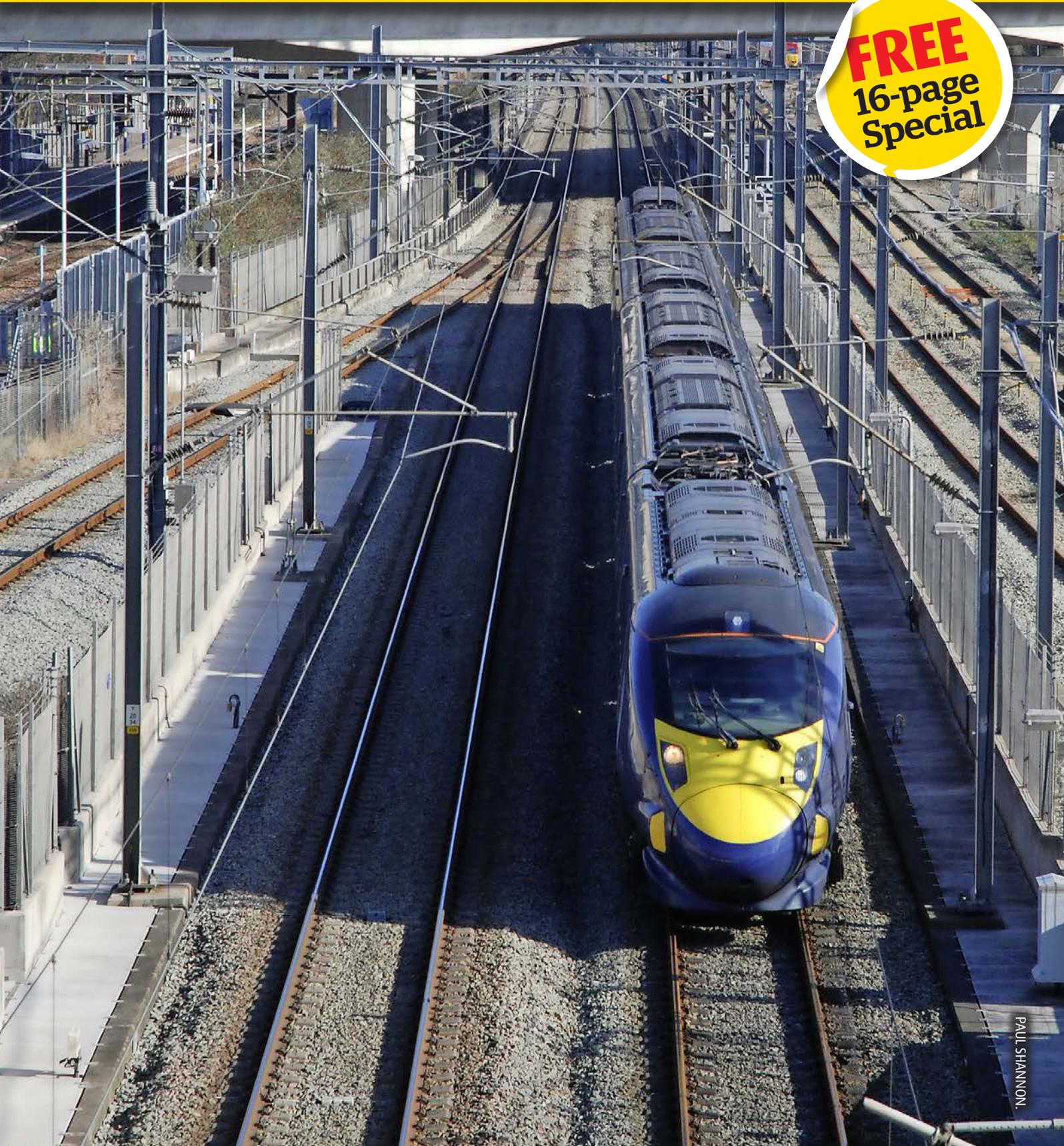


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HIGH SPEED

Siemens' Velaro Novo ■ Private finance for HS2? ■ Cost-efficient solutions
Hitachi and Bombardier join forces ■ Securing HS2's skills legacy

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Welcome

2018 is already shaping up to be another big year for the UK's £55.7 billion High Speed 2 project as the process of moving from design to construction phases continues apace.

Enabling and preparatory works are well under way, while more than 2,300 contractors have already been recruited for what will become Europe's largest infrastructure project.

The main construction is due to commence at various locations along the route of HS2 Phase 1 from London to the West Midlands later this year. It will be overseen by HS2 Ltd's new chairman Sir Terry Morgan, who joined from the £15bn Crossrail project to take over from Sir David Higgins on August 1.

Working alongside Morgan is HS2 Ltd's Chief Executive Officer Mark Thurston, who features in this 16-page supplement by outlining how the organisation intends to secure a lasting skills legacy in the UK beyond the completion of HS2 Phase 2 in 2033.

HS2 is due to directly employ more than 20,000 people each year during construction, which Thurston says will require a sustained effort from the entire supply chain to overcome the current skills shortages and structural problems surrounding diversity.

Once construction begins, attention will increasingly turn to who will design, build and maintain a new fleet of at least 54 classic-compatible high-speed trains for HS2 Phase 1. Talgo, CAF, Siemens and Alstom have

all been shortlisted, as has a joint bid from Hitachi and Bombardier. With a contract award expected by the end of 2019, Hitachi and Bombardier tell *RAIL* why a combined bid could be attractive to HS2 Ltd in fulfilling its strategic aims, while fellow bidder Siemens unveils its latest high-speed train concept – the Velaro Novo – which has cost and energy efficiency at the heart of its design.

Elsewhere, SYSTRA's Julie Carrier and Dominique Roux explain how high-speed infrastructure can be designed to lock in long-term operational savings and safety benefits, while Taylor Woodrow demonstrates how its parent company VINCI has helped finance Europe's largest high-speed rail project to date, to link the French cities of Tours and Bordeaux.

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TIM SQUIRES.

BUILDING A BULLET TRAIN FOR BRITAIN

Two giant rail firms working together on the next generation of Britain's trains, and on hallowed railway ground? It's certainly compelling, but the proposal from Hitachi and Bombardier is based on much more than nostalgia



More than 50 years since the introduction of the famous Shinkansen bullet train in Japan, Hitachi has begun the development of its AT400 Very High Speed train concept for the European rail networks. The company will now work with Bombardier on a joint bid to design and build an even newer generation of trains for HS2. HITACHI.

The race to select who will design, build and maintain a new £2.75 billion fleet of at least 54 high-speed trains for HS2 took an added twist on July 4 when two of the world's largest train builders confirmed they would team up to submit a single bid.

Hitachi and Bombardier will now enter the competition as a joint venture when the formal tendering process begins later this year, with a contract award expected in March 2020.

The trains will run at speeds of up to 225mph on Phase 1 of the £55.7bn HS2 project between London and Birmingham when it opens in 2026, but also serve

destinations further afield on existing lines including York, Liverpool, Glasgow and Edinburgh.

The announcement follows a similar partnership in Italy, where the companies

jointly built 50 ETR 1000 train sets for Trenitalia between 2013-2017, which are known as Red Arrows (Frecciarossa), owing to their top speed of 247mph.

The success of the project demonstrates

that when working in unison, Bombardier and Hitachi form a tried and tested high-speed team. Meanwhile, both companies are also able to call on their own considerable experience and strong reputations for individually delivering innovative rolling stock solutions in both the UK and international markets.

For Hitachi, this includes Japan's famous Shinkansen family of bullet trains which was first introduced in 1964, and can run at speeds of up to 198mph.

Hitachi is also responsible for delivering Britain's only domestic high-speed fleet which it built and introduced ahead of the 2012 Olympic Games in London.



“There are a lot of new things in HS2, and between the two of us, we believe there is a far greater capacity for working with them to deliver the best product possible.”

Barrie Cottam, HS2 Bid Director, Hitachi Rail

Twenty-nine six-car dual-voltage Class 395 Javelins are currently operated by Southeastern at speeds of up to 140mph on HS1 before running onto the conventional network to serve a variety of destinations in Kent, while being maintained by Hitachi at its purpose-built depot in Ashford.

Hitachi's A-train concept used in Japan formed the basis of the design for the '395', representing the first application of Japanese bullet train technology in the UK.

Hitachi's UK footprint increased further in 2015 when it commenced train building at an all-new £82 million rolling stock assembly plant in Newton Aycliffe.

More than 1,000 people are currently employed at the site to fulfil a sizeable order book, including the Intercity Express Programme trains that will enter service to replace High Speed Train (HST) and Class 91/Mk 4 sets on both the East Coast and Great Western main lines, and be maintained by Hitachi.

In total, the company will have 281 trains in service and expects to employ more than 2,000 people across 15 sites in the UK by 2020.

Barrie Cottam, Hitachi Rail's HS2 Bid Director, says: "The most famous project that Hitachi Rail has been involved in is the world-renowned Shinkansen, while we also acquired Ansaldo Breda in 2015 and their family of Italian high-speed trains. The latest generation of those is the ETR 1000, which we delivered in partnership with Bombardier.

"Closer to home, the Class 395 is still the fastest domestic train in the UK and highly relevant to HS2 as the only classic-compatible high speed train currently in service in this country. It has revolutionised commuting on that part of the Southeastern network by

running equally well on HS1 at 140mph as it does on classic commuter routes in deepest Kent at 75mph using the third rail.

"It is also another example of how we've brought a lot of people and new processes into the UK rail industry through its cutting-edge design, and our new depot at Ashford which has achieved a reliability of more than 99%. That new way of managing maintenance is now being developed even further for IEP."

He adds: "When I joined Hitachi four years ago, Newton Aycliffe was just a greenfield site. It now employs more than 1,000 people and produces 30 cars a month, so we're very proud of how we've recruited and developed the workforce and look forward to what it can do in the future."

Meanwhile, Bombardier's UK presence is founded on 175 years of continuous rolling stock manufacturing in Derby, where its Litchurch Lane facility has been responsible for designing, developing, manufacturing and testing over 60% of the UK's existing train fleet.

Almost 2,000 people are based at the plant including 450 specialist engineers, making it a globally recognised centre for vehicle design located at the heart of the largest cluster of rail businesses anywhere in the world.

Litchurch Lane is one of 18 Bombardier sites in the UK, and has delivered some of the country's largest rolling stock orders ever placed. This includes 1,403 cars for London Underground's sub-surface line fleet, which form the 192 S-Stock units that are now in service on the Circle, District, Metropolitan and Hammersmith & City lines.

The facility is now busily fulfilling Bombardier's multibillion-pound order book, which includes a total of 2,660 cars from



A Southeastern Class 395 arrives at Stratford International on February 2 2017. Built by Hitachi, the trains form part of the UK's only fleet of classic-compatible trains. HITACHI.



50 ETR 1000 train sets were built by a Hitachi and Bombardier joint venture for Trenitalia between 2013-17. Although Italian infrastructure restricts them to running at 190mph, they are designed to run at 250mph, 25mph higher than the top speed proposed for HS2. HITACHI.



its Aventura platform. These are due to enter service with operators including South Western Railway (750 cars), Greater Anglia (665), West Midlands Trains (333), London Overground (222) and c2c (60), plus London's Elizabeth Line (630).

Further afield, Bombardier's international high-speed family of trains is called the Zefiro, which is currently operating in China at speeds of 155-236mph. The company has also extensively collaborated with other manufacturers to help build Germany's high-speed Intercity Express (ICE) train sets, AVE Class 102 and RENFE Class 130s in Spain and the Acela Express in the USA. It has also provided components for TGV, Duplex, Eurostar and Thalys units in operation throughout Europe.

Bid Director Robert Davies explains: "Until now, Litchurch Lane has predominantly been a conventional main line and metro production site due to the lower speeds of UK operation, and we have other product centres elsewhere in Europe. Our high-speed train product centre has been housed in Germany in terms of knowledge, but Derby has the

engineering expertise that could integrate that technology into UK infrastructure.

"We have our range of high-speed trains in operation in China, while across the world we're primarily known as an enabler for high-performance, high-speed trains by providing key pieces of technology such as bogie and power systems - particularly in Europe."

So why have the two companies decided to join forces for HS2? Both Bombardier and Hitachi had already been shortlisted for the HS2 contract with individual bids, but Davies feels there were clear strengths in combining the bids to complement each other's technical abilities.

He also believes that adopting the partnership approach will help amplify the



“It meant asking if the result of a joint venture would be greater than the sum of its parts. The answer was a definite ‘yes’.”

Robert Davies, Bid Director - High Speed Trains, Bombardier

bid's support for HS2's strategic goals to boost economic development, create employment and to leave a lasting skills legacy in the UK.

"We entered the process and pre-qualified separately, but competition law meant we couldn't engage much until recently. There was a high-level commercial discussion and then due diligence, and for us it meant asking if the result of a joint venture would be greater than the sum of its parts. The answer was a definite 'yes', because each of us brings different strengths.

"We want to be seen as the best in class, and this partnership means the overall train design should be even better. Hitachi implementing Javelins on all-new high-speed track on HS1 is similar to what we're currently doing with the Aventras in the newly constructed Crossrail tunnels [due to open in December], and you won't find that type of pedigree with other competitors. That makes another compelling reason for us to come together.

"It also means that at a stroke we effectively double the effect we could have on the UK economy, and by doubling our footprint we could start a long way ahead of our competitors.

"We can already point to four years in Newton Aycliffe and 175 years in Derby in terms of our economic contribution, and the security it would bring to our established supply chains, in addition to that great product combination."

Cottam agrees that it made good sense to

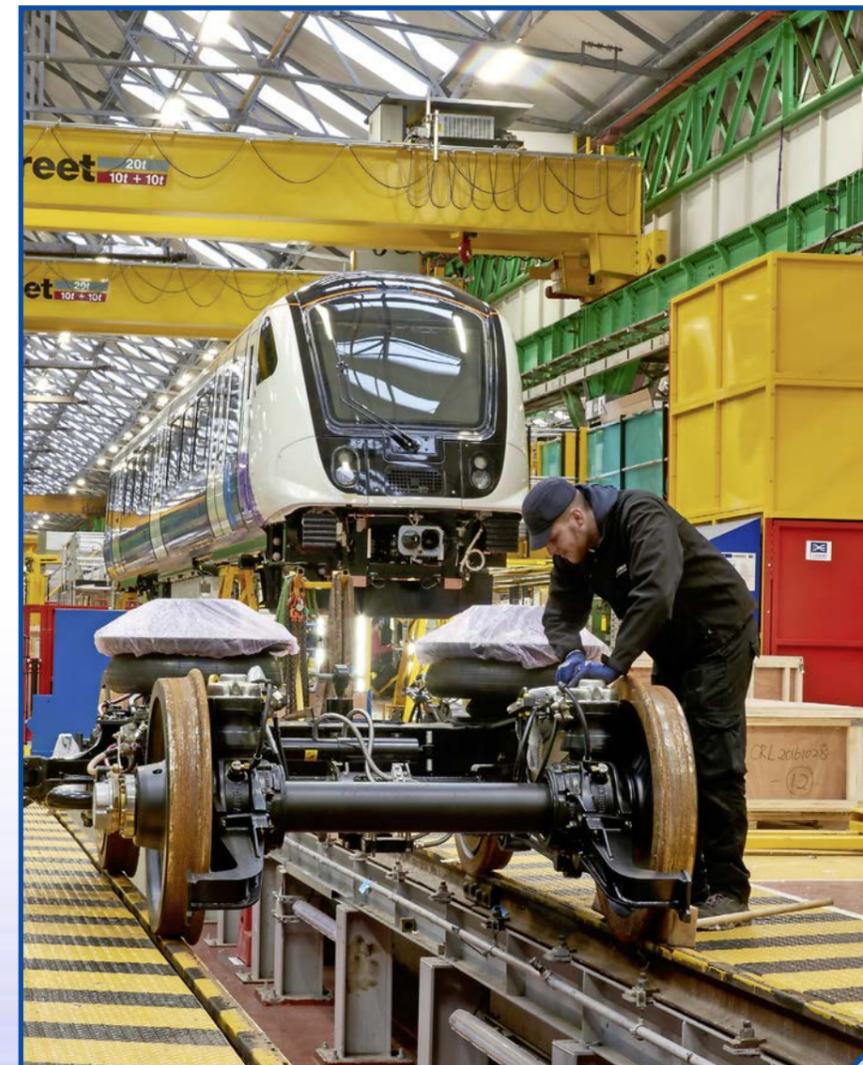
form a joint venture in order to - potentially - create a combined workforce on this project of almost 5,000 people in the UK to manufacture rail vehicles. If successful, he feels the bid would also mean substantially lower risk to the delivery of the contract by securing twice the amount of expertise, in addition to providing more added value to the UK economy as a whole.

He adds: "The high-speed specification for HS2 is, not surprisingly, very demanding. And it becomes more challenging when you add in aspirations for environmental protection, industry design standards, passenger experience standards and utilisation. We've effectively doubled our capacity to meet the demanding timetable for the design and development phase.

"We also have established production techniques that safeguard the process, and that means we'd have much lower risk to the fulfilment of those orders than if we did things on our own, or if it was a different company acting alone. There are a lot of new things in HS2, and between the two of us,



Train building has been undertaken in Derby for more than 175 years. The site is currently fulfilling a total Aventura order book for 2,660 cars. BOMBARDIER.



Bombardier and Hitachi say that its joint venture provides an opportunity to strengthen its partnerships with local schools, and build on the 200 apprentices and graduates they currently employ. BOMBARDIER.

we believe there is a far greater capacity for working with them to deliver the best product possible, while enjoying unrivalled reliability.

"The size of our UK footprints also means that any investment in HS2 trains is spread over a wider area and therefore the benefits will be much greater in terms of skills development, training and the recruitment of graduates and apprentices."

Teams from Bombardier and Hitachi have already met to discuss how to capitalise on the experiences of joint-working in Italy, and ways to most effectively work together as part of the HS2 bid.

The companies will share HS2 bidding information, but strict competition law means that they will remain competitors in other markets.

"HS2 will be a joint effort and not one leading the other," says Davies. "It will be an integrated team formed of staff from both companies putting together the design and manufacturing package.

"We have to comply with a tight legal framework. Anyone involved in this bid is effectively behind a firewall, and all information and tools must have no connection with our other day-to-day activities. For example, if I receive a technical drawing on my computer, it cannot be accessible to anyone outside my team - everything stays behind that firewall."

Cottam adds: "We've bid together before and will put that experience to good use. We remain competitors on every other project, but collaboration between companies is becoming more of a fact in our industry worldwide. We have experience of working in this way together, so it's relatively easy for us to work as part of a joint venture.

"HS2 has been very clear that it wants a train that is a credit to Britain and embodies the best of its culture, and together we are determined to do just that." ■

VELARO NOVO FOCUSES ON EFFICIENCY

Siemens Program Director MICHAEL KOPP introduces the company's latest high-speed train concept



An artist's impression of the Velaro Novo, which uses 30% less energy than previous Velaro models, translating to an average carbon dioxide emissions reduction of 1,375 tonnes a year. SIEMENS.

welding is better known in the aerospace industry, but this is the first time it's been used for long welds like this, of up to 25m.

"We're also testing acoustics and the aerodynamics of the roof units in the test car which can be either locomotive-hauled for speeds of up to 200kph (125mph), or placed within the ICE S train for even faster running.

"Testing is going well and everything is currently in line with our simulations and what we expected to happen, but now we have real world measurements."

After premiering the new concept at InnoTrans later this year, Kopp expects the first Velaro Novo trains to be ready to enter in service in 2023.

The flexibility of its design means the high-speed platform is suitable for deployment anywhere in the world including - potentially - here in the UK.

He concludes: "It is a flexible concept that can be adapted to suit a range of operating speeds. To achieve the maximum speed of 360kph we simply increase the number of traction units. We think this will be a major advantage to operators - we don't have to change the types of components on the train, just the number of components - which in turn makes maintenance far more manageable.

"I am very proud of the train because we have managed to realise our target of having the most economical high-speed train on the market right now. The market has changed quite a lot in the last 20 years, but with the Velaro Novo we are able to offer operators a proven technology, but with significantly reduced whole lifecycle costs.

"We will be able to place the first trains in service in 2023, and I can promise you that the ten years [since development began in 2013] will be well worth the wait for the latest chapter in the Velaro success story." ■

Siemens is preparing to launch its newest high-speed train, the Velaro Novo, at the InnoTrans 2018 international rail show in Berlin in September.

With a top speed of 360kph (225mph), Siemens claims it uses 30% less energy while at the same time providing 10% more available space than previous Velaro models.

Meanwhile, it will also be 15% lighter and cost 30% less to maintain, thereby offering potential operators optimised capacity, energy consumption and maintenance costs without any compromise in passenger comfort.

Four generations of Siemens' iconic Velaro trains have been in service across Europe, Russia, China and Turkey since 2000, with the global fleet currently covering more than one million kilometres per day.

In Germany it is known as the ICE 3 and is operated by Deutsche Bahn, while in the UK the Velaro is branded as the e320 and is in operation with Eurostar, providing services from London St Pancras International to destinations in France, Belgium and the Netherlands via the Channel Tunnel.

Development for the Velaro Novo concept began in 2013, with much research focus placed on cutting maintenance and fuel costs,

which represent up to 50% of a train's whole-life costs.

Program Director Michael Kopp explains: "We started five years ago by analysing the market and what we see as the future operational requirements for high-speed services. Those five years have been time well spent achieving much-improved energy efficiency and a more lightweight construction.

"We have more than 1,000 Velaros in operation around the world today, from running on broad gauge in Russia at temperatures of -40°C to Spain, where temperatures can be as high as plus 40°. We were therefore able to call on all that experience to develop a truly international offering that can be fully adapted for various operational and infrastructure requirements

across the world."

According to Kopp, much of the 30% reduction in energy consumption has been achieved from improved aerodynamics, for example keeping the train's pantograph shrouded when lowered and placing side skirts and underside panels around its bogies.

The Velaro Novo has also been made 15% lighter thanks to thinner car body walls that are built by joining components with friction stir welding.

Maintenance costs have been lowered through the use of remote monitoring technology, while the design of the car bodies has also been based on what Kopp calls the 'empty tube concept', meaning that all electrical equipment cabinets have been removed from the interior of the train.



"We don't have to change the types of components on the train, just the number of components - which in turn makes maintenance far more manageable."

Michael Kopp, Program Director, Siemens

This has yielded a 10% increase in available interior space, enabling operators to provide improved levels of comfort to passengers.

He adds: "Many operators previously just looked at the capital cost of trains, but we have shown that large gains can also be made in whole lifecycle costs. Energy consumption is an increasingly important issue, especially when we talk about environmental impact.

"We have therefore tried to make the train as aerodynamic as possible, and moved technical equipment and electrical cabinets from inside the cars into the roof space of end walls instead.

"Vehicle length is 28.75 metres, so a seven-car Velaro Novo is 202 metres long and 11mm wider inside compared with previous Velaros, helping operators to offer wider seats or aisles and interiors that can be fully customised according to customers' wishes."

Siemens is currently assessing individual components of its Velaro Novo concept with a test car, that has been placed within the formation of a Deutsche Bahn-operated ICE S Train in Germany.

Tests started in April at speeds of up to 331kph (206mph) and will continue until the end of the year, concentrating on structural dynamics, running behaviour and brake tests.

Starting in 2019, the test car will run with the ICE S during regular infrastructure tests for further mileage accumulation.

"We have built the first car to test running behaviour and structural dynamics as we use such thin aluminium profiles and a different type of welding," says Kopp. "Friction stir



Siemens has been testing elements of the Velaro Novo design since April in its Novo test car that is currently incorporated into a DB-operated ICE S train on the German network. SIEMENS.

SYSTRA FAVOURS THE LONG GAME

SYSTRA prides itself on its unique future-proofed approach to the design of high-speed railways and the systems needed to operate them.

By considering whole lifecycle costs as a matter of course during each stage of design development, the company has carved itself a strong reputation for identifying innovative design interventions to new infrastructure that significantly reduces its ongoing operational and maintenance costs.

This has been demonstrated in a host of flagship international high-speed projects, as clients increasingly take longer term views of both capital (CAPEX) and operational (OPEX) expenditure in favour of a sharper focus on the total cost of ownership (TCO).

For SYSTRA this has required not only a commitment to achieving and maintaining technical excellence but also robust planning for all lifecycle phases, so that a careful balance can be struck between a potential short-term rise in CAPEX that might be required to yield much larger and longer term reductions in OPEX.

SYSTRA's Director, Railway Systems, Dominique Roux explains: "We approach and handle every project with this in mind between future operations and initial design. The trade-off is an interesting one and it hasn't always been done right in the past, particularly considering how railways have been procured.

"It might be that adjusting the design and increasing asset reliability, for example, adds cost in the construction phase but reduces the cost of long-term maintenance. It can be difficult to persuade clients sometimes that it's the right thing to do, but we think that reducing OPEX doesn't always have to cost much more in CAPEX, and we will always suggest the optimum trade-off."

To successfully strike this balance, SYSTRA is able to not only call on its own experience in designing some 4,000 miles of high-speed railways in the last 30 years, but also the considerable operations and maintenance

The railway can make huge operational savings by paying a little more up-front for cost-optimised solutions, say **JULIE CARRIER** and **DOMINIQUE ROUX** of SYSTRA

(O&M) expertise of its shareholder SNCF.

As France's national railway company, SNCF manages a network of some 20,000 miles - including 1,650 miles of high-speed lines - and operates 14,000 trains a day.

According to Roux, this advantage also makes SYSTRA best placed to understand that the benefits of taking a longer term approach are not just financial.

This is because increasing asset availability and moving to a more predictive maintenance regime has been proven to lead to less disruptive maintenance which will, in turn, bring safety benefits to clients during construction and O&M and an improved passenger experience.

He adds: "Some benefits are less quantifiable, such as the increased punctuality plus passenger comfort and satisfaction that comes from having greater asset availability. O&M that requires fewer possessions to be taken will mean reducing the need to run rail-replacement bus services, for example.

"Safety is also increased through remote monitoring and predictive maintenance, and where diagnostic data can be generated by the infrastructure that will reduce the need for regular on-site inspections."

To achieve these objectives, SYSTRA works in close collaboration with infrastructure operators from day one of the design process in order to optimise the construction of new infrastructure for O&M.

This collaboration is particularly effective in cases where SYSTRA not only has design responsibility but an ongoing O&M liability, such as the 302km SEA (South Europe Atlantic) line from Tours-Bordeaux, which opened in July 2017.

SYSTRA was involved in every stage of the delivery of Europe's largest high-speed project to date, from civil engineering and railway equipment design through to dynamic and integration testing.

It also has an ongoing role for the next 44 years as part of the MESEA Joint Venture to provide maintenance.

According to SYSTRA UK's high-speed rail director Julie Carrier, owning 30% of MESEA created an added incentive for its teams to find innovative ways to design for reduced O&M costs and to integrate cost-efficiency at all stages of the projects.

It is, however, a formula that the company is comfortable working with under a variety of contractual models, such as in Africa, where SYSTRA has been involved in a variety of design and build contracts for the continent's first ever high-speed line between Tangier and Kenitra in Morocco.

She says: "Working with SYSTRA means leaving the client to get on with their job while we continuously ensure that there is an O&M integrated design on their behalf. We are absolute perfectionists and only focused on getting to the right solution by using our global experience.

"We recognise that the largest benefits do not come when you design in silos, but when it is properly integrated with O&M. That worked particularly well on SEA where, as a shareholder, there is a direct financial impact which drives different behaviours and by taking a longer term view it means that everyone will succeed or fail together, and that building the railway is not just a walkaway project.

"But it doesn't have to be that way because

Dynamic testing began on Africa's first high-speed line between Kenitra-Tangiers in February. Operating at up to 320kph, SYSTRA has managed various elements in the delivery of the new 183km line including initial studies and design through to construction and testing. SYSTRA.



“Reducing OPEX doesn't always have to cost much more in CAPEX, and we will always suggest the optimum trade-off.”

Dominique Roux, Director, Railway Systems, SYSTRA



“We recognise that the largest benefits do not come when you design in silos, but when it is properly integrated with O&M.”

Julie Carrier, High-speed Rail Director, SYSTRA UK

we have people with the skills to apply that approach in any contractual model, such as Kenitra-Tangiers, where O&M is separate."

Looking ahead to future projects, Carrier says that SYSTRA will continue to pioneer data-driven engineering design in order to further enhance the benefits of the company's O&M-led design approach.

By creating digital models to capture all project lifecycle data in 5D format [data based on the analysis of the three physical dimensions, plus time and cost factors], she says that virtual reality, and other forms of simulation that this type of data capture enables, will become vital in design validation

and outcome prediction.

SYSTRA is creating bespoke digital tools to tackle this challenge, having achieved significant gains with the Crossrail project in its role as subcontractor to the delivery partner.

She adds: "Some of the things we have developed in partnership on Crossrail on BIM [Building Information Modelling] is world leading. When I started in this industry many years ago, everybody wrote things down. Now information is stored in the cloud. This opens things up to real-time information processing and global models, and we can use that information to better plan asset management.

"It's hard to imagine right now what our

railway will be like in 50 years' time, but the concept of someone digging a hole in the ballast in between trains seems unlikely. Remotely controlled robots or drones will be undertaking these tasks in a less disruptive and a safer way of doing things. Our aim is to make this transition to data-driven asset management much easier."

SYSTRA believes that a continued drive for optimal TCO, alongside commitment to excellence and innovation, is the only way the UK railway industry will achieve the long term improvements in safety, reliability and operational performance we are all striving for. ■

THE CHANCE OF A LIFETIME

The £55.7 billion construction of High Speed 2 represents a once-in-a-lifetime opportunity to leave a lasting legacy of skills in the UK.

That is the message of HS2 Ltd's Chief Executive Officer Mark Thurston, whose job it is to help oversee Europe's largest infrastructure project that will link London to Leeds and Manchester via the West Midlands from 2033.

With enabling works having started in spring 2017, the 16-year construction sequence will require an estimated 25,000 workers in a wide variety of professions to design and build nine major new stations and more than 350 miles of new track, tunnels and bridges.

A further 3,100 permanent jobs are expected to be created in operations and maintenance once HS2's two phases of construction are complete.

But mobilising a workforce of this scale will have significant challenges, as other major national infrastructure projects threaten to place competing and sizeable demands on the UK supply chain.

These projects include Hinkley Point C nuclear power station and the expansion of Heathrow Airport, and increase the likelihood of an overall skills shortage unless new ways can be found to bring fresh talent into the sector.

Meanwhile, further resources must also be deployed to upskill existing rail sector workers in order to tackle the problems posed to the rail sector by an ageing workforce.

According to Thurston, HS2 Ltd has a number of tools in its armoury to meet these challenges which will be fully outlined when the organisation officially launches its skills strategy in the autumn.

It is expected to show in detail how it will not only help to make the sector more attractive to young people seeking careers, but also how it will support the supply chain to fulfil contractual requirements to expand and create a more diverse workforce that must be adhered to as a condition of working on HS2.

Thurston explains: "There is an estimated shortfall of some 20,000 engineering graduates in the UK, so in order to successfully compete for resources we must do two things. First we need to dispel the preconception that our engineering and infrastructure are outdated, and that rail sector jobs are insecure and low paid, when the reality is that HS2 will generate thousands of highly skilled employment opportunities.

Projects such as HS2 don't come along often, so it's in everyone's interests to capitalise on the opportunity to upskill the workforce, says HS2 Ltd CEO MARK THURSTON

"Second, we need to reach out to people who are underrepresented in our industry by championing equality, diversity and inclusion strategies to promote fair and equal access to the many thousands of employment opportunities generated by HS2.

"After all, HS2 is not just an infrastructure or an economic project but also a social mobility project that will change the way people live their lives right across the country."

Thurston reveals that HS2 Ltd is already working closely with local and national stakeholders to set new standards in providing equal employment opportunities.

This includes practising a recruitment policy where candidates are selected exclusively on merit, which all contractors will be legally obliged to follow.

"Our first cohort of 25 apprentices at HS2 Ltd went through a blind auditioning recruitment process which removes the CV and application form in the conventional sense and replaces it with a technical assessment which directly feeds into their skills.

"This means that when we shortlist candidates it's based on ability and nothing else, which has resulted in 44% of our current cohort being female, 36% from BAME (black, Asian and minority ethnic) backgrounds, and 80% of them being under the age of 30.

"This ensures that there is no prejudice in the selection process and feedback from the apprentices themselves has been very positive because they feel like they have been chosen for their aptitude and no other reason.

"This approach will be rolled out across the entire supply chain and will make investment in skills and behaviour geared towards creating a more diverse workforce a contractual requirement – this isn't optional!"

“When we shortlist candidates it's based on ability and nothing else.”

Mark Thurston, CEO, HS2 Ltd

Contractors will also be obliged to help local, disadvantaged and underrepresented groups to access apprenticeships and other opportunities.

HS2 Ltd has already put plans in place to aid this process and give the supply chain a helping hand through an innovative partnership with Jobcentre Plus.

Thurston adds: "Right now we're developing plans for piloting an HS2 jobs brokering service in the West Midlands between ourselves and Jobcentre Plus. As a first step, Jobcentre Plus staff have already based themselves with our enabling contractors to gather vacancy information so jobs can be matched with local unemployed people. Then, in the autumn, we will begin pre-employment training to build up a body of interested job-ready candidates."

According to Thurston, HS2 Ltd has set up a requirement for apprentices to make up 4% of the total workforce after main construction works begin later this year. This equates to 2,000 apprenticeships across the lifetime of the projects, of which 25 have already been filled by HS2 Ltd and a further 75 by the supply chain.

HS2 Ltd will, therefore, continue to provide practical support to the supply chain and will lead an education programme in schools so that a strong pipeline of new talent can be established.

He adds: "Think about it this way – the drivers of the first HS2 trains to go from Leeds to London in 2033 will be making GCSE choices at school right now, and some of the apprentice engineers to work on the final stages of construction could, at this moment, still be in primary school.

"We're therefore committed to promoting STEM subjects through our education programme at HS2 Ltd, and the work of our supply chain will bring a range of other education and guidance packages. HS2 workshops and ambassadors will go out to schools to share their experiences, but also explain the diversity and range of careers that are available to them."

Finally, Thurston issues a call to action to the entire supply chain to build on the work



HS2 Ltd CEO Mark Thurston addresses RAIL's National Rail Convention at Rail Live, Long Marston, on June 20. CHRIS LOWNDES/RAIL.

already being done by HS2 Ltd and bolster the rail sector's appeal to young people.

The need for 20,000 additional engineering graduates represents a considerable skills shortfall to overcome, and will require the combined efforts of everyone associated with the HS2 construction project to ensure its success and the future health of the rail supply chain.

He concludes: "HS2 is providing a guaranteed pipeline of work for the next two decades, which should give suppliers the confidence they need to invest in skills and training. This gives us a once-in-a-lifetime opportunity to leave a lasting skills legacy for this country.

"But it's more than just an opportunity to train and upskill our current workforce. It is

our responsibility to young people to inspire them to take up careers in the transport and construction sector, which offers high-quality employment at the cutting edge of engineering.

"My message to the entire supply chain is to get out there and be ambassadors for our industry - you can show the next generation what an exciting and dynamic career they can have working with us in rail." ■

ALTERNATIVE ROUTE

The UK Government should take serious note of the privately financed Tours-Bordeaux line, says TAYLOR WOODROW's Business Strategy Director JEZ HASKINS

Rail infrastructure in the UK will require a significant amount of investment in order to meet rising demand and to keep busy lines running.

Much of that investment is currently publicly funded, including the £47 billion that Network Rail is expected to receive for operations and maintenance in Control Period 6 (Apr 2019-Mar 2024), and the estimated £55.7bn cost of building Phases 1 and 2 of High Speed 2 by 2033.

But in order to reduce this heavy reliance on financial support from government, there is a growing trend in the UK and elsewhere to seek private investment in infrastructure where steady and long-term returns are available.

This policy shift was confirmed by the UK Government in March when it issued its formal call for Market-led Proposals (MLPs) to be submitted by the private sector for proposed railway enhancements on the conventional

rail network, such as the Heathrow Southern Link, that are financially credible without direct taxpayer funding.

The UK could also choose to follow in the footsteps of France in terms of funding high-speed rail, where private finance has been used extensively to deliver Europe's largest ever high-speed rail project between Tours and Bordeaux.

The Tours-Bordeaux South Europe Atlantic (SEA) high-speed line opened in July 2017 and comprises 212 miles of new track, including new connecting branches.

With running speeds of up to 200mph, journey times between Bordeaux and Paris have been reduced from three hours and 15 minutes to just over two hours, with 24 million passengers expected to be carried on the route by 2025.

The line was built by the LISEA consortium and was funded by the largest public-private partnership (PPP) contract ever undertaken in France's rail sector.



Opened in July 2017, the 7.8 billion euro Tours-Bordeaux high-speed line is the largest ever public-private partnership undertaken on France's rail network. It could also represent a future funding model for high-speed rail on this side of the Channel, says global construction group VINCI. TAYLOR WOODROW.

Of the 7.8bn Euro total cost of construction, LISEA contributed 3.8bn Euros, the French Government and the European Union 3bn Euros, and national operator SNCF 1bn Euros. LISEA has also been awarded a 50-year

concession to operate and maintain SEA, which commenced in June 2011, making it the first private company in France to ever manage high-speed infrastructure.

Its mission is to effectively, professionally and safely manage the line for train operating companies which in turn pay a toll to LISEA. LISEA is also run for the benefit of the territories served by SEA high-speed line, while ensuring the line's performance until 2061.

Hervé Le Caignec, chief executive officer of LISEA, explains: "The specifications of LISEA's concession agreement have enabled the State to limit its financial contribution while having the assurance of the construction, operation and maintenance of a high-quality public infrastructure."

"One year after its launch, the results prove that the SEA high-speed line is playing a leading role in regional and national

economic development by increasing the territories' attractiveness and creating new mobility patterns."

VINCI is a leading player in concessions and construction, operating in some 100 countries. VINCI Concessions owns a 33% shareholding in LISEA, alongside CDC (25%), Meridiam (22%) and Ardian (20%).

Henry Snow, chief financial officer of VINCI Concessions' UK subsidiary, says the success of the LISEA consortium could make an interesting case study for financing high-speed projects in the UK, using a similar formula.

He adds: "VINCI Concessions is one of the largest concession companies in the world and is proud of its success in integrating the delivery of the Tours-Bordeaux HSL in partnership with VINCI's construction arm."

"VINCI continues to follow developments in infrastructure markets throughout the

POSITIVE IMPACT

LISEA prides itself on having a strong commitment to the sustainable development of local communities. It has also put in place a comprehensive business strategy to mitigate the environmental impact of its activities.

This includes a compensation plan for local stakeholders, and long-term environmental monitoring by a dedicated committee called L'Observatoire Environnemental LISEA.

As part of the compensation plan, 2.7 million trees have been planted on 3,500 hectares of suitable land identified for the protection of affected habitats and species.

LISEA has also made five million Euro endowments between 2012-2020 to two corporate foundations created to foster sustainable development and benefit businesses and communities along the high-speed line.

LISEA Biodiversité provides long-term support for natural heritage conservation and restoration projects, while LISEA Carbone helps fund local projects in reducing energy consumption, increasing smart mobility and energy transition in farming.

Meanwhile, LISEA has put in place a socio-economic monitoring team in order to assess the impact of SEA high-speed line on local economic development, and has participated in the creation of the Sillon Solidaire endowment fund that is dedicated to improving mobility, social inclusion, access to housing and literacy.

world, actively considering prospects for new investments. We are excited by the prospects for the rail industry in the UK and look forward to seeing new projects come to market."

This view is also shared by Jez Haskins, business strategy director for Taylor Woodrow, which is the civil engineering division of VINCI Construction UK, and a part of the VINCI half of the Balfour Beatty VINCI Joint Venture that has been awarded two key construction contracts for HS2.

But with no precedent so far set in the UK for this type of funding package, he feels it is time for the Government to begin considering its options.

He says: "These are exciting times for UK rail and Taylor Woodrow. There is a palpable buzz in the air in our office in Birmingham, where the team feels it is part of something very special."

"We hear that there is no shortage of ready and willing institutions prepared to finance viable infrastructure schemes in the UK."

"This, coupled with the Government via the DfT's 'Market-Led Proposals' and NR's 'Open for Business' proposals which are actively encouraging third party promoted projects, means that one day, a high-speed privately funded rail scheme may just become a reality." ■

The South Europe Atlantic (SEA) high-speed line: one of the largest rail infrastructure projects in Europe. TAYLOR WOODROW.



“The results prove that the SEA is playing a leading role in regional and national economic development.”

Hervé Le Caignec, Chief Executive Officer, LISEA

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