months of the control tower's life, to counteract any settling of the foundations.

“This was a very simple process in which the tensioners were repressured to re-tension the stays and secure the nuts again,” said Mr Bucknell. “Since then, maintenance requirements have been minimal. The stainless tensioners are engineered to be very resistant to corrosion from the salty air, which is in abundance at the airport,” he added.

These are the same qualities that make them such a good choice for building sites in aggressive environments, as well as mining, energy, power and gas and water utilities.



Technofast EziTite nuts can be used singly (left) and in multiple sets (right) to facilitate rapid and safe installation and servicing of applications extending from buildings and mines through to energy plants, where access is restricted and timing is crucial to minimise downtime and avoid hazards.

ABOUT TECHNOFAST

Technofast Industries is a worldwide leader and specialist in Bolt Tensioning, providing innovative and effective technical solutions along with uncompromising customer service.

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PRECAST BYPASS SUPPORTING LOCAL COMMUNITIES NOW AND INTO THE FUTURE

PROJECT: The Smithfield Bypass Project

MASTER PRECASTER: Stresscrete

LOCATION: Cairns

National Precast Master Precaster Stresscrete was engaged by Highway Construction and Albem Operations (HAJV) to supply precast concrete structural elements for a major bypass project in Smithfield, Cairns.

This project is funded by the Queensland Government.

The Smithfield Bypass Project is building a new 3.8km road from the intersection of the Captain Cook Highway (CCH) and Cairns Western Arterial Road to the McGregor Road roundabout, as an alternative to the CCH.

The bypass will provide a safer, more efficient travel route for motorists, and separate through traffic from local traffic movements. It

will improve traffic conditions on the local road network by addressing congestion.

National Precast Master Precaster Stresscrete has supplied structural precast elements to the bypass project, notably seven precast headstocks spanning 13 metres each, and totalling 490 tonnes. The headstocks are accompanied by sets of 25-metre and 15-metre deck units. As precast concrete elements are manufactured offsite in a factory-controlled environment, the typical congestion of trades and materials deliveries is reduced on the construction site.

The offsite manufacturing process allowed Stresscrete to deliver precast elements with consistent strength and finish quality across the entire project. When using precast concrete, the reduced congestion of onsite labour makes better access to the construction site and regulated precast factories can ensure the safest possible working conditions.

The implementation of precast concrete elements reduces the cost and time inefficiencies

of onsite construction, and ensures a high quality, durable outcome that will be valued for many generations.

The Smithfield Bypass Project is expected to be completed late 2021, weather permitting.





HUMES LEADING SUSTAINABILITY WITH SUPPORT FROM GLOBAL GIANT LAFARGEHOLCIM

Precast concrete is a durable construction material that is suitable for both civil and architectural applications. Its manufacture uses local materials and supports local communities. The longevity of precast structures contributes to a sustainable building future by ensuring buildings and civil works last for many generations. As well, they are fire, flood and termite safe and thermally efficient. Precast buildings also require minimal maintenance.

As a National Precast Master Precaster, Humes is the Australian precast division of global building materials' company LafargeHolcim. It

has a strong and established history of supplying critical, high quality precast elements to infrastructure projects nation-wide.

Impressively, LafargeHolcim is the first global building materials' company to commit to a *Net Zero Pledge* by 2050, with core 2030 targets aligned and validated with the Science Based Targets initiative.

The journey toward Net Zero has seen the company reduce CO₂ intensity by 27% since 1990, focusing on reduction initiatives including clinker substitution, renewable energy, carbon capture and development of green products.

Not surprisingly, Humes is also a proud advocate for sustainability in the construction industry. The company has a strong environmental commitment, including its partnership with the Infrastructure Sustainability Council of Australia (ISCA) as a member since 2010. Alongside the ISCA, Humes has helped to develop sustainable practices for design, construction, and operation of infrastructure projects.

In 2017 Humes developed and published an Environmental Product Declaration (EPD) for Reinforced Concrete Pipes under accreditation of EPD Australasia. The company's commitment to environmental transparency was groundbreaking for the construction manufacturing industry and was recently complimented with the Precast and Prestressed Concrete Products' EPD, which was certified and published in 2020.

As a proud advocate for improving construction manufacturing's social and sustainability performance, Humes is also certified under the Australian Government's National Carbon Offset Standard, 'Climate Active, Carbon Neutral'.

Humes uses the lifecycle modelling data from their EPDs to calculate the embodied carbon of precast products for each project and offset these carbon emissions by supporting projects that affect real change.

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