CAPABILITY & **INNOVATION**

1st Edition
February 2024

Rail Forum

Foreword

Last year, we had the pleasure of hosting both Robert Ampomah, Chief Technology Officer and Gareth Evans, Head of Rail Technology at Network Rail for a couple of Rail Forum member visits followed by an informal roundtable discussion. During the discussion, Robert shared some thoughts around key priorities for Network Rail, including using technology to reduce costs, improving efficiency, enhancing safety, making the network more resilient to extreme weather and climate change, and improving the customer experience.

Members are at the heart of all our activities, and so following this visit, we were delighted to provide members the opportunity to contribute to a capability and innovation brochure and showcase relevant case studies of products and services. Positively, there is an overlap where solutions shared by members span more than one priority area, this has been indicated through the design of the brochure.

We hope the brochure inspires readers of the innovative nature of the rail supply chain as well as the breadth and depth of its capability.

Elaine Clark
Chief Executive Officer
Rail Forum

Rail Forum

Foreword

The railway makes a difference to the lives of millions of people every day by connecting communities and driving economic growth.

Innovation is critical to the railway's future through the delivery of excellent services for our passengers and freight customers.

As we continue to expand innovation in rail, I believe in the importance of building and fostering a strong collaborative partnership with our supply chain and one that revolves around delivering on our informed priorities and encouraging the growth of diverse talent in the rail industry.

Effective research and development, and adoption of technology is essential to securing competition and innovation in rail. We must improve efficiency and value for money from our core activities, including in how new technology can best support workforce reform and modernisation.

Research, development and innovation (RD&I) plays a vital role in unlocking opportunities to improve efficiency and our growing battle against extreme weather, to identify how new technology and innovative ways of working can best improve safety, reduce cost and achieve net zero and to improve customer experience and deliver a more sustainable railway system for future generations.

Network Rail has successfully secured a financial settlement for the next five years from 2024 and I am excited about the opportunity this presents for wider collaboration between Network Rail and our supply chain partners, such as Rail Forum, to drive investment in innovation to unlock efficiencies and benefits across our rail network.

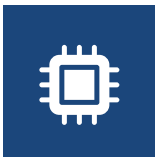
Robert Ampomah
Chief Technology Officer
Network Rail

Rail Forum members showcased:

Case Study

Categories

All of the case studies featured fall into one or more of Network Rail's key priority areas. For each case study the primary category and any additional relevant categories have been highlighted by the following colour coded icons:



Using technology to reduce costs

Improving efficiency

Enhancing safety

Making the network more resilient to extreme weather and climate change

Improving the customer experience

Using technology at a train depot paint shop

CLEANING APPLICATION:

Removing difficult paint from airless hoses in the paint shop of train depots - such as micaceous iron oxide, zinc, polyurethane & epoxy.

EXISTING PROCESS:

Previously 200 litres of nitro thinners per month were used. This posed health & safety risks and uncontrolled costs in relation to the use, storage and disposal of nitro thinners. Handling and exposure to nitro can cause many health problems.

Short term effects can include:

- dizziness
- headaches
- shortness of breath
- nausea
- hallucinations
- confusion
- loss of consciousness
- skin, eye, or respiratory system irritation

Long term exposure can lead to:

- muscle weakness
- depression
- bone marrow damage
- may cause pneumonia or chronic kidney infection

Inhaling excessive amounts of paint thinner can also affect the cardiorespiratory, renal, and central nervous systems, and can lead to multi-organ toxicity and even death. Additionally, paint thinner is a highly combustible substance so it's crucial to ensure proper usage and disposal which in itself poses risks and associated costs.

COSTS OF EXISTING PROCESS:

Total cost = £6,000 per year, plus cost of specialist disposal = £1,000.

BIO-CIRCLE PROCESS IMPLEMENTED:

Specialist PROLAQ paint cleaning system & PROLAQ cleaning solution. Only 40 litres of PROLAQ cleaning solution is required per month due to the longevity and reusability of the liquid. Whereas the cleaning performance of thinners diminishes over time, the clever filtration system in PROLAQ cleans the cleaner so it can be reused again and again without cleaning performance being compromised after every use.

PROLAQ cleaning solution is non-hazardous, label-free and VOC reduced... and smells much nicer than thinners! Therefore worker safety is enhanced as hazardous thinners are no longer handled or need to be stored. There is also minimal environmental impact due to the low VOC content when compared to nitro based thinners. VOCs cause indoor air pollution and contribute to poor air quality in the environment.

COST SAVINGS:

The combined cost of the rental of the PROLAQ paint cleaning system, the PROLAQ cleaning solution and our monthly service and disposal is £1,700 per year.

Total customer savings per year c.£5,300 - that's in excess of 75% saved in terms of cost and VOC output.

Ready to optimise your cleaning processes? Whether you're cleaning paint/ varnishing tools & equipment; large components and machinery; tiny parts with complex geometries; or internal pipes, cooling ducts and heat exchangers; we are confident we can transform your cleaning processes with biotechnology.

Call 03300 415 396 or email sales@bio-circle.co.uk to book a free site survey and process optimisation plan.

Digital Manufacturing process

DB ESG's Digital Manufacturing service is supporting the UK rail sector by solving obsolescence, component failure and engineering problems

Our Digital Manufacturing process has been used to address component supply issues with more than 46 different parts, across 13 vehicle classes operated by 13 different train operators in the UK. It has also provided multiple brand-new parts & components to solve engineering and operational problems, enabling vehicles to remain in service.

DB ESG started its journey into Digital Manufacturing in 2018, working initially in partnership with Angel Trains to minimise the impact that obsolete components have on rolling stock operations. Suppliers may no longer exist, manufacture, or support certain parts. Low volume ordering is also a struggle, leading to operators having to order, store and pay for hundreds more parts than they require with a higher unit price due to tooling & set-up costs.

Digital Manufacturing is the design, development and production of physical parts using computer aided processes, such as CAD, Additive Manufacturing (AM, also known as 3D printing) and programmable CNC machines. Our process allows the supply of just one unit, removing the need for storage and keeping costs low. Additionally, components can be delivered within days rather than the months it can take to manufacture traditionally.

Digital Manufacture is not just a way of combatting obsolescence but can be used to address component failings. Design improvements can be made to improve the reliability and quality of parts whilst incorporating different materials and technologies. We can also create bespoke components from scratch or create jigs, fixtures, patterns and rapid prototypes to assist larger integration projects. Our rail and rolling stock expertise ensures that all our parts meet the relevant railway standards, including fire compliance and structural requirements.

We were the first in the UK to place 3D printed parts into commercial service on a passenger train (seven grab handles and four armrests). Since then, we have rapidly expanded into the supply of Digitally Manufactured components. We have 3D printed parts in many materials including polymer, metal and rubber using multiple production methods. We also incorporate 3D printing to enhance more traditional production methods. Such as additive casting; where the mould itself can be 3D printed for parts to be cast, lowering cost and speeding up production time.

We have developed an online Digital Manufacturing Hub with a catalogue of parts. This serves as both an educational and procurement tool where parts can be re-ordered online.

Selection of 3D printed train parts produced for UK rolling stock.

To learn more about how digital manufacturing can help you solve your component issues then visit – www.3dbesg.co.uk or email: 3denquiries@dbesg.com

Revolutionary Infrastructure Monitoring

ENCOMPASS ENGINEERING

Infrastructure monitoring has stagnated in the past 20 years in the UK railway. The lack of high-frequency measuring and monitoring and continual under-investment over consecutive control periods has created an infrastructure monitoring approach that is not 'fit for purpose' as stated by Network Rail during the recent IM conferences.

The good news is - there are a number of small and medium enterprises both in and outside the rail industry that have new, revolutionary approaches to the process and how we can measure, monitor and deliver the necessary information to the infrastructure owners and rail operating companies that will really add value.

The New Measurement Train 'NMT', mentor, Track recording coach and other trains within the IM fleet are old, unreliable and operating under draconian rules. It's reported only 60% of the miles run by the NMT are recorded, due to concerns over recording 'transit' runs and disjointed pathing and planning of units that are drawn out over multiple teams. Combined with a lack of adoption of systems and concerns over the information produced has stifled innovation and the SMEs that the industry so badly needs. Each region of the UK requires standard and bespoke information to be provided at a significantly higher frequency than it is today to add value.

With the ability to gather and record more data, we can use recursive algorithms within Artificial Intelligence (AI) programmes to provide ongoing monitoring and predictions. This allows us to simulate significantly more passes of the network to understand how the network may degrade over time. With this knowledge, we can proactively plan maintenance and activities on the network, and manage resources, equipment and possessions to the maximum. It's not about removing people from jobs - it's about using the resources we have more effectively - targeting the areas of the network that need maintenance. The aim is to eradicate line closures, remove speed restrictions and provide a railway fit for today. Huge cost savings and overall maintenance efficiency can be achieved through innovation and technology.

Technologies are being deployed on trains that are 40/50 years old and older, unreliable and expensive to maintain. The use of private operations and investment could change all of this. With a phased approach to process and policy, pathing and planning - costing thousands, not tens of millions - that is complemented by new ways of measuring and monitoring - Encompass Engineering and the POLUS Group have the solution.

In conjunction with the Polus Group, Encompass Engineering has a strategy and a plan to change the current status quo - an opportunity that has huge potential to change the industry for the better. But to be successful - it requires a fresh perspective, forward thinkers and dynamic teams looking for innovative new ways to help drive this industry forward in a more positive way, which Encompass and the POLUS group can deliver.

To understand more about our approach, the processes and the technology and how it can help your business - email engineering@encompass-engineering.com

IcoShape Data Traffic Management

From digital video surveillance to remote condition monitoring (RCM), more business-critical onboard systems are leveraging Internet connectivity than ever before. In addition, more passengers are connecting to onboard Wi-Fi services, with those travelling expecting to remain productive and entertained throughout their journeys.

As a result of this growing consumption of wireless data, transport operators face an ever-expanding challenge in managing their overall data usage and the associated costs, while supplying an onboard experience to match expectations.

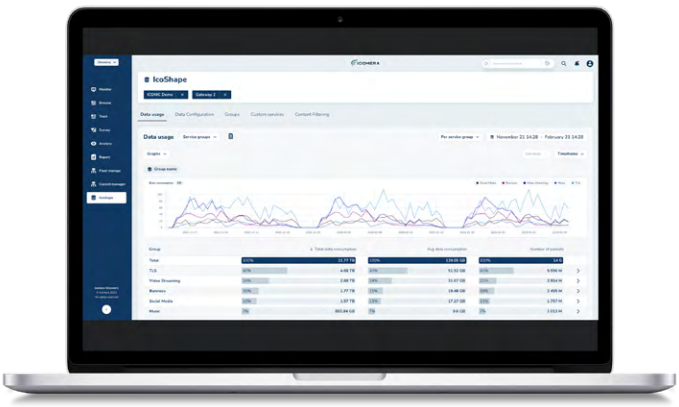
Icomera's data traffic flow management tool, IcoShape, has been designed to reduce the impact of heavy bandwidth usage in this new data-centric normal. IcoShape empowers transport operators to utilise their available bandwidth more efficiently by categorising and then prioritising / throttling and / or blocking links as desired, ensuring that data from operational-focused systems is distributed in good time, at a low cost, and without noticeably impacting performance for other systems or passengers.

In 2022, Northern deployed IcoShape as part of a competitive trial to investigate how to better manage its data costs, optimise the quality of service, and improve overall passenger satisfaction levels. With an average of more than half a million users connecting to its Wi-Fi every month, the transport operator sought a solution which would allow it to control and mitigate its data spend, while still being able to offer the best possible experience for its passengers connecting to the onboard Wi-Fi.

By categorising network traffic, IcoShape allowed Northern to gain a deeper understanding of how data was being used, and to take the appropriate action. Northern was able to configure Wi-Fi usage rules using a web-based graphical interface integrated within ICONIC, Icomera's cloud-based monitoring tools. Data traffic streams could then be prioritised, throttled, or blocked depending on their level of importance; for example, traffic for Northern's onboard systems, such as digital video surveillance, could be prioritised.

Importantly, IcoShape's deployment resulted in no detrimental impact to passenger satisfaction levels; in fact, Northern saw an improvement in the overall passenger experience because it could provide a fairer, more reliable Wi-Fi service for all (as opposed to a small number of passengers "hogging" the available bandwidth).

Using IcoShape, Northern achieved an average 20% reduction in its data consumption. As a result of the trial's success, Northern selected Icomera to roll-out IcoShape fleet-wide; this was a simple task given that Icomera's connectivity solution allows for over-the-air deployment.



> IcoShape has allowed us not only to better maintain our cost portfolio, but also to increase the customer benefit through delivering a more reliable Wi-Fi service across our network.
>
> *Marc Silverwood, On Train System Manager, Northern*

Innovative 3rd Generation Server Launched

Infotec is an original equipment manufacturer that designs, builds, tests, and distributes passenger information systems. Its products are in more than 1500 stations and vehicles across the world.

All Infotec displays are provided with a wide range of features that reduce the risks, costs, and simplify the installation, commissioning, and configuration of customer information systems (CIS). They do all this whilst providing feature rich and open interfaces.

Infotec displays are always system agnostic, which means clients are not stuck with a single control system for its lifetime, they can change the system at any point without fear of having non-interoperable displays.

As part of the continued development to meet these objectives IPH4 has been launched, an innovative third generation server offering advanced features and advantages over its IPH3 predecessors.

Because the new IPH4 can still re-use existing / legacy RS485 cabling whilst providing most of the CIS capabilities of a direct IP network, the client can save a great deal of money and time when upgrading. CIS IPH4 still allows displays to be daisy-chained and used on long cables up to 1km.

With IPH4, connected displays work just like IP connected displays, using industry standard MQTT to enable all of this functionality over the existing cable infrastructure. For example, Infotec's web-based back office system Javelin now provides exactly the same functionality, irrespective of how the equipment is connected, be that Ethernet, IPH4 or 4G. This means that all displays provide much more functionality, improving the customer experience.

IPH4 benefits include:

- Live screenshots of display content to reduce maintenance visits and costs
- Improved security as CIS displays are not networked devices.
- True zero configuration – (i.e. put any display anywhere – it will sort itself out).
- No need for IP addresses or new expensive IP infrastructure
- Works through the firewall configuration
- System can be connect in or connect out (i.e. unidirectional Internet connection equals better security)
- Automatic firmware upgrades and script management
- Direct connection to any MQTT data available, for example Worldline Open CIS, Siemens SMS, Apion, and RTIG 047 protocols.

Beyond the features above, and more importantly, the IPH4 is APION enabled which allows the connected displays to link to multiple data providers using generic MQTT protocols.

Infotec always tries to listen to its clients' needs, and to the travelling public, to maintain focus on developments that will add value, reduce costs and deliver results, IPH4 is one of many examples of this.

In-Service Infrastructure Monitoring

THE CHALLENGE:

Maintaining railway infrastructure safety, availability, and efficiency is a constant challenge. Ageing, unreliable, and costly measurement trains, along with limited numbers, make it difficult to continuously monitor the entire network, leaving sections vulnerable to undetected faults. Maintenance teams also face the task of manually inspecting assets, in often difficult conditions.

COLLABORATIVE SOLUTIONS

In response, Northern Trains, Belvoir Rail, Modux and Network Rail joined forces on a proof-of-concept project to integrate advanced technologies onto passenger trains to better monitor infrastructure condition. The collaborative project is a catalyst that is set to bring about a new era of efficiency and effectiveness for infrastructure maintenance.

TECHNOLOGICAL INTEGRATION:

The project's integration of radar, lidar, thermal, acoustic, bogie monitoring and intelligent camera technologies on a Northern train, enabled the collection of a remarkable 2TB of data a day. Supported by powerful algorithms, machine learning, and data science, the sensors can accurately identify changes or signs of deterioration that may go unnoticed by the human eye, enabling a new era of infrastructure intelligence.

KEY CAPABILITIES:

The integrated system can:

- Detect track anomalies, misalignments, rough rides and worn-out components
- Prevent landslips by tracking surface degradation and changes to embankments
- Identify vegetation growth encroaching upon track clearance limits
- Monitor tunnel water ingress without shutdowns and physical inspections
- Provide railhead temperature intelligence for safer and extended train operations
- Inspect overhead line equipment and identify dropped stanchion arms and sagging wires, ensuring the integrity of the infrastructure

OUTCOMES:

Real-time Intelligence: continuous assessment by digital inspection teams, enabling proactive maintenance and improved network reliability.

Predictive Maintenance: ability to predict when assets require maintenance, allowing for planned interventions and optimised resource allocation.

Enhanced Safety: Reduced visits to sites, fewer asset failures and disruptions, leading to a safer railway network.

The cost of prioritising passenger service

ENCOMPASS ENGINEERING

The number one priority for rail operators is to ensure their train's wheels are on steels of the track, transporting customers safely and efficiently. But often, focusing on this objective above all else can sometimes come at a cost.

In the many rail depots across the UK, the key focus is to achieve minimal downtime so service availability isn't impacted. As a result, often, the course of action is to defer the fault with a temporary solution until it can be thoroughly fixed. The pressure to maintain regular and full service is enormous across all levels of the operation, and to the operators' credit, most achieve this target daily.

The risk of this service priority mentality is that it can begin to lead to cultural shifts in working practices and attitudes, which is a downfall of the fantastic work being completed.

Using three examples - let's ask three hypothetical questions to demonstrate how a negative culture can so easily creep in:

HSE- Towards the end of an exam, the operative has a major oil spill from some equipment, which has unfortunately spilled onto a walkway. Is the priority the spillage or finishing the exam and getting it back into service?

Materials management- An operative requires a component - do they get the part that has just been delivered and is easier to access, or do they get the component that has been pushed to the back of the stores and been on site for months?

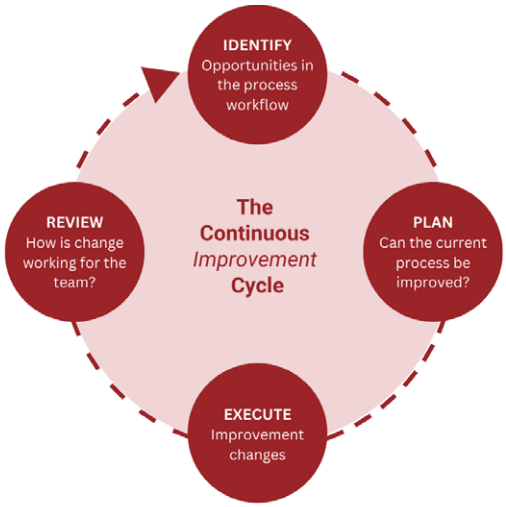
Tooling Management- Tooling management across the depot requires enhancement, as staff are constantly looking for bits of kit to complete their tasks. Is time and effort spent on treating the root cause, or is money thrown at purchasing additional tooling every couple of months, for it to then be lost or misplaced?

Most will know that the answers are - they should clean up the spillage, take the older material and start a new initiative. Unfortunately, that isn't always the case, and in most circumstances, the path of least resistance is the route taken for its ease and speed.

It doesn't have to be like this. Rail Operators can continue prioritising their passenger service and maintain a positive culture and work processes. Most of us are already stretched to capacity doing the day job and don't have the luxury of time to step back and question how we could work more efficiently. But it is only by breaking the norm of 'service at all costs' that will enable growth and continuous improvement that will drive performance and efficiency.

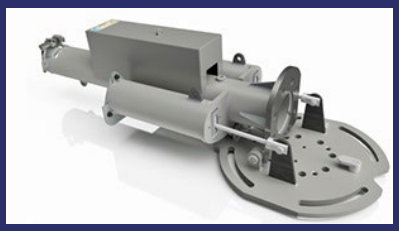
At Encompass Engineering, we are experts in challenging the normal and asking the 'why' for our clients. We bring a fresh new perspective to ensure you are running as efficiently and cost-effectively as possible.

Find out more about Encompass and how they can help your business - visit www.encompass-engineering.com



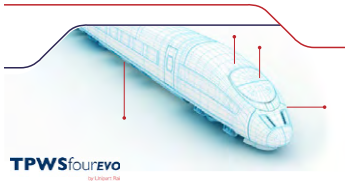
Actively Driving Innovation for the Rail Sector

We deliver process and technology innovation in our own right and work with third party innovators to accelerate the delivery of innovation for the sector. These are just some of the technologies we have developed, or worked with partners to bring to the market.



The Heavy Duty Assisted Lift trunnion now enables the lifting and lowering of up to 95% of the Unipart Dorman signal heads - increasing productivity in installation and maintenance.

Unipart Rail's TPWSfour EVO and AWS systems, equipped with the latest Evo control unit are fully compatible with the rail industry standards and ETCS requirements and have proven high levels of reliability in service.



With the new **SwiftLine** rail dropper from Gripple, conductive catenary droppers can be fully installed up to 8 times faster than traditional rail cable droppers.

FuelActive is a unique method of delivering 92% cleaner fuel to the engine by drawing fuel from just below the surface of the fuel tank, bulk storage unit or fuel cube, ensuring that only clean fuel enters the fuel lines.

EAVE FocusLite smart ear defenders provide hearing protection and situational awareness whilst collecting noise data on the Peak online platform for insights and analysis of the noise data.

Click here or scan the QR Code to read more.

SCAN ME

Harnessing technology to enhance efficiency, in the rail network

3SQUARED
A Velociti Group Company

3Squared pioneers innovative rail technology solutions, driving operational efficiency and safety. Below are key case studies highlighting their transformative products.

RAILSMART EDS (EMPLOYEE DEVELOPMENT SYSTEM) AND LNER

3Squared's competency management system, RailSmart EDS (Employee Development System), has delivered results for a wealth of organisations. EDS supports increased rail safety by lowering business risk and reducing incident rates.

To date, more than 200,000 EDS assessments have been conducted for over 15,000 employees. 3Squared has introduced EDS to several key rail operators, including London North Eastern Railway (LNER).

> We have been using RailSmart EDS for the last 7 years, and it has made a significant change to our business. Bringing in an electronic system means we have a better oversight of our competency management arrangement, allowing us to work with teams and provides all records in front of us on screen.

Melanie Sewell, Safety & Environment Programme Manager, LNER

EDS is a digital hub, accessible from anywhere, whether that be the station or the driver's cab:

> Previously we would have 6 years' worth of data in paper files. With RailSmart EDS on website or iPad, we have all that information at our fingertips.

Simon Reading, Driver Team Manager, LNER

3Squared works collaboratively with its EDS customers to tailor the system accordingly:

> 3Squared have been great over the past few years in assisting us to tailor the system to suit our needs, thank you!

Stephen Catterall, Head of Training & Competence (North), Stadler Rail.

3Squared continues to work closely with clients such as Stadler to optimise EDS.

BULKSMART AND HS2

BulkSmart streamlines supply chain management for aggregate and bulk cargo businesses, including freight operators. 3Squared developed BulkSmart to help with the HS2 rail logistics operation for tunnel-excavated soil transportation. Soil is moved via a 1.7-mile conveyor network to Willesden, where it's loaded onto trains and sent to various destinations, including a bird nature reserve.

BulkSmart provides train ordering, performance, and delivery data to aid the control room team in monitoring on-site quantities and wagon loading.

Visit 3squared.com to find out more, or email us via hello@3squared.com

Safer, Greener more Efficient Walking-Routes

Safety is of paramount importance to our railways; whether we are referring to ensuring safe journeys for the travelling public, or the guaranteed provision of a safe working environment for our lineside colleagues it is imperative that safety really does come first. In 2023's periodic review The Office of Road and Rail Regulation states that it will focus on the four objectives of safety, performance, asset sustainability and efficiency in the coming control period.

CHALLENGES TO MEETING THE SAFETY FIRST MANTRA:

It is specified that the railway must have an authorised walkway alongside the track for the workforce and passengers. Despite this instruction, it is well documented by Network Rail that the largest proportion of mainline workforce injuries were due to slips, trips and falls, the majority of which were caused by obstructions on walkways or due to uneven surfaces (HSE). Critically, it is also commonplace for the railway to feature separate cable management solutions (CMS) that demand considerable space in an already constrained and safety critical area. CMS, aka cable troughs, are traditionally manufactured from concrete, a material which is difficult to modify, is prone to cracking and can therefore never be used as a component within a safe walking route. Furthermore the latest Network Rail National Performance Affecting Cable Theft Impact Summary found that over 3000 train journeys causing over 32,000 delay minutes were caused by cable theft. Network Rail's Director of Incident Management and Operational Security James Nattrass, when interviewed in 2021, said cable theft caused circa 22,000 hours of passenger delays in the previous four years and resulted in costs of £61 million.

AN EFFICIENT SOLUTION TO MITIGATING ACCIDENTS, MAXIMIZING SPACE AND REDUCING COSTS:

In response to these known industry challenges, Trough-Tec Systems (TTS) developed a pioneering, sustainable and easy-to-install anti-slip walkway system, which provides all the benefits of their standard Green Trough CMS range but its dual functionality makes it fully compliant with the railway's safe walking route instructions, and boasting many safety and efficiency features:

- Manufactured from one hundred per cent recycled polymer.
- Anti-slip coated, creating zero static thus improving safety and avoiding any shorting of lineside electrical equipment.
- One tonne weight bearing, with a ten-tonne option: capable of withstanding human foot traffic and road-rail vehicle loads.
- Removable and re-lockable lids, enabling easy maintenance and access to increase cable capacity at a later date and supplied c/w anti-theft & anti-vandal features as standard.
- Can be provided in modular combinations with different components to enable a multitude of route configurations.
- Optional handrail option, that is self-supporting so need no auguring or post-fixing concrete.

EARLY CONTRACTOR INVOLVEMENT: CREATING EFFICIENCIES FOR ALL:

TTS is more than simply a product provider: the company actively seeks to work with its clients on a partnership basis across small to major projects to ensure that it provides a full-service proposition; in this way product innovations unlock process improvements.

TTS Safer, Greener more Efficient Walking-Routes

TTS works with stakeholders to eliminate problems that arise when key components such as theirs are considered within the original design process, and not merely considered as an ancillary product. By embedding itself within project design and delivery teams, TTS ensures that certain problems can be designed out, thus avoiding costly rectifications which would occur otherwise. Exemplary projects on which TTS has worked in this way include the Great Western Electrification project, Northern Hub, Northwest Electrification projects and East West Rail.

The East West Rail project is a great example of early contractor involvement. By working in collaboration with the East West Rail Alliance (EWRA) TTS gained an in-depth understanding of the project requirements and was able to recommend alternative designs, product modifications and installation solutions. As a result, TTS was able to incorporate site-specific configuration requirements into their offering and create an innovative 'ready to assemble' kit of parts, establishing a 'construction to production' approach to meet EWRA requirements. A first for the UK rail industry and thought to be a first worldwide, there is no comparable combined cable management and safe walkway product delivered in an easy-to-install kit on the market on a like-for-like basis. The sustainable base product and innovative kit format have created significant benefits for EWRA including:

- Ability to order exact quantities – minimising waste and reducing delivery costs and associated carbon emissions.
- Creates time efficiencies – no time wasted by staff in storage compounds picking abstract parts from a huge inventory, eliminating the risk of mis picking.
- Guaranteeing the right components are delivered to exact locations and correct installations.
- Contributes to right first-time installation.
- Minimises time and costs associated with snagging lists as mistakes are eliminated from a product and design perspective.
- Enhances workforce safety by reducing the volume of activity and time on site for installation and minimising plant and equipment requirements.

This innovative approach is a practical example of 'doing more for less' by avoiding unnecessary costs to what could be a

very mundane but potentially expensive, occupational and operational safety-critical problem. This is an ongoing industry challenge and commitment set by NR and GBR.

As the Department for Transport states: 'Major projects are often asked to deliver against aggressive timescales set early in their lifecycle. They are expected to deliver to schedule and budget and to be right first time.' By working in conjunction with much larger stakeholders, and much earlier on, TTS have proved that their early involvement as described above pays dividends for all, maximising the design and cost-efficiency of projects and possessions, and providing a cable management and walkway system that significantly improves a project's costs, carbon footprint, health and safety considerations and overall lifecycle.

Email: ttsinfo@hird.group Visit: www.hirdtts.com

Photo 1: this is an example of a bespoke walkway kit designed and kitted off-site for delivery into EWR. In this instance it's walkway and troughing connecting into a loc base

Photo 2: TTS combined anti-slip walkway and cable management system c/w optional handrail

Cyber Security for the Operational Railway

ENCOMPASS ENGINEERING

THE CHALLENGE

With the increasing use of digital technology within the rail industry to reduce costs and deliver a better passenger experience, keeping rolling stock and its infrastructure safe from cybercrime has never been so important.

Cyberattacks can be financially and operationally devastating for rail organisations, notwithstanding the reputational damage they can bring. It is vital that rail companies have the correct mitigations and protection in place should the company be targeted.

There is a great deal of connectivity built into modern trains. It's not just the working systems but also the public-facing systems like the Wi-Fi on trains, ordering food from your seat, and knowing what platform your train is going to arrive at. Remote monitoring to inform maintenance activity is also becoming commonplace. All this functionality means the train is talking to trackside equipment, which, unmitigated, is a potential cyberattack vector.

The industry has also begun to combine traditional dedicated train wire architecture with systems using networks and devices commonplace in an office. Many of these office systems are understood by potential cyber attackers, and as a result trains are becoming increasingly open to attacks.

It would be easy to be overwhelmed by the scale of the cyber security task, particularly if your organisation's policies and skills are centred around your office equipment. Not all companies can justify dedicated resources to evaluate and continually update the Operational Technology assessment for every system.

HOW ENCOMPASS ENGINEERING CAN HELP

Encompass Engineering has significant experience in helping its customers navigate the complex issues surrounding cyber security in the operational railway environment. By leading stakeholders through a structured assessment framework, they help rail operators develop a thorough understanding of potential vulnerabilities and their associated risks. The output of this is a detailed risk assessment with a set of cyber security requirements defined to reduce the risks to a tolerable level, and a cyber security handbook to document the handover to the asset owner/operator. Where this process identifies particular hazards, these are fed into the CSM REA process for treatment and inclusion in the Hazard Record.

Encompass Engineering provides cybersecurity expertise fused with our in-depth rail engineering knowledge and our detailed experience of operations. We can help you to ensure that in the event of a cyberattack, your response is appropriate and proportionate to the threat so that safety is maintained with the least possible operational impact.

It is vital that rail organisations remain ahead of the game to prepare for cyberattacks and, by working with Encompass Engineering, its current and future customers can be assured of this.

Visit www.encompass-engineering.com for more details.

Meeting HSE guidelines to ensure both staff and companies are protected

HAVi Technologies is the UK's leading hand arm vibration (HAVs) specialist working with companies to meet HSE guidelines to ensure both staff and companies are protected by doing the right thing when it comes to managing exposure to vibration within the workplace.

Working with manufacturers and partners within the rail industry, the company's solutions for HAVs management range from on-tool monitors, which measure trigger time, and data collecting watches, to precise digital reporting and tool testing days, all are designed to keep workers safe, protect businesses, reduce costs and improve efficiency.

HAVs is one of the most commonly reported diseases in the rail industry and a survey carried out in 2020 by Rail Technology magazine and HAVi Technologies revealed that only half of the respondents measured exposure to HAVs, with many citing data collection and the time it takes to report and analyse the results as a key reason, and this is echoed across many industries, which led the HAVi team to develop a new reporting platform.

In 2022 the introduction of the company's ActivIQ reporting system was a game changer for many businesses struggling to interpret and take action with existing HAVs data collected. The new reporting solution brings together all HAVs data collected for a business into one helpful visual. It also features the unique HAVS Risk Index (HRI), which scores HAVs data outcomes and provides prompts for improvements, with Smart Recommendations for risk reduction for an individual, task, team or tool, enabling managers to improve hand health outcomes by making the correct decisions quickly and effectively.

The HAVi team has also identified that the tools used by businesses can have a huge effect on both excess exposure to vibration and productivity. A recent test carried out by HAVi Technologies for a specialist welding engineering company within the rail industry to compare its current sheet metal grinder with a new one proved this. The results showed that by simply switching to a different blade, the vibration exposure level for the operative was halved, increasing the recommended safe usage time by 200%. Productivity was increased, too, with the new grinding disk completing the task in just ☐ of the time taken by the original.

Managing director at HAVi Technologies, Kate Louise Cole, said: "We are continually innovating and developing our offering to meet the changing demands of the rail industry. We pride ourselves on working closely with organisations to create better health outcomes, whether that is through expert advice, collaboration or testing. We aim to proactively identify safer solutions where employees are exposed to vibration, providing managers with the knowledge and reporting tools to comply with the HSE's regulations and to create healthier workplaces." Kate continues, "continuing the theme of proactivity, we will soon be launching experiential e-Learning content to equip operators with the knowledge to manage the risk of vibration exposure and empower them to be advocates of best practice"

For more information on HAVi Technologies, visit www.thehavi.com or contact the team directly 0115 896 6247/support@thehavi.com

Fire Retardant Rubber Products For Rail

As an early provider and promoter of EN45545 approved fire retardant rubber products to rail and other industries, J-Flex are always looking to stay ahead of the pack when it comes to innovation and the bringing to market of products and solutions that will satisfy the needs and requirements of their customers - and where safety and performance are top priorities.

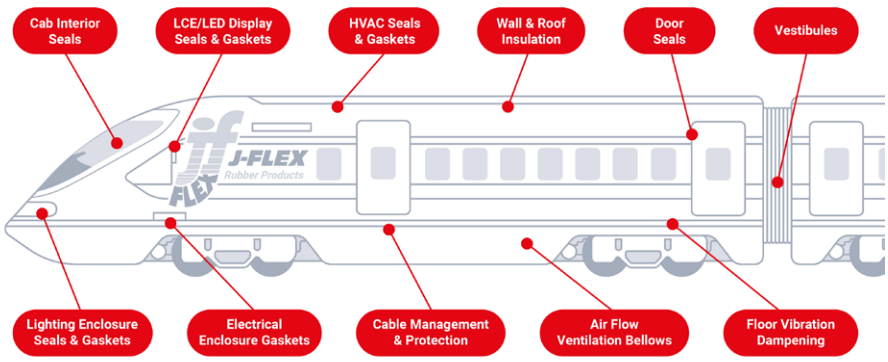
Their extensive range of unique elastomer materials for Surface, Sub-Surface, Tunnel and Rolling Stock applications have been tested & approved to not only EN45545-2, but many other certifications, including LUL S1085 compliance.

One such instance is the supply of Vamac® cable protection for both underground and above ground protection of signal and other cables in terms of abrasion, the elements and of course, vermin - thereby saving potential downtime and associated costs and frustrations, as well as providing peace of mind.

Another instance was one of providing suitable drop-light window seals to a customer whose drivers had complained about draughty cabs causing discomfort during the colder months. The solution was a flock-coated extruded rubber window seal, manufactured in a fire retardant, low smoke, low toxicity EPDM approved to EN45545. Following satisfactory testing of an initial sample coil, an order was placed to replace the problem seals on the whole fleet and we're told the drivers are now happy and snug in their cabs.

As J-Flex Sales & Marketing Director, Andrew Rhodes, says: "In many of the industries we provide rubber products to, the parts themselves very often go unseen or un-noticed, yet every day are in situ performing vital or necessary roles. That might be a sealing function regarding liquids, electricity, temperature/environmental control etc. It could be an anti-vibration or cushioning function, or it might be a protective role regarding other parts or humans. Essentially they are there to seal, insulate, protect and perform - and do it well. Although many people never realise it, these endless amounts of rubber components (and some rubber to metal bonded components) are constantly contributing towards rail passenger and operator safety, comfort and enjoyment.

A recent investment has been that of new improved nesting software to work in conjunction with the large flatbed digital equipment J-Flex installed some years ago. This combines time-saving features with cost efficiencies by allowing multiple shapes and sizes of shapes, which may be for one or more jobs, to be set out and cut from the same sheet/roll of material in the most effective way to use the least amount of material and cut in the least amount of time. This is proving useful for various types of work such as membranes for vacuum-forming/ laminating equipment (up to 3.2m wide), gaskets/ diaphragms.



Professional Inductions - Safer Sites

lucid

Creative. Technical. Engaging.

Lucid develops high-quality, professional, online inductions for the UK rail industry.

Experience

We built our first online induction in 2009 and have now developed over 40 for both depots and stations. Last year we delivered more than 20K inductions. Network Rail Wales and Western introduced SiteSentinel at Reading Station in 2020 and have continued to expand their usage since.

Perspective

Lucid has been active in the rail industry since 2002. We do not regard ourselves as rail industry experts, but we are able to ask the right questions and understand the answers. We bring an experienced external perspective to a development project.

Technology

SiteSentinel 2.0 launched in January 2023 to facilitate ongoing feature development. Wales and Western have moved to SS2.0 and are using the Pathway-specific pass mark function.

Pathways

This is a core development concept: different types of visitors require different induction content. For example, Reading Station has induction Pathways for Contractors, Volunteers, Film Crew, Retail Personnel, Charity Workers, and Visitors. Pathways have different content, different pass marks, different results delivery and different information capture.

Craft

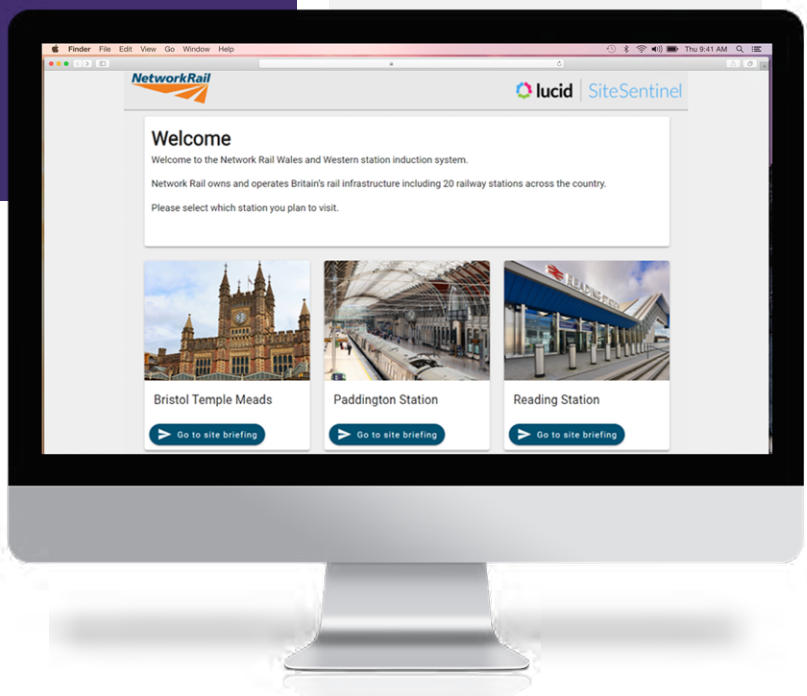
It's not just about technology. A quality induction uses language and media to convey information and drive behaviour. We use professional photos, video, audio, diagrams and maps.

Info Capture

Information flow should be two-way. A professional induction will capture information such as contact number, PTS status, COSHH substances, Production Reference, visitor photo, etc.

Futures

We continue to develop our offering. Future versions will introduce randomised questions, Permit to Work, electronic RAMS and Smart Glossary. We continue to work with several Network Rail Regions to enhance their induction process.



Rail Safety Guide

In 2023, Ricardo Rail relaunched the STOP personal safety rules through the launch of an innovative Rail Safety Guide. Designed as a compact, pocket-sized companion, this guide is meant to be carried conveniently by employees to ensure easy access to important safety information at all times.

The Rail Safety Guide is a comprehensive resource with valuable tips and guidelines to promote safety and wellbeing. Key features of the guide include QR codes that lead to the HSEQ Team contact details and Ricardo Incident Reporting Tool, which allows incidents to be promptly reported.

Additionally, it provides instructions on how to complete a Risk Assessment, empowering employees to proactively assess and manage potential risks.

An integral part of the guide is a reminder of the STOP personal safety rules, serving as a constant reinforcement of the importance of individual safety practises. By providing such a user-friendly and informative tool, Ricardo aims to empower its employees to prioritise safety at all times, ensuring a safe working environment for all.

Adhesion Management Decision Making Tool

ENCOMPASS ENGINEERING

A Rail Operator's highest priority is to transport their passengers to their destination safely, comfortably and on time, whilst delivering a positive customer experience - whatever season they are travelling. To achieve this - they need to minimise delays and costly issues resulting from low adhesion.

Low adhesion typically occurs when the frictional force between the wheel and the rail is reduced, making it difficult for trains to maintain grip. This can lead to issues such as increased stopping distances, wheel slip during acceleration, and difficulty climbing gradients. This is a significant problem that directly impacts the safety, reliability, and efficiency of railway operations. Low adhesion is especially prevalent in the United Kingdom.

The Adhesion Management Decision Making and Reporting Tool developed by Engineering experts - Encompass Engineering and Data and AI experts - Fishbone Solutions, is a comprehensive online portal equipped with an intelligent processing engine. The tool collects real-time data from trains and identifies instances of low adhesion. This platform is designed to provide immediate, actionable solutions based on machine learning algorithms, that continually adapt its recommendations through ongoing data analysis.

By effectively managing low adhesion on their networks, train operators can improve safety, enhance their customer's experience, save operating costs and in doing so, achieve a competitive edge, improve public perception and work collaboratively with the Infrastructure Managers. These advantages can be attained with a robust, data-driven tool that will allow them to manage and mitigate the risks associated with low adhesion. The aim is to improve operational efficiency, safety, and punctuality by turning live data into actionable insights. This allows Rail Operators to proactively manage their assets, rather than the more costly alternative of reacting to issues that could have been avoided.

An online portal accessible remotely by the users, offers real-time, 24/7 adhesion performance tracking, Geographical heat maps of adhesion problem areas, and machine learning algorithms for optimised response actions on one central platform that the owning groups operating companies can access. This enables collaboration of results and solutions between all owning group rail operators, and best practice sharing. Having one centrally owned system for all their operators saves costs and results in a consistency of response actions, and sharing lessons learned and innovation.

The Tool can guide immediate responses, allowing control to alert drivers or for the TOC to initiate track maintenance procedures with the infrastructure maintainer and more proactive planning of activities. For example, in areas where vegetation contributes to low adhesion, the system will specifically recommend actions, such as cutting back overgrowth. The recommended actions become more effective and targeted over time as machine learning algorithms optimise the system's understanding of the factors contributing to low adhesion and the key data points and trends that show certain solutions to be the most effective.

To learn more about Encompass Engineering and Fishbone Solutions and the services they provide, please email Matthew.Bagshawe@encompass-engineering.com

Collaborative Relationships with Suppliers & Customers

At Aura Brand Solutions we pride ourselves on our collaborative relationships with our suppliers and customers and value their role in supporting our continuous innovation.

Our extensive work in the rail industry, showcases our commitment to excellence and sustainability, demonstrated by our prominent use of 3M Films 480 PVC-free material across pioneering environmental projects such as the Drax biomass wagon liveries, Porterbrook's new HydroFLEX hydrogen powered train and Chiltern Railways HVO powered class 68 this year, underlining our dedication to eco-conscious practices and a greener future.

In addition to sustainability, Aura places a strong emphasis on enhancing the customer experience. Our range of window film solutions not only assist our customers such as Alstom, Southwest Rail, Greater Anglia and West Midlands with their sustainability goals by lowering energy consumption and protecting the surface from scratches and graffiti, but also reduce sun glare and heat, making journeys more comfortable for passengers. Most recently Govia Thameslink Railway have been discovering the benefits of protective window film for their Class 700's, as have Siemens with 21 of their Class 360/1 units.

Always on the lookout for new innovations, Aura is contributing to improving the customer experience through our partnership with Whoosh Media to deliver their real-time journey dashboard across rail operators nationwide. This ongoing project has seen us implement QR codes across 20+ stations, and many trains for Grand Central, GWR, SWR, LNER plus many more to come with the aim of simplifying access to information, ticketing, and essential services, making rail transport more efficient and user-friendly than ever.

As we approach winter, weather resilience becomes a prominent key aspect of many of our projects. We employ anti-corrosion and Blocksil protection and repair techniques to ensure that rolling stock remains robust in the face of adverse weather conditions, guaranteeing the safety and reliability of transport services. For many years we've supported customers such as Northern Rail with these solutions and we're soon to begin implementing them as part of our upcoming project with EuroTunnel. To prevent service disruptions, we also implement cutting-edge electrical moisture prevention measures.

Throughout all of our projects, safety is paramount and Aura leaves no stone unturned in this regard. We provide yellow safety markings for stations and safety labelling and accessible safety signage for stations and rolling stock, making essential information and emergency exits easily identifiable for passengers and those with disabilities. Before any work commences, our dedicated Health and Safety Manager carries out in-depth risk assessments on every project and site and all of our installers wear relevant PPE at all times to ensure the safety of everyone working on and visiting sites.

Delivering a Great Customer Experience

ENCOMPASS ENGINEERING

Customer experience has always remained a priority for Rail Operators, even more so as they look to entice customers back onto trains following COVID-19. Although the ridership is gradually increasing, they are now competing with more people working at home, less money to spend on travel and the convenience of other transport options and strike action. Combined with battling to keep costs down so they can offer their service at a reasonable price - they are in a difficult position.

The key to delivering a great customer experience in the railways is to build a strong foundation of trust, and to compete these days - rail operators need to offer unmatched levels of service. Delivering the basics of a safe train and environment in which to travel and the next level of comfortable seating on trains that run on time. Customers' expectations now require reliable wifi, uniform heating, legroom, charging facilities and online food ordering from the comfort of their seats. The list goes on. The customer experience is key, but so is driving down costs - but how do you achieve them both?

SMEs could be the answer by bringing experience and innovation to the UK rail sector through their own application development. With trust in the railway so low, building it back up will require action on several fronts to improve the customer experience and effectively manage customer expectations. To do this, rail companies need to focus on the following key areas:

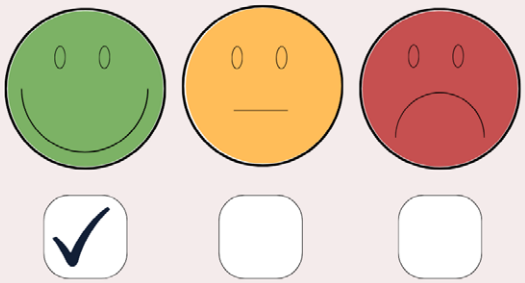
Competence. Can rail companies and the industry run a quality and functioning rail service? The customer will use reliability and safety as an indicator - and competence is the foundation. If you are not meeting the basic requirements, you cannot build the enhanced experience customers now expect.

As experts in providing quality specialist engineering services, Encompass Engineering has many years of experience working with rail operators who take this seriously. We independently check their assets and regularly audit and review them to ensure they continue to not only meet but exceed industry standards. As an added benefit, this prevents costly issues down the line, which helps keep costs low.

Motivation. Customers will look at pricing, reliability and availability as well as the level of service on offer. Reliable trains operating on time will motivate customers to use the services provided as they get more confident that their expectations will be met. Encompass has supported many ROSCO's and TOC's with quality checking to ensure all systems on the train function correctly before any entry into service and pathing and planning services to maximise timetables and use of rolling stock. We see first-hand the benefits this can have on the service delivered.

Leadership and communication. Are rail companies and the industry taking time to explain what they are doing and why things occasionally go wrong? The specific measurables in this instance are accountability, vision and investment. Working closely with their customers, Encompass Engineering's team of specialists investigate issues to the root cause, offering cost-effective, long-term solutions to remedy any issues.

Find out more about Encompass and how they can help your business email operations@encompass-engineering.com



To be innovative is to be different

Flotec's objective for train leasing and operating companies is to:

Support train companies in solving engine cooling issues, which keeps fleets running to schedule and on time, helping to improve the customer experience.

THINKING PASSENGER. REDUCING DOWNTIME. IMPROVING EFFICIENCY. READ THE NEWS STORY, HERE

SME Flotec Rail Division has focused its attention on engine cooling and efficiency enhancements, consisting of the following products:

- EPDM Blue Stripe coolant hose and PowerGrip clamping
- RailtecTM hydrostatic hoses and couplings
- Variable pitch fan upgrade and installation

TO BE INNOVATIVE IS TO BE DIFFERENT. FLOTEC'S COMMITMENT TOWARDS INNOVATION:

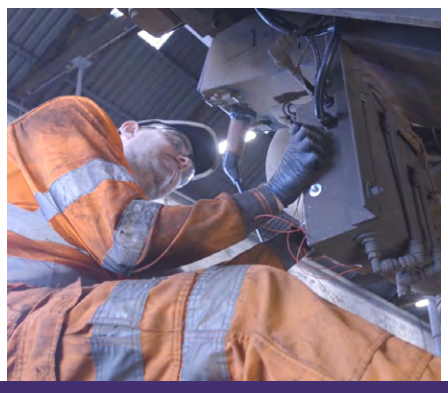
- To continuously investigate and find new ways of doing things for the better
- To develop, create and invent unique solutions relevant to the task in hand
- Where appropriate, to apply existing ways of doing things to a new market
- Where appropriate, to modify existing assets to perform better
- Where appropriate, to radically transform and disrupt markets for the better

TRIED AND TESTED:

Flotec's manufactured innovations have been tried, tested and in use throughout the UK's rail network. Train operators benefitting from Flotec's engine cooling solutions include Northern, TfW, and EMR and more!

Follow the links for the press releases and published case studies and video link to a VPF install for TfW:

- Northern Press Release
- EMR Press Release
- Variable Pitch Fan install film for TfW



Digital Technologies Overcoming Physical and Linguistic Barriers to Rail Usage

In the UK, more than 60% of users with accessibility needs do not attempt or struggle to make independent journeys on public transport. The impact of inaccessible transport on the national economy is estimated to be over £70 billion per year.

The ergonomic design of stations and vehicles will play a role in improving accessibility. However, alongside these major infrastructural changes, digital technologies which use personal smart devices will provide more immediate and cost-effective wins through personalised and at-hand support, reducing the barriers to use for visual and hearing-impaired customers.

Icomera, through its subsidiary GoMedia, has developed two transport accessibility solutions which help passengers who need assistance while on the go. Delivering timely, accurate information to passengers via their smartphone, the services help those with hearing and sight loss to travel with confidence.

VISOR: GUIDED NAVIGATION FOR PASSENGERS WITH SIGHT LOSS

Developed in association with the Royal National Institute of Blind People (RNIB) and NaviLens, and trialled at Euston Station, Visor leverages NaviLens BIDI codes and GoMedia's live cloud-based passenger information system to display directions in the NaviLens and NaviLens GO apps already adopted by the visually impaired community. Passengers simply hold up their smartphone. The device automatically recognises any BIDI codes in view and displays location- and context-specific directions to help them reach their destinations more quickly and easily.

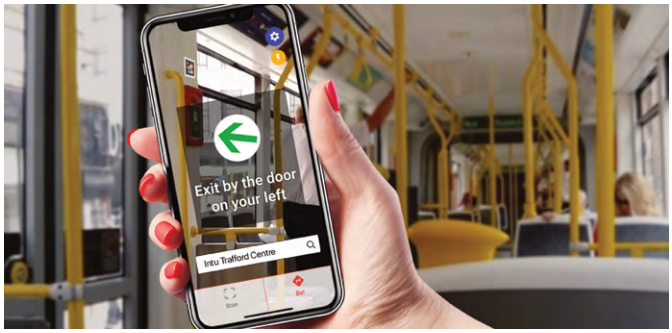
During closed tests of Visor, 94% of users could locate elements they were previously unable to find.

HEAR: EMPOWERING PASSENGERS WITH HEARING LOSS

Developed with support from charities Hearing Link and Hearing Dogs, and trialled with Transport for Wales (TfW), HEAR (Hearing Enhanced Audio Relay) enables passengers connected to a vehicle's onboard Wi-Fi to receive personalised journey announcements to their smart devices in real-time.

When an announcement occurs, passengers receive a text notification, and the audio begins playing automatically. The passenger controls the volume and can set notifications for their specific destination or opt to hear them all. A history of announcements is always available. Leveraging personal devices in this way is a viable alternative to hearing loops, and it broadens the use case to include people who have a temporary limitation such as from an ear infection, or a self-imposed limitation, such as headphones.

A survey of people with hearing loss found 96% of respondents would love to have a solution like HEAR implemented on public transport.



Installing Vix Smart Gates for Transport for Wales

Project Description:

Transport for Wales are set to become the first train operator outside of London to deliver contactless EMV ticketing in heavy rail when they partner with Vix Technology to launch a new smart gate pilot programme. The pilot programme will launch with the first gate being tested and proof of concept is taking place in Newport in Summer 2023. The new gates promise fast installation, flexible passenger zones and opportunities for optimized passenger information. The EMV Contactless pilot programme will operate Newport - Cardiff - Pontyclun.

Vix Role:

Passenger benefits include pay-as-you-go travelling using gates and platform validators provided by Vix Technology. The new smart gates are cloud-based and can be managed via a tablet or other device whilst on the platform. They are operated by back-end software allowing remote control and easy inspection, advanced scheduling configurations and automated communications. The gates also feature flexible passenger zones, security features including built-in alarms, easy maintenance procedures, and are produced in durable stainless steel.

Scope of work:

TfW's ambitious timescales meant Vix brought in 2 teams of developers and testers, support for integration with VTH, a new product owner and physical gates, supplied by Gunnebo.

Customer testimonial:

Helen Mitchell, Head of Digital Programmes at Transport for Wales said:

> "Transport for Wales is delighted to be engaged in this pioneering project with Vix Technology as part of its wider Contactless EMV pilot. The teams at both Vix Technology and TfW have worked incredibly hard in a short timescale to bring this innovation to life. The new digital rail gates are key to the success of the pilot and we look forward to launching the new contactless ticketing proposition to our customers.

VIX SMART GATE IN SITU AT NEWPORT RAILWAY STATION:

Rail Forum

info@railforum.uk

CAPABILITY & INNOVATION