CORE2023

CONFERENCE ON RAILWAY EXCELLENCE

Celebrating 25 Years in Motion

19-21 JUNE 2023 | MELBOURNE AUSTRALIA

HOSTED BY

RTSA

SUPPORTED BY

ENGINEERS AUSTRALIA

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PROGRAM HANDBOOK

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Acknowledgement To Country

We pay respect to the Traditional Owners of Narrm, the Wurundjeri Woi Wurrung people of the Kulin Nation and pay our respects to their Elders past and present, and to Elders of all First Nations communities.

WELCOME TO CORE 2023

A very warm welcome to each and every one of you. Thank you for joining us in Melbourne for CORE 2023.

CORE has positioned itself as Australasia's premier technical conference for rail professionals, with a high-quality technical program and significant networking opportunities.

The ability of the RTSA to deliver this event is thanks to the generous contributions of our sponsors, including our Host Partners ARTC Inland Rail, Metro Trains Melbourne and Speno Rail Maintenance Australia, Major Partner Aurizon, Delegate Satchel Partner Rail Confidence, and long-term supporter of the name badge and lanyards, as well as our partner in convening technical subcommittee for 2023, Monash University Institute of Railway Technology.

Complementing the support of our sponsors are the CORE 2023 exhibitors, who each help to create a dynamic and engaging exhibition where our delegates can interact and connect.

For our volunteer organising committee, arranging the conference has been a significant undertaking. I would like to take a moment to acknowledge the assistance of everyone who has made this event possible, and extend that appreciation to the supportive organisations and families of all those who have contributed their time and expertise so generously.

To all contributors who have submitted any technical content, I thank you for your willingness to share your knowledge and advance the rail industry. To anyone attending CORE for the first time, and especially our scholarship recipients, I'm confident you'll find the experience valuable, and hope to see you again at future RTSA events.

Thank you once again for your commitment to sharing knowledge and fostering professional connection. I wish you each the most rewarding of times with us here at CORE 2023, as we come together **Celebrating 25 Years in Motion**.

T Keating

Tom Keating
MIEAust CPEng NER
CORE 2023 Conference Chair

Contents

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Event Code:
core2023

ARTC | INLAND RAIL
An Australian Government Initiative

Did you know?

Inland Rail will enable double-stacked, 1,800m long trains that will carry the equivalent freight volume of 110 B-double trucks.

To find out more about the Inland Rail project:

inlandrail.com.au

WELCOME FROM RTSA EXECUTIVE CHAIR

It is a privilege to welcome you to Melbourne, on behalf of the Railway Technical Society of Australasia (RTSA) for our preeminent event, the Conference on Railway Excellence (CORE). Our Conference Organising Committee, headed up by Thomas Keating has shown vision, patience and planning skills in preparing the CORE 2023 program for you, our delegates. The success of CORE 2023 will also be a product of your enthusiasm and willingness to participate and learn.

The conference theme chosen by the Conference Organising Committee is "Celebrating 25 Years in Motion". This year the RTSA is celebrating its 25th year and the theme is carried through the conference, technical papers and tours and the Gala Dinner. The theme is particularly relevant given the growth in the rail sector in Australasia since 1998. The theme will be evident in the keynote addresses by Gabrielle Trainor AO, Professor Clive Roberts, Futurist Dr Jordan Nguyen along with our Chief Engineers Panel moderated by Jane McMaster. I hope you enjoy their presentations and reflect on the implications for your own organisation and the rail sector in general.

The conference papers contain much new knowledge, and an expanding field of topics across the railway sector. Our industry has never been busier! However, in order to continue to deliver projects and operate our railways systems safely and efficiently, we need to learn and find ways to manage the increased complexity, market capacity to deliver, interface challenges and the impact of technological development such as artificial intelligence. This is what CORE 2023 offers. I would also like to acknowledge our valued sponsors and exhibitors and hope you will seek them out at CORE 2023. Without their continued support we could not have delivered this conference.

The RTSA is a Technical Society of Engineers Australia and Engineering New Zealand. Our six chapters work to provide continuing professional development opportunities for our members from a range of disciplines and professions across the railway industry and in academia. I encourage each of you to become a member of RTSA and contribute to its next 25 years in motion.

Melbourne is an appropriate city to hold our conference, with the ongoing Big Build investment in rail. I trust that all of you will enjoy your time in Melbourne with all of the networking opportunities that CORE 2023 has been designed to provide.

Best Regards

Roy Unny, CPEng
National Executive Chair Railway Technical Society of Australasia

25 YEARS IN MOTION

RTSA 1998 — 2023

Conference on Railway Excellence

12 CORE Conferences
7,413 Delegates
872 Technical Papers
278 Youth Scholarships
42 Technical Tours

6 Chapters

International membership base

2nd largest Engineers Australia Technical Society

30% membership growth in the past 5 years

$500,000 awarded
15 Life Memberships
12 Scholarships
15 Research Awards
63 University Awardees
55 Young Professionals
20 Senior Professionals

180 Awards

Rail Professional Development

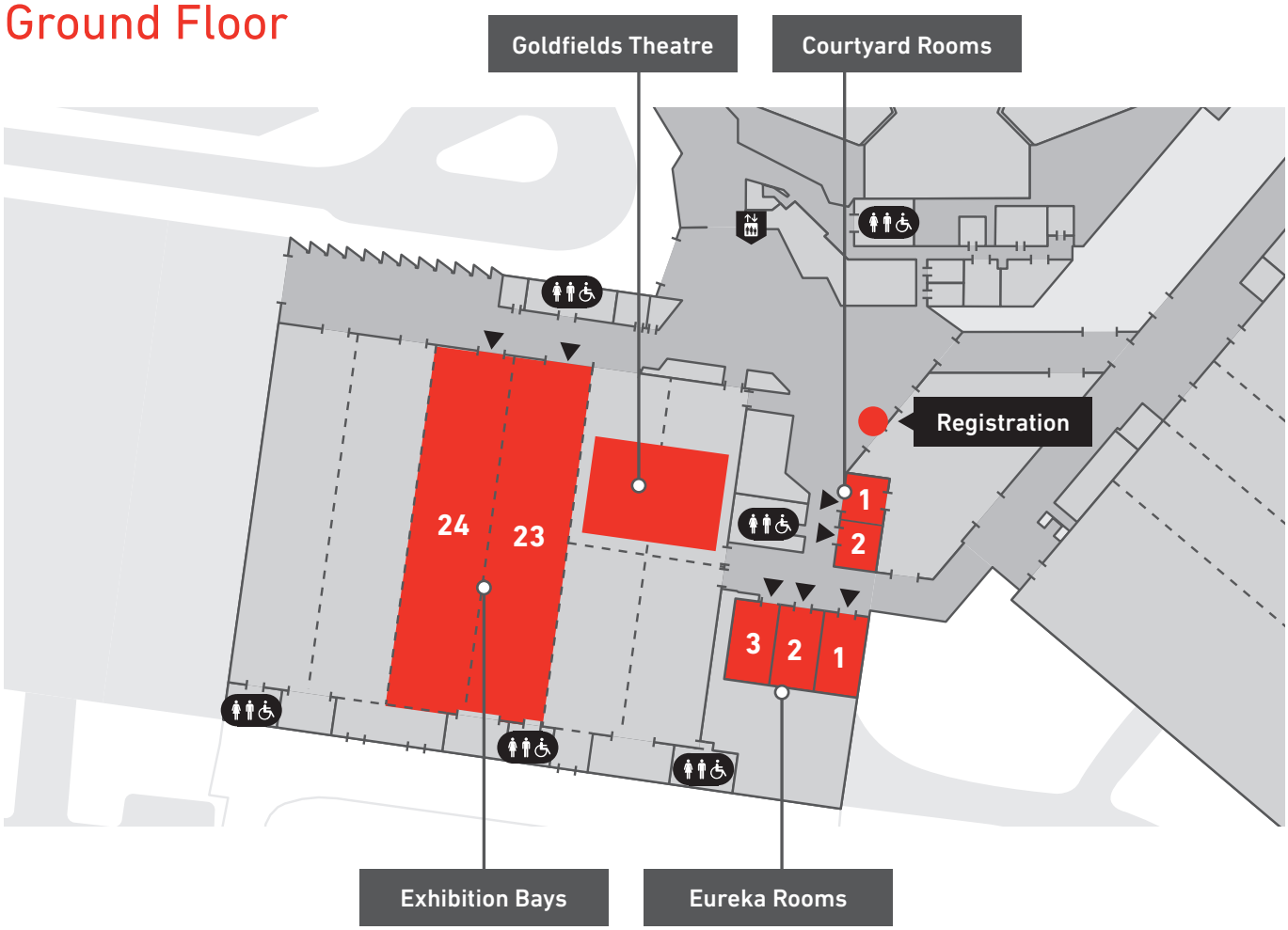
1,143 CPD events
>130,000 CPD hours
300 Undergraduate challenge participants
11 Study Tours
19 Joint AusRAIL conferences (**159** Technical Papers)
24 Track and Rollingstock Courses

Figures accurate as of February 2022.

VENUE

Melbourne Convention and Exhibition Centre | MCEC
1 Convention Centre Pl, South Wharf VIC 3006

Ground Floor

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GENERAL INFORMATION

Registration Desk

Location: Foyer, adjacent to the Goldfields Theatre.

Opening Times:	Monday 19 June	14:00 – 18:00
	Tuesday 20 June	07:00 – 18:00
	Wednesday 21 June	07:00 – 16:00

Contact

From Monday 21 June, Encanta can be contacted on:
M: 0476 034 305 (during registration desk hours)
M: 0411 105 569 (after hours)

Dress

Welcome Reception, Conference Sessions and Networking Session:	Business Casual
RTSA 25th Anniversary Gala Dinner:	Business/Lounge Suit
Technical Tours:	Please refer to specific PPE requirements for individual tours.

Disclaimer

The information in this brochure is correct at the time of printing. The organisers reserve the right to alter any aspect of the program without prior notice as circumstances dictate.

Meals

All tea breaks and lunches will be served amongst the exhibition. Special Dietary Requirements: If you have requested a special meal, please make your way to the dedicated buffet in the exhibition hall.

Mobile Devices

As a courtesy to other participants, please ensure that all your mobile devices are on 'silent' mode during presentations.

Name Badge

It would be appreciated if delegates wear their name badge at all times during the event as this identifies them as eligible for catering and entry to sessions.

Privacy Statement

In registering for this event relevant details may be incorporated into a delegate list for the benefit of sponsors, exhibitors, committee, Encanta Event Management and other parties directly related to the event. Should you wish for your details not to be included in this list, please inform the registration desk team.

Speakers & Session Chair Breakfast Briefing

Dates:	Tuesday 20 June and Wednesday 21 June
Time:	07:30 – 08:15
Location:	Eureka 1

Speakers & Session Chairs are required to attend a briefing breakfast on the day of their allocated presentation/session. This breakfast will provide you with an opportunity for Session Chairs and presenters to meet and discuss the format and their understanding of the strict time keeping requirements.

Speakers' Preparation Room

Location: Courtyard Room 2

It is our objective that presentations operate as smoothly as possible. Therefore, all presenters are required to check into this room at least 2 hours prior to their presentation to ensure that they have met with the technician and that they are fully aware of your presentation needs. Please check into this room and provide your presentation on a usb to the technician during the following times:

Opening Times:	Monday 19 June	14:00 – 18:00
	Tuesday 20 June	07:00 – 16:30
	Wednesday 21 June	07:00 – 15:30

WiFi

Connect to the **CORE 2023**
Pre Authorised User: **RTSA25Years**

ACKNOWLEDGEMENTS

We would like to acknowledge the valuable contribution of all session chairs and paper reviewers for their time and expertise in the peer review paper process.

Dave Anderson
Mohamed Awadalla
Martin Baggott
Jonathan Barnes
Damian Birkin
Steve Boshier
Alan Braithwaite
Phillip Campbell
Colin Cole
Tim Constable
John Cookson
Michael Crocker
Briony Croft
Jonathan Duvel
Eric Englund
Henry French
Ali Ghiasi
Maneesh Gupta
Geoffrey Hingston
Katharina Gerstmann
Alex Howie
Tom Keating
Matt Kwong
Jenny Lancaster
Barry Lovat
Phil Magdaraog
Tricia Malowney
Andrew Matthews
Chris McKeown
Sajith Mohan
Adam Morris
Peter Mutton
Greg Newman
Jennifer Nguyen
Ismet Perona
Jerome Pun
Mark Rieper
Robert Schweiger
Amir Shamdani
Scott Simpson
Don Skerman
Maksym Spiryagin
Peter Sroba
Michelle Tan
Andrew Tay
Graham Tew
Kris Thompson
Liz Tinlin
Roy Unny
Carlos Valente
John Watsford
Nicholas Wheatley
Joshua White
Warren Williams
Wilson Wong
Simon Wood
Scott Younes
Qian Zheng

MASTER OF CEREMONIES

Tricia Malowney

OAM

Churchill Fellow
Chief Accessibility Advocate
Department of Transport and Planning

Tricia Malowney OAM is the Chief Accessibility Advocate for the Victorian Department of Transport. She provides an advocacy consultancy to government and non-government agencies. Tricia is a senior member of the Disability Leadership Institute and works to bring a gender lens to Disability Sector and a disability lens to mainstream services. Tricia has been running a consultancy for the past 20 years operating in a range of portfolios including transport, justice, health and housing. Her early career was spent working with engineers in the Public Transport Corporation in Victoria.

Tricia is a member of the NDIA Independent Advisory Council, a Director at the Urgent Action Fund for Women, Asia Pacific and has taken a leave of absence from Melba Support Services. Tricia is a member of the Fire Rescue Victoria Strategic Advisory Council. She is chair of the Client Advisory Committees at OCConnections and at Outlook Australia

Tricia has attended and spoken at many conferences in Australia and overseas, and was the Australian delegate to the International Conference on Population and Development in Nairobi in 2019. In 2019 and 2020, Tricia was Invited to the Indonesian Economic Development Forum, to speak on the Economic Benefits of Employing People with Disabilities and regularly contributes to international forums on disability inclusion.

Tricia was awarded a Medal in the order of Australia for her advocacy work on behalf of people with disabilities in 2017, In 2013 she was inducted into the Victorian Honour Roll of Women for services to women with disabilities. She was the Inaugural President of the Victorian Disability Services Board and was Deputy Chair of the Victorian Disability Advisory Council.

SPEAKERS

Gabrielle Trainor

AO, LL. B, M.A, FAICD

Interim Chair, Infrastructure Australia

Gabrielle Trainor AO is the interim chair of Infrastructure Australia. She also chairs the Construction Industry Culture Taskforce, a collaboration between the construction industry and the NSW and Victorian governments and the Commonwealth Department of Infrastructure, Transport, Regional Development, Communications and the Arts, supported by a team of academic researchers. The aim of the Taskforce is to make a step change in the culture of the industry through the government procurement process.

Gabrielle is a non-executive director and advisor whose experience covers more than twenty-five years on a wide range of boards in the public and private sectors. She has conducted several reviews for governments, including on governance and organisational culture.

Her background is as a lawyer, journalist and public sector executive and she had a long career in issues management and public policy.

Gabrielle's other current appointments include as board member of the Major Transport Infrastructure Authority (Vic), director of Built Group Pty Ltd and the Western Parkland City Authority. She is a commissioner of the AFL, a trustee of the Charlie Perkins Trust, an adviser to Gadens and a director of listed investment company WAM Global.

Jordan Nguyen

Upon completing his PhD in Biomedical Engineering at the University of Technology Sydney, he was accepted into the prestigious UTS Chancellor's List.

Drawing on his experience of almost breaking his own neck, he developed a mind-controlled smart wheelchair for people with high-level physical disability. Now as founder of Psykinetic, he designs life-changing technologies focusing on intelligent, futuristic and inclusive technology.

He is the author of a new book called 'A Human's Guide to the Future', an inventor, and he creates and presents documentaries on ABC Catalyst and Discovery Channel, all about the impacts of science and technology and how we can harness these tools to build a better future. He was a 2017 finalist in Australian of the Year for NSW, named in the Top 100 Most Influential People Globally on Virtual Reality, mad the list of 6 Harper BAZAAR Visionary Men of Australia in 2019, and he recently had the honour of being Master of Ceremonies for former President Barack Obama during his visit to Australia.

His mission is to improve as many lives as possible.

Prof Clive Roberts

FIRSE FIET

Director of the Birmingham Centre for Railway Research and Education (BCRRE)

Lead for the UK Railway Research and Innovation Network (UKRRIN)

Deputy Head of the School of Engineering, University of Birmingham

Clive is Director of the University of Birmingham's Centre for Railway Research and Education, which has over 180 researchers. He works extensively with a broad range of industry and academia in the UK and overseas.

Clive leads a sizeable portfolio of research aimed at improving the performance of engineering systems, with a particular focus on railways. He leads the UK Railway Research and Innovation Network (UKRRIN) – a £92M academia/industry collaboration, as well as initiatives to introduce small and medium sized enterprises to the rail sector. In 2018 his group was awarded the Queen's Anniversary Prize for Further and Higher Education for supporting the UK and international railway industries. His group demonstrated the UK's first hydrogen train at COP26 in Glasgow in 2021 and also won the Guardian University Award for 'Business Collaboration of the Year' for their work on the project. In 2022, Clive was named as the Innovation Thought Leader of the Year at the 2022 Technology Supply Awards.

Stephen Jones

Director Health, Safety and Environment, Inland Rail, Australian Rail Track Corporation

Steve joined the Australian Rail Track Corporation (ARTC) in October 2020 and is responsible for ensuring the Inland Rail Program's continuing commitment to health, safety and environment (HSE) – at work, in the community and at home.

As a chartered HSE professional, Steve has held a range of diverse leadership roles and has more than 20 years' rail infrastructure experience in the public and private sector, both within Australia and overseas.

Before joining Inland Rail, Steve held executive positions in Transport for NSW, including responsibility for all operational readiness activities required to deliver Australia's first driverless railway on the Sydney Metro project. As Executive Director – Safety, Steve provided expertise to help ensure the safe journey of 6 million NSW transport customers each day and had overall accountability for the health, safety and wellbeing of a 25,000-strong workforce.

His leadership in developing and implementing all aspects of HSE policy and frameworks, and his passion for delivering global best practice outcomes, has seen him recognised with several peak industry awards.

BIENNIAL CHIEF ENGINEERS PANEL

Wednesday 21 June 4.20pm, Moderator:

Jane MacMaster

FIEAust CPEng EngExec NER MRAeS

Chief Engineer, Engineers Australia

Jane MacMaster has worked as an aerospace, mechanical and systems design engineer in Australia and internationally, focusing primarily on supersonic flight vehicle design, operations research and rapid prototyping in the Defence and cyber security sectors.

She has previously worked as a senior advisor within the strategy unit of the Department of the Prime Minister and Cabinet. Prior to becoming Chief Engineer at Engineers Australia, she developed a generalised approach for complex problem solving which she taught across all faculties at universities, and to staff from Commonwealth, and State and Territory government departments.

She is a director on the Board of the Australian Council of Professions.

Wednesday 21 June 4.20pm, Participants:

Phil Ellingworth

Chief Engineer, Metro Trains Melbourne

Phil Ellingworth is the Chief Engineer at Metro Trains Melbourne (MTM), responsible for assuring all technical aspects of MTM's operations is in accordance with rail safety national law.

In this role he leads a team of around 200 engineers and 25 graduates across a multitude of specialities, including track, civil, structural, electrical, signalling and rolling stock engineering. Much of Phil's focus centres around the provision of assurance and advisory services, guiding the integration of the Victorian Big Build infrastructure works into the operating network whilst supporting safe, compliant, reliable infrastructure and rolling stock performance, delivering over 2500 passenger services to Victoria each day. Previously, Phil held the role of Principal Advisor in Victoria's Metropolitan Rail Network (within PTV), overseeing the deployment of High-Capacity Signalling within CBTC. Prior to this, he spent 10 years as Managing Director of Invensys Rail Asia Pacific, supervising the Australian and Asia-Pacific regions in one of the top three global railway signalling system providers.

Phil has practical, hands-on experience in delivering complex engineered solutions into multi–disciplinary rail infrastructure environments together with extensive experience and knowledge of contemporary and appropriate capacity enhancing technologies for mainline, heavy haul and metro rail environments across England, Australia, and the Asia Pacific Region.

He is a qualified Chartered Engineer and Professional Signal Engineer by background, and is recognised as an EngExec with Engineers Australia, a credential that recognises pre-eminent individuals in executive positions who have shown exceptional leadership and talent.

Amy Lezala Zahr

Chief Engineer – Rail, Department of Transport and Planning

Amy has been in rail since she graduated in 2007. In that time she has worked in maintenance, design and delivery. She started her career in Materials and Fire Engineering, she then worked in RAMS and Through Life Engineering. Amy has been in Engineering Governance for over 5 years, bringing together her learned experiences. As a people leader, Amy focusses on enabling the individual to deliver for the team.

Across her career, Amy has focussed on a 'whole of life, whole of system' view. She has a passion for sustainability and finding the balance for people, planet and profit.

Chris Van Berendonck

Chief Engineer, Queensland Rail

An accomplished executive experienced at leading technical professionals to achieve in highly dynamic and challenging environments. Adept at navigating customer focussed organisations in technically critical sectors through organisational and asset change. An experienced professional engineer with skillsets in operational and safety critical systems both in acquisition and sustainment. Chris is a Fellow and Chartered Professional Engineer of Engineers Australia and a Registered Professional Engineer Queensland.

Dr Christian Christodoulou

Director of Engineering, Asset Management Branch, Transport for NSW

Christian is a senior executive at Transport for NSW in the role of Director of Engineering, with accountability for technical standards, assurance and technical capability across rail, roads, buses, maritime and ferries.

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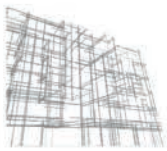
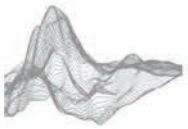


BUILDING

BRIDGE



GEOTECH

Our Services

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Support and assist with technical queries and provide e development based on Australian and Global codes.

GLOBAL TECHNICAL CENTER
24/7 Online platform to connect the users and MIDAS engineers worldwide

CUSTOMIZED TRAININGS
Online or face-to-face trainings to learn MIDAS programs according to the client's specific project need

WEBINARS AND OTHER EVENTS
Hosting webinars and partaking in timely events to broaden the MIDAS knowledge of engineers

PROGRAM

Monday 19 June 2023

10:00 - 17:00	**Technical Tours**
14:00 - 17:00	**Exhibitor Move In** – Exhibition Bays 23 & 24
14:00 - 18:00	**Registration Desk Open**
14:00 - 18:00	**Speakers Preparation Room Open** – Courtyard Room 2
16:00 - 17:00	**Emerging Rail Professionals Icebreaker (Invitation only)** – Hospitality Room 6 & 7
17:30 - 19:00	**Welcome Reception** – Exhibition Bays 23 & 34

Tuesday 20 June 2023

07:00 - 18:00	**Registration Desk Open**
07:30 - 08:00	**Presenter and Session Chair Breakfast** – Eureka Room 1
07:30 - 18:30	**Exhibition Open** – Exhibition Bays 23 & 24
08:30 - 10:00	**PLENARY SESSION**
Room	Goldfields Theatre
08:30 - 08:40	**Welcome to Country**
08:40 - 08:50	**Welcome** – **Tricia Malowney OAM**, Master of Ceremonies
08:50 - 09:00	**RTSA Welcome** – **Tom Keating**, Conference Chair and **Roy Unny**, RTSA Executive Chair
09:00 - 09:25	**Official Opening** – **Paul Younis**, Department Secretary, Department of Transport and Planning
09:25 - 10:00	**Keynote Address** – **Gabrielle Trainor AO, LL.B,M.A,FACID**
10:00 - 10:30	**Morning Tea** – Exhibition Bays 23 & 24

10:30 - 12:30	**CONCURRENT SESSIONS** – Concurrent sessions are 20 minutes presentation + 5-minute questions time				
	1.1A **Bridges and Structures**	1.1B **Environment & Sustainability I**	1.1C **Public Transport**	1.1D **Track I (Design & Constructions)**	1.1E **Systems Engineering I**
Chair	Ali Ghiasi	Maksym Spiryagin	Qian Zheng	Robert Schweiger	Colin Cole
Room	Exhibition Theatrette 1	Eureka 1	Eureka 2	Goldfields Theatre	Eureka 3
10:30	**Structural Monitoring: Practical Perspectives, Actionable Outcomes and Value for Money** **Daniel Ash & Henry Griscti**, ARTC & EngAnalysis, NSW, Australia	**Powering Towards Net Zero - Battery and Hydrogen Fuel Cell technology for Australia's Heavy Haul Freight Industry** **Damien Harding & Roger Buckley**, Aurizon, QLD, Australia	**Real-time Passenger Counting Using mmWave Radar System** **Kareeb Hasan**, Monash University, VIC, Australia	**Comparing Numerical Modelling to Monitored Transient Vertical Rail Deflection** **Andy Doe**, ARTC, QLD, Australia	**Efficiencies in Design, Construction, and Operations Utilising System Information Modelling for Complex Interconnected Systems** **Andrew Lamb & Hayden Short**, I & E Systems and Rail Systems Australia, WA, Australia
11:00	**Rail Structure Interaction – Suggested Improvements to the Australian Bridge Design Standard AS 5100:2017** **Muhammad Shariq & Kristian Santro**, GHD, QLD, Australia	**If Not Hydrogen, Can Batteries?** **Frank Szanto**, Jacobs, NSW, Australia	**Challenges in Station Precinct Lighting Design to Achieve Compliance with Legislative DSAPT Requirements** **Paul Farrugia**, Metro Trains Melbourne, VIC, Australia	**Improving Railway Joint Service Life Through Computational Analysis of its Geometry** **Kaiden Hood**, Central Queensland University, Centre for Railway Engineering, QLD, Australia	**Do the Locomotion: Identifying How Much Rail Drivers Move at Work and Opportunities for Enhanced System Design** **Anjum Naweed**, Central Queensland University, QLD, Australia
11:30	**Inland Rail – Determining the Right Culvert Solution** **Claire Jager**, ARTC, QLD, Australia	**Partial Electrification Option for Traction Energy Decarbonisation of Australian Railway** **Sundar Shrestha**, Arup Pty Ltd, VIC, Australia	**COVID-19: An Existential Crisis for Metro Rail?** **Graham Holden**, Downer, WA, Australia	**Increasing Axle Loads on Existing Infrastructure** **Surendra Bisht**, Aurecon, WA, Australia	**Integration on Complex Rail Projects: What, Why and How at a Glance** **Edmund Ang & Khawaja Aniq**, Aecom Australia & John Holland, NSW, Australia
12:00	**Wind Effects on Four Track Cantilever Overhead Wiring Structures** **Satyajit Datar & Kanjana Siamphukdee**, Aurecon, VIC, Australia	**Evaluation of the Stress Levels in Plastic Composite Sleepers** **Cong Qiu & Guixiang Zhao**, Monash Institute of Railway Technology, VIC, Australia	**Planning Railway and Metro Stations to Effectively Serve Major Events** **Pietro Crovato**, GHD, NSW, Australia	**Automating 3D Rollingstock Clearance Outlines** **Andrew Smetherham, & Ryan Spooner**, Arup, WA, Australia	**Next Generation Train Control** **Chris Bosomworth**, Insyte Solutions, QLD, Australia
12:30 - 13:30	**Lunch** – Exhibition Bays 23 & 24				

Interactive Zone Presentations

Recyclable steel-reinforced KLP® Hybrid Polymer Sleepers: 45 years of evolution from structural elements into durable alternative rail sleepers
Gerhard Klooster, Link Asia Pacific

Applications of autonomous sensor networks for monitoring track and key rail assets
Andrew Jones, Position Partners Pty Ltd

Tuesday 20 June 2023 (continued)

13:30 - 15:30	**CONCURRENT SESSIONS** – Concurrent sessions are 20 minutes presentation + 5-minute questions time				
	1.2A **Inspection & Condition Monitoring I**	1.2B **Train-Track Interaction I**	1.2C **Major Project Innovations**	1.2D **Safety & Risk Management I**	1.2E **Traction Systems**
Chair	Briony Croft	Darrien Welsby	Tricia Malowney	Maneesh Gupta	Ismet Perona
Room	Eureka 3	Eureka 2	Goldfields Theatre	Eureka 1	Exhibition Theatre
13:30	**New Wheel Sensor Angle of Attack Measurement System** **Jiandong Jiang**, Transport for NSW, NSW, Australia	**Principles of the Implementation of Wheel-Rail Friction Measurements in Rail Digital Twins** **Maksym Spiryagin**, CQ University, QLD, Australia	**Separating Trains From Trams - Design and Engineering Challenges on the Glen Huntly Level Crossing Removal Project** **Jeremy Gutierre**, WSP, VIC, Australia	**Demonstrating SFAIRP** **Gaye Francis**, R2a, VIC, Australia	**Progress on Design Optimisation of Railway Pantograph-Catenary Systems** **Hanlei Wang**, Monash University, VIC, Australia
14:00	**Clustering Based Classification of Unbalanced Freight Traffic Loads Based on Wayside Monitoring** **Ruben Silva**, University of Porto, Porto, Portugal	**Influence of Wagon and Locomotive Wheel Diameter Differences on Wear and RCF Considering Train Operational Conditions** **Esteban Bernal**, Central Queensland University, Centre for Railway Engineering, QLD, Australia	**Design and Installation of PORR Precast Concrete Track Panels for the Melbourne Tunnel Project** **Nick Prasad & Dietmar Bobacz**, John Holland & VCE, SA, Australia & Austria	**Analysis of Lighting Effects on Train Conspicuity** **Elias Kassa**, Monash University, Melbourne, VIC, Australia	**Power Quality in AC Traction Networks - A Case Study** **Thomas Smith**, Arcadis, QLD, Australia
14:30	**Acoustic Emission Method for Non-Destructive Defect Detection in Flash-Butt Welded Rails** **Fangzhou Zhang**, Monash University, VIC, Australia	**Economic Argument for Source Control of Freight Rail Noise** **David Hanson**, Acoustic Studio, NSW, Australia	**Perth's Airport Line – How Three Train Stations are Set to Become Urban Catalysts While Providing Affordable Transport Solution** **Ricardo Kiperman**, GHD Design, WA, Australia	**Is Too Much Safety Safe? The Danger of Large Safety Arguments** **Andrew Gabler**, Acmena, QLD, Australia	**Engineering Out Failures – Spark-Erosion in Electric Traction System Components** **David Stuart-Smith**, Arup, NSW, Australia
15:00	**Where's That Defect? Unlocking IRV Geospatial Mapping Potential** **Harindu Korala**, Monash University, Institute of Railway Technology, VIC, Australia	**Comparison of White Etch Layer Induce by Rail Grinding Vs Rail Traffic** **Ash Athukoralalage**, Speno Rail Maintenance Australia, NSW, Australia	**Smart Parking: A Technology-Enabled Parking System That Transforms the Way We Commute for Work** **Harman Singh & David Murphy**, Level Crossing Removal Project, Melbourne, VIC, Australia	**Development of a Risk-Based Prioritisation Tool to Assess Errant Vehicle Risk to Railway Networks** **Mostafa Emara**, Metro Trains Melbourne, VIC, Australia	
15:30 - 16:00	**Afternoon Tea** – Exhibition Bays 23 & 24				

Tuesday 20 June 2023 (continued)

16:00 - 17:30	**CONCURRENT SESSIONS** – Concurrent sessions are 20 minutes presentation + 5-minute questions time			
	1.3A **Rolling Stock I (Design)**	1.3B **Systems Engineering II**	1.3C **Railway Materials**	1.3D **Environment & Sustainability II**
Chair	Amir Shamdani	Mohamed Awadalla	Wilson Wong	John Watsford
Room	Goldfields Theatre	Eureka 1	Eureka 2	Eureka 3
16:00	**What is Critical Speed? A Review of the Use of Standards for Assessment of Hunting Stability in Simulation** **Scott Younes**, Monash Institute of Railway Technology, VIC, Australia	**The Challenge of Deploying COTS Products into Australian Railways** **Justin Drinkwater**, Acmena, NSW, Australia	**Outcome-Led Strategies for Optimal Procurement in Rail** **David Stuart-Smith**, Arup, NSW, Australia	**Zero Carbon Energy Storage Options for Intermodal Freight Trains** **Colin Cole**, Central Queensland University, Centre for Railway Engineering, QLD, Australia
16:30	**Building a Train, One Layer at a Time: Additive Manufacturing in the Railway Industry** **Michael Crocker**, Public Transport Authority of WA, WA, Australia	**Implementing a Systems Engineering Discipline in Queensland Rail** **Brenton Atchison**, Queensland Rail, QLD, Australia	**Ranking of Endpost Materials of Insulated Rail Joints for Cyclic Wheel Loadings** **Nirmal Mandal**, Central Queensland University, Centre for Railway Engineering, QLD, Australia	**Alternative Technology for Zero Emission Rail Systems** **Daniel Hill**, Network Rail Consulting, VIC, Australia
17:00	**Approach to RAM Modelling for Rolling Stock Assets** **Allen Tam**, DB Engineering & Consulting GmbH, VIC, Australia	**Driving at Cross Purposes: A Problem Analysis of an Australian Automatic Train Protection System Based on the ETCS-DMI** **Anjum Naweed & Reece Blaschek**, Central Queensland University, Centre for Railway Engineering, QLD, Australia & Keolis Downer Adelaide, SA, Australia	**Investigation of Wheel Material Mechanical Properties at Elevated Temperatures** **Lily Tran**, Monash Institute of Railway Technology, VIC, Australia	**Passenger Rolling Stock – From Diesel to Net Zero** **Shaun Robertson & Bhevene Govender**, Mott Macdonald, NSW, Australia
17:30 - 18:30	**Poster and Networking Session** – Exhibition Bays 23 & 24			

Wednesday 21 June 2023

07:00 - 17:00	**Registration Desk Open**
07:30 - 08:00	**Presenter and Session Chair Breakfast** – Eureka 1
07:00 - 16:00	**Exhibition Open** – Exhibition Bays 23 & 24
08:30 - 10:00	**DAY 2 PLENARY SESSION**
Room	Goldfields Theatre
08:30 - 08:35	**Welcome Day 2** – Master of Ceremonies
08:35 - 08:50	**Emerging Rail Professional Scholarship Presentations** Making our Railway Network Safer for Female Passengers **Lauren Guiney** Wheel Rail Interface – Rollingstock Adhesion **Theo Vander Heyden** What I learnt on a major railway project **Avinderjit Singh Daljit Singh**
08:50 - 09:20	**Keynote Address** – **Prof Clive Roberts, FIRSE, FIET**
09:20 - 10:00	**Keynote Address: AI and the Future of Rail** – **Dr Jordan Nguyen**
10:00 - 10:30	**Morning Tea** – Exhibition Bays 23 & 24

Be sure to vote following these presentations for the Emerging Rail Professional award

Wednesday 21 June 2023 (continued)

10:30 - 12:30	**CONCURRENT SESSIONS** – Concurrent sessions are 20 minutes presentation + 5-minute questions time				
	2.1A **Looking into the Future**	2.1B **Signals & Communications**	2.1C **Safety and Risk Management II**	2.1D **Track II (Design & Construction)**	2.1E **Train-Track Interaction II**
Chair	Tom Keating	Steve Boshier	Simon Wood	Jonathan Barnes	Peter Mutton
Room	Eureka 1	Exhibition Theatre	Goldfields Theatre	Eureka 3	Eureka 2
10:30	**Application of Reference Class Forecasting to the Australia Passenger Rail Market** **Roy Unny**, Mott Macdonald, VIC, Australia	**System Reliability Growth Assessment - A Case Study** **Steven Gibson**, RGB Assurance, WA, Australia	**What Does Safe SFAIRP Really Mean in Major Project Delivery?** **Graham Holden**, Downer, WA, Australia	**Dual Gauge Infrastructure for the 21st Century: The Integration of 1435mm and 1600mm Gauges** **Shane Cooper**, V/Line, VIC, Australia	**Gauge Face Friction Control Optimization for a High Density, Mixed Traffic (Freight and Transit) Railway Network** **Andrew Lagos & Ben Muscat**, Sydney Trains, NSW, Australia
11:00	**Automation of the Australian Level Crossing Assessment Process** **Hooman Alenoori & Paul Murray**, NTRO, ACT, Australia	**Improving the Design of Auditory Warning Signals for Australian Trains** **Shahrzad Akbarzadeh Pooladi**, Arup, QLD, Australia	**How Can Female Perceptions of Safety Research Change Railway Lighting Standards?** **Morgan Foster & Hoa Yang**, Arup, VIC, Australia	**Reliable Turnouts for Highest Axle Loads** **Uwe Ossberger**, Voestalpine Railway Systems, Austria	**Railway Bridge Transition Zone Design Details – A Review of Current Practice** **Andy Doe & Robert Hu**, ARTC, QLD, Australia
11:30	**A New Trend In Rail Signalling Training** **Frank Heibel**, Doc Frank Rail Services, WA, Australia	**Migration Strategy: GSM-R to FRMCS** **Rodrigo Alvarez**, Rail Systems Australia, WA, Australia	**Managing Interfaces - The Key to Success** **Michael Horgan**, Rail Confidence, NSW, Australia	**Mind The Gap: Tackling Platform Gap Challenges in Existing Railway Stations for Improved Accessibility** **Ghazaleh Tabarsi**, Aurecon Group, VIC, Australia	**Mechanics in Wheel Squeal** **Scott Simson**, Bradken, NSW, Australia
12:00	**Characteristics of Good Quality Requirements, and Use of AI (Artificial Intelligence) Tools to Improve Requirements Quality** **Dhana Venkatachalam**, Aurecon, VIC, Australia	**Communication Based Train Control (CBTC): Train Controller and Dynamics** **Qing Wu**, Central Queensland University, Centre for Railway Engineering, QLD, Australia	**A Better Understanding of Rail Incidents – Rail Incident Dashboard** **Sarangan Paskarajothy**, KPMG, NSW, Australia	**Relationship Between Track and Tunnel Centrelines** **Eric Wang**, Mott Macdonald, NSW, Australia	**Digital Twin Study to Investigate the Impact of Heavy Haul Train Driving Strategies on Rail Wear** **Sanjar Ahmad**, Central Queensland University, Centre for Railway Engineering, QLD, Australia
12:30 - 13:30	**Lunch** – Exhibition Bays 23 & 24				
	Interactive Zone Presentations Work Smarter with Your LiDAR DATA **Jamie Ibrahim**, Agonics Rails on Bridges in MIDAS Civil **Norlan De Ver**, Midas				

Wednesday 21 June 2023 (continued)

13:30 - 15:30	CONCURRENT SESSIONS				
	2.2A **Rolling Stock II (Freight)**	2.2B **Inspection & Condition Monitoring II**	2.2C **Track III (Maintenance)**	2.2D **Light Rail & Metro Systems**	2.2E **RTSA 25 Years in Motion**
Chair	Tim Constable	Alan Braithwaite	Jonathan Duvel	Matt Kwong	Roy Unny
Room	Eureka 3	Exhibition Theatre	Eureka 2	Goldfields Theatre	Eureka 1
13:30	**Freight Wagon Rectification for Improved Steering Performance** **Jiandong Jiang**, Transport for NSW, NSW, Australia	**Wayside Monitoring System for Safe Rail Transportation – The WAY4SafeRail Project** **Rúben Silva**, University of Porto - Faculty of Engineering, Porto, Portugal	**The Role of Bond-Line Defects in Variable Slow Bend Tests for Rail Flashbutt Welds** **Anthony Micheletto**, Monash University, VIC, Australia	**Axle Counters and Broken Rail Management – Metro Trains Melbourne Experience** **Timothy Royal**, Metro Trains Melbourne, VIC, Australia	**Improving Networks Capacity Without Track Quadruplication: A Large Panel of Low Footprint Alternative Solutions Implemented over the Past 25 Years** **Julien Morizet**, WSP Australia Pty Ltd, QLD, Australia
14:00	**Breakthrough in Continuous Unloading with the Kiruna Wagon Helix Dumper** **Neville Kelly**, RCR Mining Technologies, VIC, Australia	**Flood Monitoring and Impact Assessment for Linear Infrastructure Projects** **Ayub Ali & Hartley Bulcock**, ARTC Inland Rail, QLD, Australia	**Adapting Aluminothermic Welding to Restricted Track Access in Suburban Networks – A Queensland Rail Experience** **Carlos Valente**, Queensland Rail, QLD, Australia	**Retirement and Disposal of Life-Expired Comeng Rolling Stock** **Will Marshall**, Department of Transport, VIC, Australia	**New York's 25-Year CBTC Journey** **Frank Heibel**, Doc Frank Rail Services, WA, Australia
14:30	**A Quantitative Comparison of AS 7520.2 and ROA-AAR Freight Rolling Stock Structural Design Standards** **Warren Williams & Liam Irvine**, Advisian, VIC, Australia	**Experiences from Transitioning to Predictive Maintenance Based on Way Side Detector Data** **Jesper Westerberg**, Predge Ab, Bd, Sweden	**Aligning Track Geometry Requirements for Rolling Stock Qualification and Track Management** **Nithurshan Nadarajah**, Monash Institute of Railway Technology, VIC, Australia	**A Streetcar to be Desired..? Exploring The Impacts of Tram Network Modern-isation on Community Perceptions of Place Quality** **Ian Hopkins & Matthew Diemer**, Yarra Trams & Auckland Transport, VIC, Australia	**New Track and Track Upgrades for Rail Sector Growth – The Past and Next 25 Years** **Philip Laird**, UOW, NSW, Australia
15:00	**Investigation of an 8-Axle Freight Locomotive Design as a Possible Net-Zero-Emission Motive Power Solution for Australian Rail Operational Tasks** **Maksym Spiryagin**, Central Queensland University, Centre for Railway Engineering, QLD, Australia	**Engineering and Implementation of Sydney Trains 4th Generation Wayside Bearing, Brake and Traction Temperature Monitoring System** **Arnab Roy & Shane Doyle**, Sydney Trains, NSW, Australia	**Experimental Approach to Evaluate Performance Differences of HD and Standard GIRJ Using ATIS** **Ian Hoather**, Aurizon, QLD, Australia	**From Good to Great – Reconfiguring Auckland's Britomart Station to Accommodate the City Rail Link** **Grant Daniel**, Aurecon NZ, Auckland, New Zealand	**30th Anniversary of High-Speed-Rail in Germany – When Will HSR Become Available in Australia?** **Tilo Franz**, Db E&c, VIC, Australia
15:30 - 16:00	**Afternoon Tea** – Exhibition Bays 23 & 24				

Wednesday 21 June 2023 (continued)

16:00 - 17:00	**Closing Session**
Room	Goldfields Theatre
16:00 - 16:20	**ARTC Inland Rail Update** – Stephen Jones
16:20 - 17:20	**Biennial Chief Engineers Panel** – Moderator: **Jane MacMaster**, Participants: **Phil Ellingworth**, MTM, **Amy Lezala Zahr**, DTP, **Chris Van Berendonck**, Queensland Rail and **Dr Christian Christodoulou**, Transport for NSW
17:20 - 17:30	**Closing Remarks**
19:00 - Late	**RTSA 25th Anniversary Gala Dinner** – Palladium Ballroom, Crown Towers

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SOCIAL PROGRAM

Welcome Reception

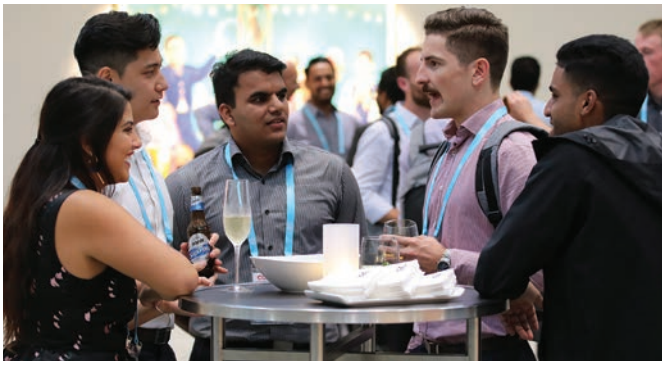
Date:	Monday 19 June 2023
Time:	17:30 - 19:30
Room:	CORE 2023 Exhibition, Bays 23 and 24
Dress:	Smart Casual

Delegates and exhibitors are invited to the Welcome Reception. This is an opportunity for us to welcome you to the Conference and for you to meet and mingle with other participants or rekindle past friendships.

Poster Networking Session

Date:	Tuesday 20 June 2023
Time:	17:30 - 18:30
Room:	CORE 2023 Exhibition, Bays 23 and 24
Dress:	Smart Casual

At the conclusion of Day 1 enjoy a casual drink and nibbles amongst the CORE exhibition and reflect on the days proceedings. A great opportunity to also view the posters during this reception.



Gala Dinner

Date:	Wednesday 21 June 2023
Time:	19:00 - late
Room:	Crown Towers, Palladium Ballroom, 8 Whiteman St, Southbank
Dress:	Business Formal

The Palladium at Crown is Australia's premier ballroom and has been the venue of choice for some of Australia's most prestigious events including the AFL Brownlow Medal and the Allan Border Medal.

Celebrate the close of CORE 2023 in style and your last chance to reconnect with colleagues whilst enjoying food, wine and entertainment from Logie award winning Melbourne comedian Dilruk Jayasinha

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EXHIBITION

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ABEN Technical Services is one of the leading service providers for inspection, testing, and analysis in a wide range of industries. Having highly qualified and experienced engineers and experts, as well as well-equipped laboratories, we provide the following comprehensive range of testing and services both on-site and within our laboratories:

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AusRAIL PLUS 2023 is the must-attend event for the Australasian rail industry, bringing together key players, experts, and innovators from across the industry. As the premier rail conference in the Asia Pacific, AusRAIL PLUS 2023 will provide a unique platform for networking, knowledge sharing, and exploring the latest advancements in rail technology, infrastructure, and operations. Join 5,000+ colleagues for AusRAIL PLUS, 13 – 16 November in Sydney – run for the industry, by the industry.

Centre for Railway Engineering
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The Centre for Railway Engineering (CRE) is an industry focused research centre hosted by CQUniversity and located in Rockhampton. CRE is a provider of world-class research to the rail industry, delivering innovative solutions, engineering consulting and commercial outcomes. Through its research and close collaboration with industry, CRE has become internationally recognised as a leader in the provision of applied engineering research for railway owners, operators and manufacturers. The Centre is specifically known for expertise in rollingstock, multi-body dynamics, simulation, condition monitoring and non-linear modelling.

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Cold Forge develops and supplies engineered products focused on delivering competitive, reduced cost-of-ownership product solutions for the maintenance and construction of rail permanent way including track, steel sleepers, fastenings and related components. Cold Forge holds ISO9001 accreditation (including design), is an Australian Trusted Trader, and is an active participant in RISSB development groups. We develop innovative solutions to address customer challenges where none exist, and partner with industry leaders where existing solutions meet our customer needs. Our partnerships include British Steel, Progress Rail and Pandrol.

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Rick Morgans

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The IRSE is the professional institution for all those engaged in or associated with railway signalling and telecommunications, train control, traffic management and allied professions. The Institution aims to advance the science and practice of train control and communications engineering within the industry, and to maintain high standards of knowledge and competence within the profession. The IRSE hold regular events around Australasia and the world to encourage knowledge sharing, open discussion and networking. Join the IRSE today for access to our regular events, opportunities to meet industry colleagues from around the world and support for your development as an engineer.

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Key Direction Limited is an integrated railway solutions provider with strategic business operations in 20 cities across the globe and international offices situated in Hong Kong, Macao, Malaysia, Singapore and Australia. Established 15 years ago (2008) in Hong Kong, we are a private limited company with a proven track record of delivering cost-effective and future-forward railway solutions to our customers worldwide. Our strong commitment towards becoming a global leader in this field has enabled us to build up a growing customer base of more than 60 corporations globally and a workforce of more than 60 employees and associates.

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Link Asia Pacific (LinkAP) are the sole agency in Australia and New Zealand for KLP Hybrid Polymer sleeper products, which are manufactured by Lankhorst Engineered Products in the Netherlands. KLP sleepers are composite polymer, steel reinforced sleeper products which include mainline sleepers, turnout bearers, bridge transoms, low-profiletunnel sleepers and more. The sleepers can be engineered to suit client requirements. KLP products are manufactured from recycled plastics which are recyclable, robust, and technologically advanced. They have been in use since 2006 and have been installed across multiple counties in Europe, in New Zealand (KiwiRail) since 2019 and Australia (TasRail) since 2022.

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Monash Institute of Railway Technology
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Monash Institute of Railway Technology (IRT) based at Monash University is the premier track and vehicle railway research centre in Australia and enjoys an international reputation for excellence in railway research. Monash IRT is one of the main technology service providers to heavy haul railway operations and leading mass transit railway systems. Monash IRT provides a "one-stop" technology access point for the railway industry. The Institute's comprehensive and systematic approach to problem solving using its team of experienced technical specialists has led to significant savings to its customers' operating and capital costs, surpassing all expectations and providing value added environmental benefits.

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- Asset condition assessment, asset renewal and maintenance work program development; and
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Position Partners
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Predge
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Predge delivers a sophisticated decision support service for operation and maintenance for both Rolling Stock and Rail Infrastructure. By utilizing existing data sources, failures of assets are forecasted, the remaining useful life is quantified, and actionable insights are provisioned. Our approach is unique, as it combines domain knowledge, first principles and AI in the analytics to generate the actionable insights. Data sources include condition data from wayside monitoring equipment such as wheel impact loads, acoustics, hot box, hot wheel, and wheel profile data. The solution utilizes various other data sources from the customer relating to operation and maintenance for a more holistic view on the asset degradation.

Rail Industry Safety and Standards Board
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RISSB is a dynamic organisation that is at the forefront of safety and standards development in the rail industry. RISSB is helping drive national harmonisation and interoperability, moving the rail industry towards technical and operational consistency, improving safety, lowering costs and enhancing productivity. With a vast catalogue of more than 200 publications, RISSB is industry's partner in co-regulation, supporting and working with the Australian rail industry to provide the essential tools rail organisations need – good practice Standards, Codes of Practice, Guidelines and Rules and is the only accredited Standards development organisation for the rail industry in Australia. RISSB also fosters knowledge sharing and networking through its various forums, groups and committees and works collaboratively with the Australian rail industry to move to harmonised safety practices across the country.

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Rail Systems Australia (RSA) is an Australian company providing the rail industry with engineering solutions for conventional and advanced signalling, communications systems, and asset management. Our emphasis is on designing, engineering and implementing safe, reliable and cost-effective integrated packages for train control. Backed by a proud record of delivery, we form collaborative partnerships with rail operators and their suppliers to steer through complexity. RSA introduces Nexxiot, Viezo, Prover and VIAVI and, in partnership with these innovative companies, we are providing customers with access to leading-edge technologies to support the successful delivery of predictive maintenance, communication, signalling and train control solutions.

Rail Track Association Australia Incorporated
Claudia Lu

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The Rail Track Association Australia, (RTAA) is dedicated to pursuing and promoting the interests of railway infrastructure within the Australian rail sector. With a proud history which began in 1973, the RTAA brings together owners, contractors, consultants, manufacturers, suppliers, academics, research and development personnel, regulators and individuals who are part of the Australian rail infrastructure community. Members come from all walks of the industry and include individuals and corporate bodies

Roundel Civil products Pty Ltd
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Salix is an Australian owned and operated business providing rail design, engineering and product supply and delivery in Australian, New Zealand and international markets for over 18 years. Salix has a reputation for innovative and sustainable solutions and delivering complex projects. Salix has developed our Green Range which focuses on sustainable, low carbon and environmentally friendly track and civil products for the rail corridor.

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As a leader in intelligent transport solutions for more than 175 years, Siemens Mobility is constantly innovating its portfolio. Its core areas include rolling stock, rail automation and electrification, a comprehensive software portfolio, turnkey systems as well as related services. With digital products and solutions, Siemens Mobility is enabling mobility operators worldwide to make infrastructure intelligent, increase value sustainably over the entire lifecycle, enhance passenger experience and guarantee availability. It has been in Australia & New Zealand for more than 150 years and employs over 600 people with offices in all major capital cities and manufacturing sites in Melbourne and Perth.

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Speno Rail Maintenance Australia (SRMA) is a world leader in the field of rail maintenance, technology, diagnostics, and rail rectification. Our mission is to provide our customers with sustainable, high-quality rail grinding and rail testing solutions through innovation and professionalism in a safe working environment. With a strong presence in Australia and New Zealand, SRMA prides itself on working closely with customers to provide rail grinding and rail testing solutions through accountability and transparency and tailored to the customer's needs. SRMA maintains contracts with rail infrastructure managers in mining, resource, heavy haul, commuter (metro and regional), and light rail networks. SRMA values its people, partners, and customers by being environmentally conscious, promoting socially acceptable activities, and delivering a safe working environment. Through innovation, professionalism, safety, and sustainability, SRMA is a trusted brand striving to exceed expectations. base of more than 60 corporations globally and a workforce of more than 60 employees and associates.

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Thermit Australia is a part of the Goldschmidt Group – the global network of experts for the railways. Together we lead your rail infrastructure into the future, with smart solutions, services and products. Thermit Australia has been in operation for over 60 years, and is well situated to offer the highest quality products and services to the local rail industry. Our products such as Thermit Weld Kits and Consumables, Glued Insulated Joints, Tracksafe Barriers, Rawie Buffer Stops and more, along with our technical services such as grinding and welder training, make Thermit Australia a trusted and reliable partner in the railway market.

UIC International Union of Railways
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The International Union of Railways is the worldwide organisation tasked with promoting rail transport and developing the railway system to support the strategy of its Members (which include rail operators, infrastructure managers and railway service providers).

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Westermo offers a complete range of data communications solutions designed to meet the demanding requirements of a diverse range of applications encountered within the rail industry. Our networking technologies are used to support both vital and non-vital communications and are installed in thousands of railway trackside and onboard rollingstock applications globally.
In Australia and New Zealand, Westermo have been providing highly reliable, robust and cybersecure communication solutions to the Rail Industry for over 20 years. In 2016, Westermo opened an Australian sales and support office with a team of dedicated personnel to better service the needs of our Australian and New Zealand customers.

RTSA AWARDS

Australasian Rail Industry Awards 2021 RTSA Young Rail Professional Award

Recipient: Mary Nguyen

Citation: RTSA Executive Chair Roy Unny said Mary's engineering and planning knowledge has led to multiple innovative solutions.

"Mary's enthusiasm for technology has not only improved how Sydney Trains makes decisions and manages project requirements for critical resources, she has saved hundreds of hours of time for staff with her Access Locator App and track possession software," Mr Unny said.

"She is also a passionate advocate for diversity, gender equality and inclusion and is a shining example of how modern the rail industry is."

2021 Railway Graduate Engineer Award

Recipient: Linda Li

Citation: Linda Lin has completed her Bachelor of Engineering (Honours)-Civil and is currently working in Arup's Queensland Rail team. Linda has worked in various major rail and civil engineering projects including the Gippsland Line Upgrade, Cross River Rail and Beerburrum to Nambour Rail Upgrade, where she is involved in proponent design documentation reviews, management of the Systems Breakdown Structure, PSTR reviews and Value Engineering. Linda is also currently the track drainage discipline lead for the Gippsland Line Upgrade as part of Victoria's Regional Rail Revival initiative.

Linda is a Skills Manager of Arup's Australasia Skills Network, an active member of Arup's Community Engagement Committee and part of the Technical Operations Group in Arup. She is also an active member of the ARA, RTSA and Young Engineers Australia Queensland and has delivered multiple presentations in technical events and conferences.

2021 Railway Graduate Engineer Award

Recipient: Brendan Cornish

Citation: Brendan Cornish completed his Bachelor of Engineering (Honours)-Mechanical three years ago. Since then, he has joined Transport for NSW and later joined SNC-Lavalin's Rail Vehicle Engineering team in Sydney. His skills and experience as a rolling stock mechanical engineer have expanded over time to cover procurement and delivery support for Australian rolling stock, compliance certification, vehicle refurbishment, retrofit for Automatic Train Control, reliability monitoring, and end-of-life assessment.

Brendan has worked on numerous significant projects across Australia including Sydney Growth Trains and Automatic Train Protection in New South Wales, New Generation Rollingstock and Cross River Rail in Queensland, Canberra Light Rail Stage 1 in ACT, and the Metronet project in Western Australia.

Brendan is actively working towards Chartered status. He has supported the delivery of SNC-Lavalin's Australian Graduate Programme and serves as a mentor for interns and graduates in the business.

2021 Young Railway Engineer Award

Recipient: Andrew Tay

Citation: Andrew Tay is a Chartered Engineer with 10 years of experience in Overhead Line Engineering. He is currently working as a Senior Overhead Line Engineer and director for ELITE Overhead Wiring Solutions. Andrew has a Bachelor of Engineering (civil) degree and Advanced Diploma of Applied Electrical Engineering.

Andrew started his career with GHD as a design consultant and worked on various construction projects with EM-Rail / Rhomberg Rail Australia. In 2020, Andrew has founded Elite Overhead Wiring Solutions with his co-founders and continue to provide his technical capacity to the Australian railway electrification development. He has made significant contributions to many key rail projects in Western Australia such as Perth City Link, Butler Extension Project, and many METRONET projects.

Andrew is an active member of RTSA and has volunteered his services to the WA Chapter since 2014 and awards sub-committee since 2016. He has organised various railway professional events which benefited many members, in particular the young generations in railway industry.

2021 Young Railway Engineer Award

Recipient: Sanya Kerawala

Citation: Sanaya Kerawala is a Principal Rail Engineer and Chartered Civil Engineer at Mott MacDonald, with ten years of experience in the delivery of conventional, metro and high-speed rail schemes globally, specialising in permanent way and multi-disciplinary design management.

Sanaya started her career in the UK, working as a Track Engineering Lead where she managed a team of engineers responsible for an 80km-package on the High Speed 2 project, Europe's largest infrastructure project. After relocating to Australia, Sanaya is the Track and Alignment Lead for Sydney Metro West and is responsible for delivering the alignment design for 24km of track, including nine new stations and a depot. Sanaya is also the Design Lead for a major tunnelling package on Sydney Metro West, leading a multi-disciplinary team responsible for the tunnelling and station box excavation design in the centre of Sydney and supporting the Early Contractor Involvement phase.

Sanaya is an enthusiastic advocate for young people and women to enter engineering and has supported a range of events and initiatives, such as STEM outreach work, early career professional development forum, and knowledge sharing presentations.

2022 Young Railway Engineer Award

Recipient: Adriane Ho

Citation: Adriane Ho is a Chartered Mechanical Engineer with 12 years' experience in rolling stock and rail operations on networks and projects throughout Australia, Hong Kong, Malaysia and Singapore. Adriane's experience is equally vast in terms of technical application having worked through projects involving all periods of the asset lifecycle, from planning studies, to procurements, testing commissioning, maintenance optimization and depot interface related projects as well as life extension and decommissioning. She has excelled in the application of her rolling stock eminence with almost all forms of rolling stock - suburban passenger trains, metro, light rail/tram, regional and intercity trains (including high speed), locomotive as well as track maintenance, plant and engineering vehicles. Adriane is currently working as a Lead Engineer, Rolling Stock at Aurecon leading a team of over 15 professionals ensuring technical excellence is delivered to a variety of clients on rolling stock projects at different stages of asset life cycle.

Further to rolling stock technical expertise, Adriane's has a vast interest in railway asset management and rail operations planning. She has obtained a certificate level on ISO55000 and adopted the principles of ISO55000 on various asset management projects. She has prepared and published technical papers in this topic and delivered training sessions.

Adriane is a mentor and active promotor for railway engineering and women in engineering. She volunteered her time to support Institution of Mechanical Engineer and Institution of Engineering and Technology in particular the young members and female students.

2022 PhD Thesis Award Runner-Up

Recipient: Dr Hang Su (Rick)

Thesis: Plastic deformation of flash butt welds in high strength rail steels in heavy haul railway systems

Place of Study: Monash University, Clayton, Australia

Dr Hang Su's thesis is awarded to be the Runner up of the RTSA 2022 PhD Thesis Award. The investigation and research findings from his thesis form the fundamentals for understanding the ratcheting performance of rail welds and parent rails in terms of rolling contact fatigue initiation and provide information for railway operators to develop more reliable and cost-effective maintenance strategies for rails.

The application of premium high strength rail steels has been evidenced to improve the overall performance of heavy haul operations by controlling or reducing rail degradation. However, these benefits can be offset by the potential of localized degradation in rail flash butt welds. It has been found that plastic ratcheting plays an essential role in causing rail degradation. Variety of tasks and experiments were designed and performed to investigate the plastic deformation (in particular ratcheting behavior) of flash butt welds in high strength rail steels in Australian heavy haul railway environment. Dr Su's thesis provides comprehensive description of the investigation process, data gathered, and research outcomes which provides valuable information for further research in this field.

2022 Railway Engineering Student Thesis Award

Recipient: Kieranpal Sidhu

Citation: Kieranpal Sidhu is awarded with the 2022 RTSA Student Thesis Award for his novel and pertinent thesis presenting locomotive energy harvesting to decarbonize heavy haul by a fully loaded diesel-electric locomotive. This study simulated a fully loaded GT46Ace diesel-electric locomotive traveling along the straight-line non-elevated segments of a railway track, at a constant speed of 50 km/h, under dry contact conditions, and, for a simulation time of 20 seconds. With the corrugation along the railway track forced the rigid bodies of the locomotive to vibrate, kinetic energy could be harvested. The net energy available for use after the GT46Ace locomotive had travelled an accumulated track length of 130 km was 44.83 Wh. Kieranpal has concluded that the total average net power generation was 17.74 W which was insufficient to operate as a consistent power source for the locomotive's electric traction motors. Kieranpal has conducted further study to seek practical use of the harvested net energy. He recommended for the net energy to be collected in an energy storage system which could be discharged later. After a simulated trip, a minimum 45 Wh energy storage system could be discharged to power a 100 W lightbulb in the train cabin for approximately 26.9 minutes.

2022 Railway Engineering Student Thesis Award

Recipient: Michael Bourke

Citation: Michael Bourke is awarded with the 2022 RTSA Student Thesis Award for his thesis presenting whether the White Triangle signals are an effective safety mechanism system, its optimisation strategies and potential use on all light rail networks. This study assessed one method of reducing intersection delays used on Sydney's CBD and South East Light Rail (CSELR). The CSELR provides an extra 'White Triangle,' signal, displayed before the 'proceed,' indication (green light). This allows drivers to continue up to a red light at speed, knowing that the light is about to change in their favour. A thorough literature review found similar systems used around the world. However, limited guidance exists to aid signal designers and support the use of White Triangles in minimising journey times. Michael's thesis has discovered that White Triangle signals provide significant theoretical time savings of 5 to 30 seconds per intersection. Whilst only some of this is achievable in practice, White Triangles also reduce light rail vehicles signal phase lengths and maximise Transit Signal Priority effectiveness. The signals thus offer potential reductions in passenger journey times and cost savings to network operators.

2022 Railway Graduate Engineer Award

Recipient: Bryan Law

Citation: Bryan Law has completed both a Bachelor of Engineering (Honours) at Australian National University, majoring in Mechanical and Material Systems with a Minor in Project Management, as well as completing his Masters of Systems Engineering from the University of New South Wales, majoring in Test and Evaluation. Bryan currently works as a Systems Engineering and Safety Assurance (SESA) Engineer for Arch Artifex where he is responsible for deploying SESA processes on projects for a variety of clients. He has also held previous roles as a Signalling and Communications Engineer with WSP Australia where he worked on the Cross River Rail Project in QLD on ETCS Signalling systems, Rio Tinto's Next Gen Level Crossing Systems Project, Inner Armadale Level Crossing Removal Project, Platform and Signalling Upgrade Program in Perth, and the City Rail Link project in New Zealand.

Bryan is also an active mentor in the ABCN (Australian Business and Community Network) program, volunteers on the RTSA Queensland Chapter Committee, was a mentor in the ARA Mentoring program and volunteered for the Australian National University throughout his undergraduate degree for 4 years. Bryan's goal is to continue encouraging the younger generation to be more innovative and enter into STEM.

2022 Railway Graduate Engineer Award

Recipient: Andrew Smetherham

Citation: Andrew Smetherham has completed a Bachelor of Engineering (First Class Honours) at Curtin University, majoring in Civil and Construction. Andrew currently works as a Rail Engineer for Arup where he has worked on a number of key projects such as detailed design of Morley Ellenbrook Line in Perth. Andrew has experience in an array of rail engineering activities ranging from track design and modelling to project management and coordination. Andrew has created and co-created several FME track modeling and design automation tools including Kinematic Rollingstock Outline FME tool and Sleeper Modelling FME tool.

Andrew is proactive in the rail industry, attending CORE2021 and AusRAIL2020 as a Young Professional Scholarship winner. He has hosted technical knowledge sharing sessions for the Arup WA office, which he has also presented on the topic of rail automation tools. Andrew actively mentors and supports fellow graduates and vacation students across multiple disciplines and is building CPD for his Engineers Australia chartership.

2022 Railway Master Thesis Award

Recipient: Mohan Sankarasubbu

Citation: Mohan is awarded the RTSA 2022 Master Thesis Award, whose Master's Thesis studied capacity issues in passenger rail networks and proposed an advanced train control system.

The solution developed was performed using outputs from simulation modelling and compared with the results of a pilot project in a system integration laboratory. The proposal utilised standardised architecture that could be applied and expanded for the entire project area and be used as a typical solution for future rail network expansion projects where capacity is an issue.

The capital expansion cost and subsequent ongoing maintenance costs on a rail network would be reduced by having a standard train control system instead of contending with mixed systems and technologies.

2022 Railway PhD Thesis Award

Recipient: Dr Sundar Shrestha

Thesis: Estimation of adhesion conditions between wheels and rails for the development of advanced braking control system

Citation: Dr Sundar Shrestha is awarded with the RTSA 2022 PhD Thesis Award for his thesis which makes a significant contribution to knowledge of the process of adhesion estimation between wheel and rail contact in a real-time mode that is currently unavailable; and has therefore not been implemented in existing rollingstock brake control system designs.

An ideal braking system not only ensures safety and ride comfort but also attracts significant cost benefits through optimum on-time operation and reduction in wheel-rail damage processes. For such a braking system, the adhesion condition information between the wheel and rail at contact interfaces during rail vehicle operation is essential.

In this thesis work, a real-time novel observer was designed to estimate such adhesion condition information. The information was further utilised for the improvement of the braking performance of a heavy haul wagon. For the transition from the algorithm development to the physical implementation/validation, an experimental scaled bogie test rig was designed based on an existing heavy haul wagon design and equipped with a newly designed braking system. For robustness of the system, the acoustic signal emanating from wheel-rail interaction was considered in this project as an additional input parameter.

Dr Sundar's research confirms the capability for enhancement of the productivity, efficiencies, and safety of trains that will ultimately be a contribution toward sustainable transportation.

2022 Railway PhD Thesis Award Runner-Up

Recipient: Dr Steven McKerlie

Thesis: Investigations on existing open deck railway bridges and transom systems to inform the development of new transom technologies

Place of Study: University of Southern Queensland, Australia

Dr Steven McKerlie is awarded with the Runner up of the RTSA 2022 PhD Thesis Award for his investigation and contributions in transom technologies. His thesis provided a comprehensive review of Australia's railways and open deck transom top bridges which included a critical appraisal of historic and current design practices and standards with inputs from participating rail organisations and salient findings from relevant overseas research. This provided essential baseline data and understanding for the issues to be addressed.

Dr McKerlie's thesis provided a practical state-of-the-art reference that will assist the Australian rail industry in successfully transitioning from hardwood to new transom technologies. The methods and investigative techniques developed for his research may be applied to any bridge on any network in Australia. Therefore, this body of work is considered a major step towards "next generation" bridge transoms that are best for track and bridge.

2022 Railway Professional of the Year Award

Recipient: Walter Rusbrook

Citation: Walter Rushbrook is awarded the RTSA Railway Professional Award for 2022. Walter is a Chartered Civil Engineer who commenced working in rail in 1997. He has held a variety of technical, operational, and managerial roles in infrastructure with these predominately in the rail industry. He is a leading professional rail engineer in New Zealand, having positively influenced some of the most significant railway works in this country over the past 25 years. These include improving the safety leadership, asset management, and technical capacity of rail engineering in New Zealand. He has also assisted in successful business case preparation as well as holding significant roles in many award-winning projects, some of which have been recognised internationally. He is a regular contributor to the improvement of the New Zealand rail industry through active participation with the RTSA and CORE and is a past Chair of the Engineering New Zealand's Wellington Branch. Walter has exemplified engineering excellence and integrity throughout his career whilst bringing innovation and lateral thinking to complex situations, especially during notable emergency recovery scenarios following earthquakes, adverse weather events or operational incidents. Walter is a worthy recipient of this award.

2022 Railway Scholarship Award

Recipient: Priannka Kumar

Citation: Ms. Priannka Kumar is a senior signaling engineer with more than 10 years experience in signaling and control systems across Australia and New Zealand. Priannka has a Bachelor of Engineering (Hons) and a Bachelor of Commerce from University of Melbourne.

Priannka has been involved in a range of detailed and high-level tasks utilizing her specialized knowledge in railway signaling in rail projects accommodating high-capacity trains and signaling upgrades. Some of her notable projects include Inland Rail (railway operated by Australian Rail Track Corporation (ARTC)), Regional Rail Revival (railway operated by V/Line), the Rail Infrastructure Alliance as part of the Metro Tunnel Project (railway operated by Metropolitan Trains Melbourne (MTM)), Pakenham East Depot (railway operated by MTM), and the Auckland Metropolitan Re-signaling Project (railway operated by KiwiRail).

Priannka is planning to attend an online professional development program offered by the Oxford University's Transport Studies Unit (TSU). The TSU's Global Challenges in Transport program covers two courses: 1) Global challenges in transport infrastructures, and 2) Smart technologies. The expected benefits for Priannka would be:

- Applying lessons learnt from global transport infrastructure case studies
- Utilizing a variety of theoretical and methodological approaches for transport infrastructure planning, financing, and management
- Understanding and evaluating the relationships between transport infrastructure and sustainable development

2022 Young Railway Engineer Award

Recipient: Dr Ash Athukoralalage

Citation: Dr Ash Athukoralalage is nominated as the co-winner of the RTSA Young Railway Engineer Award for 2022. As the Wheel Rail Interface Engineer of Speno Rail Maintenance Australia, he is responsible for ensuring the quality assurance process of the rail grinding and provides technical advisory support for the grinding crew. Dr Ash is a chartered mechanical engineer with a PhD in wheel-rail contact fatigue and material wear. During his research, he has enhanced understanding of contact mechanics, damage mechanisms and maintenance of railway tracks to develop new approaches for the controlling and condition monitoring of the damage mechanism in track material. Dr Ash is now concentrating on making a positive contribution to the rail industry in the areas of wheel- rail interface management, rail grinding, condition-based monitoring techniques and improving the reliability and safety of Australian rail infrastructure. Within the space of 8 years, Dr Ash has contributed to more than 15 publications and presentations across Australia, Italy, United States and Turkey.

2023 Railway Professional of the Year

Recipient: David Stuart-Smith

Citation: David Stuart-Smith is awarded the RTSA Railway Professional Award for 2023. He is an electric power infrastructure engineer with over 35 years in rail, who has dedicated a lot of time and effort in his work to improve the safety and whole-of-life asset management across the rail industry, through design, standards and technical management.

As a Chartered Engineer and Fellow of Engineers Australia, David has held senior technical leadership roles in both the private and public sector, including 10 years as Principal/Chief Engineer, Electrical Systems of RailCorp NSW, and its predecessors.

David has contributed to the railway engineering professional via the RTSA continuously through presentations at local chapter meetings and at CORE. He is a recurring technical reviewer and session chair at recent COREs. David also presents at other rail conferences and has been serving on the ARA Rail Industry Group Executive Committee since 2020.

David's impact on safety, efficiency, and technical detail enables him to be one of the industry's most experienced and accomplished operators. It would be fitting for his achievements to be recognised as the recipient of this award.

2023 Railway Engineering Undergraduate Thesis Award

Recipient: Thomas Murphy

Thesis: Rail track structure review and analysis place of study: university of southern queensland

Degree: Bachelor of Civil Engineering, Honours

Citation: Thomas Murphy is awarded the 2023 RTSA Undergraduate Thesis Award for his thesis that reviewed current rail track structure design methodologies, with a particular focus on identifying best practice for different sleeper types. A typical Queensland rail track structure acted as the basis of his review and the subsequent analysis of current rail track structure methodologies. Analytical and finite element models were constructed to provide a better understanding on how emerging sleeper technologies affect the track behaviour and for their effective use. It is anticipated that the results of this project will provide guidelines and information that engineers, and rail track operators will find useful in ensuring the reliable and safe design of rail track infrastructure.

2023 Railway Individual Award

Recipient: Andrew Matthews

Citation: Andrew Matthews is awarded the 2023 RTSA Individual Award celebrating his 40 outstanding years of engineering experience in the rail industry, both heavy and light rail. This Award acknowledges Andrew's achievements in a wide range of projects across Australia including the Melbourne Level Crossing Removals Program and Suburban Rail Loop, Sydney Light Rail, Wellington Rapid Transit Program in NZ and the Gold Coast Light Rail Extension Project as well as overseas experience with the London Jubilee Line Extension. He was also contracted in Queensland in 2001 as a Level Crossing Safety Advisor. Andrew is presently in the role of Technical Director Rail at GHD.

Andrew is a proven subject matter expert who could be trusted to provide sound, well-developed and thoroughly analysed advice from concept transport planning and development to design and implementation. Andrew is credited with mentoring junior engineers and technicians as well as presenting papers at over 20 conferences and undertaking many document and presentation reviews. He was also a member of RTSA Queensland for over 10 years. Andrew is highly respected by all his peers and is a well-deserved recipient of the 2023 RTSA Individual Award.

2023 Railway PhD Thesis Award Winner

Recipient: Dr Piyush Punetha

Thesis: Dynamic behavior of ballasted railway track with special reference to transition zones

Place of Study: University of Technology Sydney

Citation: Rail infrastructure managers have long been concerned about the poor performance of transition zones in railway tracks, which are highly vulnerable to differential settlement and require frequent maintenance to ensure passenger safety and comfort. In his PhD study, Dr Piyush Punetha has developed a novel methodology for predicting the dynamic behavior of transition zones under train-induced repeated dynamic loading and assessed the suitability of different countermeasures in improving the track performance. Using a rheological approach, he considered the inhomogeneous support conditions along the track and successfully validated his methodology with published field data and finite element (FE) analyses. This methodology provides practicing railway engineers with reliable techniques for analyzing the performance of different sections of ballasted railway tracks, identifying effective methods for improving track performance, planning maintenance operations, and enhancing design. As a result of this PhD study, nine journal publications and conference presentations have been prepared.

2023 Railway PhD Thesis Award Runner-Up

Recipient: Dr Christophe Camille

Thesis: feasibility study on macro synthetic fibre reinforced concrete for sleeper applications

Place of Study: Western Sydney University, Australia

Citation: Dr Christophe Camille is awarded to be the Runner Up of the RTSA 2023 PhD Thesis Award for his thesis which evaluates the feasibility of an innovative design solution to address the performance reliability, sustainability and cost-efficiency of macro synthetic fibre reinforced concrete for sleeper applications.

With the increase in railway traffic and axle loads over the last few decades, traditional sleepers are experiencing more premature failure, resulting in significant maintenance costs. While concerns about the sleeper materials (i.e. timber, steel or prestressed concrete) have long been acknowledged, in practice, replacement with composite alternatives remains fairly limited.

Dr Christophe's research is concerned with comprehensively understanding the effects of macro synthetic fibre reinforcement on the material and structural properties of concrete, which also addresses gaps in the existing literature prior to sleeper applications. Further, the design methodology identifies the partial or complete replacement of prestressing steel with sustainable fibre reinforcement technology to reduce corrosion risks and improve life cycle costs of concrete sleepers, which are not typically addressed in railway standards and the current literature.

This thesis is supported by 15 publications that have been accepted or published in internationally renowned journals and conferences. Work included in this thesis has also been presented or has been registered to present at seven railway related conferences. Dr Christophe's research outcomes provide profound evidence and significant contribution in promoting the adaption of macro synthetic fibre reinforced concrete in railway sleepers.

2023 Railway PhD Thesis Award Runner-Up

Recipient: Dr Esteban Bernal Arango

Thesis: Smart sensor node for freight wagon condition monitoring systems

Citation: Dr Esteban Bernal Arango is awarded to be the Runner Up of the RTSA 2023 PhD Thesis Award for his thesis work in developing an innovative sensor node hardware architecture and algorithms for a practical on-wagon monitoring device, with low power usage and sufficient on-board calculation capability to provide warning messages when a fault emerges.

An ideal Condition Based Maintenance application for freight railway wagons would consist of a wireless self-powered electronic device installed on each vehicle, detecting and communicating parameters such as brake, bearing or wheel faults, and dynamic instabilities. Such a monitoring device has not been achieved yet, mainly because of the lack of electricity on-board the vehicles and the cost of instrumenting massive fleets.

Dr Esteban's research work reviewed the Internet of Things (IoT), integrated systems and fault detection techniques and developed a wheel flat defect as a case study to develop and investigate the proposed condition monitoring sensor node. Railway vehicle dynamic behaviour was simulated to determine operating conditions for the device and the nature of the signals to be monitored.

The device concept was firstly proven by combining vehicle dynamic simulations with a physical prototype of the on-wagon fault detection analogue circuit. Subsequently, a hardware prototype version of the circuit was constructed and tested on a scaled bogie rig. The proposed sensor node hardware architecture effectively reduced power consumption and memory requirements for detecting a wheel flat defect using on-board acceleration signals.

This thesis is supported by four high quality peer-reviewed journal papers and two conference papers. Dr Esteban's research method and prototype provide potential for improving safety and operational efficiency of large fleets of unpowered railway vehicles.

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