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# HIGHWAY ENGINEERING AUSTRALIA

DEC 2020/JAN 2021

V52.3



TRANSPORT  
INFRASTRUCTURE  
ITS TECHNOLOGY  
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**TOWARDS ZERO  
BRIDGE FATALITIES**



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



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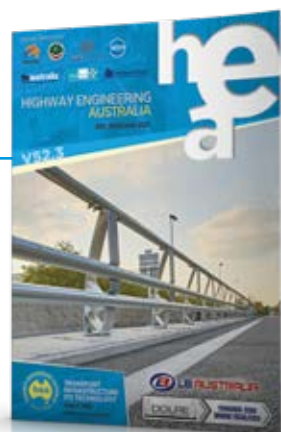
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## About the Cover

Ideal for bridge refurbishment projects, the DOLRE Low Stress Parapet System offers a cost-effective and easy to install method of upgrading existing bridges to meet the current Standard without the need for significant and expensive deck strengthening or deck replacement works.

► Turn to **Page 10** for the full story.





# Addressing the 'Low Tech' requirements for our high-tech transport future

Dear Readers,

As many of you would know, *Highway Engineering Australia* (HEA) has been a long-time supporter and advocate for the introduction and expansion of Intelligent Transport Systems (ITS) technology across our road and transport network.

Sparked by my long-term professional involvement with the IT sector (as well as my undeniable fascination with all things high-tech), I believe that ITS technology has the potential to deliver significant improvements in efficiency and productivity across the majority of industry sectors, while also improving safety, reducing travel times and reducing the environmental impact of transport and freight in general.

While I'm clearly in the 'pro ITS technology' camp, I also believe that we, as a nation, have a significant infrastructure issue that must be addressed before we can even begin to consider the wide-spread introduction of much of this technology.

The issue to which I am referring is, perhaps not surprisingly, the quality of our road network infrastructure... in this instance, more specifically, the quality of line marking and road markings (or lack thereof).

Put simply, as much as I (and many others I'm sure) would love to see the establishment of integrated ITS technologies across the country - including the technologies required to facilitate autonomous vehicles - the sad fact is: *much of our road network is simply not up to the task.*

Indeed, most of our major capital cities still have sections of unmade road within their greater metropolitan boundaries. And as for the quality of the paved road network, much of it is in dire need of repair or replacement.

That said, for the purpose of this editorial, I'm not referring to the quality of the pavement.

A number of critical ITS technologies - including many of the 'driver assist' technologies such as 'lane departure warning systems' now being included in many new car models - rely on quality line marking and road markings to establish the vehicle's physical position on the road.

While I'm not about to start a blame game for the poor quality of much of the line marking on our road network (after all, attempting to apportion blame does nothing to solve the issue), it's clear that something needs to be done. In short, without the critical 'low-tech' components of quality pavements and high quality, clearly visible line marking, many of the high-tech components simply won't function.

Please don't misunderstand, I'm not for one moment suggesting that we slow down on the development and implementation of ITS technology so we don't end up trying to put the 'cart before the horse' - quite the contrary.

What I'm suggesting is that with ITS technologies moving forward at such a rapid rate of knots, we need to really step up our game in terms of road maintenance - especially when it comes to improving the quality and consistency of line marking.

While there finally seems to be a widespread agreement on the value of investing in road infrastructure as we start to rebuild the economy in a post-COVID lockdown world, most of the talk still revolves around 'major projects' along key transport routes.

Sadly, it seems that in the rush to expand our network and increase capacity, the more mundane, but highly necessary tasks - such as ensuring that ALL roads across the network have clearly visible and compliant line marking and road markings - is once again in danger of being relegated to the 'back-burner'. We must not let that happen.

Poor quality and non-compliant line marking and road markings are not only a hazard to road users, they are also completely useless when it comes to providing what's needed for many ITS technologies. What's more, the longer you leave them, the worse they get.

Given the current economic and job market conditions across the country, I believe that now is the perfect time to address this most critical issue.

After all, high quality line marking and road markings are the 'low-tech' key to many of the high tech ITS solutions that will carry us into the future.

**Anthony T Schmidt**  
Managing Editor



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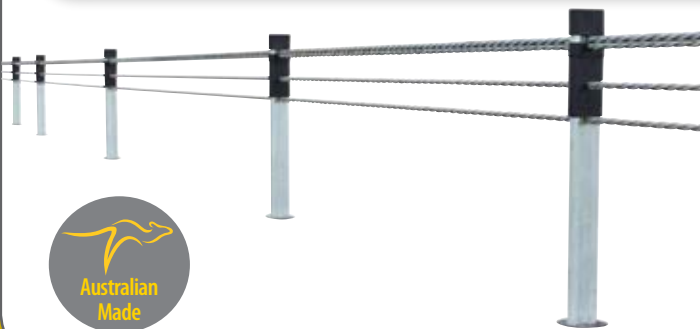
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## Monash launches state-of-the-art facility to test safety of infrastructure, save lives

A state-of-the-art impact testing facility designed to boost the structural safety of present and future high-risk infrastructure and save lives across Australia, was recently launched at Monash University in Melbourne.

In a move that will place Australia at the forefront of impact engineering research, the National Drop Weight Impact Testing Facility (NDWITF) will have world-leading technology that can observe the behaviour of elements under severe impact loading of up to two tonnes. This facility has the capacity to assess the structural safety of high-risk infrastructure across Australia, including railway networks, tunnels and bridges, buildings and construction materials, as well as road safety barriers and protective equipment.

The NDWITF will also support research in the broader research community on construction, mining, geo-mechanics, energy and the environment. Fields of application and interest include construction materials under high strain loading, structural dynamics and engineering, mining excavation and rock fragmentation.

Enabled by an Australian Research Council (ARC) LIEF grant, the NDWITF is a Monash University-led collaboration involving six other

universities, including the University of New South Wales, Swinburne University of Technology, Queensland University of Technology, University of Wollongong, University of Technology, Sydney and The University of Melbourne.

The facility, located at Monash University's Department of Civil Engineering, is accessible to all researchers, students and industry.

Associate Professor Amin Heidarpour, Head of Structural Engineering at Monash University, has led this project. He was supported by some of Australia's esteemed experts in this space, including Professor Xiao-Ling Zhao and Professor Mark Bradford (UNSW), Professor Guoxing Lu (Swinburne), Professor David Thambiratnam and Dr Sabrina Fawzia (QUT), Professor Alex Remennikov (Wollongong), Professor Brian Uy (Sydney), Professor Chengqing Wu (UTS), Professor Tuan Ngo (Melbourne) and Professor Pathegama Ranjith (Monash).

"Understanding the behaviour of construction and geo-materials under dynamic loading is essential in dealing with various engineering problems, such as protective structures design and impact cratering, excavation and mining, blasting and fragmentation, and risk management," Associate Professor Heidarpour said.

"A state-of-the-art impact engineering facility provides a national research focus on behaviour of construction materials and systems under impact loading with unique observation techniques. The facility will advance understanding of the fundamental behaviour of critical infrastructure exposed to impact loading and will foster innovations in design and construction.

"This will ensure Australia is at the forefront of impact engineering research in the international arena, promoting local innovation and industrial competitiveness contributing to the safeguarding of Australia, saving lives and reducing losses," Associate Professor Heidarpour added.

The performance of structures subjected to impact loading has received worldwide attention. The catastrophic failure of construction materials caused by extreme impact conditions, such as natural disasters and man-made hazards, has justified the need to carry out comprehensive research in order to develop future infrastructure with new, innovative, cost-effective and environmentally friendly materials.

The NDWITF have been constructed with a 2000kg impact mass that has the capacity to create an impact energy of up to 200,000 J and impact velocity of up to 18m/s. Impact loading can be applied to specimens with a width of up to 1m and length of up to 2m. All displacements recorded within each test is captured by an optical 3D photogrammetry system.

"Thanks to the ARC LIEF grant, the NDWITF will provide economic, environmental and social benefits to Australia as it will undertake research in robust, resilient, cost-effective and environmentally friendly impact engineering applications. This will be of great benefit to the Australian construction and manufacturing industries and will promote Australia as the leader in new construction technology," Associate Professor Heidarpour said.

A key partner in this project is Austeng, a Geelong-based engineering company who engineered, manufactured, and installed the facility in line with the University's requirements.

"Austeng was proud to be part of this important project and collaborate with Monash University and I am delighted our team was able to deliver a practical and workable solution given the stringent performance parameters set by Monash and the significant engineering challenges involved," said Ross George, Austeng Managing Director.



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## Virtual reality tech to improve pedestrian safety for older Australians

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A new research project from the University of South Australia will see planned upgrades to roads and pedestrian areas simulated using virtual reality technology in order to improve road safety for older people. University of South Australia researchers will create a walkable environment in virtual reality, suitable for use by older people, which will help planners and engineers design better roads and footpaths.

Older pedestrians are overrepresented in road accidents with up to 50 per cent of all injured pedestrians in OECD countries being seniors. Similarly, a study by Victoria Walks found people aged 65 and over represent 14.6 per cent of the population yet account for 39 per cent of all pedestrian fatalities.

The Department of Infrastructure, Transport, Regional Development and Communications has awarded UniSA a \$142,034 Road Safety Innovation Fund (RSIF) grant to investigate the VR-based methods for assessing pedestrian safety through the eyes and experiences of older people.

Research suggests road intersection design, crossing widths, traffic light locations and timings as well as traffic types and density, all play a part in the overrepresentation of older people in road accidents.

The interdisciplinary study involves three UniSA researchers – Dr Jun Ahn (Construction Management), Dr Gun Lee (VR technology) and Dr Ancret Szpak (Psychology) – and Dr Ahn says it will use innovative user experience methods including eye-tracking, getting participants to verbalise their thoughts (ThinkAloud techniques), and wearable biosensors to track physiological indicators of stress such as heart rate, skin conductance response and movement.

“Having access to a wide range of data from both virtual and real environments means we can overcome the limitations of previous ways of assessing pedestrian safety,” Dr Ahn said.

“Through this project we will create a virtual environment to simulate the road environment. We can easily change that virtual model to test the impact that a range of factors, such as

intersection designs, crossing widths and traffic signals, have on road safety.”

“The project will focus on the needs of older people, who may, for example, have impaired vision or hearing, need a walking aid or require longer to cross the road than young people,” Dr Ahn added.

Virtual reality (VR)-based user experience methods will be used to record and identify safety issues for the older people involved in the study. This involves testing options called VR locomotion techniques, that make a VR environment walkable by considering older people’s individual characteristics.

A pilot study has already been undertaken on Jetty Road at Glenelg. Dr Ahn says he hopes to build on that work through this new project, A State-of-the-Art User Experience (UX) Approach for Assessing Pedestrian Safety Factors through the Experiences of Older People, in line with the City of Holdfast Bay’s long-term plan for renovating the Jetty Road. Over the course of the three-year study, researchers will compare vulnerable pedestrians’ experiences in real environments with experiences captured in virtual environments.

“Our ultimate ambition is for councils to be able to use this technology to test road designs virtually with vulnerable pedestrians, while still in the planning stages,” Dr Ahn said.

“This means city planners can get an idea of how safe and useable the built environment will be and address any road safety issues well before construction begins.”

“By making roads safer and decreasing the likelihood of accidents, we hope to see more older people taking a stroll,” Dr Ahn concluded.

Two of the researchers involved in the study, Dr Jun Ahn and Dr Gun Lee are members of UniSA’s Australian Research Centre for Interactive and Virtual Environments in the Empathic Computing Group. A third researcher involved in the study, Dr Ancret Szpak, is a member of UniSA’s Brain-Behaviour-Body Research Concentration in the Cognitive Ageing and Impairment Neurosciences Laboratory.



## Survey: 59 Percent of Australians Would Leave Their Cars at Home – Kapsch TrafficCom reports

According to Kapsch's *TrafficCom Index 2020* survey, 59 percent of Australians are willing to limit car journeys to certain times in order to improve urban air quality. A majority of 63 percent are in favour of reducing traffic-related emissions by means of environment-friendly transport solutions the survey revealed. Although a broad consensus already existed among the population, practice during the Corona crisis is proving to be at odds with expectations: Passenger numbers on local public transport have fallen dramatically. Switching to bicycles and e-bikes increased. Mobility experts advise exploiting this window of opportunity.

"Cities across Australia have reacted swiftly during the Corona crisis by creating more space for cyclists and pedestrians to enable social distancing," says David Bolt, VP Sales & Solution Consulting Kapsch TrafficCom.

"In Melbourne, for example, the city has fast-tracked some 40 kilometres of bike lanes within the CBD. This has been a real success story, but it is only a question of time before the numbers of cars on the road increase again," he added. "And on the grounds of the current COVID-19 situation, many people will continue to avoid public transport whenever they can."

"Those responsible should therefore grasp the opportunity existing now to get things back on the right track. Digitally integrated systems have proven in practice to be very effective here," he said.

Kapsch is working together with Melbourne University and the Department of Transport (Victoria) on a number of projects within the *Australian Integrated Multimodal EcoSystem* (AIMES) environment – a world-first living laboratory based on the streets of Melbourne.

"This testbed was established to test highly integrated transport technology with the goal to deliver safer, cleaner, and more sustainable urban transport outcomes," explains David Bolt.

Two applications within this mobility hub are the modular and highly scalable Kapsch solutions 'Smart Intersections' and 'Intelligent Corridors'. They focus on a view to change the habits of how people move in a network and to provide operators increased situational awareness.

As David Bolt explains, "Real-time traffic data is key to a smart and sustainable traffic management. Our integrated EcoTrafIX™ software platform is the centre of the corridor management, assisting various agencies to manage and coordinate congestion and events in a coordinated fashion. People and the environment both benefit as a result."

For additional information, please visit: <https://www.kapsch.net/au/>



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## Technology milestone will expand access to on-demand public transport in Queensland



An important public transport milestone for Queensland was reached recently, following the signing of a new partnership between TransLink and Via, the global leader in TransitTech, for the development of demand responsive public transport services in Queensland. As part of the partnership, most current and future on-demand transport services will be powered by technology from Via and will complement existing public transport services while introducing flexible and dynamic transport offerings.

Head of TransLink Matt Longland said the technology behind pre-booked and shared services was critical to deliver efficient and customer focused services, and the new partnership with Via would accelerate delivery across the network.

"We are really pleased to announce TransLink's partnership with Via who is the leader in on-demand technology

with global experience," said Longland. "This investment complements our \$371 million investment in Smart Ticketing which is being currently rolled out across Queensland."

"On-demand services are a complementary form of public transport, filling the gap in the mobility spectrum between a regular service bus route and a variable, highly-personalised service offered by taxis or other booked hire services," said Longland. "Innovative, on-demand public transport doesn't just happen, and our partnership with Via is the first step toward delivering an integrated technology solution that meets service needs and customer expectations."

Via Partnerships Lead Ben Hague said Via was proud to partner with TransLink to establish the future of on-demand public transport in Queensland.

"Via's technology and platform will provide a flexible and comprehensive solution that will enable TransLink to greatly expand the reach of on-demand transport services, while strengthening existing public transport services," said Hague. "We are now working toward technology that can be delivered on smart and mobile devices; for use by customers, drivers, delivery partners and staff to enable planning, booking and payment of an on-demand journey."

Demand-responsive transport in Queensland currently operates in Ipswich, Hervey Bay, Toowoomba, Logan, and Mt. Tamborine, with two more services announced for Nerang and Helensvale. Unlike traditional bus networks that rely on routes and schedules, demand-responsive public transport allows passenger flexibility, with varying service models operating in different locations.

Mr Longland said the partnership with Via would immediately start on detailed planning to deliver new technology that would be trialled in various locations.

"We are working on confirming the design and utilisation of key features and ensuring our all staff are fully trained before we roll out any version of the new technology," he said.

Via has been tapped by cities and transportation operators around the world to use software solutions to re-engineer public transit from a regulated system of rigid routes and schedules to a fully dynamic network. Via now has more than 150 launched partnerships in more than 25 countries using on-demand solutions to reimagine transport. In addition to Via's partnership with TransLink, the company has a growing footprint in Australia and New Zealand, including services in Sydney, Newcastle, Adelaide, Auckland, Canberra, and Timaru.

### ABOUT VIA

Founded in 2012, Via pioneered the TransitTech category by using new technologies to power public mobility systems, optimising networks of dynamic shuttles, buses, wheelchair accessible vehicles, school buses, and autonomous vehicles around the globe. Building the world's most efficient, equitable, and sustainable transportation network for all riders — including those with limited mobility, those without smartphones, and unbanked populations — Via works with its partners to lower the cost of public transit and provide accessible options that rival the convenience of a personal car at a much-reduced environmental impact. At the intersection of transportation and technology, Via is a visionary market leader that combines software innovation with sophisticated service design and operational expertise to fundamentally improve the way the world moves, with 150 global partners on six continents, and counting.





## Global Electronic Toll Collection and Road Usage Charging market to reach €490 billion in 2030

As the UK government just announced it is considering *Road Usage Charging* (RUC) as a funding solution for its road network, RUC schemes are being pushed ahead around the world. In the US, Asia, Africa and Oceania, electronic tolling is becoming crucial to bridge financing gaps and substitute declining gas tax receipts.

PTOLEMUS Consulting Group forecasts that 874 million global subscriptions in ETC/RUC schemes will be active by 2030, collecting over €490 billion every year by 2030.

PTOLEMUS' *Electronic Tolling Global Study* is the 3rd edition of its highly popular Electronic Tolling series of reports and represents the most comprehensive review of the global ETC/RUC market to-date,

including 950 pages of insights, data, analyses and forecasts.

PTOLEMUS expects the global ETC/RUC market to grow at 13% CAGR to 2030, driven by multiple factors including: environmental policy, economic development, interoperability schemes and growth of cashless payments, propelled by COVID-19.

Dr Andrew Jackson, PTOLEMUS' Research Director stated: "Since our 2017 report, much has changed. From Utah to Kenya, to the Netherlands and China, we devoted over 9,000 hours to analyse the market." He continued: "EETS has moved from unachievable to unavoidable. Spain may need to toll its motorways again and Audi launched connected vehicle tolling in all its new models in the US."

PTOLEMUS' report analyses road funding and tolling strategies of 55 countries and 14 US states. It examines the current status of ETC and RUC schemes, how each area has evolved its legislation and value chain, and provides guidance on infrastructure developments and business opportunities.

According to Dr Jackson, "...the changes in the last 3 years have been impressive but they are nothing compared to what will come: from mobile tolling to ANPR and video tolling, city congestion charges and low emission zones (LEZ) to nationwide road pricing schemes. Electronic tolling is moving into the mainstream."

PTOLEMUS Consulting Group is the first strategy consulting & research firm entirely focused on connected & autonomous mobility. It assists leading mobility stakeholders including governments, toll agencies, road operators, toll technology and service providers, automotive OEMs and vertical service providers in defining and deploying their strategies.

For more information, please visit:

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# DOLRE LOW STRESS PARAPET SYSTEM

## AN INNOVATIVE SOLUTION TO A COMMON PROBLEM

Although widely considered as a critical step in ensuring that our road bridge assets are able to meet the needs of our ever-changing vehicle mix, the adoption of Australian Bridge Standard AS5100:2017 - which references the MASH-2016 standards - has rendered a lot of bridge traffic barrier assets obsolete.

Together with a significant increase in vehicle numbers, the past three decades have also seen significant changes in vehicle design - including materials used, size, shape and mass. And while it may seem the task of ensuring bridges comply with the new Standard is simply matter of 'swapping out' an existing barrier for a newer model with greater structural capacity to cater for larger and/or heavier vehicles, in reality, it is a far more complex challenge than it first appears.





## TOWARDS ZERO BRIDGE FATALITIES

### THE CHALLENGE

One of the main challenges is that most existing bridge decks have not been designed with the structural capacity to meet the needs of higher capacity, traditionally designed bridge traffic barriers.

The reason: transfer of impact energy.

Put simply, the energy of an impact into a traditional bridge traffic barrier affects more than just the traffic barrier itself. It flows through the barrier to the bridge deck and then the greater structure.

In many cases, the increase in load from the traffic barrier is too great for the bridge deck capacity, and the bridge deck will be damaged. Thus, the greater majority of existing bridges are unable to be fitted with higher capacity, traditionally designed barriers without first being fitted with additional reinforcement such as carbon fibre – an expensive solution in terms of both time and cost. In some instances, increasing the capacity of the traditional bridge traffic barrier would necessitate a complete replacement of the bridge deck.



## INNOVATION TOWARDS ZERO

### THE SOLUTION

The innovative solution to this common problem has come in the form of a bridge traffic barrier system developed by Belgian bridge engineer, David De Saedeleer, a director of Belgian manufacturer Desami.

Working with world-renowned FEA specialists Global Design Solutions (GDTech), Desami developed a ground-breaking design that restricts the energy from the vehicle impact to a fraction of the capacity of the bridge deck, resulting in a low load in the bridge deck.

Known as the DOLRE Low Stress Parapet System, this world-leading bridge traffic barrier system has been fully crash tested to European Standards and simulated to US MASH TL4 requirements, and has been Approved by ASBAP for use throughout Australia.

Ideal for bridge refurbishment projects, the DOLRE Low Stress Parapet System offers a cost-effective and easy to install method of upgrading existing bridges to meet the current Standard without the need for significant and expensive deck strengthening or deck replacement works. DOLRE also offers the added advantage of being easy to dismantle and remove in times of flood, thereby helping to significantly reduce the risk of damage to valuable bridge assets.



# DEVELOPMENT OF THE DOLRE BRIDGE TRAFFIC BARRIER IN EUROPE

Unlike its neighbours Germany, France and the Netherlands, Belgium was a relative late starter in the construction of motorways. Indeed, construction of Belgium's first motorway (Brussels to Antwerp) only started in 1971. This motorway construction was soon followed by a number of other projects, with expansion of the country's motorway network continuing at a rapid pace thereafter. This provided Belgians and their industrial powerhouse neighbours with routes across Belgium to markets, ports and the industrial hubs of Europe.

A significant number of bridges were built to service both motorways and byways in the 1970s and 80s. All of these bridges were required to be constructed with a standard parapet design known as the Mailleux parapet. The Mailleux design used weak posts that transferred low stresses to the bridge deck during an impact.

Following Belgium's decision to adopt the European standard for common testing and certification procedures for road restraint systems in 1989, the Mailleux parapet was doomed. The new European Standard EN1317.2 was first published 1998 and superseded some 12 years later by EN1317-2010.

Belgium's bridges had been struggling with the rapid changes in traffic since the

1970s. Higher traffic densities, higher speeds, and larger vehicles (particularly trucks) were all factors of concern. Belgium's engineers were struggling with the new requirements of EN1317. It was no longer the case that a single traffic barrier was mandated, it was now about designing barriers for containment - while at the same time preserving the bridge deck.

Belgium adopted the EN1317 H4b containment level for parapets on motorway bridges, and EN1317 H2 containment level for lesser bridges on truck routes. These new barrier designs created stress levels that old bridge decks could not accommodate, and costs to rehabilitate the bridge decks escalated.

In 2014, the Belgian government offered several large R&D grants, one of which was for research into roadside safety.

A partnership between local Belgian companies Desami and Global Design Technologies (aka "GDTEch") won one of the grants.

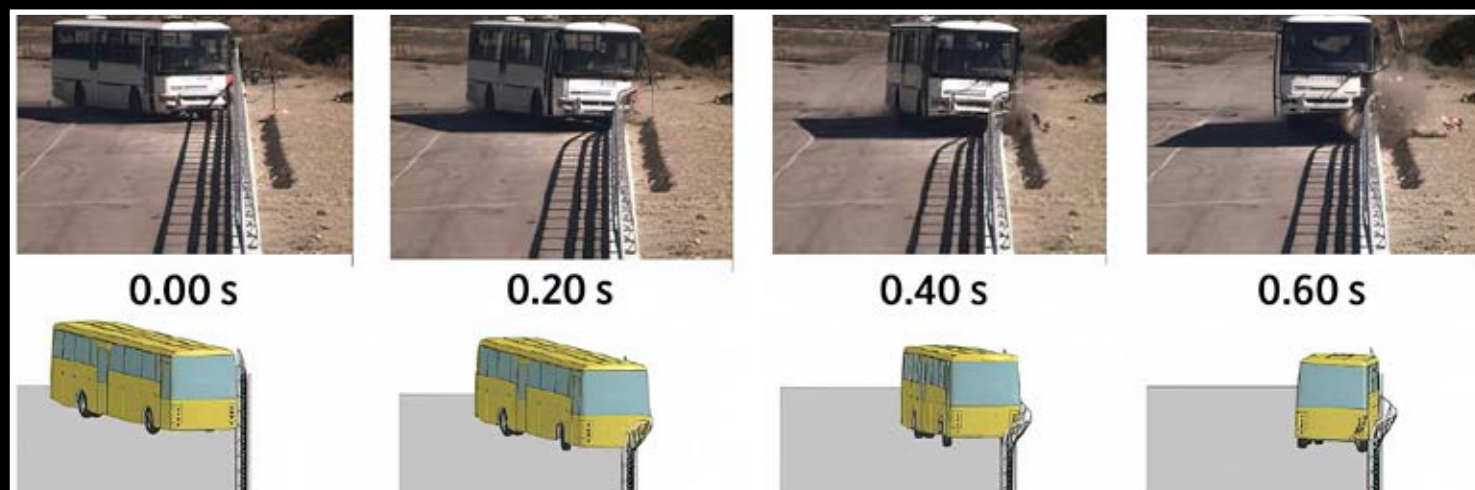
An iterative process utilising Finite Element analysis was utilised together with the relevant Eurocodes to design, refine and optimise a solution for the vehicle barriers on bridge decks to EN1317-2010 containment levels, without creating large stresses in the bridge decks.

With the resulting DOLRE barrier, the stresses transferred to the bridge deck during an impact are less than one third of the stresses created by a conventional barrier. Given the cost savings resulting from use of the DOLRE barrier for bridge refurbishment works, it is little wonder that Desami already has some 83 contracts either completed or in progress for bridge works in France and Belgium.



**ABOVE:** Use of the old style, non-tested, Mailleux parapet design ceased in Belgium following the introduction of the European Standard EN1317.2

**BELOW:** Engineering and numerical modelling was confirmed using full-scale crash tests, thereby allowing the product to be CE certified to the EN1317 Standard.





# TOWARDS COMPLIANCE OF THE DOLRE BRIDGE TRAFFIC BARRIER IN AUSTRALIA

The key to DOLRE's performance lies within the post, which is unique in both shape and purpose. The post is designed using computer algorithms to maximise the performance of the overall traffic barrier system. Not only is the post architecturally and aesthetically pleasing, it is also an efficient shape to support the rails. Most importantly, the post is extremely efficient in transferring a maximum transverse load, which is restricted to just 43kN per post for the DOLRE Regular performance parapet.

Another unique feature of the DOLRE Regular performance traffic barrier is the transition to MASH TL4 Thrie-Beam. This design feature provides an engineered continuity of MASH TL4 protection on either side of the DOLRE Regular traffic barrier.

Engineers recognise that conducting full-scale crash testing on a transition to every combination of product in the market would be a severe financial burden which ultimately would restrict the progress of safety in the industry. To counter this, it is becoming the norm to utilise virtual testing in conjunction with the dynamics observed in the full-scale crash tests of the products to assess the performance of transitions between products.

The DOLRE Regular transition has been assessed against both European EN1317 H2 impacts and US MASH TL4 impacts for transitions. In all cases, the transition was deemed to have met the assessment criteria for these impacts.

With the increasing reliance on virtual testing, there is also increasing importance on ensuring that the virtual tests are validated. Both Europe and America have standards for assessing the validity of a virtual test. The reference documents for validation are TR16303-2012 and NCHRP 179-2010 for Europe and the US respectively. DOLRE, being a European product, naturally had its virtual testing being validated against TR16303-2012, but as Australia uses the American MASH standard, these virtual tests also needed to be analysed using the NCHRP 179-2010 methodology. It may be noted that DOLRE is the first traffic barrier introduced to Australia to satisfy all of these criteria.

The virtual testing of the DOLRE products has been heavily scrutinised and accepted by ASBAP (Austroads Safety Barrier Assessment Panel). In all, a comprehensive suite of some 22 crash test reports or simulated test reports have been produced for the DOLRE Regular performance traffic barrier. These performance reports, together with other documents were submitted to ASBAP for assessment, with ASBAP subsequently recommending the DOLRE MASH TL4 traffic barrier for use to the six SRAs and the two territory road authorities.

As DOLRE is mainly focused on bridge applications, the next step was an independent structural assessment of the DOLRE traffic barrier against the requirements of the AS5100:2017 bridge standard. The entire package of reports and documents on the DOLRE low stress parapet has been analysed by independent specialist bridge structural engineers. Again, DOLRE has been assessed as complying with the requirements of AS5100:2017.

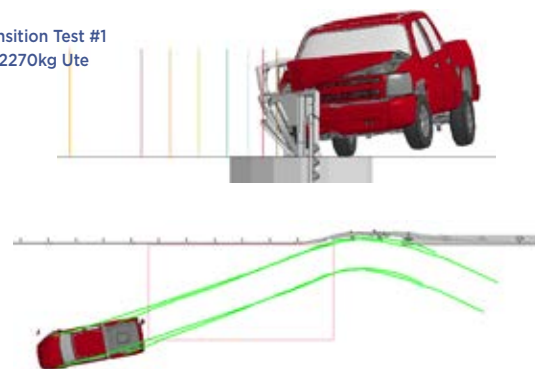
DOLRE is an innovative product in a niche market for bridge refurbishment. In Australia, DOLRE complies with Australian standards AS/NZS3845:2015 and AS5100:2017, has been ASBAP approved, and has been independently approved by two consulting bridge engineers.

The DOLRE Low Stress Parapet System now available throughout Australia and New Zealand exclusively from road safety systems and engineering specialists LB Australia Pty Ltd.

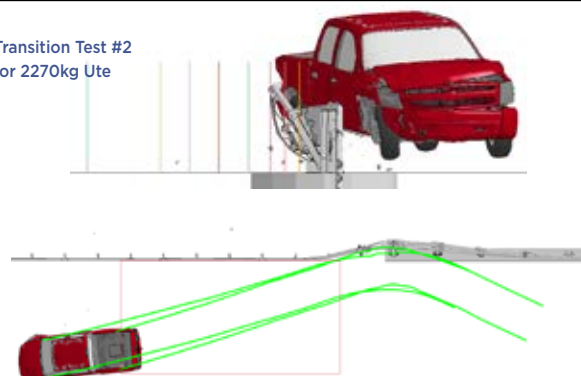
**For further information, contact LB Australia Pty Ltd, Ph: 1300 522 878 or Email: [roadsafety@lbaustralia.com.au](mailto:roadsafety@lbaustralia.com.au)**



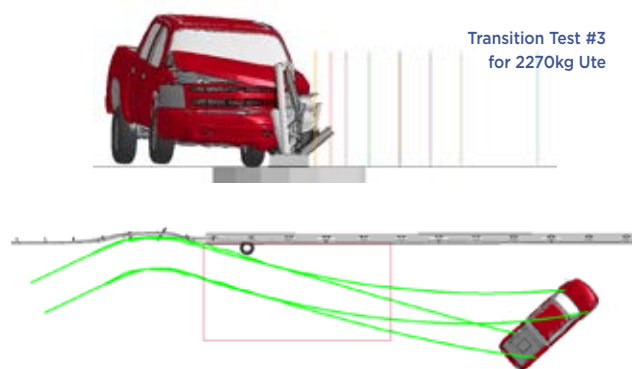
Transition Test #1  
for 2270kg Ute



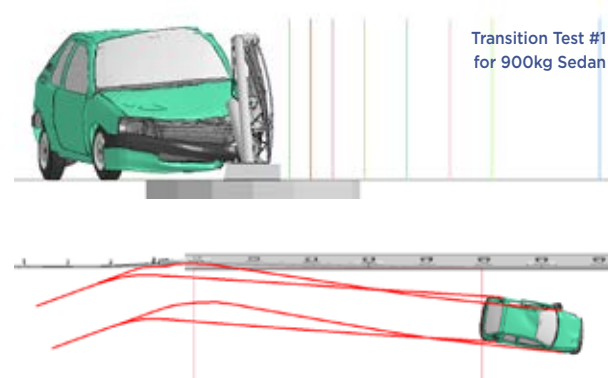
Transition Test #2  
for 2270kg Ute



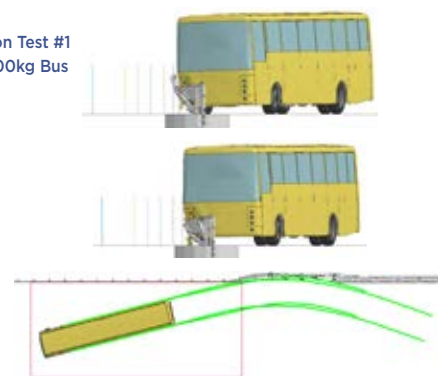
Transition Test #3  
for 2270kg Ute



Transition Test #1  
for 900kg Sedan



Transition Test #1  
for 13,000kg Bus



# THE ACRS DIFFERENCE

## ✓ Independent

ACRS is a steel certification scheme for steel users, and independent of product suppliers. So you know ACRS is working for you;

## ✓ Expert

All ACRS auditors and technical staff are qualified and experienced in the manufacture of the materials ACRS certifies. So with ACRS you know certified materials have been audited and approved by people who understand them;

## ✓ 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

During every audit, ACRS takes samples at random from standard production and checks production data every three-months. So with ACRS you know supplied materials are assessed regularly;

## ✓ Continuous

ACRS uses only selected laboratories to ensure accurate results independent of the supplier, and matches these with the supplier's production data to monitor the supplier's consistency.



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ACRS - Independent, Expert Third Party Certification & Verification of Reinforcing, Prestressing and Structural Steels for Compliance with Australian and New Zealand Standards





## 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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**mainmark**

# CRASHWORTHINESS RULES HAVE CHANGED...

## DO YOUR CRASH CUSHIONS COMPLY?

The new rules requiring MASH tested & approved crash cushions came into effect across Australia on January 1st, 2020



In accordance with the Austroads / ASBAP 'Transition to MASH' process, crash cushions installed on Australian roads are now required to be tested and approved under the AASHTO MASH guidelines, rather than the superseded NCHRP350 guidelines.

Both the **SMART CUSHION SC100** and **SMART CUSHION SC70** have been successfully tested to MASH-2016 Standards, with both models **ASSESSED, APPROVED & RECOMMENDED FOR ACCEPTANCE** throughout Australia by ASBAP (Austroads Safety Barrier Assessment Panel).

SMART CUSHION speed dependent crash attenuators have been used in the USA for almost two decades and in Australia for over 5 years – delivering outstanding life-saving performance and significant savings on repair costs in many thousands of impacts.

# SMART CUSHION

**Speed Dependent Crash Attenuators**



# SMART CUSHION

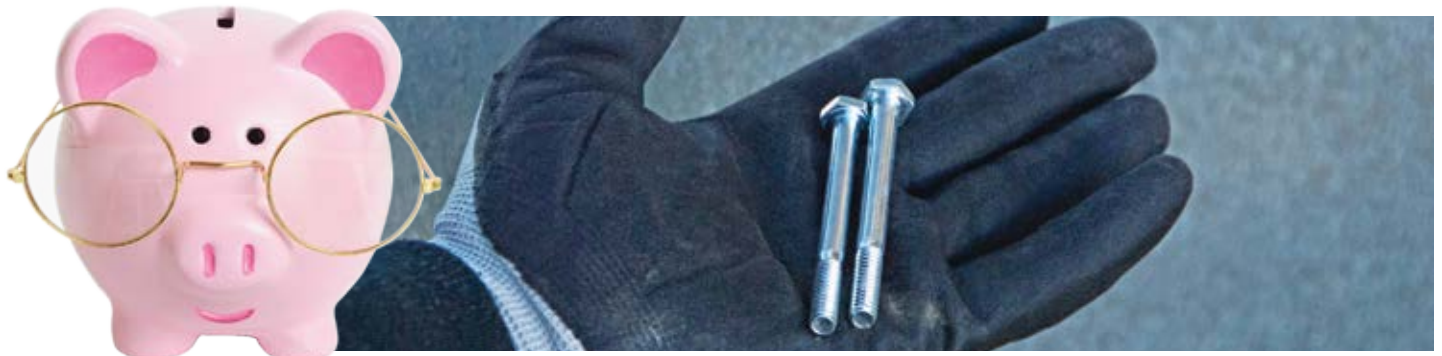
## Speed Dependent Crash Attenuators

### MASH TESTED & APPROVED



**SAVE TIME...**

For most impacts up to 100km/h (by vehicles up to 2,270kg) the SMART CUSHION can usually be repaired and reinstated into service in under 60 minutes.



**SAVE MONEY...**

In 90% of all impacts in Australia, the only spare structural parts needed for repairs are 2 shear pins (COST <\$5). After 59 impacts in Australia, the average cost for each reset was \$169.



**SAVE LIVES...**

After more than 20 years of successful service internationally and over 5 years successful service in Australia, SMART CUSHION has been directly credited with saving numerous lives and significantly reducing the severity of injuries in literally thousands of impacts.



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# ACRS 2021 CERTIFICATES ARE ONLINE WITH SOME IMPORTANT CHANGES

Philip Sanders, Executive Director, ACRS



While 2020 has been a year we would all like to move on from, the effects of the last year have created some perverse effects we all need to be aware of and manage. Together with the pain and disruption to all our lives from the pandemic, most businesses have been severely impacted - few more so than steel traders and suppliers, and steel certifiers due to highly globalised supply chains and associated implications for continued effective verification of product conformance in Australia and New Zealand.

As many of you would have read in previous ACRS features, a number of new Standards were released during 2019 and 2020, some suppliers left the local market whilst others entered, and numerous projects have found that their basic assumption that materials specified and purchased would consistently meet the required standards and specifications have been severely challenged - including that materials would be supplied to projects under ACRS certification, as required.

Additionally, and separately, the ACRS traceability scheme supports and enhances ACRS product scheme certification, but care still needs to be taken in a more volatile and changeable supply environment.

This article covers some important recent developments in construction steels and steel supply, and some adjustments and additions to ACRS certification to reflect the new realities and provide continued confidence that materials supplied meet Standards, including:

- Further developments in the certification of AS 4671:2019 for steel reinforcing materials;
- ACRS accreditation to AS 4100:2020 Steel Structures complementing ACRS longstanding JAS-ANZ accredited certification of welded sections to AS/NZS 3679.2 2016 *Welded I-Sections* and AS/NZS 5131: 2016 *Steelwork Fabrication*;
- Traceability concerns and use of ACRS certification to effectively manage materials traceability (and awareness of misstatements regarding ACRS certification to avoid effective scrutiny of supply of affected materials), and resultingly;
- Changes to ACRS certification and practice (particularly rebar processing and structural welded sections fabrication) to assist steel customers easily confirm the unbroken chain of ACRS certification required to verify only ACRS certified materials have been supplied.

## ACRS Certified Steel Reinforcing Materials – Manufacture and Processing

The recent release of AS/NZS 4671:2019 and its product requirements initially caused some confusion in the marketplace - particularly whether the 2001 edition of AS/NZS 4671 remains valid, or whether the 2019 edition must apply to any supply delivered under ACRS certification. A transition period of 2 years is currently operating, and suppliers are progressively moving to the new Edition.

ACRS early JAS-ANZ accreditation to certify to both AS/NZS 4671:2001 and AS/NZS 4671:2019 has continued to assist suppliers, building surveyors, government departments and consumers retain confidence in the uninterrupted supply of compliant materials. ACRS is continuing to issue certificates to AS/NZS 4671:2001 and seamlessly update suppliers to AS/NZS 4671:2019 as they complete their transition.







## ACRS Certified Structural Steel – Manufacture and Fabrication: An Integrated 2-Stage System

AS 4100:2020 *Steel Structures* was released in August 2020 with ACRS JAS-ANZ accredited to include this new edition in certification from November, providing an important link with ACRS existing JAS-ANZ accredited certification of structural welded sections to AS/NZS 5131:2016 *Structural Steelwork Fabrication*.

With this latest extension to our accreditation, ACRS provides certification across all the necessary standards and government specifications forcibly ending the false claims by some parties that ACRS certification of structural welded fabricated sections does not cover AS/NZS 5131, leaving customers and government departments without their expected coverage by ACRS certification, with consequent contract problems when this was discovered.

As with steel reinforcing materials manufacture and any subsequent processing or fabrication, ACRS certification of both **Stage 1 - Manufactured Product** and **Stage 2 - Fabricated Product** (structural welded sections) remains a requirement. Any break in the chain of certification renders the materials uncertified, and materials conformity and compliance to regulations must be demonstrated by other means and approved by the appropriate decisions making body. If you have any questions about:

- a) the ACRS integrated 2-stage process, or
- b) questions about the ACRS chain of certification, or
- c) where ACRS certification is required and you are told that ACRS does not certify structural welded sections to AS/NZS 5131,

please contact ACRS directly on T: +61 (0)2 9965 7216 or E: [info@steelcertification.com](mailto:info@steelcertification.com)



### ACRS Certified Traceability

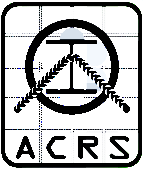
ACRS certification covers traceability between *Stage 1 (Manufactured Product)* certificate holders and *Stage 2 (Fabricated Product, e.g. processed rebar, steel mesh, and welded structural sections)* certificate holders.

Separately, the standalone ACRS traceability scheme provides an additional, complementary assessment and verification system for non-producers and intermediaries in the increasingly complex steel supply chain.

*ACRS Traceability Certification*, derived from long-established European best practice, showed its value in both prestressing strand and structural sections supply in Australia and New Zealand during 2020. For example, in prestressing supply, ACRS certification and associated

ACRS services to stakeholders assisted a longstanding and valued international supplier maintain its supply to both infrastructure and commercial projects.

In other cases, the break in ACRS chain of certification between *ACRS Stage 1* and *ACRS Stage 2* or *ACRS Traceability Certification* alerted engineers, builders and government authorities to structural steels supply breaching purchase and supply conditions. Whilst ACRS has worked with affected parties on several such incidences, regrettably from January 2021 - due to the sheer increase in these incidences during 2020 and the resulting demand on ACRS resources - ACRS will be unable to provide comment and assistance for parties not holding the necessary ACRS certifications.







## Important ACRS Certificate Wording Updates: January 2021

To assist users of ACRS certificates more clearly understand the scope of each certificate there have been some significant wording changes this year that you should be aware of.

For the various Manufactured Product categories, wording will be similar to:

*"Products listed on this Manufactured Product certificate may be relied upon as having the benefit of ACRS Product Scheme certification after any subsequent processing only where cut, or bent, or welded by an ACRS certified processor. For Approval of processed reinforcing bar, refer to the bar processor's ACRS Fabricated Product certificate."*

*For the various Fabricated Product categories, the new certificate wording will be similar to:*

*"Products listed on this ACRS Fabricated Product certificate may only be relied upon as having the benefit of ACRS Product Scheme certification where fabricated from appropriate Approved Materials manufactured by an ACRS certified Manufacturer with the appropriate Scope of Certification."*

It is therefore a very important part of your risk management process that you ensure you receive an unbroken chain of certification for both the steel manufacturer(s) and the steel processor(s) or fabricator(s).

For further information or enquires please contact ACRS at: [info@steelcertification.com](mailto:info@steelcertification.com) or phone: +61 (0)2 9965 7216

## Takeaways:

- 1) Always obtain the ACRS certification from all the sources of steel supply, both manufactured steels and processed/fabricated steels. Where necessary, also demand the **ACRS Traceability Scheme Certification** from your trader or steel stockist to ensure the steel is traceable to origin and the correct standard of supply;
- 2) Check the scope of each certificate to be sure that what you have ordered is what you have received, and importantly;
- 3) Remember, "ACRS certification" of fabricated materials has always covered more than the just the mill of manufacture: **You need an unbroken chain of ACRS certification from source to site.** Therefore, you must have the appropriate ACRS Stage 2 certification from the rebar processor, mesh manufacturer, or structural welded section fabricator, for those materials to be ACRS certified – not just the ACRS certificate of the mill of origin from which the processor or fabricator sourced their basic steel.

**If you don't confirm this, you could be in trouble – as so many projects unfortunately discovered during 2020.**





## LEICA GEOSYSTEMS AND DOOSAN ANNOUNCE NEW LEICA-READY KIT FOR FACTORY FITTING

Leica Geosystems, part of Hexagon, and Doosan, a global industry leader in the engineering, manufacturing and marketing of compact and heavy construction equipment, have announced the release of a new Leica-ready factory kit for the Doosan DX255LC-5 excavator with the new semi-automated excavator functionality.

Leica Geosystems is continuously working on solutions to provide easy-to-use tools that will help contractors increase uptime, efficiency and safety by automating specific functions. Automating excavators, for example, will increase productivity, accuracy and decrease operator fatigue and fuel consumption.

"The automation journey into several areas in earthmoving equipment has been an active area of research and development over the past three decades in the industry," said Magnus Thibblin, Leica Geosystems Machine Control President.

"Starting with the world's first string-less paving solution, to 3D GNSS automatic dozer solutions, Leica Geosystems has been driving the change in the heavy construction industry," Mr Thibblin said.

With this in mind, Leica Geosystems introduced semi-automatic functionality for excavators which offers part or full automation of the boom, bucket, tilt bucket or tilt rotator.

Together with other automated features such as *iXE CoPilot* and *Automatic Tool Recognition*, operators are able to work with less fatigue and higher working comfort which can minimise over digging and reduced operational costs.

"Today we can offer semi-automatic systems for excavators, including tilt and tilt rotator bucket automation, *Automatic Tool Recognition* and *CoPilot* functions to help operators working with less fatigue and in higher comfort," Mr Thibblin said.

"The new semi-automatic functionality for excavators enables the operator to execute complex tasks, reduce manual controls, increase productivity, speed and accuracy of the work, even for less experienced operators, resulting in less over digging and reduced operational costs," he added.

### 2D and 3D machine control ready kit with semi-auto functionality

To meet the increasing demand for machine guidance systems from excavator customers, Doosan is introducing a new ready kit for the Leica iXE2 2D and iXE3 3D excavator machine control solution, which enables tilt bucket or tilt rotator automation for Doosan's popular DX255LC-5 25.5 tonne crawler excavator.

Thanks to the collaboration between Doosan and Leica Geosystems, the new factory kit enables customers to order Doosan's wheeled and crawler excavators pre-configured to be ready for the installation of Leica 2D and 3D machine control systems. Also, the Leica-ready kit includes all the components needed to install the new semi-automatic functionality for the DX255LC-5 excavator directly from Doosan's factory through Doosan Smart Solutions.

"Under our motto of '*Powered by Innovation*', Doosan is keen on expanding our smart solution offerings," said says Charlie Hyunchul Park, Doosan Europe CEO.

"I am glad that our close partnership with Leica Geosystems, a leading innovator in smart construction, resulted in the new ready kit for the Leica 2D and 3D machine control systems, which surely will help our customers achieve better productivity and job efficiency," Hyunchul Park added.

The kits include all the components (main brackets, wires and sensors) required to make sure an equipment is ready for the installation of the machine control solution and the semi-auto functionality, which gives customers the flexibility to install the complete system at a later date.

The Leica-ready kit is fitted on customer machines in the Doosan Customization Centre in Belgium. As a result, lead times on machines can be reduced and the process also lowers workload. It is even possible to modify existing orders up to just a few days before the machines are shipped to the customer.

### Benefits of using machine control for excavators

Machine guidance systems give operators easy access to design surfaces, grades and alignments on a display inside the excavator cab. The systems use GNSS, GPS, laser, sonic or total station technology to accurately position the blade or bucket in real time, which is designed to significantly reduce material overages and improve the contractor's productivity and efficiency.

The site plan and grade information can be displayed in the cab, allowing operators to complete jobs faster with minimal supervision, obtaining higher precision finishing with a reduced number of passes.



# THE CHOICE IS YOURS!

RANGE OF MODELS  
**IN STOCK  
NOW**

SET UP &  
READY TO GO



At A1 Roadlines we understand that our customers have a range of preferences when it comes to fleet vehicles. That's why we fit and service the Scorpion II TMA across a full range of suitable host vehicles from world-leading manufacturers including **ISUZU**, **UD**, **FUSO** and **HINO** to name a few.

So, when it comes to selecting a fully MASH tested, passed and eligible TMA that has also been **ASSESSED, APPROVED & RECOMMENDED FOR ACCEPTANCE** throughout Australia by ASBAP (Austroads Safety Barrier Assessment Panel), the only name you need to remember is **Scorpion II® TMA** from **A1 Roadlines**. When it comes to the brand of host vehicle... that's up to you!



**THE EQUIPMENT YOU NEED – THE SERVICE YOU EXPECT**

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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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## CONSTRUCTION SITE AND QUARRY PUMPS – DRY PRIME OR WET PRIME

Pumps play a massive role in the construction industry. They are indispensable in keeping quarries dry enough to be able to operate. Imagine if concrete batch plants had to shut down every time a quarry was full of water after a cloud burst.

One Australian company, Aussie Pump, has done a lot to develop wet prime pumps in what has traditionally been a dry prime pump application.

Most dewatering applications involve some solids handling and the ability to move large amounts of potentially contaminated water. When you need to move water fast, most operators use diesel drive pumps. Nothing about that is new, and dry prime pumps by companies like Pioneer, Sykes and Cornell have all played a major role in keeping sites dry and operational.

However, those dry prime pumps, with their essential priming devices have their vulnerabilities.

Vacuum or compressor assist has potential for breakdown, particularly with corrosive or silty water.

Aussie Pump Industries started out developing a range of first world self-priming centrifugal trash pumps from 2" through to

4". They realised that many of the dry prime pump applications could be better served by big simple self-priming trash pumps without complicated priming devices.

Aussie Pumps' Chief Engineer listened to Site Engineers and Quarry Operators about the real requirements of the job.

"Basically, it was about reliability and moving lots of dirty water with no fuss or breakdowns" said John Hales.

### THE SELF PRIMING PROCESS

What makes the Aussie Pumps option so attractive, is the simplicity of the pump design. That is, a non-clog style, open impeller, designed to handle slurry and solids.

Integrating a huge tank in the pump's body enables it to hold the liquid required for priming. On the suction inlet, there's a check valve that stops the water in the pump from escaping when the pump is primed.

There are three simple steps to follow:

1. **To prime the pump, the operator fills the pump body with water. It is held inside the body by the check valve in the suction port.**
2. **When the operator starts the engine, the water in the body is expelled through the delivery port.**

3. **The vacuum created within the pump bowl, opens the check valve, and the water is drawn up through a suction line like drinking through a straw.**

There are no mechanical priming aids required.

The other major difference in design to dry prime pumps, is the front opening port. Being able to open the pump's body in the event of a choke of any kind, means the bowl can be cleared of debris in a matter of minutes, without disturbing the suction or delivery hoses.

Although the company started out with 2" trash pumps, with the Honda petrol engines, they quickly moved to diesel engines and increased the range to 3" and 4" products.

"We still weren't pumping water fast enough and had to move to a 6" pump, winding up with a design for a pump that will move 6,000lpm", said Hales.

The pump will draw water from a 7.6m vertical lift, without ancillary priming devices, produce a head of 46m, and can handle solids to 3". For a long, trouble-free life, it is fitted with an oil lubricated tungsten titanium carbide seal. The shock mounted control panel in a water-resistant housing includes an hour meter, ammeter, tachometer and alternator.





**Left:** Aussie Pumps build the big 6" Quarry pumps at their Castle Hill works in suburban Sydney.

**Above:** Aussie Pumps' Chief Engineer, John Hales inspects a production run of the big Aussie wet prime pumps.

***"Known as the MQ600TD, the big 6" pump is powered by a 80hp Deutz air cooled diesel engine. It is built into the skid with a 152-litre fuel tank that facilitates 11 hours of continuous running."***

Known as the MQ600TD, the big 6" pump is powered by a 80hp Deutz air cooled diesel engine. It is built into the skid with a 152-litre fuel tank that facilitates 11 hours of continuous running. The machine also comes with an integrated lifting bar and a super heavy-duty skid. It can also be configured into a robust site trailer for easy movement where required.

"You get a lot of pump for the money, but all this capacity, including the big 80hp diesel, weighs in at just under a tonne" said Hales.

The Deutz engine is fitted with engine protection and the Lofa DL240 controller. Low oil pressure, high oil temperature and v-belt failure shutdown are all incorporated in the protection kit.

Major mines and quarries are moving to wet prime Aussie Pumps with the company now planning an 8" "Guzzler" that will move dirty water at up to 9,000 lpm!

Further is available from: [www.aussiepumps.com.au](http://www.aussiepumps.com.au)

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# AUSSIE MOTORISTS SHUN BIOFUELS AGAINST WORLD TREND AS LOCAL SUPPLY TIGHTENS AND GROWTH INCENTIVES FAIL

As Australian motorists continue to shun the use of ethanol in their fuel, and combined with the impact of COVID on all petrol type sales, demand for biofuels declined in 2019-20.

Pre-COVID, Australia's little-changed biofuel production is at odds with the growing overseas experience where biofuel production (more so biodiesel) continued to increase in 2019, year on year.

The findings are contained in the latest *Annual National Biofuels Overview* by APAC Biofuel Consultants, a joint venture between consultancies, EnergyQuest and Ecco Consulting.

APAC found that while COVID impacts contributed to an easing in biofuel use, and all fuels generally, the drop in motorists' buying confidence was underpinned in the main by continuing consumer aversion to ethanol blended fuel - also called E10 - a blend of 10% ethanol with 90% petrol.

Exacerbating the domestic biofuel challenge mid this year was the closure of United Petroleum's Dalby Bio-Refinery in Queensland, dealing a major blow to the country's ethanol industry and regional development, despite considerable government assistance to stay open.

This left national ethanol production capacity relying on two refinery sites - the same scenario as far back as 2008, albeit now each with higher capacities.

The latest report did note, however, that biodiesel supply and demand picked up a little in 2019-20 following the recommissioning of Australia's largest biodiesel plant in mid-2019.

Overall, Australian biofuel (fuel ethanol and biodiesel) demand declined 3.8% in 2019-20 year-on-year, to 249 Megalitres (ML), representing only about 0.4% (by volume) of Australia's transport liquid and gaseous fuel consumption.

The 2020 statutory reviews of each the NSW and Queensland biofuel mandates acknowledged that both had failed to meet targets for ethanol and biodiesel and yet no major change has been recommended for either mandate.

APAC Joint Chief Executive, Mr Michael Cochran, said Federal excise/customs duty support for biofuels, the essence of which has been in place since the early 2000s, had failed to encourage new sustainable investment in the industry over the past decade.

"Australia is also a key supplier of feedstocks to the international biodiesel industry," Mr Cochran said.

"Overseas, new biofuel investment is now focusing on renewable diesel and aviation jet 'drop-in' fuel production as a direct substitute for some fossil fuels, with ethanol taking second place."

"This at a time, biofuels in Australia are facing new technological competition from other forms of renewable and emission reduction investment across such fields as hydrogen, solar and electric vehicles," Mr Cochran said.

"So, we are at a point the industry needs to regroup and replace outdated current policies with new initiatives delivering a biofuel future for Australia."

"The current development of the Bioenergy Roadmap offers a unique opportunity for the Federal Government to review Australian biofuel support schemes."

## Production Infrastructure

The closure this year of the Dalby Bio-Refinery took 76ML (17%) of aggregate production capacity out of national supply. Seeking alternative investments to fuel grade ethanol production, Manildra has recently reconfigured its 300ML capacity refinery at Bomaderry, in NSW, to produce pharmaceutical and beverage grade ethanol, but maintaining flexibility to produce fuel ethanol.

Biodiesel, the other key 'biofuel' produced in Australia, is blended (up to 20%) with mineral diesel and has partly recovered from an industry collapse in 2016. The biodiesel market in Australia remains very small.





**“Overall, Australian biofuel (fuel ethanol and biodiesel) demand declined 3.8% in 2019-20 year-on-year, to 249 Megalitres (ML), representing only about 0.4% (by volume) of Australia’s transport liquid and gaseous fuel consumption.”**

APAC estimates biodiesel production in 2019-20 reached about 45ML, up from 15ML in 2018-19. Of that production, about 11ML was directed to the more profitable export market (Europe). The increase in biodiesel production, year on year, was due to recommissioning of the Barnawartha biodiesel plant in mid-2019 by Just Biodiesel.

### Biofuel Mandates

When it comes to Biofuel Mandates (ethanol and biodiesel), Queensland and NSW, the only States which have ethanol and biodiesel mandates, command about 85% of the national E10 market. In both cases, motorists have a choice of fuel grades. On biodiesel, NSW has a mandate of 2% of total diesel sales and Queensland a 0.5% mandate. NSW achieved almost 0% of its targets since 2016, with Queensland faring marginally better with 0.2% target achievement over the past 12 months.

Ethanol sales in NSW over the past few years have been around 2.6% of its total petrol market, failing to reach its 6% mandated target. Queensland has also fallen short of its 4.0% target of regular unleaded petrol sales, set in 2018. In 2019 (pre COVID-19), Queensland ethanol sales hovered between 2.5% and 3.0%.

Victoria (including very small volumes from other States) without a mandate, commanded the other 15% market share in 2019-20. More aggressive marketing has lifted E10 consumption in Victoria over the past four years but the Dalby closure, APAC says, will probably see a decline in E10 sales in that State.

The APAC report found that despite Federal assistance which gives ethanol and biodiesel produced and sold into the Australian market, an excise advantage of 28.4cpl and biodiesel a 35.25cpl advantage over petrol and diesel excises respectively, the continual shrinking of the industry over the past decade is testament to the failure of this now outdated policy in Australia.

### Feedstocks

Subject to seasonality and price, Australia has surplus feedstock to meet the capacities of both ethanol and biodiesel production facilities. Indeed, Australia has become a major supplier of feedstocks to international bio-based diesel producers in Europe, Singapore and the US. In 2018, Australia exported sufficient feedstock into the international bio/renewable diesel market to produce in excess of 1,000ML of biodiesel/ renewable diesel – begging the question of the lost value-adding opportunity for Australian industry.

Feedstock price is generally the key cost component in the greenfield manufacture of biodiesel and ethanol in Australia. In 2019-

20, the lower price of crude oil combined with the high price of vegetable oil and fat feedstocks, yielded negative refining margins in some cases. Thus, local biodiesel producers chose to export into the better subsidised European markets.

### Future Directions

APAC found that sustainable aviation jet fuel (SAJF) is continuing to penetrate the global aviation jet fuel market to meet greenhouse emission and sustainability goals. Virgin and Qantas have both trialled US-produced SAJF over the past three years for domestic and international flights. Late last year, Qantas reiterated its intention of using technology and SAJF to reach zero carbon emissions by 2050 – but Australia could do more in this R&D space.

There is also increased interest in ‘advanced biofuels’ worldwide with a focus on producing higher quality bio middle distillates which have the advantage of being ‘drop in’ fuels with a wider market application.

The Queensland Government is one state implementing a program promoting biofutures with its recently announced *Waste to Biofutures* alliance with Gevo (a USA SAJF producer) and Australian refiner, Viva Energy.

Northern Oil Refining, Queensland, which is pioneering the refining of renewable diesel fuel made from waste plastic, old vehicle tyres and agriculture is one of the three or four advance biofuel pilot projects in Australia.

For further information, please contact APAC Biofuel Consultants, T: 08 8431 7903



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# itsaustralia

Intelligent Transport Systems

## ITS SPECIAL FEATURE

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News and Feature Articles



# NEW RESEARCH REVEALS CONNECTED 'TALKING' CARS COULD SAVE LIVES ON VICTORIAN ROADS

Cutting-edge digital communication technologies allowing cars to intelligently interpret their surroundings and alert drivers to potential hazards could reduce vehicle crashes by up to 78%, new research from the University of Melbourne has revealed.

This research - funded by the iMOVE Cooperative Research Centre, University of Melbourne, the Department of Infrastructure, Transport, Regional Development and Communications, and ITS Australia with support from IAG, Intelmatics and Transmax - has the potential to dramatically reduce trauma and the road toll.

The eight-month project involved a comprehensive analysis of Victorian traffic accident data from 2006-2019 and state-of-the-art traffic micro-simulation studies from within the Australian Integrated Multimodal Ecosystem (AIMES).

Researchers focused on understanding cooperative intelligent transport system (C-ITS) technologies that would help drivers in eight main ways including: lane guidance, curve speed, collision avoidance, do not pass and blind spot warnings, intersection movement and right turn assistance, plus pedestrian safety messages.

Professor Majid Sarvi, Lead of Transport Technologies at the University of Melbourne said:

"Our analysis of Victorian Road Safety data shows that with eight significant connected safety focuses, we have the ability to reduce the incidence of crashes by up to 78% and make vehicle transport safer for all road users."

Professor Sarvi's team of researchers including Dr Neema Nassir and Dr Patricia Sauri Lavieri found that curve speed warnings could have the most significant impact in rural areas. 52% of all fatal

accidents occurred in rural Victoria, compared to 37% of all fatal crashes occurring in urban areas of Melbourne.

Motorcyclists stand to derive the most benefit from curve warnings, as curve speed was a factor in 17% of crashes involving motorbikes, data shows.

C-ITS vehicle adaptations include cameras, ultrasonic or wireless sensors, antennas, 3D HD mapping capabilities, GPS, and Lidar which is a light pulsing laser device to accurately measure distances.

Professor Sarvi suggested that some technologies would become standard in new cars off the production line, while older vehicles could be retrofitted with aftermarket hardware.

## OLDER VEHICLES INVOLVED IN FATAL CRASHES FOUR TIMES MORE FREQUENTLY THAN NEWER CARS

Data from ANCAP included as part of the overall study shows the oldest vehicles (built in 2001 or earlier) on Australian roads accounted for just 20% of the total national vehicle fleet but were over-represented in fatal crash data.

"1 in 5 cars on Victorian roads are considered older, but they are involved in 36% of all fatal crashes. By contrast, newer vehicles [built between 2012-2017] make up 31% of road vehicles but are involved in just 12% of fatal crashes," Professor Sarvi said.

The rate of fatal crashes per registered vehicle for oldest vehicles was four times higher than that of newer vehicles.

## IMPROVING MELBOURNE'S CBD TRAFFIC CONGESTION WITH CONNECTED VEHICLES

Traffic micro-simulation experiments were conducted in Melbourne's arterial corridors within AIMES. Researchers concluded that if

just 30% of all vehicles on the roads during peak hour were connected vehicles, traffic congestion could be driven down by up to 11%.

A separate network micro-simulation in Melbourne's CBD during peak hour (pre-COVID-19) found that average travel speeds could improve by up to 10% if a fifth of cars were connected vehicles.







## WHAT WORKS FOR VICTORIA WORKS FOR AUSTRALIA

While this study honed in on 15 years' worth of Victorian crash data, the findings are broadly applicable to other jurisdictions across the country where similar C-ITS uptake has the potential to reduce crashes, save lives and improve travel times.

## INDUSTRY STAKEHOLDERS RED FLAG DRIVER FATIGUE AND RAIL CROSSINGS

Professor Sarvi's research team's interviews with industry stakeholders revealed common

challenges across the transport sector. These include driver fatigue for fleet operations, rail crossing safety, cross traffic, overhead bridge heights and extreme weather events.

Stakeholders broadly agreed that significant standardisation and regulation is needed, along with a unified national approach toward C-ITS communications adoption.

It is estimated to take anywhere from a few years to a few decades for safety enhancing technologies to be commonplace in vehicles, hinging on broad support from government and car manufacturers.

Speaking about the research, iMOVE Managing Director Ian Christensen said:

"C-ITS is a technology whose time has arrived, and based on research not only by our research partners in Australia but all around the world we know lives will be saved if this technology is implemented widely."

"Making the adoption of C-ITS a national priority will bring major social and economic benefits, and lead to greater transport efficiency and, most importantly, increased safety," he said.

ITS Australia CEO Susan Harris said, "This research shows the vital importance of transport technologies in both reducing road trauma and improving our transport networks."

"Supporting the deployment of these road safety and efficiency technologies is a key issue for ITS Australia and our members," Ms Harris added.

The research white paper and supporting research documentation are available to read online at: <https://its-australia.com.au/connectivity-in-c-its-final-report/>

## ABOUT IMOVE

iMOVE is the national centre for collaborative R&D in transport and mobility. It facilitates, supports and co-funds research projects that improve the way people and goods move in Australia. It has 44 industry, government and academic partners and has over 50 projects completed or currently underway in a broad range of transport areas.

To find out more visit: <https://imoveaustralia.com/>

## ABOUT ITS AUSTRALIA

ITS Australia is the peak group representing over 120 public and private organisations delivering on transport solutions and technology improving Australia's road and transport networks and promotes the development and deployment of advanced technologies to deliver safer, more efficient and sustainable transport across all public and private modes – air, sea, road and rail.

To find out more visit: <https://its-australia.com.au/>

## ABOUT THE AUSTRALIAN INTEGRATED MULTIMODAL ECOSYSTEM (AIMES)

AIMES is a University of Melbourne-led collaboration bringing together industry, government and research partners to improve safety, mobility, sustainability and liveability for the community. The establishment of a world-first ecosystem in Melbourne sees the largest ever inner-city grid of streets mapped with smart sensors. The sensors monitor real-time flow of vehicles, cyclists, pedestrians and public transport.

AIMES will deliver an integrated, connected and multimodal approach to transport management, especially as we compete with burgeoning population growth and increased pressure on city mobility.

To find out more visit: [industry.eng.unimelb.edu.au/AIMES](https://industry.eng.unimelb.edu.au/AIMES)





# ITS Australia National Awards 2020

## 2020 ITS AUSTRALIA NATIONAL AWARD WINNERS ANNOUNCED

Australia's Intelligent Transport Systems (ITS) industry came together in late November across the country to celebrate the eleventh year of the *ITS Australia National Awards*. The Awards, which were broadcast online due to Covid restrictions, recognise the outstanding projects and people that have advanced Australian transport technology throughout the year.

Recognising professional ITS expertise and excellence, the awards raise awareness across all levels of government and community about the benefits of ITS technology to Australian people, cities and communities, the economy, environment, and transportation.

"Each year, I am increasingly impressed by the breadth of work and accomplishments of ITS Australia's Award winners. That this year's award-winning work was completed in spite of the tremendous challenges that 2020 has posed is even more impressive," said Dean Zabrieszsch, ITS Australia President.

"Our 2020 nominees and winners demonstrate the excellence and innovation that makes our industry a world leader. I congratulate them all."

This year's recipient of the **Max Lay Lifetime Achievement Award** is Dr Peter Sweatman. Throughout his 30-year career, Dr Sweatman has driven global innovation in transportation research and the application of R&D. In the United States he was a cofounding principal of CAVita LLC, a trusted connected and automated vehicle ecosystem partner for government, industry and academia.

Dr Sweatman is also the former director of the University of *Michigan Transportation Research Institute* (UMTRI) (2004 - 2015), and the founder and former director of the *Michigan Mobility Transformation Center* (MTC) (2013 - 2016).

Now returned to his native Australia, Dr Sweatman has joined the University of Melbourne as International Enterprise Professor with the AIMES testbed.

The **2020 Young Professional Award** resulted in a tie between Abdulmalik Alyousfi of Transurban and Azadeh Emami of The University of Melbourne.

"It was truly thrilling to be nominated for this award given the quality of the young professionals shortlisted. You realise what amazing potential the ITS field has to make a positive difference in the world when you see the calibre of your peers", said Mr Alyousfi.

As part of the Award, ITS Australia will sponsor both winners to attend the 17th ITS Asia Pacific Forum, which will be held in Brisbane in April. The event will bring an expected cohort of 1,500 industry professionals from across the Asia Pacific region to Queensland and Mr Alyousfi and Ms Emami will join their peers to participate in a robust program of conference sessions, technical tours, and demonstrations.

This year, the **Excellence in Research & Development Award**, sponsored by iMOVE Australia, was won by Data61 CSIRO for their Transit Assignment Engine: The Agent-based Simulation Engine Enriched with Disease Spread Model.

Senior Research Scientist, Hanna Grzybowska said, "CSIRO's Data61 is committed to understanding Australia's current and future challenges, and by working with Transport for NSW, we are seeking to create new technology-driven solutions that will empower the nation and its industries."

"The Traffic Assignment Engine with a Disease Spread Model is amongst the first in the world that combines a detailed transport simulation with a cutting edge epidemiological modelling. This capability is particularly pertinent to tackle the challenge of safe transit during a pandemic," Hanna said.

The **Excellence in Transport Data Award** winner is Transport for NSW for the 'When to Travel Physical Capacity Indicator'.

"The When to Travel – Physical Capacity Indicator is evidence of the quick, agile and

customer-focused work we do to help customers use public transport safely," said Sherrie Killiby, Director, Digital Customer Information Services, Transport for NSW.

"The new digital information, that tells customers if their public transport services has capacity to travel safely, has already been used over 50 million times since it's launch. The award congratulates the hard-working team who made it happen in record time."

The **Connected & Automated Vehicle Award** was won by Cohda Wireless for its C-ITS (V2X) Technology in Production Vehicles.

"As an Australian company supplying solutions to a global market, we are very proud to have been recognised by ITS Australia for advancing the application of V2X technology to make the streets and highways of the world safer and less damaging to the environment," said Dr Paul Gray, CEO, Cohda Wireless.

"The implementation of a cooperative intelligent transport system will require the continued cooperation of governments, road and transport authorities, OEMs and other organisations. The adoption of our V2X solution by Volkswagen is the start of the adoption of C-ITS by OEMs and proof that Cohda is leading the world in this market."

The Intelligent Mobility Award winner is Directed Technologies of the Ambulance Victoria Next Generation ITS Solution.

"Directed is very honoured to be the recipient of this prestigious award from ITS Australia. ITS Australia serves a vital role for transport in Australia and as the lead global conduit for industry, policy and academic endeavour promoting life, time and environment saving solutions. These awards play a key role in advancing this important triple bottom line," said Brent Stafford, Executive Director, Directed Electronics.

"As an Australian owned company competing against global majors, we are very proud that we could deliver this state-of-the-



Brian Negus, ITS Australia Ambassador and Chairman, CICA Group (left) and Dean Zabrieszch, President, ITS Australia (right) present Dr Peter Sweatman (centre) with the 2020 Max Lay Lifetime Achievement Award.



art next generation ITS solution for Ambulance Victoria and thank their dedicated team and leadership for entrusting us with this mission critical service."

This year the **Smart Transport Infrastructure Award** resulted in a three-way tie between Data61 CSIRO for A Structural Health Monitoring System for the Sir Leo Hielscher Bridge; SAGE Automation for SAGE Edge - Delivering Valuable Insight and Smart Asset Management; and SICE for M8 Tunnel Remote Access Testing Solution.

"CSIRO's Data61 is committed to understanding Australia's current and future challenges. We are seeking to create new technology-driven solutions that will empower the nation and its industries," said Dr Khoa Nguyen, Senior Research Scientist, Data 61 CSIRO.

"In collaboration with Transurban, Data61 and its research and engineering partners (the University of New South Wales, Cisco, Innovation Central Sydney and Rockfield Technologies Australia) have designed and developed an advanced sensing and data platform to monitor the iconic old Sir Leo Hielscher Bridge (the Gateway Bridge) in Brisbane in real time. The platform uses machine learning techniques to detect damage before it can affect the public."

"The ITS Australia Awards not only gives Australian businesses the very best opportunity to showcase Australian innovation and technology, but it also allows us to demonstrate how we can use technology to resolve community needs like supporting activities such as mobility solutions for disability and age care," said Damian Hewitt, General Manager Transport, SAGE Automation.

"We are pleased to win this award as it allows SAGE to be recognised for the investments we have made in developing technology locally that really makes a difference to the users through ITS."

"SICE is honoured to receive this award from ITS Australia as recognition of SICE's team effort in managing to overcome the challenges and tough situations presented by this pandemic, sparking the creation of new ways of carrying out projects," said Alejandro Guerra, Project Manager - WestConnex M8, SICE.

"We are firm believers that our remote testing solutions will permanently change the way ITS project's conduct testing and commissioning activities in the future."

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# TOYOTA MOTOR CORPORATION AUSTRALIA TO DELIVER CONNECTED VEHICLES WITH SUPPORT FROM INTELEMATICS

**When triggered, this potentially life-saving technology is designed to automatically connect with a specialised triage contact centre where trained agents connect the vehicle occupants to the required emergency service fast - be it police, fire or ambulance.**

Getting help to the scene of an emergency as quickly as possible can make all the difference.

From late 2020, select new Toyota vehicles will come fitted with connected-car capabilities thanks to a long-term partnership between leading mobility company, Toyota Motor Corporation Australia (TMCA), and Australian technology company, Intellematics.

Intellematics' ASURE product suite will support Toyota's *Connected Safety and Security* offering, including *Automatic Collision Notification (ACN)*, *SOS Emergency call (SOS)* and *Stolen Vehicle Tracking (SVT)*.

Behind the scenes, Intellematics has implemented this product suite alongside in-car technology and a contact centre partner to deliver best of breed, Australian-based services to select vehicles.

Toyota's new Yaris Cross is the first model offered with this technology, employing a *Data Communication Module (DCM)* that is designed to automatically generate an SOS emergency

call to a 24/7 Emergency Call Centre and relay the location of the vehicle in the event of a trigger, if an airbag deploys, or if an occupant presses the SOS (personal duress) button located above the overhead console in the vehicle. The trained Call Centre personnel then have the ability to assess, triage, and facilitate an accurate and fast response from emergency services, potentially saving lives as a result.

TMCA vehicles are already widely known for their quality but also the advanced level of safety technology featured therein, something of which will be even more notable with the support of Intellematics' ASURE product suite.

Intellematics Australia's Chief Operating Officer, Stephen Owens, says this plays a crucial role in ensuring a quick response from emergency services.

"We know that time is of the essence in an emergency situation. Now, vehicle occupants will have access to one of the best emergency assistance products on the market. Intellematics

is incredibly proud to partner with TMCA and to deploy our local technology and services to help them to deliver connected vehicles to Australian drivers," Mr Owens said.

"Intellematics has a heritage in providing highly valued services to the Australian Automobile industry and being an integral part of this program continues that tradition. The Intellematics ASURE product suite has again proven its capability in supporting large scale connected vehicle programs in local and global markets."

Toyota Australia's Vice President Sales and Marketing Sean Hanley said the introduction of connected services is another way to reinforce commitment to the continual improvement of safety.

"Having the ability to further protect the wellbeing of our customers through the delivery of connected safety and security services with the assistance of Intellematics' Call Centre solutions and services is a wonderful addition to our vehicle technology," Mr Hanley said.



# ITS AUSTRALIA BOARD ELECTIONS RESULT ANNOUNCED

The election of ITS Australia's Board of Directors took place in late November, coinciding with the association's Annual General Meeting held online. This year's election resulted in a recomposed board, with several new entrants.

There was significant and continued interest in the directorships, with 13 candidates nominating for the seven vacancies for the second year running.

ITS Australia congratulates the elected board members:

- Mr Richard Delplace, Austroads
- Mr Jeremy Nassau, Transurban
- Prof Majid Sarvi, The University of Melbourne
- Ms Kim Thomas, Integrate
- Ms Silje Troseth, Q-Free Australia Pty Ltd
- Mr Tom Walker, Cubic Transportation Systems
- Mr Michael Watts, Transmax

They will join ongoing members of the Board:

- Dr Dale Andrea – Department of Transport Victoria
- Mr Chen Cai – Data61 CSIRO
- Mr Jeff McCarthy – Transport for NSW
- Mr Brian Negus – ITS Australia Ambassador / CICA Group
- Ms Nathalie Sassen – Keolis Downer
- Mr Dennis Walsh – Queensland Department of Transport and Main Roads
- Mr Dean Zabrieszsch – HMI Technologies

ITS Australia President, Dean Zabrieszsch, reflected on the significant voter turnout for this year's board election.

"It is hugely encouraging to see that more than 50% of our eligible voters participated in this online election. ITS Australia's member base is keenly interested in the governance of the association, and I am pleased to see this engagement grow

year after year," said Mr Zabrieszsch.

"Despite the substantial challenges posed this year, ITS Australia is poised to begin 2021 with renewed energy and a continued focus on supporting Australia's transport technology industry."

"The strength of ITS Australia is due, in no small part, to the support of my colleagues on the Board. I welcome our newly elected members, and I thank our outgoing members for their outstanding work on behalf of the association," Mr Zabrieszsch added.

Mr Zabrieszsch recognised the contribution of outgoing board members, David Bolt, Kapsch TrafficCom Australia; Gino Dompietro, Jacobs Group; Cecilia Warren, Insurance Australia Group Limited (IAG); and Chris Woods, Robert Bosch Australia.

In particular, he thanked Gino Dompietro for his ten years of exceptional service to the Board.

Mr Zabrieszsch also acknowledged the two new members of the ITS Australia Board of Directors,

Richard Delplace, Program Manager - Transport Network Operations, Austroads and Kim Thomas, Managing Director, Integrate.

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# THE ITL INTERCHANGE

## A highly effective and affordable highway interchange solution

By Rafko Atelsek, ITL Interchange Team

Modern highway interchanges and other heavy traffic roads must ensure the highest possible traffic safety and capacity. Most of these interchanges are located on the outskirts of major cities or in urban areas where the size of the interchanges is conditioned by the available space. The financial aspect, including the cost of construction and ongoing maintenance of the interchange, is also very important.

### Introduction

There are many different types of interchanges. Each type of it has some advantages and disadvantages in a particular surrounding. We present a new solution for the highway interchange, which in most comparisons achieves very good - and in many aspects - the best results.

The characteristic of this interchange is that in the area of the interchange, the opposite carriageways of a single highway/road are separated to the extent that in the middle there is space for left\* directional ramps. That's where the name comes from: Inside Turning Left Interchange (ITL Interchange).

**\*The directions described apply to countries where the right-hand drive rule applies. In the case of driving on the left, the situation is reversed. There are right directional ramps in the middle of the intersection.**

The ITL Interchange should be used for four-way interchanges or other heavy traffic road junctions in order to increase the capacity and traffic safety at the crossing point. The ITL Interchange is suitable for interchanges where traffic is approximately evenly distributed in all traffic directions. It is less suitable for roads where most vehicles drive straight ahead and only a few vehicles turn right or left. The ITL Interchange has no conflict points.

ITL Interchange left turning ramps are much shorter than all other known solutions for interchanges. The interchange is built in two levels. These two facts significantly lower the cost of construction.

### Designing the ITL Interchange

We have two big challenges in designing the ITL Interchange. The first challenge is vehicles sorting before the interchange. An even bigger challenge is changing the level of the slip road for turning to the left.

- **Vehicles sorting before the interchange:** At a sufficient distance before the interchange on the highway (at least 1500 m), it is necessary to limit the speed and inform the drivers with the vertical and horizontal signaling which lane leads to which traffic direction. This also helps avoid unnecessary weaving within the interchange and prepares drivers for timely sorting.

The ITL Interchange is suitable where traffic is approximately evenly distributed in all directions. The inner lanes lead to left directional ramps. Vehicles that turn to the left do not change lanes. Vehicles driving straight or turning to the right, move to the right-hand lanes before the interchange.

- **Level change of the slip road for turning to the left:** The Left directional ramp has to remain on the unchanged level until it crosses both of the left directional ramps at the opposite level. This length is about 2/3 of the entire length of the directional ramp. Therefore, there is a very short distance to pass to come to the opposite altitude level. Sharp vertical convex and concave curves allow significantly lower speeds than allowed by a horizontal turn. In order to mitigate vertical curves, we use a trick to slightly raise the level of both roads in the diagonal corners. In the other two diagonal corners, the level of the roads should be slightly lowered. The straight lane must also be adapted to these level changes.



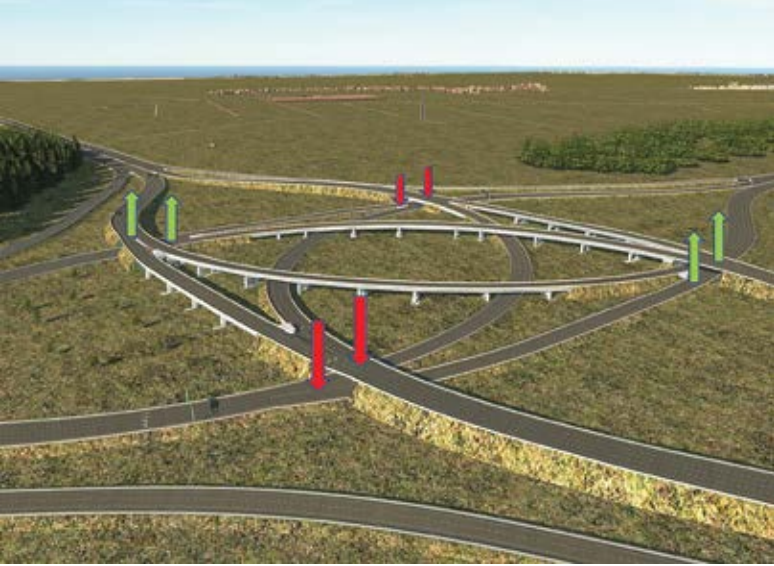
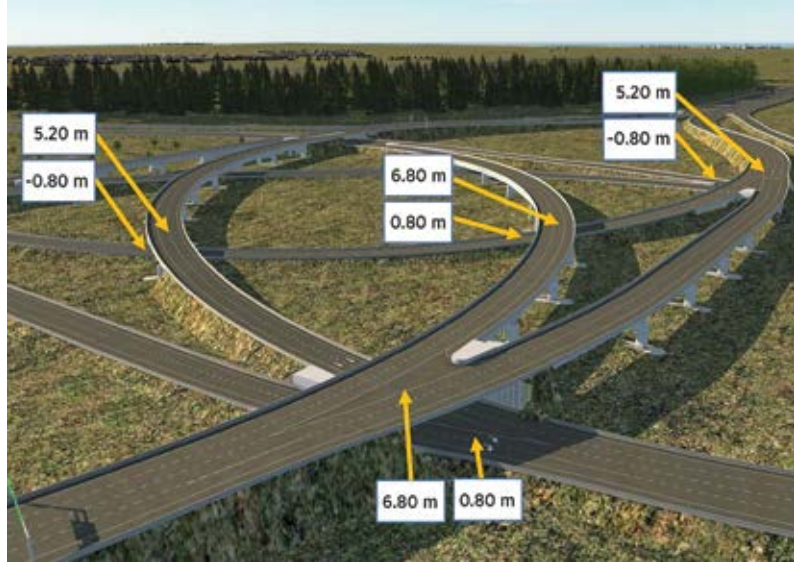


Figure 1: In order to mitigate vertical curves, the level of both roads is slightly raised in the diagonal corners. In the other two diagonal corners, the level of the roads should be slightly lowered. The straight lane must also be adapted to these level changes.



Practical calculation has shown that a level rise of about 80 cm on one side and a level drop of about 80 cm on the other side is sufficient.

### Geometry comparison of interchanges

Comparison is made for interchanges which allow higher speeds also on the left directional ramps and thus ensure greater traffic capacity. These interchanges also have no conflict points. This group includes: Stack Interchange, Turbine and Pinavia.

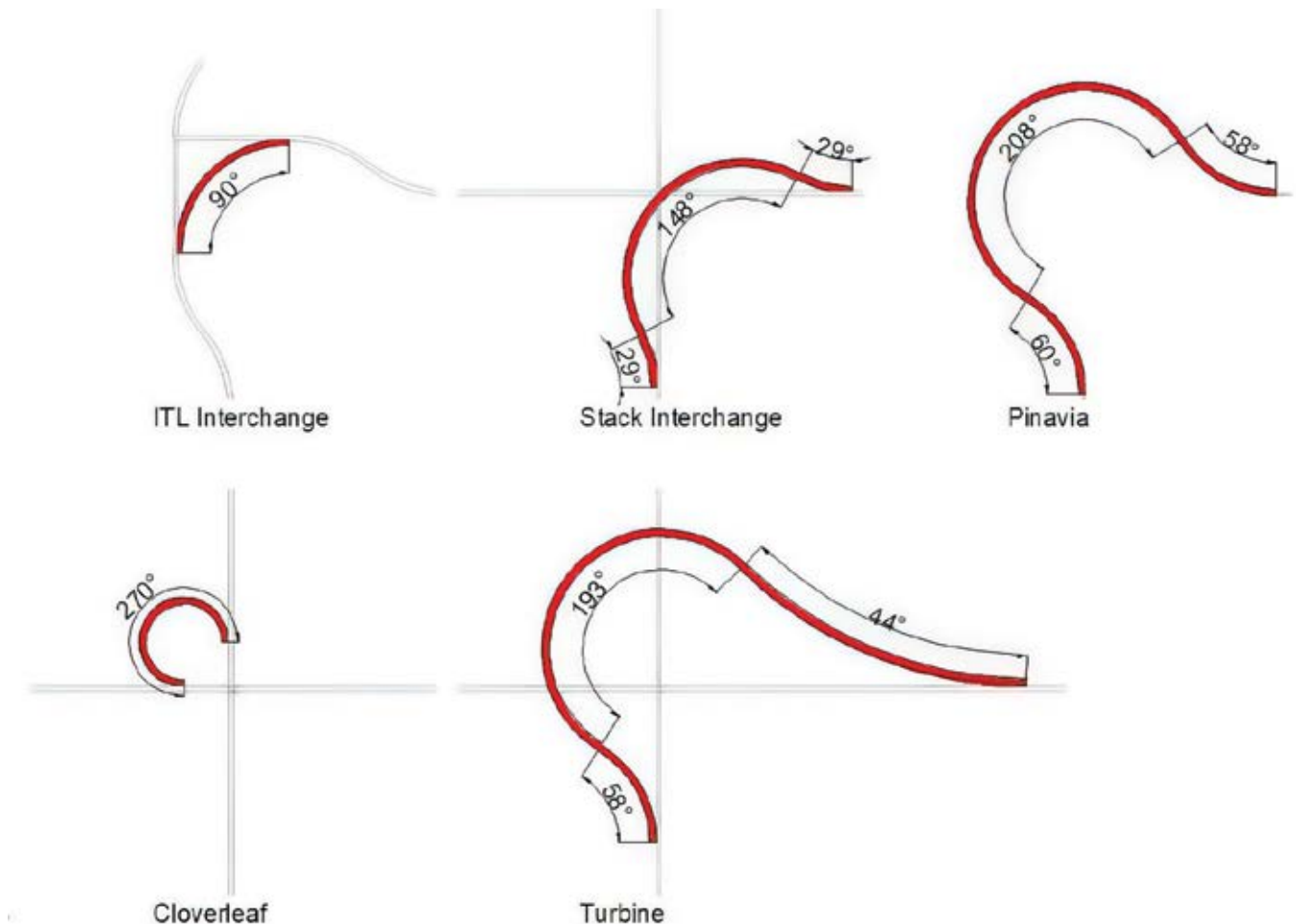
There are also other types of interchanges. However, at these interchanges, a crucial speed reduction is required when turning to the left. These interchanges are: Cloverleaf, Contraflow Left, Diverging Windmill.

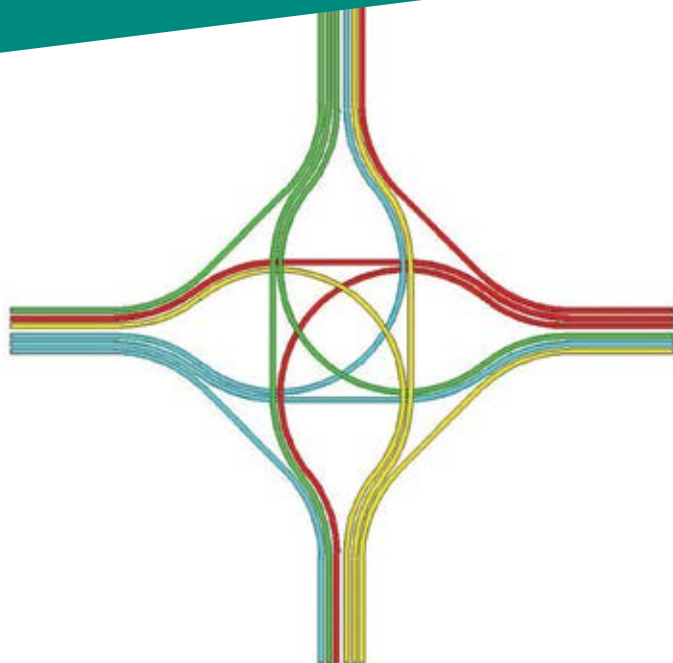
Due to the low cost of construction, the Cloverleaf is included in the comparison. However, for the same area of the entire interchange as ITL Interchange, the Cloverleaf has a much lower speed limit for turning to the left. The Cloverleaf also has conflicting points, while other interchanges do not.

Comparison is made for interchanges with horizontal radius for the left directional ramp  $R=250$  m. This radius allows driving at a speed of 80 km/h. In case of the Cloverleaf on the same area, horizontal radius is  $R=100$  m for turning to the left.

#### Parameters:

- Radius of the horizontal circular curve for left directional ramps  $R=250$  m (Cloverleaf  $R=100$  m).
- Maximum transverse inclination 7%.
- Vertical rounding with a convex radius of 4000 m and a concave radius of 3000 m.
- Maximum longitudinal inclination 6%.
- Altitude difference between individual levels 6 m.
- Speed limit 80 km/h.





## Results

Stack Interchange, Turbine and Cloverleaf have a completely straight lines when driving through. The ITL Interchange has a slightly longer distance due to the separation of carriageways. Pinavia has an even longer distance because lanes run along the circle.

Construction for right directional ramps is similar in all cases. The ITL Interchange and Stack Interchange have the shortest length of ramps. The Cloverleaf and Pinavia have an approximately double length, and Turbine, due to its size, has about a triple length according to the most favourable variants.

However, construction for the left directional ramps differs completely. There are the greatest differences between compared interchanges. Ramps mostly lead over the overpasses. ITL Interchange has an extremely short length of ramps. A little longer distance is in the Cloverleaf, but due to the small radius, there is a lower speed limit. The distance is greater by factor 2 on Stack Interchange and more than by factor 3 on Pinavia and Turbine.

Cloverleaf has the shortest length of overpasses. However, it has lower speed limits for turning to the left and some conflict points. At other compared interchanges, ITL Interchange has the shortest length of overpasses. The distance of overpasses is greater approximately by factor 2.5 on Stack Interchange and Turbine. Pinavia has by far the highest length of overpasses. Compared with ITL Interchange, the factor is more than 5.

The results of the geometric comparison are shown in Table 1.

## Performance measures of the ITL Interchange and comparison with other types

Traffic simulation techniques has been used since early development of traffic theory. Therefore, delay analysis of ITL interchange has been done by microsimulation software, which we usually use for the analysis of complex traffic problems at intersections and interchanges.

The Microsimulation software tool is ideal for setting up a clear and conclusive knowledge basis for decisions relating to all kinds of traffic engineering questions, and can provide the analyst with valuable information on the performance. The microsimulation has been designed for analysing and modelling transport networks of any size, and traffic systems of all types, from individual intersections right up to entire conurbations.

PTV Vissim link-connector structure of the network topology allows for highest versatility and – in combination with detailed movement models – extremely precise traffic flow modelling.

Transportation analysis performance measures (outputs of microscopic model) estimate the performance of different interchange designs, including the ITL.

Performance measures in analysis was driven by a goal to determine the capacity of ITL interchange and to estimate the comparison between some of the most commonly used highway interchanges, including some new types like Pinavia.

In this paper we focused on Delay, Average Speed and Distance Travelled. We analysed one traffic distribution test matrices (Table 2): q1 (1/3 of entry traffic crossed the intersection, 1/3 turned left and 1/3 turned right). Performance measures should be sensitive enough to differentiate between analysis scenarios and therefore we used three different load scenarios (2500 veh/h, 3500 veh/h and 4500 veh/h). The fleet composition included in the highway network reflects most common composition on the Highways including passenger cars (90%) and heavy good vehicles (10%).

## Results

The results of traffic simulation are shown in Table 2. At lower volumes (2500 veh/h) the performance is almost identical for all interchange designs. For middle volume (3500 veh/h) Cloverleaf and Turbine interchange designs are already over congested with Average Delays higher than 140 s/veh. The Average speed drops below 40 km/h in Cloverleaf and 46 km/h in Turbine design.

For highest volume traffic scenario (4500 veh/h) only ITL and Pinavia Interchange can throughput the demand with slightly lower delay of ITL; 10.2 s/veh than Pinavia: 13.6 s/veh. Total Delay time of ITL is 25% lower than Pinavia (51 hours vs 68 hours) and the travel distance of ITL is 3.6 % less than Pinavia.

TABLE 1 – GEOMETRIC COMPARISONS

	ITL INTERCH.	STACK INTERCH.	TURBINE	PINAVIA	CLOVERLEAF <sup>(*)</sup>
<b>Area of interchange (ha) <sup>(*)2</sup></b>	<b>33.5</b>	<b>18.5</b>	<b>58</b>	<b>33.5</b>	<b>33.5</b>
<b>Number of levels</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>Road distance</b>					
Road distance straight (m)	1360	1300	1300	1420	1300
Road distance right (m)	330	390	1.070	680	590
Road distance left (m)	395	805	1.295	1.415	460
<b>Road distance total (m)</b>	<b>8340</b>	<b>9980</b>	<b>14660</b>	<b>14060</b>	<b>9400</b>
<b>Overpasses distance</b>					
Overpasses dist. straight (m)	620 /200 <sup>(*)3</sup>	100	100	3.060	100
Overpasses dist. right (m)	0	0	0	0	0
Overpasses dist. left (m)	790	3220	4140	4600	0
<b>Overpasses dist. total (m)</b>	<b>1410 / 990<sup>(*)3</sup></b>	<b>3320</b>	<b>4240</b>	<b>7660</b>	<b>100</b>



**TABLE 2 – TRAFFIC SIMULATION RESULTS**

	ITL INTERCHANGE			CLOVERLEAF			PINAVIA			STACK			TURBINE		
	2500	3500	4500	2500	3500	4500	2500	3500	4500	2500	3500	4500	2500	3500	4500
Delay Avg. (s)	3.6	5.9	10.2	5.1	193.3	859	4.6	6.8	13.6	4.4	12.9	243.2	7.6	147	295.8
Speed Avg (km/h)	85	84	82	84	36	11	84	83	80	84	80	33	83	46	30
Dist. Total (km)	39906	55663	71506	41691	46541	29304	41273	57732	74143	39468	54989	56486	42260	51430	46844
Travel Total (km)	471	667	879	496	1289	2760	490	695	927	469	687	1698	510	1129	1545
Delay Total (h)	10	23	51	14	751	2421	13	27	68	12	50	1045	21	534	1003
Delay Total (h)	10	23	51	14	751	2421	13	27	68	12	50	1045	21	534	1003

Some measures may not be clearly understandable to the reader of this paper and therefore additional explanation is provided. If we compare Dist. Total (km) in Table 3 for the ITL and Turbine design, there is much less distance travelled for Turbine design, which can lead to misunderstanding that this design has much better performance. In the sum of this measure there are all vehicles that are in the network or have already left it. For Turbine, volume scenario 4500 veh/h, the performance of Average Delay is very high (295.8 s/veh) and therefore many demands are not served and as result much less Total kilometres travelled.



## Conclusions

In this paper we analysed new type of ITL Interchange and compared with conventional designs Cloverleaf, Pinavia, Stack, Turbine.

ITL Interchange has proven to be a very good or the best choice in all benchmarks.

The geometry comparison concludes:

- The lengths of all ramps at other interchanges are 20-75 % longer than in the ITL Interchange,
- The lengths of all overpasses at other interchanges are from two to five times longer than in the ITL Interchange. In Stack-Interchange, the length of the overpasses is longer by the factor of 2.5, but it has a four-level construction,
- Overpasses incur the highest construction costs. In particular, the ITL Interchange is cheaper to build because it has a significantly lower length of overpasses than other interchanges. Maintenance is much cheaper.

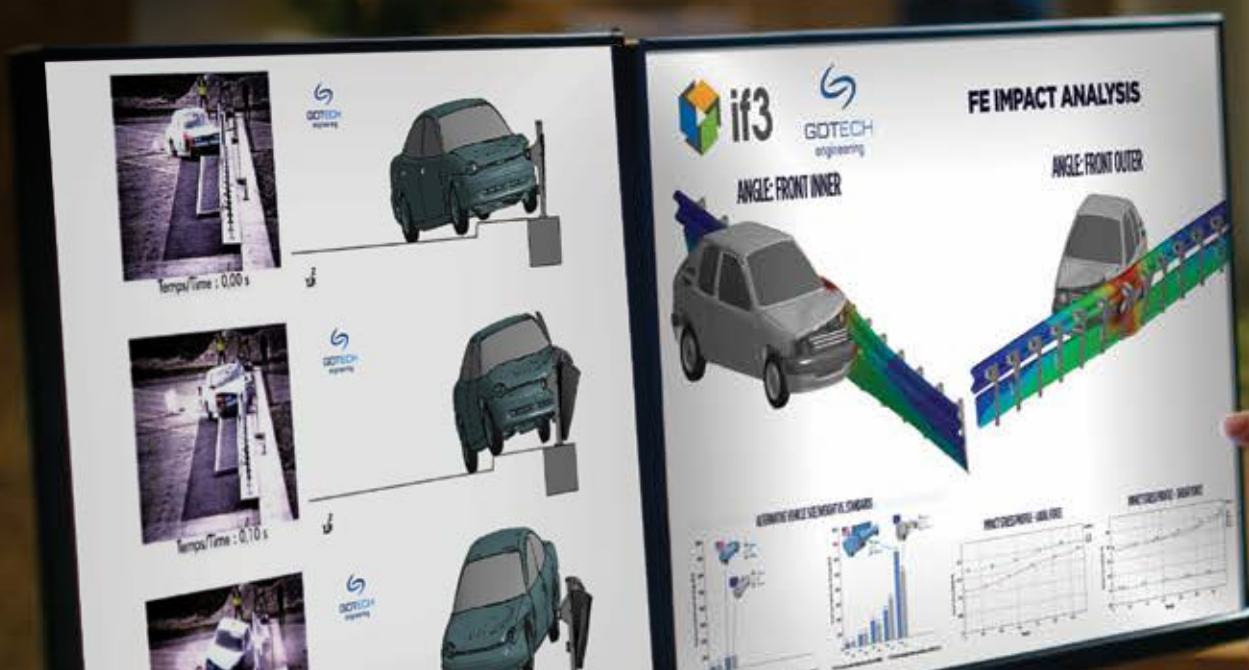
The following conclusions can be made from the Performance analysis:

- For higher traffic volumes (4500 veh/h), the ITL Interchange has better performance and offers much lower delays than conventional types like Clover, Stack and Turbine. Total Delay time of ITL is 25 % lower than Pinavia,
- For lower traffic volumes (2500 veh/h), the ITL Interchange has almost the same Average Delay (3.6 s/veh) than others (from 4.6 s/veh up to 7.6 s/veh),
- Average Speed and Total Distance Travelled are much higher for ITL Interchange and it is slightly higher than Pinavia Interchange.


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# HUMES HIGHLIGHTS PRECAST DELIVERY SOLUTIONS

As precast concrete is cast off-site in purpose-built factories, it is not uncommon for trucks to transport precast elements over large distances, often on interstate routes. National Precast member Humes is proud to announce its 2020/21 in-house transport fleet and delivery capability.

According to National Sales Manager Paul Adams, Humes offers a highly efficient design to

delivery service to projects of all scales.

"With engineering, manufacturing, and delivery solutions all integrated, time and cost efficiency are both maximised," says Adams.

"It's not uncommon for precast concrete elements to require dimensional adjustments due to transport restrictions including load height, weight distribution, as well as the ease



of loading and unloading components. Our in-house and integrated approach minimises additional time and cost implications of doing so," he added.

Sarah Bachmann, National Precast's CEO says the model offered by Association Master Precaster member Humes is not uncommon among the organisation's membership and commends Humes for its flexible service.

"An in-house and integrated approach to design changes and transport, in combination with the modular nature of precast concrete, allows for an efficient and low-cost building solution, to projects of a diverse range of scale," Ms Bachmann said.

## SERVING THE ALBANY COMMUNITY FOR YEARS TO COME

**PROJECT:** Water Corporation Bridges

**LOCATION:** Young's Siding Road, Albany WA

**MASTER PRECASTER:** MJB Industries

A recently completed set of box culverts and associated civil components have been deployed to the construction of four bridges throughout Young Siding, Albany, WA.

Precast concrete construction enabled a swift timeline despite the range of unique components that was specified, and National Precast Master Precaster member MJB Industries was engaged by Fulton Hogan to design, manufacture and transport these civil elements to the rural locality over an 8-week timeline. The collection of 24 precast concrete box culverts provided by MJB Industries spans 4500mm and ranges in height and lengths.

MJB Industries has showcased the unique potential of precast concrete by integrating tie-in reinforcement that protrudes from the top of the precast culverts, in preparation in-situ slabs, to be poured after the installation. In response to the

client's request for this protruding reinforcement, the MJB team swiftly developed custom formwork from steel sheet and foam block-outs.

MJB's inhouse transport fleet delivered the 24 culverts and ancillary precast elements including Class 4 Pipes and Pipe Headwalls to the Young Siding, Albany site. Precast concrete enabled the client to specify custom details

with great accuracy and consistent quality yet maintain an efficient manufacturing and installation timeline.

In all, MJB Industries contributed a deployment of over 200 tonnes of precast concrete components that will serve the community of Young Siding for many generations.





# ESSENTIAL INFRASTRUCTURE DEMANDS BUSHFIRE SAFE MATERIALS

Australia is no stranger to bushfire. As well as devastating property loss, damage to essential infrastructure that can add additional stress and even catastrophe. Continued power, water and communications services are very often compromised in extreme temperatures, especially when combustible materials are used in their construction.

Precast concrete power poles are a robust solution in fire-prone bush areas and they've been manufactured and supplied around Australia by Master Precaster Rocla for over 45 years.

The inherent ability for precast concrete elements to be non-flammable, non-combustible and ember resistant - all whilst maintaining a fast construction turnaround and low cost - means that precast construction is an excellent choice for high fire risk locations.

That is not to say that under intense and extreme conditions there will not be some changes however, to the aesthetics of the members. Structural integrity though is usually maintained.

Under the prolonged high-heat load of a bushfire, precast concrete poles occasionally exhibit non-structural surface defects known

as pop-outs. Surface defects are typical at approximately 660 degrees Celsius, or the melting point of aluminium. Australian bushfires typically sustain temperatures of 600-800 degrees in heat fluxes that last for a few minutes. In extreme cases, the surface layer of precast posts may spall, resulting in an exposed concrete core as the outer aggregate layers degrade. In such cases, the inner layers of concrete retain their grey off-form colour, indicating that these layers have not lapsed 300 degree Celsius, and thus the structural integrity of the pole is not compromised.

To assert the validity of these claims, controlled tests have seen precast concrete poles manufactured by Rocla endure 6 hours of a 250 degree fire, whilst maintaining the typical specification of 115% bending strength.

As high wind speeds are common during bushfires, it is vital for precast concrete poles to simultaneously withstand the force of both heat and wind. Further testing has confirmed the rigidity of Rocla's poles to withstand 840 degrees over a 20-minute timespan. This testing identified that in accordance with AS3600, each concrete pole exhibits a fire resistance period (FRP) of 30 minutes. It is noted that the severity

of such tests is over ten times the duration/heat load of a typical bushfire.

Precast poles are often embedded with services such as electricity and telephone lines, both of which are vital to remain active during a bushfire. National Precast's Master Precaster Rocla have taken great pride in protecting these services for rural communities. Rocla ensures that each pole has a wall thickness of 60mm or greater, which is double the appropriate fire rating standard of 30mm.

In bushfire prone areas, it is not uncommon for precast concrete poles to be lined with fire-retardant materials such as vermiculite or cementitious grout. Precast concrete, although not highly susceptible to heat inflicted damage, can be quickly and affordably repaired. Any surface imperfections due to bushfire damage can be repaired with cementitious, non-shrink mortar.

Not only does precast concrete provide affordable and constant quality power poles, but they also prove to withstand the sustained high-heat of bushfires. With bushfires on the rise, National Precast's members are industry leaders in the design, supply, and installation of precast concrete power poles.



## QUEENSLAND LEADING THE FUTURE OF INNOVATIVE TRANSPORT RESEARCH INTO 2026

The *National Asset Centre of Excellence* (NACOE) continues to lead the way in delivering engineering excellence in Queensland. Queensland's Department of Transport and Main Roads (TMR) and the Australian Road Research Board (ARRB) have reaffirmed their commitment to their joint research and development initiative, NACOE, through the signing of their renewed agreement for 2021-2026.

The new agreement was signed by Queensland's Department of Transport and Main Roads Director-General Neil Scales OBE and ARRB's Queensland State Technical Leader Matthew Bereni.

Through NACOE, TMR and ARRB strive to maximise their combined resources and remove the barriers of innovation to provide smarter engineering outcomes to both the Queensland and the Australian road industries.



Since its inception in 2012, NACOE has delivered some major economic benefits to our state through cost-effective and higher performing pavements and structures, enhanced asset management practices, and by improving road safety and network operation outcomes," Mr Scales said.

The Program has been a leading force in researching new products and approaches outside the scope of established standards and specifications to gain market acceptance in Australia.

NACOE is a heavily focused on collaborating with industry to improve best practises by bringing new knowledge into practise sooner and providing efficiency gains on a national scale.

"In 2019-20, we have further advanced our knowledge in the use of recycled materials such as glass, construction waste, crumb rubber and plastics to build new, high-performing and resilient roads. This

research is instrumental in driving cost savings and enhanced performance while reducing the overall transport industry's carbon footprint," Mr Bereni said.

"We have recently launched our Facebook and LinkedIn pages to help spread the word of the great work we undertake."

"I encourage everyone to follow the National Asset Centre of Excellence on social media and check out our webpage to learn more about our past work and our current program of activities," Mr Bereni added.

You can follow NACOE on Social Media Channels at:

- **LinkedIn:** <https://www.linkedin.com/company/national-asset-centre-of-excellence>
- **Facebook:** <https://www.facebook.com/NationalAssetCentreofExcellence>

For further information, please visit the website: <http://nacoe.com.au/>

## ARRB USHERS IN NEW ERA OF LINE MARKING TECHNOLOGY

ARRB (Australian Road Research Board) has acquired state-of-the-art technology to help road agencies and local government ensure their road line markings are up to standard for the latest in driver assistance systems.

ARRB is now using the RetroTek-D vehicle mounted retroreflector from Irish company Reflective Measurement Systems Ltd in its road marking condition surveys. It is the first full lane width vehicle-mounted retroreflector that can operate day or night and check the condition of line markings on both sides of the lane at the one time.

Never have line markings been more important on Australian roads. Advanced driver assistance systems (ADAS) like lane keeping assist rely heavily on clear

lane markings. The widespread adoption of ADAS in new Australian cars, and the arrival of connected and automated vehicles (CAV) mean the clarity and quality of line markings are vital to this technology working effectively, and therefore saving lives.

"The RetroTek-D reflectometer technology will assist us in helping road agencies and local government with efficient and safe road marking maintenance solutions, which is more vital than ever for road agencies as ADAS and CAV technologies become commonplace in Australian vehicles," ARRB Infrastructure Management National Discipline Lead, Richard Wix said.

Chief executive of Reflective Measurement Systems Ltd Joe Turley said: "We are delighted to be working with ARRB and supporting them in this important area."

ARRB can offer a holistic service for road marking condition surveys, incorporating data collection and program development.

Contact ARRB for more information on how your local government agency or road agency can use this technology at: [info@arrb.com.au](mailto:info@arrb.com.au)



The RetroTek-D vehicle mounted retroreflector can operate day or night and check the condition of line markings on both sides of the lane at the one time.



The state-of-the-art technology will help road agencies and local governments ensure their road line markings are up to standard for the latest in driver assistance systems.





## FORMER ARRB INTERN WINS JOHN MONASH SCHOLARSHIP

Former ARRB intern Jess Coldrey has been awarded a prestigious *John Monash Scholarship*, allowing her to further her work on sustainable infrastructure started at the National Transport Research Organisation.

As an ARRB intern in 2018/19, Jess compiled the initial literature review on the use of plastics in roads in Australia, which has kick-started work towards Australia having specifications for the use of plastics in roads.

ARRB is leading this research work, and the resulting specifications are likely to be delivered in 2021.

The John Monash Scholarship will allow Jess to study a Master of Humanitarian Engineering with Management at Warwick University in England, focusing on sustainable infrastructure.

Through her work, she aims to harness the underutilised potential of infrastructure to address social and environmental needs. Her friends and colleagues at ARRB will watch her progress with interest and pride.



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## ARRB ROAD RISK RATINGS HELP TO OPTIMISE ROAD SAFETY SPENDING

Announced as part of the 2020-21 Budget, the Australian Government's \$2 billion *Road Safety Program* will deliver life-saving infrastructure projects to be fast-tracked over the next 18 months. The works are expected to target hazardous run-off-road and head-on crashes in rural and regional areas, and will include shoulder sealing, edgeline and centreline treatments including rumble strips, median improvements, and barrier system installations. Funding will also be allocated to improving urban and peri-urban road environments for vulnerable road users such as pedestrians and cyclists.

ARRB is assisting several state and territory jurisdictions to ensure that this much-needed funding is wisely spent. ARRB is hard at work determining the road risk rating of current roads and of the proposed infrastructure designs.

As Australia's *International Road Assessment Program* (iRAP) Centre of Excellence, ARRB specialises in road risk assessment models, using AusRAP, ANRAM and Austroads road stereotype analysis. We are using these proven, evidence-based processes to predict the safety risk of a section of roadway and to model the predicted improved performance once treatments are installed.

"This development is exciting because it is proactive - we are working to prevent crashes before they occur, rather than being reactive and focussing treatment at known blackspots and blacklengths," said David McTiernan, ARRB's National Transport Safety Leader.

"It is just fantastic to see the Federal government, jurisdictional governments and local councils across the country responding to Australia's pressing road safety problem from this new, proactive and unified front."

"Consistent cross-sectional infrastructure treatments along an entire road corridor, rather than improvement at a single location, provide a more holistic safety benefit for the local community and visitors travelling our regional highways," Mr McTiernan said.

When it comes to better spending on our roads, we have ample room to grow. In October, ARRB held a series of local government outreach forums to identify how money allocated to improving roads could be successfully optimised to achieve greater road safety gains. Engineers and road practitioners from over 100 councils across the country attended the forums to speak with ARRB's subject-matter experts from key areas including road asset management, planning, design, construction, operations and maintenance.

ARRB is currently in the process of developing the latest guide in its *Local Government* series. This guide will focus on *Safer Road Infrastructure* and will be developed specifically to create safer infrastructure for our local roads.

100% of local government attendees confirmed that a vision of zero deaths and injuries on Australian roads was an important pragmatic aim. There was consensus that access to data, internal capacity, skills development, and resourcing were the key roadblocks to achieving safety outcomes.

The results of the outreach will be distilled into the next volume of ARRB's well received *Local Government Best Practice Guides*; Part 6 will be entitled *Safer Road Infrastructure* and is planned to be released early 2021.

For further information, please email ARRB at: [transportsafety@arrb.com.au](mailto:transportsafety@arrb.com.au)

# ARRB TO UNDERTAKE RESEARCH FOR WA ROAD SIGNAGE INQUIRY

An inquiry will examine whether temporary traffic signage installed in regional areas in Western Australia is properly secured and displayed at roadworks sites, following community concern. The Australian Road Research Board (ARRB) will undertake the research for the inquiry.

WA Transport Minister Rita Saffioti says a reference group made up of key stakeholders and industry representatives will be established to guide the independent review into regional road signage.

"We are establishing a reference group of key industry representatives to be a part of this inquiry, with research to be undertaken by the Australian Road Research Board, a trusted national transport research organisation," Ms Saffioti says.

"The independent, expert advice offered by ARRB will provide valuable insight into ensuring temporary signage remains secure and does its job of warning and advising road users to ensure their safety."

"We anticipate the review to take about six months - I look forward to receiving the results of the review," the Minister added.

The reference group will be chaired by Dennis O'Reilly, Executive Director for the WA Department of Transport, with members to be invited from:

- The Traffic Management Association Australia WA
- WorkSafe



- Engineers Australia
- Institute of Public Works Engineering Australasia WA
- RAC
- Western Roads Federation
- TWU
- Main Roads WA

Public consultation will be undertaken during the review, which will also involve a comparative analysis of regional traffic management signage practices in other States and jurisdictions.

The review and its final report are anticipated to be completed within six months.

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## **TOWARDS ZERO BRIDGE FATALITIES**

- Fully crash tested to European Standards and simulated to US MASH TL4 requirements
- Unique design imparting low stress to bridge deck - protecting water proofing membranes and coatings on the deck
- Easy to install
- Easy to dismantle in times of flood
- Cost-effective bridge rehabilitation solution

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