EMESRT

Earth Moving Equipment Safety Round Table

2024 ACTIVITY REPORT

EMESRT.ORG

EMESRT is a global 'safety by design' initiative established by mining companies to fill the functional performance expectations gap between earth moving equipment users and equipment designers.

ACRONYMS

ACARP	The Australian Coal Industry's Research Program
BoK	Body of Knowledge
CMEIG	Construction and Mining Equipment Industry Group
DP	Design Philosophy
EAG	EMESRT Advisory Group
EMESRT	Earth Moving Equipment Safety Round Table
FDSS	Fire Detection and Suppression System
ICMM	International Council on Mining and Metals
ICSV	Innovation for Cleaner Safer Vehicles
ISO	International Standards Organisation
OEM	Original Equipment Manufacturer
OTR	Off the Road
PDS	Proximity Detection System
PR	Performance Requirement
TWG	Technical Working Group
VI	Vehicle Interaction

INTRODUCTION

EMESRT is pleased to present the 2024 Activity Report, highlighting it's ongoing commitment to 'safety by design' in the mining industry.

Formalised in 2006, EMESRT is a global initiative involving major mining companies and remains the ‘common voice’ of the mining industry.

EMESRT engages with key mining industry Original Equipment Manufacturers to advance the design of equipment and processes to improve safe operability and maintainability beyond Standards.

EMESRT is a respected high-influence global organisation that delivers industry-level understanding of complex health and safety problems. Its effectiveness rests on trusted relationships with OEM’s and third parties.

This trust is vital to sustain EMESRT’s relevance and ability to influence the design outcomes. EMESRT interacts by genuine two-way engagement with all stakeholders.

Throughout its history, EMESRT, a mining company membership-based entity, has focussed on health and safety problems of significant consequence to the people in the mining industry.

EMESRT's genuine two-way engagement delivers an industry-level understanding of complex health and safety problems. This collaborative effort ensures that a wide range of perspectives are considered when developing equipment design improvements.

The success of EMESRT is based on trusted relationships, open and honest dialogue, and a practical industry-level approach that:

- Defines the landscape of the problem
- Identifies stakeholders who can influence design changes
- Stimulate stakeholders to work on industry-level improvements through collaboration

This 2024 Activity Report provides a summary of activities, achievements, and project progress for the 2024 calendar year.

It covers the current three key industry projects (vehicle interaction improvement, tyre management improvement, fire management improvement), industry engagement, resource materials developed for industry use (accessible via the Body of Knowledge), workshops held and other information of possible interest.

The EMESRT Advisory Group hope that the information is pertinent and useful to readers.

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EMESRT

EMESRT is a global 'safety by design' initiative established in 2006 by mining companies to fill the functional performance expectations gap between earth moving equipment users and equipment designers.

VISION	A mining industry free of fatalities, injuries and occupational illnesses associated with operating and maintaining earth moving equipment.
PURPOSE	Accelerate development and adoption of leading practice designs to minimise the risk of health and safety through a process of Original Equipment Manufacturer, contractor and user engagement.
KEY PRINCIPLES	▪ Design beyond standards ▪ Balancing engineering and behaviour (human factors) ▪ Recognising the value of task-based design review ▪ Appreciate that the OEM does its best with the end user involved ▪ Open genuine two-way engagement is key

ACKNOWLEDGEMENT

The individual contributions of member company representatives, technical working group members, and other individuals of the wider EMESRT community—including mine operators, original equipment manufacturers, third-party equipment suppliers, regulators, researchers, industry associations, and others—are acknowledged and much appreciated by the EMESRT Advisory Group.

As part of the EMESRT success story, their participation in meetings, webinars, workshops and other events has directly aided in the realisation of the EMESRT vision and purpose.

MEMBERS FOR 2024

TIER 1

1. Alcoa
2. Anglo American
3. AngloGold Ashanti
4. BHP
5. Glencore
6. Kiewit
7. New Hope Group
8. Rio Tinto
9. Teck Resources
10. Vale
11. Whitehaven Coal

TIER 2

1. Coronado
2. South32
3. Tronox

ADVISORY GROUP

The EMESRT Advisory Group (EAG) plays a crucial role in guiding EMESRT initiatives and ensuring the continuous improvement of leading practices in the mining industry.

The EAG comprises one representative from each Tier One member company.

An EAG member can lead multiple EMESRT industry projects. As a project lead, the member representative provides strategic direction for all technical working group activities, ensuring consistency in messaging to Original Equipment Manufacturers (OEM's) and third-party manufacturers and suppliers.

The EAG provides valuable insights and experiences that enhance the effectiveness of EMESRT's program of activities.

OBJECTIVES OF THE EAG

The EAG has several primary objectives. These include:

- Development and implementation of EMESRT's strategic work plans and initiatives:
  - Identifying, rigorously defining, and documenting the problem landscape to be addressed from the perspective of mining equipment users and agreeing on appropriate actions to stimulate industry activity to address the problem
  - Promoting collaboration among key industry stakeholders to address equipment safety challenges
  - Preparing a draft industry improvement project scope and project plans
- Building project communities through subject-focused technical working group
- Sharing knowledge and experiences to facilitate continuous improvements through stakeholder education of the problem

> Each EAG company member brings a wealth of knowledge, diversity of thinking and experience to the table.

KEY RESPONSIBILITIES OF THE EAG

The EAG contributes to EMESRT's vision and purpose by fulfilling a range of responsibilities.

These include:

1. Participating in EAG monthly meetings to discuss membership, activity funding, current industry focus area project progress, stakeholder engagement opportunities, and industry emerging issues
2. Participating in the EAG strategic planning annual workshop
3. Providing input on the development of industry resource materials
4. Collaborating with other industry organisations to promote leading practices in equipment design
5. Offering guidance on the communication strategies employed by EMESRT to raise awareness

BENEFITS OF BEING AN EAG MEMBER

Being a part of the advisory group offers numerous benefits to EMESRT members. These include:

- Access to a network of industry experts and professionals which provide:
  - Opportunities for collaboration and knowledge sharing
  - Exposure to the latest safety innovations and technologies
  - Exposure to global safety trends and leading practices
- Early involvement in developing industry resource materials
- Ability to influence earth-moving equipment design improvements by direct collaboration with OEM's
- Influence in the development of industry standards through EMESRT Liaison status with International Standards Organisation (ISO) committees

STRATEGIC PLANNING WORKSHOP

From 19-21 of November 2024, the EMESRT advisory group convened in Perth, Australia, for their annual strategic planning workshop.

This three-day event allowed the group to reflect on EMESRT's 2024 achievements and chart the course for future industry focus areas in 2025 and beyond.

In early 2025, detailed activity planning will commence for the current focus area projects. Action items for each project will be identified, and project plans will be updated to include the scope, actions, and resources required.

More information on the current industry project focus areas, achievements, and future work can be found in the following sections of this report.

WORKSHOP SUMMARY

Achievements in 2024 and future goals: The group reviewed the progress of the three current industry projects (vehicle interaction improvement, tyre management improvement, fire management improvement), acknowledged the milestones reached, and identified and agreed on the remaining tasks to ensure successful project completion.

Uptake strategy and resources: The group discussed and confirmed strategies for the uptake of future initiatives, along with the development of essential industry resource materials to support these efforts.

Future industry focus priorities: The group confirmed the focus priorities for upcoming industry projects, ensuring alignment with EMESRT's long-term strategic goals.

In the room.

Online.

Natalie Hawkins (Vale) based in Toronto, Canada.

Greg Henshall (AngloGold Ashanti) based in Johannesburg, South Africa.

Daenan Fairburn (Kiewit) based in Texas, USA.

Image (left to right): Australian based Kent Flaherty (New Hope Group), Kostas Apostolidis (BHP), Brett McDonald (Anglo American), Eve McDonald (EMESRT), Mark Geerssen (Rio Tinto), Tony Egan (Glencore) , Peter Hasler (Alcoa).
Absent: Andy Barrow (Whitehaven Coal) based in Australia and Roberto Martinez (Teck Resources) based in Chile.

MEMBERS

In 2024, existing EMESRT members welcomed Coronado Global Resources and South32 as Tier 2 members, joining the existing Tier 2 member Tronox.

Tier 1 members include Alcoa, Anglo American, AngloGold Ashanti, BHP, Glencore, Kiewit, New Hope Group, Rio Tinto, Teck Resources, Vale, and Whitehaven Coal.

EMESRT member company representatives bring a wealth of knowledge, diversity of thinking, and experience to the table and collaborate closely with OEM's and equipment designers to influence improved health and safety outcomes.

Advisory group members actively promote the EMESRT engagement process at industry forums to a wide international audience and have introduced resource materials developed by EMESRT to help understand the hazards faced by operators and maintainers of earth-moving equipment.

Although EMESRT membership is limited to mining companies, EMESRT has a global community of individuals representing mining houses, original equipment manufacturers, third-party suppliers, regulators, researchers, and other companies that are part of the technical working groups.

TECHNICAL WORKING GROUPS

To achieve its vision and purpose, EMESRT has established working groups that collaborate on specific focus areas. These groups bring together industry experts, equipment manufacturers, mining companies, technology providers, end users, regulators, researchers, and others to share knowledge and experiences.

The EMESRT working groups aim to discuss and address significant health and safety issues in the mining industry by leveraging the collective expertise of industry stakeholders.

In 2024, these groups focused on the three EMESRT focus areas being vehicle interaction improvement, tyre management improvement, and fire management improvement.

By sharing resources and knowledge, the EAG and working group members work towards developing practical improvement materials that can be implemented across the industry.

In 2024, EMESRT working group member numbers continued to grow, leading to more expertise aligning and contributing to EMESRT's vision and purpose.

In summary, EMESRT continues to maintain its relevance to the industry through an extended global reach, with new members joining and additional technical working group patronage.

The EMESRT advisory group extends its appreciation to all involved for their time, contribution, commitment, and continued support in delivering EMESRT's vision and purpose.

EMESRT looks forward to continuing the collaborative approach in 2025.

INDUSTRY ENGAGEMENT

Industry engagement plays a pivotal role in fostering collaboration and influencing improvements in the design of earth-moving equipment.

The EMESRT collaborative approach has cultivated a culture of trust, knowledge sharing, and cooperation within the EMESRT community. By bringing together diverse stakeholders, EMESRT has facilitated the exchange of ideas and leading practices, resulting in continuous improvement.

EMESRT hosts regular monthly and bi-monthly meetings, topic-specific workshops, and webinars where global participants openly discuss safety concerns and share their knowledge and experiences.

EMESRT brings together mining companies, original equipment manufacturers, regulators, third-party providers, researchers, and users to collectively address safety challenges associated with earth-moving equipment.

Through active participation and collaboration, the EMESRT community can define problems and seize opportunities for design improvements.

Throughout the year, EMESRT continued to collaborate with the ICMM Innovation for Cleaner, Safer Vehicles (ICSV) Vehicle Interaction initiative and in June 2024 hosted the Cohort 3 leading sites workshop in Tucson, Arizona, USA.

Early in 2024, EMESRT hosted several underground functional performance scenario storyboard development workshops and in May launched the five finalised storyboards:

1. Pedestrian approaching a static vehicle
2. Vehicle moving towards a person, equipment, or another vehicle
3. Two vehicles approaching each other
4. Vehicle turning towards a person, equipment, or another vehicle
5. Vehicle approaching an environmental hazard

The five underground scenario storyboards, along with the 17 surface scenario storyboards published in 2019, are available via the EMESRT vehicle interaction improvement body of knowledge section on the EMESRT **website**.

Image: Tyre handler workshop held in June 2024, Brisbane, Australia.

Image: Leading sites Cohort 3 workshop opening, June 2024, Tucson, Arizona, USA.

In June 2024, EMESRT hosted the tyre handler working group workshop in Brisbane, Australia.

The working group, consisting of EMESRT members and industry experts, focused on assessing operational and design erosion factors of tyre handlers, a priority ongoing project that commenced in 2018.

Tyre handlers, or tyre manipulators, are critical mine mobile equipment. Without them, tyre maintenance is impossible due to the size and weight of the tyres and rims. Tyre handlers come in all shapes and sizes, from forklifts to over-the-road trucks to wheel loaders, and many other combinations.

In September 2024, EMESRT advisory group members Tony Egan and Mark Geerssen, and EMESRT Program Manager Eve McDonald traveled to Las Vegas, Nevada, USA, to set up an exhibit at MINExpo 2024 and present at the pre-scheduled industry forums. More information on the exhibit is available on Page 36.

During the EMESRT Advisory Group Strategic Planning Workshop held in November 2024 in Perth, Australia, EMESRT presented to the Worksafe Mines Safety Directorate based in Western Australia. The presentation focused on the EMESRT operational effectiveness approach, current industry focus areas and challenges, and industry resources developed and available to the industry.

In October, Dr. Sara Pazell (ViVA Health at Work) presented on behalf of the EMESRT tyre management improvement project on day one at the Resources Regulator 4th Mining Engineering Managers Safety Seminar held in Sydney, New South Wales, Australia. The title of Dr. Pazell's presentation was *Balancing the Equation on Technology Adoption and Human Readiness: A Hallmark of Sustainable Operations*.

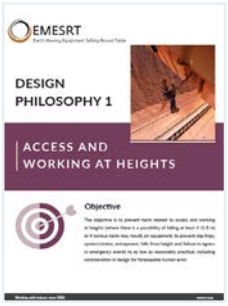
The EMESRT advisory group looks forward to continuing its engagement with the industry to drive positive project outcomes and to continue developing useful industry resource materials in 2025 and beyond.

DESIGN PHILOSOPHIES: THE BACKBONE OF EMESRT

EMESRT published a unified set of Design Philosophies (DP's) in 2007 for earth-moving equipment used in mining operations. The DP's provide an overall understanding of the material problems that create unwanted exposure for users, with an emphasis on human-centered design deficiencies.

These philosophies, listed below, are part of EMESRT's broader mission to accelerate the development and adoption of leading practice designs that minimise health and safety hazards in the mining industry.

In 2024, all eight DP's were reviewed, updated as required and re-published on the EMESRT website.



DP-1: ACCESS AND WORKING AT HEIGHTS

The objective is to prevent harm related to access and working at heights (where there is a possibility of falling at least 6' (1.8 m) or if serious harm may result) on equipment; to prevent slips/trips, sprains/strains, entrapment, falls from height and failure to egress in emergency events to as low as reasonably practical, including consideration in design for foreseeable human error. For example, injury during access to equipment and its routine service and inspection points, work platforms and operator workstations due to poor location of service and inspection points, etc.

DP-2: TYRES AND RIMS

The objective is to prevent harm related to tyre and rim events to as low as reasonably practicable, including consideration in design for foreseeable human error and material failures. For example, harm due to uncontrolled release of pressure from the tyre and rim assembly during operation and maintenance, etc.

DP-3: EXPOSURE TO HARMFUL ENERGIES

The objective is to prevent harm related to exposure to moving machine parts, failure of hydraulic equipment or systems, or other energy sources, such as compressed gases, heat, electricity, electromagnetic fields and gravity to as low as reasonably practical, including consideration in design for foreseeable human error. For example, harm from exposure to energies such as heat, electricity, radiation, compressed air, high pressure fluids (including hydraulic fluids) and falling objects, etc.

DP-4: FIRE

The objective is to prevent harm related to equipment fires to as low as reasonably practical, including consideration in design for foreseeable human error. For example, harm from fire arising from damage (including heating, melting and chaffing) to electrical cables and components, hydraulic hoses and fuel lines due to design inadequacies including poor location, inadequate separation of fuel and ignition sources, and flaws in clamping or restraints, etc.

DP-5: MACHINE OPERATION AND CONTROL

The objective is to prevent harm, during machine operation and control, to as low as reasonably practical, including consideration in design for foreseeable human error. For example, musculoskeletal injury or illness due to workstation design (including seat and seatbelt design, openings and cab height) that promotes biomechanically compromised postures for the 5th percentile female to 95th percentile male body dimensions, etc.

DP-6: HEALTH IMPACTING FACTORS

The objective is to prevent harm from exposure to health impacting factors to as low as reasonably practical, including consideration in design for foreseeable human error. For example, harm from exposure to health hazards such as extreme temperatures, excessive vibration and noise levels, particulates, gases and vapours within the operating workspace; and musculoskeletal factors due to poor ergonomic design of equipment and controls, etc.

DP-7: MANUAL TASKS

The objective is to prevent harm due to manual tasks during installation, maintenance and operations of equipment, to as low as reasonably practical, including consideration in design for foreseeable human error and anthropometric range. For example, musculoskeletal injury from exposure to risk factors such as forceful exertion, awkward or static posture, repetition or prolonged duration, and hand-arm and/or whole-body vibration due to manual tasks associated with installing, operating and maintaining the equipment, etc.

DP-8: CONFINED SPACES AND RESTRICTED WORK AREAS

The objective is to prevent harm to people working in confined spaces and restricted work areas to as low as reasonably practical, including consideration in design for foreseeable human error. For example, asphyxiation from irrespirable atmosphere due to lack of adequate ventilation, etc.

...each industry project is lead by an advisory group member who provides strategic project oversight and coordinates the technical working group activities on a voluntary basis...

INDUSTRY-LEVEL PROJECTS

EMESRT adopts a structured approach to project establishment and management. It rigorously defines and documents each project, prepares an industry landscape, identifies key stakeholders, builds project communities, coordinates resources, and articulates project deliverables.

Each project is led by an EMESRT advisory group member who provides strategic project oversight and coordinates the technical working group activities on a voluntary basis.

The project lead is responsible for achieving specified outcomes and driving the strategic direction of the technical working group.

EMESRT applies a formal project management methodology to all projects and, utilising the operational effectiveness approach, provides users with practical and usable results.

At the end of 2024, EMESRT was leading three active industry-level projects:

1. Vehicle interaction improvement
2. Tyre management improvement
3. Fire management improvement

All three projects have established global technical working groups that meet regularly and deliver on agreed project objectives.

The following sections of this report provide a summary of each project's status and achievements.

PROJECT 1

Vehicle interaction improvement

PROJECT 2

Tyre management improvement

PROJECT 3

Fire management improvement

VEHICLE INTERACTION IMPROVEMENT

Project objective: To improve the effectiveness and reliability of vehicle interaction operational requirements in mining.

This industry project is led by EMESRT Glencore representative Tony Egan.

INTRODUCTION

A major challenge in reducing fatalities in the mining industry is improving operational requirements to manage the operation of mobile equipment and the transportation of people and materials.

According to the International Council on Mining and Metals member incident data, each year mining industry fatalities are attributable to unwanted vehicle interactions with a significant portion involving pedestrians in underground operations.

THIS INDUSTRY PROJECT

The EMESRT Vehicle Interaction Improvement Project aims to enhance the effectiveness and reliability of vehicle interaction operational requirements in the mining industry. This project addresses the significant safety hazards associated with vehicle interactions, which are a major cause of fatalities and serious injuries in mining operations.

Key aspects of the project include:

- **Industry collaboration:** Bringing together industry experts, equipment manufacturers, and other stakeholders to share knowledge and leading practices.
- **Technology integration:** Implementing and integrating new technologies to improve vehicle interaction operational requirements.
- **Resource development:** In collaboration with industry, developing informative and useful industry resource materials aimed at improving safety and operational efficiency in mining.
- **Continuous improvement:** Focusing on ongoing improvements and updates to ensure the effectiveness of vehicle interaction operational requirements.

The project leverages the collective expertise of industry stakeholders to provide a unified perspective on the defined problem, aiming to present it as a business opportunity for designers to develop solutions for all or part of the issue.

The project builds on EMESRT's earlier work in developing **Design Philosophy 5: Machine Operation and Control**.

Updated in 2024, Design Philosophy 5 (DP-5): Machine Operation and Control objective is to prevent harm, during machine operation and control, to as low as reasonably practical, including consideration in design for foreseeable human error.

> ...industry fatality experience tells us that no organisation has reliably sustained vehicle interaction management...

DP-5 stipulates that the intended design outcome should include/consider the following:

- Eliminate the risk of collision with people, mobile and fixed equipment and other objects in the vicinity of machine operation
- Warn operators of any condition that threatens machine health and stability
- Automatically prevent operation outside gravity limits for stability, including speed and/or load
- Minimise harm for all operators from inadequate diversity of ergonomic and anthropometric range, e.g.
  - Seat suspension adjustment range does not allow for light or heavy weight operators
  - Footrests and pedals unreachable
  - Steering wheel adjustment inadequate
  - Dozer operator not being able to see ripper tip from a normal seated position
- Minimise operator physical and mental fatigue that causes slips and lapses
- Minimise unwanted vehicle interactions by:
  - Monitoring and providing enhanced situational awareness
  - Warning operators and pedestrians of people in the vicinity
  - Preventing vehicle motion into objects, structures or pedestrians without requiring operator systems activation
- Provide engineered controls which are fully functional under a range of operational and environmental conditions
- Provide controls and displays that are appropriately located, intuitive to use, consistent and failsafe
- Provide communication systems that are accessible and able to be understood from the normal operating position, e.g., two-way radio
- Provide warnings and alarms that are designed to be detectable, unambiguous, simple, meaningful and integrated so as not to mentally overload the operator
- Provide labels that are relevant, durable, clear in meaning and appropriately positioned
- Provide ability for operator to adjust mirrors

In September 2024, following the review and update of DP-5, Performance Requirement 5A (PR-5A): Vehicle Interaction Systems was reviewed and updated accordingly.

PR-5A is a key enabler in the collision awareness technology integration process for Vehicle Interaction improvement. It provides an understanding of the role technology plays at levels 7, 8 and 9 through a controls model that depicts the 9 defensive layers which provide differing levels of process controls to prevent an unwanted vehicle interaction. PR-5A should be read in conjunction with DP-5. Both resources are available on the EMESRT **website**.

PROJECT COMMUNITY

This project has global working group representation comprising:

- Original equipment manufacturers
- Mining equipment users
- Technology providers
- Industry experts
- Regulators
- Researchers
- And other interested parties

Since 2013, EMESRT has hosted the vehicle interaction improvement technical working group regular meetings, both in person and online.

The interactions provide an avenue for EMESRT to update the industry on the vehicle interaction improvement project progress, discuss industry challenges, and develop a common understanding of the problems at hand.

EMESRT thanks all the working group members for their continued contribution, commitment and support throughout 2024.

Working group member contributions are invaluable, and EMESRT looks forward to continuing this important work in the new year.

Special thanks to working group member Phil Nelthorpe for providing regular updates throughout the year on International Standard 21815: *Earth-moving machinery - Collision warning and avoidance.*

BODY OF KNOWLEDGE

EMESRT is committed to making operational site user information available to the industry to assist in addressing real-world occupational health and safety problems.

In mid-2024, EMESRT restructured its website to focus on project outcomes and introduced a diagram to navigate through the vehicle interaction improvement industry resource materials known as the **Body of Knowledge** (BoK).

The BoK provides users with an easy-to-use navigation aid, see Figure 2 opposite, that also shows where each of the industry resource materials fits into the overarching vehicle interaction improvement project.

SCENARIO STORYBOARDS

The storyboard approach was first developed for surface mining by an EMESRT member company in 2019 to assist designers of Proximity Detection Systems (PDS) in understanding the functional performance requirements of specific fatal scenarios encountered in a surface mining operational area.

The functional performance scenario storyboards provide a visual and dynamic reference for equipment operators, PDS suppliers, and vehicle interaction improvement project managers as they implement vehicle intervention strategies.

In mid-2023, an EMESRT underground functional performance scenario storyboard development sub-group was established and led by Adam Ferris, Glencore's Zinc engineering manager.

The sub-group comprised current EMESRT vehicle interaction improvement technical working group members and other experts in the field from several EMESRT member companies and beyond.

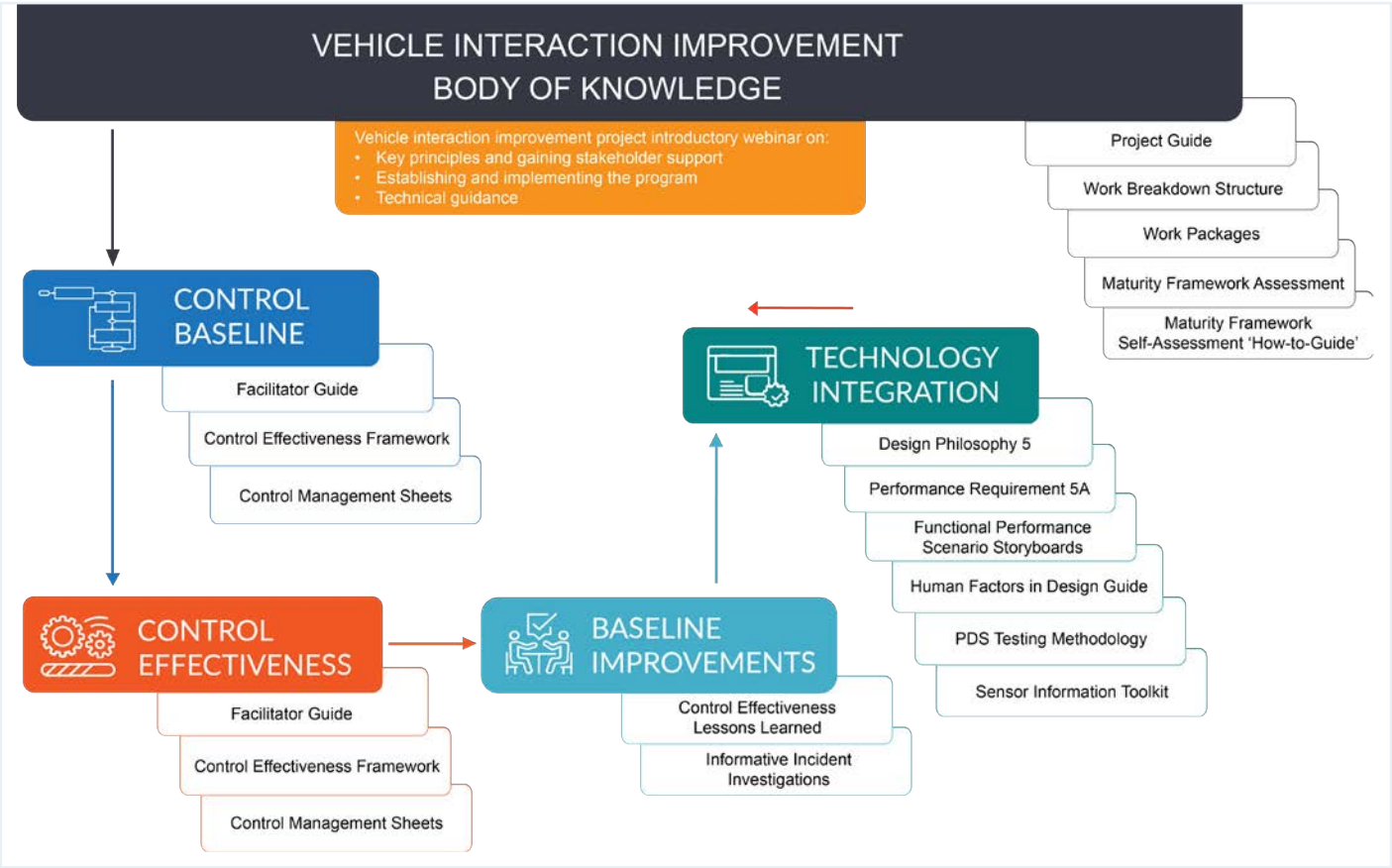


Figure 2: The EMESRT vehicle interaction improvement body of knowledge navigation diagram.

Using the EMESRT process of clearly understanding and defining the industry-wide problem from the perspective of mining equipment users, the sub-group prepared a draft set of fatal consequence scenario storyboards.

The sub-group aimed to distill the essence of the problems encountered underground, focusing on collision and technology sensing constraint issues. They remained agnostic of suppliers, concentrating on how various sensing technologies generate false or unsuccessful alarms under certain operating conditions or ore body types.

The draft set of scenario storyboards was presented to the EMESRT vehicle interaction working group resulting in alignment.

The objective of functional performance scenario storyboards is to prevent a person or vehicle from causing a Potential Unwanted Event in the following three categories, resulting in injury or equipment damage:

1. Vehicle to person
2. Vehicle to vehicle
3. Vehicle to equipment or environment

The five scenario storyboards include several erosion factors focusing on:

1. Pedestrian approaching a static vehicle
2. Vehicle moving towards a person, equipment, or another vehicle
3. Two vehicles approaching each other
4. Vehicle turning towards a person, equipment, or another vehicle
5. Vehicle approaching an environmental hazard

SCENARIO STORYBOARDS cont...

The five scenario storyboards are focused on the fatal situations and do not try and solve everything at this point in terms of metal to metal, they focus on fatals only.

In conjunction with the development of the scenario storyboards, EMESRT took the opportunity to review and update **Performance Requirement 5A: Vehicle Interaction Systems**. Subtle changes were made to the definition of levels 7, 8 and 9. The updated version was re-published on the EMESRT website in August 2024.

Developing the underground scenario storyboards was a significant undertaking, involving several iterations and numerous global industry consultations. By May 2024, the finalised versions were ready for industry use.

The underground scenario storyboards are conceptually similar to the surface ones, but there is more variability in erosion factors for each of the underground scenarios, adding complexity.

Both the surface and underground scenario storyboards are available via the EMESRT website, vehicle interaction improvement **body of knowledge**.

EMESRT thanks Adam Ferris, the sub-group and others involved for their time and commitment in developing these useful industry resource materials.

HUMAN FACTORS IN DESIGN GUIDE

During the development of the underground functional performance scenario storyboards, several items were raised by the technical working group members around human factors aspects.

EMESRT took this on board and engaged Professor Robin Burgess-Limerick from the Sustainable Minerals Institute at The University of Queensland to develop a Human Factors in Design Guide.

The guide objectives are threefold:

1. Describe a human-centered design process to support developers and sponsors of new technology related to vehicle interactions
2. Outline the importance of evaluating human factors, people, and processes that impact the successful integration of technology in work systems, including mobile plant equipment
3. Provide accompanying information on human factors to complement the surface and underground functional performance scenario storyboards

Although the guide focusses on vehicle interaction it is transferable to other industry focus areas, e.g. tyre management improvement, fire management improvement.

EMESRT published the **Human Factors in Design Guide** in September 2024.

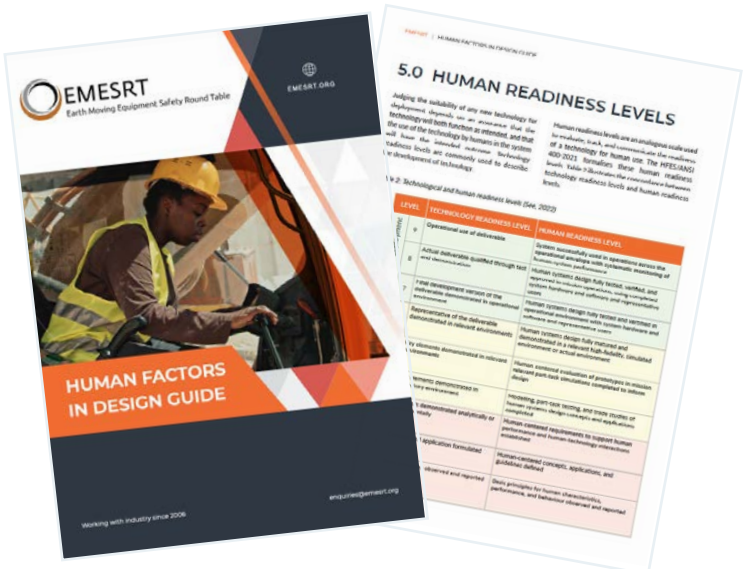


Image: Leading sites Cohort 3 group photo, Tucson, Arizona, USA.

LEADING SITES WORKSHOP

The EMESRT and International Council on Mining and Metals (ICMM) Vehicle Interaction Leading Sites Program is a collaborative initiative aimed at improving vehicle interaction safety in the mining industry. The program is a joint effort between ICMM and EMESRT, under the Innovation for Cleaner Safer Vehicle (ICSV) initiative.

Mobile equipment accidents are the highest fatality category in ICMM member mining companies and the ICSV ambition is that by 2025 vehicle interaction technology is available that supports industry operational practice.

Ongoing collaboration between mine operators, industry associations, researchers, OEM's and third-party technology providers continue to develop and refine resources that will deliver this outcome. These include practical processes that assist sites to integrate technology while supporting the development of Capable Solutions for global market uptake.

More information on the Leading Sites Program Capable Solutions is available via this **link**.

To date, three leading site workshops have been held, with the most recent (Cohort 3) taking place on June 11-13, 2024, in Tucson, Arizona, USA. This event was hosted by Hexagon at their Experience and Conference Centre in Tucson. ICMM and EMESRT extend their thanks to Hexagon for their hospitality and support.

The workshop was officially opened by Giles Hellyer (BHP) and attended by 24 participants representing nine mining companies. It was supported by Steering Committee Co-chairs and EMESRT support personnel.

Several knowledge share presentations were delivered during the workshop from participants and via webinar, e.g. VICE deployment, collision avoidance systems project, etc.

During the three-day workshop, participants were introduced to and utilised industry resource materials designed to deliver capable solution outcomes at the site level. These materials are available on the EMESRT **website**.

A further workshop is planned for mid-2025 in Perth, Australia.

LEADING SITES FORUM

Throughout 2024, the EMESRT ICMM Innovation for Cleaner Safer Vehicle (ICSV), Vehicle Interaction leading sites monthly forum had great attendance, insightful presentations, and motivational discussions from participants.

The purpose of the monthly forum is to provide an avenue for leading sites workshop participants to continue the sharing and learning about what is happening across the industry and to leverage from those learnings.

In September, Rio Tinto delivered a presentation on how they are using recent field trial data to support their vehicle interaction improvement program. The presentation was extremely well received with participants using terms like 'innovative', 'tremendous capability', and 'opportunity to help make changes on site'.

Forum participants were eager to hear more about this simple algorithm that has the potential to pack a powerful punch and they did not have to wait too long as Rio Tinto stepped up to the plate once again and this time focusing their presentation on their VITS field trial at Yandi, Western Australia completed in 2024.

VITS, short for Vehicle Interaction Technology System is what Rio Tinto calls their collision awareness systems roll-our project. The forum heard how the trial was conducted and how Rio Tinto linked it directly to the EMESRT design philosophies where the underlying design of the verification and validation process is followed.

The team took the forum through the Yandi field trial journey that included five types of testing/ method categories being tested, demonstration, inspection, analysis and certification.

In November, Project Manager Samuel Pieterse representing Anglo American gave a presentation about the journey and current state of Anglo's collision avoidance system.

Samuel outlined the steps taken, the integration process, data collection purpose, and the risks and problems encountered throughout the project.

In addition, the presentation covered ongoing machine type testing, theoretical and practical training, and other crucial topics like the length of project phases, hardware lead times, operator updates and responses, production impacts and the challenges around technical support and manpower.

Thank you to all who have presented, participated and shared their experiences and learnings, good and bad, during the forums throughout the year.

IN SUMMARY

The EMESRT Vehicle Interaction Improvement Project has made significant strides in enhancing the safety and reliability of vehicle interactions within the mining industry. By leveraging the collective expertise of industry stakeholders, the project has developed a unified perspective on the challenges and opportunities in vehicle interaction operational requirements. This collaborative approach has not only identified critical areas for design improvement but also presented these challenges as business opportunities for designers to innovate and provide effective solutions.

The ongoing efforts and achievements of the project underscore the importance of continuous improvement and proactive engagement with industry. As the project progresses, EMESRT remains committed to improving design one step at a time.

More information about this project is available on the EMESRT **website**.

...the forum is an avenue for leading sites workshop participants to continue the sharing and learning about what is happening across the industry and to leverage from those learnings...

TYRE MANAGEMENT IMPROVEMENT

Project objective: To provide tyre and rim designers and users with structured information that enables the prevention of unwanted tyre and rim events and the mitigation of the consequences should an event occur.

This industry project is led by EMESRT Glencore representative Tony Egan.

INTRODUCTION

Off-the-road tyre maintenance is crucial in mining operations as it enhances safety, efficiency, and cost-effectiveness. However, working with off-the-road tyres is potentially dangerous due to their large size and mass with the uncontrolled release of stored energy resulting in serious, even fatal, consequences.

Industry statistics show that tyre fitters are the highest fatality occupational group in vehicle servicing within the mining industry.

THIS INDUSTRY PROJECT

Formed in 2018, The EMESRT Tyre Management Improvement Project aims to enhance the safety and effectiveness of tyre and rim management in the mining industry.

Established in response to significant incidents involving tyres and rims, this project focuses on providing structured information to designers and users to prevent and mitigate the consequences of tyre and rim events.

Key aspects of the project include:

- **Industry collaboration:** Bringing together industry experts, equipment manufacturers, and other stakeholders to share knowledge and leading practices.
- **Resource development:** Creating a comprehensive body of knowledge that includes guidelines, case studies, and technical resources to improve tyre and rim management.
- **Operational effectiveness:** Developing frameworks and tools to assess and enhance the effectiveness of tyre and rim management practices.

The project builds on EMESRT's earlier work in developing **Design Philosophy 2: Tyres and Rims**.

Updated in 2024, Design Philosophy 2 (DP-2): Tyres and Rims, objective is to prevent harm related to tyre and rim events to as low as reasonably practical, including consideration in design for foreseeable human error and material failures.

DP-2 stipulates that the intended design outcome should include/consider the following:

- Physical size and weight of tyres
- Stored pressures
- Tyre and rim monitoring technology
- Tyre handling equipment and tools
- Gripping/handling of structurally damaged tyres
- Handling of spare tyres from storage or transport carriers

DP-2 is a high-level overview of problems that can lead to adverse consequences from tyre and rim management events.

PROJECT COMMUNITY

This project has global working group representation comprising:

- Mining equipment users
- Equipment manufacturers
- Tyre management specialists
- Industry experts
- Regulators
- Researchers
- And other interested parties

EMESRT hosts regular global tyre management improvement technical working group meetings, and workshops, both in person and online.

These interactions provide an avenue for EMESRT to update the industry on the tyre and rim project progress, discuss industry challenges, and develop a common understanding of the problems at hand.

EMESRT thanks all the working group members for their continued contribution, commitment and support throughout 2024.

Working group member contributions are invaluable, and EMESRT looks forward to continuing this important work in the new year.

Special thanks to the below working group members for providing regular updates throughout 2024:

- Dr Sara Pazell (ViVA health at work): ACARP funded projects
- Jarrod Sampson (Glencore): Australian Standard 4457: *Off-highway rims and wheels – maintenance and repair* (Part 1), published on the 1 November 2024

EXTERNALLY FUNDED PROJECTS

Clearly, the incidents that are occurring in the industry today, DP-2 has not had the level of influence that EMESRT expected it would have in changing the behaviours and the outcomes relating to tyres and rims in the industry.

In 2018, EMESRT and the technical working group, recognised that further work needed to be done in looking more deeply at the issues surrounding tyre and rims.

With this in mind, EMESRT brought together several industry experts, particularly in the human factors area, to work with the technical working group and look at the issues in a way that had not been done before.

This resulted in a number of successful project submissions to the Australian Coal Industry's Research Program (ACARP) with the most recent approved in late 2024 being Project C37007: *People, Equipment, and Process: A Case Review on the Integration of OTR Tyre Handling Mobile Plant in Mining Operations.*

More information on the ACARP projects is available on the EMESRT **website**.

One of the key outcomes in 2023 was the publishing of 17 tyre handler functional performance scenario storyboards and one compilation video.

The animations were developed in collaboration with industry, through ACARP funded Project C33005: *Human factors aspects of tyre handling equipment design and operation examined within an EMESRT control framework approach*. In late 2023, a project extension was approved by the ACARP Board.

Project C35020: *Human-centred (and technology-enhanced) approaches to support users in tyre handling operations* was well and truly underway when EMESRT hosted a tyre handler workshop in January 2024.

The one-day workshop held in Brisbane, Australia, brought together 18 individuals from 12 entities, all focused on expanding the original scenario storyboard library.

During the workshop, participants delved into four specific scenarios previously selected by the EMESRT tyre and rim technical working group:

1. Fixing chains to off-the-road tyres
2. Removing a damaged tyre assembly
3. Traveling while loaded with a tyre stack
4. Removing a tyre and wheel rim assembly from supported mobile plant

Participants worked to understand these scenarios in the context of the initial animated scenarios, extracting valuable insights from subject matter experts to consider machinery workflows and task requirements.

Collaborating with an animation/instructional design and technology partner, the group planned the scenarios and identified the learning requirements to convert them into interactive animations.

Throughout the workshop, small groups tested the four scenarios against erosion factors and potential unwanted events for the industrial lift truck and grab example.

This collaborative effort not only enhanced the scenario storyboard library but also reinforced the commitment to improving safety and efficiency in vehicle interactions within the mining industry.

The full list of the tyre handler functional performance scenario storyboard titles are available on page 29.

A further workshop was held in June 2024 in Brisbane, Australia. This workshop was attended by 25 individuals representing 16 entities. The workshop focus was on the assessment of the EMESRT tyre handling mobile equipment operational and design erosion factors.

Workshop purpose: A human centred, task- and scenario-based evaluation of the hazard exposures on the tyre handling vehicles and their associated manipulating attachments.

Key topics:

- Orientation on design thinking and human equipment interface for tyre handling
- Verification of the potential unwanted events and associated erosion factors in the review of industrial lift truck and fixed arm machine

This workshop was another important step in understanding the equipment causal pathways that lead to tyre fatalities and provide industry stakeholders with a clear understanding of the problems that need to be designed out or mitigated.

The workshop focused on one common type of tyre handler that has allowed the working group to contribute to and validate the casual pathways analysis technique.

The next step in 2025, is for the working group to use the same technique used during the previous workshop on other known types of tyre handlers and the combination of tyre grabs so that users can use the documented information in their selection and purchase of fit-for-purpose equipment.

Once this work is completed, the current EMESRT tyre management body of knowledge will be updated where required.

Image: Tyre handler workshop held in June 2024, Brisbane, Australia.

BODY OF KNOWLEDGE

Industry resource materials have been developed during the course of the project and they are available via the EMESRT **website**, tyre management improvement body of knowledge.

In mid-2024, EMESRT restructured its website to focus on project outcomes and introduced a diagram to navigate through the tyre management improvement industry resources known as the **Body of Knowledge** (BoK).

The BoK provides users with an easy-to-use navigation aid, see Figure 3 below, that also shows where each of the industry resource materials fits into the overarching tyre management improvement project.

The diagram navigational approach is based on a sequential improvement methodology and the key resources developed are linked to each of the improvement steps in the diagram.

As the technical working group and ACARP research projects continue to work in this space, the resources and the detail that is provided to the industry will improve as we learn even more.

SCENARIO STORYBOARDS

Four new tyre handling functional performance requirement scenario storyboards were developed and uploaded to the existing library of scenario storyboards available on the EMESRT BoK.

The four new scenario storyboards are:

1. Fixing chains to off-the-road tyres
2. Removing a damaged tyre assembly
3. Traveling while loaded with a tyre stack
4. Removing a tyre and wheel rim assembly from supported mobile plant

The complete tyre handler functional performance scenarios storyboard titles are listed on the page opposite.

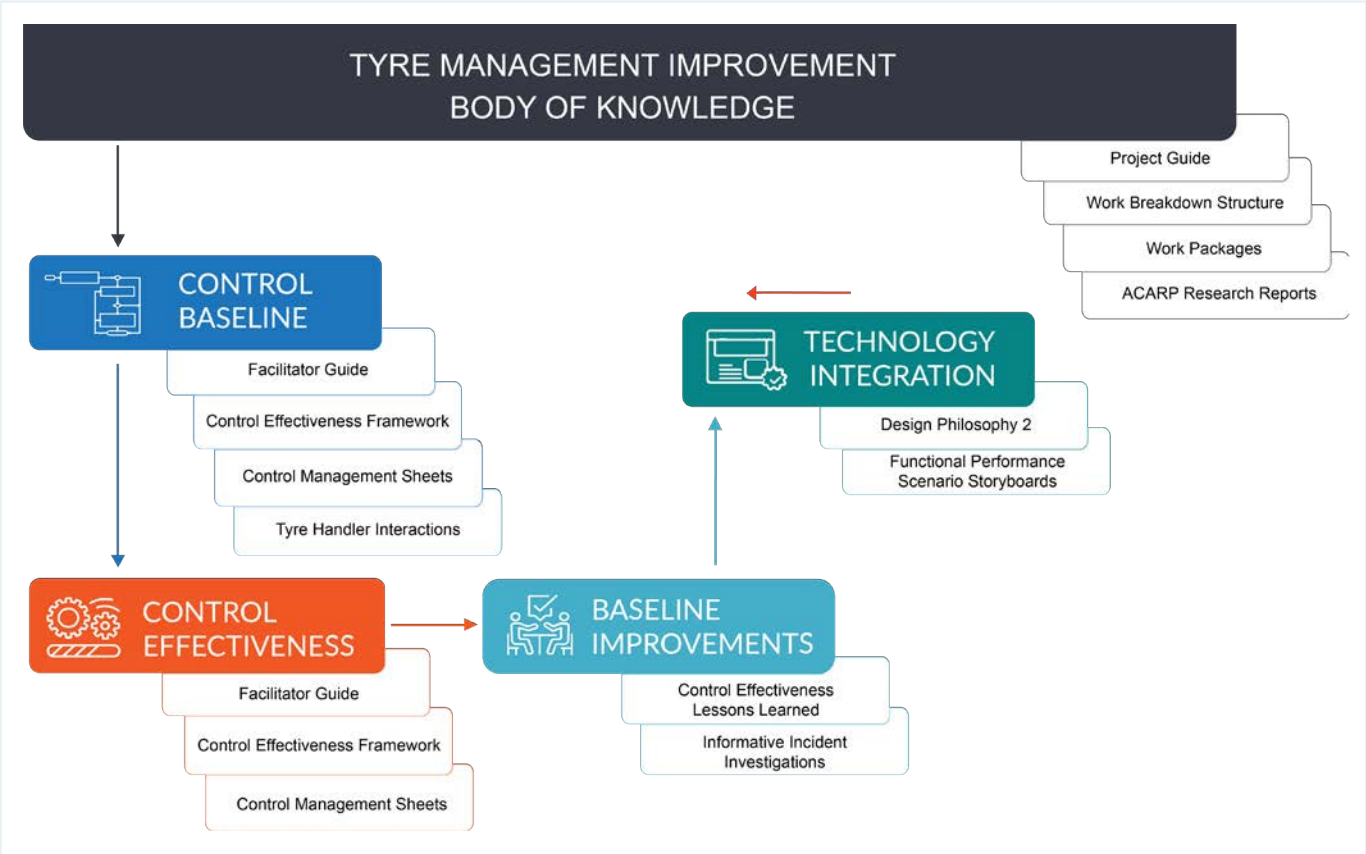


Figure 3: The EMESRT tyre management improvement body of knowledge navigation diagram.

SCENARIO STORYBOARD TITLES

0	Compilation video - tyre handling equipment
1	Aligning the wheel, rim or tyre assembly with the hub
2	Lifting wheel or rim components
3	Placing a tyre in a storage location
4	Removing the tyre assembly from an earth moving vehicle
5	Removing the wheel-rim retaining hardware
6	Standing a tyre assembly vertically on the ground while held in the grabs
7	Fitting the tyre assembly to the hub
8	Fitting a tyre to a wheel rim- horizontally
9	Installing retaining hardware
10	Lifting wheel, rim, or tyre assembly components
11	Lifting a tyre
12	Placing components on a rim
13	Placing a tyre assembly on the stand
14	Placing a tyre on a transport vehicle
15	Placing a tyre on wheel or rim vertically
16	Raising and flipping a tyre
17	Releasing tyre restraints
18	Fixing chains to off-the-road tyres
19	Removing a damaged tyre assembly
20	Travelling while loaded with a tyre stack
21	Removing a tyre and wheel rim assembly from supported mobile plant

IN SUMMARY

The EMESRT Tyre Management Improvement Project has made meaningful strides in enhancing the safety and efficiency of tyre handling within the mining industry. By drawing on the collective expertise of industry stakeholders, the project has developed structured information and practical resources to address tyre handling events.

While there is still much work to be done, the project has identified operational and design erosion factors, with consideration elements such as improved tyre handling, better maintenance processes, and work environments.

As the project continues to evolve, it remains dedicated to reducing the hazards associated with tyre handling and rim maintenance, ultimately contributing to the reduction of potential unwanted events.

More information about this project is available on the EMESRT **website**.

FIRE MANAGEMENT IMPROVEMENT

Project objective: To provide mobile equipment designers and users with structured information that enables the prevention of mobile equipment fires and the mitigation of the consequences should an event occur.

This industry project is led by EMESRT Rio Tinto representative Mark Geerssen.

INTRODUCTION

In the mining sector, mobile equipment fires, in both surface and underground mines, continue to represent a significant proportion of high-potential incidents.

Mobile equipment operators, maintenance staff, mine workers and others face an unacceptable risk from fire hazards. To lower the risk as much as is reasonably practicable, a step change in the management of fire hazards in mobile equipment and fixed plant is necessary.

THIS INDUSTRY PROJECT

Formed in 2018, the EMESRT Fire Improvement Management Project aims to enhance the safety of mobile equipment in the mining industry by preventing and mitigating the consequence of equipment fires. The project focuses on several direct and indirect key areas:

DIRECT

1. **Mobile equipment design:** Improving the design to prevent fires, such as separating fuel from heat sources
2. **Maintenance practices:** Addressing issues with routine maintenance, including hot work
3. **Fire detection and suppression systems:** Enhancing the design, installation, and maintenance of these systems

INDIRECT

1. **Operational practice:** Maintaining safe operation of equipment
2. **Emergency response:** Improving local and emergency response to fire incidents

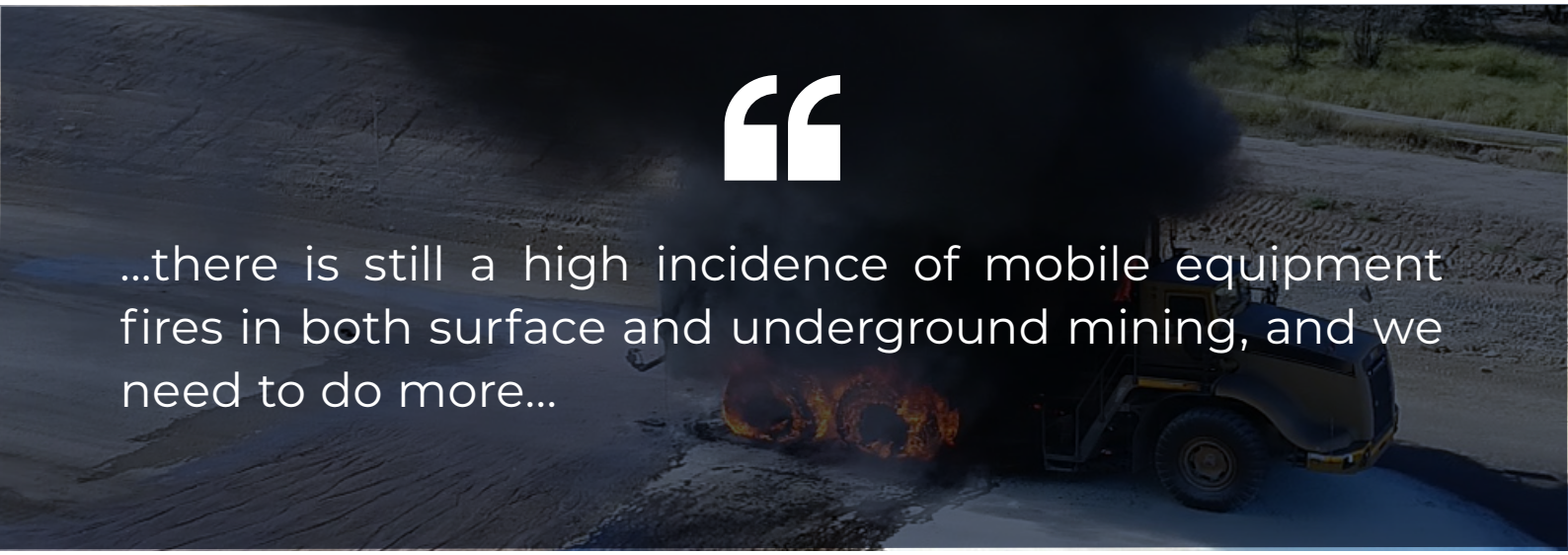
The project builds on EMESRT's earlier work in developing **Design Philosophy 4: Fire.**

Updated in 2024, Design Philosophy 4 (DP-4): Fire, objective is to prevent harm related to equipment fires to as low as reasonably practical, including consideration in design for foreseeable human error.

DP-4 stipulates that the intended design outcome should include/consider the following:

- Elimination of ignition type of fuel sources
- Early fire detection and appropriate response initiation
- Protection of the operator should fire occur
- Automatic suppression of fire - design
- Automatic engine shut-down and isolation of fuel sources, should fire occur
- Manual suppression of the fire should auto suppression be inadequate

DP-4 is a high-level overview of problems that can lead to adverse consequences from mobile equipment fire events.



PROJECT COMMUNITY

This project has global industry working group members comprising:

- Mining equipment users
- Equipment manufacturers
- Fire detection and suppression system specialists
- Industry experts
- Regulators
- Researchers
- And other interested parties

EMESRT hosts regular global fire management improvement technical working group meetings, and workshops, both in person and online.

These interactions provide an avenue for EMESRT to update the industry on the fire project progress, discuss industry challenges, and develop a common understanding of the problems at hand.

EMESRT thanks all the working group members for their continued contribution, commitment and support throughout 2024.

Working group member contributions are invaluable, and EMESRT looks forward to continuing this important work in 2025.

Special thanks to working group member Osama Ali from the Construction and Mining Equipment Industry Group (CMEIG) for providing regular updates throughout the year on ISO 13649: *Earth-moving machinery - Fire prevention*, published on 24 September 2024. EMESRT also extends its gratitude to retirees Stephen Oxley from Wormald and Ken Thomas from Total Fire for their valuable contributions during the project.

BODY OF KNOWLEDGE

While bringing the working group together, EMESRT identified that there were a lot of moving parts in this project and this resulted in the development of a **mobile equipment fire event tree with areas of influence**.

The fire event tree showed that there were complexities that have not been fully understood or discussed in DP-4.

The event tree focuses on mobile equipment design, mobile equipment maintenance, fire system detection and suppression design, and operating company emergency and crisis management and is available via the EMESRT fire management improvement **body of knowledge**.

BODY OF KNOWLEDGE *cont...*

Developing the fire event tree was the catalyst behind the development of Performance Requirement 4 focusing on fire.

The objective of Performance Requirement 4 (PR-4) is to provide structured and comprehensive information that can be applied by:

- Designers and manufacturers of original equipment
- Mining companies - mobile equipment users
- Suppliers of fire detection and suppression systems to reduce the number and consequences of mobile equipment fires in earth moving equipment

It is worth noting that PR-4 has been translated to French, Portuguese, Russian and Spanish.

PR-4 was prepared to augment DP-4 and should be read in conjunction with DP-4.

Other industry resource materials have been developed during the course of the project and they are available via the EMESRT website, fire management improvement body of knowledge.

The Body of Knowledge (BoK), provides website visitors with a visual diagram navigational approach that is based on a sequential improvement methodology and the key resources developed are linked to each of the improvement steps in the diagram, see Figure 4 below.

As EMESRT and the technical working group continues to work in this space, the resources and the detail that is provided to the industry will improve as we learn and share even more.

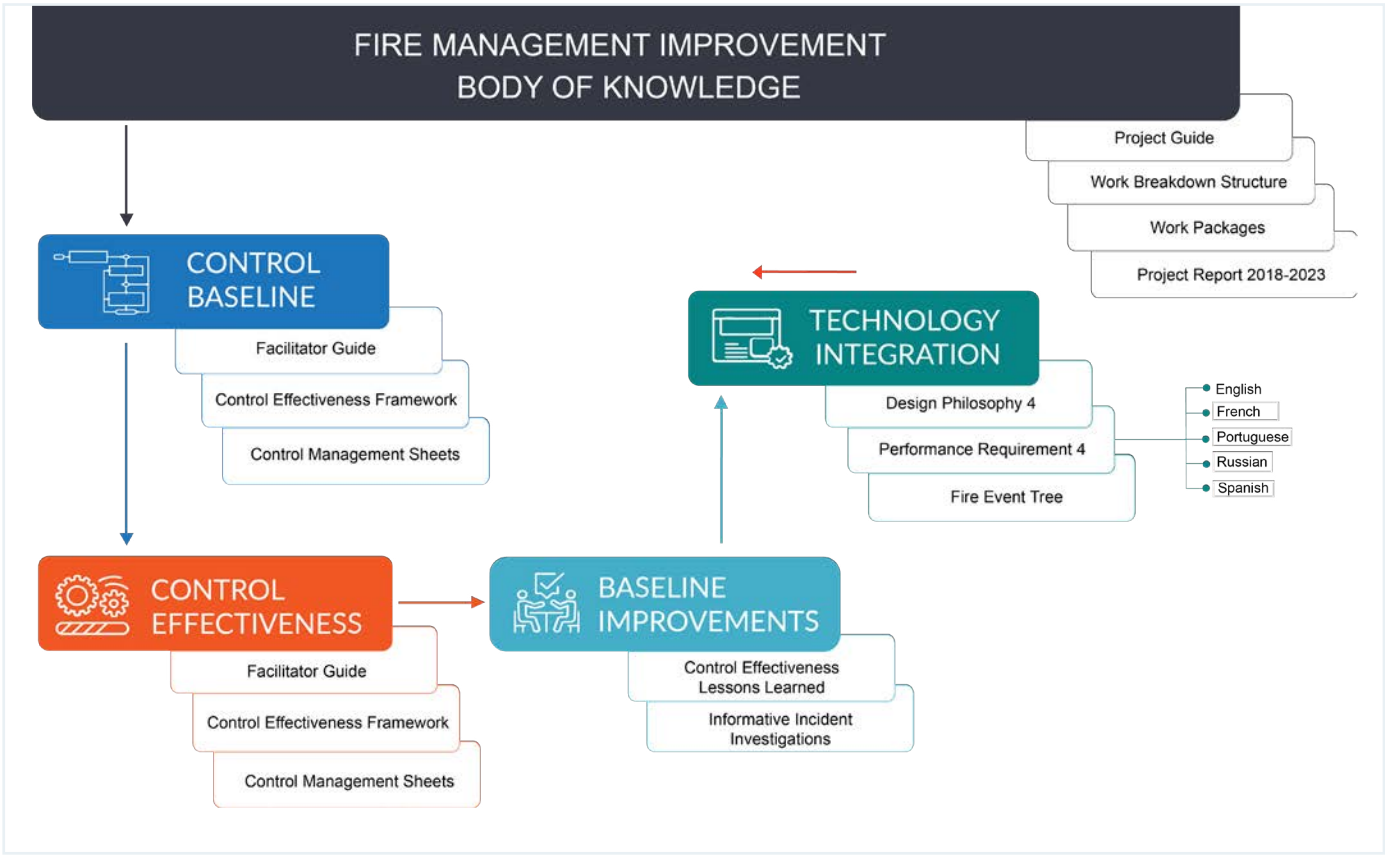


Figure 4: The EMESRT fire management improvement body of knowledge navigation diagram.

FIRE INCIDENT DATA ANALYSIS

In early 2024, EMESRT gathered fire incident data sets for 2019 - 2023 from a range of mining users and regulators.

The data received included manufacturer details, models affected, incidents related to dozers, excavators, graders, haul trucks, loaders, drill rigs, and other machinery used in the mining industry. Insights into fire-related failures and their causes were included in the data set but lacked specific detail and consistency.

In June 2024, EMESRT engaged an independent expert analysis group to analyse the fire-related incident data and report on findings.

The group's approach in analysing the data was two-fold:

1. Identify trends, rather than focus on complex relationships
2. Focus analysis on the 'top 20%' of the data (most represented) to prioritise high-value opportunities for improvement

The analysis focused on identifying and providing insights into fire-related failures and their causes. However, the data is only indicative and lacks specific detail required to report on failures and causes with confidence.

EMESRT can however, report on the number of incidence per year and the top five machine types per fire incident reported, see Figure 5 and 6 on the following pages.

> ...total of 2,460 fire incidents were analysed for a five year period with an average of 492 fire incidents recorded per year...

HIGH-LEVEL DATA ANALYSIS OUTCOMES

A total of 2,460 surface and underground fire incidents were independently analysed over a five-year period, averaging 492 fire incidents per year.

The fire incident data was categorised based on specific equipment involved.

The focus was on the top five; haul trucks, dozers, excavators, graders and loaders. The top five consistently recorded the most reported fire incidents during the five-year period.

The data analysed showed that 42.49% of fires occurred on haul trucks, followed by dozers at 26.62%, then by excavators at 14.91%, with graders at 7.10% and loaders at 8.89%.

Given the industry does not typically have as many dozers or excavators as haul trucks, its probably fair to say that some assets have a higher risk of catching fire than others.

The predominant cause of fire incidents were identified as equipment related, electrical and wiring faults, hose failure, and turbo related incidents . However, not enough specific detail and consistency is available in the data set to provide more insightful and meaningful information to be useful for OEM's, designers and others.

The data did indicate that the severity of incidents varied, with minor damage, major damage and total loss of asset in some instances.

Regardless of the severity, the incidents pose a risk to operators, can lead to operational downtime and have an economic impact on operations.

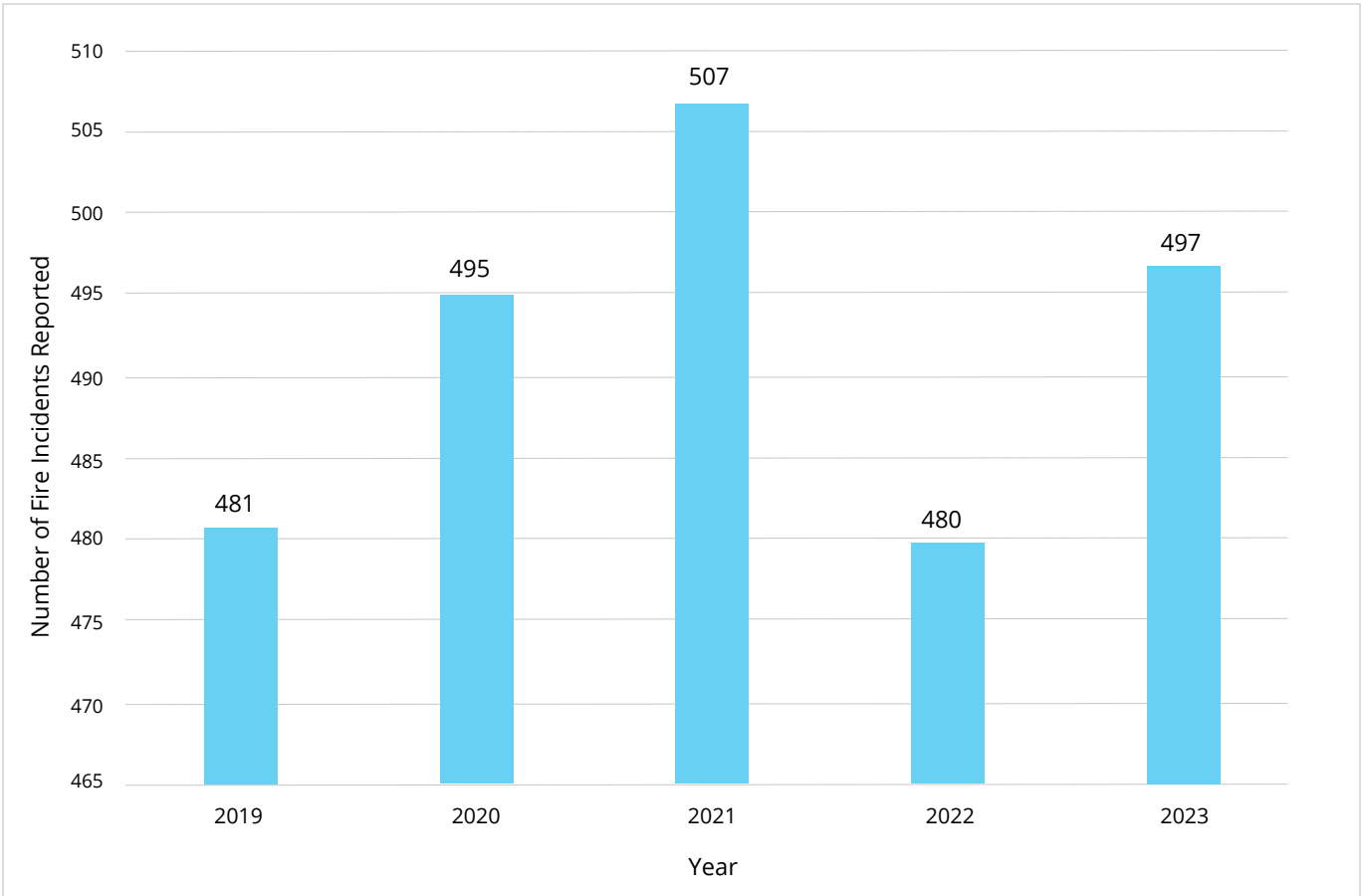


Figure 5: Total fire incidents reported per year (2019-2023).

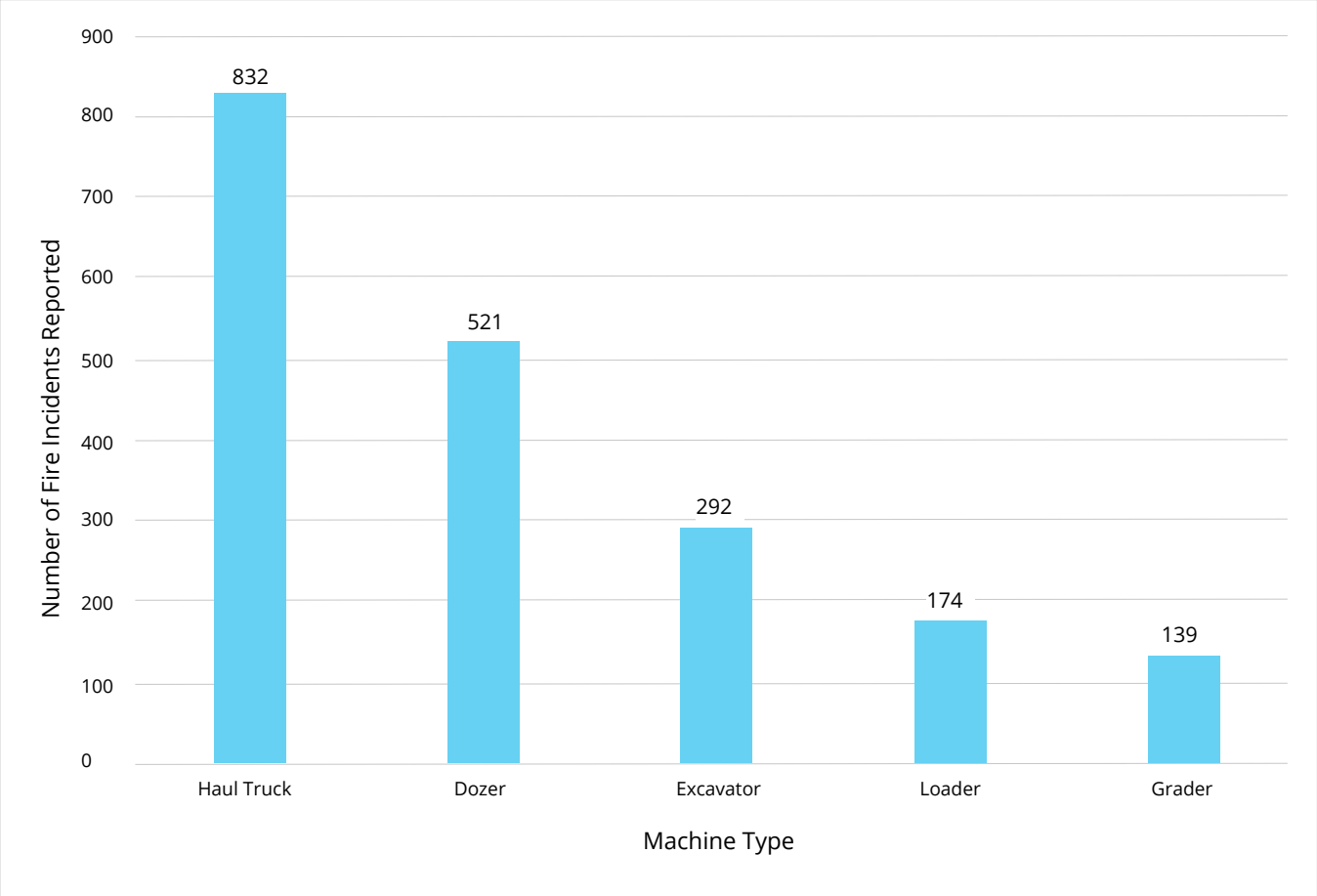


Figure 6: Machine type by number of fire incidents reported per year (2019-2023).

IN SUMMARY

There is still a high incidence of mobile equipment fire events in both surface and underground mining, and as an industry, we all need to do more.

For instance, the data captured and analyzed is only indicative and lacks specific detail and consistency.

When data is only indicative and lacks specific detail, it can be challenging for designers to make informed decisions regarding accuracy, completeness, consistency, and granularity. Improving these aspects can help make the data more definitive and useful for designers and others.

With industry collaboration, EMESRT is planning to do more work with the fire incident data in 2025 to improve the quality of information available for analysis, ensuring it is evidence-based rather than speculative.

This project has come a long way in understanding fire management issues and identifying opportunities for improvement, but there is more to do, particularly in capturing data in a definitive and useful way.

More information about this project is available on the EMESRT website.

MINEXPO 2024

MINExpo 2024, the world's largest mining event took place on the 24 - 26 of September 2024 in Las Vegas, Nevada, USA.

Organised by the National Mining Association, the event brings together professionals, experts, and decision-makers from the global mining industry to collaborate, discover innovative solutions, and gain valuable insights.

EMESRT has exhibited four times at MINExpo: the first in 2008, the second in 2012, the third in 2016, and the fourth in 2024. Unfortunately, COVID-19 prevented EMESRT from exhibiting in 2020.

Each year, EMESRT was granted a complimentary booth space and meeting room by the National Mining Association, and EMESRT extends its appreciation.

MINExpo was a significant opportunity for EMESRT to showcase its ongoing efforts and focus in delivering industry-level understanding of complex health and safety problems of significant consequence to the people in the mining industry.

During the planning process, EMESRT made a conscious decision to go paperless and use QR codes to showcase its industry resource materials. A catalog with QR codes was developed in electronic format, enabling booth representatives to gain instantaneous access to individual resources during discussions with booth visitors and walk-arounds at the expo.

EMESRT engaged a professional full service, turn-key exhibit rental production company to develop the modular structure using graphics provided by EMESRT.

The booth, located in the Partner Pavilion, provided visitors with the opportunity to meet with EMESRT representatives and learn about EMESRT's industry focus areas, progress made to date, and future planned activities.

The booth served as a hub for one-on-one discussions on safety innovations, and collaborative efforts to enhance equipment safety in the mining sector.

EMESRT embraced the opportunity to discuss and physically walk visitors through the restructured EMESRT website and the development of the body of knowledge covering the three focus areas being vehicle interaction improvement, tyre management improvement and fire management improvement.

The body of knowledge contains industry resource materials, including an easy-to-use navigation diagram that provides users with access to the documents and a visual representation of where each resource fits into the topic areas covered.

Great feedback was received on the restructured website, which enables visitors to access all industry resource materials developed through one visual diagram.

The booth, manned by EMESRT advisory group members Tony Egan and Mark Geerssen, along with EMESRT Program Manager Eve McDonald, was a hive of activity, entertaining a constant flow of visitors. Several advisory group and working group members who traveled to the expo volunteered to man the booth as needed, and their help was greatly appreciated.

Booth visitors took advantage of the two tablets displayed at the front of the booth with the 20 animated tyre handler functional performance scenario storyboards and educational materials developed through the EMESRT tyre management improvement project and the Australian Coal Industry's Research Program (ACARP) project funding.

The 20-tyre handler functional performance scenario storyboards and one compilation video are available on the EMESRT website.

On day two of the expo, EMESRT hosted a series of industry forums in the North Hall. The forums covered the EMESRT three focus areas being vehicle interaction improvement, tyre management improvement and fire management improvement.

The forums stimulated great discussions and debates among participants, strengthened existing relationships through mutual thinking, and generated new interest in EMESRT's work.

MINExpo 2024 was a pivotal event for EMESRT, provided a platform to highlight EMESRT's contributions to mining safety and to foster industry-wide collaboration.

EMESRT met existing community members face to face for the first time and many like-minded passionate individuals who wanted to share and learn more about the current and future work of EMESRT.

Thank you to all the volunteers who helped man the booth. And thank you to those who helped prepare and present at the industry forums held on Wednesday 25 September 2024.

What a great three days. Thank you to all booth visitors who popped in to say, 'Good day'.

Image (L to R): Tony Egan, Eve McDonald, Mark Geerssen, September 2024, Las Vegas, Nevada, USA.

HOW EMESRT OPERATES

GOVERNANCE FRAMEWORK

Whilst EMESRT is not a registered entity, it is committed to ensuring that its practices reflect good governance.

EMESRT aims to deliver practical outcomes at an industry level, with a work program that involves delivering specific projects. EMESRT's Advisory Group (EAG) members, who are senior managers in their respective organisations, make contributions based on their availability, experience and expertise.

Secretariat and financial management support is provided on a fee-for-service basis by a third-party provider.

Expert consultant support is sourced as required.

FUNDING

EMESRT membership is open to mining companies and the members provide the direct funding for EMESRT activities through an annual membership fee. The fee is set based on a 24-month rolling activity and project plan, which is reviewed annually.

Significant value is contributed from the in-kind involvement of all stakeholders in the many related project activities. This includes coordinating and connecting work already in progress by other organisations. Indirect funding is accessed via groups such as ACARP's coal industry research, university research, and other technical research and development conducted by other organisations.

ACTIVITIES SCOPE

EMESRT seeks to foster candid dialogue, transparent industry-level collaboration, open sharing of non-commercial information, and active stakeholder engagement.

The EAG is aware of managing anti-trust issues and clearly communicates EMESRT's scope in all workshops and other industry forums. This process has been in place since OEM engagement work commenced in 2006.

In scope; EMESRT **will**:

- Focus on the design of earth moving equipment in surface and underground mines
- Provide aligned design expectations based on hazards
- Involve interested mining companies in the industry
- Share openly with all interested OEM's and other third-party suppliers
- Listen, consider and value OEM and third-party supplier contributions
- Provide information on leading practice to OEM's and third-party suppliers
- Share leading practice to assist mining equipment users in achieving health, safety and environmental compliance goals

Out of scope; EMESRT **will not**:

- Discuss commercial issues or anything of an anti-trust nature
- Provide approval for OEM or third-party designs
- Share OEM confidential information with other OEM's or third-party suppliers
- Impose adoption of solutions on member company sites

ANNUAL WORK PLAN

The EAG meets annually to discuss the progress of current projects, review and amend the strategic plan, and document future focus areas.

The work plan process includes:

- Reviewing the progress of current industry projects (including outstanding activities and the potential end date)
- Identifying prevalent industry issues that members are highlighting
- Structuring responses that are within EMESRT's stated scope of operation
- Appointing project lead(s)
- Confirming the strategy and plans
- Setting timelines and allocating resources
- Allocating budget(s)
- Determining the following year's membership fees based on the identified work plan and allocated budget

The EAG establishes a TWG for each project. Each TWG includes multiple member representatives, OEM's, third-party suppliers, industry experts, regulators, researchers and others with relevant expertise. The EAG and TWG's meet regularly to discuss the progress of each industry project.

CONTINUITY AND RENEWAL

One of EMESRT's significant strengths is the continuity of its representatives from member organisations. A core group of company representatives were responsible for establishing EMESRT and have remained involved.

Each has made significant contributions to developing the reach and profile of EMESRT and supported the evolving operational processes that can deliver successful industry-level projects. Importantly, they have established and maintained good relationships with senior managers in OEM's and industry third-party supplier organisations.

One of the most important challenges facing EMESRT is capturing the core representatives' decades of effective work so EMESRT can continue beyond its original cohort of pioneers. Meeting this challenge has required formalising and updating EMESRT's operational processes as well as documenting the journey of current and past projects to provide insights into the activities that made a real difference in improving outcomes for users.

The effectiveness of EMESRT's approach for engaging with and influencing organisational decision-makers is reviewed at each EMESRT strategy and planning review meeting.

While EMESRT's role within the industry is well understood and highly regarded by senior OEM leaders and other industry supplier organisations, it has a lower profile in mining companies, including those that are members.

This uneven profile was reconfirmed during ongoing collaboration with the ICMM ICSV program in 2021, where senior OEM manager participants consistently and publicly endorsed EMESRT's successes and ongoing relevance.

This situation reflects EMESRT's underpinning philosophy of focusing on delivering useful outcomes. However, the EAG is working to increase EMESRT's profile and influence with all stakeholders, to increase capacity and support project outcomes.

Relevant stakeholders include research organisations internationally, regulators, industry associations and senior managers in operating mining companies (including EMESRT members).

More information about EMESRT is available on the EMESRT **website**.

EMESRT MEMBERS FOR 2024

TIER 1

Alcoa

AngloAmerican

AngloGoldAshanti

BHP

Glencore

Kiewit

NHG New Hope Group

RioTinto

Teck

Vale

Whitehaven Coal

TIER 2

Coronado Steel Starts Here

South32

Tronox

EMESRT

Earth Moving Equipment Safety Round Table

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