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Welcome

The UK has a long and enviable history as a trading nation and, for more than two centuries, has played a leading international role in the fields of engineering and industrial technology.

Its considerable influence in the world was felt, in part, due to the extent of the British Empire, but can more principally take its root in the technical prowess and spirit of innovation displayed by our forefathers within these shores.

After all, it was these men and women who gave the industrial revolution to the world and, indeed, the iron road as we know it, ushering in a new age of global commerce, increased productivity and a hitherto unknown speed of travel across Europe and beyond.

The UK retains its leading status in many areas of railway development in the 21st century including health and safety, design and engineering. In this 32-page supplement, the UK's global clout is well demonstrated by the Office of Rail and Road's visit to South Africa to share knowledge and learning on railway safety cultures (p64-65), and Bechtel's redeployment of skills honed by working beneath London on Crossrail to help deliver the Sydney Metro project (p60-61).

The Railway Industry Association also explains how it is helping to support other stakeholders and parts of the UK supply chain to secure contracts and deliver similar projects over the coming years (p62-63).

Of course, 21st century Britain is also more open to external influences than it used to be, as globalisation continues to make borders more porous than ever to cultural

and commercial forces and the spread of international trade.

RAIL therefore highlights how the UK rail network could benefit from the international credentials shown by five different companies, which are each well placed to bring innovation and new technologies from abroad.

They include Siemens and its international expertise in Digital Railway knowledge (p52-53), and EGIS Rail (p66-67) which is rapidly growing its UK project portfolio. SYSTRA shows off its high-speed rail experience (68-69), while Colas Rail demonstrates how rail projects can leave a long and enduring legacy for the regions they serve (p58-59).

Finally, RAIL finds out more about Alstom's Coradia iLint hydrogen fuel cell-powered train (p44-47) and its potential to fill the traction gap created by a phase-out of diesel.

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ALSTOM'S ELEMENTAL ADVANTAGE

With air quality and carbon emissions from transport back in the public gaze and electrification projects on hold, Alstom UK's head of strategy MIKE MULDOON says the company's hydrogen fuel-cell powered Coradia iLint train (currently on test in Germany) could provide the alternative that the UK is looking for

Following Secretary of State for Transport Chris Grayling's recent announcement to cancel electrification schemes in South Wales, the Lake District and the East Midlands, it has become increasingly likely that significant parts of the UK rail network will remain un-electrified in the long term.

Meanwhile, the Government has announced plans to extensively de-carbonise transport with tougher measures such as a ban on the sale of diesel and petrol-powered road vehicles from 2040, and an ultra-low emission zone in central London in force by 2020.

It is hard to imagine that similar measures will not be applied to rail, where some of the oldest diesel trains like the Pacer are to be withdrawn by the end of the decade, and train operating companies are to be

encouraged to meet stricter environmental targets in new franchises.

Rail Minister Paul Maynard summed this up in the Department for Transport's annual rolling stock strategy which was released on October 20 by saying: "We have a responsibility to our passengers, neighbours and ourselves to protect the environment in which we live.

"Our dependency on diesel as a fuel, and the pollution associated with it, challenges us to work towards a cleaner and more sustainable future."

This raises an interesting question for the future of rail traction, which must clearly be powered from much more environmentally friendly sources than diesel, but cannot rely on a more widespread provision of overhead line equipment to provide their power.

For the immediate future, the UK



Alstom 654602 is pictured at Velim test track in the Czech Republic during the first day of test runs on April 25. The two-car Coradia iLint is scheduled to go into passenger service in Germany in early 2018 as the world's first hydrogen fuel cell-powered train. ENRICO SCHREURS.

Government has opted for the procurement of bi-mode trains that can be powered by OLE where it has been erected, before lowering its pantograph and switching to conventional diesel engines.

This hybrid method has enabled the Government to cut back the electrification programme, but it's not without its own problems. That is because by carrying traction equipment for both diesel and electrical power, the performance in electric modes is compromised due to the additional weight they must carry, while running on diesel produces harmful emissions and cannot match electric performance.

Other alternative fuels are being trialled, including the use of solid-state lithium-ion batteries that can be charged electrically from either OLE or trackside charging points, following significant technological advances with battery technology in the automotive sector. But there remain serious questions about the length of time required

to give the batteries sufficient charge, and ultimately their capacity, which could severely limit the range of such vehicles between re-charges.

Alstom has developed an innovative alternative - it's the only company in the world to have built a fully functioning hydrogen fuel cell-powered train.

The Coradia iLint works by taking hydrogen from on-board tanks, plus air, and converting it to electrical energy which is then used to power the train or stored in lithium-ion batteries when not required for traction. The only physical byproduct of the process is water, which is released harmlessly as either steam or liquid.

"This is about having cleaner air and the need to deal with emissions from the transport we use like carbon dioxide, nitrogen oxides and particulates," explains Alstom UK & Ireland's Head of Business Development and Marketing Mike Muldoon.

"We need to have clean, independently

powered trains, but we have no means to do so. Batteries in isolation have too short a range, and electrification was never likely to reach everywhere in the UK, so we were always going to run into this issue.

"There are several ways to use bi-modes, but if you buy a new train today with a diesel engine, and new trains typically have an operational life of 30 or 40 years, there's a good chance they will be running in 2060, which doesn't feel right."

He adds: "We're not taking a stance against batteries, because we need them to store the energy made from hydrogen in the iLint. But if you want a regional train that runs over hundreds of miles of track, batteries on their own just wouldn't be able to deliver that range."

The train was officially launched at the Innotrans exhibition in Berlin, Germany, on September 20 2016. The iLint incorporates the hydrogen fuel cell technology in Alstom's Coradia range of modular regional trains,

of which more than 2,400 units have been sold around the world over the last 16 years, as either diesel multiple units (DMUs) or electric multiple units (EMUs).

Dynamic testing is almost complete of the first Coradia iLint (654602), and the two-car unit is expected to enter passenger service in Germany in early 2018 for a two-year trial. Fourteen further Coradia iLints are on order for the German network and they will be built at Alstom's largest manufacturing site in Salzgitter, Germany.

Muldoon says that there is no technical reason why a standard gauge version of Alstom's hydrogen fuel cell powered train could not be adapted to run in the UK. However, the train would require the installation of hydrogen-supply infrastructure to pipe or generate the gas at depots and fuelling points, and currently that does not exist in this country.

Demand must be created first, however, following a successful trial to provide the

“ We need to have clean, independently powered trains, but we have no means to do so. Batteries in isolation have too short a range. ”

Mike Muldoon, Head of Business Development and Marketing, Alstom Transport UK & Ireland



► right commercial environment before a more widespread deployment could take place.

Muldoon adds: "We are in discussions with a number of UK operators, but you have to take small steps to demonstrate such new and advanced technology. You would need to invest in a potential trial first, and then you could extrapolate what is happening in Germany. Clearly, any German product would be inappropriate for the UK, as the iLint's low floors are alien to this country, and they are 27-metre cars, so we would need to be clever about taking the heart of that vehicle and turning it into a product for the UK."

"We are already talking to the DfT, UK train operators and regulatory authorities, which is quite a complex mix of stakeholders. It's quite difficult because there's no overarching strategy for clean trains and it's always been acceptable to have diesel or electric. There's never been a strong drive for the iLint's unique selling point, but the UK market is beginning to make some promising noises."

"DfT released its new Rolling Stock Perspective quite recently and our job now is to rise to the challenges they identify."

Another way to cut emissions is to increase energy efficiency, and Alstom has developed a range of new trains to do just that. This includes the Coradia Stream EMU that reduces weight by using longer vehicles. This not only cuts the amount of energy consumption per passenger while maintaining passenger comfort, but also reduces maintenance costs for both the train

The first order for 79 Coradia Stream trains was placed in July 2016 by NS. Called Intercity Next Generation by the operator, the trains will run on the Amsterdam-Rotterdam-Breda line and on the Den Haag-Eindhoven corridor at a maximum speed of 200kph. ALSTOM.



and track operator.

The trains have a modular design that allows operators to choose the configuration and interior that suits them best, or specify a train for either regional or inter-city requirements. They also come with modern onboard information and entertainment systems to offer improved passenger convenience.

Muldoon says: "The Coradia Stream is currently being developed for two operators in parallel, NS in the Netherlands and Trenitalia in Italy. This highlights its modularity as each operator has its own unique configuration."

"A modular platform is not a new concept, but we work to give operators the choices they want without undue costs or complications - people still want value for money."

In addition to creating new regional and inter-city trains, Alstom has shown its ability to evolve and refine its more mature products to suit the needs of today's market. This includes the Pendolino, of which 56 are in operation with Virgin West Coast in 9 and 11-car formations on the West Coast Main Line.

These are currently being re-painted at the company's new train modernisation facility in Widnes, which is an example of the localised benefits that Alstom brings to the countries in which it operates. The team at Widnes is 80-strong and includes five new apprentices who will work on the project.

Alongside this facility is Alstom's Academy for Rail that was officially opened by Transport Secretary Chris Grayling on October 4, and is due to train 500 apprentices over the next five years, contributing to the closure of the skills gap in the UK rail industry.

The first of the next generation of the family of Pendolino trains was inaugurated by Alstom on October 10. Now part of



Amtrak has ordered 28 Avelia Liberty high-speed trains to run in the USA. Over nearly 40 years, Alstom has sold more than 1,100 trains from its Avelia high-speed range, in which time they have covered 6.2 billion kilometres and transported four billion passengers in 20 countries across the world. ALSTOM.

Alstom's Avelia high-speed trains portfolio, 12 non-tilting seven-car Pendolino trains are being delivered to Italian operator NTV and will be capable of operating at speeds up to 250kph when they begin entering service

next year.

As well as having an improved interior, the new Pendolinos (which have been named the Italo EVO) are also more environmentally sustainable with distributed traction providing high levels of braking efficiency and regeneration.

The train is manufactured using recyclable materials and its nose cone has been designed to provide optimal aerodynamics.

"These new trains have lighter seats but the same level of comfort," says Muldoon.

"They run using less energy and can be more widely recycled at the end of their lives, while they also feature the benefits

of advances in regenerative braking technology. It's also inspiring to see everything coming to fruition at Widnes, and delivering what we set out to do. The Pendolino re-paint programme there is running like clockwork."

Meanwhile, Alstom's very high speed rolling stock falls under the Avelia brand. This ranges from the AGV single-deck distributed traction solution to Euroduplex double-decker trains.

There is also Alstom's latest development, named the Avelia Liberty, which is a single-deck concentrated traction train of which Amtrak has ordered 28 to operate on the

United States' Northeast corridor between Boston and Washington DC. Manufacturing will be localised in the USA.

Capable of travelling at 300kph, it offers 33% more capacity than existing trains on the route, and comes equipped with the company's innovative Crash Energy Management system for improved safety.

Its key feature is its articulated architecture which provides enhanced safety, passenger comfort and stability, while Tilttronix anticipative tilting technology enables the train to negotiate curves safely and more comfortably at high speeds.

Muldoon says all this places Alstom in a strong position to cater for the future traction needs of the UK, including the arrival of High Speed 2, which will place greater focus on environmental sustainability and passenger comfort, in addition to speed and technical performance.

He concludes: "All of these technological developments reflect how Alstom is a very focused business, a specialist in rail and urban transport that is constantly seeking to address the problems that face us. We will continue to use technology and common sense to find the optimal solution for the UK and around the world." ■



“ There’s never been a strong drive for the iLint’s unique selling point, but the UK market is beginning to make some promising noises. ”

Mike Muldoon, Head of Business Development and Marketing, Alstom Transport UK & Ireland

Virgin territory

Virgin has teamed up with SNCF to bid for the West Coast Partnership franchise. **BEN JONES** finds out what the French operator could bring to UK high-speed railways



A TGV Duplex leads a single-deck Réseau set out of the Saverne Tunnels on Phase 2 of the Paris-Strasbourg LGV Est line, which also carries international traffic to Germany and Switzerland. BRIAN STEPHENSON.

It's no surprise that SNCF is one of several international railway giants lining up for a shot at the flagship West Coast Partnership franchise.

Starting in April 2019, it includes three to five years of operating Phase 1 of HS2 from its opening between London and Birmingham in 2026.

With the Department for Transport (DfT) looking for bids with 'world class' experience in developing and operating high-speed railways, it was inevitable that the French state operator would be involved. While there had been suggestions that Spanish company RENFE was the favourite to join Virgin/Stagecoach, a joint venture with SNCF brings a wealth of experience and high-speed knowledge to the table.

Apart from Japan, which launched its Shinkansen trains as far back as 1964, no other country in the world has more

experience of building and operating dedicated high-speed railways than our neighbour across the Channel.

France has been pushing the boundaries of high-speed rail since the mid-1950s, when a series of test runs south of Bordeaux took two 1.5kV DC electric locomotives up to an astonishing 205mph (331kph) in March 1955. It was one of the first countries in the world to introduce regular, scheduled 200kph running in the late-1960s, but even then it was looking for more, and found the answer

in the Train à Grand Vitesse (TGV). Starting with a gas-turbine powered prototype in the early 1970s, it quickly developed the technology, replacing thirsty jet engines with electric traction after the 1973 oil crisis, and took the far-sighted decision to supplement its busiest route - Paris-Lyon - with a new 254-mile (409km) line, dedicated to high-speed passenger trains. The Ligne à Grand Vitesse Paris-Sud-Est (LGV-PSE) opened in 1981-83 and slashed journey times in half, to just two hours. It was so successful that

several other radial routes have followed over the last 35 years and, significantly, TGV technology has become a successful export for France.

Almost 2,700km (1,674 miles) of LGV now reach out from Paris to Marseille, Montpellier, Strasbourg, Mulhouse, Bordeaux, Nantes and Rennes, not to mention international routes to London and Brussels. The 362 miles from the French capital to Bordeaux are now covered in just over two hours by the fastest TGV L'Océane trains on the new EUR9 billion LGV Sud Europe Atlantique (SEA), which opened in July.

In partnership with Alstom (and its previous incarnation Alsthom), SNCF has gradually evolved the TGV concept through several generations too. It now has around 430 sets in traffic, by some margin the largest fleet of high-speed trains in Europe.

This includes some of the original PSE sets, still earning their keep despite having tens of millions of kilometres on the clock.

From the late 1990s, the focus has been on double-deck TGV Duplex sets, which have allowed SNCF to cope with increasing demand on the busiest routes without adding to growing congestion or lengthening trains - but still within the strict 17-tonne maximum axle loading of LGV lines. A pair of Duplex sets can carry more than 1,000 passengers.

A shortened and heavily modified TGV Duplex is the rail speed world record holder, having achieved 574.8kph (357mph) on the LGV Est line in 2007. Regular speeds have increased too, from the initial 280kph of the LGV-PSE to 300kph and, when required, 320kph on more recent lines. Perhaps the greatest demonstration of SNCF's technical and engineering excellence though came in May 2001, when a standard Réseau set ran 1,067km (663 miles) from Calais to Marseille in three hours and 29 minutes - an average speed of 190mph.

TGVs and their derivatives now link Paris to London, Barcelona, Milan, Amsterdam, Munich, Frankfurt, Brussels, Geneva, Bern and Zürich, running for much of their route over LGVs built on French principles - often by French civil engineering companies. In fact, the TGV/LGV concept has been exported to the UK, Belgium, the Netherlands, Spain, Morocco, South Korea and Taiwan, making France a world leader in the field of high-speed railways.

Not including Thalys (a joint venture with Belgian and Netherlands Railways that runs Paris-Brussels-Amsterdam/Cologne services) or Eurostar, SNCF runs around 700

high-speed rail trains per day in France and internationally. SNCF's high-speed division turned over EUR7.5 billion in 2016, of which 27% was from international operations, with 27 million passengers journeying on high-speed trains outside of France. It is, by any standards, a huge operation, key to the economy of France and its neighbours.

But - and there's always a 'but' - SNCF's flagship operation is not without its problems. After the roaring success of the early lines, higher costs and lower returns have become the norm for more recent LGVs, built to satisfy political demands as much as those from passengers. LGV SEA has been dogged by arguments about funding, which comes from numerous sources - European, national, local and regional - not to mention access charges levied by the Public Private Partnership concession LISEA, which built and part-funded the project, and their effect on SNCF's proposed service levels, which have angered those contributing to the project.

More fundamentally, French President Emmanuel Macron chose the opening of the Bordeaux route to announce his intention to prioritise 'everyday transport' in France, rather than investing in more high-speed lines. This decision is likely to put paid to further LGV extensions to Toulouse, Limoges, a second Paris-Lyon route via Orleans and Clermont-Ferrand, and possibly even the controversial EUR25bn Lyon-Turin project.

The separation of the management of track and trains to meet European regulations has also created an issue, with SNCF blaming SNCF Réseau, the French equivalent of Network Rail, for reducing the profitability



Since the late 1990s, SNCF has focused on building double-deck 'Duplex' TGVs to increase capacity on the busiest routes. On November 27 2016, 'Euroduplex' multi-voltage set 4710 calls at Stuttgart Hbf with a Paris-Munich working. BEN JONES.

► of TGV services by imposing high track access charges.

For many years SNCF has also been accused of prioritising TGV to the detriment of its other operations, particularly inter-city and cross-country main lines not sponsored by regional government - which are in poor shape. Ageing rolling stock and decades of underinvestment in infrastructure have led to 'maintenance holidays', speed restrictions, longer journey times and even line closures, driving many into their cars, or onto less direct routes using TGV - deliberately if the critics are to be believed.

As if those in-house problems weren't enough, increasing competition from low-cost airlines, long-distance buses and car-sharing websites have attracted many students and leisure passengers away from rail which has eaten into the revenue, and yield per passenger, of TGV services. SNCF Réseau's argument is that those access charges are required to service the EUR45bn debt mountain built up to construct these multi-billion pound lines.

SNCF's response has been to introduce more Duplex trains in place of single-deck PSE, Atlantique and Réseau sets, with lower operating costs per seat, cut back on loss-making services and reduce on-train catering on many routes. It has also copied low-cost airline practice by introducing dedicated no-frills TGV services between major cities. In 2013 it launched Ouigo, its low-cost high-speed service, using modified, high-density Duplex sets covering extraordinary daily mileages. Thalys followed suit in April 2016 with low-cost international TGV trains, branded Izy, on the Paris-Brussels route.

If the Department for Transport continues



More than 400 TGV sets are in traffic across France and neighbouring countries, although French President Emmanuel Macron has stated that his government will focus on improvements to 'everyday transport' rather than more grand high-speed railway projects - putting several new LGV extensions in doubt. BEN JONES



to insist on maximising seating capacity on new trains, such as the Thameslink Class 700s and Hitachi IEP sets, SNCF's experience in developing high-density high-speed trains, with compulsory seat reservation and an emphasis on internet booking, could prove irresistible.

With a view to increasing line capacity by 25%, SNCF is working with Alstom to introduce semi-automatic train operation on the congested Paris-Lyon LGV by 2023. ATO is also likely to be deployed on HS2, which opens in 2026, so SNCF's experience over the next few years could be key to its successful introduction here.

A struggling French economy, a drop in tourist numbers after recent terrorist attacks, industrial action and political pressure to support French industry (specifically Alstom, in which the government has a 20% stake) by placing orders for expensive new TGVs (even where they aren't necessarily needed) makes this a difficult time for SNCF.

In 2016, the group's operating margin dropped from 14.1% of turnover to 12.8%, with the passenger division, Voyages SNCF, suffering a 4.3% fall in revenue over the previous year, most notably outside the greater Paris region. However, TGV traffic

SNCF's TGV fleet has evolved over several generations and includes numerous sub-fleets for specific duties, including international services to neighbouring countries. On September 13 2009, TGV POS (Paris-Eastern Germany-Southern Germany) 4408 rests at Paris Gare de l'Est after arrival from Zurich. Behind it is an older TGV Réseau set and a CC72100 C-C diesel used on Paris-Belfort trains until August 2017. BEN JONES.

grew by 1.9% as a result of various special offers and Ouigo reported a 76% increase in passenger numbers after new routes were added. After making economies of EUR825m, profit across the group was EUR567m, although after acquisitions are taken into account, overall revenue dropped by 1.5% to EUR32.3bn.

Even before conditions became difficult at home, SNCF was extremely active in the international sphere; it owns 70% of Keolis, one of the world's largest urban and regional transport operators - and a partner in Govia, which runs Southeastern, TSGN and (until December) London Midland in the UK. Keolis bus, rail and metro services carry around three billion people in 16 countries.

SNCF also owns 55% of Eurostar, 60%

“ SNCF has exploited open access regulations to expand elsewhere in Europe.”



SNCF is the majority shareholder in Eurostar, which operates international services on the London-Paris/Brussels route. On May 23, Siemens e320 374025 and one of the older e300 sets wait at Brussels Midi before returning to London. BEN JONES.

SNCF has more experience of high-speed operations than any other European railway, having introduced its first TGVs on the Paris-Lyon route in 1981. CHRISTOPHE RECOURA.



of Thalys and 20% of NTV, the Italian operator of .italo open access high-speed trains. The latter run in competition with Trenitalia, which is working on a rival West Coast Partnership bid with FirstGroup. In response, Trenitalia expressed its intention to compete with SNCF on its lucrative Paris-Brussels route in 2015.

Although its domestic rail freight business is in perpetual crisis - French press reports a drop of 12-15% in 2016, with a 60% collapse in its operating margin - SNCF has exploited open access regulations to expand elsewhere in Europe. Its Captrain subsidiary has absorbed smaller freight companies in Germany, Italy, Belgium and Romania and operates across the continent. Other

businesses include global logistics company Geodis, France's third largest rail freight operator VFLI, automotive logistics specialist STVA, intermodal operator Naviland Cargo and locomotive leasing company Akiem.

However, despite SNCF's enthusiasm for international acquisitions and open access, the situation in France is much less welcoming, with new rail operators finding it extremely difficult to obtain decent paths and gain authorisation for new locomotives. While freight operators such as Euro Cargo Rail, Colas and Europorte have made significant inroads into SNCF Fret's business, there is currently just one open access passenger operation - Trenitalia/Transdev joint venture Thello - which runs

Paris-Venice overnight and Milan-Nice daytime trains.

SNCF's grip on passenger operations could start to loosen over the next few years as the Macron administration looks to introduce competitive tendering for regional services. While the regional governments paying for those services are keen to end SNCF's monopoly, any such moves are likely to meet formidable resistance from the state operator and trades unions.

Whatever the outcome of the West Coast Partnership contest, if they decided to launch a competitor to TGV it's unlikely that Virgin or Stagecoach would find as warm a welcome in France as SNCF has in the UK. ■



ERTMS between Madrid and Valencia. SIEMENS.

DATA MINING FOR TOMORROW'S RAILWAY

It is a truth almost universally acknowledged that the rising passenger demand for the railway over the past 20 years will only continue to put strain on the current network. If today's rate of growth continues for the next 20 years, people could well be making one billion extra journeys a year by 2030.

Projects such as HS2 and Crossrail represent opportunities to create significant additional capacity, but they are not enough on their own. Drawing more out of the existing railway will be key to sustainable growth across the country.

"We have to do something in order to meet the demand to keep the country flowing," says Mark Ferrer, Siemens Rail Automation's operations director for Digital Railway. "Because you can say that the transport systems are the arteries of the nation. They carry the economy around the country.

Siemens Rail Automation Director MARK FERRER tells STEFANIE FOSTER how Digital Railway projects around the world provide lessons for the future of UK rail

"There is a latent capacity in the current infrastructure which is constrained by the way we control train movements today. For example, look at some lines and you'll see demand currently exceeds the capacity of that line. But if you watch the line you won't see a train for ages. That's just because of the way we control the movement of trains."

Ferrer explains that if we were to apply radio-based digital control (such as ETCS) to the network, we would have permanent continuous control over the movement of trains, as opposed to the system we have

today where signalling at fixed locations along the trackside conveys information to the train, so there is no continuous control. Solving that means we can fit more trains on the track and they can run closer together, thus increasing capacity.

Of course, this will mean the infrastructure is being used more intensively and it's wearing out quicker, with a knock-on effect on maintenance. Any failures will have a much bigger impact.

Says Ferrer: "The railway needs failure prediction and analysis with remote

condition monitoring, where the system generates predictions about the performance of the infrastructure."

Predicting failures means they can be avoided before any delays to passengers are caused. But the added benefit of these Digital Railway systems is fewer trackside assets, and therefore fewer things to fail.

"When you have a system that has digital traffic management, train control, diagnostics and failure analysis, all this digital information can give us a really good, highly performing infrastructure. Now all we have to do is get the right passenger to the right train at the right time."

Radio-based train control systems such as ETCS are not new to railways. But this is a relatively new concept for the UK main line. The Cambrian Line is the only current example in this country.

On the continent, it's a different story. "With high-speed lines in Europe - in Spain and Germany for example, they are predominantly controlled by some form of in-cab signalling, either radio or some other form of transmission," says Ferrer.

Siemens has carried out a number of projects in Spain and Germany to deploy ETCS to the high-speed lines. A project completed in 2013 involved ETCS Level 1 being rolled out across the Madrid-Valencia-Albacete line (a 438km high-speed route).

In a consortium with Thales, Siemens also modernised the signalling and control equipment on the 340km section of high-speed line between Olmedo and Ourense in Northern Spain, enabling the line to become one of the country's key high-speed corridors. In Germany, a project is currently under way to improve transport links between Munich and Berlin by closing a gap in the country's high-speed network and delivering a journey time between the two cities of four hours (it is currently more than six).

Says Ferrer: "In both countries, we've provided ETCS to enable the trains to be controlled along those lines. The systems that we have deployed there are very similar to the ones we're deploying in the UK."

"From 2018 we will be deploying ETCS Level 2 on the Thameslink Core. That system is basically the same as the one controlling the high-speed lines in Spain. We've installed some extra functions because one is a high-speed line and the other is an intensive commuter line, but it's essentially the same system. So, we've taken



“ For me, Digital Railway is all about accurate prediction ”

Mark Ferrer, Operations Director, Digital Railway, Siemens Rail Automation UK

a lot of learning and knowledge from what we've done in overseas projects and we've brought it into the UK."

The Thameslink Programme is a flagship project for Siemens, but it will also be the first deployment of Automatic Train Operation (ATO) over an ETCS Train Protection System in the UK, and one of the first in the world.

Siemens has recognised the long-term importance of having a sustainable capability in ETCS and ATO in the UK, and so has nurtured a UK team.

Ferrer's view is that Digital Railway here is a long-term strategy and so we need to have people in the UK that understand how it works and have the ability to deploy it nationwide. By transferring the knowledge Siemens has gained in Spain to people here, it leaves a lasting capability legacy.

"If we're serious about the Digital Railway - and certainly I am - I need the capability here in the UK to meet the needs of its customers."

If we make the right decisions for Digital Railway, what does Ferrer think the UK network will be like in 20 years?

"I think it could be a system where demand is matched by capacity, or capacity matches demand. By using data streams like social media and online booking systems, with historical data, we could make more accurate predictions.

"For example, what was going on a year ago today on the railway? Was it a sunny day, was it raining, was it freezing? How many people were using the railway? Using that data, we'll have a prediction of what the railway is going to look like tomorrow and that could be vastly different to what it is today.

"We could run models that predict tomorrow's demand, so in the morning everything on the railway is where it should be to meet the demands of the day. I think in the future we could enjoy much more personalised travel, where the capacity meets the demand. So, you won't have to worry about whether you'll have to stand, because you know there will be a seat for you.

"There are challenges in getting there, but digitising the railway will also generate this flow of useful data. Then we'll find that there's information within that data that we can use to provide better options to people. I think it will be a voyage of discovery.

"But the most important step of any journey is the first one. We've started with Thameslink and Great Western, but now the industry as a whole needs to embrace the concept." ■

California calling

RICHARD CLINNICK reports from California, where Siemens is using the local supply chain and workforce to build trains and trams that will support growth across the country

RAIL photography: RICHARD CLINNICK

On the west coast of America, Siemens is making big strides in terms of delivery of trains for the local railways.

Much like plans being made in the UK, these trains are built by people who live local to the manufacturing facilities.

The company's first order from North America came in 1975, for vehicles that would operate in Edmonton, Canada; these were imported from Germany. Further deals followed, with the first order for the USA in 1980 (for San Diego). In 1983 the first USA vehicle assembly was completed, following the introduction of the Buy America Act that year. This mandated that trains to run in the USA would have to be built there. So in 1984 the company established a vehicle assembly

facility in Sacramento, California, which at the time was a leased facility.

President of Siemens Rolling Stock USA Michael Cahill explains that in 1992 Siemens established a permanent facility at Sacramento, and that was where initial engineering activities took place.

The plant's capabilities have been considerably enhanced in the 21st century. In 2006 car shell manufacturing was added, followed three years later by bogie manufacturing. In 2012 locomotive manufacturing began after a decision was made to change the strategy from light rail transit and branch out into other markets.

There isn't a huge market for electric trains in America, due to the relative lack of overhead line electrification.



A 'Charger' locomotive under construction in Sacramento.

HYBRID

In the American mass transit rail market, designs for electric operation without overhead line electrification are gaining favour as a way of expanding existing networks.

Siemens has reacted to this by converting its S70 light rail vehicle (already widely used in the US, and which largely corresponds to a European streetcar) into a hybrid vehicle. Power is supplied via the pantograph or from batteries. The batteries are charged through a sophisticated system that charges when the tram is operating using OLE, while power harvested from the regenerative brakes is used when the vehicle is away from the wires.

A tram was tested in San Diego, and it set a world record by travelling 24 hours with just a single charge. Charlotte (North Carolina) was the first city to order such trams, and these will be used on a 2.4-mile extension there.



A tram destined for Calgary, Canada, undergoes testing at Siemens' Sacramento factory prior to delivery by rail to the Canadian city.

Cahill explains that with over 220,000 miles of railway in the country, the costs are prohibitive, with diesel the preferred motive power for the time being. He says there are plans for OLE on West Coast corridors, but it is accepted that this will take time. However, emissions are also an issue in the States, and Siemens was the first to bring a Tier 4-compliant locomotive to the market.

In 2015 passenger coach building started, and these were constructed out of stainless steel. Cahill says that by early 2017 there were more than 1,000 employees working at the site - in 1984 there were just 34. In California overall, Siemens has almost 3,000 employees working on a number of projects. Eighty per cent of the site's power comes from solar energy. The site is now the North American manufacturing headquarters for Siemens Rolling Stock. In the past three decades, Siemens has invested some \$100 million in the plant and staff.

The supply chain is also vital, and within the LRT market there are 184 suppliers from almost 30 states working with Siemens.

Today Siemens is the market leader in light

rail and passenger locomotives in North America, and has a visible presence in most major regions. It has an enviable reputation in a number of key areas: reliability, digital diagnostics and automation, passenger experience, asset management optimisation and modular design. With a national presence in the USA of more than 30 years, and with its understanding of local needs, Siemens enjoys long-term customer loyalty.

Since 1980, the plant has produced light rail vehicles and streetcars for San Francisco, Charlotte, Calgary, Denver, Twin Cities (Minneapolis-St Pauli), Seattle and San Diego, while locomotives and

“ We wanted someone who knew better than us about what would work. ”

John Haley,
Director of Transit, SMFTA

trainsets have been built for IDOT (Illinois Department of Transportation), Caltrans (California Department of Transportation), WSDOT (Washington State Department of Transportation), MARC (Maryland Area Regional Commuter), SEPTA (Southeastern Pennsylvania Transportation Authority) and Brightline.

Cahill says Siemens prefers to view cities as accounts not contracts, which is down to the fact there are many repeat orders from existing clients. The American market differs to Europe in that a greater emphasis is put on reliability rather than innovation, but the funding is different. For example, most public agencies have to achieve more with less money, and Cahill says Siemens has been able to facilitate this through the development of modular designs, which keeps the costs down.

There is a strong lobby for accessibility and mobility in the USA, which is reflected in the designs of its trains and LRT.

The site at Sacramento covers 60 acres and there's scope for expansion, should the company win further orders.



A 'Charger' locomotive built in Sacramento, California that will be used locally by Caltrans on high-speed passenger trains. The diesel-electric locomotives are 90% more environmentally friendly than the locomotives they replace.

► The site is certainly busy. Under construction are trams for San Francisco, Calgary, and locomotives for Caltrans, Washington, Illinois and Maryland. The high-speed trainsets for Brightline in California are also at various stages of construction; these are for the Miami, Fort Lauderdale and West Palm Beach corridor, but have been funded privately. Building full trainsets for the USA is another first for Siemens. These will operate with a locomotive on each end and their introduction will happen in phases; each trainset is also a different colour.

Called 'Chargers', with a fleet value of \$425m, these 4,400hp machines are capable of 125mph. They are 100% Buy America compliant as well, and it's the first time the company has delivered its proven diesel-electric locomotives in America.

These Tier 4 locomotives feature a single-cab design and are fitted with a Cummins

“ The city has exciting economic and environmental goals which rely heavily on a mass transit system. ”

**John Haley,
Director of Transit, SMFTA**

16-cylinder engine that feeds an alternator, while the IGBT traction converters provide a single-axle control for 125mph running. They also have dynamic braking, which allows traction motor energy to feed the Auxiliary and HEP systems to minimise fuel consumption. They reduce emissions by approximately 90% compared to existing Tier 0 locomotives. Siemens has a lot of orders for

these Bo-Bo locomotives on its books.

On test is a tram for Calgary, the design of which was decided by a vote in a local newspaper. It has been created to look not unlike a hockey mask, such is the fondness for the sport in the Canadian city.

Further south, in San Francisco, Siemens is delivering 215 S200 light rail vehicles for San Francisco Municipal Transportation Agency (SFMTA) and its 71.4-mile network. This is the largest order the company has ever received for light rail vehicles in the States. The original order, placed in 2015, was for 175, but that was increased by 40 a year later.

SFMTA's existing fleet of 151 vehicles is more than 20 years old, and now it's being replaced and expanded with the new trams.

This is to meet growing demand on six lines that carry a total of 235,000 passengers per day. The new Siemens vehicles have high energy efficiency, including regenerative brakes. The manufacturer says they are easy to maintain and offer extensive recycling opportunities at the end of their careers. They have been fitted with digital diagnostic systems to ensure a high availability.

The first vehicles were delivered in January. The articulated two-car sets can travel on gradients of 1-in-11 (9%), have a 50mph maximum speed and can be reconfigured to run in trainsets of up to five cars in length.

San Francisco has wanted an environmentally friendly mass transit system, and so the trams have a lightweight drive system that recuperates braking energy and feeds it back into the overhead power line. Electric brakes stop the trains without dust emissions and reduce lifecycle costs. The trams have LED lighting, which reduces lighting energy consumption by up to 40%. Each car is fitted with 60 seats, with four areas for wheelchairs or bicycles; overall, a two-car tram can carry 203 passengers.

This is vital for supporting such a huge



Siemens started building passenger carriages at Sacramento this decade. This is a vehicle for Brightline in Florida, the first complete trainsets the company has built in America.

transit division. The SMFTA fleet has over 1,000 vehicles in total, including buses, railcars and cable cars. Public perception is improving, and the SMFTA is preparing for growth - there will be an extra 130,000 new households and 310,000 new jobs in the region by 2040. Ridership on light rail is expected to increase by more than 80,000 passengers per day.

The S200s will be used to enable a more frequent service, and consideration is also being given to running express trains to improve capacity.

SMFTA Director of Transit John Haley says that the transformation of San Francisco's transport system is "exciting, both in the

short and the long term."

The city is a transit-first city with a public body that stipulates that transport must come first. There is a \$1.4bn procurement process under way to modernise the entire transport system. Lessons have been learned from existing fleets, including the realisation that perhaps too few were ordered previously. Says Haley: "The city has exciting economic and environmental goals which rely heavily on a mass transit system."

He highlights overcrowding, but the new policy regarding various orders seeks to remedy this. SMFTA is also reacting to the public, which voted for the transport modes to be related, which the investment in new

VELARO HIGH-SPEED TRAINSET, BUILT IN AMERICA, BY AMERICANS

High-speed trains in North America have been mooted many times over the years. Currently, Very High Speed Trains run from Washington DC-New York-Boston, and in California, between San Francisco and Los Angeles, with links to San Diego in the south and Sacramento in the north. The current plan for the west coast is for eight-car trainsets for 400 to 500 passengers, travelling at speeds up to 220mph.

Siemens can offer its eight-car Velaros for such projects. The company says that the design used in Europe can be adapted, but that it would be built in Sacramento, where space has been allocated on its site for the work, should the order come in. A transfer of know-how would take place between its Krefeld site in Germany (where 2,200 employees complete up to 450 coaches per year) and the California facility.

S200 tram 2002 stands outside Muni Metro East Maintenance facility in San Francisco. This is the second tram to be delivered by Siemens from Sacramento, as the Californian city expands its transit system.



A Brightline 'Charger' undergoes testing at Sacramento. The 'Chargers' for this contract have been privately funded and will operate in top-and-tail mode, in Florida.

A WORLDWIDE LEGACY

With a project portfolio spanning five continents, Colas Rail Chief Executive Officer **JEAN-PIERRE BERTRAND** and Colas Rail UK Managing Director **IAIN ANDERSON** tell *RAIL* how the company is committed to leaving a lasting legacy wherever it operates

As one of Europe's leading suppliers of railway infrastructure services, it's no surprise that Colas Rail has a hefty presence in the UK.

From the Docklands Light Railway to High Speed 1, the company has designed and constructed every form of railway in this country and throughout Europe for several decades.

As a fully integrated company, Colas Rail is also a primary contractor for Network Rail's renewals activity, in addition to being a dedicated freight operator.

In fact, in October, the scale of Colas Rail's considerable clout in the UK market was reinforced when it was named sixth in the list of Network Rail's top 20 suppliers in 2016-17, having completed more than £200 million worth of work for the infrastructure owner.

In recent years, its global reach has been extended beyond the UK and Europe to other countries, including in Asia, North Africa and South America, and to date Colas Rail has constructed some 3,000km of high-speed rail lines worldwide and delivered light rail and metro schemes in more than 50 cities.

Uniting these major projects is a commitment to leaving a lasting and positive legacy while always being led by the company's values: safety, profitability, quality and respect.

But in order to do so, Colas Rail must first understand the diverse social and economic climates it faces in the wide range of countries where it operates before it can effect positive change.

This is ably demonstrated by two of the company's major projects located in the UK and Morocco, where a major emphasis has been placed on aiding regional social and economic regeneration through the implementation of sustainable measures,



“It's about leaving a lasting legacy and enhancing the social and economic environment around that piece of infrastructure.”

Iain Anderson, Managing Director, Colas Rail UK

LEADERS OF THE FUTURE

Cate Lough, Assistant Project Manager – Infrastructure at Colas Rail, joined the company's graduate scheme in 2015 and was recently recognised as one of the rail industry's Top 20 Rising Stars 2017 by Women in Rail.

She is one of the company's graduates selected to fly out from the UK to its high-speed rail project in Morocco to gain practical experience in delivering these works, with a focus on installation of overhead line equipment (OLE).

Having now completed the Future Leaders Programme, Cate and other former members of the graduate scheme will use this experience to

support the National College for High Speed Rail where OLE equipment has also been donated from the Morocco scheme to give future candidates the opportunity to work in a realistic environment.

Cate is currently working as a project lead for track, drainage and OLE as part of the enabling works for HS2.

“The sharing of knowledge and best practice and gaining practical on-site experience has been critical to building our skills base in the UK to continue to deliver this kind of work in future,” says Colas Rail UK Managing Director Iain Anderson.

such as recruiting local staff, upskilling employees and educating local school pupils.

In the West Midlands, Colas Rail forms part of the Midland Metro Alliance (MMA) which was created in 2016 to develop a light rail network over the next decade on behalf of the West Midlands Combined Authority, worth some £1.3 billion.

In addition to the economic and social benefits that will result from the new infrastructure and increased connectivity it will bring, MMA - in partnership with local colleges, job centres and other public bodies - offers six-week training programmes to unemployed adults in the area to give practical work experience of careers in construction and engineering.

Meanwhile, more than 2,000 miles away in Morocco, Colas Rail is completing the construction of 200km of a twin-track high-speed line between Tangiers and Kenitra where it is responsible for all track work, catenary and operational logistics.

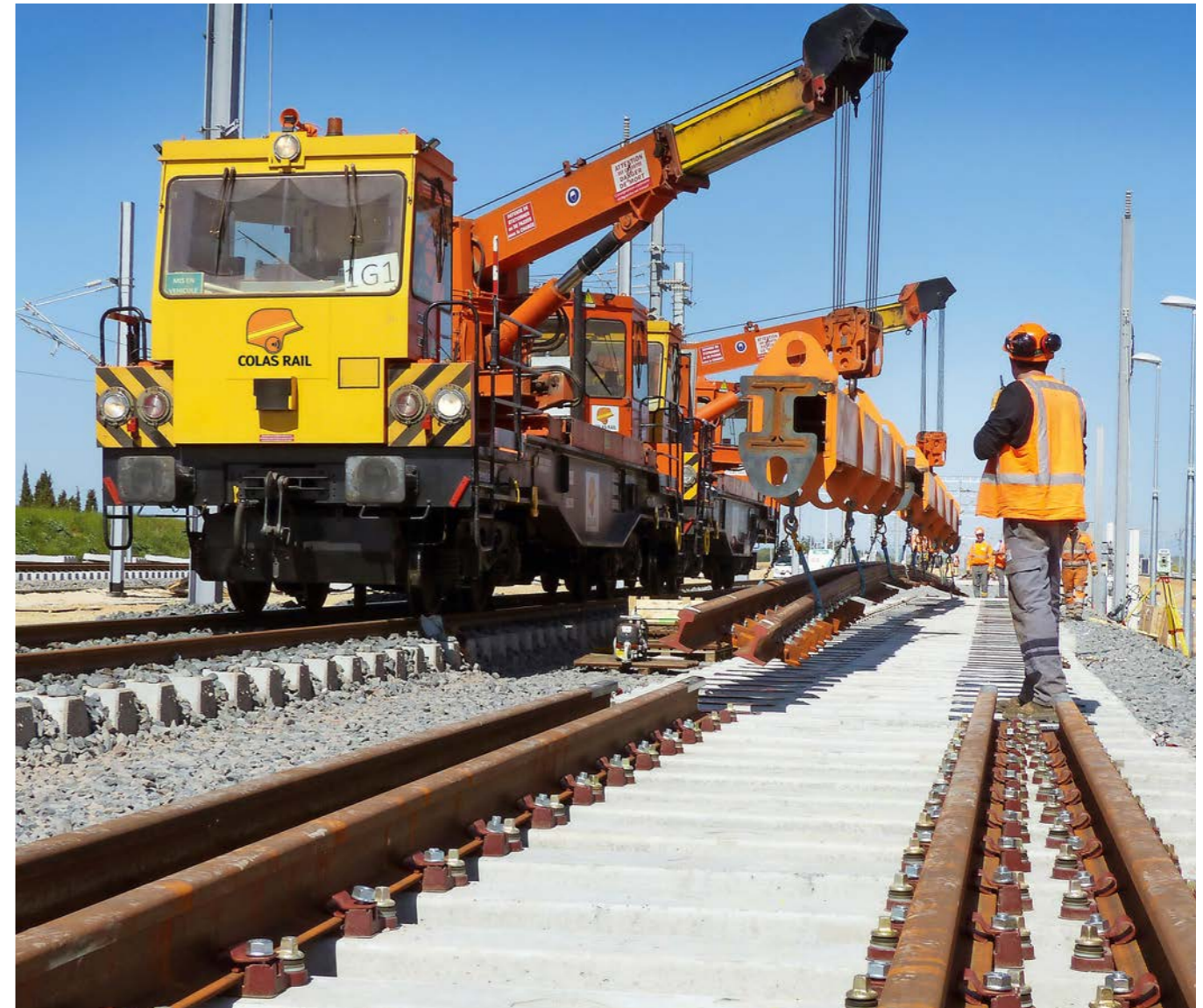
More than 95% of the company's workers in Morocco were recruited locally and taught specialist railway knowledge at a purpose-built training school established by Colas Rail. Over 30 of these individuals went on to undertake senior roles within the project and obtain formal professional qualifications.

Colas Rail UK Managing Director Iain Anderson says: “MMA is a fabulous programme of work which has allowed us to take a long-term approach and invest in the area. We've done some excellent work in training people who had been unemployed for a long time to help them back into jobs.

“It's about leaving a lasting legacy and enhancing the social and economic environment around that piece of infrastructure, which is good for the area and enables us to operate a sustainable business.”

Colas Rail CEO Jean-Pierre Bertrand adds: “In Morocco, we've built Africa's first ever high-speed line with the majority of the workforce recruited from the local area. There was a lack of existing railway knowledge, so we've trained 1,400 local people over three years with 85% of them being completely new to the industry.

“Obviously, Morocco is very different from the UK, but the basic principles of our approach remain the same and for both projects we have focused closely on developing links with local schools and



colleges or created them ourselves in order to secure a long-lasting skills legacy.”

As part of Colas Rail's commitment to sustainability, the company is also working with industry to help fill the infrastructure skills gap in the UK, where it is estimated that over 180,000 new engineers will be required by the rail supply chain over the next five years.

This support is manifested by both its backing of the newly opened National College for High Speed Rail (by providing catenary at its Birmingham campus), and its award-winning graduate scheme.



“We have focused very closely on developing links with local school and colleges or created them ourselves to secure a long-lasting skills agency.”

Jean-Pierre Bertrand, Chief Executive, Colas Rail

This scheme has supplied almost 10% of the company's total workforce, and 25% of its management team, thereby developing future leaders who will continue to champion these values long into the future.

Successful applicants to its Future Leaders Programme embark on a two-year programme that rotates graduates nationally and internationally to work with senior managers in all Colas Rail divisions.

This includes placements in Morocco, where not only vocational training in high-speed rail can be given, but the powerful effects of the company's legacy approach can

More than 95% of Colas Rail's employees constructing Africa's first high-speed line between Tangiers and Kenitra were local Moroccan nationals, leaving a strong skills legacy in the country well after the end of the project's delivery phase. COLAS RAIL.

be seen first-hand in an international context (see panel).

Meanwhile, the Midland Metro Alliance is also using the Future Leaders Programme as a template to introduce a bespoke talent programme across its alliance partner organisations.

Bertrand adds: “We were able to bring some of our graduates over from the UK to learn from the Moroccan high-speed rail project as we continue to develop our next generation of leaders and provide a sustainable approach. They are able to see the principle in action of being a local player to support local growth, by providing training in each country we operate in. This is not a short-term approach - it's for the long term, and many years beyond the end of the project lifecycle. ■

EXPORTING EXPERTISE DOWN UNDER...

On May 4, global engineering and construction firm Bechtel was appointed by Transport for New South Wales (TfNSW) as an official delivery partner for the Sydney Metro project.

As part of Australia's largest public infrastructure project, Bechtel has been charged with leading the Tunnels and Excavations package of Stage 2 of the scheme - Sydney Metro City & Southwest - working as part of the customer's integrated team.

The scope of the works includes managing the delivery of 9.6 miles of twin-bore tunnels using five tunnelling machines, and the excavation of six new metro stations.

By burrowing beneath the central business district of a city of more than five million residents, plus the world-famous Sydney Harbour, the project is remarkably similar to Crossrail in London owing to both its

Bechtel's Global Rail Sector Lead AILIE MacADAM tells PAUL STEPHEN how lessons learned from Crossrail are being applied by the company on the other side of the world

technical complexity and scale, and the economic and capacity benefits it will bring.

At a projected cost of \$11.5-\$12.5 AUS billion (£6.77bn-£7.36bn), it will provide infrastructure and signalling enhancements to Sydney's existing suburban rail network, increasing capacity across the Sydney Metro network from 120 trains per hour in the peak to 200 trains per hour, making room for an additional 100,000 customers by 2024.

Bechtel's role in Sydney will also be

very similar to the part it continues to play at Crossrail, having been appointed as Crossrail Ltd's project delivery partner in 2009 to help construct 13 miles of twin tunnels and eight new stations in the line's central section.

As part of Crossrail's integrated management team, Bechtel is bringing together more than 150 contracts ranging from the first stages of demolition in London through to the final commissioning of the railway, ensuring the customer's core values are upheld throughout.

Bechtel's Global Rail Sector Lead Ailie MacAdam highlights the company's experience of managing Crossrail's complex interfaces and wide range of stakeholders as a lead factor in TfNSW's decision to award it the Sydney Metro project contract.

She says: "Our role in Sydney has striking similarities with the central section of Crossrail. Driving tunnels beneath busy city streets combined with the logistics of keeping the city open for business is an extraordinary feat, and so we will be using our experience in London very extensively."

With the Crossrail programme approaching 88% complete and now entering a phase of infrastructure testing before opening to passengers in December 2018, Bechtel has been able to transfer some of those skills to Sydney. This includes MacAdam, who was delivery director at Crossrail during peak construction until 2014 when she was promoted to general manager of Bechtel's rail division, and then to be its Global Rail Sector Lead.

She says that she is excited to be working for TfNSW as it shares many of the progressive values pioneered by Crossrail in being a responsible client and an agent for change across the nation's entire supply chain. This includes a commitment to increasing the ethnic and gender diversity of the workforce, and leaving a lasting skills legacy.

She adds: "It's a project that everyone in

Many of Bechtel's 150-strong team at Crossrail have been relocated to help manage the Sydney Metro project. BECHTEL.



“TfNSW liked the delivery partner approach used by Crossrail Ltd, and admired our talent and skills on the project.”

Ailie MacAdam, Global Rail Sector Lead, Bechtel

the Asia Pacific region wants to be part of. We really enjoy working with Crossrail and now with TfNSW because they both feel a responsibility to make a real change to the industry.

"The similarities between the clients is obvious in terms of the values they uphold, which makes them the sort of clients that it is terrific to work with and make a difference together."

In terms of specific lessons being transferred from Crossrail to the southern hemisphere, MacAdam says that TfNSW will be carefully studying how commercial developments have been incorporated into the station designs to maximise the potential for economic growth along the route.

"We want to maximise the return on investment made in the original infrastructure. I can see that the customer in Sydney will be looking at ways to understand the overall infrastructure outcome, combining both station and oversite development needs to maximum effect, including cost, schedule and customer end use.

"Across the world, Crossrail is held up as an example not just for what we're doing from a technical point of view, but also how we are doing it in terms of understanding stakeholders, improving health and safety and solving problems effectively. The motto I used at Crossrail was 'looking around the corner', to encourage people to think about

the next challenge and how to meet it, and we can do that much earlier in Sydney through integrated design."

Ultimately this transfer of knowledge and skills from London to Sydney will be a self-fulfilling prophecy for Bechtel and the UK, says MacAdam.

That is because for more than 60 years Bechtel has been operating internationally and exporting lessons from its UK projects across the globe, but then bringing back further valuable lessons from abroad.

She adds: "I've no doubt that there'll be things that I learn in Sydney and elsewhere around the world that I can bring back to the UK to add more value for our customers. Let's just see what happens." ■

Promoting the UK's expertise to a global market

With uncertainty in the domestic rail market, it has never been more important to sell UK expertise around the world, RIA's Exports Director **NEIL WALKER** tells **STEFANIE FOSTER**

Shortfalls in Control Period 5 (CP5) funding, the impending Brexit, uncertainty over the future of the Government and the ever-increasing prospect of nationalisation make for troubling times for the UK's rail businesses. As a result, more and more emphasis is being placed on increasing the export of UK goods and services around the world to maintain a robust economy.

In the summer, the Rail Supply Group launched a Rail Exports Leadership Group with a clear goal - to develop UK capability and double exports by 2025. The Government also launched Infrastructure Exports: UK (IE:UK) to create consortia to bid for global contracts. The support and encouragement for UK businesses with export potential is clearly growing.

A significant organisation in that mix is the Railway Industry Association. RIA works very closely with the Department for International Trade (DIT) as a trade challenge partner, which allows it to run trade missions in partnership with DIT, alongside its own exports missions.

RIA's Exports Director is Neil Walker. He tells *RAIL* that he recently came back from a trade mission to Bangladesh: "The mission was led by the Prime Minister's Trade Envoy to Bangladesh, Rushanara Ali, who is the MP for Bethnal Green and Bow. We took nine different companies over to Bangladesh where we had high-level meetings with rail and metro authorities."

Walker admits that Bangladesh was not on RIA's list of priority export destinations

(Australia currently tops the list, based on RIA's research among its members), but DIT approached RIA and asked them to collaborate on a trade mission.

"We saw an awful lot of opportunities. It's a difficult market, but the welcome we received was second to none and they are very keen to work with us, thinking back to their heritage and how their railways were built."

£625 million is available to help UK exporters and their buyers in Bangladesh through a department within DIT, known as UK Export Finance. It helps UK companies to win export contracts by providing attractive financing terms or by helping them to fulfil orders, either by supplying the working capital or making sure they get paid via export insurance.

DIT has a list of what it calls 'high-value campaigns'. Regions where there is significant market intelligence in rail development and where accessibility to UK companies is important fall into this category - deemed to provide potentially high returns for the UK market. South East Asia, Saudi Arabia, Canada, South Africa and Latin America are all on that list.

Getting exposure for UK companies in these and other regions around the world is more cost-effective and successful when it is co-ordinated. RIA manages UK pavilions at key international trade shows, also administering DIT's trade access programme grants, which help SMEs (small and medium-sized enterprises) towards the cost of exhibiting.

"Working with government on this



allows us to get high-level support from them," Walker continues "For example, Paul Maynard has joined us at Innotrans [Germany], Middle East Rail [Dubai] and Trako [Poland], helping to facilitate exporting and draw high-profile visitors to the pavilions. He held meetings and listened to what is affecting UK companies in exporting."

Next year, RIA plans to have three UK pavilions at Innotrans, as well as a presence at several other trade shows. Walker believes more UK companies need to consider exporting: "We realise that there is a lot going on in the domestic market, with shortfalls in CP5, which are well publicised. We feel that exporting is very important. In the last RIA survey we did just over a year ago, our members reported over £400 million worth of export. That's just from our members. There will be a lot out there that we haven't captured."

Walker's most recent trade mission was to Spain, where RIA ran a rolling stock suppliers mission with about 20 UK delegates. Meetings were arranged in

Barcelona with Alstom, before moving on to Madrid to meet with Talgo and Stadler.

While Walker says the interest these companies have in HS2 is important, RIA's focus is more on the opportunity to supply UK content into the train builders' rolling stock in other parts of the world.

Soon after speaking to *RAIL*, Walker was preparing to lead another mission to Singapore and Malaysia to engage with officials about high-speed and metro development, before heading to Brisbane (Australia) in late November for AusRAIL PLUS, where a small pavilion of nine UK companies gained grant support to attend the trade show.

There is clearly a lot of activity to help UK companies make the most of export opportunities, but where do they start?

"Companies need to start with the basics," advises Walker, "They must try to take a structured approach. Understanding the market is particularly important. In my opinion, you need to dedicate at least a person to focusing on export."

He's optimistic about the Government's

IE:UK initiative to bring together companies of all sizes to bid for global infrastructure and rail projects in a single UK consortium. "The whole idea, led by industry and supported by government, is to explore how we can form UK consortia overseas. If that works, that will be a whole new dynamic."

Of course, the elephant in the room is Brexit. RIA's stance with government is that there will be both challenges and opportunities for UK rail from Britain's exit from the EU, but that it is essential for rail to be part of future trade deals. Walker emphasises that this makes it all the more important for us to promote the success of the UK's rail industry.

The Rail Delivery Group's launch last month of a 'partnership railway' goes some way to doing this, promoting combined public and private investment that is said to secure almost £85 billion of economic benefits to the UK. Walker says there is a wealth of experience the privatised industry brings in equipping a cost-effective network here and creating the perfect opportunity to export that expertise.

A recent UK trade mission to Bangladesh took nine companies to Dhaka (above) to discuss how the UK can help the country to develop its railways. ALAMY.

Just as winning contracts in the UK is dependent upon businesses' commitment to upskilling the local workforce and helping to build a lasting legacy in the country, the same is true of more and more overseas contracts.

Says Walker: "We have a reputation of building the world's railways and of successfully working with partners around the world. We're very innovative with smart and intelligent regimes, such as asset management and condition monitoring."

"An SME or bigger company looking to get into exports should investigate what government support is there. The DIT has international trade advisers who are there to help companies take their first steps into exporting. They cover virtually every sector. Or join a RIA mission! There is a lot of support out there, but companies need to be proactive." ■

Working with government allows us to get high-level support from them.

Neil Walker, Exports Director, RIA

ORR on tour: A South African adventure

When the Railway Safety Regulator of South Africa (RSR) invited me and my colleagues from the Office of Rail and Road to take the 8,200-mile, 13-hour flight from London to Johannesburg to share our thinking on best practice in rail safety, we jumped at the chance.

Not only because we know that the Risk Management Maturity Model (RM3) has had a hugely beneficial impact on the safety of passengers and workers in Great Britain and we are very keen to share its positive effects around the world, but also because we expected, that as well as the opportunity to teach, the trip would provide learning we can use to improve our own practices.

The South African railway has had a troubled record in recent years. In 2015, 200 people were injured when two passenger trains collided in Johannesburg, and that disaster came on the heels of previous tragedies, including 25 people being killed when a coal train hit a truck carrying farm workers in 2012, and ten children dying in a crash between a commuter train and a minibus on a level crossing in 2010.

IAN PROSSER, HM Chief Inspector of Railways, reports on how he and two colleagues, Ben Shirley and Clare Povey (both HM Inspectors of Railways), recently took a visit to South Africa to share knowledge and learning on railway safety cultures

Further challenges faced by the publicly owned network include a decline in usage – from around 50 million journeys a month in 2008 to 34 million a month in 2016 - which means that there's very low activity on around 35% of the nation's 12,000 miles of track. To add to the problems, there's been an epidemic of cable theft, which affects day-to-day safety and makes journeys unpredictable for passengers.

Our visit followed a trip earlier this year when colleagues first introduced RM3. We were there to explain how we approach our work as a regulator and how we use RM3. We worked with RSR and PRASA (the Passenger Rail Agency of South Africa) by conducting joint inspections of the PRASA operations.

On the first day we visited the impressive new Gauteng Nerve Centre (GNC) which has been built to manage signalling across the country, but is not yet fully operational.

There we discussed the differences between our RM3-based Process Inspection, which takes a broad approach assessing the effectiveness of risk controls and observing for evidence, against Compliance Auditing (the current method of inspection by RSR) which takes a narrower approach focusing on whether or not the situation, as observed, is compliant with regulations or not.

Our hosts were very keen to learn all they could of our working practices and were very interested to hear how we incorporate concepts such as our vision for zero fatalities, striving for continuous improvement, devising frameworks for inspections and adjusting for the influence of human factors on our daily work.

But the learning was very much a two-way street, and we brought home some useful information. This included opportunities for improving our permissioning arrangements by adopting the South African model of agreements to operate and the fundamentals of railway operation. Pilotman-working is obsolete here, but in South Africa, where cable theft is a growing problem, they've had to adapt to changing situations; using a pilotman has been an unfortunate daily reality for seven years on one route.

It was a timely reminder that we need to remain alert to unusual situations that can arise, and it was also a useful 'stress test' for RM3 under a railway operation with a very different risk profile and challenges, which we are constantly looking to update and improve.

The second day featured a visit to Koedoespoort Station, where we looked more closely at change management and infrastructure. It was here that we got a real impression of the problems faced by the railway network in South Africa and why they are so keen to learn all they can from ORR



Left to right: Ian Prosser (ORR Chief Inspector), Herman Bruwer (RSR General Manager: Safety Management Systems), Clare Povey (ORR Inspector), Ben Shirley (ORR Inspector) and Denis Owaga (RSR General Manager: Systems Management & Projects). ORR.



1. Claire Povey and Ben Shirley give their feedback on findings at the end of an inspection on a platform upgrade project between Koedoespoort and Piensaarspoort stations, to PRASA operations staff and RSR inspectors.



2. A photo of the new train fleet in service. A fault on the new train stock has resulted in the doors opening on the wrong side of the train and exposing the adjacent tracks.



3. A photo of the old train fleet in service. Frequent misuse of the doors results in the doors not closing properly when in use.



4. Still in service, a train from the old fleet passes over an open level crossing. A door has failed in the open position as a result of misuse.



5. Taken at Piensaarspoort station, members of the public are able to access the tracks through damaged fencing and gaps in the boundaries.

6. The new Gauteng Nerve Centre (GNC). Recently opened, the GNC will eventually replace all eight Gauteng Centralised Traffic Control (CTC) Centres.

and RM3.

In just a few short hours we saw cleaners working on tracks with weak safety controls, members of the public wandering along the tracks, trains which operated even though the doors did not close properly due to misuse, and where those same doors opened on the wrong side - allowing passengers

onto the tracks.

On day three we inspected rolling stock maintenance at Wolmerton and Braamfontein depots. Here we witnessed more troubling practices, such as a member of staff risking life and limb by jumping over an inspection pit instead of taking a few seconds to walk around.

THE RISK MANAGEMENT MATURITY MODEL

The Risk Management Maturity Model, or RM3 as it is more commonly called, was launched in 2011.

It was created to explain to organisations what the ORR looks at when judging their ability to achieve excellence in health and safety management, and it was quickly adopted as the go-to guide across the industry.

It is a tool which identifies what people need to be doing to ensure that the railway runs safely and effectively, providing a checklist of 26 themes which range from having proper governance and leadership to taking measures to ensure that people are competent to do their jobs.

Railways are in the business of avoiding harm to customers, neighbours

and their own staff, and RM3 enables them to assess how they measure up against each of the themes - and change their practices where necessary.

It was quickly embedded in health and safety management in railways of all sizes and has even been adopted further afield. The Health & Safety Laboratory (HSL) recognised that it had greater potential and has started using RM3 as part of its training courses for people working in other industries.

Subsequently, HSL and ORR worked together to revamp RM3 with better illustrations and even simpler language, which makes it more accessible to a wider audience of health and safety professionals and managers across the economy.

This prompted a long discussion on leadership and the importance of embedding the principles of RM3 through every tier of the organisation.

Our host, Herman Bruwer, RSR General Manager Safety Management Systems, said after our visit:

"I wish to thank the ORR team for their professionalism in every intervention you made and in sharing your strategic thoughts, which will add tremendous value to the RSR's thrust in obtaining safety assurance in the railway industry."

"Your presentation to us and PRASA Rail will go a long way in assisting us both to ensure 'excellence' in railway operations."

However, the relationship between ourselves and RSR does not end there. We are currently discussing the possibility of a return visit, which would enable a South African Inspector to witness first-hand how we inspect the railway, and to offer insights on how we might improve our practices and return to South Africa as an 'RM3 Champion'.

ORR also continues to provide support to railway safety colleagues in Dubai, where an ORR representative recently helped with an RM3-based audit of its metro operation. The costs of these engagements are met by our partners and they offer valuable opportunities for ORR inspectors to develop their professional expertise. ■

FROM CONCEPT TO COMPLETION

In the UK, Egis is known for being a heavyweight in railway design and construction. And PAUL STEPHEN finds out that the firm has a lot more to offer the rail industry

Egis is perhaps best known to RAIL readers for its role as a major design and engineering consultancy on a number of high-profile light rail (LRT) projects.

That is because, in the UK and Ireland, it is in this sector where it has secured some of its largest rail contracts to date, including Birmingham's light rail system extension within the Midland Metro Alliance.

In Dublin, Egis completed the engineering, procurement and construction management (EPCM) between 1994-2004 for the first two lines of the Luas, comprising 25km of track and 36 stations. It also produced the Invitation to Tender and provided additional support for the procurement of 32 tram sets.

Meanwhile, in the UK, it conducted in 2002 technical and environmental impact studies related to the Edinburgh tram project, and in the West Midlands it is the lead design partner of the Midland Metro Alliance that is delivering six LRT extensions since 2016.

But having already established a sound reputation as a leading project partner in Light Rail, Egis is now embarking on a new strategy in the UK to bring its much wider global capabilities to bear in all forms of rail, including support for all stages of project delivery from conception to commissioning.

With a company motto of 'creative for the long term', the rail division of Egis is part of an international group that offers engineering, project structuring and

operations services in a wide range of sectors including transport, water and energy. With more than 14,000 employees around the world, it recorded a turnover of more than one billion euros in 2016.

75% owned by one of France's largest financial institutions Caisse des Dépôts, Egis also has a strong track record in Project Structuring and turnkey solutions in road and aviation infrastructures. Egis is also developing road mobility and Asset Management Solutions. These successful experiences could potentially be applied in UK heavy rail as Network Rail commits itself for renewals and enhancements in Control Period 6, which should imply better focus on final client's satisfaction and, as a consequence, new business schemes to be set.

The rail division of Egis has more than 1,500 employees and a turnover in excess of 200 million euros, having worked on more than 12,000km of conventional and high-speed rail lines and 800km of light rail systems across the world. It now aims to become one of the global top five rail engineering providers.

"The rail division of Egis is part of a much bigger group which has been involved in some very significant engineering projects in the UK and Ireland," explains Illy Toiber, UK business development director at Egis.

"These include the new nuclear power station being built at Hinckley Point, the M25 concession and our aviation consultancy - Helios, while we are also



Egis provided preliminary studies and final designs for the first two lines of Dublin's LRT system, produced the ITT for rolling stock and supported its procurement. SOPHIE PERRILLAT CHARLAZ.

Ireland's largest motorway and tunnel infrastructure operator and maintenance provider.

"We also have some important rail contracts, such as the Midland Metro Alliance, but we see lots more growth potential in UK and Irish rail. As the largest French engineering firm with the largest French bank as a key stakeholder, we don't want to be seen as too niche because we have a much wider offer.

"Much of the business we've done so far in UK rail is providing engineering services to infrastructure owners, but we can also be involved through many other schemes including turnkey solutions."

"Having worked across the world and in the UK alongside some of the largest rail contractors and engineering firms we are known to be good project partners, but we aren't so well-known to the end clients as a total solutions provider, which is something we want to change."

International Commercial Manager Scott Kunitani adds: "We're not a conventional engineering company as we have been specifically created to deliver transport schemes including through public-private partnerships. Our ability to bring systems integration and part of turnkey solutions could also be very relevant, given Network Rail's new approach for CP6.

"Under the forthcoming CP6 framework we intend to bid for work, using our know-how from across the globe."

As part of Egis's strategy for the UK rail market, the company is seeking to expand on its design and consultancy credentials to reposition itself as a fully integrated provider of engineering and project management services.

This includes the installation of systems



Egis is a member of the Midland Metro Alliance that will deliver four extensions to the light rail system worth some £1.2 billion by 2026. WMCA.

and equipment for high-speed lines, from initial design through to handover and commissioning, as will be needed for Phase 1 of High Speed 2 once main construction work begins between London and Birmingham next year.

Egis's expertise in this field has been demonstrated in Morocco, where the company is part of a consortium constructing Africa's first high-speed line between Tangiers and Kenitra and is supervising civil engineering, track and catenary work, and the construction of depots.

Elsewhere in the world, Egis has an impressive amount of experience providing design, infrastructure, systems, testing and project management services on high-speed lines in a wide range of countries, including China, Thailand, Spain, Saudi Arabia and in its native France, on which it worked on several of France's high speed lines including South Europe Atlantic, Rhine-Rhone, East European, Bretagne-Pays de la Loire, South West and Nîmes Montpellier.

It has also fulfilled design and build contracts on a range of LRT projects,



“ We're not a conventional engineering company as we have been specifically created to deliver transport schemes including through public-private partnerships. ”

Scott Kunitani, International Commercial Manager, Egis

including a 1.7km extension to Lyon's Line B that opened in 2013, and a 13km driverless metro line under construction in Rennes, which is scheduled to open in 2019.

It is also currently engaged in engineering, procurement and construction management (EPCM) on six lines of the Grand Paris Express Metro project to expand the French capital's public transport system.

Egis hopes that this will make it a strong contender for forthcoming LRT tenders in the UK and Ireland, including extensions to existing systems Edinburgh, and also the Dublin Metro North project, plus design and

build contracts for HS2.

Egis is also committed to making the industry more sustainable by supporting the pipeline of future talent in the industry, and by working hard to overcome one of the principal barriers to the wider deployment of LRT and high-speed rail: the cost.

Illy Toiber says: "We are actively supporting the new National College for High Speed Rail by providing lecturers with hands-on experience of various aspects of high speed rail. We also believe that through innovation we can deliver great cost savings." ■



“ We are actively supporting the new National College for High Speed Rail by providing lecturers with hands-on experience of various aspects of high speed rail. ”

Illy Toiber, UK Business Development Director, Egis

LEADING LIGHT

SYSTRA is one of the world's leading multi-disciplinary engineering consultancies for rail and urban transport, as demonstrated by its impressively large and varied worldwide portfolio of projects.

Specialising in all forms of rail, including metro, high-speed, conventional and light rail, *RAIL* readers needn't look too far to see how the company is helping to provide high-quality and cost-effective transport systems in the UK, as well as abroad.

In one of its largest UK contracts, at Crossrail, SYSTRA forms part of the Project Delivery Partnership that is responsible for managing and integrating project delivery.

But where SYSTRA is hoping to make

With big ambitions in the UK, SYSTRA is a global leader with a difference when it comes to rail, says Deputy CTO and Technical Production Director HENRI VERGNAUX

more of an impact in the UK is in metro and light rail, given that it is involved in almost 50% of metro lines currently in development across the globe, and 60% of worldwide automated (driverless) metro projects.

This includes project manager roles as

part of consortia for Dubai metro's 2020 World Expo extension and Riyadh, one of the world's biggest metro projects, where it is also supervising construction on three of the network's six automated lines.

"Our ambitions for the UK are based on our worldwide experience, as we are heavily involved in so many high-profile projects," says SYSTRA's Deputy CTO and Technical Production Director Henri Vergnaux. "This includes our major role providing project management assistance for systems and infrastructure on the Grand Paris Express, which is one of the biggest automated metro projects in the world.

"We are also involved in many 'brownfield' metro projects, where we switch from an existing conventional system and rolling stock to a new automated system. We can manage and implement this migration and the refurbishment of rolling stock to enable automation, as we have done in Santiago (Chile) and in Paris, for example."

In addition to demonstrating SYSTRA's deep knowledge and understanding of high-speed, conventional and light rail systems across the world, the Group's global portfolio also showcases another of its key differentiating factors.

That is its flexibility to work equally effectively either as part of the client organisation on projects or in support of individual contractors, while continuously delivering projects on time and on budget.

SYSTRA's strong focus on optimising its designs from a maintenance and operational perspective is another unique selling point, helping the client or contractor to reduce operational (OPEX) and capital (CAPEX) expenditure.

Vergnaux adds: "SYSTRA is able to deal with all technical skills necessary to design and build metro, conventional or high-speed lines from design to civil works right up to systems such as power supply and track work - we have it all in-house.

"When a client or a contractor asks us to provide any of these services we can provide each of these aspects fully, while our capacity to deliver on time and on budget is part of our DNA.



More than 450km of SYSTRA-developed U-shaped viaduct has been designed and built since 1992. The world's longest metro line in Shanghai includes 45km of a highly cost-efficient, time-saving construction solution, as pictured here. P. WACK/CAPA/SYSTRA.

"In addition, due to the make-up of our shareholders (which include French national operator SNCF) we are able to optimise the total cost of ownership (construction, operation and maintenance)."

As lead design project partner of the COSEA consortium, SYSTRA played a major role in the South Europe Atlantic (SEA) high speed line that opened in July. It is also a tier one member of the MESEA consortium, which is responsible for the line's maintenance for the next 44 years.

SYSTRA helped reduce maintenance costs for the 7.5 billion euros (£6.7bn) line using specialist techniques, such as designing 250 overbridges that have no bearings on the piers next to the high-speed line. Using safe design principles to reduce hazards in construction, each of these were built off-site using precast concrete, which also reduced CAPEX and speeded up construction.

The seven major viaducts on the 303km route were designed by SYSTRA and built using approximately 400 standardised post-tensioned concrete box sections, enabling each bridge deck to be built in just two months.

"Providing a design that includes optimisation of maintenance and operations is an important advantage to a

client or a contractor which cannot be said for all of our competitors," says Vergnaux. "We succeeded in honouring all of the deadlines for Tours-Bordeaux, having been given a contract date to open the line in July 2017 more than four years previously. It was opened on deadline and on budget because we were able to propose optimal design with technically efficient solutions to save cost and time."

SYSTRA has produced all the designs for one of the world's largest maritime causeways in support of a third party. The 36km causeway is currently under construction in Kuwait. The project demonstrates SYSTRA's ability to support contractors when they bid for high-value tenders as part of their design proposals.

Elsewhere in the world, another example of SYSTRA deploying an innovative concept to save clients and contractors time and money is its U-shaped viaduct, which SYSTRA has developed as a quick and

The 302km South Europe Atlantic (SEA) high-speed line was opened in July between Tours and Bordeaux. SYSTRA was involved in all phases of its design and construction and continues to provide maintenance services, demonstrating its wide range of expertise. PASCAL LE DOARE/SYSTRA.

cost-effective solution for the construction of metro viaducts.

More than 400km of U-shaped viaduct has been constructed on light rail and metro projects across the world, including Kuala Lumpur and Shanghai, while the patented structural design also formed a key element of SYSTRA's successful bid to design a new metro system in Bogota, Colombia, where a more expensive underground alternative had been considered.

Vergnaux concludes: "Whether for the end client or a contractor, what makes us different is our ability to adapt. In Bogota, the client accepted our design solution and

we are now leading the preliminary design, while in Kuwait we have enabled the contractor to have a cheaper price and secure a multi-billion-dollar contract. We have enabled the contractor to optimise quantities thanks to smart design." ■



“Our capacity to deliver on time and on budget is part of our DNA.”

Henri Vergnaux, Deputy CTO and Technical Production Director, SYSTRA

Metro masterpieces

Stations are far more than simply a portal to another place - they also hold a cultural significance. They're the central hubs of their surrounding communities and they're often the first and last place on the railway that a passenger experiences. And stations which are easy on the eye seem to fulfil this role more than others.

Some of the most impressive examples are London's Underground stations, with their individual characters created by bespoke tiles, vintage styling and colour schemes. More recently, they have also been adorned with contemporary art projects, as part of London's Art on the Underground initiative, launched in 2000 to promote greater understanding of the Tube as a cultural and social environment. You may remember

Alby station on the red line was opened in 1975. Designed to be a hidden green oasis, artist Olle Angkvist decorated the cave station with moss green flowers, mazes and symbols. Angkvist included some unexpected figures in his work that were not in his original plans, sticking their tongues out at adverts and posters.



In the UK, the role of the station at the centre of the community is growing in importance. **STEFANIE FOSTER** reports on how Stockholm's metro stations have been embracing this vision for decades

the Labyrinth project to create artwork for all 270 stations on the network in the form of a maze for LU's 150th anniversary in 2013. But while London may have the oldest underground railway network in the world, it was by no means the first when it comes to artistic additions.

The Stockholm metro (known in Swedish as tunnelbana) is claimed to be one of the most beautiful underground systems in the world, helped by the fact that it is also the world's longest art gallery, with sculptures, rock formations, paintings and mosaics filling the stations.

The 68-mile metro network in Sweden's capital city has one hundred metro stations, 90 of which are home to public art displays, featuring the works of more than 100 artists.

This year, the Metro is celebrating its 60th

anniversary, the first line having opened in 1950. At that time, the metro system was like any other, but soon two artists decided to give the railway its own unique identity.

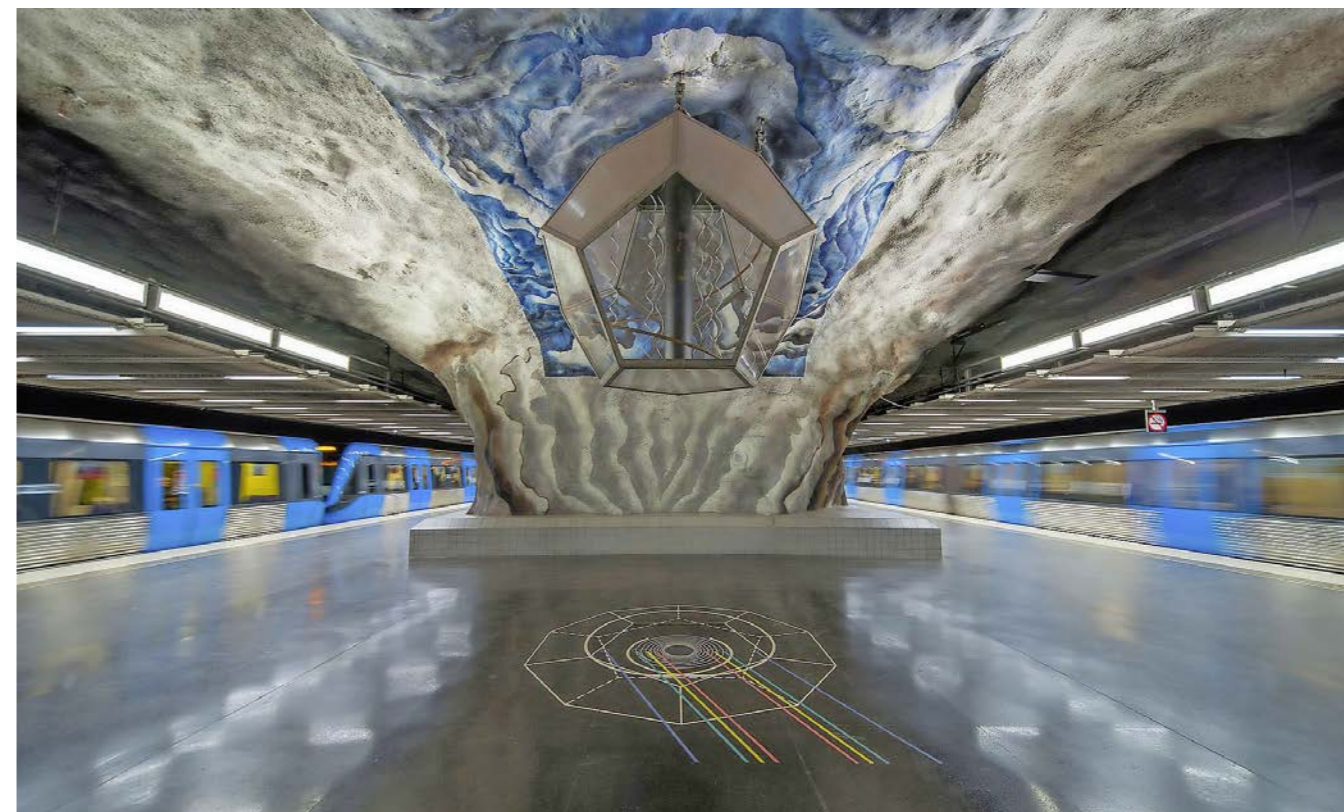
Siri Derkert and Vera Nilsson began a political debate following research in Paris suggesting that the average Parisian would spend a total of four years travelling on the Metro. The pair believed that by installing art, the railway would have a more positive impact on passengers' everyday lives. They referred to a statement made by Swedish playwright August Strindberg in the 19th century, that "art cannot continue to be exclusive to just some people, because then it won't be long-lived". Strindberg felt that art should not be confined to galleries, but shared with everyone.

To bring that vision to life, a competition >



Above: Opened in 1957, T-Centralen is a station at the heart of Stockholm's metro. It's the only station on the network where all three lines (red, blue and green) meet. Seventeen artists have created pieces at the station. The most famous is Per-Olov Ultvedt's work on the blue line depicting blue vines, flowers and silhouettes of workers, which cover the walls and ceiling. The silhouettes were designed as a tribute to the workers who built T-Centralen station.

Below: Tekniska Hogskolan on Stockholm's red line was opened in 1973, named for the Royal Institute of Technology, which is situated nearby. Artist Lennart Mork decorated the station that same year with paintings, technical drawings and mural sculptures conveying themes such as the four classical elements, the universe and advancements in technology.





“ The art chosen is not just about brightening people’s days but also raising important societal issues. ”

► was held in 1956 to find artists to decorate the city’s metro stations. Twenty-one artists were chosen. By the 1970s, a committee (known as Trafikens Konstnämnd) was set up to manage and select art for the stations, and still does so today.

The art chosen is not just about brightening people’s days but also raises important societal issues, such as women’s rights, inclusivity and deforestation, which was once a significant problem in Sweden.

Operator Storstockholms Lokaltrafik believes that the art helps to make the network safer by reducing crime and vandalism, and that it is easier to navigate because each station has its own unique identity, helping passengers to recognise where they are on the network.

Many other cities around the world, including New York and Moscow, have decorated their underground stations in similar ways. There is clear recognition across the globe that art has a place in our subterranean spaces.

With the increasing emphasis in the UK on developing railway stations into true hubs at the hearts of their communities, perhaps a little artistic inspiration from around the world can provide some new ideas back home. ■



To see more photographs of Stockholm’s beautiful metro stations, visit www.railmagazine.com and take a look in the Galleries section.

Kungsträdgården (Swedish for King’s Garden) on the blue line opened in 1977. It was decorated by Ulrik Samuelson in collaboration with a number of engineers and architects. Together they transformed the station into an underground garden with prominent green colours to symbolise nature, red to represent gravel and white for marble statues. Samuelson’s intention was to tell the history of the local area.