0845 Chair's Opening Remarks

ENVIRONMENTAL COMPLIANCE AND ENERGY USAGE REDUCTION IN THE DEPOT
Real-World Examples Of Successfully Integrating New Technologies And Practices

KEYNOTE DEPOT MODERNISATION PANEL ENVIRONMENTAL COMPLIANCE & SUSTAINABILITY

0850 – 1000 **Advancements In New Technology & Practices For Environmental Compliance & Energy Usage Reduction**

The EU Green Deal and the Climate Target Plan 2030, which aim to make Europe the first climate-neutral continent by 2050, and such regulations impact rail depot operations, include limits on greenhouse gas emissions, energy efficiency requirements, and mandates for the use of renewable energy sources. *How are operators preparing their depots for this shift?*

During our research discussions, European rail operators highlighted several emerging technologies currently under evaluation, including:

Smart Lighting Tech	Advanced HVAC Controls	Depot Machinery and Equipment
IOT For Energy Management	Renewable Energy Sources	Low Energy Train Washing

0850 AN OVERARCHING STRATEGY FOR ENVIRONMENTAL COMPLIANCE
Results So Far On Making Depot Operations More Energy-Efficient For Environmental Compliance – *From Integrating Renewable Energy Sources To Cutting Down On Energy Consumption*

- Recognising the regulations and standards for energy efficiency and environmental compliance in depot operations
- Identifying the main areas of energy use within depot operations and their impact on overall environmental performance
- Incorporating renewable energy sources into depot energy mixes.
- Energy Efficiency Upgrades - Upgrading lighting, HVAC, and operational machinery to more energy-efficient models and incorporate smart control systems

0910 EFFICIENCY AND RESOURCE OPTIMIZATION IN DEPOTS
Proven Methods For Minimising Energy Consumption And Optimising Resource Usage In Depot Operations

- Understanding the specific areas and processes in depot operations that are the largest consumers of energy
- Identifying inefficiencies in the use of resources, including water, electricity, and materials, within depot activities
- Keeping abreast of the latest technologies and systems that can contribute to more efficient depot operations
- *Prioritising Energy-Efficient Technologies*: Adopting LED lighting, high-efficiency motors, and smart HVAC systems to reduce energy use

0920 ADOPTING NEW TECHNOLOGIES FOR COST-EFFECTIVE ENVIRONMENTAL COMPLIANCE
Implementing Smart Technologies To Optimize Energy Usage In A Cost Conscious Environment

Strategic adoption of smart technologies to achieve cost-effective environmental compliance in depot operations. Outlining actionable solutions, including implementing energy management systems, IoT devices, and renewable energy sources.

- Balancing the investment in new technologies with the need for environmental compliance and cost savings
- Challenges and opportunities associated with integrating smart technologies into existing systems for energy optimisation
- Establishing metrics for evaluating the effectiveness of new technologies in reducing energy consumption and costs
- Results and conclusions so far

0940 Curated Interactive Discussion For The Entire Panel – *Questions To Get The Conversation Started Include:*

How can rail depot operators effectively balance the upfront costs of adopting smart technologies against the long-term benefits of environmental compliance and energy savings?

Can you detail the process and impact of transitioning depot machinery and equipment to high-efficiency models? What operational changes are necessary to support this shift?

What metrics and KPIs are being established to evaluate the effectiveness of new technologies and practices in reducing energy consumption and greenhouse gas emissions in depots?

Given the rapid pace of technological advancement, how are rail depots planning for future scalability and adaptability of the technologies they implement today for energy management and environmental compliance?

1000 – 1030 Morning refreshment break and networking

SAFETY FIRST!
Strategies & Upgrades That Enhance Safety Management In The Depot

DEPOT SAFETY ENHANCEMENT PANEL PIONEERING APPROACHES AND INNOVATIONS

1030 – 1210 **Practical Experiences In Integrating New Technologies & Practices To Improve Depot Safety Management**

During our research discussions, European rail operators highlighted several emerging technologies currently under evaluation, including:

Digital Twins for Safety Simulation and Analysis	Automated and Remote-Controlled Vehicle Systems	Robotic Maintenance Assistants
IoT-Enabled Safety Monitoring Systems	Augmented Reality (AR) for Maintenance Training & Ops	Predictive Analytics for Equipment Maintenance

1030 COST-BENEFIT ANALYSIS OF NEW TECHNOLOGIES FOR SAFETY MANAGEMENT
Demonstrating Value From New Safety Technologies And Integrating These Tools Effectively Into Depot Operations

- Prioritising new technologies in a cost-constrained environment
- Identifying and overcoming obstacles in incorporating advanced safety technologies into existing operational frameworks within the depot
- Creating step-by-step plans for integrating new technologies into depot operations to minimise disruption.

1050 ELEVATING SAFETY CULTURE IN THE DEPOT
Managing Safety Culture In The Depot When Implementing Changes To Procedures & Practices

- Recognising the elements that constitute a strong safety culture within depot operations and how changes influence them in procedures and practices
- Identifying the common barriers to changing safety behaviours and practices among depot staff
- Ensuring that depot leaders are visibly committed to safety, acting as role models for safety culture excellence
- Developing and implementing training programs tailored to address specific safety culture challenges within the depot

1110 HUMAN FACTORS AND ERGONOMICS IN SAFETY
Best Practices On Creating A Working Environment & Culture That Is Both Safe And Conducive To High Performance When Implementing Changes & Upgrades

In 2024, as European rail depot operations continue to modernise and integrate advanced technologies, the focus on human factors and ergonomics in ensuring safety becomes increasingly critical. The complexities of new systems and the integration of digital interfaces mean that the potential for human error remains a significant concern. Issues such as confusingly similar controls can lead to operator mistakes, contributing to safety incidents. Ergonomic improvements are, therefore, essential for enhancing safety and ensuring the well-being and efficiency of the workforce.

1130 DIGITAL TWINS AND AUGMENTED REALITY FOR SAFETY SIMULATION, ANALYSIS AND OPERATIONS
***From Virtual to Reality*: Leveraging Digital Twins and AR for Safety Excellence**

- Utilising digital twins for comprehensive risk analysis and preventive measures in rail operation
- Developing tailored AR scenarios that replicate real-world dangers for effective safety training
- Predictive Maintenance with Digital Twins: Implementing digital twins to predict and prevent potential safety issues before they occur
- Integrating AR guides and digital twin analytics into daily safety checks and emergency response drills

1150 Curated Interactive Discussion For The Entire Panel – *Questions To Get The Conversation Started Include:*

Considering both direct and indirect benefits, how do you quantify the return on investment (ROI) for deploying digital twins and augmented reality in depot safety management?

What are the most effective strategies for overcoming resistance among depot staff when integrating advanced technologies like IoT-enabled systems and robotic maintenance assistants into safety protocols?

How can depots effectively balance the need for technological innovation with the practicalities of cost constraints, especially when prioritising new safety technologies?

Given the critical role of human factors and ergonomics in safety, what best practices can be shared for designing controls and interfaces that minimise the risk of operator mistakes?

1210 – 1310 Networking lunch break

OPTIMISATION FOR GREATER OPERATIONAL EFFICIENCY PANEL *SMART SOLUTIONS AND UPGRADES*

1310 – 1530 **Adopting New Practices For Optimizing Maintenance Tasks, Operational Workflow & Fleet Lifecycle Management In The Depot**

1310 FROM ARRIVAL TO OVERHAUL, FROM MIDLIFE TO END OF LIFE & HANDOVER
Optimal Approaches For Fleet Lifecycle Management In The Depot

Investigating strategies to manage the lifecycle of a fleet efficiently in the depot, from acquisition through to repurposing or decommissioning.

- **Lifecycle Stages**: Identifying the distinct stages of fleet lifecycle management within the depot, from initial arrival to final decommissioning
- **Efficiency in Transition**: Assessing how to maintain efficiency as vehicles transition between lifecycle stages, including midlife overhauls
- **End-of-Life Strategy**: Determining the best practices for end-of-life processes, including repurposing or responsible decommissioning.
- **Handover Protocols:** Establishing effective protocols for the handover process that ensure continuity and adherence to standards.

1330 DIGITALISATION OF DEPOT OPERATIONS
Digital Transformation Of Depot Operations, Including Maintenance Procedures, Documentation, And Competency Management

- Understanding the shift required to integrate digital tools into traditional depot operations
- Developing effective training programs to upskill staff in new digital procedures and tools
- Managing resistance and facilitating a smooth transition to digitalised operations
- Rolling out digital tools and systems in phases to allow for adaptation and learning

1350 BLOCKCHAIN-ENHANCED SUPPLY CHAIN
ADVANCING DEPOT OPERATIONS AND FLEET MANAGEMENT
Discover The Transformative Potential Of Blockchain Technology In Redefining Fleet Lifecycle & Supply Chain Management For Depot Operations.

- Steps to adopt blockchain technology for fleet lifecycle and supply chain management processes
- Strategies for consolidating various data types onto a blockchain platform to facilitate access and analysis
- Developing training programs for depot staff to adapt to blockchain-enabled processes
- Establishing protocols for the ongoing review and adaptation of blockchain systems to meet evolving operational needs

1410 CONDITION MONITORING EXCELLENCE: OVERCOMING CHALLENGES FOR DEPOT INTEGRATION
Successful Integration Of Condition-Based Monitoring Within Depot Operations

- Reviewing diverse approaches to integrating condition monitoring systems into existing depot infrastructures
- Identifying common challenges depots face when implementing these systems and how they have been successfully addressed
- Exploring effective strategies for managing and leveraging the data collected from condition monitoring for enhanced decision-making within the physical depot environment
- Forming cross-functional teams to manage the integration and ongoing operation of condition-monitoring systems

1430 INCORPORATE PREDICTIVE SYSTEMS INTO DEPOT MAINTENANCE WORKFLOWS

Practicalities Of Integrating Predictive Systems Into Depot Operations Also Configured For Traditional Maintenance Processes

- Designing customized frameworks for integrating predictive maintenance technologies based on specific depot requirements
- Offering advanced training for depot personnel to use predictive maintenance tools and interpret data analytics effectively
- Creating feedback loops that allow for the continuous refinement of predictive maintenance systems based on operational data
- Forming partnerships with technology providers to ensure ongoing support and system optimisation for predictive maintenance solutions.

1450 CHANGE MANAGEMENT IN DEPOT INNOVATION:

Change Management Strategies Specific To Depot Modernisation While Fostering A Culture Of Innovation

- Recognising the cultural shifts required to foster innovation within rail depot operations
- Developing effective change management strategies tailored to the unique environment of depot operations.
- Engaging staff at all levels to embrace change and contribute to innovation initiatives
- Involve staff in the planning stages of depot innovation projects to build ownership and facilitate smoother transitions

1510 SKILLS FOR SUCCESS: THE DEPOT WORKFORCE OF TOMORROW

Practical Insights On Workforce Skills Development To Empower Your Workforce For A Future Of Excellence

- Upskilling depot staff for the digital age
- Skill development as a competitive advantage
- Practical solutions for nurturing a skilled depot workforce

1530 Curated Interactive Discussion For The Entire Panel – *Questions Include:*

Could you provide examples of innovative end-of-life strategies for depot operations, especially in terms of repurposing or responsible decommissioning?

Managing resistance to digital transformation can be challenging. Can you elaborate on strategies to facilitate a smooth transition to digitalised depot operations?

Are there best practices for rolling out digital tools and systems in phases to allow for adaptation and learning within depot environments?

What are the diverse approaches to integrating condition monitoring systems into existing depot infrastructures, and how do they impact operational efficiency?

1600 Afternoon refreshment break

THE ROBOTICS, AI AND AUTOMATION PANEL EVALUATE ROI & ADDRESS INTEGRATION CHALLENGES

1630 – 1715 **Application Of Automation, AI, Robotics & Data To Improve Depot Maintenance Efficiency And Safety**

During our research discussions, European rail operators highlighted several emerging technologies currently under evaluation, including:

Underframe Inspection Robots	Real Time Monitoring Robots	Automated Cleaning Robots
Robotic Depot Assistance	AI Driven Smart Solutions	Automated Maintenance Tasks

1630 HIGHLIGHTING REAL-WORLD APPLICATIONS OF ROBOTICS IN MAINTENANCE
Discussing Early-Stage Robotic Developments And Addressing Implementation Challenges

- Real-world examples of successful robotics applications in maintenance
- Exploring early-stage developments and innovations in maintenance robotics
- Addressing challenges and solutions in the implementation of robotics and automation for maintenance

This session from the University of Huddersfield will describe their research activities in the field of robotics and vision systems for train maintenance and inspection including case studies using robotics for train refuelling and brake pad replacements.

Gareth Tucker, *Associate Director of Data Science and Automation*, **Institute of Railway Research (IRR, University of Huddersfield**

1650 INTEGRATING AUTOMATION INNOVATIONS FOR SMARTER DEPOTS
Integration Of AI & IoT Drive Automation Innovations In Depot Operations

- Evaluate the impacts of AI usage on depot operations
- Addressing the impact of diverse human factors and ergonomics on technology integration
- Leveraging AI, IoT, and automation for enhanced depot efficiency

1710 EFFICIENT USE OF DATA IN DEPOTS
Optimal Utilisation Of Data Analytics And Monitoring To Improve Depot Operations

- Integration of AI, IoT, and automation innovations into depot operations
- Addressing the impact of diverse human factors and ergonomics on technology integration
- Practical solutions for implementing smart depot management solutions
- Leveraging AI, IoT, and automation for enhanced depot efficiency

1730 Chair's Closing Remarks and Close of Day 3