

EU LIGHT RAIL CONGRESS 2024

▼ BELOW: The exhibition hall was busy and allowed exhibitors to showcase their latest products and innovations. All images by Geoff Butler unless stated otherwise.



Two busy days in Seville offered a variety of fascinating case studies covering the very latest in urban transport technology. Geoff Butler rounds up the highlights of this year's successful event.

The beautiful Andalusian capital of Seville was the host for the 2024 European Light Rail Congress. Nearly 200 senior and key professionals from ten European countries attended this year's event.

Hosted by Metro de Sevilla, parent company Globalvia and the regional government, Junta de Andalucía, the event's majestic venue was the Hotel Meliá Lebreros, offering superb modern facilities as well as proximity to the metro. In addition, a new tram extension is being built right outside the hotel.

The event ran over two days with presentations and panel debates as well as an exhibition; delegates also had the chance to visit the Metro de Sevilla depot.

An address from Jose Maria Rivera, Managing Director of the Agencia de Obra Pública de la Junta de Andalucía, officially opened the event. He spoke about the importance of light rail systems for sustainability and the passenger experience. Daniel Quintero, Globalvia's Director of Railways, also emphasised the importance of collaboration between systems to make public transport the best travel option.

Clara Lozano and Gerardo Murillo kicked off with a session covering the digital transformation of the employee and

customer experience at Metro de Sevilla. Having identified certain 'pain points', they have looked at ways to assist with the implementation of a new 'tap and go' payment system to speed up the process of moving around the city. Numbers of individual tickets for trips decrease, saving operational costs, additional ticket machines and the like. In fact, Metro de Sevilla is the first subway to implement EMV validation (travel without buying a ticket from a vending machine). Customers are charged monthly at the best rates based on usage, with their travel history available via the app and website.

Antonio Macia from CAF followed, explaining the company's transport solutions provided in the region. CAF has been present in Andalucía since 2005, supplying both metro and tram vehicles in Seville, along with Cadiz, Granada, Malaga and Velez-Malaga. The region currently represents CAF's third comprehensive engineering centre, with more than 200 engineers distributed between Linares, Jaén and Granada; 300 staff are based in Andalucía for warranty and maintenance services, and there are 249 employees in its digital and design solutions service.

Amber Hart, SSG Insight, highlighted how networks can achieve sustainability

goals using the company's Agility asset management system, which not only offers asset management but also predictive maintenance practices, energy management and software tools for scheduling and planning. SSG products have been installed in UK light rail systems including Manchester's Metrolink and Edinburgh Trams as well as the Rideau Transit Maintenance systems in Canada.

Isidro Prieto from Spanish multi-national GMV talked about its on-board intelligent transport systems for rail. Present in 12 countries with 3000 employees, GMV offers advanced fleet management systems (AVLS) ticketing solutions, and planning and scheduling tools. There are three blocks of AVLS systems including onboard equipment, communication systems and back-office tools.

GMV has renewed the CCTV system across Seville's entire fleet of 21 vehicles; the previous system was analogue and affected by obsolescence. Now, there is a new digital system with advanced functionalities. The CCTV system was also renewed across the fleet.

Passenger and video information formed part of the presentation. The heart of the system is the PIS control unit, responsible for generating the contents and triggering

THE FUTURE OF AUTONOMY

The future of self-driving trams was considered by Ana Moreno, General Manager of Los Tranvías de Zaragoza, who looked at how AI will help develop these vehicles. Tramways will in future include public-private partnerships, green spaces, pedestrian areas, environmental considerations, electrification and sustainable solutions, inclusive design and accessibility, smart technology, multi-modal transportation networks, data-driven decision making and autonomous vehicles.

Zaragoza also has a fully digital depot with antennae taking information from the trams, linked via the cloud to the LeadMind tool where data is processed. The TAURO project is aimed at full autonomy using Wi-Fi connectivity, safe positioning, sensoric validation, automated function remote driving and command. Three radars in each cab, solid state lidar and two cameras help with perception issues. ADAS (Obstacle detection system) is set-up to detect objects that could potentially collide with the vehicle and ascertain risk levels, enhancing the driver's perception and passenger safety.

Tobias Koch of Siemens Mobility also spoke on the theme of autonomy. Driverless vehicles have been in use at airports for some time, but these operate in closed environments. Trains and trams in urban environments must master complex traffic situations autonomously, without centralised external control. The main tasks are for permanent surveillance of the environment and forward-looking driving to prevent collisions. Siemens is planning for its automated depot to be in operation by 2026, but still needs to approve the technology and implement the legal framework to define the safety level required.

them according to the scheduling of different events, such as arrival at a stop. Different types of devices such as LED signs or multimedia screens are connected to this equipment, which can offer travel or service information, sometimes interlaced with adverts.

Gerard Clariana of Kruch Railway Innovations discussed how Energy Flow Simulation (EFS) is used on systems. Together with Spanish engineers at KRUCH SIDOS, the EFS system software simulates the energy flow for different scenarios. This analyses the returns of investments, solves problems, increases power supply reliability, and supports systems in meeting new requirements for CO₂ reduction. With the help of EFS, customers can easily simulate their energy balance in their networks, with critical points in the electrical network highlighted. The software analyses substations and energy consumption of the vehicles in detail.

Getting on track

The topic of fully integrated track resilient solutions was presented by Pandrol. Ernesto San Vicente looked at the expectations of a modern track system from a stakeholders' perspective. As a specialist in anti-vibration products, the general thinking that resilient track may generally create higher noise levels (because of lower frequencies and/or larger amplitude oscillations) was highlighted, but it was argued that good track design can not only compensate but improve the radiated



▲ ABOVE: Metro de Sevilla's presentation looked at Globalvia's approach to future-forward asset management.



◀ LEFT: The second panel debate focused on answering the question, 'How can we speed up light rail adoption in an era of net-zero?'

airborne noise. There is a link between direct track degradation and rolling noise. Loading distribution can be modified into a longer length of track, decreasing local forces and stresses, and consequently reducing track degradation.

In the same manner, rail corrugation leads to vibration but also to a characteristic noise (directly linked to the short/long wavelength of the corrugation). Implementation of resilient elements can reduce the corrugation significantly, said Ernesto.



All attendees had the chance to visit the Metro de Sevilla depot on the first afternoon, to see the facilities including the maintenance, vehicle painting and preparation areas along with Sevilla's control centre.

Track resilience plays a key role in the vibration mitigation and longevity of railway infrastructure, resulting in reduced maintenance costs.

Recycling-based resilient systems can help urban transit authorities meet CO₂ targets while ensuring optimal performance, while recycled rubber materials are used to meet environmental targets.

Manfred Rudholzer from Robel Group & Plasser & Theurer Iberica highlighted various products, tools and machines suitable for LRT applications. Battery-driven tools were on display at Robel's stand, which demonstrated a drilling machine. Many benefits were cited and included track gauge modification for different countries, low personnel costs (with only one operator with remote control needed instead of eight operators), and automated and fast tightening.

Lola Bravo from the Latin American organisation ALAMYS highlighted its global work. ALAMYS started in Caracas (Venezuela) in 1986, with the main objective being to share experience, and learn and acquire best practice standards. The main public transport operators in Spain and Portugal joined along with other operators from Latin America. Later, some of the best-known suppliers of the railway sector in Europe and America joined too. ALAMYS aims to be a reference

point in public transportation among all relevant stakeholders, highlighting the move towards Integrated Transportation Systems and sharing knowledge with its partners through technical committees and KPI benchmarking.

Chris Wiseman from TWI presented on technology for lightweight materials. TWI is non-profit and membership-driven, with 600-plus industrial members, 600-plus staff globally, 2000-plus professional members, four main UK research and development centres and 18 international offices. The organisation aims to provide members with authoritative and impartial expert advice, know-how and safety assurance. Examples of lightweight materials and new procedures include laser welding, friction



A networking dinner was held at the Abadas Triana restaurant, where people had the opportunity to enjoy views of the city from the river. Tapas and drinks were enjoyed, and many business conversations were had. New relationships were certainly being formed!

SOMETHING TO TALK ABOUT

The first panel debate of the congress covered innovation in rolling stock, which was discussed by representatives from CAF, Siemens, and Bosch Engineering. They covered how they saw the visionary vehicles of the future. The second panel debate covered the topic of net-zero and how light rail adoption could be accelerated, with representatives from Eversholt Rail, Keolis, Metro de Sevilla and UK Tram.



▲ ABOVE: The Innovation in Rolling Stock panel debate on the first day included speakers from CAF, Siemens and Bosch Engineering.

and forge processing, electrical resistance welding and electron beam welding.

Rob Nield from Sella Controls talked about the importance of overspeed protection systems and spoke of the events at Sandilands (Croydon, UK) when a tram turned over in 2016, which overspeeding detection could have prevented. Sella Controls' Tracklink III system is linked to the vehicle communication system, offering safety-critical control for automation selective door opening, correct side door enabling, automatic power changeover, radio changeover and regenerative braking control. Placing beacons at specified distances on the approach to these zones allows intervention in cases of overspeed.

Assets for the future

Day two began with Metro de Sevilla's Jose Angel Santos and Miguel Angel Mengual,

who together explained Globalvia's approach to asset management in terms of transport infrastructure concessions and mobility solutions. Linear railway asset management was also covered through digitalisation, and asset georeferencing in linear infrastructures with long tunnel sections.

Train digitalisation to deal with fleet obsolescence and improvements in reliability and availability of rolling stock was also discussed.

From Sevilla we moved to Barcelona, where Eduard Cabrera gave a presentation on connecting the Catalan capital's tram networks, Trambaix and Trambesós. The system uses catenary-free sections, with energy supplied continuously by a third rail – a proven solution in many cities around the world, but used for the first time in Spain. The existing fleet requires retrofitting to adapt it to APS.

Barcelona will offer a unified tram network with new interchanges, connections between nine municipalities, and urban transformation. The city's current public transport offering includes no more than medium- to high-capacity options, bus congestion and slow speeds. The tram routes offer seamless connectivity between BCN and eight other municipalities.

Ian Bruce talked about how SYSTRA is delivering social, economic, and environmental value through station 'placemaking' – the built environment that connects stations to local communities. By 2030 Bologna is looking to reduce car journeys in and out of the city by 37%, with an increase of cycling trips by 62%, walking trips by 3%, and public transport travel up by 35%.

SYSTRA's task was to understand the city's 'urban fabric' – being separate from road traffic and reducing car access, offering inter-modality of transport with new park-and-ride areas created.

SYSTRA's placemaking has previously benefited the UK's Nottingham (NET) and Tyne & Wear systems, helping to improve the cities' health and wellbeing ratings, increasing a sense of community and pride, and reducing social isolation and crime. It has led to local economic growth and increased rail demand, increased local biodiversity and a reduction in local pollution.

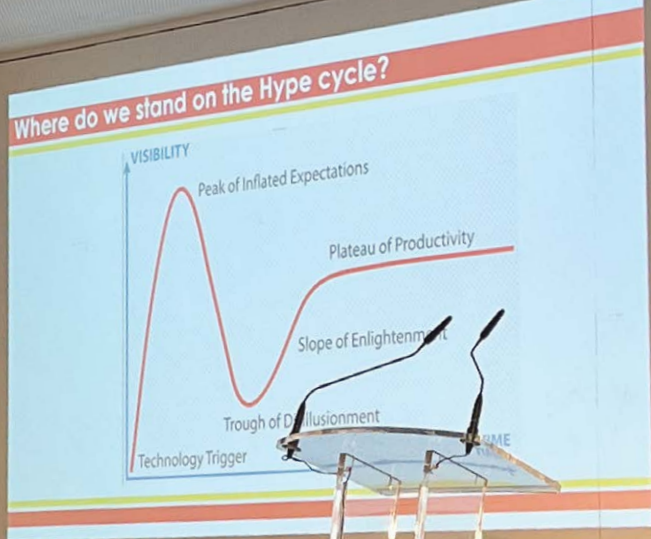
Moving back to Andalucia, Fernando Lozano explained how Metro Malaga is connecting communities through line expansion. The extensions of lines 1 and 2 looked to double their ridership figures with 2km (1.2 miles) of additional track and two new stations.

The operator is utilising the sun's rays to generate electricity, with 8% of the total used being delivered by the photovoltaic power plants in phase 1, a further 6% in phase 2 and 12% in phase 3. The CAF Urbos 3 vehicles have new accessibility features, with renovated stock rising to the challenge of integration with the signalling system. Metro Malaga also has a driver simulator, a first for the Spanish systems.

A new extension is currently under construction with the line running from the city centre to the Civil Hospital.



▲ ABOVE: Almost 200 delegates packed out the presentation hall for two days of learning, sharing and debate.



Christophe Sanguina from Keolis spoke about delivering tangible value to passengers after years of digitalisation.



Amber Hart from SSG Insight.



Fernando Lozano from Metro Málaga.

The vibrational impact of urban rail infrastructures using resilient stone wool mats was discussed by Caterina Lobefalo of Rock Delta, who covered the impact of vibrations within light rail. Stone wool mats both for ballasted and ballast-free tracks can help reduce this noise and vibration. Added to this, they are robust, fire resistant, have thermal properties, are resistant to water, are easy to install and store, and are produced via natural products.

France's Brest tramway – a 14.3km (8.9-mile) line with 28 stops that opened in 2012 – was highlighted as an example of this noise and vibration reduction.

Santiago Bobo completed the second day's morning sessions with an update from Cadiz and its tram-train system. There are 15 tram stops, six stations, and seven tram-train vehicles.

Trambahía is made up of 11km (6.8 miles) of existing Iberian-gauge double-ballasted tracks, part of the RFIG, and 13km (eight miles) of new tram tracks, making 24km (15 miles) in total. Embedded rail with corkelast from Edilon-Sedra was used. Trambahía opened in October 2023 and passenger numbers have remained high. Over 2.7m people ride the system each year, with customer satisfaction averaging over 8.5/10.

Christophe Sanguina from Keolis spoke about delivering tangible value to passengers following years of digitalisation. Finances are more important than ever with up to 30% of a city's budget dedicated to public transport.

In collaboration with Dubai's RTA, Keolis has developed an innovation framework based on a strategic approach and robust governance to assess existing challenges, explore opportunities, and develop ideas. The PSD remote condition monitoring system (POC) allows data to be collected and analysed for optimisation, to refine thresholds based on observations and data, reducing failures by switching from planned to predictive maintenance. Train remote condition monitoring was also installed and tested in July-December 2023, with the automated rail and infrastructure inspection system installed in December, and implemented in January. The train examination system is being implemented by July 2024.

Making tramways safer

Avansim MD Ian Rowe talked about driver simulation training, explaining how better training via simulators has helped reduce incidents. Simulators used to be large, heavy,

and expensive, designed for one-to-one training. They were not designed for line-of-sight training, not geo-specific and have no interaction with other traffic or pedestrians. However, PCs have improved, while the overall costs of equipment are reducing.

Rowe highlighted a real case study from Edinburgh Trams that recorded training and performance data prior to installing a simulation system. This was installed in March 2021 with full training given. Post-simulator statistics showed a reduction in direct costs by replacing psychometric testing with simulator exercises, training times reduced from 13 to eight weeks and the cost of incidents (including investigation manpower, loss of driving resource and the repair of vehicle infrastructure) down as well. Simulation for light rail is now financially affordable, and can be tailored for each client.

Jose Diaz from Schenck Process took to the stage to discuss multi-rail wayside train monitoring – described as an innovative modular diagnostic system for rail vehicles. The diagnostic system safely identifies vehicles that have the potential to damage track through dynamic forces or overload.

Teresa Benet from Metrotenerife talked about light rail overspeed prevention, with the SIMOVE product being installed in Tenerife on all vehicles. SIMOVE monitors a vehicle's real-time positioning and speed, stores data and offers a back office. It has been fully deployed in Tenerife since 2016 on 26 vehicles (Alstom *Citadis 302*) running on 28.6km (17.8 miles) of track on two lines.

Since 2019 SIMOVE has been fully installed on the Metro Ligerio Oeste with 27 Alstom *Citadis 302* vehicles covering 48.8km (30.3 miles) of track across two lines. SIMOVE was also successfully trialled on the UK's Metrolink system in Manchester. Currently SIMOVE is being installed on Sheffield Supertram vehicles (UK): 25 Siemens trams and seven Stadler tram-trains.

Alberto Sanchez from Metro Granada talked about the metro being for the present and future. Like many cities, Granada suffers from crowded streets, with increasing numbers of people moving about. The city is investing in a tramway, and CAF *Urbos III* trams run over 13km (eight miles) of track. Trams run every eight minutes at peak times, while three underground stops promote exchange with other transport modes, and there are park-and-ride options.

With 133.5m inhabitants, over 14m trips were made, and patronage is expected to break the 19m mark over the next ten years.

James Hammett, MD of UKTram, talked about how the trade body is driving innovation in the UK. UKTram promotes light rail's adoption and looks to reduce the time and costs involved in developing new tramways and extending existing networks. Safety standards are looked after under the remit of its subsidiary company, the Light Rail Safety and Standards Board, which drives innovation in the UK by promoting driver assistance systems, fatigue/health monitoring, hazard perception, track safety and authority to work permits. It is also promoting its track awareness safety tool, developed by Avansim. **TAUT**