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About the Cover

A1 Reversing Systems (A1RS) and Reverse Smart have been at the forefront of heavy-duty, radar-based safety systems for large trucks and mobile plant & equipment since 2015. Six years on, and they're continuing to lead the way with a number of innovative new products.

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



Driver Education

Teach them Young & Teach them Well

Dear Readers,

It seems that not a day goes by when we aren't confronted with the seemingly never-ending carnage on the nation's roads. Every day people are having their lives cut short, or dramatically and permanently changed by a serious road accident.

Together with the 'big three' accident causes (speed, alcohol, and fatigue), other factors such as drugs, aggression, 'hoon' driving behaviour, and a lack of driving experience will all no doubt play a significant role in numerous serious accidents each week - particularly across the younger driver population.

Not surprisingly, the over-representation of young drivers in road trauma statistics generates a significant level of often heated debate about what can be done to improve the attitude of young drivers on the road. Even though these discussions inevitably result in a myriad of ideas and laws, including increasing the legal driving age and limiting the number of passengers, it's interesting to note that the general consensus appears to be that improving driver education for young drivers will play a key role in reducing road trauma.

Regrettably, this 'consensus' of opinion has yet to translate into any significant changes in mandatory professional driver training and license testing procedures throughout Australia.

Unfortunately, it is still possible to obtain a Driver's License in some Australian States with little more than a basic understanding of the road rules, a minimal level of professional driver training (which tends to place a heavy emphasis on learning how to reverse parallel park) and absolutely no mandatory high-speed highway, freeway and/or rural road driving experience whatsoever. And while some jurisdictions utilise Learner's Logbooks with required hours of driving prior to taking the practical test, this is not a uniform national requirement.

Perhaps most alarmingly, despite numerous proposals - some of which date back decades - there's still no national mandated requirement for professional driver training.

For many young male drivers, and an ever-increasing number of young female drivers, the issues associated with this lack of professional driver training are being further compounded by the fact that when they obtain their driver's license, in some states there are still very few (if any) limitations on the type of vehicle they may drive.

Needless to say, the combination of a lack of driver knowledge and experience, excessive horsepower and youthful 'bravado' is a deadly cocktail, and one that all-too-often reaps horrendous results.

While we may be limited in our capacity to control youthful bravado, we do have the capacity to address the issues of lack of driver knowledge and excessive horse-power. If we are truly serious in our approach to road safety

and in reducing the number of deaths and serious injuries on our roads, we must all work together to improve both driver education and licensing standards throughout Australia.

Rather than considering delaying our children's involvement with driving, I believe that we should be looking to incorporate formal driver education programs, including advanced driver training and 'emergency response' training, as part of the high school curriculum. In short, starting driver training as early as possible.

Importantly, for maximum effectiveness, I believe these education programs also need to be backed up with strict, nationally 'standardised' legislation governing the types of vehicles that can be driven by young and/or inexperienced drivers.

Although we may never achieve the 'utopian' goal of a zero road toll, helping to eliminate the 'culture' of bad driving through education, legislation and enforcement will no doubt help the young drivers of today increase their chances of surviving to become the older, more experienced drivers of tomorrow.



Anthony T Schmidt
Managing Editor

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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.

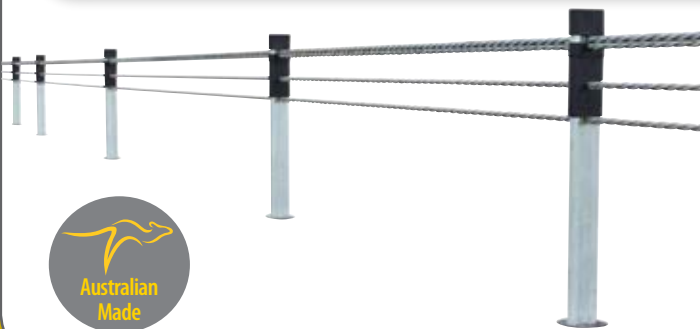
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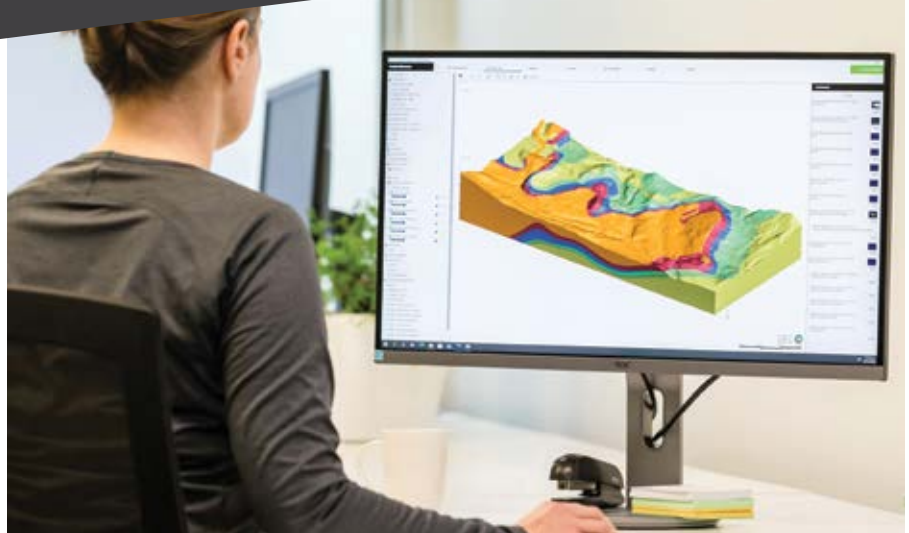
Seequent introduces next-generation digital twin technologies for infrastructure projects

Geoscience software company Seequent, has unveiled major updates to its civil and environmental portfolio, enabling powerful ground information modelling that delivers a digital twin for civil infrastructure and environmental projects.

Seequent's *Leapfrog® Works*, its 3D geological modelling and visualisation solution, and *Central*, for cloud-based model management, include new technologies that will ensure a smooth and seamless transition to Seequent Evo, its new ecosystem of hybrid cloud and desktop solutions.

Seequent's Chief Technology Officer, James Lawton, says: "As projects become increasingly complex, organisations are generating greater amounts of data. We want to enable organisations in their digital transformation journey and enhance productivity.

"We've planned for the future with these releases, building the capabilities of Seequent Central at the centre of the workflow in Seequent Evo, to improve digital effectiveness and inform better decisions



around realising value and delivering environmental benefits."

Central 4.0 projects are more accessible, shareable, and collaborative, with all-new visualisation capability, enhanced modelling workflows, direct communication with notifications, links and sharing, and more publishing improvements. The new import capability bridges the gap between geoscience disciplines via a common workflow.

Leapfrog® Works 4.0.1 has been built from the ground up with an all-new user interface designed for intuitive use and unrivalled productivity, with up to 25% faster overall processing times on complex projects. New integrations include *OpenGround*, Bentley's cloud-based ground engineering database.

Other enhancements include better interval table and mesh handling and

increased interoperability via *Seequent Central*. Advances to the *Leapfrog Works Contaminants Extension* provide increased flexibility with variogram modelling and allow land and groundwater contaminant plumes to be characterised inside Leapfrog.

Seequent's Chief Revenue Officer, Daniel Wallace, says: "Our latest releases allow for better connectivity to cloud products and between different software solutions, and enable large processing tasks and multi-user workflows by taking advantage of cloud computing capabilities."

"The releases are geared for the transition to Seequent's Evo ecosystem – which links operations, data, and technology, to provide real-time decision support."

For more on Seequent's solution updates, please visit www.seequent.com/products-solutions/whats-new

No more unnecessary go-slow around roadworks in SA

Companies responsible for traffic management during roadworks on South Australian state roads will now face fines if they leave speed limit signs on the road when they are not required – to help avoid unnecessary traffic disruptions.

Under the new regulations which start on April 5, fines of up to \$1,250 will be available if incorrect speed limit signage is in place when work isn't taking place and there is no requirement from a safety perspective.

South Australian Minister for Infrastructure and Transport Corey Wingard said the State Government is keen to ensure temporary traffic management used around worksites keeps both workers and road users safe but that there weren't unnecessary disruptions.

"With a record \$16.7 billion infrastructure spend rolling out over the next four years there's plenty of road works occurring across

the state – improving safety and creating jobs," Minister Wingard said.

"This is ensuring that contractors don't leave speed limit signs up when they're not needed, holding up traffic and creating unnecessary disruptions.

"Fines can now be issued to any contractor who breaches their permit conditions because we need to make sure our pipeline of works roll out seamlessly.

"We want to make sure road workers and motorists are safe, but we also want to ensure we keep traffic moving.

"We know that just a few weeks ago there was an instance on the SE Freeway that saw traffic slowed to 40km/h during peak time when in fact it should have been 60km/h.

"I completely understand the frustration that caused and that's why I'm keen to crackdown on those who don't adhere to the regulations," Minister Wingard said.

Minister Wingard has written to stakeholders that are major road traffic management companies who are pre-approved to undertake traffic management on DIT roads to inform them of the changes.

The Traffic Management Association of Australia Treasurer Andrew White applauded the South Australian government's commitment to the safety of road users and roadworkers with the introduction of The Regulations, which build on the existing Road Traffic Act.

Mr White said the introduction of The Regulation would provide an educative function for companies involved in traffic management and assist with compliance.

"Safety is central to our industry and The Regulations will provide a platform to introduce and educate the industry and the public in regulatory safety on and around roadworks," Mr White said.



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\$1 million funding for hydrogen vehicle refueller

CSIRO, Australia's national science agency, has welcomed Victorian government funding that will enable it to partner with Swinburne University of Technology to establish the Victorian Hydrogen Hub (VH2). VH2 is designed to bring researchers, industry partners and businesses together to test, trial and demonstrate new and emerging hydrogen technologies.

Under the partnership, CSIRO will receive more than \$1 million towards the development of a refuelling station to fuel and test hydrogen vehicles.

The refuelling station, to be located at CSIRO's Clayton campus in Victoria, is a key milestone in the development of CSIRO's national Hydrogen Industry Mission, which aims to support Australia's clean hydrogen industry - estimated to create more than 8000 jobs, generate \$11 billion a year in GDP and support a low emissions future.

"As Australia considers energy alternatives, we know hydrogen is clean and will be cost-competitive - but a major

barrier to it becoming a fuel source for cars and trucks is how to refuel, and the lack of refuelling infrastructure," CSIRO Executive Director, Growth, Nigel Warren said. "The refueller is a significant step towards removing that barrier."

Construction will take place as part of the development of VH2 - a new hydrogen production and storage demonstration facility, where CSIRO, Swinburne and their partners will test 'real world' uses for hydrogen technology.

"We thank the Victorian government for supporting VH2 which, combined with the refueller, will allow us to test emerging hydrogen technologies," Mr Warren added.

Swinburne University of Technology's Vice-Chancellor Professor Pascale Quester said the University was excited by the development.

"We are grateful for the Victorian Government for their support," Professor Quester said. "The Victorian Hydrogen Hub will be another demonstration of how we can bring people and technology together to create a better world."

"Swinburne's strong partnership with CSIRO means that we will be able to build

on our focus of digitalisation and Industry 4.0, and support industry to enhance its understanding of what hydrogen can deliver."

The refueller project will demonstrate a fleet trial for CSIRO hydrogen vehicles with the potential for expansion, providing refuelling opportunities to other zero emission Fuel Cell Electric Vehicles (FCEVs) in the local area.

"We are proud to be investing in this forward-looking initiative, the kind that will help build a smarter Victoria and help respond to climate change," Victorian Minister for Higher Education, Gayle Tierney said.

CSIRO is engaging with vehicle companies such as Toyota Australia to support the future adoption and supply of FCEVs in Australia.

"Toyota Australia is delighted to support the development of this new hydrogen refuelling station in Victoria with next-generation Mirai FCEVs," Toyota Australia's Manager of Future Technologies, Matt MacLeod said.

"This is a significant step towards having the necessary refuelling infrastructure to help grow hydrogen opportunities in Australia."

"We look forward working closely with CSIRO and their partners on this exciting project."

projects and the sharper focus on world-class infrastructure that delivers social, cultural, environmental and economic value to our communities," Ms Simpson says.

Projects on the Priority List are advanced proposals with fully-developed business cases that has been assessed by Infrastructure Australia's independent board. Projects remain on the Priority List until delivery or constructions begins.

Ten projects have moved off the Priority List and are now in the construction phase. Nine of the 10 projects are pursuing third party verification of their social, environmental, cultural and economic benefits using ISCA's IS Rating Scheme.

"Among the projects now progressing with IS ratings are the M4 Motorway Upgrade in New South Wales, the METRONET Morley-Ellenbrook Line in Western Australia and sections of the Bruce Highway and M1 Pacific Motorway in Queensland," Ms Simpson says.

"By embedding sustainability into decision-making at the earliest stages of projects we can consider whole-of-life outcomes of infrastructure. We have clear evidence that sustainable infrastructure projects not only deliver better

environmental outcomes, but also maximise social, cultural and economic benefits."

Independent analysis finds infrastructure projects rated under the IS Rating Scheme will deliver up to \$2.40 in benefit for every dollar spent.

"These IS ratings will provide an assured evidence-base of sustainability performance during the post-construction review process as Infrastructure Australia assesses each project's outcomes against the expectations of the business case."

ISCA also welcomes the Priority List's "holistic focus" on infrastructure projects across transport, utilities and social infrastructure. New projects on the list will address the international competitiveness of Australian ports, new energy sources and water scarcity.

More than half of the investment opportunities on the 2021 Priority List are focused on regional communities.

"With seventy per cent of Australia's emissions enabled by infrastructure, and a holistic approach to infrastructure investment is fundamental to our resilient, inclusive and low-emissions future," Ms Simpson concludes.



Artist's impression of the proposed refuelling station at Clayton.

Australia's infrastructure investment roadmap points to a resilient, inclusive and low-emissions future

The 2021 *Infrastructure Priority List* is a welcome step towards a resilient, inclusive and low-emissions future, says the nation's peak body for sustainable infrastructure, ISCA (Infrastructure Sustainability Council of Australia).

Infrastructure Australia has added a record 44 new proposals to its \$59 billion investment roadmap across transport, energy, water, waste, telecommunications and social infrastructure.

Ainsley Simpson, ISCA's Chief Executive Officer, commends Infrastructure Australia's commitment to transparency, best practice and robust decision-making principles for infrastructure investment.

"We are pleased with the clarity of criteria used to assess potential infrastructure



Dr Collette Burke joins ARRB

The Australian Road Research Board (ARRB) has announced the high-profile appointment of Victoria's first Chief Engineer, Dr Collette Burke, to work with the organisation. Dr Burke has joined ARRB as its National Inception Leader for the Road Asset Performance Team, based in its Melbourne head office.

The Road Asset Performance team specialises in asset management, data collection and analysis, and infrastructure measurement. ARRB is focussed on the development of new knowledge in this area to provide guidance for the public and private sector on next generation asset management and better value for money economic outcomes.

Dr Burke spent two and a half years as Victoria's Chief Engineer and brings extensive and diverse experience to ARRB – the National Transport Research Organisation.

But she says her passion for asset management, and the type of work she had been doing in her role as Victoria's Chief Engineer, made ARRB a perfect fit for the next career challenge.

"My early career was a lot in building roads, bridges and tunnels, and I have particular experience in looking where roads failed," Dr Burke said.

"In recent years as Chief Engineer, I looked at raising the profile of asset management in government, and what was needed for whole-of-life asset management. I'm particularly interested in technology – digital engineering, sensors in bridges, pavement predictive technology such as ARRB's iPAVE and ISSAVE.

"I have a deep interest in trying to see if we could make a bigger impact on industry for better decision-making on our assets, and looking how we maintain them."

Chief Executive of ARRB Michael Caltabiano said: "The appointment of Dr Collette Burke to this role will indeed allow our organisation to work closely with transport agencies across Australia and New Zealand and the private sector to shape our transport future".

"Our journey as an organisation is to reimagine the transport journey and embed the opportunities that integrated mobility option bring to our community.

"Collette has many years of exceptional experience, that when combined with some of the brightest minds in the transport sector at ARRB, will enable us to deliver more great outcomes for our road and transport communities across Australia."

Dr Burke's role will be a strategic one – helping highlight ARRB's work and the benefits of infrastructure measurement and data analysis, to government and the private sector.

"As Victoria's Chief Engineer, I was able to work on some amazing projects and a lot of that work is very well aligned work to what ARRB's been doing, so I'm hoping ARRB is going to drive new knowledge in these areas to deliver some great outcomes," Dr Burke said.

"ARRB's a fantastic environment, incredible labs, a really friendly working place. I think ARRB have been the quiet achievers in the infrastructure sector. They've been doing fantastic work.

"Already I've had some great conversations with people in the office, but I also have a great network outside. So the aim is to strengthen and create those networks between ARRB, industry and government.

"That's one of my strengths, and there's really good opportunities to do that."

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Getting Rail Ready for Sydney Metro

John Holland will deliver important upgrades to the more than 125-year-old Bankstown Line in Sydney to bring it up to metro rail standards, and building on the successful delivery of the Sydenham Station and Junction project as part of our existing joint venture with Laing O'Rourke.

The \$227 million contract will see the rail line between Bankstown and Sydenham upgraded to accommodate metro services when the second stage of Sydney Metro opens in 2024.

Executive General Manager Rail Steve Butcher said the project would transform rail services for commuters.

"When complete, customers will be able to enjoy more services, safer stations and a world-class level of customer service," Mr Butcher said.



"Sydney Metro is transforming transport for Sydneysiders, and our team is excited to start work on the next phase of this incredible project."

The project will include:

- Upgrading 15 bridges while installing safety protection screens;
- Improvements to retaining walls, culverts and track drainage;
- Rail corridor fencing and segregation of the existing freight line from the new driverless metro tracks;
- Upgraded rail systems, signalling and overhead wiring.

Executive General Manager Infrastructure Andrew English said the project will build on a long partnership between John Holland and Sydney Metro.

"We are proud to be entrusted with this key upgrade project for Sydney Metro, building on the great work completed by our teams on Sydney Metro Northwest, the City & Southwest under-harbour tunnels, and the Sydenham Station and Junction project," Mr English said.

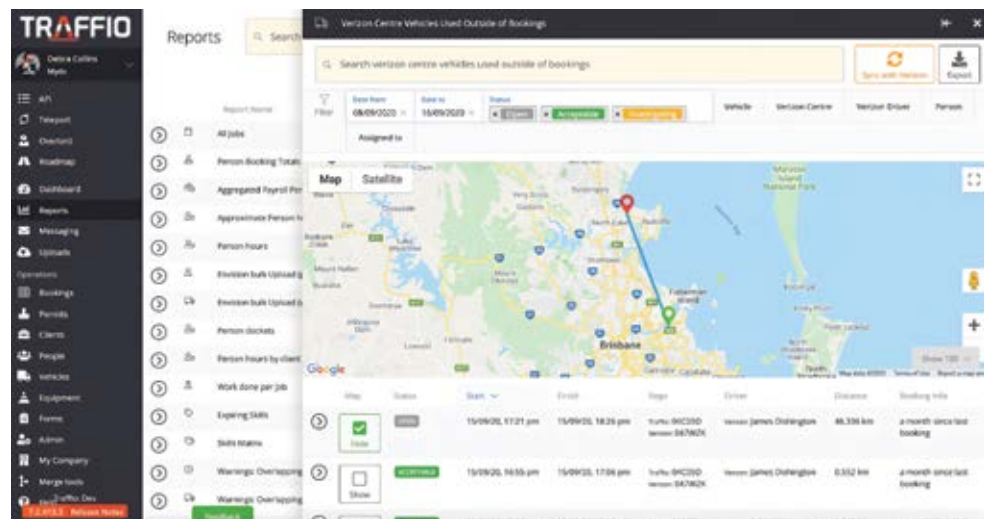
John Holland is currently delivering enhancements to Sydenham Station and Junction, the Sydney Metro City & Southwest tunnels, Sydney Metro Waterloo Station and Integrated Station Development and is part of the consortium that operates services on Sydney Metro Northwest.

John Holland was also part of the consortium that delivered the tunnels, 13 stations and 36km of track for Sydney Metro Northwest.

Verizon Connect improves fleet management efficiency with traffic management integration

Verizon Connect has given customers the ability to drive greater fleet management efficiencies by integrating Traffio's traffic control booking system to its *Reveal* platform. The enhancement will automatically locate the closest driver, allowing businesses and fleet management companies on Verizon Connect's *Reveal* platform to optimise bookings and deployments.

"A business using Verizon Connect's *Reveal* platform can now improve the entire vehicle deployment process – from viewing any available job, assigning the job to the closest driver with all the necessary details, while automatically providing an accurate ETA to the customer and enabling the paperwork to be completed digitally and made available to both the driver and head office so that nothing gets missed. For traffic management businesses, the time and efficiency savings in automating this entire process is priceless," said Greg Newham, Head of Verizon Connect in Australia and New Zealand.



Through Traffio's software, businesses can additionally track the individual vehicle activity of their whole fleet in near real-time to allow for prompt reporting and proof of compliance by accessing historical vehicle movements for previous jobs.

"It's exciting to be able to integrate with such a trusted and well-known company. Verizon Connect's openness in sharing their API has meant that we have been able to collaborate and explore new and innovative ways to benefit our clients together. We look forward to working alongside Verizon Connect in finding ways to help the Traffic Management Industry," said Nicholas Inglis, Director at Traffio.

Verizon Connect *Reveal* is a cloud-based fleet management platform that provides GPS fleet tracking to help businesses gain a 360 degree overview of all fleet management operations. The platform also includes high-resolution maps, fuel consumption management, asset tracking, customisable dashboards, performance analytics, and more. With integrated fleet tracking, fleet operators can view all drivers on a map and automatically detect driving behaviour such as harsh braking, quick starts, hard cornering, and additional vehicle misuse.

For more on Verizon Connect, please visit: www.verizonconnect.com/au

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STRONGER TOGETHER

MB SOLUTIONS AUSTRALIA ACQUIRES BLUEY TECHNOLOGIES

At a time when MB Solutions Australia was re-establishing itself in Australia as a market leader for specialised construction products, Bluey was also looking for ways to continue its expansion and support its growth efforts both locally and abroad. The solution for both companies came in the form of an acquisition that was finalised during March.

Considered a major step forward for both companies, the acquisition of Bluey Technologies by MB Solutions Australia allows both companies to continue their expansion together, building on their strong reputations for innovative products and high-quality service.

Importantly, the acquisition also looks set to deliver a range of benefits for their many customers across the construction, infrastructure and mining sectors, including: access to a larger and more diverse pool of expertise; expanded in-house manufacturing, product testing and R&D capabilities; and better support for customers on the ground.

Following its recent separation from BASF Group, MB Solutions Australia became part of MBCC Group and was looking to grow the Australian & New Zealand customer experience with its main brand Master Builders Solutions.

In keeping with those goals, the company approached Bluey late last year to discuss a possible acquisition. After the initial discussions, it was clear to all, that the

proposal had great merit and would be highly beneficial for both companies.

MB Solutions Australia Managing Director Australia & New Zealand, Jason Bolt, explained:

“Master Builders Solutions and Bluey Technologies both have a strong focus on innovation and sustainability and have a long history of being at the forefront of materials and technologies for the construction, infrastructure and mining sectors.”

“We’re also both experiencing a strong growth for our products and services across Australia, New Zealand and beyond. The acquisition is a perfect fit for both companies, especially given the massive ‘post-COVID’ surge in demand that has occurred across these key industry sectors,” Jason said.

“In an acquisition, both companies are stronger together. We’re combining our strengths and capabilities, which is a great result for both companies, and all of our customers,” he added.

These sentiments were echoed by Bluey Technologies Founder, Daniel Bosco, who added: “The acquisition enables all of us at Bluey to continue offering the same high-quality services and products to both our current and future customers across Australia and around the world.”

“The Master Builders Solutions brand will increase our strength and will be

instrumental in our future growth and success. It’s also going to deliver a number of major benefits for our customers.”

“With our newly expanded capabilities, we’ll be better able to develop and deliver high-quality products and solutions faster than ever before. What’s more, our expanded network of facilities and warehouses, together with our national logistics network will significantly increase the reliability of our supply chain for all customers,” Daniel said.

“It also provides an expanded geographic reach, enabling us to better support our customers on the ground, regardless of their location,” he said.

“Most importantly, from the customer perspective, it’s business as usual. Same points of contact, same people, same product names,” Daniel concluded.

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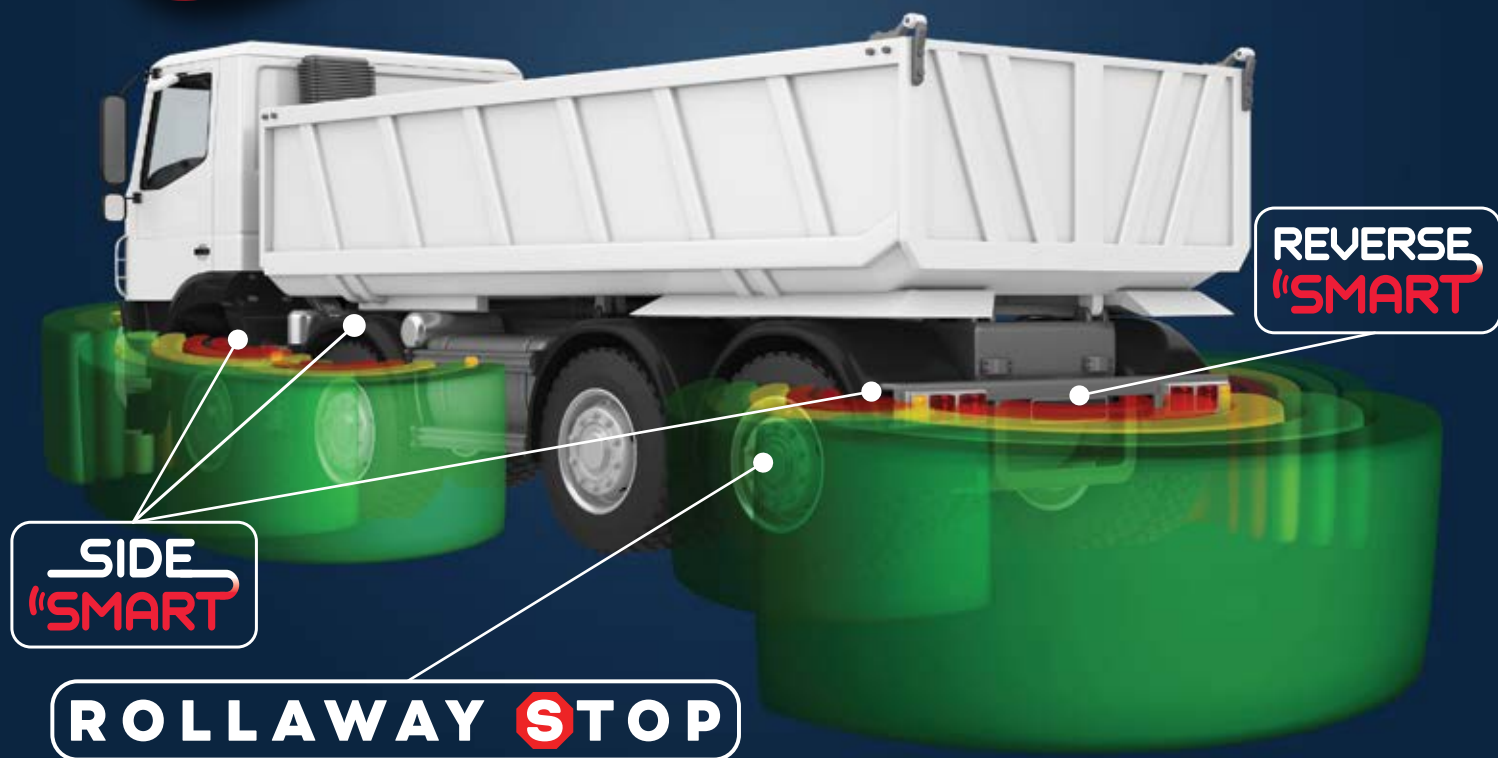
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Since the installation of the first Reverse Smart AEB (Automatic Emergency Braking) system in Melbourne in 2015, Reverse Smart - and their exclusive Australian distributor A1 Reversing Systems (A1RS) - have been at the forefront of heavy-duty, radar-based safety systems for large trucks and mobile plant & equipment.

Some six years on, they continue to lead the way, with the introduction of a number of new products and equipment safety solutions - including a state-of-the-art 'tunable' radar unit, a new automated braking system which applies the parking/emergency brakes in the event that the operator alights the cabin without first applying the park brake, and a new interface which allows the Reverse Smart system to connect directly to the vehicle or equipment's CANBUS for more efficient operation and greater flexibility.

As evidenced in the majority of new vehicles available on the market today, automated hazard detection and safety technology has moved ahead in leaps and bounds in recent years. While many of these new advanced safety systems have predominantly focussed on the passenger vehicle market, the advancements in technology and available componentry have been critical in the development of specialised systems including the Reverse Smart and Rollaway Stop technologies. As with the passenger vehicle market, these new technologies are set to change the face of safety for large vehicles and heavy mobile plant and equipment. Davin Hamnett, Business Manager with Reverse Smart, explained: "Things certainly have come a long way since A1RS and Reverse Smart started out in 2015."

"This new state-of-the-art technology represents a real 'watershed moment' in terms of the safety solutions that we're now able to offer our clients," Davin said.

"When we first started out, our initial

Reverse Smart AEB system was utilising a number of 'off the shelf' components, including the fixed beam radar detection units. While that wasn't an issue in terms of the quality or longevity of the systems or componentry, it did limit us in terms of how far we were able to customise the system for specific tasks or to suit specific applications."

"With that in mind, we set out to build a completely new system from the ground up. From the radar units and ECU, through to the display unit and system electronics, all components within the new Reverse Smart and Side Smart systems have been specifically designed and built for purpose."

"When it comes to radar-based safety detection, the level of control you have over the radar to provide clearly defined safety zones, and the speed with which the system can process and interpret the radar detection data, are both critical factors in providing an effective safety system," Davin said.

"Our new ECU is able to process data at over 3 times the speed of the previous unit and that, combined with the fact that we're now able to 'tune' the beam (both

in terms of beam shape and intensity), not only makes the system more accurate and responsive, it also gives us the flexibility to customise a solution to suit almost any type of large vehicle or mobile plant, including equipment with moving components that extend or operate beyond the confines of the cab-chassis."

"Without full control of the beam shape and intensity, it can prove nearly impossible for a radar-based system to be set up so it can identify and differentiate between the shapes that should and shouldn't be in a particular zone while the equipment is mobile and/or operating. That can either lead to 'false alarms' and unnecessary shut-downs, or the system missing a person or object moving into a hazard zone - neither of which are acceptable outcomes," he said.

"The new 'tunable' radar units not only enable us to better define the shape and length of the beam, they also allow us to pinpoint each of the hazard zones so that we can eliminate issues such as false alarms caused by the plant or equipment's own moving parts," Davin added.



ROBUST & RELIABLE PERFORMANCE

Built tough to withstand even the harshest operating conditions, ultra heavy-duty Reverse Smart radar units have been specifically designed for use on heavy vehicles and large mobile plant. Fully sealed to protect them from dust or other contaminants, the units are extremely robust and maintenance-free.

TUNED FOR MAXIMUM SAFETY AND PERFORMANCE

The key to the success of the Reverse Smart system lies within its purpose-designed radar, which not only allows for an accurately focussed detection area, but also overcomes many of the limitations that can be experienced by traditional ultrasonic detection.

Unlike traditional ultrasonic reversing or hazard detection, which is a common feature on many passenger vehicles, the Reverse Smart and new Side Smart radar units are not affected by vibration or frequency clashes which can result in 'ghosting' and false proximity alarms. In addition, the fact that the radar unit is a purpose-built, heavy duty, fully-sealed unit, means that it is unaffected by dust and dirt and is suitable for use in even the harshest operating environments.

Importantly, rather than trying to apply a 'one size fits all' solution, each Reverse Smart / Side Smart application is

customised to suit the individual vehicle or plant. Once the radar units have been fitted, they are individually tuned and calibrated to that specific location on that specific vehicle or piece of equipment.

Each radar unit is tuned to a specific width, height, transmission distance and intensity - taking into account the shape of the cab-chassis, as well as the location and operation of moving components and/or attachments including grab arms, screeds, spreader boxes, lifting arms, buckets and conveyors.

"Being able to tune each individual radar unit has provided an exponential boost to the system's capabilities," Davin said.

"Having the ability to focus the radar beam to suit the unit's specific installation location has not only provided us with greater flexibility in terms of where we can install the units on different plant and equipment, it has also helped us all but eliminate any instances of 'ghosting' or false-positive system faults."

"In fact, even after more than 6-months of testing in the field in Australia and overseas, we've not had any instances of false-positive detections with the new radar units."

"Equally importantly, we've also not had any instances of the units failing to detect a critical object or person entering a safety zone," Davin added

MORE THAN JUST REVERSING PROTECTION

Together with the new fully-tunable radar unit, Reverse Smart and A1RS have also introduced a newly updated version of the system's central ECU (Electronic Control Unit). As well as providing for even greater definition of the radar detection zones, the new ECU allows for the addition of up to four separate detection zones per ECU.

"The new Electronic Control Unit has allowed us to expand the system from a Reversing AEB system to a fully customisable safety system with multiple protection zones, enabling us to provide a full 360-degrees of protection," Davin Hamnett said.

Indeed, the newly designed ECU was also the primary catalyst behind the introduction of the new Side Smart system, which has been specifically developed to provide pedestrian protection in blind spots, danger zones and activity zones along the sides of large plant and equipment. Side Smart radars can be programed to activate a rage of functions, including the activating the Reverse Smart AEB brake if required.

"The new ECU provides us with the flexibility to design bespoke solutions for a wide range of specialist vehicles, plant and equipment," Davin said.



**SIDE
"SMART"**



NEW ROLLAWAY STOP EMERGENCY BRAKING SYSTEM

As the latest addition to Reverse Smart's range of vehicle safety systems, the new Rollaway Stop system has been specifically developed to eliminate accidents involving runaway heavy vehicles resulting from the driver failing to correctly engage the park brake.

Connected to the Reverse Smart ECU, the Rollaway Stop system sounds an alarm and activates the vehicle's emergency brake if the operator moves from the driver's seat without applying the park brake – providing a safe and reliable solution to this surprisingly common problem.

Not surprisingly, the new Rollaway Stop system is already gaining significant interest from contractors large and small. Indeed, following the success of a number of recent trials, several major contractors have starting installing Rollaway Stop units across their fleets, with one also recommending the technology be installed on all sub-contractor vehicles entering their worksites.

ROLLAWAY STOP

ECU to control the Volvo braking system via the vehicle's own CANBUS rather than via an addition external system.

Importantly, the CANBUS-connected Reverse Smart units are performing extremely well in the field, with no negative impacts on either the vehicles' or systems' performance. The team from Reverse Smart are also currently working with a number of other equipment manufacturers on CANBUS connectivity, with a number of other brands expected to be available over the coming months.



"Thanks to the new ECU and Side Smart components, we're now able to set up and customise 'protection zones' around moving parts and components which extend beyond the confines of the cab-chassis."

The other major advantage of the new Reverse Smart ECU is that rather being installed on a vehicle as a separate sub-system, it can now also be connected directly to a

vehicle's CANBUS system for even greater flexibility and response times.

The first Australian CANBUS-connected Reverse Smart systems were recently installed on a number of Volvo FM Front Loader waste collection vehicles in Brisbane. The team from Reverse Smart and A1RS worked with Volvo Engineers to integrate the systems and allow the Reverse Smart



EASY TO USE

Importantly, from an operator's perspective, the Reverse Smart is extremely easy to use. The driver or operator doesn't have to change the way they operate the equipment, and there are no additional steps required to operate or calibrate the Reverse Smart or Side Smart system once it has been installed. Reverse Smart and Side Smart both use the one in-cabin display, which automatically switches between the two when reverse gear is selected.

The in-cabin display provides a quick visual indicator as to the presence of people or objects in any of the detection zones, displaying either green, yellow or red indicator lights. If an object is detected in the red zone, the unit also emits an audible warning and activates the appropriate safety measure (applying the brakes, stopping equipment operations, etc).

The only driver interactions with the system are when they are intentionally reversing close to a solid object, in which instance they can press a button to 'sleep' the braking function while still maintaining the proximity detection alert.



For further information, or to arrange a demonstration, call T: 03 8899 6619 or email: davin@reversesmart.com.au or visit:

www.reversesmart.com.au





Aussie's 3" high pressure, semi trash, self-priming pump is now available with hydraulic drive.

WATER CARTS

THE UNSUNG HEROS OF CONSTRUCTION

EPA regulations today mandate that tankers need to be available on road construction and maintenance sites across the country. The days of driving through the middle of a road maintenance work zone that leaves your car covered in dust are over.

Today's tanker manufacturers are right up there in terms of engineering and efficiency. They are able to offer contractors and local government bodies a range of products to suit every need - from 600-litre trailer mounted units, right up to 50,000-litre semi-trailer tankers. The heart of every water cart is the pump.

The pump provides the ability to load the tanker during an emergency, spray down a site, or transferring water to a thirsty town undergoing drought conditions.

Australian Pump Industries got interested in tanker pumps 25 years ago when their 1,000 lpm 3" Honda powered pump started getting a lot of attention from the civil industry. Since then, there has been a revolution, with big pumps being employed. On some construction sites pumps are independently mounted to a standpipe running 6" lines and filling water carts at up to 6,000 lpm. Australian Pump work

with major tanker manufacturers, both poly and steel as well as dialoguing with the major user groups as well.

"We work with earthmovers on a regular basis because we want to know what the user thinks, something that can often be at variance with the tanker manufacturer's opinion," said Australian Pump's Chief Engineer, John Hales.

HYDRAULICS - THE REAL DRIVER

One core feature of the latest pump designs is the use of hydraulic power to drive the pump.

"There's lots of advantages for hydraulics over conventional internal combustion engine drive pumps," said Hales.

Australian Pump believe that hydraulics is gaining in popularity because of the "closed circuit" that doesn't allow dust into the system. Hales points out that traditionally, engine drive pumps have been mounted on the rear end of the tanker, with the result that they can be subjected to dust and vibration problems.

"Hydraulics gives the design engineer the ability to mount the pump where it is required, using flexible hydraulic hoses to supply the power to the pump," said Hales.

A hydraulic drive pump provides more power (by harnessing the drive prime mover's power) and can still fulfil all the functions of a self-priming centrifugal pump design to provide pressure or flow or both.

PERFORMANCE NEEDS POWER

Limitations on engine drive pumps are generally related to the size of the engine driving the pump. Because of the space requirements, that generally means that the drive will be a single cylinder petrol or diesel engine. The limitation therefore is to get the best you can out of a 13hp Honda or a 10hp air cooled diesel, providing a real obstacle on the required flow and pressure that most operators want.

"You simply can't make a 10hp single cylinder Yanmar engine do more than it can do. That means we always get limited choice of either lots of flow or lots of pressure or a medium range duty in both," John Hales said.

"Although Aussie dealt with this with the development of their Brigade Boss pumps, originally designed for firefighting, it still represents a compromise in performance," he added.

The Brigade Boss pumps are an Australian innovation specifically for water cart chores. The pumps can deliver heads as high as 70 metres and flows as high as 1,200 lpm, but not at the same time.

AUSSIE GMP - RIGHT PUMP, RIGHT DRIVE

Aussie's GMP range of cast iron semi trash pumps with hydraulic drive are proving to be the industry's answer. Big 3" pumps, self-priming in design, are capable of drafting water through a 6-metre lift, provide big flows right up to 2,200 lpm. High pressure versions will deliver 55 metre head... that's 77 psi!

Best of all, the pumps come with a big open impeller, silicon carbide mechanical seals and a stainless steel wear plate built inside the pump's body. The big self-priming housing is high grade cast iron but with a clean-out port built into the suction cover, mounted below the suction port.

This allows the pump to be cleaned out in the event of a blockage by simply undoing the clean-out toggles (in a matter of seconds) and hosing out the internals and clearing the impeller passages.

The company is now offering the same pump configuration in both super high pressure or high flow versions with a 316 stainless steel impeller!

The Aussie GMP pumps are first world construction. They come complete, on steel rails with a direct drive from the bare shaft pump configuration into bell housing onto which the hydraulic drive is fitted. The whole thing comes as one complete package.

Australian Pump has seen a lot of action in mine and dust suppression for water carts as well as applications in both drill rigs and even underground mine dewatering.

The company is continuing to work on developing 4" hydraulic pumps. They got the idea from the Australian Army who has been using Aussie GMP hydraulic drive tanker pumps for a number of years.

Further information is available from Australian Pump Industries, T: 02 8865 3500 or by visiting the website: www.aussiepumps.com.au

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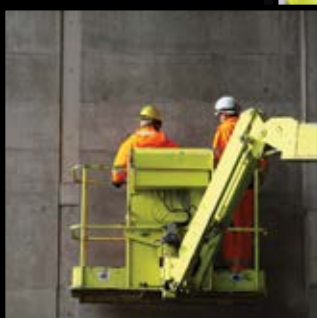
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INNOVATION
TOWARDS ZERO

Mainmark's Teretek® resin injection solution has been used to improve the structural integrity of a number of traffic bridges, including this two-lane concrete bridge Queensland which had become unlevel due to underlying ground settlement. Teretek was used to remediate the bridge so that it could continue to safely bear the weight of constant traffic, including heavy vehicles.

Why now is an ideal time to invest in essential infrastructure maintenance

Extending the lifecycle of bridges, culverts, tunnels and arches

There are currently billions of dollars being invested into infrastructure projects to help drive the economy out of a post-pandemic slump. However, while a flurry of new civil construction works will fuel growth, boosting jobs and productivity, it is equally important to service and maintain existing assets that provide essential services for Australian communities.

An increasing number of structures are reaching the end of their expected 50-year lifecycle and ageing infrastructure has been identified as an urgent issue in Australia. Bridges and tunnels continue to absorb growing volumes of traffic, and culverts are showing signs of deterioration due to the environmental effects of extreme weather.

To help extend the life of essential infrastructure, a range of engineered remediation solutions are able to help asset managers rejuvenate urban and rural infrastructure and complete scheduled maintenance works faster and more cost effectively than ever before.

Regardless of how large or structurally solid an asset may be, every asset has a design life. Over the longer-term, these assets can degrade due to the environmental impact of geological changes in the ground, which in turn affect load bearing capacity. What happens beneath the ground can affect

foundations and cause serious structural issues.

If left untreated, structural issues can be costly to fix, or may require demolition and rebuilding. However, a timely and proactive approach to remediation using engineered solutions can add years, if not decades, to an asset. Ground remediation can also help to preserve heritage assets for future generations as was the case in Tasmania after devastating floods caused millions of dollars in damage to public infrastructure including the Kimberley Rail Bridge which spans the Mersey River.

The heritage listed bridge had partially collapsed after raging floodwaters caused the riverbed to erode (otherwise known as scour). Urgent works were required to rebuild sections of the bridge and remediate two original concrete piers. Before commencing the remediation work, a team of divers undertook an underwater 3D sonar survey to identify the extent of the damage. The survey revealed scour had eroded the edges of the piers exposing the underside of the pier's footings where large voids had formed. Engineers considered several remediation options to help restore the bridge's structural integrity, including the extreme measure of decommissioning the bridge and rebuilding it.

After a thorough review, Teretek®, an engineered resin injection solution from Mainmark, was selected to remediate and re-support the bridge piers. Teretek has excellent ground bearing and void filling capabilities and is also environmentally inert, an important consideration given Tasmania's pristine waters. Teretek utilises a precise, discreet, and efficient delivery process with injections applied beneath existing structures in a procedure likened to keyhole surgery. The solution immediately expands on application, filling voids and increasing ground bearing capacity.

The Kimberley Rail Bridge project was further complicated due to the extremely limited site access to the fast-flowing river. There was no road to the riverbank and the ground surrounding the embankment was soft soil. However, Mainmark was able to overcome the access issues by parking a single Mainmark rig containing all the equipment and injection hoses near the railway deck and injecting the solution into the treatment areas during predetermined safe times. Despite the project complexities, Mainmark successfully completed the work in a single day, providing a far quicker, extremely efficient and much less disruptive process compared to alternative methods.

Mainmark's Teretek resin injection solution has also been used to improve the structural

integrity of a number of traffic bridges including a two-lane concrete bridge in the Mackay-Whitsunday region of Queensland that had become unlevel due to underlying ground settlement. Teretek was used to remediate the bridge so that it could continue to safely bear the weight of constant traffic, including heavy vehicles.

Culverts and tunnels are also vital infrastructure that manage the flow of water and can degrade over time. Whether they have reached their end of life or been impacted by corrosion, soil erosion or ground subsidence, in many instances these assets can be rejuvenated using technologically advanced products designed to revitalise and restore their stability.

Underlying issues, such as ground subsidence, can be a catalyst for issues such as voids, which can lead to soil destabilisation and cause the asset to crack and leak. Mainmark has extensive experience in the structural restoration of culverts, tunnels and arched passageways. Its team of engineers and skilled technicians work closely with asset owners and contractors to identify and deliver appropriate rehabilitation such as ground strengthening, re-levelling, void filling, re-lining and other bespoke engineered solutions for individual projects.

Below: Mainmark recently engineered a multi-faceted re-lining solution to remediate seven reinforced concrete culverts beneath the Toowoomba Bypass which had cracked longitudinally and lost structural integrity.



Above: Mainmark re-lined the Toowoomba Bypass culverts using a custom manufactured corrugated metal pipe lining which was placed inside the culverts and positioned using a specially designed landing skid, reel and winching system. The void between the concrete culvert and new corrugated pipes was then filled with Terefil®, Mainmark's lightweight cementitious void fill solution.

For example, Mainmark recently engineered a multi-faceted re-lining solution to remediate seven culverts beneath the Toowoomba Bypass, a 41km long dual carriageway connecting Toowoomba to the north and west of the city. The original reinforced concrete culverts had cracked longitudinally and lost structural integrity. Mainmark drew on its breadth of infrastructure and asset remediation experience to re-line the culverts and restore their structural integrity quickly and efficiently by creating a custom manufactured

corrugated metal pipe lining that was placed inside the culverts and positioned into place using a specially designed landing skid, reel and winching system.

The void between the concrete culvert and new corrugated pipes was then filled with Terefil®, Mainmark's lightweight cementitious void fill solution designed for geotechnical applications and developed to comply with specific project requirements determined by the Queensland Department of Transport and Main Roads. Due to site constraints, the grout was pumped from a single injection point quickly and easily. Mainmark's remediation approach delivered significant cost and time benefits while providing a 100-year warranty for the customer.

While asset preservation is a critical factor in protecting infrastructure, selecting the right engineered solution that is fit for purpose is key. The most effective solutions – ones that maximise longevity and performance – respond to the material of the structure and the conditions to which it is exposed. Selecting the wrong product can often result in failure and greater expense over time.

For further information, please visit: www.mainmark.com



ABOUT MAINMARK

Mainmark provides a range of specialist ground engineering and asset preservation solutions for residential, commercial, industrial, civil infrastructure and mining sectors.

Committed to excellence, Mainmark's state-of-the-art solutions are backed by more than 25 years of engineering expertise.

Mainmark has 15 sites across Australia, New Zealand, Japan and the UK. Mainmark products and services include solutions for ground stabilisation, void filling, stopping water ingress, raising and levelling on-ground and in-ground structures, fixing anchors into rock faces and embankments, and other related ground engineering processes.



Teretek® Fills Underwater Voids to Stabilise Kimberley Rail Bridge Piers Following Floods

The heritage listed Kimberley Rail Bridge is a vital part of Tasmania's Burnie to Hobart Rail Freight Corridor. Originally built in 1884 and then extended in 1976, the bridge stretches 76m over the Mersey River and is one of three remaining wrought iron structures still in use in the Tasmanian rail network.

During the devastating floods in 2016, one of four Kimberley Rail Bridge spans collapsed as a result of scour (erosion in the riverbed) affecting the western abutment. This left the rail line between Burnie and Brighton impassable, impacting the State's freight transportation.

Urgent works were undertaken to rebuild the collapsed western-most span and abutment with modern materials, creating a new superstructure made of steel, supplementing the original wrought iron spans. Once the rail line resumed operation, TasRail identified further scour under the edges of two of the mass concrete piers supporting the bridge. The two piers form part of the original bridge construction and consist of 3m wide and 8m long mass concrete columns that are founded in the river bed, with an elevation of 7.7m-8.6m above the riverbed.

To determine the extent of scour a carefully coordinated inspection was led by engineering consultants Pitt & Sherry, using a team of divers and a 3D sonar survey. It was determined that the riverbed had scoured away around some edges of the piers exposing the underside of the pier footing.

Numerous remediation approaches were considered, including installing concrete sheet piles which would require temporary damming of the river and excavating, or the more extreme measure of decommissioning the bridge entirely and rebuilding it.

Based on prior experience, Pitt & Sherry recommended that Mainmark's proprietary Teretek® resin injection solution be used to bind the aggregate and reduce the voiding, to increase the longevity of the scour resistance protecting the bridge piers. Mainmark was contracted to complete remediation works under project managers, VEC Civil Engineering.

Objectives

The key objective was to restore long-term stability of the Kimberley Rail Bridge piers, by remediating all areas that had been undermined by scour to the piers and to protect each bridge pier from any further scour.

Mainmark was required to inject Teretek resin into the aggregate to fill 8 underground voids surrounding the bridge piers and to restore structural integrity without impacting the Mersey River.

Solution

Prior to injecting Teretek, dive teams needed to clear underwater vegetation, place the aggregate into the voids and insert one 50mm galvanised water pipe into the centre of each void to allow Mainmark technicians to guide the resin injection tubes directly into the treatment area.

A single self-contained Mainmark Rig, with all equipment and material needed for project delivery, was positioned as close to the injection site as possible on the bank of the river. This allowed the crew to run the resin delivery hoses along the ditch in the railway deck during specified "safe times", to deliver the Teretek resin to the affected areas.

Teretek increases ground bearing capacity, fills voids, and has no detrimental effects on the environment. Following injection, the engineered resins immediately expanded to fill the space, binding with the aggregate to create a consolidated mass which filled each void and prevented further scouring under the bridge piers.

Although two days were allowed for project delivery, Mainmark successfully completed works within a single day, and without causing any major disruption to the rail service.

The bespoke methodology proved to be far quicker, more efficient and much less disruptive than the alternative options considered for remediating the bridge piers.

Project Manager Tristan Burns stated that TasRail was satisfied with the project results, considering the unique nature of the project and the complexities involved:

"The works were undertaken adjacent to an operating rail line and a sensitive site with environmental and local stakeholder constraints. VEC and Mainmark undertook the works in a safe and methodical manner. The repairs will ensure structural integrity of the piers in future floods which will preserve the heritage structure for many years to come."

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INFINITY TESTING

'Infinity Testing' is without a doubt the harshest method of testing the performance of a Truck Mounted Attenuator (TMA) during an impact.

NO RELIANCE ON ROLL-AHEAD DURING AN IMPACT

Rather than relying on some of the impact energy being absorbed by the forward movement of host vehicle on which the TMA is fitted, with 'Infinity Testing' the host vehicle is anchored to the ground to prevent any forward movement during an impact.

'WORST CASE' SCENARIO TESTING

Compared to standard testing with an unrestrained host vehicle, Infinity Testing is a much tougher testing regimen. It is considered 'worst-case scenario' testing which 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.

TMA ABSORBS & DISSIPATES 100% OF THE IMPACT ENERGY

Testing the TMA on a host vehicle which is anchored in place, tests – and for both the Scorpion II® TL-3 and Scorpion® II METRO® TL-2 TMAs – confirms the capacity of the TMA to absorb/dissipate 100% of the impact energy – without the benefit of the host vehicle roll-ahead.

NO UPPER LIMIT FOR HOST VEHICLES

From a practical standpoint, the fact that both the Scorpion II® TL-3 and Scorpion® II METRO® TL-2 TMAs were successfully tested to MASH Standards using the 'Infinity Testing' method, means both units are MASH certified with no upper weight limit for the host vehicle.



THE ULTIMATE TEST OF ATTENUATOR PERFORMANCE

HOW IT'S DONE

With 'Infinity Testing' the host vehicle is anchored in place during the impacts to assess the TMA's capacity to absorb/dissipate 100% of the impact energy without the benefit of roll-ahead.



WHAT ABOUT ROLL-AHEAD DISTANCES?

Importantly, to emulate 'real world' operating conditions, both the Scorpion II® TL-3 and Scorpion II® METRO® TL-2 TMA have also been successfully tested and MASH certified using standard 'non-anchored' host vehicles, with both units posting impressively low roll-ahead distances.

Scorpion® II TL-3 TMA

Crash Test: MASH Test 2-53

Impact Angle: 10.3 Degrees

Roll-Ahead Distance: 5.1m

Impacting Vehicle Weight: 2266kg

Impact Speed: 103.8km/h

Scorpion® II METRO® TL-2 TMA

Crash Test: MASH Test 2-53

Impact Angle: 9.9 Degrees

Roll-Ahead Distance: 12.4m

Impacting Vehicle Weight: 2295kg

Impact Speed: 81.6km/h



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INEIGHT UNIFIES MAJOR PROJECT COST AND SCHEDULE RISK WITH INTELLIGENT MULTI-DIMENSIONAL PLANNING SOLUTION

InEight changes the game for construction project risk with the most comprehensive and complete risk analytics toolbox in the marketplace for total cost schedule risk assessment.

InEight Inc., a global leader in construction project management software, recently announced enhancements to its planning, scheduling and risk offering to deliver the most intelligent and multi-dimensional planning solution for capital projects.

With increased infrastructure spending widely seen as a path to global economic recovery, the need among capital project owners and contractors for data-backed confidence around project cost and schedule is more important than ever before. Now InEight helps project managers, schedulers, workforce planners and estimators remove risk from the bottom line and increase confidence with the most complete risk analytics toolbox on the market today.

"At Project Controls Cubed, we are successfully managing cost and schedule risk for several multi-billion-dollar projects simultaneously. You can't do that very efficiently without using state-of-the-art software solutions that automatically identify risks and suggest ways to mitigate them," said Jeff Campbell, director of virtual planning, Project Controls Cubed, a virtual design and construction consultancy.

"InEight not only enables us to do that with today's projects, but tomorrow's projects as well with built-in artificial intelligence that continually learns from past projects to improve the plans and schedules for future ones."

InEight Planning, Scheduling & Risk uses artificial intelligence (AI) and data from previous projects to identify threats in current projects and recommend risk mitigation strategies. The solution's intuitive interface enables a seamless user experience that delivers clear and actionable insights on risk management.

"We're democratising access to world-class risk assessment for construction by building the most complete risk analysis and mitigation capabilities on the market and making them easy enough for anyone to use," said Nathan St. John, head of product, scheduling and risk, InEight.

"Risks are not static – they move with the ebbs and flows of the project, so getting an accurate picture of total risk exposure across an entire capital project in real time has been something reserved for organisations with big budgets and a dedicated risk expert on staff."

"With InEight, now you have a complete cloud-based solution that continuously monitors total project risk, finds threats and then takes the extra step of surfacing and prioritising mitigation options."

"InEight not only enables us to do that with today's projects, but tomorrow's projects as well - with built-in artificial intelligence that continually learns from past projects to improve the plans and schedules for future ones."

New InEight capabilities for total project risk management include:

- **Multiple Risk Mitigation** Assignments and Tracking completes the cost schedule risk assessment (CSRA) and fills the gap

between identifying threats and taking the right corrective measures by using AI to intelligently recommend mitigation actions with the highest probability of success.

- **Schedule Critique** an always-on AI assistant that runs in the background to offer real-time assessments of the soundness of a project schedule, suggest improvements, and give feedback to ensure the schedule is ready for risk analysis.
- **Enhanced Risk Register** allows for better management of threats and opportunities with advanced categorisation, tracking and analysis of risk across multiple projects and seamless promotion of risk items previous to current projects.
- **Cost Risk** integrates risk from two key pillars of project controls – cost and schedule -- to provide total project risk analysis. If a schedule takes longer, it is likely to cost more. Breaking the silo between two critical aspects of a capital project can help reduce added costs.

The democratisation of data-driven risk analysis in construction has long reaching implications, including a potential shift in owner/contractor relationships.

As risk analysis matures in the capital projects space, contractors who can use data to prove a higher chance of meeting their proposed budget and schedule – even if at a slightly higher price tag – will see more winning bids and improved performance. This not only boosts owner confidence, but it also helps to improve owner/contractor relationships once the project is underway. With real-time visibility into risk exposures and their impact on project cost and timelines, a collaborative and assured approach to project management helps to protect the bottom line and achieve timely outcomes.

To learn more about how connected data brings together owners and contractors, visit: <https://ineight.com/webinar/how-connected-data-connects-owners-and-contractors/> and check out the on-demand webinar featuring Brad Barth, Catie Williams and Dan Patterson.

For more information about InEight solutions for capital project planning, scheduling and risk, follow on LinkedIn or visit <https://ineight.com/solutions/planning-scheduling-risk>

ABOUT INEIGHT

InEight provides field-tested project management software for the owners, contractors, engineers and architects who are building the world around us.

Over 300,000 users and more than 750 customers worldwide rely on InEight for real-time insights that help manage risk and keep projects on schedule and under budget across the entire life cycle.

From pre-planning to design, from estimating to scheduling, and from field execution to turnover, InEight has powered more than \$400 billion in projects globally across infrastructure, public sector, energy and power, oil, gas and chemical, mining, and commercial.

For more information, follow InEight on LinkedIn or visit: www.InEight.com





BRP ROAD PATCH

Prefabricated Bitumen Rubber Bound Seals



ROAD MAINTENANCE



SEALING UTILITY REPAIRS



BRIDGE MAINTENANCE



TRAFFIC CALMING

FEATURES & BENEFITS:

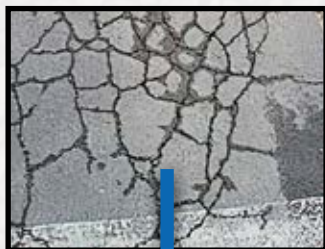
- Simple application with standard emulsion
- Reduces overall maintenance costs
- No expensive tools or machinery required
- Consistent quality – Reduced rework
- Waterproof seal with the flexibility of bitumen rubber
- Prefabricated format for ease of use and 24/7 availability
- Easy to handle 750mm x 1000mm sheet size
- 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.



Early Intervention

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.



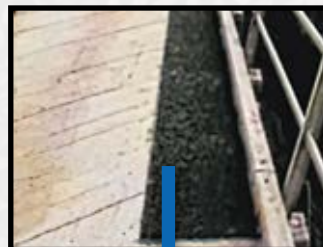
BRIDGE MAINTENANCE

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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RECYCLING FACE MASKS INTO ROADS TO TACKLE COVID-GENERATED WASTE

Researchers have shown how disposable face masks could be recycled to make roads, in a circular economy solution to pandemic-generated waste. Their study shows that using the recycled face mask material to make just one kilometre of a two-lane road would use up about 3 million masks, preventing 93 tonnes of waste from going to landfill.

The new road-making material developed by RMIT University researchers - a mix of shredded single-use face masks and processed building rubble - meets civil engineering safety standards. Analysis shows the face masks help to add stiffness and strength to the final product, designed to be used for base layers of roads and pavements.

“Using the recycled face mask material to make just one kilometre of a two-lane road would use up about 3 million masks, preventing 93 tonnes of waste from going to landfill.”

The study published in the journal *Science of the Total Environment* is the first to investigate potential civil construction applications of disposable surgical face masks.

The use of personal protective equipment (PPE) has increased dramatically during the COVID-19 pandemic, with an estimated 6.8 billion disposable face masks being used across the globe each day. First author Dr Mohammad Saberian said multidisciplinary and collaborative approaches were now needed to tackle the environmental impact of COVID-19, particularly the risks associated with the disposal of used PPE.

“This initial study looked at the feasibility of recycling single-use face masks into roads and we were thrilled to find it not only works, but also delivers real engineering benefits,” Saberian said.

“We hope this opens the door for further research, to work through ways of managing health and safety risks at scale and investigate whether other types of PPE would also be suitable for recycling.”

Making roads with masks

Roads are made of four layers: subgrade, base, sub-base and asphalt on top. All the layers must be both strong and flexible to withstand the pressures of heavy vehicles and prevent cracking.

Processed building rubble - known as recycled concrete aggregate (RCA) - can potentially be used on its own for the three base layers.



A sample of the recycled road-making material, which blends shredded single-use face masks with processed building rubble.

But the researchers found adding shredded face masks to RCA enhances the material while simultaneously addressing environmental challenges on two fronts: PPE disposal and construction waste.

Construction, renovation and demolition account for about half the waste produced annually worldwide, and in Australia, about 3.15 million tons of RCA is added to stockpiles each year rather than being reused.

The study identified an optimal mixture – 1% shredded face masks to 99% RCA – that delivers on strength while maintaining good cohesion between the two materials. The mixture performs well when tested for stress, acid and water resistance, as well as strength, deformation and dynamic properties, meeting all the relevant civil engineering specifications.

While the experimental study was conducted with a small amount of unused surgical face masks, other research has investigated effective methods for disinfecting and sterilising used masks. A comprehensive review of disinfection technologies found 99.9% of viruses could be killed with the simple “microwave method”, where masks are sprayed with an antiseptic solution then microwaved for one minute.

Using shredded disposable face masks as an aggregate material for making concrete

In related work, the RMIT researchers have also investigated the use of shredded disposable face masks as an aggregate material for making concrete, with promising preliminary findings. Professor Jie Li leads the

RMIT School of Engineering research team, which focuses on recycling and reusing waste materials for civil construction.

Li said the team was inspired to look at the feasibility of blending face masks into construction materials after seeing so many discarded masks littering their local streets.

“We know that even if these masks are disposed of properly, they will go to landfill or they’ll be incinerated,” he said.

“The COVID-19 pandemic has not only created a global health and economic crisis but has also had dramatic effects on the environment.

“If we can bring circular economy thinking to this massive waste problem, we can develop the smart and sustainable solutions we need.”

“The team was inspired to look at the feasibility of blending face masks into construction materials after seeing so many discarded masks littering their local streets.”

‘Repurposing of COVID-19 single-use face masks for pavements base/subbase’, with co-authors RMIT Indigenous Pre-Doctoral Research Fellow Shannon Kilmartin-Lynch and Research Assistant Mahdi Boroujeni, is published in *Science of the Total Environment* (DOI: 10.1016/j.scitotenv.2021.145527).



The new material blends recycled concrete aggregate (left) and small strips of shredded disposable face masks (right).

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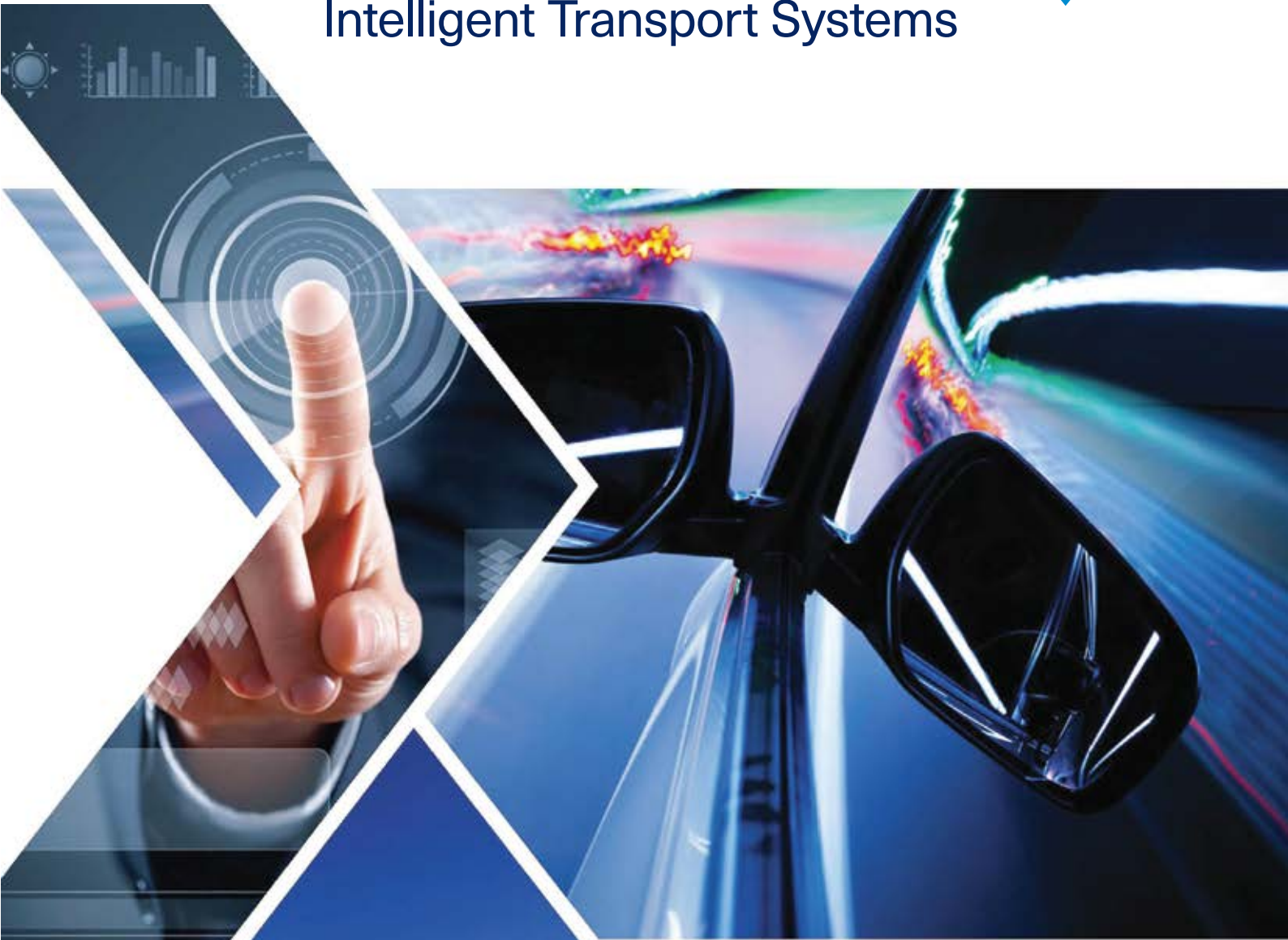
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Intelligent Transport Systems



ITS SPECIAL FEATURE

Intelligent Transport Systems
News and Feature Articles





ITS AUSTRALIA AND ITS (UK) WEBINAR SERIES

The ITS Societies in Australia and the United Kingdom have got together for a series of webinars comparing and contrasting different aspects of traffic technology implementation in the two countries.

The monthly ITS2 live events, which kicked off during February, take place at breakfast time in the UK and evening in Australia, however they are also recorded and made available to watch on demand for those who find the time inconvenient.

The first webinar (held on February 3) examined the rollout of smart motorways in the two countries, their similarities and differences, public perception and the future.

With all-lane running on smart motorways in the UK getting some negative press at the moment, leading personal injuries lawyer Steven Baylis of Lime Solicitors gave a legal view of the risks of the concept, while UK-Australian consultant Paul Glover of GHD gave his view on implementation.

The panel was completed by Alex Torday from Aimsun, who explained how transport

modelling can help in traffic management and training on these highly signalised stretches of road.

"There haven't been many advantages of Covid, but normalising virtual meetings has certainly led to new opportunities in delivering international knowledge sharing," commented Jennie Martin, ITS (UK) Secretary General.

"We have so much in common with our colleagues in ITS Australia, but physical meetings would be limited to the occasional ones at World Congresses where only certain members could take part, so I am delighted we have launched our virtual meetings to share our experiences and expertise and further strengthen our ties with ITS Australia to the benefit of all our members."

Episode #1 - 'Smart Motorways' and Episode #2: 'Active Travel' are available to view online at: <https://its-australia.com.au/webinars>

Episode #3: 'Automated Vehicles' will take place on Wednesday 7 April. Please contact ITS Australia on (03) 9646 6466 or visit: www.its-australia.com.au to register.

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 visit: www.its-australia.com.au



ITS AUSTRALIA MEMBERS RELAUNCH RENMARK'S DRIVERLESS BUS 'MURRAY'

During February, the South Australian town of Renmark saw the return of its driverless bus 'Murray' to the road as part of a new trial which will continue through to June 2021.

Murray will provide a free hop-on and hop-off service at six bus stops along the 2.4km loop from Murray Avenue to the Fourteenth Street shopping precinct.

There will be no need to book a ride in advance, as customers are invited to use the service whenever they want during operating hours, on Tuesdays from 10am to 1pm and Wednesdays to Saturdays from 10am to 4pm.

The new route takes in the Renmark riverfront and key locations, including the Renmark Swimming Pool, supermarket, and food outlets, aiming to best service people with limited mobility and visitors to Renmark. Further information on Murray and the route can be found [here](#). Nearly 700 people travelled on Murray during Phase 1 of the trial, and were carried more than 2800km.

The trial is a joint project between the South Australian Department for Infrastructure and Transport, Renmark Paringa Council, Flinders

University, autonomous technology provider EasyMile and multi-modal transport operator Keolis Downer, who are excited to bring smart technology to regional South Australia. Keolis Downer has employed five local residents to undertake the role of safety chaperones for the duration of the Phase 2 trial.

Murray was selected as a finalist in the *ITS Australia National Awards 2020*, receiving a nomination for the *Connected and Automated Vehicle Award*.

The EZ10 autonomous shuttle is in constant communication with infrastructure, such as traffic lights, sending signals to the shuttle, which then analyses and makes the decision to continue its route or stop. It is guided by a range of GPS, camera, sensors and odometry with extensive safety processes in place. It is the most-deployed driverless passenger shuttle in the world with its technology having driven autonomous vehicles in 300+ locations in more than 30 countries.

A key focus of the project is to support those in the community with restricted transport opportunities, and the tourism sector. Services

like the one in Renmark are informing us of the reliability, acceptance and operational framework for automated vehicle technologies which may play a role in the future transport mobility mix.

Keolis Downer are currently project partners with two additional driverless bus trials in Australia: one in Raby Bay, Queensland and another in Tonsley, South Australia. They also come with international expertise, as parent company Keolis operates over 30 driverless vehicle projects worldwide, with operations in Paris, London, Belgium, Montreal, and Las Vegas (just to name a few), moving 140,000+ passengers on driverless vehicles each year.

COVID SAFETY MEASURES

In line with expert health advice, passengers are required to practice social distancing as far as practical, and must sign in prior to entry for contact tracing purposes, either through the COVID SAfe Check-In QR code function of the mySA GOV smartphone app, located at each bus stop along the route, or by providing their details in writing.



VENTURA LAUNCHES NEW DEMAND RESPONSIVE TRANSPORT SERVICE IN VICTORIA

Ventura, Victoria's largest bus provider, has launched a new Demand Responsive Transport service and corresponding urban mobility app available to Rowville and Ferntree Gully residents. This is Ventura's first Demand Responsive Transport service since its founding in 1924, and also the first transport service of its kind in metropolitan Melbourne.

Locals from the eastern suburbs are able to use the FlexiRide app, available for free on iOS and Android, to plan their journeys and book Demand Responsive Transport rides to and from Ferntree Gully Station and Stud Park Shopping Centre. This offering has been created in partnership with Department of Transport Victoria and Moovit, an Intel company, a leading Mobility as a Service (MaaS) solutions provider and creator of the #1 urban mobility app.

Ventura currently operates Telebus, a phone-based request and dispatch system that relies on physical bus stops to pick up and drop off passengers and can result in relatively long wait times. As a way to modernize the service and shorten wait times, Ventura has replaced Telebus routes 7, 8, and 9 with FlexiRide's Demand-Responsive Transport service, bringing more convenient and efficient mobility to people traveling to one of two major hubs: Ferntree Gully Station and Stud Park Shopping Centre.

Ventura's new service is made possible thanks to its partnership with Moovit, a global Mobility as a Service solutions company. The

FlexiRide app is powered by Moovit's White Label App solution, and FlexiRide's Demand Responsive Transport service is powered by Moovit On-Demand solution, a dynamically-routed transport system that automatically assigns multiple passengers heading in the same direction to a shared vehicle.

The FlexiRide app:

- Suggests the most efficient routes: Once a user launches the FlexiRide app and inputs their destination, FlexiRide will display the most convenient routes
- Enables users to book FlexiRide: Users can select Transit On-Demand to book FlexiRide and travel from any virtual stop to one of two major hubs: Ferntree Gully Station or Stud Park Shopping Centre. Rides can also be booked in the opposite direction and travel from one of the two hubs back to any virtual stop within the zone
- Directs passengers to a nearby pickup location: Once the ride is booked, riders receive guidance to a virtual bus stop within a short walking distance
- Provides riders with real-time shuttle tracking:
 - o While waiting for their ride, users can track the approaching vehicle in real-time and view its ETA
 - o While riding, users can view the route on the map, as well as the estimated time to drop off
- Enables future ride booking: Rides can be

booked up to a week in advance

To pay for their ride, passengers can tap on with their Myki as they board the vehicle, just as they would do with any other service.

In addition to booking Demand Responsive rides, the FlexiRide app, powered by Moovit, combines official information from local transport agencies in Melbourne and the surrounding area as well as crowdsourced information to calculate the best route for each journey with urban mobility options like the bus, train, and tram. FlexiRide also provides real-time arrival information so users know exactly when their bus or train is arriving, a Live Directions feature with Get Off Alerts to provide step-by-step guidance for the entire journey, and Service Alerts so they can avoid disruptions and plan their journey accordingly.

FlexiRide also incorporates accessibility features, empowering people with disabilities to use public transportation with more assurance. The app is optimised with screen reading features for low vision users, including TalkBack/VoiceOver capabilities, identifies wheelchair-accessible routes and stations, and calculates step-free routes. FlexiRide's app is also designed with optimised menus and buttons for those with hand-motor disabilities.

"Ventura has been searching for the right technology partners over the last three years and after investigating trials in other cities, we were comfortable with Moovit's global reach

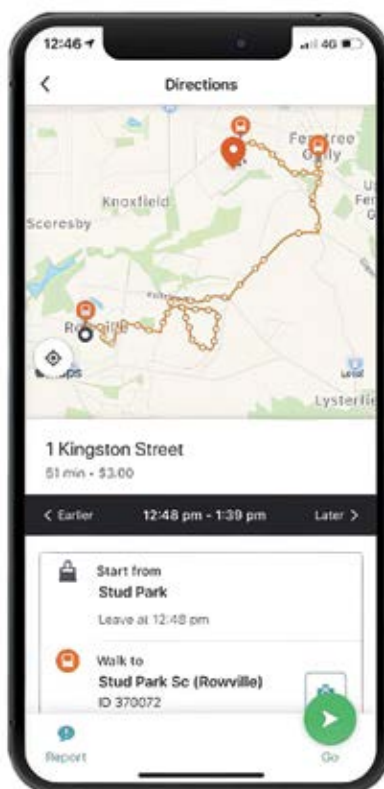
and willingness to understand and cater for our passenger's needs", said Andrew Cornwall, Managing Director at Ventura.

"We are excited to partner with Ventura and Department of Transport Victoria to power the FlexiRide app and new service to provide Rowville and Ferntree Gully residents shorter wait times and a much smoother journey to the busiest transport hubs" said Yovav Meydad, Chief Growth and Marketing Officer at Moovit.

"Complementary to traditional modes of transport, FlexiRide can help residents get around efficiently and conveniently without the need for a private vehicle."

Moovit On-Demand leverages the power of big data analytics to help transport agencies, cities, and private companies plan and dispatch the most accurate and efficient demand responsive transport service. The solution combines the advantages of public transport with the benefits of demand responsive transport to introduce a mobility service that increases ridership, reduces congestion, and solves first/last-mile challenges.

The FlexiRide app is available to download on the App Store and Google Play.



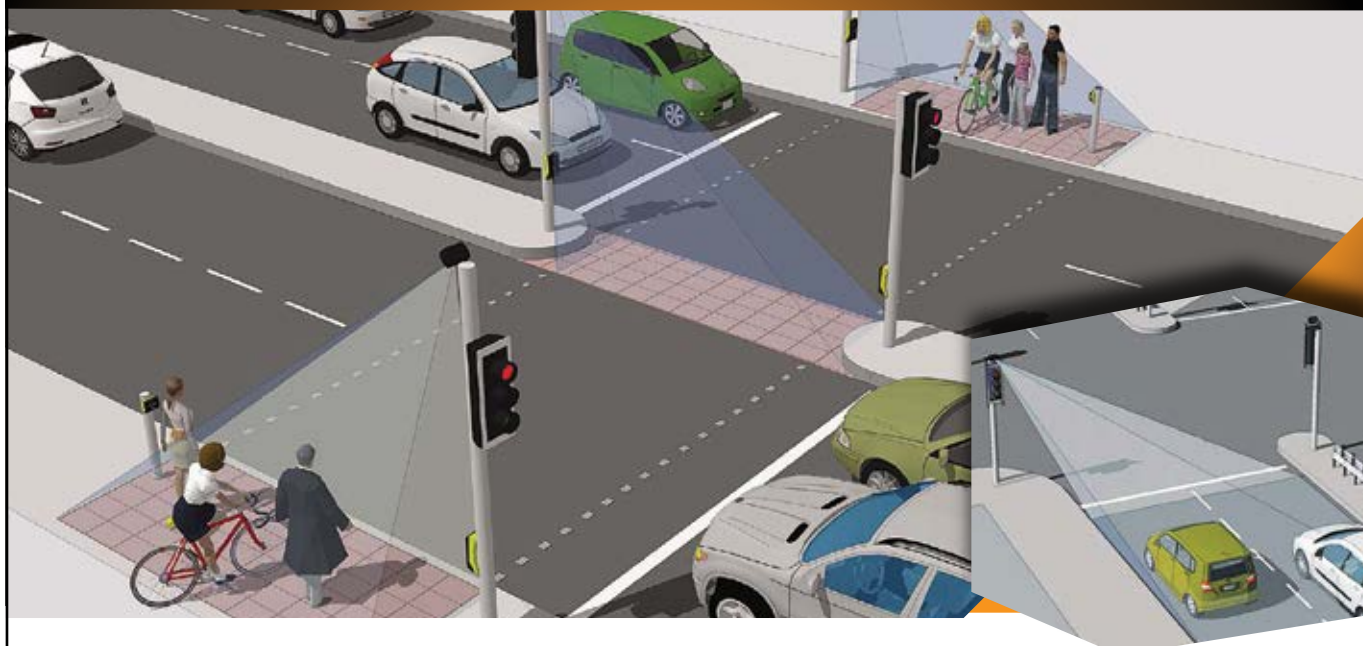
ABOUT MOOVIT

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.

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Moovit Global Public Transport Report 2020

MOOVIT UNVEILS ITS 2020 GLOBAL PUBLIC TRANSPORT REPORT

Moovit, an Intel company, a leading Mobility as a Service (MaaS) solutions provider and creator of the #1 urban mobility app in the world, has unveiled its 2020 *Global Public Transport Report*. The report consists of big data analysed from tens of millions of journey requests, together with user research in 104 metropolitan areas across 28 countries. The result portrays a fascinating picture of global public transport trends, comparing 2019 and 2020 - how people move around their cities, the impact of COVID-19 on public transport use, and riders' increased demand for mobile payment.

At the lowest point in 2020, some cities in Australia experienced between a 70-80% drop in public transport ridership. It's an understatement to say that with many residents working from home, avoiding mass transport, and vast changes in local transport services, the way people travel within their cities has changed.

In Australia, data was analysed in the Adelaide, Brisbane & South West Queensland, Melbourne & Victoria, and Sydney and New South Wales regions.

Report metrics include the duration of a one-way public transport commute, wait time at stops/stations, walking distance as part of a one-way commute, number of transfers, total journey distance, what public transport riders said would encourage more ridership, and micro-mobility (bike and scooter) usage frequency, why it's used, and barriers to adoption. The 2020 report includes two new categories: mobile payment demand for transport, and COVID-19 impact on public transport usage.

The data revealed in the 2020 *Global Public Transport Report* indicates that public and shared transportation riders are open to new transit options that are considered safe and convenient, such as future robotaxi services. To

fulfil their shared *Mobility as a Service* (MaaS) vision, Mobileye, a leader in autonomous vehicle technology and Moovit's sister company, plans to harness Moovit's mobility behavioural insight to offer autonomous MaaS in key markets globally. Together, Moovit's urban mobility app used by millions, and deep understanding of mobility patterns will enable Mobileye to begin offering robotaxi services, both as a standalone and in partnership with transit operators in 2022.

Findings about public transport in Australia:

- Australia has handled COVID-19 quite well, in comparison to other countries, yet 53% of Australians say that how often they ride transport has changed due to the pandemic
- Due to the pandemic, 31% of Australians want to know how crowded a public transport vehicle is, before they board
- The average distance travelled in Australia during a public transport commute is 9 km
- Melbourne locals endure the longest public transport commute times in Australia, while Adelaide locals enjoy the shortest commutes
- Fourteen percent of Brisbane locals wait at stops and stations for more than 20 minutes during a commute – the worst in Australia
- The top three reasons that riders say would encourage them to get back on public transport are: respecting social distancing regulations on vehicles and at stops/stations, increase the frequency of vehicles so that each is less packed, and hand sanitiser dispensers on vehicles, and at stops/stations

Compared to other global cities:

- Forty-nine percent of Adelaide commuters enjoy short travel times of up to 30 minutes, comparable to 42% in London, but almost double the 25% in New York City
- Just 5% of Spaniards in Madrid care about

knowing in advance if their approaching bus is crowded, while 36% in Melbourne do

- 30% of Parisians make 3+ transfers per commute, on average, while just 15% in Sydney do
- Compared to other countries hard hit by COVID-19, 44% of Melburnians definitely want mobile payment for mass transport, while just 15% of Parisians do

"We're living in a time where data is more important than ever before," said Yovav Meydad, Moovit's Chief Growth and Marketing Officer. "Especially in the public transport industry, big data can help cities and transport agencies gain insights into what riders need in order to increase mass transport use."



"We're excited to release our annual Global Public Transport Report, which includes insights from riders themselves on what they need in order to feel safe riding public transport. This report is a great tool for transport agencies, operators, and municipalities to learn about the services they can offer to fill in the gaps and keep their city running."

THE DATA IN MORE DEPTH

• COVID-19 Impact on Public Transport Usage

- o 57% of public transport riders in Brisbane say that the pandemic did not affect how often they ride public transport, while 10% in Melbourne say they are using it more

• COVID-19 – Related Public Transport Usage Incentives

- o Public transport riders said that the top three reasons that would get them back on public transport during the pandemic are:
 - Hand sanitiser dispensers on vehicles at stops/stations
 - Respecting social distancing regulations on vehicles and at stops/stations
 - Higher frequency of vehicles so that each is less packed
- o Thirty-six percent of Melbourne locals would like to know how the occupancy status of an approaching vehicle, before they board — the highest in Australia

• Average public transport commute time (one way):

- o Melbourne commuters endure the longest public transport commute times (47 minutes), while Adelaide commuters enjoy the shortest commutes — 39 minutes



- o 49% of Adelaide commuters travel up to 30 minutes

more than 12 km during an average public transport commute

• Total wait time at stops/stations per commute (one way):

- o Brisbane locals wait the longest for transport lines during their journey, averaging 12 minutes. This is better than in the US, where locals in Miami wait 18 minutes.
- o In Australia, Adelaide has the highest percentage of people waiting less than 5 minutes for transport. This is comparable to London, which has the highest percentage of people waiting less than 5 minutes for transport (33%) in the UK

• Mobile Payment Demand:

- o 24% of Australians said they want mobile payment methods for a safer public transport journey
- o Surprisingly, 50% in Sydney don't have a desire for mobile payment for transport

• Micro-mobility (bikes and scooters) usage:

- o In Australia, the #1 reason that citizens said they use bikes and scooters, besides that it is faster than walking, is that people can get to places they can't reach by bus
- o 59% of Adelaide locals say they use micro-mobility to travel directly to their destination, while 59% in Sydney say they use bikes/scooters in combination with public transport
- o 47% of micro-mobility users in Adelaide said they prefer using bikes/scooters because it is environmentally friendly — the highest percentage across all Aussie cities

• Micro-mobility (bikes and scooters) barriers:

- o The barrier of adoption for bikes and scooters in Australia is because people feel that they are not safe enough
- o 21% of Sydney locals said they do not use bikes/scooters because there are not enough bike lanes, compared to just 7% in Adelaide

For more information on these statistics, you can view the Moovit 2020 Global Public Transport Report at: https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-countries



• Total average walking distance per commute (one way):

- o Across Australia, the average walking distance during a public transport journey is 642 metres
- o Melbourne takes the lead for longest distance commuters walk during a public transport journey, with 701 metres
- o Sydney locals enjoy the shortest walking distances, averaging 573 metres

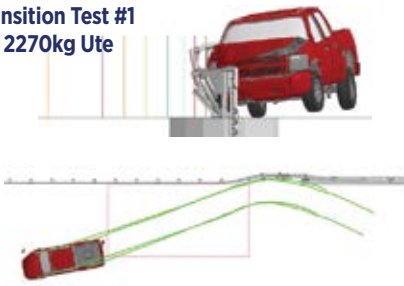
• Number of transfers per commute (one way):

- o Sydney has the highest rate of riders making three or more transfers per journey (15%), while 57% in Adelaide get where they're going using a single line (no transfers)

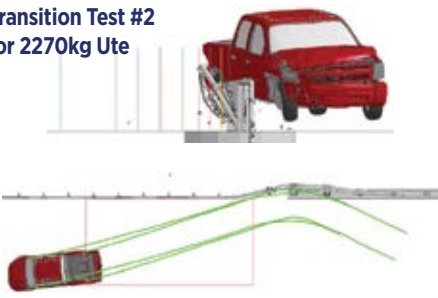
• Total commute distance (one way):

- o The average public transport commute distance in Australia is 9 km
- o 27% of Melbourne commuters travel

Transition Test #1
for 2270kg Ute



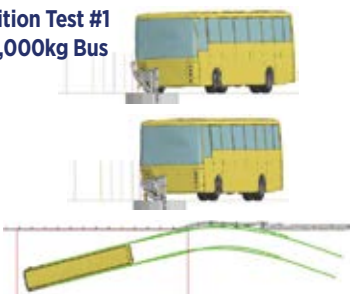
Transition Test #2
for 2270kg Ute



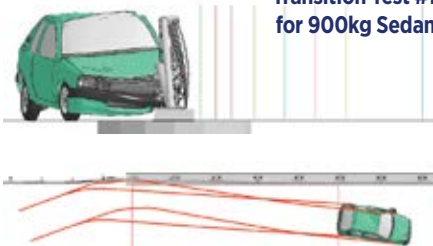
Transition Test #3
for 2270kg Ute



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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A SWEEPER TO MEET EVERY NEED

Garwood International's expansion into the sweeper market started in 2017, when it partnered with Boschung to become the company's exclusive Australian and New Zealand distributor.

Keen to build on its well-earned reputation for the design, manufacture and supply of high-quality waste collection and compaction equipment and vehicles, the move to incorporate sweepers into its product offering was really a natural progression for the growing company. Garwood International's Managing Director, Daniel McHugh, explained:

"While expanding into the sweeper market had been a long-term goal for the company, we wanted to make sure that when we did it, we would be able to offer our customers a full suite of high-quality, reliable sweeping solutions."

"From compact footpath sweepers and mid-range units for urban environments, through to full-size highway sweepers

and specialist units for road works and pavement construction applications, we wanted to make sure that we had a comprehensive product offering to meet the needs of any sweeping challenge," he said.

"With that in mind, I travelled the world looking at what products were available and whether they'd be a good fit for us – especially in terms of quality, reliability and, perhaps most importantly, the equipment's ability to stand up to the harsh Australian operating environment," Daniel added.

"Needless to say, with both Boschung and Schwarze, we found their sweepers well and truly 'ticked all the boxes.'"

"Once we had established our partnership with Boschung, we started our discussions with Schwarze," Daniel said. "Schwarze had built a strong reputation throughout Australia for quality sweepers in both the local government and contractor market, and we felt their products were a perfect fit."



Garwood International was appointed as Schwarze Industries' exclusive Australian and New Zealand distributor in 2017, taking over sales, service and after-sales for both the Schwarze and Bonne branded sweepers.



Schwarze GS6 Tempest™ 6 Cubic Metre Regenerative Air Sweeper.

BELOW: Schwarze A4 Storm™ 3.6 Cubic Metre Regenerative Air Sweeper.

RIGHT: Available in a choice of models, Bonne heavy-duty Tractor and Trailer Brooms by Schwarze offer the ideal sweeping solution for road maintenance and construction sites.



Since that time, Garwood International has continued to build both the Schwarze and Bonne brands, with its sweeper business going from strength-to-strength.

"We're extremely proud to be the exclusive distributor for Schwarze throughout Australia and New Zealand," Daniel said.

"Together with the fact that both brands are held in extremely high regard in terms

of their quality, reliable and performance in the field, for us, signing the agreement with Schwarze also represented 'the last piece in the puzzle' in terms of us being able to provide our customers with a sweeper to meet every need," Daniel concluded.

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

SITE SWEEPING DONE RIGHT!

Specifically designed for road maintenance and construction, Bonne Tractor and Trailer Brooms from Garwood International deliver the quality, performance and reliability you need.

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- Easy to Manoeuvre and Easy to Use



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FREE ELECTRIC VEHICLE CHARGING NETWORK TRIAL IN ADELAIDE

The Australian Renewable Energy Agency (ARENA) recently announced over \$980,000 in funding to JOLT Charge Pty Ltd (JOLT) to develop and trial its free electric vehicle (EV) charging network in Adelaide. JOLT will install 21 innovative EV fast charging units that are embedded in roadside advertising panels across Adelaide in car parks, streets and public spaces. The network will be rolled out across several local government areas consisting of Campbelltown City Council, Charles Sturt Council, Marion Council and Port Adelaide Enfield Council.

The \$1.97 million project will provide fast chargers that are capable of charging all types of EVs and will provide free charging for approximately 15 minutes, providing drivers with approximately 45km of range (users can pay to use the JOLT chargers for longer than this period). All of the 21 units will be powered by 100 per cent renewable energy.

The project will test the commercial viability of generating revenue through advertising sales to cover the cost of both the EV charging infrastructure and the provision of charging for EV drivers. If successful this model could help to develop a larger charging network in inner cities and major networks across Australia in advance of the expected increase in EV sales.

ARENA has previously supported the rollout of two ultra-fast charging EV networks across Australia by Chargefox and Evie Networks which have focused mainly on enabling travel on key highways. ARENA has also supported Origin, AGL and ActewAGL to trial different technologies and approaches to accelerate the commercialisation of managed EV charging and V2G services.

Together, these ARENA funded EV projects not only help to address consumer range anxiety for EVs but are also demonstrating and informing the market on how EV charging can be managed at higher levels of uptake, with the lowest cost and greatest benefit to consumers.

ARENA CEO Darren Miller said the innovative model would help to test consumer behaviour in using EV charging in metro areas.

"The advertiser funded model for EV charging is untested in Australia and JOLT's project could lead to a viable business model to address charging availability and range anxiety and therefore lead to increased uptake of EVs.

"This project will test the appetite of customers living in metro areas who use their vehicles for shorter trips to charge their vehicles while they're out shopping or at



public events. The more we can learn about consumer behaviour now, the better prepared we will be for the broader uptake of EVs across Australia," Mr Miller said.

Doug McNamee, CEO of JOLT Charge said the company was thrilled to see their vision come to life and provide much needed infrastructure for EV drivers.

"Through this ARENA grant, we're able to make EVs more accessible with the launch of our free charging network. Increasing the availability of charging infrastructure is a key piece of the puzzle for widespread adoption of EVs. We are excited to be partnering with innovative and forward-thinking councils, helping them transition to a zero-emission transport future," Mr McNamee said.

As outlined in the Australian Government's first *Low Emissions Technology Statement*, ARENA will also continue to support consumers choosing new vehicle technologies through the roll-out of the *Future Fuels Fund*.

The *Future Fuels Fund* will help businesses and regional communities take advantage of opportunities offered by hydrogen, electric, and bio-fuelled vehicles.

THE GOLD COAST WILL INSTALL FAST ELECTRIC VEHICLE CHARGERS TO ANCHOR QUEENSLAND'S ELECTRIC SUPERHIGHWAY

The Gold Coast is powering up electric vehicles and its growing green credentials with a network of 10 of the RTM75 fast-charging stations by Brisbane technology company Tritium. The stations will be installed over a 50km city-wide radius from Pimpama on the northern edge of the Gold Coast to Coolangatta and offset by solar power generation.

The world-first fast-charging technology is 50 per cent quicker than standard 50kW charging stations and capable of charging two vehicles at once. The new wave 75kW DC fast chargers deliver 75km of range to an electric vehicle within 10 minutes of charging.

The fast-charger network, supported by the State Government's *COVID Works for Queensland* jobs booster that helps fund new infrastructure projects, will anchor the *Queensland Electric Super Highway* of 31 fast-charging sites enabling travel from Coolangatta to Cairns and from Brisbane west to Toowoomba in a low or zero-emissions electric vehicle.

The stations will also be a key link for some of Australia's best road trips that are in the process of going electric including the Pacific Coast Way from the Gold Coast to Cairns and the renowned Pacific Coast Drive from Lake Macquarie in NSW to the Gold Coast Hinterland.

Queensland's Deputy Premier and Minister for State Development, Infrastructure, Local Government and Planning, Steven Miles, said the Queensland Government had provided \$350,000 towards the charging stations, to provide a boost to the local economy during the COVID-19 pandemic.

"Having charging stations along the Gold Coast not only incentivises future EV users, but it also encourages driving tourism along a beautiful stretch of the Coast," Miles said.

Gold Coast Mayor, Tom Tate, said the investment in EV infrastructure reflected the city's reputation as an innovative destination as well as its commitment to sustainability.

"As the transition to electric vehicles begins to pick up pace, we have secured

the most advanced DC fast chargers on the market," Tate said.

"The power used to charge vehicles at these stations will be offset by power generated by the City's *Virtual Power Plant*, which harnesses solar energy from more than 47 city buildings."

The network would provide drivers with a rapid, positive recharge experience and would deliver a boost for local businesses as electric vehicle drivers stayed an average of 30 per cent longer than other travellers to return to recharge and engage with the local area, he said.





INDIA'S FIRST FLEET OF ELECTRIC BOATS TO ACHIEVE ZERO EMISSIONS WITH SIEMENS ENERGY'S TECHNOLOGIES

Electric propulsion drive train and automation technologies will help provide safe, cost-effective, reliable vessel operation.

India's first greenfield and largest shipbuilding yard, Cochin Shipyard Ltd., has selected Siemens Energy to provide advanced marine solutions for the country's first fleet of 23 boats to be equipped with electric propulsion drive trains with energy storage integration (batteries) and vessel automation technologies.

Cochin Shipyard Ltd. is building the fleet to strengthen Kochi Metro Rail Ltd.'s (KMRL) infrastructure and its connectivity to islands

around Kochi / Ernakulam.

The combination of the electric propulsion drive train, energy storage, and automation systems will significantly reduce fuel consumption, increase manoeuvrability, and provide reliable, uninterrupted power supply while ensuring safe, cost-effective operation of the vessels.

"The project showcases our commitment towards decarbonization and environment sustainability," said Thorbjørn Fors,

Executive Vice President for Siemens Energy Industrial Applications. "Furthermore, the low emission footprint of the vessels makes it an ideal benchmark for other customers looking to use inland waterways to transport goods and passengers."

ABOUT SIEMENS ENERGY

With its portfolio of products, solutions and services, Siemens Energy covers almost the entire energy value chain – from power generation and transmission to storage. The portfolio includes conventional and renewable energy technology, such as gas and steam turbines, hybrid power plants operated with hydrogen, and power generators and transformers. Siemens Energy employs more than 90,000 people worldwide in more than 90 countries. More than 50 percent of the portfolio has already been decarbonized.

For more information visit: www.siemens-energy.com

EQUIPMAKE LAUNCHES NEW HIGH-TORQUE, DIRECT DRIVE ELECTRIC MOTOR FOR HEAVY DUTY COMMERCIAL VEHICLES

Leading automotive electrification specialist, Equipmake, has launched an all-new high torque electric motor designed specifically for use in heavy duty commercial vehicles, such as electric buses. Known as the HTM 3500, the new motor combines high torque with low motor speeds, fitting directly onto the propshaft of a large electric vehicle, negating the need for a separate gearbox.

Capable of producing maximum torque of 3,500Nm at just 1,000rpm, it has been designed for multiple heavy duty vehicle applications, from electric buses to HGVs and mining trucks, where high torque and start/stop duty cycles are required.

Based in Norfolk, UK, Equipmake provides EV technology to automotive OEMs and specialist supercar makers, producing everything from industry-leading high-performance electric motors to power electronic systems, all the way up to complete EV drivetrains, while also operating across marine, off-highway, agriculture and aerospace.

The company has developed its own retrofit electric bus chassis – known as EBus – which allows any bus coachbuilder to become a full electric bus manufacturer almost overnight. Such is the demand from bus makers wishing to go zero emissions that Equipmake has forged partnerships with companies in Brazil, Argentina and India and grown its UK staff from 15 employees to 57 in a little over two years.

Equipmake's new HTM 3500 motor is an integral part of the very latest iteration of the state-of-the-art EBus platform, with

in-service trials of this technology beginning next Spring by Brazilian commercial vehicle manufacturer, Agrale, who will launch an electric bus first in Buenos Aires, Argentina in 2021.

Ian Foley, Managing Director, Equipmake said:

"The HTM 3500 is the perfect motor for heavy duty electric commercial vehicles such as buses, mining trucks and HGVs offering enormous amounts of torque from extremely low motor speeds."

"While it pushes the boundaries of conventional interior permanent magnet motor design, it does so reliably and cost-effectively and, by being direct drive, negates the need for a gearbox allowing more efficient packaging of an electric drivetrain," he said.

Engineered and manufactured in the UK, HTM 3500 weighs 195kg, has a diameter of 540mm, a width of 251mm and height of 607mm.

As well as peak torque of 3,500Nm, it has peak power of 400kW and a maximum motor speed of 3,500rpm. It is available as a single or coupled unit.

Equipmake's HTM 3500 electric motor is available now, included within the EBus platform. It can also be ordered in production runs of tens of units, right up to thousands. It joins the company's other industry-leading innovations, including its APM electric motor, believed to be the most power dense in global series production.



Late last year, Equipmake opened an all-new factory in Snetterton, Norfolk, where the company provides the complete electric mobility solution – whatever the sector – offering the capability to design, test and manufacture everything from motors to fully electrified platforms. It also sources and supplies the very latest lithium-ion batteries, creating entire electric drivetrains for an increasingly international customer base.

ABOUT EQUIPMAKE

Equipmake has more than 20 years' experience developing and integrating industry-leading innovative electric powertrains. It provides the complete solution. Not only is Equipmake a leader in ultra-high performance electric motors, but also complete EV drivetrains and ultra-fast power electronic systems.

As well as developing proprietary technology – such as an ultra-compact, lightweight high performance spoke motor – it also offers industry-leading EV consultancy too.

Managing Director Ian Foley is a highly-experienced engineer who has worked in global motorsport at the highest level – from Le Mans to F1 – and Equipmake's small team of expert engineers can take a project from initial specifications through modelling, simulation, design, prototyping, testing and then production in industry-leading timescales.

Using this expertise, Equipmake has developed a range of products for use in a wide variety of projects, including Ariel's upcoming *HIPERCAR* high-performance range-extended electric sports car.

For more visit: www.equipmake.co.uk

WA PRECASTER EMBRACES MASTER PRECASTER BADGE OF HONOUR

Western Australian precast manufacturer MJB Industries is one precaster who has embraced National Precast's new Master Precaster membership category and is using the brand to promote itself to its market as an industry leader.

"MJB is a truly outstanding organisation which strives for excellence in producing quality precast products and in providing great service to the Western Australian construction and mining industries," says National Precast's CEO Sarah Bachmann.

Recognising the need to raise the bar in the precast industry, the company embraced the Master Precaster concept with enthusiasm. The company was the first in the country to be audited and awarded the title.

"MJB jumped straight in for their audit, offering all the requested documentation and passing the desktop and factory audit with flying colours," says Bachmann.

The company is happy to be awarded the title and is full of praise for the new brand.

MJB General Manager Kim Hovey says his team at MJB Industries is delighted with the acknowledgement and endorses the term, as one that is widely used in construction.

"We are passionate about the precast we manufacture and we fully support the introduction of Master Precaster. Just as Master Builders are recognised in building, Master Precaster conveys instant credibility when it comes to precast manufacturers," Hovey comments.

"To be recognised by National Precast as a Master Precaster is an honour, and we will strive

to maintain and exceed the Master Precaster standards into the future".

According to Bachmann, Hovey is passionate about MJB and that rubs off on others. Systems Manager Ian Prosser shares that sentiment when he says that "...we want to produce the best product in the best environment and provide opportunities for people who might not have them otherwise."

Bachmann says that MJB Industries is not alone in its enthusiasm for the new brand. Other Master Precasters are keen to take steps to push the new branding and what it means. Rocla's Head of Marketing and Technical David Livermore yesterday commented that he is looking forward to Rocla adopting the new Master Precaster brand as an acknowledgement of the expectations of our customers and asset owners.

"The enthusiasm among the membership is impressive, and it shows why our Master Precaster members are the best in the business, from many perspectives," Bachmann says.

"Not only are they masters at manufacturing precast concrete elements. They have impressive, long track records, they make substantial contributions to the precast and broader construction industry, they are financially stable, they employ highly skilled workers, they boast impressive quality, safety and environmental systems that are implemented throughout the business on a daily basis and they can be relied on to provide outstanding professional expertise," Bachmann states.

Dealing with a Master Precaster provides you with the confidence to know that you are engaging one of the premium precast manufacturers in the country.

Please visit: www.nationalprecast.com.au to find a Master Precaster to supply your next project.



WHY USE A MASTER PRECASTER?

Carrying out proper due diligence is extremely resource intensive. The process of auditing a precast manufacturer should be complex and detailed, calling for checks that the business is sound and that the required processes and procedures are not only in place, but are actually being implemented on a daily basis.

Whilst any old precaster's price might be 'right' and they may have a similar level of experience, are you confident you have done your due diligence to mitigate the risks? Here are some that you might not have thought of:

- A precaster might be ISO certified but they may not implement procedures on a day-to-day basis, and the ISO audit may not have been conducted by someone who intimately knows precast;
- Staff turnover may be high so what you get today, you may not get tomorrow;
- A precaster may have little repeat business and disputes may be commonplace;
- The precaster may cut corners during manufacture;
- Shop drawings may be inadequate or not properly authorised;
- Hold points may not address the most important stages during manufacture;

- A precaster may not have a thorough understanding of – and may not comply with – Australian Standards, codes and legislative requirements;
- Testing may not be adequate.

"Most checks are inadequate if the goal is to mitigate any unwanted delays, cost blowouts, quality issues or unexpected finishes," said National Precast CEO, Sarah Bachmann.

"ISO certification isn't failsafe and proper checks of a precast manufacturer are needed to minimise risk of cost blowouts. Master Precasters are audited by us and follow a Code of Conduct, to ensure you get the best possible outcome from your precast experience," she added.

THE BENEFITS OF USING A MASTER PRECASTER

Master Precasters are the country's most skilled and experienced precast manufacturers. They follow the National Precast Master Precaster Code of Conduct and they have met National Precast's strict audit requirements.

- They have a strong track record with happy repeat clients.
- They are financial stable and hold the right insurances.

- They implement stringent quality, safety and environmental procedures.
- They provide a safe working environment for their workers.
- They consistently produce high quality precast.
- They take pride in their work and remedy any defects.
- They employ long term, skilled workers.
- They understand and comply with Standards, codes and legislation.
- They know about and embrace new technology and practices.
- They have good working relationships with their subcontractors, such as transportation and erection contractors.
- They look after the natural environment.
- They are good corporate citizens and they are invested in their industry.

Master Precasters supply every state and territory of Australia. They can specialise in a particular type of precast such as flooring or can manufacture a range of precast elements. They can supply – and often erect – precast for large or small projects in the residential or commercial buildings or civil sector.

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NATIONAL PRECAST WELCOMES NEW BOARD MEMBERS

Michael Waeger of Waeger Constructions will continue in the second year of his two year term as President and several other existing Board members were re-elected at the organisation's November 2020 AGM.

In addition to Michael being re-elected, also back for another year are Craig Zinn from Stresscrete, Paul Adams from Humes, Ian Coulter from Precast Concrete Products, George Spiropoulos from Euro Precast, Daniel Nassar from Alpha Precast, Alberto Ferraro from PERMAcast and Riccardo Musella from Reinforced Earth Company.

New to the Board are Adrian Cahill from Reinforced Concrete Pipes Australia (RCPA) and Karen Thompson from Rocla. Daniel Coutts from Austral has stepped down and is thanked for his contribution.

Craig Zinn will continue to serve as Immediate Past President and Paul Adams has been appointed Incoming President.

National Precast's CEO Sarah Bachmann is delighted with the new appointments.

"Michael's leadership has proven outstanding throughout the recent challenges we've all endured and his enthusiasm for the Association is having an impact. We had one more than our Constitution allows nominating for Board roles, and we recently put a call out to other Board members about the incoming president role. This is the first time we have had three Board members offer to fill the role," Bachmann comments.

"It's wonderful to see such positivity and enthusiasm. Unlike many operators in the industry, these people – both Board members and members generally - think beyond the confines

of their businesses and are really invested in the Association. They are genuinely committed to making the precast industry better for everyone.

That alone is a good reason to give preference to a member over company which is not a member," Bachmann says.

National Precast's 2020-21 Board of Directors

Michael Waeger	Waeger Constructions (President)
Craig Zinn	Stresscrete (Immediate Past President)
Paul Adams	Humes (Incoming President)
Ian Coulter	Precast Concrete Products
George Spiropoulos	Euro Precast
Daniel Nassar	Alpha Precast
Alberto Ferraro	PERMAcast
Riccardo Musella	Reinforced Earth Company
Adrian Cahill	RCPA
Karen Thompson	Rocla

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✓ Comprehensive

ACRS certifies all steel products, from all manufacturing locations to all scheme standards. So with ACRS you know all listed products are covered, not just some;

✓ Rigorous

ACRS audits every major site at least once every year. So with ACRS you know certificates are up to date;

✓ Verified

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