MAFEX
Mafex corporate magazine
Spanish Railway Association
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SPANISH RAILWAY INDUSTRY
A model of global success

SPECIAL
Leadership: The Spanish railway industry in the world

MAFEX INFORMS
The association joins the European Year of Rail launched in Portugal

INTERVIEW
Raül Blanco, General Secretary of Industry and SME y Víctor Ruiz, President of Mafex.

Spanish railway industry: pioneering and strategic for the sustainable future

The EU has designated 2021 as the "European Year of The Railway". Undoubtedly, an additional indication that strengthens the great expansion that this mode of transport has experienced in recent years. Modern metro systems, light rail, new commuter train connections or large high-speed projects are a sign of its great growth. The success of these projects has on most occasions relied on the advice and experience of the Spanish railway industry, one of the most avant-garde in the world and with a great international recognition. These companies have exported their technology and knowledge to more than 90 countries on the five continents and have become the preferred partner of numerous administrations and operators. The model of its success is based on a solid and extremely competitive value chain, a determined commitment to R&D, a unique know-how and the excellence in the quality of the services. In addition, they have the endorsement of having been the architects of the development of the Spanish railway network, one of the most extensive and advanced in the world.

Pioneers in R&D and at the forefront of technology, they are prepared to take on the new challenges facing the sector and respond to market trends and needs. In the coming years, this industry will play a very prominent role in aspects such as sustainability, mobility as a service (MaaS), progress in the digital transformation of the sector or connectivity between different modes of transport.

All these aspects are discussed in detail in the special issue number 26 of the Mafex magazine "The Spanish railway industry: A model of global success". This new edition presents an in-depth analysis of the characteristics that make its companies lead the world ranking in transport solutions, as well as their great contributions in all segments of activity: engineering, construction of high-speed lines or urban systems. In addition, a section is devoted to the most relevant technological achievements in R&D: the outstanding participation in the ambitious European instrument Shif2Rail, advances related to automation, digitalisation, hydrogen trains, Hyperloop, etc.

This extensive report also includes two interviews: one with the Secretary General of Industry and Small and Medium-sized Enterprises, Raül Blanco, where he details the performance of this body and gives his vision on the capacity and strength of the Spanish companies, and another interview with our president, Victor Ruiz Piñeiro, where he explains how the Spanish railway industry is prepared to solve the great challenges.

In addition, there is an update on 21 Mafex partners, as well as on 17 of the latest innovations that have been incorporated into the international market.

We hope that all this information will be of interest to you and will help to get to know more about one of the main characters of the change in modes of transport.

Railway is the future, and the Spanish industry is ready to play the leading role in this important shift towards a sustainable, highly technological, and emission-neutral mobility.

MANAGEMENT: MAFEX.
MAFEX COMMUNICATION COMMITTEE: Alstom Transporte, ArcelorMittal, Bombardier España, Caf, Icon Multimedia, Grupo Trigo, Idom, Indra Sistemas, Ingeteam, La Farga Yourcoopersolutions, Patentes Talgo, Siemens Rail Automation, Stadler Rail Valencia, Thales España, TPF Getinsa Euroestudios y Zitron. **ADMINISTRATION:** comunicacion@alencom.es **ADVERTISING:** mafex@mafex.es **SUBSCRIPTIONS:** mafex@mafex.es. Mafex magazine is not responsible for the opinions, images, texts and works of authors and readers that will be legally responsible for their content. It is understood that the signing authors have given their consent to be included, for which he or she will be responsible. Also, the magazine is not responsible for typographical errors contained in the original documents submitted by the authors.

New **Mafex** partners

The number of companies joining Mafex continues to increase. These are the 8 new partners:

THE SPANISH RAILWAY ASSOCIATION CONTINUES TO GROW WITH THE RECENT ADDITION OF 8 NEW PARTNERS. WITH THESE ADDITIONS MAFEX HAS A TOTAL OF 92 COMPANIES AND ENTITIES REPRESENTING ALL SUBSECTORS OF A LEADING INDUSTRY THAT MAKES ITS WAY AROUND THE WORLD.

BELGORAIL, S.A.
Belgorail SA is a certification, inspection and safety evaluation entity for the guided transport sector, both conventional railways and subways and trams. They are an accredited body for the certification of interoperability (NoBo), national regulations (DeBo), safety evaluations under CENELEC standards (ISA) and under CE Regulations (AsBo).They are part of the Certifer Group, with a presence, in addition to Spain, in Belgium, France, the Netherlands, Germany, Austria, Italy, Sweden, Turkey, Algeria, Brazil, Australia, Vietnam, the United Arab Emirates and China.

ICF - Ingeniería y Control Ferroviario, SAU .
ICF offers technical and sustainable solutions for railway signalling. In this area, our vocation is betting heavily on the development and innovation, constantly releasing new products that can be used to improve and optimize existing technology solutions.
All the level crossings since June 2001 have been protected by ICF with its level crossing protection system SPN-900. We are working worldwide with more than 1000 international references.

FLANKER TECH SOLUTIONS
Flanker produces components in the field of wood and its derivatives (tablex, HPL, OSB, plywood), as well as in fibreglass, plastic or composites. We integrate CNC technology, stamping, assembly and painting, for roof, floor, boot, carpeting or side cladding applications, among others. We are present in the Railway, Automotive, Packaging and Laboratory Furniture sectors.

FORGING STEEL PRODUCTS, S.L.
It is a company dedicated to the manufacture of machined and if needed painted forged components ready for assembly destined to the railway rolling stock manufacturers for chassis, brakes, clutches, hooks etc.

MAINRAIL, S.L.
MainRail is a high-tech startup devoted to providing IT-based solutions to help you digitizing and optimizing the railway infrastructure maintenance operations.
We combine our expertise in a wide range of technologies (e.g. big data analysis and visualization, digital twins, IoT, machine learning, etc.) with a solid knowledge in railway maintenance and operations.
Our solutions are based in a customizable IT platform (MainRailMT) for the management of all maintenance-related operations and a family of IoT devices (MainRailD) for a continuous and cost-effective inspection of your infrastructure.

SMART MOTORS.
Smart Motors applies new technologies to generate added value from the monitoring of critical railway assets that believe that Digitalization and the uses of advanced analytics are the way to service excellence. The priority is to generate new knowledge about the operation of railway assets that satisfies the requirements of the most demanding environments and with a real day to day contribution.
smart motors(r) has its own Digitalization Platform to help maintenance and operation that brings together signaling monitoring systems, infrastructure and rolling stock, as well as IoT sensors adapted to the railway sector.

FEX, FASTENING EXCELLENCE CENTER
The creation of the Fastening Excellence Center association responds to the concern of several companies to promote the transformation and competitiveness of the bolted joint sector, going from being companies more focused on the day-to-day and manufacturing process, to companies that also direct their attention to the finished product and the market.

Currently, they have 17 companies in the association, which intends to develop two lines of activity, one focused on internal activities for members, and the other open to the market offering services on demand.
Many of the partner companies work the railway market and we have a table to deal with this sector specifically

IBERICA TECNOLOGIA EN SISTEMAS DE SEGURIDAD FERROVIARIOS (ITSS)
Founded in 2005, is a leading manufacturer and supplier of railway hazard monitoring equipment, focusing mainly on hot axle box / hot wheel and Wheel impact load / Weighing in motion detectors.
The ITSS systems use state-of-the-art infrared and fibre-optic technology.
The PEGASUS HABD/HWD multi beam system monitors the axle box and brake temperatures of coaches.
The AGUILA WIM/WILD system uses fibre-optic sensors to detect off-centre wheels and flat spots. It can also report train weight and overloading.
ITSS products are the model representation of a perfect combination of experience and innovation.

Online webinar "Workplace Innovation: Building High Performance through your People"

From the innovation area of Mafex, an online webinar "*Workplace Innovation: Building High Performance through your People*" was organised on 16th February where representatives of Workplace Innovation Europe CLG presented the keys to helping companies improve their performance and create excellent workplaces. Worthy of note is the attendance of 30 organisations and companies to the session that were able to enjoy the exhibitions of Dr. Peter Totterdill and Rosemary Exton, founders and directors of *Workplace Innovation Europe CLG and Natalie Wilkie*, expert in organisational development.

This meeting was part of *the European RailActivation project "Activating inclusive growth in railway SMEs"* led by Mafex and launched in 2019 with the aim of creating and testing the business and organisational mechanisms for SMEs in the railway sector to adopt innovation mechanisms.

REPRESENTATIVES OF WORKPLACE INNOVATION EUROPE CLG PRESENTED THE KEYS TO HELPING COMPANIES IMPROVE THEIR PERFORMANCE AND CREATE EXCELLENT WORKPLACES.

Challenges event "Rail Sector Challenges: UK-Spain Summit" organised by Mafex with the participation of three British universities members of the UKRRIN network

THE EVENT TOOK PLACE ON 2ND AND 3RD MARCH 2021 AND BROUGHT TOGETHER 11 COMPANIES THAT HAD THE POSSIBILITY TO PRESENT THEIR TECHNOLOGICAL SOLUTIONS WITHIN THE THREE ORGANISED PANELS: DIGITAL SYSTEMS, ROLLING STOCK, AND INFRASTRUCTURE.

The main objective of the event, which was organised in two days, was to publicise the innovation activity of the universities of Birmingham (Centre of Excellence in Digital Systems), Huddersfield (Centre of Excellence in Rolling Stock) and Southampton (Centre of Excellence in Infrastructure) as well as the innovation challenges of the sector in the British country. The event brought together 11 Spanish companies that had the possibility to present their technological solutions within the three organised panels: Digital Systems, Rolling Stock, and Infrastructure.

UKRINN - UK Rail Research and Innovation Network - is a network of Centres of Excellence formed by a consortium of British universities, which in collaboration with industry and Innovation Centres aims to support the research, development and innovation of new technologies and products. The centres of Excellence provide the ability to develop new products and technology more swiftly into the market, using advanced simulation facilities designed for this purpose.

Rail Sector challenges: UK-Spain Summit

In collaboration with: UKRRIN, University of Birmingham, University of Huddersfield, University of Southampton

2nd MARCH – DAY 1		
10:30 - 10.40		Registration. Welcome and Introduction
10:40 - 10:50		**Presentation of UKRRIN network:** Centres of Excellence formed by a consortium of universities
		Presentation of rail UKRRIN Centres of Excellence **capabilities and use cases:**
10:50 - 11:10	1	**Centre of Excellence in Digital Systems:** Presentation of Birmingham Centre for Rail Research and Education - University of Birmingham.
11:10 -11:30	2	**Centre of Excellence in Rolling Stock:** Presentation of the Institute of Railway Research (IRR) - University of Huddersfield
11:30 -11:50	3	**Centre of Excellence in Infrastructure:** Presentation of Southampton University
11:50 - 12:00		Conclusion / closure

3 rd MARCH –DAY 2		
10:30 - 10.40		Registration. Welcome and Introduction
		Focus group discussion: This comprises leading experts from the British University and the Spanish entities who have the challenges to be addressed.
10:40 - 11:40	Panel 1: **Digital System** (University of Birmingham)	Presentation of Spanish entities rail challenges in Digital System
10:40 - 11:40	Panel 2: **Rolling Stock** (University of Huddersfield)	Presentation of Spanish entities rail challenges in Rolling Stock
10:40 - 11:40	Panel 3: **Infrastructure** (University of Southampton)	Presentation of Spanish entities rail challenges in Infrastructure
11:40 - 11:50		Focus group report back
11:50 - 12.00		Conclusion / closure

Mafex meets with representatives of the Ministry of Transport, Mobility and Urban Agenda and the Ministry for the Ecological Transition

On 4th March Mafex held a virtual meeting with the Ministry of Transport, Mobility and Urban Agenda that was attended by the following representatives Juan Pedro Fernandez Palomino – Technical Director, Secretariat of State for Transport, Mobility and Urban Agenda, Pascual Villate – Deputy Director General of Trans-European Network Planning and Logistics and Juan Manuel Gallardo – Cabinet Advisor for Air Transport and Recovery Plan.

The purpose of the meeting was broad. On the one hand, to be able to share from the Association the main proposals of great strategic lines to be taken into account for the recovery and transformation of the Spanish economy, and that were gathered by Mafex, in collaboration with its partners, and channeled through CEOE (Spanish Confederation of Business Organisations). On the other hand, to find out more about the design and implementation of the Spanish Recovery Plan "España Puede" (as well as the different initiatives that are being launched within its framework: MDIs - Memorandum of understanding -, PERTEs - Strategic Projects for the Economic Recovery and Transformation -, etc.).

Finally, the opportunity was also taken to share all those concerns that they have as an industry, and the challenges they face as a more sustainable mode of transport and potential backbone of the mobility of the future.

Similarly, a meeting was held with Eduardo González, Deputy Director General for the Coordination of Actions to Combat Climate Change at the Ministry for the Ecological Transition and the Demographic Challenge, to place value on something they already know: the commitment and potential of the industry and the sector in the face of the environmental challenges and objectives imposed by the European Union, and which aim to make our continent environmentally neutral by 2050.

Mafex joins the "European Year of Rail"

THE OFFICIAL OPENING CEREMONY, HELD ON 29TH MARCH, WAS PRESIDED OVER BY PORTUGAL'S MINISTER OF PLANNING AND INFRASTRUCTURE, PEDRO NUNO SANTO AND THE EUROPEAN COMMISSIONER FOR TRANSPORT, ADINA VĂLEAN, IN ADDITION TO HAVING THE REPRESENTATION FROM THE MAIN PLAYERS IN THE INTERNATIONAL RAILWAY SECTOR.

MAFEX, THE ASSOCIATION OF THE SPANISH RAILWAY INDUSTRY, WILL PROMOTE IN SPAIN INITIATIVES PROVIDED FOR IN THE AGENDA OF THIS COMMEMORATIVE DATE.

The event, held on 29th March, was presided over by Portugal's Minister of Planning and Infrastructure, Pedro Nuno Santo and the European Commissioner for Transport, Adina Vălean.

The opening ceremony served to highlight the role this means of transport will play in the European Union's mobility plans in the coming years, as the backbone to become the first emission-free continent.

Mafex will boost the European Year of Rail in our country

Mafex, the association of the Spanish railway industry and its associated companies, will promote in our country initiatives provided for in the agenda of this commemorative date.

The activities to be carried out this year around this means of transport aim to promote a "green, comfortable and safe" way of travelling in line with the European Green Deal. The programme includes an intensive awareness campaign on the European cross-border dimension of railway transport and the increase in its contribution to the EU economy, industry, and society. The agenda includes a complete calendar of events, such as the Rail Live! International conference-fair from 30th November to 1st December at IFEMA (Madrid) the benchmark railway event in Spain, as well as discussions around the present and future of the sector, awards, and training sessions.

For Mafex, 2021 is a key moment to highlight the dimension of the railway and its great contribution to combating climate change and to promote sustainable mobility based on the mode of transport with the greatest environmental, safety and organisational benefits of the country.

An industry with a great role in the economy

The role of this sector is also key in our country, where this industry has a very prominent role in the economy. An example of this are the figures of Mafex, which is composed of 93 partners that currently represent in aggregated form and in recent years, 82% of the Spanish railway export with a railway turnover of more than 5,5 billion euros and more than 27,000 jobs.

In addition, the business fabric of the sector is at the forefront of R&D and has a well-known portfolio of large-scale awarded projects worldwide.

Ardanuy Ingenieria to design the energy systems for the Surat and Ahmedabad Metros

Ardanuy Ingeniería

Gujarat Metro Rail Corporation (GMRC) has awarded Ardanuy Ingenieria and RITES the design contract for the energy systems belonging to phases I and II of the Surat and Ahmedabad Metros.

Both projects are part of the implementation program for new public transport networks in the main cities of the state of Gujarat.

These two new contracts further highlight the close collaboration that exists between the Indian Transport authorities and Spanish companies specialized in railway engineering. For Ardanuy Ingenieria, this undertaking represents yet another step forward in its internationalization plans. The company's Indian subsidiary, Ardanuy India Pvt. Ltd., already has more than 150 employees and is currently participating in the main railway and urban transport projects in the country. Among them including the commissioning of the Mumbai, Bangalore, Chennai, New Delhi and Kochi Metros.

New test accreditations for CETEST

CETEST

During March 2021, CETEST´s has extended its technical scope of accreditations ISO 17025 as accredited laboratory.

ENAC has approved the extension of the CETEST LE/1385 file, including in the Schedule of Accreditation the following tests:

Evaluation of vertical forces on wheels and wheelsets. (Static evaluation of vehicle mass). Wheel Slide Protection (WSP) assessment test according to EN 15595:2018. Inexhaustibility test according to EN 15806:2010. Dynamic tests - Service brake and Emergency brake tests according to UNE-EN 16185-2:2015+A1:2020, which extends current scope to multiple compositions.

With these new accreditations, CETEST is at the forefront of railway laboratories with a wide spectrum of tests for the approval of new rolling stock.

GMF installs its first lathe to renew Iberian-gauge wheels in Constantí

COMSA

Gestión de Maquinaria Ferroviaria (GMF), COMSA Corporación's railway maintenance company, has put into service a pit lathe at its Constantí (Tarragona) facilities to restore the profiles of the Iberian-gauge wheels and lengthen their useful life. GMF has thus become the first independent company in the sector to have this equipment.

The kit enables the wheel profiles to be adapted to the tolerances required at all times without dismantling either the axles or the bogies. This reduces the time to return the vehicle to operating condition. The supplier of the automatic and programmable lathe is the Spanish market leader Patentes Talgo.

The lathe has involved an investment of 1.5 million euros and extends the life of the wheels between 2 and 6 years. GMF will offer this service to all companies that request it since more than 80% of its clients are external to the group.

DSB awards ELECTRANS the framework agreement for the design and construction of a route control system

ELECTRANS

The largest train operating company in Denmark, DSB, awards ELECTRANS the framework agreement for the design and construction of a route control system.

The 8-year agreement will allow DSB to provide a modern signalling system to at least three of the workshops or stabling yards spread over Denmark's geography. Optionally, the agreement contemplates the maintenance services for a period of 10 years.

The technical solution proposed by ELECTRANS is based on the ENCETRANS electronic interlocking which will guarantee the safety movements and operations while maintaining at the same time a high availability level of the installations.

Knorr-Bremse and Estanda renew their contract for the supply of Brake Discs until 2023

ESTANDA

The German multinational Knorr-Bremse, world leader in the development of braking systems, has renewed its commitment to Fundiciones del Estanda, after extending its preferred partner agreement for the supply of steel brake discs for three additional years, at least until 2023.

The northern spanish company, Estanda, is dedicated to the casting and machining of high-performance steel parts, with a special focus on the supply of railway components (discs, axle boxes, spring supports, couplers, brackets, etc.). Estanda has modern facilities and specific investments to automate the manufacture of these parts. It is therefore a proven partner for Knorr-Bremse, incorporating industry know-how, customer orientation and economic competitiveness.

Knorr-Bremse and Estanda have been working together for more than 20 years and have > 1,000,000 discs in operation on high-speed trains, from the main European lines to the American Acela or the Japanese Shinkansen, which are used for both original equipment and maintenance.

Estanda manufactures flat (WMD), double (AMD), and semi-discs, mainly in low alloy steel".

Dsaf applies a new family of signals for railway tunnels

DSAF

The railway tunnels Vilariño - Taboadela (Galicia) and La Sagrera (Catalonia), have been the first to apply the new regulation of tunnels Adif and Adif AV, E.T. 03.399.006-0, from July 2020. Dsaf signals are classified as "luminescent" (Power 700) and "nonphotoluminescent" (Power 007).

Rotleds (tunnel signs)

A new family of "Rotleds" led signs is being applied by dsaf in different tunnels in Spain, Egypt, Colombia, Scotland, etc ... Dsaf Rotleds are applied with reflective photoluminescent materials, complying with current European and American regulations.

Alstom acquires Bombardier Transportation

ALSTOM

On January 29, Alstom and Bombardier closed the agreement to acquire the Canadian company's railway division, making Alstom the second largest company globally in this sector, with sales of nearly 15.7 billion euros and 75,000 employees.

Following the integration of Bombardier Transportation's legal entities in Spain and Portugal, the Group employs close to 3,000 professionals in the region, spread over 27 workplaces.

Leopoldo Maestu will continue as President and Chairman of Alstom in the region, while David Torres has been appointed head of the acquisition integration processes and new Managing Director of Portugal.
After the acquisition, Alstom is the only player with a local industrial and technological presence for all activities related to rail transport: signaling, infrastructure, train manufacturing, maintenance, and digital mobility.

The Fastening Excellence Center (FEX.) is created

FEX

The Fastening Excellence Center (FEX.) Was created to help companies in the value chain of bolted joints to generate value in the product / service and market areas, promoting their transformation with a comprehensive product-technology-market prespective that allows anticipating risks and opportunities for the industry in the medium-long term, and gaining visibility and recognition from customers.

FEX. is located in Bergara and is interested, among others, in the railway market where it offers its research and development capacity to companies in the industry. In this field, we have already held two meetings of the so-called "Rail Table" where 8 of our partners who operate in this market or are interested in studying this possibility, participate actively.

Today, we are 18 companies (and growing....):

TPF Getinsa Euroestudios contributes to the improvement of rail transport in Colombia

TPF GETINSA EUROESTUDIOS

TPF Getinsa Euroestudios has been awarded a contract to conduct technical, legal, and financial studies for the improvement of rail transport in the Coffee Region and Antioquia in Colombia. The section links Santo Domingo to Puerto Berrío, with a total length of 124.4 km, and stretches from Botero station, in the municipal district of Santo Domingo, to Puerto Berrío station, in the municipal district of the same name. With an estimated duration of 12 months, this important project consists of two stages:

Stage 1:

a. Review of the feasibility study of the section.
b. Update of the demand study.
c. Technical, legal, and financial due diligence and verification of the Intervention Plan.

Stage 2:

a. Technical, legal, and financial studies based on the Intervention Plan.

ICON Multimedia implements its software for railway planning and management in Euskotren

ICON

Within the framework of the actions for the promotion of the Connected Industry 4.0, ICON Multimedia has implemented its DENEVA software in the premises of Euskotren for the management of services, agents and trains in the stations. This new application helps in the internal management and automatic organization of railway services, by displaying the allocation of trains and drivers, driving and resting times, the creation of line schedules and the planning of auxiliary services.

In addition, it allows the optimized assignment of schedules, shifts, tasks and/or destinations of the personnel, allowing to adapt or modify this previous planning in case of possible incidents or changes, and thus optimize the requirements of the available personnel.

An efficient and flexible system, available to be adapted and applied to different specific railway environments.

IDOM is the designer of the first section of Tren Maya

IDOM

With the objective of reinforcing the tourist industry in Mexico and promoting the socioeconomic development of the southeastern region of the country, the Mayan Train is playing its part by handling both passengers and goods along almost 1,500 km. In addition, it also links the main cities and tourist areas of the 5 states of the region.

In this work divided into 7 sections, IDOM was awarded, together with the Mexican engineering company DIRAC, the detailed design project of the first Section, between Palenque and Escárcega.

This section will have a length of approximately 228 km, 6 stations, 14 viaducts, more than 55 overpasses over the railway and a similar number of wildlife crossings. The construction of this section has been contracted to the LAMAT construction consortium, formed by MOTA-ENGIL and CCCC.

Indra installs Adif's assited driving track equipment and traveler service systems

INDRA

Having won several public tenders, Indra was awarded many contracts with Adif for over 50 million euros. The company will contribute to the installation of the assisted driving system for the ASFA Digital control, with the solution of its line Mova Protect, which entails evolution and improvement in driving aid systems.

Indra will install too a network of landline and Wi-Fi telecommunications in the stations Madrid Puerta de Atocha, Madrid Chamartín, Pontevedra, Salamanca and Bilbao Abando Indalecio Prieto, part of the network with which Adif wishes to move on to a hyper-connected and smart station.

Indra also will set up the traffic management system in the AVE high-speed train on the Pedralba-Orense section.

Completion of Hot Axle Box Detection project in Morocco by ITSS

ITSS

In 2020, ITSS (Ibérica Tecnología en Sistemas de Seguridad Ferroviarios), headquartered in Sagunto in Valencia, successfully completed a new project in Morocco for their end customer, ONCF.

This project was carried out with a local company, Lumières et Technologie, based in Casablanca. It consisted of delivering 7 PEGASUS Hot Axle Box/Hot Wheel Detectors, ITSS's flagship model, for installation in ONCF's railway network.

This new delivery and installation is the extension of a previous project that was carried out in 2013/2014 when ITSS delivered 5 single and 5 double track PEGASUS systems, along with several maintenance terminals and the Central Monitoring System "CosMos". The 7 new detectors have alsoly been integrated into the existing Central Monitoring System located in the Moroccan capital, Rabat.

Stadler wins the tender to deliver 59 trains to Spanish state-owned rail operator RENFE

STADLER VALENCIA

The Spanish state-owned rail operator RENFE awarded Stadler the contract to build and deliver 59 high-capacity commuter trains. The contract is worth approximately 998 million euros and includes the spare parts and maintenance for a 15-year period.

This award is one of the batches in the bidding for the high-capacity trains tendered by the Spanish operator. Stadler proposes to maximize the capacity by using double-deck coaches with a scalable length from 100 to 120 meters and from 160 to 240 meters. The Iberian-gauge trains will operate on 3 kV DC overhead lines reaching a maximum speed of 140 km/h. They will provide the commuter service in the largest Spanish cities.

The new trains shall be developed and produced in Stadler's plant in Valencia. The contract envisages an option for 44 additional units as well as their maintenance.

Siemens Mobility establishes a hub for train engineering and design in Madrid

SIEMENS

As part of its growth strategy and international approach, Siemens Mobility sets up an engineering hub for its rolling stock business in Tres Cantos (Madrid) that will become part of the company's global network.

The new hub in Spain will design and develop innovative traction solutions for high speed, commuter, metro and light rail trains. It will also define the design of future car bodies and train interiors.

In a phased approach until 2025, Siemens Mobility plans to create 60 new highly skilled engineering positions, with a special focus on gender diversity and targeting not only trained engineers with experience in the rail sector, but also students in the final year of their studies.

SENER will develop a study on passenger experience for UIC

SENER

SENER is going to develop a new study for the International Union of Railways (UIC), this time dedicated to best practices and future trends in the passenger experience in the railway sector. The priorities of this study will be to provide, based on the analysis of real cases, a global vision of the best practices on the integral experience of the railway customer during their journey, as well as to carry out an investigation of the future challenges in the coming years. This Project respond to the Sector Vision "Challenge 2050" in relation to the "Value Added Services" promoted by the European community of rail operators and rail infrastructure managers.

This new study joins others carried out by SENER for UIC, consolidating SENER as a reference engineering company for UIC.

Teltronic updates the TETRA network of the Tenerife Metro

TELTRONIC

Teltronic has updated the NEBULA TETRA infrastructure which, since 2008, provides service to MetroTenerife, providing a more up-to-date software version compatible with the latest hardware elements, which will allow extending its useful life, as well as having greater functionality thanks to the new features and capabilities that have been incorporated in the latest versions of Teltronic's successful TETRA system.

Due to its robust design, which guarantees compatibility in its external interfaces even throughout its different versions, the operation of the Operating Aid System (OAS), integrated with the TETRA communications system, has not been a problem. The updating work was carried out at night to cause as little impact as possible on users and guarantee the operation of the trains at all times.

"Best Geotechnical Team in the UK" for the HS2 High Speed construction project (Lots S1 and S2)

TYPSA

The SCS Consortium Design House made up of TYPSA, ARUP and STRABAG has been awarded at the UK's "Ground Engineering Awards 2020" for their work in the design of Lots S1 and S2. The sections closest to London are the most complicated, specifically those in the area of the Euston tunnels and Northolt approaches and tunnels. It includes a total of 22.2 km of tunnel and 2.2 km of open-air section with a maximum design speed of 320 km / hour.

Adif trusts WSP Spain to modernize the underground stations of Aluche, Las Águilas and Fanjul

WSP SPAIN

Adif has appointed WSP Spain to modernize the underground stations of Aluche, Las Águilas and Fanjul, as part of its Suburban Railway Improvement Plan in Madrid. The multinational will be in charge of the consultancy and technical assistance for the basic and detailed design of these three terminals. The scope of services includes the remodeling of the lobby of the Aluche station; the extension of the platforms to accommodate the new CIVIA trains, 200 meters long; and the improvement of the evacuation and ventilation conditions in case of fire. WSP will also develop the study to improve the accessibility of the stations to adapt them to the regulations and ensure access for people with reduced mobility.

AZVI and MAINRAIL Digitalise Railway Maintenance in Mallorca

MAINRAIL

Azvi, the company responsible for railway maintenance of Serveis Ferroviaris de Mallorca network, makes progress in its digitalisation strategy together with the technology start up MainRail. Once this software platform has been implemented, maintenance operations shall be managed and the information generated in the various inspections and reviews of the track shall be analysed via this platform, allowing predictive maintenance to develop in the future. MainRail is a startup born because of the partnership between the research center CEIT and the software company INYCOM. After a first deployment on Zaragoza Tram for catenary maintenance, MainRail keeps pushing for the digitalization of the railway maintenance sector.

AB Transitio from Sweden awards CAF contract to supply regional trains

CAF

AB Transitio has awarded CAF a contract to supply new regional trains. The base contract comprises the production of 20 EMUs and 8 BMUs (biodiesel-electric bimodal units). The contract provides for additional options that could increase the number of units by an additional 19 EMUs and 7 BMUs. The base contract amounts to more than €250 million and the first units are scheduled to be delivered by the end of 2023.

The CAF-designed trains belong to the Civity Nordic platform, designed to operate in extreme weather conditions. They are intended for operation in four regions of Sweden, specifically in Jönköping County, Kalmar County, Kronoberg and Blekinge.

Thales to modernize the Alicante TRAM Line 5 for better service

THALES

Thales begins the adaptation of Line 5, in the Sangueta-Puerta del Mar (Postiguet Beach) section, of the Alicante TRAM metropolitan network that belongs to Ferrocarrils de la Generalitat (FGV).

The scope of the works will include the expansion and modernization of the signalling and traffic control facilities to be carried out by Thales, allowing the commercial operation of line 5 in a safer, more flexible and reliable way. To undertake these actions, Thales will carry out the work without the need for service interruption, providing mobility continuity to the passengers on this line.

Since its inception, Thales has supported FGV on different TRAM lines, with the implementation of various signalling systems, among which are electronic interlockings and Centralized Traffic Control in service since 2005.

RAÜL BLANCO
General Secretary of Industry and SME

"We see a strong railway sector, able to respond to the chanllenges of the future"

Mafex Magazine: Productive activity has slowed down due to the last year global context. Which actions are being studied by your Ministry to boost the industry?

Raül Blanco: In 2020, the Ministry had to face the emergencies derived from the pandemic, both in the protection of workers, and in the implementation of measures to promote the medical supplies production, and to safeguard the industry, which was seriously threatened.

Together with our partners from the European Union, we have achieved in record time the implementation of joint mechanisms that allow the reactivation of European industry towards a new model based on digitization and sustainability, which, as you know well, are two of the pillars of the Recovery, Transformation and Resilience Plan under development.In this year 2021, the Ministry of Industry, Commerce and Tourism has an expenditure budget of 4,860.5 million euros, which represents an increase of 2,067.7 million euros, 74.04% more than the budget extended from 2018, clearly noting the boost that EU funds will have for industrial activity.

It is the largest public budget in history to directly support the reactivation of industry, commerce and tourism. These are necessary budgets to modernize our production model and make it more resilient, sustainable and digital.

Focusing on Industry and SMEs, the Ministry will allocate 2,930.6 million euros to them, which represents an increase of 927 million euros compared to the 2018 extended budget. This will allow us to implement specific actions within of the Recovery and Resilience Mechanism, and to deepen and design new initiatives to be financed with the Ministry ordinary budget, with the ultimate objective of increasing the participation of the industry in our economy as a whole.

Thus, as an example, the department creates the Support Fund for Productive Industrial Investment (FAIIP), with an endowment of 600 million euros, to finance industrial investment projects that help promote industrial development, strengthen the competitiveness of industrial companies and maintain industrial capacities throughout the national territory.

I also want to highlight the Spain Entrepreneurial Nation Strategy, recently presented by the President of the Government and in which this Ministry has a leading role, which includes actions to support the Industrial Entrepreneurship, 136.2 million euros, and which is aimed at stimulating industrial development through support for industrial projects that improve the competitiveness of various manufacturing sectors, aimed at industrial SMEs and, especially, industrial entrepreneurship.

Mafex Magazine: Europe has already launched a "New Industrial Strategy" in order to improve its competitiveness and increase its autonomy and resilience. What is the focus of this roadmap to get back on the path of growth and international leadership? Are there specific SME measures?

Raül Blanco: Our policy is fully aligned with the new European industrial strategy. The Government approved in February 2019 the General Guidelines of the New Industrial Policy 2030, aimed at the transformation of the industry through the incorporation of R & D & I as a continuous process of companies, and the implementation of those innovations that allow progress towards ecological transition and digitization.

After time out caused by the covid-19, we get back on the development of these guidelines with more impetus and, derived from the pandemic and the availability of European funds, we are detecting a great interest from companies in accelerating or anticipating productive investments that they had planned, and they were going to perform in the future.

Regarding actions focused on SMEs, I have to remember that the Government approved in April 2019 the SME Strategic Framework Policy 2030, whose objective is to improve the competitive capacity of small and medium-sized companies to face the challenges of globalization, digitization, in addition to helping to create a suitable climate to favour their growth.

0This framework is the roadmap that the Administration is going to follow in the current stage of economic and social reactivation. Now more than ever, public-private collaboration is becoming more relevant, in order to identify the most appropriate measures, and to support our companies with the aim of relaunching the economy and recovering jobs.

From the budgetary point of view, actions are still very much oriented to SMEs, such as the reinforcement of the guarantees granted by the Reciprocal Guarantee Societies, through an endowment to CERSA (Spanish Company of Reinforcement), of 123.2 million euros.

Also, focused on entrepreneurs, the granting of loans, participation in the capital of SMEs, and in seed capital funds for entrepreneurs is promoted, through ENISA (National Innovation Company), endowed with 98.5 million euros in the 2021 budget. The program is rounded out with an endowment of 8 million euros for Innovative Business Groups, or innovative clusters.

Mafex Magazine: Given the foreseeable arrival of European funds for recovery throughout 2021, could you tell us what are your Ministry main lines of action? How will they affect / benefit a high technological industry such as the railroad?

Raül Blanco: As I have previously pointed out, the arrival of the Recovery and Resilience Mechanism Funds will allow undertaking industrial investments that were expected in the longer term. We have Recovery Fund endowments of 487.3 million euros for 2021. We will give priority to the following programs:

a) Strategic projects for the industry transition (415 million euros) and support to the large electro-intensive industry (320 million euros).

b) In order to enhance the role of industry, the Industrial Entrepreneurship Support Program is endowed with 136.2 million euros; innovation and sustainability projects in priority industrial sectors, with 94 million euros; and the actions of digital transformation of the industry with 95 million euros. These projects aim to promote the double green and digital transition of the industry.

However the foregoing, it is convenient to remember the need to comply with European regulations to receive these funds; it is necessary to require that projects contain certain percentages of contribution to the green and digital transition.

The more than 750 expressions of interest presented by the companies in the public consultation carried out by the Ministry during the months of December and January, show that there are ideas and projects, and a willingness to take advantage of this opportunity offered by European funds to modernize our entire industry.

In this context, the railway sector, which has been recognized by the EU as a basic element to achieve the objectives established in the Green Pact to reduce emissions from transport, has to play a leading role in accordance with its technological capabilities, in addition to other factors, as its contribution to territorial structuring. The participation of the railway companies in the European

R & D & i is essential for all industrial sectors, including the railway sector.

funds will translate, on the one hand, into an improvement of the railway infrastructures and of the railway transport itself in Spain, by modernizing the rolling stock. And, on the other hand, these funds can contribute to the digitization and modernization of our railway industries and their entire value chain, promoting the digitization of factories and the development of new products. All this with the aim of continuing to be a world reference and an exponent of Spain's technological and industrial capabilities.

Mafex Magazine: Within the survey "The Industrial Climate Indicator in Spain (ICI)" prepared by your ministry, a slight improvement has been observed in recent months compared to the start of the pandemic. What conclusions can be drawn from analysing these data?

Raül Blanco: We believe that following the evolution of different industrial indicators is more relevant than following only one.

In relation to the ICI, as an ad-hoc indicator, specific month data may not be representative of the real trends, and therefore it may be misleading to draw conclusions from isolated data. Overall in times of high uncertainty such as the one we currently live in, where everything can change from one day to the next, even in a sector like yours, despite being characterized by long term stability.

Once these refinements have been made, and looking at the evolution since April / May, the main industrial indicators show us a constant recovery from the minimum reached in April 2020 up to current levels. In this way, identified a general improvement we not only in the ICI since the worst moments of last spring, but we also observed in general terms a significant improvement in practically all the components of the indicator: order book, stocks and expectations of production. It is also true, however, that this last component in February reversed its good behaviour of the previous months and had a decline this month, but, again, this data, by itself, should not lead us to conclude that a change in trend is taking place. In any case, we must bear in mind that, far from having completed it, we are still fully immersed in the path of recovery of industrial activity, like that of the economy as a whole, and, therefore, there is still room for recovery. All this without forgetting that this process, being linked to the evolution of the health crisis and the consequent restrictions on activity, may still experience specific shocks that are reflected in unfavorable data in a specific period.

> We are working very intensively in the implementation of different measures and support plans to accompany and promote the changes that the Spanish industry must necessarily undertake.

Mafex Magazine: The "2021-2024 Foreign Action Strategy" indicates that our country is in prominent positions in the international economic ranking in areas such as R & D & i. The World Innovation Index 2017 mentioned in this document places Spain in 7th position. What plans exist to continue promoting this highly differentiating factor?

Raül Blanco: R & D & i is essential for all industrial sectors, including the railway sector. Thanks to investments in R & D & i made in the past, today our industry has the appropriate technological capabilities to face the challenges of the present and of the future.

The position of Spain in this indicator comes, without a doubt, to recognize the efforts that both the industrial companies, as well as the public administrations, have been making to develop a more competitive industry and prepared to face the challenges of a global competition.

Today the Spanish railway sector is a leading sector at the international level, which proudly carries the Spain brand beyond our borders, and this is something that it probably would not have achieved if significant investments had not been made in innovation and technological development in the past.

Investment in R&D is necessary now and before. It is necessary in different fields such as locomotive propulsion, in the manufacture of new components, in the incorporation of new composite materials in the structures of cars or in the improvement and the design of new security systems. We are very aware of it.

For this reason, we have specific instruments aimed at supporting companies that make investments in their production plants, to either improve their production processes, implement new processes or, directly, incorporate the latest digital technologies into them. Programs such as "Activa Industria" or the manufacturing R + D + i line, along with the rest of the department's support lines. They are available to companies in the railway sector.

Additionally, I would like to remind you that, from the Ministry of Industry, Commerce and Tourism, we are in perfect coordination with the Ministry of Science and Innovation to guarantee that the support measures for Product Innovation, which are promoted from that ministry, are fully aligned with industrial policy strategies.

Mafex Magazine: The railway sector has a prominent weight within the Spanish industry. In recent years, our companies have been an engine of international growth and a flagship of technological advances. What role do you think we can play in this new scenario focused on a green and sustainable European economy

Raül Blanco: As I have already mentioned, the European Commission recognizes that rail transport is called upon to play a decisive role in meeting the objectives of the European Green Deal. In this way, we need to remember that this mode of transport is the only one that has continuously reduced its emissions since 1990 and is considered the most energy efficient transport, being responsible for only 0.4% of greenhouse gas emissions, consuming only 2% of the total energy used in transport.

In the current context, where it is necessary to bet on reducing greenhouse gas emissions, Europe, and more specifically Spain, must continue to have a strong and competitive railway industry, capable of meeting its own needs and continuing to have a strong international presence. And, this is a government commitment.

On the other hand, the lessons derived from the pandemic have highlighted the fragility of some supply chains and the importance of having our own technological capabilities, as well as the recovery of European industrial sovereignty. And, in this area, the railway sector has a great opportunity to continue leading innovative technologies that are today demanded by citizens.

Mafex Magazine: Your Ministry works on different action plans to face the economic and technological challenges that we are currently facing. The implementation of these initiatives will presumably accelerate the change towards a digital and sustainable industrial model. How do you think the railway sector will evolve in the medium term in this new environment?

VÍCTOR RUIZ
President of the Spanish Railway Association (Mafex)

"The Spanish railway industry is ready for the big challenges"

Mafex Magazine: Global transport is undergoing a moment of change following the events of the last year. How do you think the current situation affects the sector?

Víctor Ruíz: First of all, I would like to highlight the important role that the railway has played in these special circumstances to ensure the supply of essential goods to the population and an uninterrupted public service. During these months it has been possible to witness how all the stakeholders in the sector have been able to respond and to provide effective solutions to ensure a fast and safe return of public railway transport.

With regards to the current situation, it should be noted that it also has an impact on the sector, but this situation will gradually reverse as soon as mobility restrictions decrease. The expectations are, therefore, to gradually recover passenger quota and increase the role of the railway in society. It is a forward-looking approach and has great growth potential in every country in the world.

Mafex Magazine: Many of the trends already present in terms of transport have also gained speed. Are we heading towards a new, more sustainable and decarbonised concept?

Víctor Ruiz: Indeed. We are at a crucial moment to promote more sustainable transport. And the railway is the best solution to a mobility that heads towards an emission-free model. Its numerous environmental advantages, of safety and territorial connection, make it the backbone of the new national and international strategies.

As an example, the railway generates only 0.5% of total CO2 emissions compared to 29.5% of other modes of transport and accounts for 9% of global mobility demand. To move 1,000 people 15 buses are required or between 250-1,000 cars compared to a single 8-car train. These figures support the railway as the best ally for a sustainable future and with a decisive role in the fight against climate change.

In Europe, for example, incentives are now focused on a revival of a green and digital economy. The aim is to meet the objectives of the European Green Deal and to make us the first climate-neutral continent by 2050. For that purpose, efforts are particularly focused on reducing emissions associated with sectors such as transport, where rates are still very high. In the coming years, the goal is to achieve a modal change with the railway as the main character.

In our country, in line with the European action plans, the "Mobility Strategy 2030: Safe, Sustainable and Connected" is the roadmap for the planned actions. Both, passenger and freight railway transport play a major role in transport investment plans.

Mafex Magazine: Aspects such as the increasing implementation of new technologies in mobility or decarbonisation bring with them great challenges that will have to be met in the coming years. Is the Spanish railway industry ready?

Raül Blanco: As I have already described, we are working very intensively in the implementation of different measures and support plans to accompany and promote the changes that the Spanish industry must necessarily undertake, within the framework of the firm commitment to digitization and sustainability of our industry.

We are working in a very complex environment, not only because of the challenge posed by the need to reduce greenhouse gas emissions or address the incorporation of technologies at a much more advanced scale in processes and products, but also due to the need to face the situation caused by covid-19 in the Spanish industry.

In this context, the railway sector has shown a strong resilience to the period in which we live, and this is in part due to the large investments made in recent years to adapt production processes and the purely innovative character of this sector.

> Spain, must continue to have a strong and competitive railway industry, capable of meeting its own needs and continuing to have a strong international presence.

However, in the coming years the railway sector will have to face different challenges, due to the current demands of society. Today society demands more efficient and sustainable transport for people and goods (one of the areas where Spain has to do more), and this sector can satisfy this need. In the coming years, it will be necessary to bet on greater efficiency, where the use of alternative fuels on non-electrified tracks will be a priority and where the incorporation of new generation advanced materials in our trains will be a reality.

From the Ministry, we foresee a strong railway sector, which is able to respond to future challenges, and to keep on bringing spanish technology to countries such as United Kingdom, Germany, Kazasjstan, Saudi Arabia or ourself geography. The sector has to envisage an exciting challenge, and the Ministry of Industry has the best willingness to acompaing it in this situation and to support it in everything we can do.

Víctor Ruiz: The technological transformation of our era and its acceleration after the pandemic mark a before and after in terms of transport. Mobility as a Service (MaaS), where the user experience is key, introduces new travel approaches, as well as the need to advance with more sustainable systems.

Our industry is ready to offer innovative and intelligent solutions, adapted to all new needs and able to respond to the challenges posed by operators and passengers.

Both the consolidated path and the determined commitment to R&D in our sector, to which a high percentage of investment is dedicated, make the railway sector companies highly qualified to help achieve that model of sustainable and connected mobility so necessary for today's society.

Mafex Magazine: Many are the countries on the five continents that opt for Spanish railway companies. What do you think are the ingredients that have led it to be a global example?

Víctor Ruiz: The Spanish railway industry is a global benchmark. Its companies are at the forefront of knowledge, experience, and technology. This leadership position is the result of years of work and a continuous specialisation, investment in R&D and excellence in service. Also those integrated in international groups have cutting-edge centres of excellence here that are a worldwide benchmark to innovate, manufacture and export from Spain to the rest of the world. Our industry stands for robustness, professionalism, and cutting-edge solutions.

In recent years, our companies have led the implementation of large developments by taking, for example, the high-speed experience around the world or helping to create modern metro and light rail networks in large cities. Thanks to their know-how and specialisation, they have led the implementation of ERTMS in our country and rank at the top in areas such as the hydrogen train, ticketing systems, driving automation, etc. Companies also differentiate themselves by the fact that they cover the full range of products and services that encompass the value chain of the sector. An aspect that makes them able to provide complete solutions and personalised services, adapted to the needs of each project and with a strategic expert vision.

Mafex Magazine: Is institutional support required to achieve that real boost to the railway and our industry?

Víctor Ruiz: The commitment to the railway mode must be kept in time decisively and with long term plans. Currently, our country ranks at the top of this type of networks (high-speed, metro, commuter trains, regional trains, etc.), but it is a must to continue backing the maintenance of such a prominent position. Therefore, we do consider that it is key to maintain the planned projects, not only in the modernisation of existing infrastructures, but also in the expansion of new networks for passengers and goods.

I also believe that there must be a strong commitment to R&D&I programmes and financing plans to further promote the development of the railway industry. This sustained support will make the railway the focus of mobility and allow companies to implement new solutions, continue with innovation and internationalise their services and technologies.

In recent years, our companies have led the implementation of the great railway developments.

Mafex Magazine: With regards to plans abroad. Is there room for the completion of new projects at this time?

Víctor Ruiz: Some projects have slowed down, but there is still activity, as the commitment to railway is firm both in Europe and the rest of the world. Companies associated to Mafex continue to win new contracts on the five continents and this trend will be on the rise in the coming years, when there is a gradual recovery. Nevertheless, in 2020 significant results have been achieved in many international markets and projects; for example, contracts in European reference projects such as the UK High-Speed or the railway network that will link the Baltic Republics, the Rail Baltica project or the Mayan Train in Mexico. Additionally, projects of a different nature of our rolling stock manufacturers in France, Germany or Italy to name a few markets. Also Norway and Sweden as far as Europe is concerned. Ireland, not only on its national railway network but also on the Dublin Metro project. And of course, in many other countries on the rest of the continents, with a significant activity in the United States one more year. An activity certainly important and in line with the experience and know-how of our industry.

In addition, it is always worth highlighting the contracts and investments that are generated in Spain. Without them we would not be able to strengthen our industry and thus more competitively address the foreign markets where competition is fierce. It should not be forgotten that the Spanish market is key to establish a benchmark.

The data indicate that investment in this mode of transport was positive before the pandemic and this upward trend is expected to continue. The sector will grow, in the coming years, at an annual rate of 1%, driven in particular by investments in rolling stock and services, as well as investments in infrastructures, signalling and control.

Mafex Magazine: The work of associations such as Mafex is also of particular importance to the industry. What plans do you have in the short and medium term in your support to partners?

Víctor Ruiz: At Mafex we continue to work intensively in our effort to help and defend the interests of our 94 partners whose 2019 railway turnover accounted for more than 5.5 billion euros – of which 82% was made in foreign markets – and that employ more than 24,000 people.

Our industry is ready to offer innovative and intelligent solutions, adapted to all new needs.

To this end, we have a comprehensive plan of activities that includes continuity in the promotion of international relations and the opening of new markets adapting ourselves to the current circumstances. In 2021 we are organising online meetings to analyse trends and investments, and we will support the European Union in the events planned in the "European Year of Rail". In addition, we once again co-organised, together with Terrapin, the Rail Live! conference-fair. We also continue to make progress on several European projects in which we participate such as E-Promat; EXXTRA, STAFFER or RailActivation, being the coordinators of the latter. All this is joined by our support to training, in order to attract talent and prepare the professionals of the future. In this sense, we will also co-organise the second edition of the "Master in Railway Engineering" in collaboration with the University of Cantabria.

Our ultimate goal is to be a support lever, a facilitating agent to make our companies even more competitive, innovative and among the most technologically advanced.

Spanish railway industry:
A model of global success

THE DEVELOPMENT OF MODERN TRANSPORT INFRASTRUCTURES AROUND THE WORLD HAS A SPANISH HALLMARK. IN RECENT YEARS, THE RAILWAY INDUSTRY IN THIS COUNTRY HAS EXPORTED ITS TECHNOLOGY AND KNOWLEDGE TO MORE THAN 90 COUNTRIES ON THE FIVE CONTINENTS. ITS SUCCESS MODEL: A SOLID AND EXTREMELY COMPETITIVE VALUE CHAIN, COMMITMENT TO THE MOST AVANT-GARDE R&D, UNIQUE KNOW HOW AND EXCELLENCE IN SERVICE.

The Spanish railway industry has established itself as one of the leading providers of cutting-edge solutions for the 21st century transport. Companies in the sector have seen the award of contracts around the world grow exponentially in recent years. Their high degree of technological advances, their own know-how and the ability to understand the specific needs of each project have made them the preferred partner of numerous transport administrations.

Experience in Spain: A mirror for the world

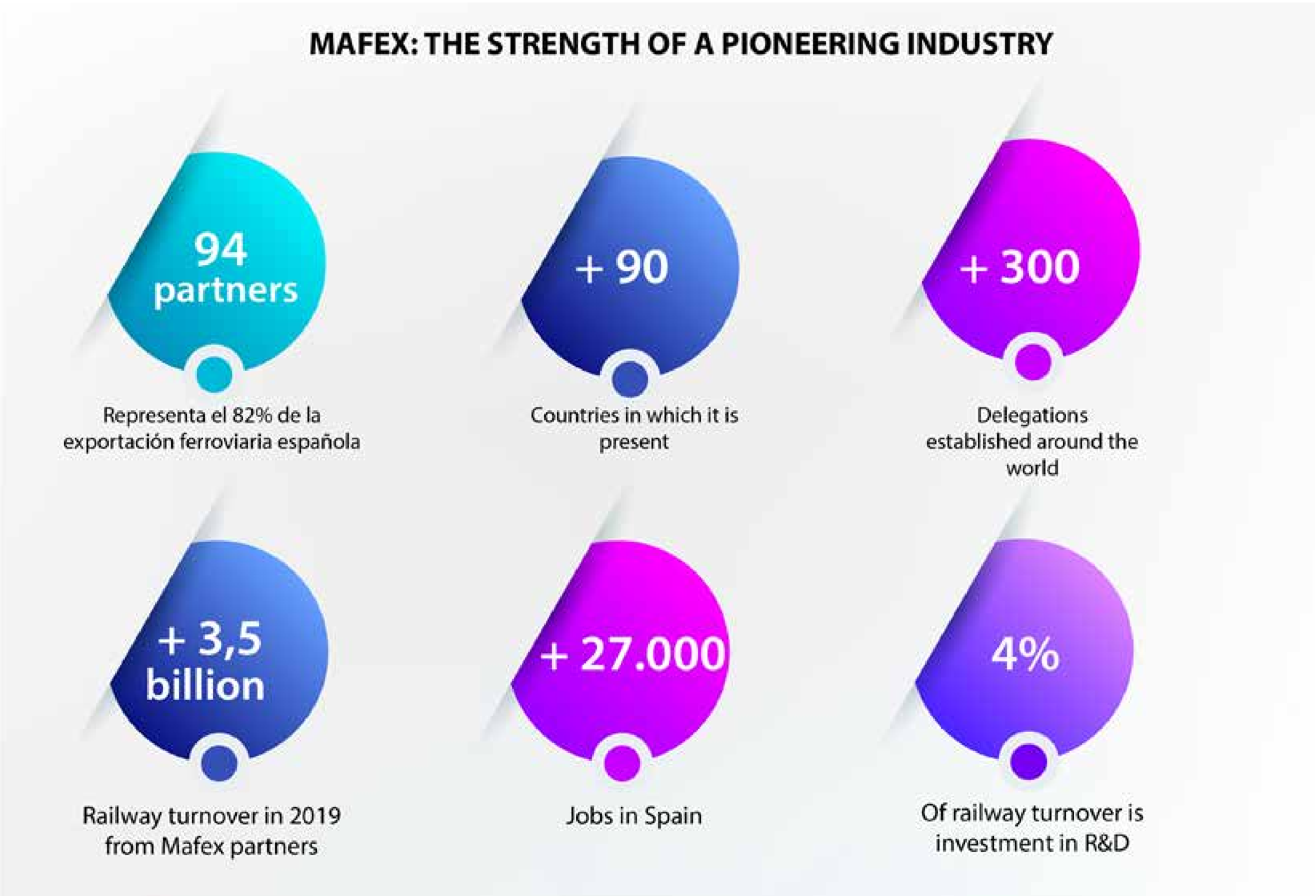
This important industry has a portfolio of state-of-the-art services and products already implemented in more than 90 countries. The remarkable increase in its international presence is the result of the experience gained in the development of the Spanish railway network, one of the most extensive and advanced in the world. The contribution to the implementation of a modern high-speed system, the second most important in the world with 3,200 kilometres, as well as the largest deployment of ERTMS in Europe or the country's numerous metro and tramway systems have earned them international recognition.

In these years of work, they have been able to overcome great challenges with a high level of complexity in the design, execution, and deployment of technology. With a complex orography they have faced mega-infrastructures, successfully solving the implementation of new lines in difficult terrain for the railway. They have also been able to respond to challenges of combining the operation of the different existing track gauges or technologies

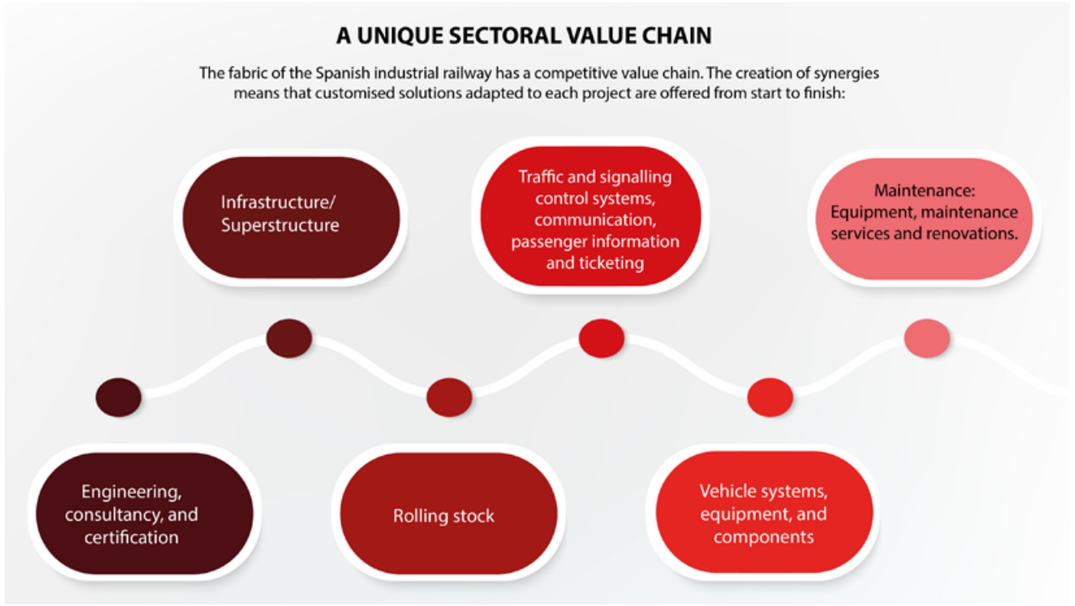
The Spanish railway industry has established itself as one of the leading providers of cutting-edge solutions for the 21st century transport.

of different international manufacturers. This background has given them a unique knowledge when it comes to successfully implementing the entire cycle of a project, from the initial stage of planning and consultancy to the final delivery.

The offer of Spanish industry covers all project cycles. This differentiating proposal is made possible by a complete value chain.



Source: Own elaboration/Mafex.



Source: Own elaboration/Mafex.

Differentiating value chain

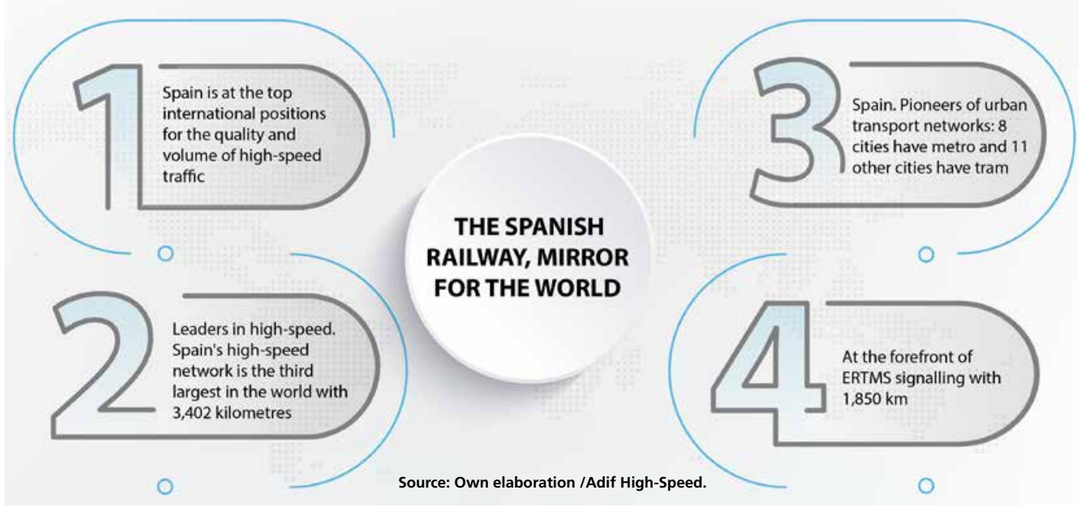
The Spanish industry offer covers all cycles of the project. This differentiating proposal is made possible by a complete value chain. The wide diversity of the companies that make up this industry is one of its most characteristic factors and it allows to create ideal synergies to adapt each proposal to the specific needs of the client. This competitive advantage makes it possible to have global solutions and for them to be present from the pre-consulting and planning phase of the project to the design, execution, and supervision stages of any infrastructure.

They also have major rolling stock manufacturers and associated equipment and components. They are joined by the development of multiple technological solutions and control and signaling, communications, passenger information or ticketing systems.

Furthermore, in recent years, the incorporation of new services around their own manufacture of products has been increasing. The objective, to respond to the trend of "servitisation" associated with the product (maintenance, financing, after-sales service, operation, management, etc.).

Sustainability and digitalisation

Another aspect that works in favour of Spanish railway companies is its contribution to the digital transformation of the sector and to sustainable mobility.



Source: Own elaboration /Adif High-Speed.

The creation of their own technologies to boost energy efficiency and environmentally friendly transport will help achieve the goals to which the European Green Deal and the UN SDGs aspire.

R&D: Key to the train of the future

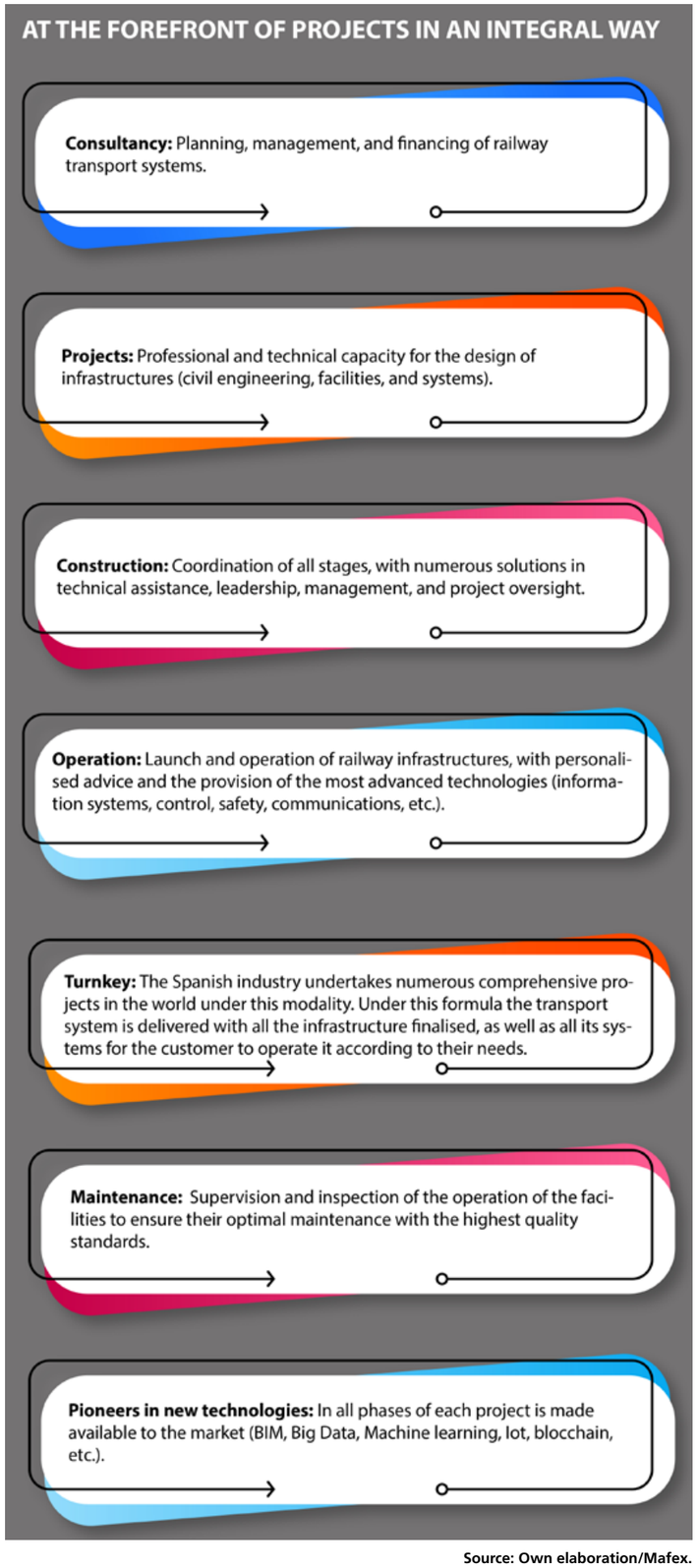
A clear example of the role of its knowledge and know-how is reflected in technology programmes such as the European R&D instrument Shift2Rail. This initiative has a wide representation of Spanish companies such as founding members, others such as collaborators or subcontractors working on the railway of the future and improving the quality of infrastructures and services.

A benchmark in infrastructures

Spanish companies have implemented many of the major railway infrastructures in recent years. The construction companies of this country are at the forefront in kilometres of railway civil engineering.

Among the many and most important international milestones are the Marmay project (Turkey), CrossRail (UK) or the St. Gotthard Tunnel, which have been three of Europe's most technically difficult underground works. Signs of their leadership in tunnels are also the "North West Rail Link" (Australia) or "The East Side Access".

The European R&D programme Shift2Rail has a wide representation of Spanish companies.



Source: Own elaboration/Mafex.

Pioneering companies ready for new challenges

THE TRANSPORT SECTOR IS MOVING TOWARDS A MODEL WHERE EMISSION REDUCTION IS A PRIORITY. MOBILITY UNDER SUSTAINABLE CRITERIA, DIGITALISATION AND CONNECTIVITY WILL MARK THE TRENDS OF THIS TRANSFORMATION. IN THIS CONTEXT, SPANISH COMPANIES, THANKS TO THEIR BOOST TO R&D, ARE READY TO MAKE THE RAILWAY THE BACKBONE OF THIS CHANGE THROUGH PIONEERING PROPOSALS THAT ALIGN TO THE NEW WAYS OF TRAVELLING.

The new challenges facing the transport sector are associated with the evolution in the mobility model and the emergence of new technologies. In the coming years, the sustainable development goals set by different international bodies and institutions will shape the strategies towards achieving a drastic reduction of emissions associated with this sector. The railway, due to its many environmental, organisational and connectivity advantages, will play the leading role of this change.

The implementation of new technological developments will also be key in this transformation and will make it a very attractive and competitive way of travelling, with the greatest comfort and safety for the passenger and fully integrated with other systems.

In recent years, Spanish companies have been demonstrating the high capacity to respond to market trends. This technological muscle and great

Spanish companies have been demonstrating in recent years the high capacity to respond to market trends.

DID YOU KNOW WHY THEY ARE PIONEERS?

+35 projects

Spanish companies are involved in the implementation of more than 35 projects of the European R&D initiative Shift2Rail

13

Companies and entities are part of the largest European railway innovation project "Shift2Rail"

Nº 1

In the world ERTMS. More than 5,000 km of operational ERTMS have been implemented by Mafex partner companies worldwide (more than 2,900 outside Spain)

SOME OF THE SPANISH SOLUTIONS TO THE NEW CHALLENGES

ECO RAILWAY PROPOSALS

- Use of renewable energies in facilities and in commercial operation
- New manufacturing method for environmentally friendly cement
- Braking energy recovery systems
- Ferrolineras: Electric vehicle charging at the station
- Fast charging at tram stations with battery systems on board
- Catenary-free trams
- Boost to the hydrogen train

DIGITALISATION

- Infrastructure digitalisation through BIM
- Smart railway stations
- Eco-efficient traffic, monitoring and driving management systems
- Flexible automatic driving system that allows the integration of functions.
- Automatic protection and operation systems (ATP/ATO).
- Energy Management System (EMS) to reduce on-board energy consumption
- Fleet system to optimise energy consumption management and control
- AI for predictive maintenance
- IoT hardware platform to integrate all on-board equipment

COVID

- Centralised operating and planning systems
- Preventive access control system
- Real-time information on infrastructure and train occupancy
- Intelligent passenger density solutions
- Technologies for contactless electronic payment method

INTERMODALITY

- Railway connections to ports 4.0.
- Systems for the traceability of goods
- Solutions for a connected intermodal transport

TALENT ATTRACTION

- It has a wide variety of specialised railway training
- Official Master's degrees in railway engineering, BIM, and numerous other disciplines
- Spanish companies have career development plans

Source: Own elaboration/Mafex.

expertise support its high capacity to face all these challenges successfully. To this end, not only do they make available to the market the most cutting-edge solutions, but they also build partnerships and ecosystems for innovation and digitalisation processes, seek full integration with other modes and provide effective responses to new situations such as the current one after the pandemic. Aware also of the importance of having the best professionals, they strive to find the best formulas to attract talent and professional development in an advanced technological environment.

TECHNOLOGY FORECASTING

One of the characteristics that defines the Spanish railway industry is its advanced position in R&D. Together with the advances already implemented in networks around the world, experts are constantly working to know new trends and needs in the sector. The objective of this technology forecasting is to collect information, stay up-to-date and capture data from the exterior and from the organisation itself to then thoroughly analyse them and turn them into knowledge.

This competitive intelligence process is key to making decisions, detecting potential threats, and identifying new opportunities for innovative ideas. A key factor that defines the innovation strategy.

INTERMODALITY: TOWARDS THE INTEGRATION OF DIFFERENT TYPES OF TRANSPORT

The articulation of the railway with other means of transport is one of the main areas on which most of the work will be focused within the coming years. Travel optimisation and progress on sustainable mobility are being sought with the integration of the different ways to reach a final destination.

Spanish companies have been working for years to make this connectivity between different types of networks effective through the implementation of numerous technologies and systems. These include combined ticketing, real-time traffic information systems and applications, advanced control centres for operators, etc.

The ultimate goal is to contribute to improving the competitiveness of public transport, improving road congestion in cities, and also boosting goods.

COVID 19

The current context has highlighted the efficiency of public transport in responding to the new environment. Thanks to the collaboration with the main stakeholders of the Spanish industry, passengers have been able to continue to travel by train comfortably and safely throughout the many cities around the world. This continuity, with every guarantee for the passenger, has been made possible through the application of numerous developments in fields as diverse as operations management, information systems or access control.

DIGITALISATION

Technological development has brought with it a breakthrough in the digitalisation of the railway sector. The new tools have introduced great advantages such as the possibility to analyse a wealth of data to know in real time the proper functioning of the train fleet and transport infrastructures and to perform predictive maintenance of high reliability.

The role of the industry in this change is of great relevance. Among them, Spanish companies have earned a technological reputation around the world and are among the top positions in aspects such as artificial intelligence, Internet of things, blockchain, automated management, etc. All this, with the aim of contributing to intelligent, more sustainable and safe mobility.

INNOVATIVE ECOSYSTEMS

The richness and variety of Spanish railway companies is based on great strength, collaboration, and gear around innovation. They are knowledge partners which promote joint actions and R&D synergies with other stakeholders connected to the sector.

Much of their success is that they have prioritised advances and technological knowledge. To that end, innovation environments and technology centres have been promoted together with other bodies such as administrations, institutions, or universities.

These innovative ecosystems respond to a new collaborative industrial culture that helps identify lines of action and achieve new challenges.

TALENT ATTRACTION

Advances in the railway sector and transport trends increasingly require highly specialised professionals in different areas.

The Spanish industry, aware of the need to attract and maintain talent, gives training and professional development plans a priority role. This strategy provides companies with competitive and highly skilled and motivated teams.

SUSTAINABILITY

One of the areas where Mafex partners play the biggest role is in terms of sustainability. These companies, very committed to the environment, have introduced production processes where climate neutrality is sought. Industry 4.0 leverages new technologies to digitalise its processes and minimise its carbon footprint.

In addition, one of the focal points of its developments specialises in solutions and services to make railway transport the means of the future, the best option to travel and, in turn, to take care of the planet. This vast portfolio includes a wide range of services and products ranging from the design of green infrastructures to the manufacture of state-of-the-art rolling stock with lighter equipment and a longer life cycle.

Progress has also been made in the use of renewables as a source of energy supply and in all types of systems (control, fleet management, signalling, energy storage, safety, etc.). All of which is coupled with the participation in research projects to make further progress in this area.

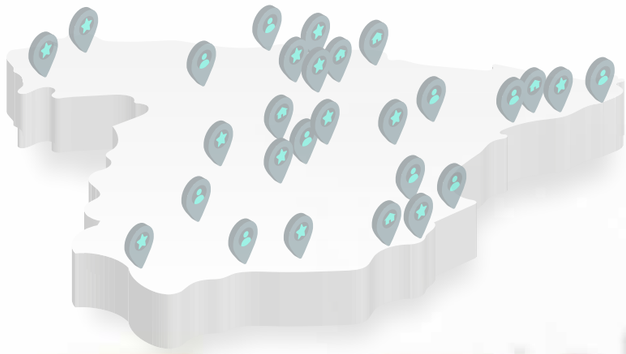
Spanish engineering, preferred partner in transport projects

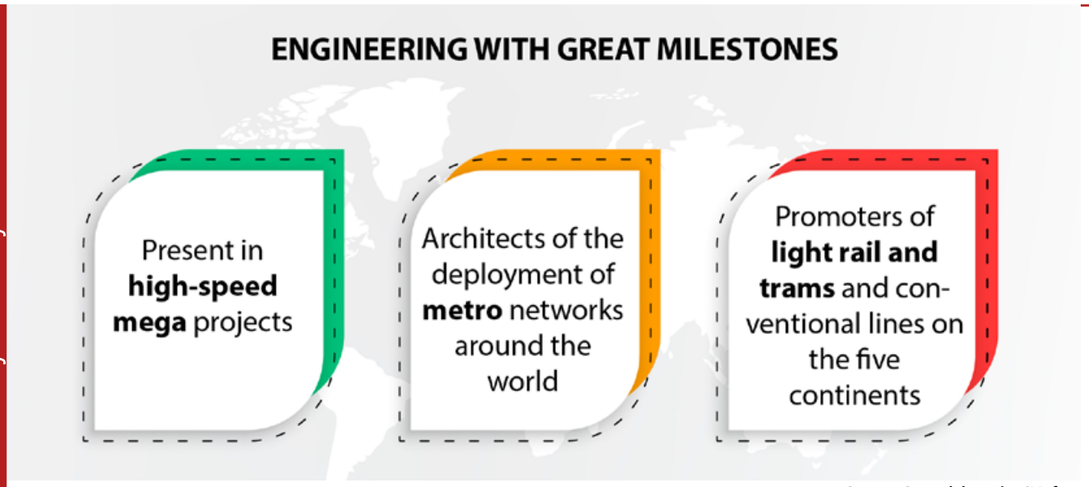
THE ROLE OF SPANISH ENGINEERING IN THE DESIGN OF LARGE INFRASTRUCTURES AND THE DEVELOPMENT OF TRANSPORT PLANS TRANSCENDS BORDERS. ITS TECHNICAL EXPERTISE IS REQUESTED BY ADMINISTRATIONS ON THE FIVE CONTINENTS IN ORDER TO DEPLOY THE MOST MODERN, EFFICIENT AND SUSTAINABLE NETWORKS UNDER THE GUIDANCE OF THE BEST EXPERTS.

The largest infrastructures in recent years have relied on Spanish engineering for its implementation. The extensive experience of these professionals has been exported to high-speed projects, metros, trams, and conventional lines. This widespread presence shows its leadership, based on the combination of experience, knowledge, and innovation.

Successes include a wide range of European countries and markets of particular complexity such as the Middle East, India, Australia, the United States or Canada. In addition, they have a consolidated track record in Latin America, where they have assisted with the planning of transport programmes of the main cities and numerous metro networks.

One of their great differentiating values is their ability to bid for large-scale and complex works, based on their experience and ability to ma-





Source: Own elaboration/Mafex.

COMPREHENSIVE ADVISORS

Comprehensive engineering services: Design, construction, implementation, operation, and maintenance.

Extensive track record in investment management (Project & Construction Management)

Strategic alliances to bid for large infrastructure projects. Participation in public-private partnerships (PPPs).

High technical quality solutions and high R&D component

Highly qualified human capital: Education and training

Management and operational consultancy.

Design and supply of intelligent transport systems.

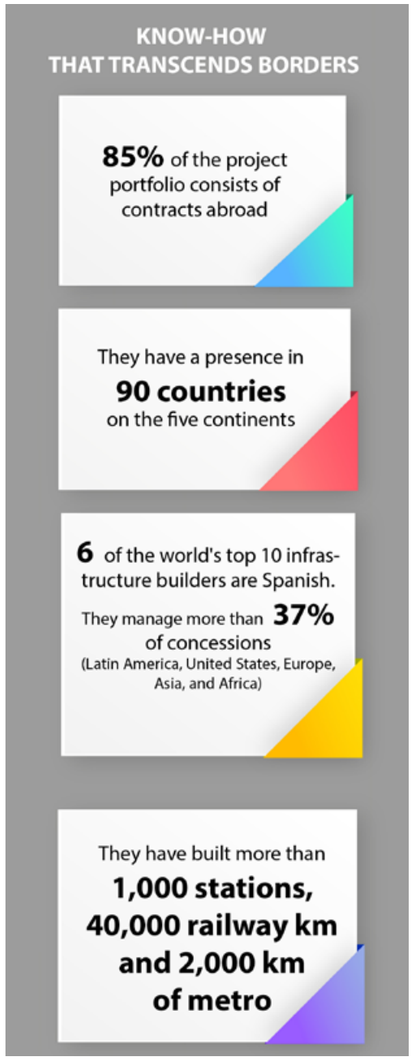
The investment in R&D has led to the creation of a specialised portfolio with flexible solutions adapted to the needs of each client.

nage mega projects. This strength has made Spanish engineers the architects of the implementation of the main railway infrastructures on the five continents.

In addition, they have become the preferred technical advisors to respond to the challenges of new sustainable mobility. A transformation that administrations and operators rely on to build modern networks and optimise investment from an efficiency point of view.

High technological component

The development of high technological component systems is another of its main features. The investment in R&D has led to the creation of a specialised portfolio with flexible solutions adapted to the needs of each client.

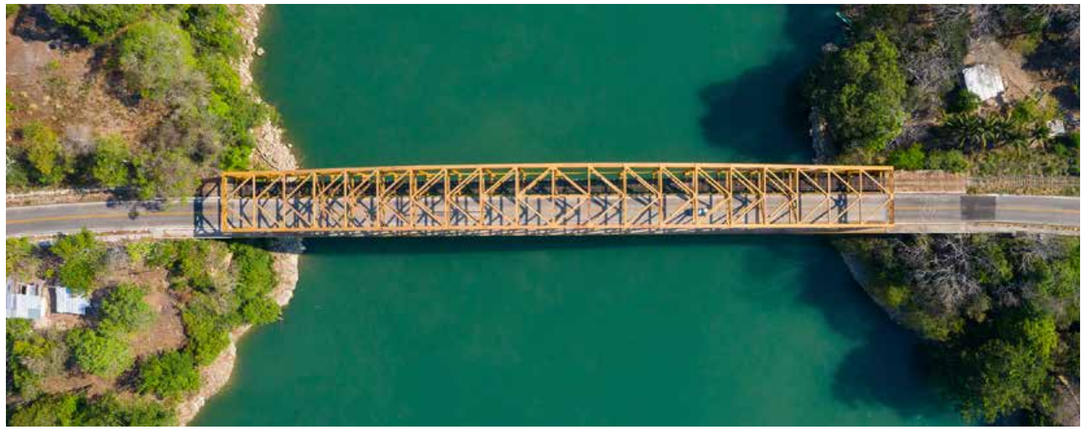


Source: Tecniberia/Mafex.

SOME MAFEX MEMBERS WITH ENGINEERING PROJECTS

TYPSA

The Mexican National Fund for the Promotion of Tourism (FONATUR) has entrusted TYPSA to provide technical advice for the overall project structuring and the supervision of the basic engineering design for the 1,584 km railway line, organised in seven sections that connect the states of Chiapas, Tabasco, Campeche, Yucatan and Quintana Roo with a total of 29 stations. The contract also includes the overall project and construction management of sections 1 to 5.



TYPSA

Dhaka is the sixth most populous city in the world, with 21 million people, and is expected to reach 28 million in 2030. To contribute to greener and more sustainable development, the consortium led by TYPSA has carried out the feasibility studies and is now designing the underground metro network that connects the main areas of Dhaka and its metropolitan area, with an approximate length of 90 km and a total capacity of 60,000 passengers per hour and direction.

INECO

Fondo Nacional de Fomento al Turismo (FONATUR) awarded the consortium formed by Renfe and the engineering Ineco and its subsidiary Inecomex (MITMA Group); and the German DB Engineering & Consulting the "shadow" operation of the Tren Maya. This consortium will provide advice to ensure the operation and maintenance of the project, including supervision of the manufacture, delivery and commissioning of the rolling stock and all systems until the entry into commercial service of this project that will connect the main regions of the Yucatan Peninsula in about 1. 550 km: Campeche, Chiapas, Tabasco, Quintana Roo and Yucatan.

The shadow operation services have a cross-cutting component ensuring the proper functioning of the infrastructure in the development of which numerous Spanish construction and engineering companies are already involved.

IDOM

IDOM has accumulated experience over more than 20 years, designing conventional, freight and high-speed rail projects. During this time the firm has developed Feasibility Studies, Detailed Design and carried out the Supervision of Works of more than 7,000 km of railway lines in different countries all over the word.

IDOM is now the main design firm working on Rail Baltica. Currently, the firm is carrying out the design and supervision during the construction of 393 km. On top of that, IDOM, in alliance with the Mexican engineering company Dirac, develops the Executive Project of the Maya Train in its Section 1, over 200 km of railway infrastructure for freight and passengers. This project will link the towns of Palenque and Escárcega in the States of Chiapas and Campeche respectively, in the Yucatan Peninsula.

IDOM

IDOM's extensive experience worldwide, having developed 1,500 km of metro and urban transport; as well as the demonstrated capacity of their design teams make it a benchmark when it comes to facilitating urban connectivity in technologically demanding environments.

IDOM develops the Engineering Services Contract for the implementation of the MetroLink, the first metro line in Dublin, will link the north and south of the city along 26 km. Also, IDOM is designing a tram / LRT networks in Greater Copenhagen and the City of Odense, Denmark, a pioneering country in public transport. The designs are sustainable, thanks to multidisciplinary teams, aware of the importance of technological evolution. Implementing collaborative methodologies such as BIM, for a collaborative and effective design.

WSP SPAIN

Connecting rather than traversing. This is a concept that WSP Spain applies to all the transport infrastructures it designs. In the Middle East, through megaprojects such as the Etihad Rail or the Riyadh Metro. In Central America, where the Tren Maya will link Mexico's main tourist centers and its rural areas, opening up opportunities for trade and social development. In California's high-speed lines or those connecting Dallas and Houston.

In Chile, where WSP Spain, together with INECO, has developed the new railway technical regulations. In the Nordic countries, through urban projects such as the extension of the 'Blue line' of the Stockholm Metro. Or in Eastern Europe, in infrastructures such as the new railway line that will connect Kicevo (Macedonia) with Albania.

AVE: example of international benchmark to implement new networks

THE DEPLOYMENT OF THE HIGH-SPEED NETWORK IN SPAIN HAS BEEN ONE OF THE GREAT MILESTONES OF ITS INDUSTRY. THE LAUNCH OF ONE OF THE BEST SYSTEMS IN THE WORLD HAS EARNED IT THE PASSPORT TO INTERNATIONAL SUCCESS IN THE AWARDING OF NEW PROJECTS

The Spanish high-speed network is regarded as being on the podium among the top three in the world, not only in extension with its 3,240 kilometres, but also in quality of services, efficiency, and technological resources. Behind this deployment is the country's railway industry, which has collaborated in all phases of each new line. One of the keys to success has been the synergy and joint work of multinationals, Spanish manufacturers and SMEs to launch the most pioneering solutions and turn this network into a global benchmark in resources and infrastructures. .

One of the keys to success has been the synergy and joint work of multinationals, Spanish manufacturers and SMEs.

In this process they have faced infrastructure challenges that they have successfully met. The peculiarities of the orography have triggered the construction of large tunnels in long sections to overcome the technical difficulties of the terrain.

Among them, for example that of Guadarrama, of 24.9 kilometres, which is among the longest in the

Source: Omio/UIC.

KEY SPANISH HIGH-SPEED PROJECTS IN THE WORLD

Baltic Rail (Baltic Countries)
The megaproject has Spanish engineering and signalling firms in its development. With this new connection the aim is to join by high-speed, in one hour and 42 minutes, the countries of Finland, Estonia, Latvia, Lithuania and Poland.

Mecca-Medina High-Speed Line (Saudi Arabia)
The most important infrastructure project in the Arab world in recent decades has been developed by the Spanish-Saudi consortium 'Al Shoula'. It involves 12 Spanish companies. The line is 450 km long.

Follo Line (Norway)
This is Norway's largest transport infrastructure civil engineering work. The 22.5-kilometre line will link Oslo with Ski. The Spanish know-how has been required for civil engineering and electrification work. Difficult geological challenges have been overcome for rock hardness and major design innovations have been incorporated.

Oslo Airport Express Line (Norway)
The new high-speed trains for the line connecting the city of Oslo to the airport have a Spanish hallmark.
State-of-the-art technology that transcends borders also in mature markets such as the European.

High-speed in California (United States)
This high-speed line also has the knowledge of the best experts. In this network there is help from the stage of first feasibility studies up to its construction. The route will connect the most important regions of the state and allow its passengers to travel from Los Angeles to San Francisco in 2 hours and 40 minutes.

Houston-Dallas Connection (United States)
The project represents the largest contract obtained by a Spanish public company abroad. This 386-kilometre route will unite the cities of Dallas-Forth Worth and Houston, Texas in less than 90 minutes. The award includes the design and advisory phases as well as the operation phases of the line, between 2026 and 2042.

Ankara-Istanbul high-speed leg (Turkey)
Several Spanish companies also participated in the front line of these sort in Turkey, not only in the design and engineering phase, but also in the construction, electrification and signalling as well as the provision of rolling stock. The renovation of a 533-kilometre stretch has been one of the most ambitious works in the country's transport infrastructures.

Halkali-Kapikule high-speed project (Turkey)
Spanish companies are also present in the Halkali-Kapikule Line project.

HS2 (Great Britain)
Spanish technology and know-how are also present in the Great Britain. In this country, several Spanish companies are part of the design, engineering and preparatory work for the implementation of the high-speed line that will link the cities of London and Birmingham in 2026 in a first phase. In a second phase, the network will reach Manchester and Leeds in 2033.

Rome-Naples High-Speed Line (Italy)
This important network also had Spanish expertise. This collaboration included the adaptation of 400 kilometres of single track, four stations, mobile switchers for high-speed and the laying of 184 kilometres between Rome and Naples. The line is part of Corridor Number 1 (Berlin-Palermo) of the Trans-European Transport Network.

New Delhi-Kolkata High-Speed Line (India)
India's transport administrations have relied on Spanish advice to analyse the feasibility of a high-speed line that links the cities of New Delhi and Kolkata. Previously they were also commissioned a similar study to analyse the project of another connection of these characteristics between Haldia and Howrah.

Tashkent-Samarkand Line (Uzbekistan)
Central Asia's first high-speed line between the cities of Tashkent and Samarkand features a modern Spanish rolling stock covering a 340-kilometre stretch.

Source: Own elaboration/Mafex.

world, or viaducts with the largest concrete arches in Europe, such as the one built on the Almonte river, on the high-speed line Madrid - Extremadura - Portuguese border. In addition, other important milestones have been achieved, such as being the European country with the highest degree of implementation of the ERTMS (European Rail Traffic Management System), which is already available in more than 2,000 kilometres of the network.

Global leadership

The consolidated experience gained in building this powerful network now translates into a global leadership of its industry. Spanish companies have been chosen to carry out the planning and construction of the world's largest high-speed projects. Among them, for example, Rail Baltica, which will be the network that will link by rail Finland, Estonia, Latvia, Lithuania with Poland or the ones with those characteristics in the United States, such as the CHSR (California High-Speed Rail) or the Dallas Houston HSR. Other projects led by Spanish companies are the connection Mecca-Medina (Saudi Arabia), Ankara-Istanbul (Turkey), Oslo-Ski (Norway), Milan-Naples (Italy), Follo Line (Norway), HS2 (United Kingdom) or Madrid-Barcelona-Lyon-Paris (Spain-France. Spanish companies have been chosen to carry out the planning and construction of the world's largest high-speed projects).
In addition, the Spanish network has been visited in recent years by representatives of administrations, organisations and companies from all over the world to learn first-hand how one of the most emblematic systems works. In addition to the awards of implementation and maintenance, these companies are also selected to carry out pre-feasibility reports of new lines as in the case of countries such as Egypt or India.

> Spanish companies have been chosen to carry out the world's largest high-speed projects.

HIGH-SPEED, MAIN SPANISH MILESTONES

- Spanish high-speed technology is present in more than 10 of the world's leading projects.
- The country exports its own innovation such as that developed by Adif: the catenary C-350.
- More than 5,000 kilometres of ERTMS in service have been developed by Mafex companies, more than 2,900 outside Spain.
- The Spanish DaVinci system is the technology that controls train traffic on high-speed lines such as Mecca-Medina.
- The most demanding clients rely on Spanish high-speed solutions. United States, United Kingdom, India, Italy, Norway, Baltic Countries, Turkey or Uzbekistan.
- Rolling stock manufacturers have introduced in the market two of the most innovative high-speed platforms.

Source: Own elaboration/Mafex.

SOME MAFEX MEMBERS WITH HIGH-SPEED PROJECTS

ARCELORMITTAL

Rails for High-speed railways, with speeds over 350 km/h, are one of the most demanding steel products that must fulfil a multitude of technological requirements. ArcelorMittal has developed state-of-the-art systems for rails production and control that allow our rails to comply the strictest requirements.

ArcelorMittal has been producing high speed rails since 1990, with more than 1.500.000 tons supplied of this product, in Spain (Palencia-León line, Madrid-Castilla La Mancha, Comunidad Valenciana-Murcia, etc.) and for the large high-speed infrastructure projects in Europe and Worldwide (Germany, Denmark, Morocco, Turkey, Mexico). At present, it can supply individual bars up to 120m. long with maximum reliability, geometrical precision, strict flatness and the highest quality on the market.

CAF

CAF was the supplier of the first high-speed trains on the Ankara - Istanbul line operated by the Turkish State Railways (TCDD). These units can reach a maximum speed of 250 km/h and their interior design guarantees a high degree of comfort for their users. The trains include cars with a restaurant area, seats equipped with screens with an entertainment system in business class and WCs adapted for people with reduced mobility.
Furthermore, CAF has high-speed projects in Spain, where it has supplied series 120 and 121 trains for RENFE's high-speed services. Currently, CAF is manufacturing high-speed units of its Oaris platform for the Norwegian operator Flytoget.

THALES ESPAÑA

Thales Spain was the first supplier of ETCS systems in Turkey and since 2008 is one of the main players in the development of Turkish high speed. The company has a subsidiary company based in Turkey since 2009 with more than 140 local professionals experts in signaling who are responsible for the implementation of all activities in the country together with the Spanish teams.

Thales is present in different phases and stations of the Ankara-Istanbul high-speed line, more than 400 kilometers are equipped with the signaling systems and the ETCS level 1 and 2 train protection system. Phase I of the line was commercial commissioning by Thales Spain in March 2009, and Phase II in July 2014.

The company is also in charge of both corrective and preventive maintenance, along this line, for the signaling systems installed, ETCS automatic train protection and communications.

ALSTOM

Alstom Spain's latest generation technology is present in one of the most relevant high-speed railway networks on the international scene: the Haramain line, which connects Mecca and Medina's cities. This line counts with traction equipment developed at the center of Trapaga (Vizcaya), responsible for the design, supply, and commissioning of converters, bogies, and TCMS. The center also supplies equipment for the HST operated by Trenitalia in the line between Turin and Naples.

In addition, Alstom Spain also supplied the onboard equipment installed on these trains, incorporating the ERTMS technology, which allows both the validation of new track projects and routine inspections among the entire rail network. With over 17 years of experience in installing ERTMS solutions, Alstom is one of the world's pioneers in developing and implementing this technology and a world leader in onboard equipment.

IDOM

Rail Baltica is a large-scale project that will connect the Baltic States (Lithuania, Latvia, Estonia), Poland and, indirectly, Finland with the current European rail network.

For this challenge, IDOM has been chosen in six of the contracts to carry out the detailed technical design and design supervision during the construction. In total, these contracts total 393 km of high-speed rail, including stations, tunnels, and up to 179 structures, one of which is the 1.7 km long bridge over the Neris River, which will become the longest railway bridge in the Baltic countries. The new railway line is designed with a track gauge of 1435 mm, in line with all the requirements of the TSI (Technical Specifications for Interoperability).

In addition, this transport system will reach 249 km / h for passenger traffic and 120 km/h for freight traffic. The project is being developed in a BIM environment.

IDOM

In over 20 years, IDOM has developed almost 50 high-speed rail projects in Spain, in total, some 2,000 km. This work has involved not just design but also informative studies, basic and construction design, work supervision and technical assistance. IDOM has developed over 130 km of high-speed rail tunnels and more than 70 km of viaducts. One of the most internationally recognized works has been the Viaduct over the Almonte River, on the Madrid-Extremadura high-speed rail line, an innovative and outstanding structure, 996 m long, with a 384 m span, breaking three world records.

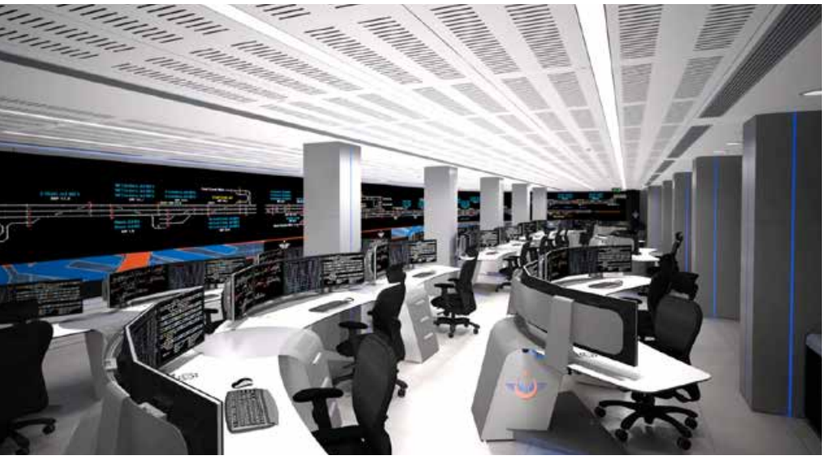
IDOM, in collaboration with Arenas y Asociados, designed and carried out technical assistance for the construction management of this singular structure. The international awards received include the Gustav Lindenthalm Award from the International Bridge Conference (Maryland, 2017) or the Maximum honor in the annual awards for Excellence in Concrete Construction of ACI (Las Vegas, 2018), among others.

SOME MAFEX MEMBERS WITH HIGH-SPEED PROJECTS

INDRA

As the technology partner on the Haramain project, Indra has been responsible for developing and implementing fixed and mobile telecommunications systems, security systems, technology management systems, the control center (OCC) and ticketing solutions (AFC) for the high-speed railway in Saudi Arabia.

Indra also has supplied driving and operating simulators, passenger information systems, electronic panels and station signage, online information, public address systems and much more.



INDRA

In Turkey State Turkish Rail (TCDD) awarded Indra a contract to implement a planning system for its entire rail network, as well as a high-speed train management system.

Indra set up a new control center in Ankara, equipped with cutting-edge technology, from which operational planning takes place for the country's 12,000 km railroad network, both conventional lines and high-speed tracks. Furthermore, the DaVinci system, part of its Mova Traffic line of solutions, support comprehensive high-speed rail traffic management in Turkey, that will achieve 2,000 km.

INECO

Ineco is participating in the development of the Rail Baltica project, a modern high-speed rail corridor that will link the Baltic republics to the Trans-European Transport Network (TEN-t). The new infrastructure will connect Poland to Finland via Estonia, Latvia and Lithuania with an 870-kilometre-long double-track railway line.

The company is leading, in consortium with Spain's Ardanuy, the design and supervision of a 94-km European gauge section linking the city of Vangazy, northwest of Riga, with the Estonian border. A technical challenge that includes 13 bridges, 36 road viaducts and 3 railway viaducts, among other infrastructures.

In addition, together with IDOM, Ineco has carried out the technical design of the 56-kilometre high-speed section that crosses the city of Riga and has developed works related to the maintenance infrastructures and the electrification of the network.

SIEMENS

The Marmaray railway line (Turkey), on which commuter, metro and high-speed trains as well as a freight link converge, has a total length of 76 kilometers and connects the Turkish cities of Gebze in Asia and Halkali in Europe through the 14-kilometre tunnel under the Bosphorus Strait.

A project in which Siemens Rail Automation, in joint venture with OHL, in charge of the civil works, has installed the ERTMS (European Traffic Management System) and CBTC (Communications-Based Train Control System) signaling and control systems, as well as the communication systems and the SCADA system (based on Siemens WinCC), in addition to the CTC (Control-guide Rail9000).

SIEMENS

In more than 25 years of High Speed in Spain, Siemens Mobility has implemented its electrification, signaling and rolling stock technologies on most of the lines currently in service.

In a joint venture with Telice, it is responsible for the electrification of the Valladolid - Palencia - León high-speed line, where Siemens installed the overhead line, among other elements, as well as the maintenance works for the traction electrical substations and associated auto-transformer centers.

Siemens has also electrified the Madrid - Seville, La Sagra - Toledo, Segovia - Valdestillas, Motilla - Valencia, Vigo - Coruña and Valladolid - León - Burgos high-speed lines.

In terms of signaling, Siemens Mobility has installed its systems on the Lleida - Barcelona high-speed line, as well as on other sections of the Barcelona - Figueres, La Sagra - Toledo, Segovia - Valdestillas, Madrid - Valladolid, Olmedo - Zamora - Pobla de Sanabria and Ourense - Santiago lines.

Currently, 26 Velaro E trains supplied to Renfe operate on the Madrid - Barcelona high-speed line.

Urban transport: Tailor-made solutions for each city

Public transport networks are more and more committed to the railway as the centre of mobility. In this evolution, administrations and operators want the advice from the best experts to implement modern, sustainable, and high efficiency systems. The Spanish industry has become the main ally of these projects in countries on the five continents. A position supported by its work in the implementation of the many and diverse systems that have been established in the main cities of Spain. The technological solutions and services of these companies have crossed thousands of frontiers and are located in urban centres on all continents. In addition, they have led the implementation of comprehensive transport plans and commuter and medium-distance railway

EUROPE

Karlsruhe LRV (Germany)
Berlin metro (Germany)
Colonia metro (Germany)
Jena tramway (Germany)
Erfurt tramway (Germany)
Augsburgo tramway (Germany)
Chemnitz tram train (Germany)
Gmunden Tramlink (Austria)
Viena tramway (Austria)
Brussels metro (Belgium)
Lijn-Amberes and Gante tranway (Belgium)
Lieja tramway (Belgium)
Copenhague tramway (Denmark)
Odense tramway (Denmark)
Helsinki metro (Finland)
Besacon tramway (France)
Nantes tramway (France)
Saint Etienne tramway (France)
Tbilisi metro (Georgia)
Atenas tramway (Greece)
Utrecht tramway (Holland)
Amsterdam tramwa (Holland)
Amsterdam metro (Holland)
Bucartest metro (Hungary)
Palermo tramway (Italy)
LAN metro (Afragola-Naples line) (Italy)
Roma metro (Italy)
Milán tramway (Italy)
Tranvía Cosenza tramway (Italy)
Naples metro (Italy)
Cagliari tramway (Italy)
Dublin-Metro link (Ireland)
Cork tramway (Ireland)
Luxembourg tramway (Luxembourg)
Oslo tramway (Norwey)
Warsaw tramway (Poland)
Mondego metrobus. Coimbra (Portugal)
Lisboa metro (Portugal)
Sheffield tram train (United Kingdom)
Docklands light rail. London. (United Kingdom)
London metro (United Kingdom)
Birmingham tramway (United Kingdom)
Tram train for "Wales and Borders" (United Kingdom)
Glaswo metro (United Kingdom)
Belgrade tramway (Serbia)
Stockholm metro (Sweden)
Lund tramway (Sweden)
Lugano-Ponte Tresa Tram train (Swiss)
Limmattal light rail (Swiss)
Berna tramway (Swiss)
Basilea tramway (Swiss)
Ankara metro (Turkey)
Izmir metro (Turkey)
Istanbul metro (Turkey)
Bucarest metro (Romania)

AMERICA

Buenos Aires metro (Argentina)
San Isidro tramway (Argentina)
East line Fortaleza-Metrofor metro (Brasil)
Sao Paulo metro (Brasil)
Rio de Janeiro metro (Brasil)
Salvador monorail (Brasil)
Porto Alegre metro (Brasil)
Cuiaba tramway (Brasil)
Fortaleza metro (Brasil)
Santos tramway (Brasil)
Eglinton Crosstown light rail. Toronto (Canada)
Ottawa light rail (Canada)
Santiago de Chile metro (Chile)
Valparaíso metro (Chile)
Medellín metro (Colombia)
Bogota metro (Colombia)
Ayacucho tramway (Colombia)
Medellín Metrocable (Colombia)
Quito metro (Ecuador)
Boston light rail (United States)
New York metro (United States)
Washington metro (United States)
Kansas City tramway (United States)
Cincinnati tramway (United States)
Houston tramway (United States)
Miami metro (United States)
MetroRiel (Guatemala)
Guatemala metro (Guatemala)
Guatemala electric train (Guatemala)
Ciudad de México metro (Mexico)
Tren ligero de México (Mexico)
Tren ligero de Guadalajara (Mexico)
Metro de Monterrey (Mexico)
Metro ligero de Puebla (Mexico)
Metro de Panamá (Panama)
East Side Access project (New York) (United States)
Lima metro (Peru)
Santo Domingo metro (República Dominicana)
Caracas metro (Venezuela)
Maracaibo metro (Venezuela)

AFRICA

Argel metro (Argelia)
Constantina tramway (Algeria)
Ouargla tramway (Algeria)
El Cairo metro (Egipto)
El Cairo monorail (Egipto)
Casablanca tramway (Morocco)
Mauricio tramway (Mauricio)

MIDDLE EAST

Riad metro (Saudi Arabia)
Technology for pricing control. Public Transport network of Riad. Saudi Arabia)
Ouargla tramway (Algeria)
Argel metro (Algeria)
Doha metro (Qatar)
Lusail tramway (Qatar)
Dubai tramway (The United Arab Emirates)
Abu Dabi tramway (The United Arab Emirates)
Mascate public transport master plan(Oman)
Astana tramway (Kazakhstan)
Metro master plan for Kuwait city (Kuwait)
Bangkok Gold Line monorail (Thailand)

ASIA AND OCEANIA

Parramattalight rail (Australia)
Sydney metro (Australia)
Canberra tramway (Australia)
Newcastle tramway (Australia)
Ho Chi Minh metro (China)
Shanghai metro (China)
Seul metro (Korea)
Manila metro (Philippines)
New Delhi metro (India)
Chennai metro (India)
Nagpur metro (India)
Mumbai metro (India)
Dhaka metro (India)
Kochi metro (India)
Bangalore metro (India)
Ahmedabad metro (India)
Palembang tramway (Indonesia)
Kuala Lumpur metro (Malasia)
Jurong Region Line. Singapur metro (Singapur)
Bangkok monorail (Tailandia)
Kaohsiung tramway (Taiwan)
Almaty tramway (Kazakhstan)
Hanoi light rail (Vietnam)

METRO AND LIGHT RAIL: MAIN SPANISH PROJECT

Source: Own elaboration/Mafex.

connections that help improve mobility in and out of the cities.

The commitment to their advice and implementation of urban transport networks is based on the high ability they have shown in recent years.

Proof of this are projects such as the Riyadh Metro, which has been characterised by its great complexity from a technical point of view; also the Lima metro or the Toronto metro, among a long list that goes around the world. In addition, they have been the main character of the mobility programmes of large cities such as the Master Plan of Public Transport of Muscat (Oman), or the Master Plan of the Kuwait City Metro (Kuwait), among others. On the other hand, the experience gained in the implementation of the longest automated metro line in Europe, the L9 in suburban Barcelona, has also become international. Many of the contracts include automatic driving systems and rolling stock families for these lines. These include, for example, the Singapore, Sydney, or Amsterdam Metro. Singapur, Sídney o Ámsterdam.

SOME OF THE MAJOR RECENT INTER-CITY PROJECTS

- Belgrano Sur Line of Buenos Aires (Argentina)
- Inter-city Train Toluca-Mexico DF (Mexico)
- Caribbean Regional Train (Colombia)
- Mayan Train (Mexico)
- First commuter train Regiotram (Colombia)
- Suburban train of Monterrey (Mexico)
- Medellin - Uraba Region Railway Line (Colombia)
- Marmaray Project (Turkey)

Source: Own elaboration/Mafex.

The commitment to their advice and implementation of urban transport networks is based on the high ability they have shown in recent years.

DID YOU KNOW?

- 35% of South America's metro networks and 25% of European ones have Spanish technology.
- More than 1/4 of the metros in Europe have Spanish technology.
- Spanish solutions such as tram-train are increasingly demanded by cities around the world.
- The Spanish industry ranks at the top as advisor and developer of metro and tramway systems.
- Our companies have implemented the most advanced "Smart" operational control centres.
- Smart Stations: Spanish companies have created pioneering systems and technologies to manage the stations of the future.
- They present a unique value proposal with comprehensive transport solutions on the five continents.
- In railway safety and maintenance, very rigorous subsectors, they are also at the top.

Source: Own elaboration/Mafex.

SOME MAFEX MEMBERS WITH URBAN TRANSPORT PROJECTS

ARCELORMITTAL

With a growing number of people living in urban areas, cities need various means of transport to reduce congestion. Tram and Light systems have been rapidly expanding worldwide during recent years as they provide innovative traffic solutions due to its best accessibility, low construction costs and limited environmental impact when compared to other transport alternatives.

ArcelorMittal has supplied rails for infrastructure projects in Europe and Worldwide as the Réseau express métropolitain in Montreal, Canada; the Manila Metro Rail Transit Line 7; the first phase of Kaohsiung's Light Rail System in Taiwan, and metro projects as Sydney Metro, Australia's largest public transport infrastructure; 4,5 y 6 Riyadh Metro lines; Metro Medellin; the Northern Line Extension in London and many other infrastructure projects.

CETEST

In recent years CETEST has actively participated in metro network projects by conducting homologation test campaigns. CETEST has carried out structural tests (carbody strength and bogie tests,...) and also on-track tests, such as simplified dynamic behaviour test (also including stationary tests using portable platforms), comfort monitorisation, EMC tests, noise tests, among others. Some examples of these projects range from Australia (Metro Sydney), Asia (Metro Singapore, Metro Taipei, Metro Dubai or Metro Riyadh) to Africa (Metro Algiers). It is worth mentioning the activity of CETEST in India, having tested the subways of Jaipur, Calcutta, Kochi, or Lucknow. In Europe: Metro Madrid, Seville, Stockholm, Helsinki, Copenhagen, Bucharest, Brussels ... And, finally, on the American continent, metros have been tested in cities as Panama, Medellín, Mexico, Sao Paolo, Chile, Quito ... For these projects CETEST has worked with clients such as Alstom, Caf, Hyundai Rotem, Bombardier and Hitachi, among others.
Some examples prove the global deployment of CETEST in urban transport issues, with projects from Australia (Metro Sydney), Asia (Singapore, Taipei, Dubai or Riyadh metro, apart from almost all of the new metro in India) to Africa (Algiers Metro). And of course, extensive presence in Europe (Metro Madrid, Seville, Stockholm, Helsinki, Copenhagen, Bucharest, Brussels ...) and in the American continent (Panama, Medellin, Mexico, Sao Paolo, Chile, Quito Metros ...). In these projects CETEST has worked with practically all the major manufacturers, and has among its clients Alstom, Caf, Bombardier, Hitachi and Hyundai Rotem, among others.

CAF SIGNALLING

In 2017, CAF Signaling delivered the first ATO over ETCS project, with the track and onboard solution. A total of 30 vehicles equipped with ERTMS Level 2 to cover 57 kilometers of railway between Mexico City and Toluca. Since then, numerous implementation projects and collaborative pilot projects have been carried out, in which the client experiences first-hand what automatic operation is, its implications and how it benefits from the results. Among them, projects in New Zealand for Auckland Transport, where dynamic tests are being carried out on the Southern line.

In addition, in the Netherlands the operator Nederlandse Spoorwegen has been collaborating with CAF Signaling since 2019, studying through multiple demonstrators how to respond to the global automation needs in the country.

CAF

CAF is one of the leaders in the implementation of comprehensive urban mobility systems. The company has extensive experience in supplying metros and trams around the world. CAF's Inneo metro and Urbos tram platforms are adapted to the needs of each customer and they meet the most demanding requirements in sustainability, safety and passenger comfort.

More and more cities are opting for CAF's urban transport solutions: Madrid, Stockholm, Oslo, Brussels, Barcelona, Istanbul, Sao Paulo, Sydney or London, among others. In Luxembourg, for instance, CAF has supplied Urbos trams equipped with Greentech technology for catenary-free operation.

STADLER

Stadler strengthens its position as a provider of sustainable and accessible urban mobility solutions thanks to the light rail vehicle platforms designed and manufactured at the Valencian plant, the TRAMLINK and CITYLINK.
TRAMLINK is a modern, modular, multi-articulated and 100% low floor light rail vehicle. It features innovative real-axle bogies that ensure a quiet and comfortable ride and maximum seating capacity over the bogies, without the need for ramps or steps.

The TRAMLINK was the first 100% low-floor LRV to operate in Latin America. 22 vehicles have been circulating successfully for 5 years in Santos (Brazil). But it has been sold mainly in Central Europe, one of the main and the most demanding tram markets. Stadler Valencia has sold around 150 TRAMLINK in the last two years in various cities in Austria, Germany, Switzerland and Italy.

CITYLINK is a modular, barrier-free, light rail vehicle family specially designed to connect the city center with its metropolitan area without transhipments, providing a safe and highly comfortable ride. They cover tramway applications and full train regional operations at 100km/h

With nearly 200 CITYLINK sold in 5 countries, Stadler Valencia has become a benchmark in the tram-train segment, as shown by the 75 LRV supplied to Karlsruhe, the cradle of tram-trains. In addition, CITYLINK vehicles have been chosen for the train-tram pilot project in the UK in Sheffield, which has been operating successfully for 2 and a half years, and in Hungary, where it will start running in summer.

This family can be perfectly adapted to the infrastructure of each city and the demand needs of each operator. There are references in metric gauge, such as FGV trains for the province of Alicante, and in UIC gauge. As for the traction chain, there are diesel CITYLINK in Puebla (Mexico); single-voltage LRV in Karlsruhe or dual-voltage LRV in Sheffield; dual-mode (electric + diesel) vehicles in Chemnitz, Alicante or Szeged; and even hybrid (electric + batteries) vehicles like the last order for Wales & Borders.

SOME MAFEX MEMBERS WITH URBAN TRANSPORT PROJECTS

ALSTOM

With 80% of its activity dedicated to exports in the last years, the Santa Perpètua plant (Barcelona), from where complete trains are manufactured, is a global reference for the manufacture of urban and suburban vehicles, such as streetcars (Athens, Frankfurt, Qatar, among others), metros (Barcelona, Panama, Singapore), high-capacity suburban (Luxembourg) and regional (Chile), among others.

With a surface area of 360,000 m² (built area of 65,000m²) and more than 900 employees, Alstom's industrial center was the first factory in the sector in Spain to opt for 4.0 technologies. The plant is developing an ambitious digitalization and growth plan, which includes applying the latest technologies and processes to design and build the trains of the future, the empowerment of its human capital, and the development of new production lines.

IDOM

In recent years, the work we are doing in building sustainable and healthy cities is now worldwide, making us a benchmark company in the design of the main European urban transport systems.

One of the latest successes is that, together with the engineering firms Jacobs and SYSTRA, we have been chosen as designer of the LRT Cork in Ireland for Transport Infrastructure Ireland (TII). This project joins the list of works that we have developed to offer sustainable mobility solutions to our clients, such as Naples Metro System or the BRT project in Taranto (Italy).

We these projects, the urban transport lines, LRT, BRT and Metro projects we have or are developing total over 1,500 km, in 60 cities and 26 countries, including professional consulting and engineering services throughout the project's life cycle.

IDOM

IDOM is developing a 4.0 urban transport system: consensual, accessible, efficient, respectful of the environment and sensitive to all social sectors. MetroLink, which will be Dublin's first metro line, is a project that is being tailored to society, for Transport Infrastructure Ireland (TII) and the National Transport Authority (NTA).

Our extensive global experience on similar projects, as well as the proven capabilities of our design teams, have allowed us to tackle this stimulating challenge alongside Jacobs. IDOM have been developing all the engineering associated with the implementation of MetroLink as an urban railway system, using BIM Level 2 design technology across all disciplines.

INECO

Ineco has extended the services it currently provides for Network Rail Consulting in Australia as a systems integrator, supporting the Transport for New South Wales (TfNSW) authority in the definition, integration and implementation of the new railway systems for the network, together with Network Rail Consulting, Acmena and The Go-Ahead Group until June 2024.

This is a critical role for the network to significantly increase its capacity and absorb future demand and is part of the Digital Systems Program, which aims to upgrade signalling to ETCS level 2 (which is part of the European ERTMS system) for the manager and operator of suburban trains in Sydney (Sydney Trains).

With this extension of the first contract in Australia, Ineco strengthens its position as a leading engineering company present on five continents and demonstrates the client's trust and the excellent work carried out by our team.

SIEMENS

Singapore's Downtown Line is one of the longest fully automated, driverless underground metro lines (GOA4 level) in the world. Currently 42 kilometers and 34 stations of the line are in service, but by 2024 its final length will be 44.2 kilometers and it will have 36 stations.

Siemens Rail Automation, in joint venture with Siemens Singapore (Siemens PTE Ltd), has carried out the installation and commissioning of the signaling system. This includes CBTC technology and the ATS (Automatic Train Supervision) Controlguide Rail 9000 system, as well as the installation of latest generation Trackguard Westrace MkII electronic interlockings and the supply of the platform screen doors.

SIEMENS

Line 9/10 of the Barcelona Metro is the longest automatically operated driverless line in Europe, with a total length of 49 kilometers and 52 stations. Siemens Mobility has installed in 32 of the stations and 35 kilometers already in service its signaling and railway control system, Trainguard MT, a CBTC system for automatic driverless operation (maximum level of automation GOA4) and based on radio communication between the train and the track.

In addition, Siemens Mobility's Automatic Train Operation Systems are present in most of the lines of Metro de Madrid, as well as in the facilities of other operators such as Ferrocarrils de la Generalitat Valenciana, Ferrocarrils de la Generalitat de Catalunya and Transports Metropolitans de Barcelona.

Siemens Mobility has also supplied the signaling systems for trams in Barcelona, Madrid and Alicante and the fixed and on-board Electric Traction Systems and Centralized Traffic Control for the entire network of Metro de Madrid.

SOME MAFEX MEMBERS WITH URBAN TRANSPORT PROJECTS

ARDANUY INGENIERÍA

Ardanuy Ingenieria is involved in developing Metro and Tramway Projects across the globe. Following in line with its active participation in various networks within Spain (Madrid, Barcelona, Málaga, Alicante, Chiclana-San Fernando, Tenerife, Zaragoza, etc.), the company has expanded its presence abroad considerably in recent years. The consultancy's expertise in urban transport has been applied to various countries outside of Spain. In India, the company has carried out work for the metros of Mumbai, Dhaka (Bangladesh), Kochi, Bangalore, Admedabad and Chennai. Ardanuy's work in South America includes the metros of Quito (Ecuador), Medellin (Colombia), Lima and Callao (Peru), Santo Domingo (Dominican Republic) and Santiago (Chile). These works are complemented by other metro projects the company has developed in Europe such as the metros of Dublin, Warsaw, Lisbon, Porto or Moscow, the Mondego light rail (Portugal) and the Nottingham tram (UK). The company's experience has also lent itself to other parts of the world with its work for the metros of Australia, Dbai, Algiers, or Cairo, amongst others.

TELTRONIC

There is an increasing demand in the transport sector for applications requiring high data rates, thus it needs broadband communication systems which enhance both management and safety as well as the quality of service for passengers. Teltronic's LTE solution is designed to meet the requirements of applications such as voice dispatching, real-time video surveillance or railway signaling applications (CBTC, PTC, FRMCS...), as well as being IoT ready which will transform passenger experience, operational efficiency and maintenance tasks.

Teltronic offers a complete solution including the infrastructure, integrated command & control centre and its cutting edge RTP-800 onboard radio, which has already proven its efficiency boosting security and services in transport systems.

TELTRONIC

From the Zaragoza tramway, where it is headquartered, to the antipodes in Sydney, Teltronic has contributed to improving urban mobility in more than 100 transportation projects by providing cities such as Barcelona, Madrid, Rio de Janeiro, Riyadh, New York o Montreal with its radio communications solutions for the railway environment. Through TETRA and LTE technologies, it offers end-to-end communications between vehicles and control systems, supporting voice and data applications, including those for signalling.

Integration with other train subsystems improves the efficiency and safety of the operation, and real-time information management enables operators to make decisions that benefit users. In addition, it has the capacity to offer fully customized solutions according to the needs of the project.

INDRA

Indra has developed for Renfe the first railway project of direct payment and access to transportation by bank card in Spain, which will allow the public to pass through the entry and exit turnstiles at the stations of the Malaga suburban train network by simply holding the bank's contactless card over the sensor. The system then automatically manages the payment for the corresponding ticket, according to the different zones of the Malaga suburban rail network.

This is an advanced and pioneering development that makes Malaga one of the few cities in the world that have this technology. It facilitates direct payment at the turnstile with EMV contactless bank cards, both credit and debit, and through cell phones, with NFC and virtual cards that allow payment.

INDRA

Indra has successfully completed the development and implementation of its ticketing technology in the Amsterdam metro, tram and buses, after the commissioning of more than 130 automatic transport ticket vending machines around the city.

Thanks to the flexibility of Indra's advanced ticketing technology, the company managed to adapt the solution to the conceptual design proposed by GVB, the Dutch capital's transport company, which is fully user-focused and aimed to improve user experience.

The project has been a real challenge, not only because of the adoption of a complex design, but also because it required adaptation to the national Translink standard, based on the OV-ChipKaart single transport card, and the inclusion of devices that the company hadn't previously used.

SOME MAFEX MEMBERS WITH URBAN TRANSPORT PROJECTS

COMSA

COMSA has executed the design and construction of the tramway in the city of Odense, located to the west of Copenhagen. The project, which is currently in its final phase, consisted of the construction of more than 14 kilometres of double-track tramway between the districts of Tarup Centre and Hjallese, together with the construction of the 26 stations on the line.

The contract includes catenary works, signalling, telecommunications, a control and maintenance centre, as well as testing prior to the start of service.

The Odense works are an example of COMSA's vocation to export its railway experience to growing infrastructure markets such as Northern Europe.

COMSA

COMSA keeps moving forward with the construction of the second phase of line 4 of the São Paulo metro in Brazil. The project, developed together with the local construction company Tiisa, will connect the centre with the southwest of the city and will serve more than one million passengers a day.

The works include the completion of new accesses, the completion of civil works at four stations and the construction of a city bus interchange-terminal, as well as the completion of the section linking Butanta and Vila Sonia. In total, the project has a length of 12.8 kilometres and 11 stations.

COMSA Corporación has consolidated experience in the Latin American market, where, in addition to Brazil, it is developing railway projects in Mexico, Chile and Uruguay, among other countries.

THALES

Thales is specialized in technology applied to signaling, communications, supervision and ticketing for transport. Bilbao is Thales' SCADAsoft Competence Center for the whole world, where Intermodal Compensation Systems are also developed for both magnetic tickets, as well as contactless cards.

As experts in control center integration, Thales team in Bilbao has participated in projects throughout the world such as the London Underground (TIMIS), Santiago de Chile (all lines), North East Line (United Kingdom), Caracas (lines 1, 3 and 4), Paris (Meteor), Santo Domingo (L1), Mexico City (all lines), El Cairo (L3). It is also important to point out the contribution to the supervision and trams control, in Bergen (Norway), as well as in suburban train networks in Mexico.

METRO TENERIFE

Last June 2020, the Cuenca Tram in Ecuador started commercial operation, becoming the first and only urban rail system in operation in the country. The project, not without its challenges, has managed to successfully start its commercial operation, despite the pandemic declaration that has affected public transport around the globe.

Since 2018 and throughout the entire process, Metrotenerife has accompanied the local operator providing technical assistance for the pre-operation and commencement of the commercial service. This assistance has included, among others, the restructuring of the operating unit; management, recruitment and training of technical staff; the roll-out of the maintenance strategy; the implementation of the commercial strategy; the assistance in pre-operation; and the organisation and support of the commissioning of the system.

Technological achievements:

An avant-garde formula that is committed to R&D

INNOVATION IS THE STAR SYMBOL OF THE SPANISH RAILWAY INDUSTRY. THE NUMEROUS ADVANCES MADE IN RECENT YEARS IN ALL SEGMENTS OF ITS ACTIVITY HAVE ENABLED THESE COMPANIES TO PROVIDE THE MOST CUTTING-EDGE SOLUTIONS TO ACHIEVE A SAFE, SUSTAINABLE, EFFICIENT, AND DIGITALISED TRANSPORT.

Spanish technological advances are among the most avant-garde in the world.

The technological contribution of the Spanish railway industry has had a very positive impact on the drive for state-of-the-art, efficient, and sustainable transport networks. The importance that its companies give to R&D is evident in the many advances they have introduced in the market. These solutions are already applied in all segments of each project, from the design and building phase to the operation maintenance and state-of-the-art rolling stock.

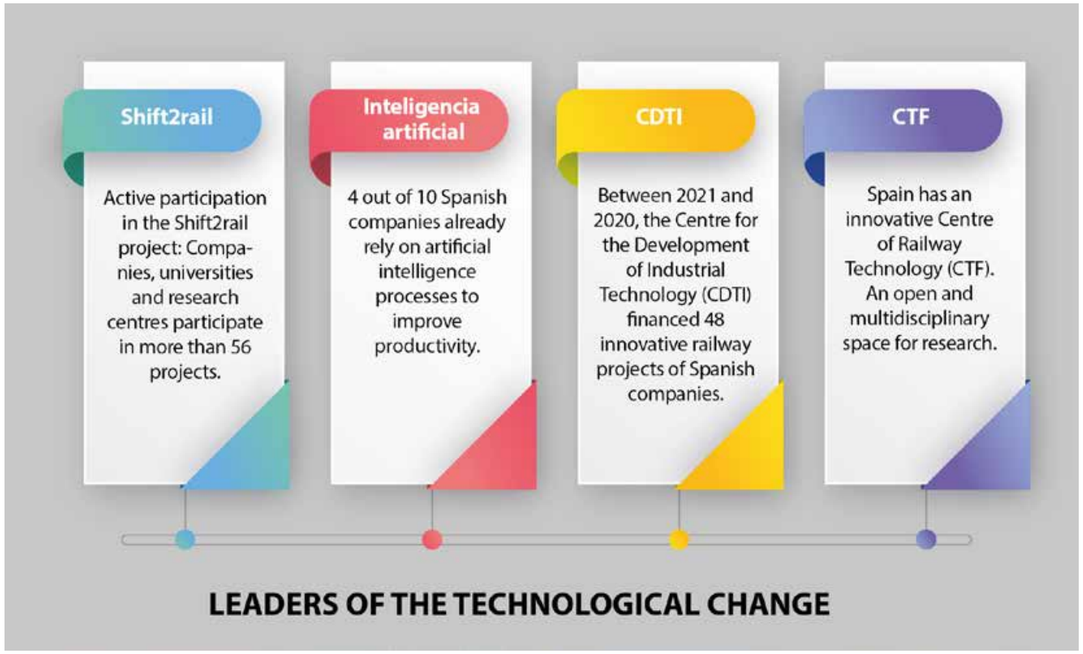
In addition, they are also prominent in innovation projects such as Shift2Rail, with which Europe wants to design the train of the future. Other fields where they bring great advances are signalling, safety, automation, digitalisation or in the development of innovations such as Hyperloop or hydrogen trains.

THE SPANISH KNOW-HOW, VERY PRESENT IN SHITF2RAIL

Europe seeks to speed up progress to address transport challenges. Among its proposals is the R&D programme Shitf2Rail, where Spanish know-how is very remarkable. Eleven Spanish companies and entities are partners and collaborators of this platform responsible for defining the new unique railway space of the European Union. In addition, a large representation of this country leads the projects of the different working groups (universities, foundations, technology centres and several companies from different subsectors) provide their knowledge to achieve the objectives. These include increasing the capacity of this system by 50%, the levels of reliability and punctuality, as well as reducing the costs of infrastructure and rolling stock by 50%.

The most outstanding projects include 4securail, Connective Assets4Rail, Astrail, Attracktive, Carbodin, Co-active, Cohesive, Connect, , Destinate, Dynafreight, Emulradio4Rail, Etalon, Extensive, Fair Stations, FFL4E, Fine, FLEXIRAIL, FR8hub, Gate4Rail, Gearbodies, Gof4r, Hipernex, Impact, In2rail, In2mart, In2Stempo, In2track, IP4MaaS, IT2Rail, Linx4rail, Locate, Maasive, Mat4Rail, Momit, My-track, Near2050, Nextgear, Mistral, Opeus, Optima, Performingrail, Pinta, Pivot, Recet4Rail, Roll2rail, Run4Rail, Safe4Rail, S-code, Shift2MaaS, Smartrail, Stream, Taurus, Transit, Vite and X2Rail.

The areas of action of Spanish companies in these research programmes focus on aspects particularly important for the future of the railway. These include, track, energy efficiency, cybersecurity, IT solutions, unified electrification systems, signalling, positioning, predictive maintenance, or development of the different technical specifications. They also collaborate in fields such as the European Hyperloop ecosystem, efficient and high-capacity infrastructure and rolling stock, intelligent maintenance, energy and noise control, technologies for automatic operation, MaaS, etc.



Source: Own elaboration/IDC Research España/ CDTI

DIGITALISATION AND AUTOMATION

Digital transformation brings with it an improvement of services on the part of operators. Aware of the many advantages of implementing new technologies in railway transport, Spanish companies work to introduce the most cutting-edge advances.

The technology that allows the operation of driverless trains developed by Spanish companies, for example, enables the country to have the longest automated line in Europe. In addition, they rank in the top positions in the constant search for new advances that optimise railway transport systems.

One of the great challenges where the Spanish experience is being key is in the implementation and development of CBTC in metro lines, compatible with the European Rail Traffic Management System (ERTMS) signalling standard. It is a technological leap that greatly increases aspects such as the safety and performance of the lines.

GREAT INNOVATIONS IN ROLLING STOCK

Spain has large rolling stock manufacturers and factories where the world's most advanced trains are designed and exported for all types of networks.

Those companies are behind the most innovative changes that have been introduced in recent years. Among them, concepts such as the tram-train, which efficiently combines rail with tram and thus becomes the ideal means to connect different municipalities with each other. This solution is already exported to many countries.

Other notable developments include new high-speed platforms or catenary-free tramway traffic systems.

In addition to these new rolling stock concepts, the Spanish industry has provided numerous proposals to achieve a more efficient and less polluting transport. It is worth mentioning the systems for the use of regenerative braking that reduce costs and optimise energy consumption.

A COUNTRY THAT ACCELERATES STARTUPS

The constant boost to R&D is one of the objectives of startup accelerators linked to the Spanish railway sector. The objective of this business support is to keep companies at the forefront of the constant search for disruptive technology solutions.

HYDROGEN

The use of renewable energy in the railway sector is booming. The Spanish industry already has prototypes for the so-called "hydrogen train", which will be ready in 2023. This technology that is defined as "green, innovative and efficient" will replace diesel locomotives and help improve sustainable mobility. In addition, the European Commission has selected a project led by Spanish companies that will allow the development of a railway prototype also powered by hydrogen. This initiative relies on substantial financing from European funds through the H2020 programme. The goal, to obtain clean electrical energy from this chemical element and make the trains 100% emission-free.

MAAS PLATFORMS

The revolution in public transport is based on the new concept "MaaS" that understands mobility as a service. In this great change, Spain has also joined the new challenges that the technological transformation and new passenger demands entail.

The country already has digital platforms such as that of the public operator, known as Renfe as a Service, which will allow to plan and manage any journey in national territory between 29 cities. The applied technologies will allow to integrate in one place all the mobility options available, in addition to other services such as accommodation and leisure so that any national trip can be planned very easily.

INFRASTRUCTURE AND RAILWAY TRACK

Participation in mega projects has made Spanish companies overcome great challenges and achieve constant technological achievements.
It has been possible, for example, to minimise the effects caused by extreme climate conditions on the network in arid areas, to develop online technology for the management of linear projects, to digitalise infrastructures through BIM. With regards to the railway track, they have also numerous contributions, such as the lateral wind prediction and detection system or the sleeper prototype that minimises ballast projections.

HYPERLOOP

The transport of the future explores new mobility alternatives such as the "Hyperloop". The Spanish counterparty working on making this zero-emission propulsion system a reality has just presented in Valencia the prototype of the future vehicle to be used in this system.

This train, capable of reaching 1,300 kilometres per hour, has a silent system made up of a capsule that levitates and travels inside a tube. An alternative focused on efficiently covering routes between 400 and 1,500 kilometres and that has great advantages associated with reducing the cost of infrastructures.

SMART STATIONS

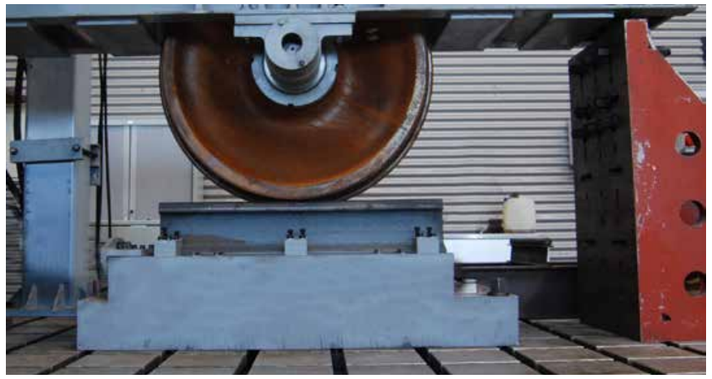
A field where great advances are recorded is in the creation of "smart stations". There is a plan to connect the 1,500 Adif stations through a hub station from where they will be remotely managed. This centre, the main axis of the Stations Digital Transformation Plan, will also allow to interact with railway companies and travellers.

Apart from this great step, Spanish companies have accelerated their R&D efforts to become the technological partner of transport operators, making this new concept a reality and improving passenger services. These digital proposals include advances in communication and information systems, forecasting, ticketing, signalling, supervisory control, asset management, etc.

SOME MAFEX MEMBERS WITH TECHNOLOGICAL ACHIEVEMENTS

ARCELORMITTAL

With the permanent evolution in the rail sector, ArcelorMittal has reinforced the improvement of its product range through the development of new types of rails, the optimization of its manufacturing process and its welding techniques. The need for fast and reliable transport has encouraged R&D in this sector, making it possible to overcome challenges unimaginable a few years ago.



A welding pilot plant, the advanced testing and In-use properties testing systems (twin-disk & real size rolling contact fatigue bench), as well as the developments of wireless sensors for track monitoring are some examples of the solutions that ArcelorMittal's R&D is developing through open innovation in collaboration with a network of universities, technology centers and companies from railway sector.

INGETEAM

For every topology and configuration, INGETRAC are comprised of all necessary elements to be fully operational, according to customer´s requirements and with the capacity to work on exigeant operational conditions. INGETRAC offers high availability, minimum weight and space and ease maintenance activities. INGETEAM has developed traction converters for different High Speed projects. Thanks to its know-how and capacities, INGETEAM can develop and also supply the complete traction system.

The system tests carried on our own facilities will allow to simulate the operation conditions and will ease the assembly operations.Because of its success, it is worth to underline the HS vehicles that operates the Tahkent-Samarkanda route in Uzbekistan, since 2011, which include High Power INGETRAC converters..

CAF

The new system seeks to determine the state of the track through sensors installed in the vehicle during its normal operation.

This is based on a physical model of the track that allows predicting the behavior of the vehicle in the face of various types of defects (corrugation, breaks, etc.) and automatic learning techniques (Machine Learning) to extract patterns for the automatic identification of defects and their magnitude.

The signal recorded by the sensors is divided into small sections. Advanced signal analysis techniques allow the extraction of patterns in each of them that are compared with results of a Digital Twin obtained under different types of defect.

This comparison, performed with machine learning techniques, establishes the current condition of the track. Subsequently, a suitable visualization is generated that allows the maintenance provider to quickly determine which the most problematic track sections are and to establish a maintenance schedule.

STADLER

The new high-performance EURO locomotives of Stadler Valencia have been designed to boost rail freight transport in Europe by making it more profitable and competitive as well as greener and safer.

They are the most powerful locomotives and the ones with the highest hauling capability on the European market. They allow to carry longer and heavier trains with a single locomotive, which means savings in operating costs and an increase in payload. In addition, they are efficient and reliable and incorporate the latest advances in remote location and diagnosis systems to advance in preventive maintenance.
It is worth highlighting the EURODUAL locomotive that is used in freight services combining both traction modes: electric and diesel. The versatile machines can run on electrified lines but they are also powered by an engine rated at 2800 kW to run on non-electrified lines. Since its approval in Germany in February 2020, several German operators have chosen this locomotive for its competitive advantages. More than 50 units are already running in this country. Furthermore, EURODUAL operates in France and Scandinavia.

For narrow gauge and low-axle load rail networks, Stadler Valencia has developed the SALi locomotive platform. With an ultra-light-weight design and state-of-the-art technology, it successfully faces the challenges entailed in operating on narrow-gauge networks, combining a high-power output with reduced fuel consumption. To highlight are the locomotives that FCA operates at 5,000 m altitude in Bolivia or those that will soon be supplied to the Taiwan Railways Administration or to Ferrocarrils de la Generalitat de Catalunya.
Stadler Valencia supplies locomotives at the forefront of technology that cover any transport need efficiently and reliably, offering railway operators numerous economic and ecological benefits.

SOME MAFEX MEMBERS WITH TECHNOLOGICAL ACHIEVEMENTS

ARDANUY INGENIERÍA

Ardanuy commits a great deal of both its material and human resources to promoting R&D. The company is an active participant in the EU's Shift2Rail programme whose aim is to expedite the integration of new and advanced technologies, thus providing avant-garde solutions for different railway products. Some of the main projects the company is working on are ETALON (energy storage for signalling and communication systems) and ASTRail (improvement of signalling and automation technologies).

Furthermore, Ardanuy is also a member of other EU projects, for example the Mistral project (preparation of the technical specification of the future communication system), OPTIMA (design of a communication platform) and 4SECURail (collaborative tools to coordinate a joint-European response in the face of a cybersecurity attack).

CETEST

R&D activities make up a fundamental pillar for CETEST to keep up-to-date in the field of instrumentation and measurement. In this line, CETEST participates in projects within Shift2Rail such as PINTA, PIVOT y CONNECTA.

PINTA aims at improving and evolving railway traction by means of new technologies. CETEST participates in the investigation of the impact of these new technologies on the behavior and interaction with the vehicle, as well as in the development of new virtual validation tools.

PIVOTis aimed at improving different key railway subsystems to improve their reliability, availability, capacity and performance. CETEST participates in the research and development of new on-board monitoring solutions to provide railway vehicles with tools for making maintenance decisions, both for the vehicle and the infrastructure.

Finally, CONNECTA is oriented towards the evolution of the TCMS system. CETEST participates in the virtual validation solutions for the different developments in the different phases of their life cycle.

SENER

SENER, in line with the innovative and technological development trajectory of its 65 years of history, continues to offer new solutions in the railway market, framed largely in the process of digital and sustainable transformation of the sector. Among its most recent developments are the artificial intelligence system for ventilation management RESPIRA©, in operation in the Barcelona Metro, the ACROT system for controlling operating risks in tunnel boring machines, the BIM integration solutions in operation and maintenance and digital twins, the structure monitoring and management system implemented in the Toluca - Mexico City line, or the innovative technology for green hydrogen generation through autothermal high-pressure reforming of bioalcohols.

SIEMENS

Siemens Mobility, in its commitment to innovation, has developed a new Control Centre, R9Kloud, which arises from the need to digitize and modernize the existing Controlguide Rail9000. R9Kloud will offer an on-demand, cloud-based digital signaling microservices model that will eliminate hardware and maintenance of current railway facilities.

Furthermore, in collaboration with Siemens Mobility Germany and after a demanding approval process, the company has carried out the first release of the new DS3 vital platform. This is a major step in digitalization, as this is the first interlocking based on commercial hardware and operating system put into service by the company.

In addition, Siemens Mobility has recently developed a new ATO track system for efficient and high-precision train driving. This system has been redesigned to use a more generic technology that is more robust against obsolescence, while also reducing its volume. Initial on-track tests have shown that it is fully compatible with trains already equipped with the on-board ATO system.

TELTRONIC

There is an increasing demand in the transport sector for applications requiring high data rates, thus it needs broadband communication systems which enhance both management and safety as well as the quality of service for passengers.

Teltronic's LTE solution is designed to meet the requirements of applications such as voice dispatching, real-time video surveillance or railway signaling applications (CBTC, PTC, FRMCS...), as well as being IoT ready which will transform passenger experience, operational efficiency and maintenance tasks.

Teltronic offers a complete solution including the infrastructure, integrated command & control centre and its cutting edge RTP-800 onboard radio, which has already proven its efficiency boosting security and services in transport systems.

SOME MAFEX MEMBERS WITH TECHNOLOGICAL ACHIEVEMENTS

ALSTOM

Innovation and the development of sustainable mobility solutions are two fundamental pillars of Alstom Spain's activity. The company has four international reference innovation centers in our country to develop solutions and new technologies in signaling, manufacturing, ergonomics, maintenance, safety, and digital mobility.

Among the projects developed by Alstom Spain's R&D teams, TrainScanner, a predictive maintenance solution that provides a continuous assessment of rolling stock's technical conditions. Thanks to digital data analysis,

it identifies the optimal time to replace a component. The technology, present in cities such as Warsaw, Manchester, Oxley, and in the PKP (Poland) and NTV (Italy) fleets, is particularly suitable for large fleets in different locations that require a high level of service.

ALSTOM

Among the technological developments carried out from Alstom Spain's innovation centers is the measuring equipment for the control of train energy consumption (EMS -Energy Measurement System-), which have been supplied to both national and international operators.
This equipment allows continuous recording of energy consumption, with real-time data exchange between rolling stock and workshops, to avoid thousands of tons of carbon dioxide per year.

This onboard energy measurement system aims to provide reports that enable railway operators to improve their rolling stock's energy efficiency and performance and reduce operating costs during commercial service.

IDOM

Catenary-free trams are ever more evident in the urban environment. This type of transport system can be more intrinsically inserted into the city, with low visual impact, and greater flexibility when it comes to design.

IDOM has designed the tram project for the city of Cuenca (Ecuador), declared a World Heritage Site by UNESCO. Catenary-free technologies have been used to preserve the architectural heritage of the city. Hybrid systems have been implemented in Spain, in Seville or Zaragoza, inserting them in urban centers, areas with limited space and green areas.
Another advantage of this type of tram is the savings in energy consumption, thanks to the electrical supply systems mounted on the ground. These allow energy from the storage device on the vehicle to be charged or discharged, while also using energy from regenerative braking. All in all, turning them into transport systems which are ever more sustainable and resilient.

IDOM

Nevomo (before Hyper Poland) is a pioneer company in the implementation of magrail technology that combines existing railway infrastructure with magnetic levitation, enabling gradual implementation of hyperloop. IDOM support the Polish Company to implement the next generation of a sustainable long-distance mass rapid transport system using existing railway superstructure.

IDOM collaborates with its rich, global experience in designing high-speed rail systems, traffic research and business analysis.

"IDOM participates in many projects that may potentially become the technology of the future. That's why this project has drawn our attention. It shows potential to implement magnetic levitation, keeping the current rail superstructure" points out Marcin Warda, IDOM Country Manager for Poland.

INDRA

In projects such as SCOTT or X2RAIL-2, 3 and 4, within the Shitf2Rail program, Indra is working on innovative solutions based on secure wireless communication that interconnect devices installed in the infrastructure and trains with control centers and cloud platforms. They make it possible to reduce the safety distance between trains and their virtual coupling, thus increasing frequency, infrastructure capacity and competitiveness, or even Automatic Train Operation, also known as autonomous train.

These wireless communication networks facilitate coverage in areas where there is no previous network infrastructure and intelligent maintenance. They will also allow existing infrastructures, with their own technological legacies, to accommodate the safest and most advanced systems, such as ERTMS, without the need for substantial investment.

INDRA

A more sustainable mobility requires progress in the digitization of passenger services and a multimodal vision based on the integration of transport, traffic, infrastructure and logistics data.

Indra materializes this "Mobility as a Service" vision through its integrating platform, In-Mova Space, and the Travel Partner travel companion application.

In the freight sector, Indra has developed an artificial intelligence-based railway gantry in the FR8hub project, which automates and speeds up document management and control of wagons and cargo by hours, even days, as well as eliminating costly errors due to current manual procedures. Together with the SIMPLE project for the digitalization of logistics, which is being developed by Indra and Minsait, this could represent a qualitative leap in the sector in Spain.

DANOBAT S. Coop will contribute its lamination technology to the **e-PROMAT** project

A CONSORTIUM OF BASQUE COMPANIES COORDINATES THE HAZITEK 'EPROMAT' PROJECT WITH THE AIM OF DEVELOPING A NEW MANUFACTURING CELL BASED ON ADVANCED AND INTELLIGENT ORGANIZATIONAL MODELS FOR THE AUTOMATION OF LARGE COMPOSITE MANUFACTURING PROCESSES.

The objective of the project is the development of equipment and processes of high productivity and efficiency for the manufacture of composite parts in sectors such as railway and shipping, but that could be extrapolated to others with similar series typology. Composite materials have great advantages in these sectors. They combine an excellent relationship between density and mechanical properties, can be designed to specifically withstand loads in the main directions and enjoy great durability mainly for their corrosion resistance.

DANOBAT's role in this project is to demonstrate the possibility of automating the placement of large-scale fabrics and various features in cooperation with parts manufacturing partners.

For this purpose, DANOBAT has a large prototyping and demonstration cell to show the capacity of its deposition technology. This cell can laminate parts up to 11x5m and larger adapting the layout according to the needs. This parts prototyping cell will be used to carry out the activities of the e-PROMAT project.

ADMP LAMINATION TECHNOLOGY®

Among its offer of manufacturing systems DANOBAT S. Coop has an exclusive lamination technology of reinforcing fabrics such as glass and carbon for the manufacture of composite materials' parts. Its acronym ADMP refers to the automated lamination of dry material (Automated Dry Material Placement) which is subsequently supplied with the resin through infusion or injection in closed mould.

The main features of the technology are its versatility and high productivity. The heads can work with remarkably diverse materials, with different widths, weights, orientations, typology, although they are especially aimed at the use of multiaxial fabrics of NCF type (Non-Crimp Fabrics) which allow to obtain very high rates of deposition. The shape and size of the plies to be deposited is also variable, and the head is easily adapted to each application. The technology can be used in two different ways, being able to work both with a roll of raw material as provided by the supplier, as well as with preforms cut and rolled on a cutting table, which allows to reduce the waste of material.

This technology enables remarkably diverse applications and in all of them it manages to reduce manual laminating times while achieving replicability and a process control that is difficult to achieve with manual processes. When manufacturing rates increase, and especially in the case of large parts with a substantial number of fabrics, the advantages of a system like ADMP become more apparent, both with carbon fibre and glass fabrics.

ABOUT DANOBAT S. Coop:

DANOBAT S. Coop is the largest machine tool manufacturer in Spain. Located in Elgoibar, Guipúzcoa, it has been serving production equipment for more than 65 years in sectors such as railway, aeronautics, automotive and others, in the early years with standard machines, subsequently with machines with a high degree of customization and currently with complete turnkey solutions for the manufacture and maintenance of high added value parts and assemblies. These machines and manufacturing lines always have a high degree of automation and can consist exclusively of equipment developed by DANOBAT, but more commonly they also incorporate third-party equipment. Customers are in the countries with the highest industrial production, and currently it exports more than 90% of its production. The internationalization of its business is also reflected in its supply network and, of course, in the commercial network and in the implementation in key countries, such as Germany, USA, UK or China.

ABOUT THE e-PROMAT PROJECT:

Basque companies lead the development of a 4.0 manufacturing cell of large composite parts. The cell will be based on advanced and intelligent organizational models for the automation of lamination, preforming, handling and liquid moulding processes of optimized materials.

The consortium consists of the Basque companies Polikea, Abeki Composites, Danobat, Ekide, Goiti, Inkatec Automation and Robotics, Oliver Design, Sisteplant and Composites Quimiber, as well as the Spanish Railway Association Mafex and the Gaiker and Ideko technology centres, Agents of the Basque Network of Science, Technology and Innovation, and members of the Basque Research & Technology Alliance (BRTA).

Data management to offer a **seamless passenger experience**

CAF HAS DEVELOPED A VEHICLE OCCUPANCY DATA MANAGEMENT SOLUTION, BOTH IN REAL TIME AND THROUGH ADVANCED ANALYTICS

Many operators are actively prioritizing their investment strategies and looking to understand the new smart systems and processes that can transform their operations. CAF has developed a vehicle occupancy data management solution, both in real time and through advanced analytics, enabling operators to track the number of passengers per train, coach, location, time-slot and service.

Currently, due to pandemic restrictions, operators need to be able to monitor the number of people onboard to provide a better passenger experience while meeting social distancing requirements. Applied to passenger's experience, this solution allows them to reach the station and through the information system of the platform, get the information about the total train and car occupancy level (through an operator app or by scanning a QR).

By accessing this information, the passenger can choose the emptiest car and increase the safety of the journey respecting social distancing. As a result, having passengers well positioned before the train reaches the platform, can reduce dwell times in the stations. But if we extend its use, the benefits of "Passenger Counter" does not end there.

LeadMind advanced analytics has the capability to analyze historical transit data and forecast passenger demand. This facilitates operators to provide an optimal and value-added service to the passengers. The functionality helps reduce the impact of unexpected incidents, providing access in real time to the number of passengers in the service. Operators will be able to take decisions in the shortest possible time and reschedule service based on updated information.

At a technological level, the number of passengers can be measured based on the weight or through the integration of a specific passenger counting system. This makes more flexible, the investment needed options to implement the solution.

Implementation of **collaborative robotics** in propulsion equipment assembly processes

ALSTOM HAS IMPLEMENTED COLLABORATIVE ROBOTICS EQUIPMENT (COBOTS) IN THE MASS PRODUCTION OF ALL ONGOING PROJECTS.

Alstom's factory in Trapaga (Basque Country), a center specialized in the manufacture of railway propulsion solutions, has implemented collaborative robotics equipment (Cobots) in the mass production of all ongoing projects.

Cobots are robotic equipment encompassed in Industry 4.0, which, being operated by a worker, allows the automation of processes in the production line without establishing safety fences. In this way, the center's productivity can be increased while training operators in new roles and the latest techniques.

Eloy Ocio, who coordinated the implementation of the cobot in the factory, pointed out that, "after two months in operation, the use of the new equipment has reduced manual assembly efforts, which means a productivity improvement, but above all in terms of quality, consistency, and repetition of the whole process."

The selected equipment (UR10e) consists of an articulated arm for which a turning device has been designed, a gripper that allows mounting the different IGBT models, and a gripper for the screwdriver machinery. An artificial vision positioning system has also been implemented to provide a broader range of functions and two conveyor belts to ensure the component's flow. For use in all projects carried out from the factory, a scalable design has been developed that allows the assembly of all manufacturing modules. Specifically, 33 different modules for streetcars, commuter trains, regional trains, metros, locomotives, and high-speed trains.

RailCor® a new range of **Corrosion Resistant Rails**

RAILCOR® IS DEVELOPED BY ARCELORMITTAL GLOBAL R&D AND HAS BEEN TESTED THROUGH A WIDE RANGE OF SYSTEMS IN ACCELERATED CORROSION TESTS.

ArcelorMittal Europe – Long Products has launched RailCor® – a completely new range of corrosion resistant rails to protect from severe corrosion environments, whether the rails are installed inside tunnels, city centers, coastal areas; be it to face demanding corrosion challenges, to fight specific corrosion produced by stray currents, or even to protect the rails during shipment.

RailCor® is developed by ArcelorMittal Global R&D and has been tested through a wide range of systems in accelerated corrosion tests. The selected solutions have been tested on real tracks for more than 2 years, under the most severe conditions.

RailCor® is available in four specific solutions to meet the most demanding customer requirements to protect rails against corrosion, depending on the location and final application. Two solutions are designed to offer long-term protection in severe environments. A third one protects rails against corrosion by stray currents. The fourth solution is ideal for low corrosion environments, or during shipment and storage.

RailCor®'s economic and sustainability advantages:

- Increased rail service life
- A considerable reduction in rail track maintenance and rail replacement costs
- Increased cost savings reducing Life Cycle Cost as there is a remarkable decrease regarding the rail replacement expenses

RailCor® was designed and tested to include best steel adhesion acting as the best physical barrier to protect the rail and meet the most demanding standards as ISO 12944-5:2018, ISO 4624:2016 and ISO 2063-1:2017.

RailCor® is a registered trademark of ArcelorMittal.

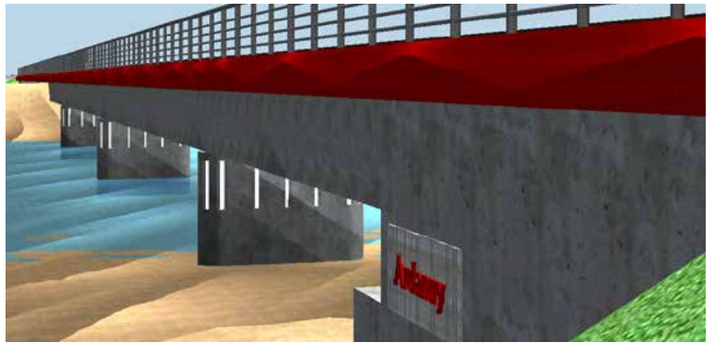
Improvements in the design of transport structures using **BIM software**

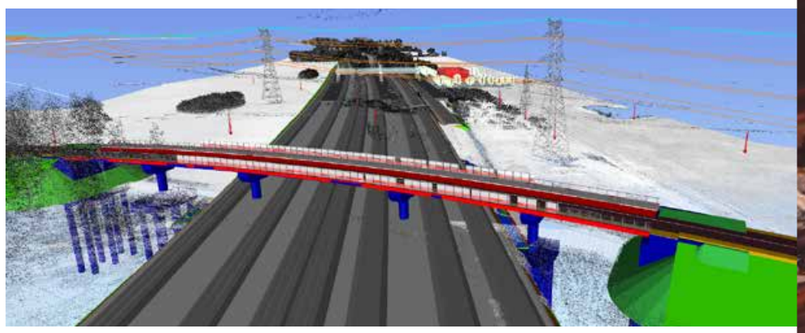
ARDANUY INGENIERIA IS CURRENTLY USING BUILDING INFORMATION MODELING (BIM) SOFTWARE TO DESIGN STRUCTURES AS PART OF DIFFERENT CONTRACTS FOR RAIL BALTICA IN LATVIA AND VALENCIAN RAILWAYS (FGV) IN SPAIN.

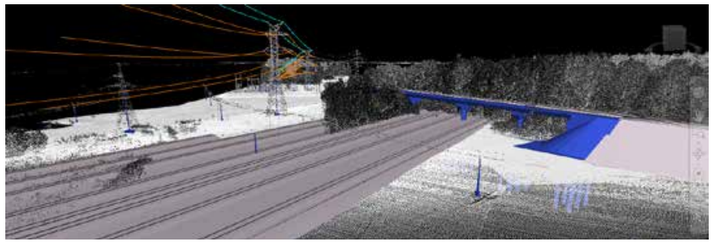
The implementation of BIM design practices in the engineering of transport infrastructures (railways and roads) implies pioneering strategies. Projects carried out using BIM software produce models which correctly represent all future works, including all information that constitutes the project as well as how to deal with the existing area. This entails taking into consideration the natural surroundings where the project is to be developed (landforms, rivers, vegetation, etc.), apart from manmade elements and structures (buildings, utilities, and other road infrastructure), consequently offering a wide variety of models in terms of types of environments and construction solutions.

Ardanuy Ingenieria is yet another entity partaking in this cultural revolution. Thanks to different railway administrations' trust in this type of methodology, besides the effort and energy invested by Ardanuy's technical team, distinct kinds of engineering solutions are currently being developed with an innovative approach. Some of the most important of these works include the construction of the pits and elevators on the platforms of FGV's stations in Valencia, tunnel facilities for the Los Cristianos-Costa Adeje section of the Tenerife Metro, as well as the bridges and structures along the northern section of the future high-speed network in Latvia within the Rail Baltica corridor.

One of the main characteristics which stands out about the Rail Baltica Project is the high degree of precision to which the design will be carried out (up until LOG 400 in the detailed design stage), apart from following BIM methodology practices for all phases of the design. Development of this project starts with the generation of a BIM Execution Plan (BEP), with elaboration going more in-depth than just a highly detailed geometric sketch in such a way that the project BoQ and execution schedule planning are integrated into the models.







By using this technology, the design of different types of structures (pretensioned structures, gantries, and frameworks) with distinct functions (railway and road viaducts, over and underpasses, walls, etc.) reaches a new dimension. Aside from defining constructive, architectural, and finishing aspects, with BIM modeling, the existing environment, geometry, structural calculations, foundations, gauges, drainage and safety elements are also outlined in a new virtual canvas, thus anticipating the reality that the future engineering works will entail.

Advances in **automation** in medium and short distance lines

CAF SIGNALLING HAS TRANSFORMED THE KNOWLEDGE INTO A FLEXIBLE ARCHITECTURE SOLUTION, WHICH IS FUNDAMENTALLY BASED ON THE STANDARD SPECIFICATION.

Automation is one of the main pillars for the transformation of the railway sector and it must be addressed to respond to the need for sustainable mobility and competitiveness in the sector for the coming decades.

The reality of each operator and infrastructure manager is different and sometimes the standard solution, per se, is not adapted to the specific application. Radio communications or integration with the Control Center are just two examples of the technical challenges that must be solved. Automation projects based on conventional signalling or on national ATP systems are even more complex.

From all the experience acquired from the automation projects of medium and short distance lines, CAF Signalling has transformed the knowledge into a flexible architecture solution, which is fundamentally based on the standard specification and on which an ad-hoc solution is built. to meet the needs of the specific application.

Two representative projects of the diversity of options are currently being executed, which are analyzed below:

1. In New Zealand, the project is being implemented with the client Auckland Transport. In this first quarter, dynamic tests are being carried out on the Southern line. Next, we will proceed to the authorization phase for the GoA-2 operation on ETCS Level 1.

2. The Dutch operator Nederlandse Spoorwegen has been collaborating with CAF Signalling since 2019, studying through multiple demonstrators how to respond to the global automation needs in the country. Under the umbrella of the ATO Program conducted by NS, ATO over ETCS and ATO over ATB projects are being implemented. Between 2019 and 2020, the ATO campaign was carried out on the Hanzelijn line, on ERTMS Level 2. In April the ATO test campaign on the national signalling system, called ATB, was resumed.

Apart from client projects, TAURO is the European project that CAF is leading and in which the problem of certification of security functions based on Artificial Intelligence is addressed. The advances of this project open the doors to future standardizations for the GoA-3/4 degrees of automation.

5G-PICTURE pilot test in the railway sector

COMSA Corporación has led the consortium of 19 European organizations in charge of executing the 5G-PICTURE program demonstration in the railway sector. The test consisted in the deployment of a 5G network on the section of the Martorell - Olesa line of Ferrocarrils de la Generalitat de Catalunya and was rated as successful by the European Commission.

Despite the complexity, both the integration of the infrastructure and the functions developed obtained satisfactory results that will have a high impact on the evolution of 5G as a communication system for railroads.
In addition to the 5G-PICTURE project, framed in the European program Horizon 2020, COMSA Corporación also participates in other innovation projects such as 5GMED, which will connect the Spanish railway network with that of southern France, and SAFE4RAIL3, aimed at developing the technologies and devices for the next generation of the Train Control and Monitoring System.

Innovative product family for **emergency lighting and signalling**: Inhelium

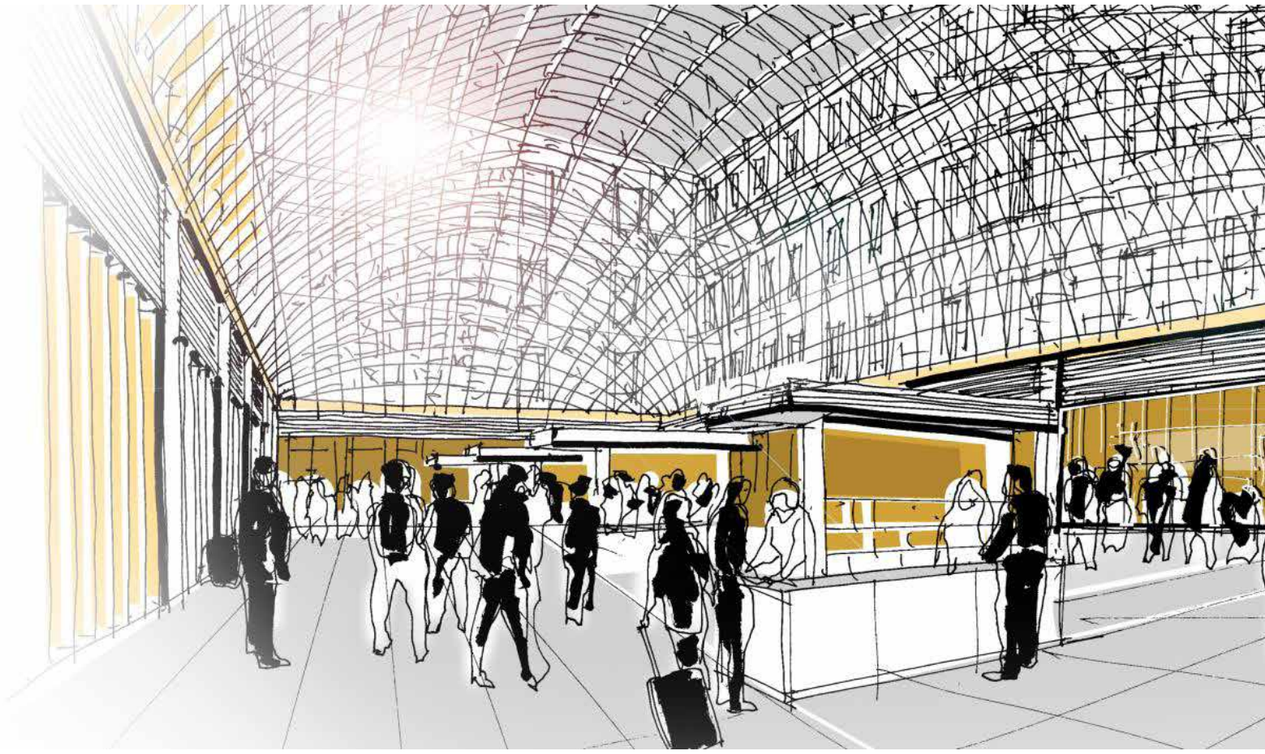
DSAF HAS FOCUSED ON OBTAINING A FAMILY OF PRODUCTS FOR EMERGENCY SIGNALING AND LIGHTING: INHELIUM, INHELIUM TUNNEL, BANLIGHT, ELTUN- NEL, ROTLEDS, POWER .007, POWER 700.

Focused on the field of emergency signaling and lighting in railway tunnels, road tunnels and wind towers, the business activity of Dinámicas de Seguridad SL (Dsaf) prioritizes its commitment to new technologies in the execution of its projects and initiatives in pursuing compliance with the highest safety standards regarding the evacuation of people in risky situations..

The premise of Dsaf is innovation, as well as research + development + application included in its acronym IDEA (in spanish), which allows us to ensure that Dsaf products can be effectively adapted to the problems and conditions of the projects that they wish to implement, either from the point of view of the fields of application, as from the current regulations and the corresponding security guarantees.

In recent years, part of the work developed by Dsaf has focused on obtaining a family

of products for emergency signaling and lighting: Inhelium, inhelium tunnel, banlight, eltun- nel, rotleds, power .007 , power .700. Products, all of them, capable of meeting the com- pany's objectives and their application in the three aforementioned areas: railway tunnels, road tunnels and wind towers.



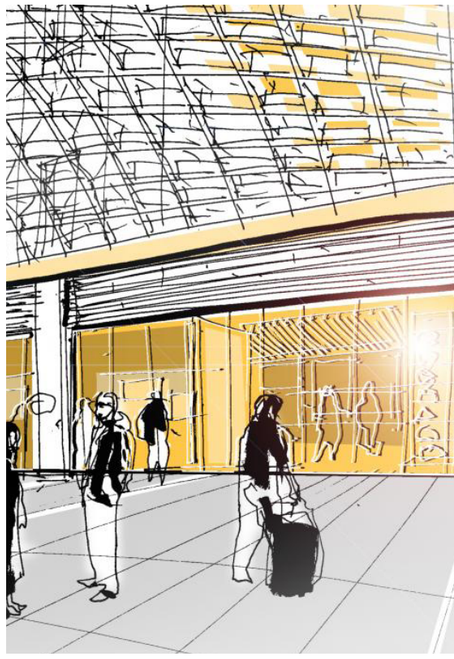
ORAT methodology to the railway sector

INECO HAS PARTICIPATED IN THE RECOVERY OF THE HISTORIC JAMES A. FARLEY POST OFFICE BUILDING AND ITS INTEGRATION INTO THE CURRENT PENN STATION.

In the airport sector, projects for the commissioning and transfer of new infrastructures and extensions are managed using the ORAT (Operational Readiness and Airport Transfer) methodology. A method that the engineering and consultancy firm Ineco has applied in the enlargements of airports such as those in Madrid and Barcelona, and which it is now able to introduce in the railway sector as well.

The Moynihan Train project at Pennsylvania (Penn) Station in New York was the first to be managed with the new ORAT Rail methodology. Ineco has participated in the recovery of the historic James A. Farley Post Office building and its integration into the current Penn Station. The station, which processes some 600,000 passengers a day, has 21 tracks and 7 tunnels for train traffic and is the busiest in the United States of America.

The new methodology optimises the results for the commissioning of the facility or railway station by ensuring: the correct functioning of systems and facilities; the assurance of procedures prepared and suitable for railway operation; and the management of the personnel hired, trained and instructed in the new working environment.



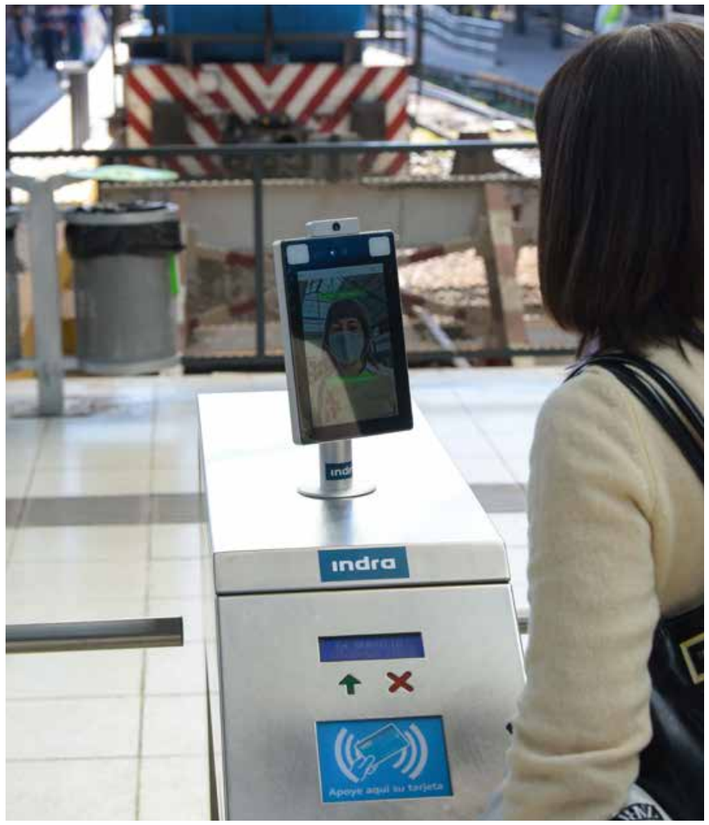
System for **monitoring people's temperature and face masks** at access to the trains

Indra has developed an access control system to prevent Covid-19 for Trenes Argentinos (Argentinian Trains), which complements the current access turnstiles with SUBE transport card readers, and integrates body temperature measurement, face-mask control and validation of ticket reservation by means of QR code, in order to lower the infection risk among passengers. During this first stage, this system has been installed in 350 turnstiles, which grant access to the Buenos Aires Metropolitan Area (or AMBA per its initials in Spanish).

Thanks to Indra's system, the access turnstiles can be blocked when body temperatures higher than those indicated as healthy are detected or when a person not wearing the mask correctly tries to enter.

The new access control solution is directly connected to the Argentine train database in order to check the QR code necessary to access the AMBA trains at rush hour, restricted to workers deemed essential. Thus, Indra's system makes it possible to confirm the ticket reservation at peak traffic hours, confirming whether the person is an essential worker or not, and denying or allowing them to pass. The solution asks the traveler to show their reservation to a tablet located on top of the access control turnstile, then asks them to stand about 50 centimeters from the device, which measures their temperature and at the same time checks the correct use of the mask, using technology that combines facial recognition with thermal and visible light imaging with ultra-fast temperature controls. Finally, it makes it possible to pay with the SUBE card and pass through.

THANKS TO INDRA'S SYSTEM, THE ACCESS TURNSTILES CAN BE BLOCKED WHEN BODY TEMPERATURES HIGHER THAN THOSE INDICATED AS HEALTHY ARE DETECTED.



New **forms of payment** for public transport

IDOM is working with Bilbao City Council on the implementation of a contactless payment system for single tickets on the Bilbobus Line 56 route. The passenger can pay with physical or virtual credit cards installed on smartphones using Google Pay or Apple Pay, based on the EMV and NFC systems.

The goal of the City Council is to reduce cash payment by users who at that time do not have a travel card or have run out of balance in their Barik travel card, with which you can access the different transport systems offered by the city (metro, bus, tram, funicular). In addition, these payment systems will alleviate the possible concentrations of passengers getting on buses, an important factor in the current pandemic situation, since it reduces the chances of contagion and improves the quality of service.

IDOM has contributed by carrying out the technical review and validation of the architecture, equipment and operations of the solution, as well as the coordination and management of the implementation and start-up of the new system.

IDOM HAS DESIGNED THE TEST TO IMPLEMENT THE CONTACTLESS TICKET PAYMENT SYSTEM IN BILBOBUS. LINE 56 ROUTE.

INGETRAC converters **benefit** from AI

INGETEAM PARTICIPATES IN BIND 4.0, CREATED BY THE DEPARTMENT OF ECONOMIC DEVELOPMENT, SUSTAINABILITY A ND ENVIRONMENT AND THE SPRI GROUP (UPEUSKADI PLATFORM).

The Traction business already has a fleet management system that allows on-the-field equipment operational data to be stored, thus speeding up the supervision of assets and the analysis of their operation.

The next objective focuses on integrating AI algorithms to analyze data automatically to improve preventive and predictive maintenance as well as the validation and improvement of design models, modifying and evolving design criteria and optimizing solutions in different aspects such as energy consumption, optimal sizing (volume, weight, etc..)This optimization seems essential to ensure the LCC of the product. This development arises from INGETEAM's continuous commitment to R&D, which has led it to participate in BIND 4.0, created by the Department of Economic Development, Sustainability and Environment and the SPRI Group (UpEuskadi platform), choosing a Start Up which is specialized in the development of AI applications to collaborate in the development of the project.

PEGASUS **HABD/HWD** system, a state-of-the-art technology

ITSS IS THE ONLY SPANISH COMPANY WHICH DEVELOPED HOT BOX AND HOT WHEEL DETECTORS. PEGASUS IS THE FLAGSHIP OF THE ITSS BRAND.

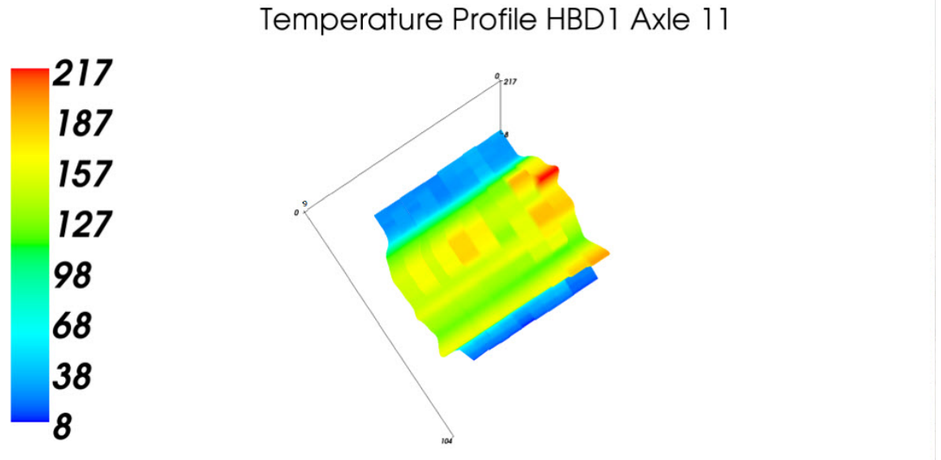
Founded in 2005, Ibérica Tecnología en Sistemas de Seguridad Ferroviarios (ITSS), based in Sagunto (Valencia) and branch in Madrid, is the only Spanish company to have developed Hot Box and Hot Wheel Detectors, while being also one of only three European companies to offer this type of product that uses very high, infrared multi-beam light reading technology.

The HABD and HWD scanners of the ITSS equipment system named PEGASUS detect the temperatures of the train's wheel bearings' axle boxes, the wheels and the brake discs when it is in motion.

PEGASUS is the flagship of the ITSS brand due to the large number of features and its reliability. The hazard warning system equipment facilitates the monitoring of the condition of the bearings and prevents accidents (such as derailments).

The major advances it brings to this complex field makes the PEGASUS system unique thanks to its innovation in offering the following:

- The only detection system with standard 10-beam infrared technology. The multi-beam scanners monitor greater measurement areas, up to 140 mm in width, while monitoring more points on the surface to be evaluated, thereby increasing accuracy.
- Redundant self-calibration that is also exclusive. The PEGASUS has integrated reference elements with redundant self-calibrating systems that increase both precision and reliability.
- Intelligent anti-vibration control and acceleration gradient control. ITSS has a patented system of integrated accelerometers dedicated to the longevity and reliability of the scanners that signal alarms in the event there is any serious defect that may affect the installation when the train is in motion.



Thermographic image of axle bearing measured with 10 beams

Concrete additives based on **graphite oxides**

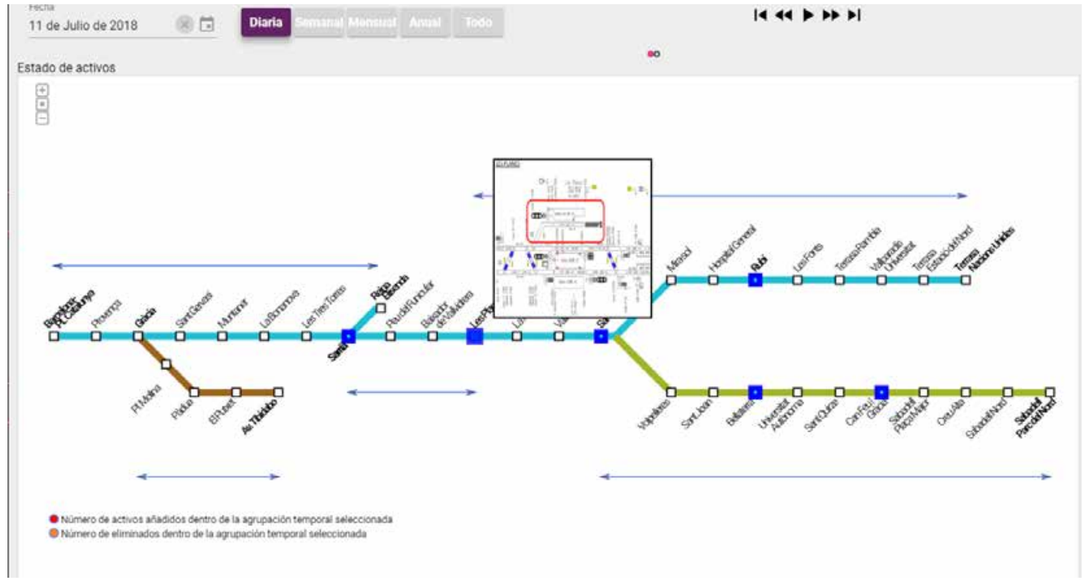
LANTANIA SIGNS AN AGREEMENT WITH GRAPHENEA TO STUDY THE USE OF GRAPHENE IN CONCRETE.

Lantania have signed a collaboration agreement with Graphenea to jointly study the use of graphene in concrete. The project's objective is to incorporate into the market, concrete additives based on graphite oxides that offer significant performance improvements. The infrastructure, water and energy group and the technology company specialising in the development and production of graphite materials, will be supported by the Agustín de Betancourt Foundation of UPM's ETSICCP in this study.

The project will last one year, is extendable, and will be carried out in three phases. The first phase involves the testing of graphite oxide additives in pastes, which will be carried out in the Civil Engineering Department: Construction of UPM's ETSICCP, in the second stage, laboratory tests will be carried out with concrete, and finally, the third stage will involve application on site.

UPM's role in this partnership is to evaluate the mechanical, durable and microstructural properties of the mixtures, while Graphenea will provide the graphene materials needed for the study, as well as its potential marketing. Lantania will carry out the installation of concrete with graphite in one of its construction projects.

The **digitalization** of railway infrastructure maintenance is real



MainRail is a software solution developed by MainRail Solutions, that makes possible to record the various inspections and operations directly in this solution, automating the results analysis and allowing the operations carried out by those responsible for maintaining railway infrastructures to be managed more quickly. As a result, not only are operations optimised in order to reduce maintenance costs, but the quality of work carried out increases and the useful life of assets is extended.

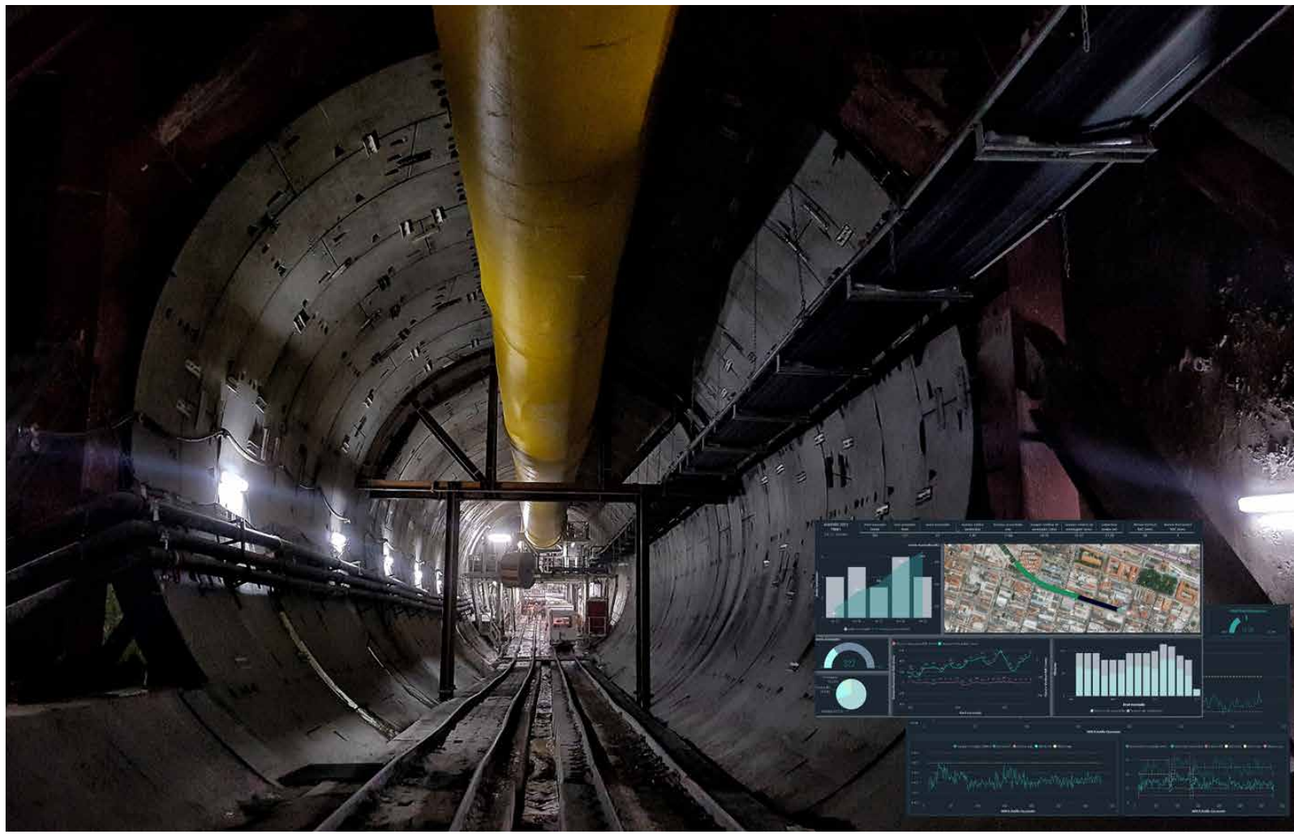
MAINRAIL WILL IMPLEMENT ARTIFICIAL INTELLIGENCE ALGORITHMS BASED ON PHYSICAL MODELS THAT CREATE A "DIGITAL TWINS".

In addition to the advantages of this kind of tool itself (increased efficiency, reduced costs and time), implementing MainRail makes it possible to significantly reduce interactions and situations at risk of Covid-19, as the maintenance teams carry out all their work on the ground with a movile app, without having to go to the base to pick up or submit work orders.

What's more, as all historical data generated is included in the platform, Mainrail will implement artificial intelligence algorithms based on physical models that create a "digital twins". This will make possible to progress towards predictive maintenance models in order to optimise cost management during the life cicle of the infrastructure extending the useful life of infrastructures.

MainRail has been implemented on catenary and electric system maintenance on Zaragoza's Tram and now is being deployed by AZVI on their track maintenance works for Mallorca's Railways.

ACROT Tunnel Boring Machine **Operation Risk Control Advisory** Service



SENER continues to evolve its ACROT Tunnel Boring Machine (TMB) Operation Risk Control Consultancy system, with which it has been offering high value-added services in tunnel boring machine works, especially in urban environments, for more than ten years.

The system is aimed at minimizing risks in the construction phase, both in terms of damage to third parties and possible catastrophic situations, as well as in terms of damage to the machine itself and operating costs.

Starting from an initial risk analysis on the project documentation, the system is based on the real-time monitoring, control and analysis of the operating parameters of the TBM and the behavior of the ground in the excavation and on the surface, together with the analysis of the damage to the tools and the pathologies of the segments. The application of different algorithms on a proprietary digital platform, based on SENER's extensive experience in this type of projects and combined with the expert knowledge of the ACROT team, allows early identification of risks and the proposal of appropriate mitigation measures in each case.

SENER OFFERS HIGH VALUE-ADDED SERVICES IN TUNNEL BORING MACHINE WORKS, ESPECIALLY IN URBAN ENVIRONMENTS, FOR MORE THAN TEN YEARS.

The ACROT system has proven its value in the boring of more than 200 km of tunnels, including projects such as line 9 of the Barcelona metro, the high-speed access to Barcelona -with the section next to the Sagrada Familia-, Girona and Montcada, in Spain; the Oporto metro, in Portugal; line 3 of the Guadalajara metro and the Toluca-Mexico City intercity train, in Mexico; and, currently, in the Fortaleza metro, in Brazil.

Euskotren.

Private LTE, maximum availability and quality of service for **CBTC** applications

TELTRONIC'S LTE SOLUTION COMPLIES WITH THE TECHNICAL REQUIREMENTS FOR PROPER ENT-TO-END OPERATION OF SIGNALLING SYSTEMS.

Railways, metros and trams need efficient communications network capable of providing the degree of availability and meet the security requirements of this kinf of environment.

Teltronic's LTE solution complies with the technical requirements for proper ent-to-end operation of signalling systems and, recently, has been certified by CAF signalling after the successful integration with its CBTC applicaction.

The field tests carried out in Bilbao Metro Line 3 on a real operation scenario proved that Teltronic's solution, consisting of its eNEBULA LTE infrastructure and its cutting-edge onboard terminal RTP-800, allows the correct operation of the signalling system up to the highest levels of train automation.

From the experience it is concluded that LTE technology is ready to be used in the deployment of CBTC systems, offering the optimal parameters in terms of availability, minimum latency and continuity and Quality of Service, and that a private broadband system provides reliable and efficient communications in railway environments through a single infrastructure.

In the face of the shortcomings and drawbacks of the wireless systems currently used in signalling applications, such as Wi-Fi, LTE technology provides an end-to-end solution that combines trackside infrastructure and onboard equipment, and which meets both the requirements of railway signalling data management and compliance with railway standards.

This project with CAF Signalling may be applicable to other transport environments with signalling systems based on different existing protocols such as ETCS or PTC.

Infrastructure digitalisation through **BIM**

TYPSA'S ALIGNMENT WITH BIM IS CERTIFIED ACCORDING TO THE INTERNATIONAL STANDARD ISO 19650 FOR THE "ORGANIZATION AND DIGITIZATION OF INFORMATION IN BUILDING AND CIVIL ENGINEERING WORKS THAT USE BIM".

TYPSA has expanded its BIM capabilities to drive collaborative, digital and coherent work regardless of the location. This approach allows the best qualified professionals to participate in projects anywhere in the world and remotely, with the information, documentation and data managed, stored and delivered digitally.

The BIM methodology enables the collaboration between the main stakeholders throughout the life cycle of a built asset, including promoters, designers and contractors, which is the key to success of the project when using shared information models.

This methodology stimulates new contractual relationships, promotes transparency and long-term planning, and facilitates energy control and environmental impact management throughout the entire life cycle of the infrastructure.

TYPSA's alignment with BIM is certified according to the international standard ISO 19650 for the "Organization and digitization of information in building and civil engineering works that use BIM", which allows to undertake increasingly complex and demanding international projects.

MEMBERS DIRECTORY

ENGINEERING, CONSULTANCY AND CERTIFICATION

Projects and infrastructure technical assistances, superstructure, signalling, communications and ticketing

- Aimen Centro Tecnológico
- Ardanuy Ingeniería, S.A.
- Caf Signalling, S.L.
- Caf Turnkey & Engineering, S.L.
- Calmell, S.A.
- CEIT
- Citef (Fundación para el fomento de la innovación industrial)
- Dsaf-Dinamicas De Seguridad, S.L.
- Mieres Rail, S.A.
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- FEX, Fastening Excellence Center
- Ibérica Tecnología en Sistemas de Seguridad Ferroviarios S.L. (ITSS)
- Idom-Engineering, Consulting, Artchitecture
- Ikusi SLU
- Indra Sistemas, S.A.
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Inserail
- Luznor Desarrollos Electrónicos, S.L.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- SGS Group Spain
- Tecnivial S.A
- Tectronic
- Tekniker
- Thales España Grp, S.A.U.
- TPF Getinsa Euroestudios, S.L.
- Trigo Group
- Typsa - Técnica Y Proyectos, S.A.
- Vicomtech
- WSP Spain-Apia S.A.

Systems, environmental, financial management and IT consulting

- Aimen Centro Tecnológico
- Aquafrisch, S.L.
- Ardanuy Ingeniería, S.A.
- Citef (Fundación para el fomento de la innovación industrial)
- Fundación Gaiker
- Idom-Engineering, Consulting, Artchitecture
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Mainrail S.L.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- SGS Group Spain
- TPF Getinsa Euroestudios, S.L
- Vicomtech
- WSP Spain-Apia S.A.

Technical Specifications Drafting and supervision of rolling stock manufacturing

- Aimen Centro Tecnológico
- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Hispacold S.A.
- Idom-Engineering, Consulting, Artchitecture
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- SGS Group Spain
- Trigo Group
- WSP Spain-Apia S.A.

Work supervision

- Aimen Centro Tecnológico
- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Idom-Engineering, Consulting, Artchitecture
- Indra Sistemas, S.A.
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Inserail, S.L.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- SGS Group Spain
- Sice Tecnología y Sistemas
- Tpf Getinsa Euroestudios, S.L
- Typsa - Técnica y Proyectos, S.A.
- WSP Spain-Apia S.A.

Product and process certifications

- Aimen Centro Tecnológico
- Ardanuy Ingeniería, S.A.
- Belgorail, S.A.
- Cetest, S.L.
- Citef (Fundación para el fomento de la innovación industrial)
- Dsaf-Dinamicas De Seguridad, S.L.
- FEX, Fastening Excellence Center
- Fundación Gaiker
- Idom-Engineering, Consulting, Artchitecture
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Sener Ingeniería y Sistemas, S.A.
- SGS Group Spain
- Trigo Group
- WSP Spain-Apia S.A.

Drafting of operation and maintenance (O&M) plans and transport and demand studies

- Aimen Centro Tecnológico
- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Citef (Fundación para el fomento de la innovación industrial)
- Mieres Rail, S.A.
- Gantrex Spain
- Idom-Engineering, Consulting, Artchitecture
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Segula Technologies España, S.A.U.
- SGS Group Spain
- Tekniker
- Tpf Getinsa Euroestudios, S.L
- Typsa - Técnica y Proyectos, S.A.

Training and simulations tools

- Aimen Centro Tecnológico
- FEX, Fastening Excellence Center
- Tekniker
- Segula Technologies España, S.A.U.
- Lander
- WSP Spain-Apia S.A.

INFRASTRUCTURE AND SUPERSTRUCTURE

Civil works (platforms,stations, depots)

- Aimen Centro Tecnológico
- Azvi S.A
- Caf Turnkey & Engineering, S.L.
- Comsa Corporacion
- Funor, S.A.
- Inserail, S.L.
- Lantania
- Luznor Desarrollos Electrónicos, S.L.
- Parrós Obras, S.L.
- Sener Ingeniería y Sistemas, S.A.

Electrification

- Alstom Transporte, S.A.
- Azvi S.A
- Caf Turnkey & Engineering, S.L.
- Comsa Corporacion
- Cunext
- Ingeteam Power Technology, S.A.
- Inserail, S.L.
- La Farga Yourcoppersolutions, S.A.
- Lantania
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Telice, S.A.
- Valdepinto, S.L.

Infrastructure and superstructure equipment and components

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Amurrio Ferrocarril y Equipos, S.A.
- Arcelormittal España, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Azvi S.A.
- Cables de Comunicaciones Zaragoza, S.L.
- Caf Turnkey & Engineering, S.L.
- CEIT
- Comsa Corporacion
- Cunext
- Dsaf-Dinamicas De Seguridad, S.L.
- Mieres Rail, S.A.
- Flexix, S.A.
- Funor, S.A.
- Hicasa-Hierros y Carbones, S.A.
- Ikusi SLU
- Inserail, S.L.
- voestalpine Railway System JEZ, S.L.
- Ladicim
- Lantania
- Precon - Prefabricaciones y Contratas, S.A.U.
- Pretensados del Norte, S.L.
- Semi -Sociedad Española de Montajes Industriales, S.A.
- Talleres Alegría, S.A.
- Talleres Zitrón
- Tecnivial S.A
- Telice, S.A.

Track assembly

- Alstom Transporte, S.A.
- Amurrio Ferrocarril y Equipos, S.A.
- Azvi S.A.
- Caf Turnkey & Engineering, S.L.
- Comsa Corporacion
- Gantrex Spain, S.A.
- Inserail, S.L.
- Lantania
- Pretensados del Norte, S.L.
- Talleres Alegría, S.A.

TRAFFIC CONTROL AND SIGNALLING SYSTEMS, COMMUNICATION, PASSENGER INFORMATION AND TICKETING

Traffic control and signalling (safety)

- Alstom Transporte, S.A.
- Bombardier España
- Cables de Comunicaciones Zaragoza, S.L.
- Caf Signalling, S.L.
- Caf Turnkey & Engineering, S.L.
- CEIT
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- Electrosistemas Bach, S.A.
- Ikusi SLU
- Implaser 99, S.L.L.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Luznor Desarrollos Electrónicos, S.L.
- Revenga Ingenieros S.A:
- Segula Technologies España, S.A.U.
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Sice Tecnología y Sistemas
- Siemens Rail Automation, S.A.U.
- Tecnivial S.A
- Tectronic, S.A.
- Telice, S.A.
- Thales España Grp, S.A.U.
- voestalpine Railway System JEZ, S.L

Protection (security) and infrastructure monitoring

- Alstom Transporte, S.A.
- Azvi S.A
- Bombardier European Holdings, S.L.U.
- Caf Turnkey & Engineering, S.L.
- Comsa Corporacion
- Dsaf-Dinamicas De Seguridad, S.L.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Mainrail S.L.
- Segula Technologies España, S.A.U.
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Siemens Rail Automation, S.A.U.
- Telice, S.A.
- Thales España Grp, S.A.U.
- Vicomtech

Systems and equipment for collection, ticketing and access control

- Caf Turnkey & Engineering, S.L.
- Calmell, S.A.
- Comsa Corporacion
- Gmv Sistemas, S.A.U.
- Ikusi SLU
- Indra Sistemas, S.A.
- Inserail, S.L.
- Revenga Ingenieros S.A:
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Sener Ingeniería y Sistemas, S.A.
- Sice Tecnología y Sistemas
- Siemens Rail Automation, S.A.U.
- Telice, S.A.
- Vicomtech

Communications

- Azvi S.A.
- Cables de Comunicaciones Zaragoza, S.L.
- Caf Turnkey & Engineering, S.L.
- CEIT
- Comsa Corporación
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- Gmv Sistemas, S.A.U.
- Ikusi SLU
- Indra Sistemas, S.A.
- Inserail, S.L.
- Revenga Ingenieros S.A:
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Sener Ingeniería y Sistemas, S.A.
- Sice Tecnología y Sistemas
- Siemens Rail Automation, S.A.U.
- Tectronic, S.A.U.
- Telice, S.A.
- Thales España Grp, S.A.U.
- Vicomtech

Passenger information and on-board entertainment systems

- Alstom Transporte, S.A.
- Bombardier España
- Turnkey & Engineering, S.L.
- Gmv Sistemas, S.A.U.
- Icon Multimedia, S.L.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Ikusi SLU
- Revenga Ingenieros S.A.
- Sice Tecnología y Sistemas, S.A.
- Siemens Rail Automation, S.A.U.
- Tecnivial S.A.
- Telice, S.A.
- Vicomtech

FROLLING STOCK MANUFACTURERS

High Speed trains (over than 250km/H) M.R para tráfico de pasajeros alta velocidad (más de 250km/H)

- Alstom Transporte, S.A.
- Bombardier España
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Zeleros

Long distance and regional passengers trains (up to 250km/H)

- Alstom Transporte, S.A.
- Bombardier European Holdings, S.L.U.
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Stadler Rail Valencia, S.A.U.

Urban and suburban trains

- Alstom Transporte, S.A.
- Bombardier European Holdings, S.L.U.
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Stadler Rail Valencia S.A.U.

Freight wagons and Locomotives

- Alstom Transporte, S.A.
- Bombardier España
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Stadler Rail Valencia, S.A.U.
- Talleres Alegría, S.A.
- Zeleros

Vehicles for infrastructure maintenance

- Alstom Transporte, S.A.
- Bombardier España
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Talleres Alegría, S.A.

MANUFACTURERS OF VEHICLE COMPONENTS, AUXILIARY EQUIPMENT AND SYSTEMS

Traction and propulsion components

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- Caf Power & Automation, S.L.U.
- Flexix, S.A.
- Ingeniería Viesca S.L.
- Ingeteam Power Technology, S.A.
- Mgn Transformaciones del Caucho, S.A.

MEMBERS DIRECTORY PER SECTOR

- Siemens Rail Automation, S.A.U.
- Zeleros

Control, auxiliary and diagnostic systems

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- Caf Power & Automation, S.L.U.
- CEIT
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- Gmv Sistemas, S.A.U.
- Hispacold S.A
- Ibérica Tecnología en Sistemas de Seguridad Ferroviarios S.L. (ITSS)
- Indra Sistemas, S.A.
- Ingeniería Viesca S.L.
- Ingeteam Power Technology, S.A.
- Kimua Group
- NGRT S.L.
- Stadler Rail Valencia, S.A.U.
- Zeleros

Assembly equipment

- Agui S.A.
- Aimen Centro Tecnológico
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Danobat, S. COOP.
- Fundiciones del Estanda,S.A.
- Funor, S.A.

Mechanical components

- Agui S.A.
- Alstom Transporte, S.A.
- Bombardier España
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- FEX, Fastening Excellence Center
- Flexix, S.A.
- Funor, S.A.
- Fundiciones del Estanda,S.A.
- Gamarra, S.A.
- Hispacold S.A.
- Metalocaucho, S.L.
- Mgn Transformaciones del Caucho, S.A.
- Stadler Rail Valencia, S.A.U.
- Talleres Alegría, S.A.
- Zeleros

Interiors

- Agui S.A.
- Bombardier España
- Colway Ferroviaria, S.L. (Nexus Management)
- Flexix , S.A.
- FEX, Fastening Excellence Center
- Flanker Tech Solutions
- Fundación Gaiker
- Satys Interiors Railway Spain, S.A.

Safety

- Agui S.A.
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- Dsaf - Dinamicas de Seguridad, S.L.
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- FEX, Fastening Excellence Center
- Fundación Gaiker
- Indra Sistemas, S.A.
- Luznor Desarrollos Electrónicos, S.L.

MAINTENANCE: EQUIPMENT, MAINTENANCE SERVICES AND REFURBISHMENT

Infrastructure and superstructure maintenance

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Amurrio Ferrocarril y Equipos, S.A.
- Azvi S.A
- Caf Turnkey & Engineering, S.L.
- CEIT
- Comsa Corporacion
- Mainrail S.L.
- Mieres Rail, S.A.
- Gantrex Spain
- Inserail, S.L.
- Ladicim
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Smart Motors

Rolling Stock maintenance

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Azvi S.A
- Bombardier España
- Caf - Construcciones y Auxiliar de Ferrocarriles, S.A.
- Caf Turnkey & Engineering, S.L.
- Comsa Corporacion
- Goratu Lathes
- Grupo Trigo
- Hispacold S.A.
- Patentes Talgo, S.L.
- Rosni S.L.
- Siemens Rail Automation, S.A.U.
- Stadler Rail Valencia, S.A.U.
- Talleres Alegría, S.A.
- Talleres Zitrón
- Technology & Security Developments

Maintenance of traffic control and signalling, communications, passenger information and ticketing systems

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Azvi S.A.
- Bombardier España
- Caf Signalling, S.L.
- Caf Turnkey & Engineering, S.L.
- Dsaf-Dinamicas de Seguridad, S.L.
- Electrosistemas Bach, S.A.
- Gmv Sistemas, S.A.U.
- Ibérica Tecnología en Sistemas de Seguridad Ferroviarios S.L. (ITSS)
- Ikusi SLU
- Indra Sistemas, S.A.
- Inserail, S.L.
- Luznor Desarrollos Electrónicos, S.L.
- Patentes Talgo, S.L.
- Semi- Sociedad Española de Montajes Industriales, S.A.
- Sice Tecnología y Sistemas, S.A.
- Siemens Rail Automation, S.A.U.
- Smart Motors
- Telice S.A.
- voestalpine Railway System JEZ, S.L..

Maintenance of systems, equipment and vehicles components

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Caf Power & Automation, S.L.U.
- Caf Turnkey & Engineering, S.L.
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- Gmv Sistemas, S.A.U.
- Géminis Lathes
- Grupo Trigo
- Hispacold S.A.
- Indra Sistemas, S.A.
- Ingeteam Power Technology, S.A.
- Kimua Group
- Mgn Transformaciones del Caucho, S.A.
- Nem Solutions
- NGRT S.L.
- Patentes Talgo, S.L.
- Satys Interiors Railway Spain SA
- Sice Tecnología y Sistemas
- Smart Motors
- Stadler Rail Valencia, S.A.U.

Supply of maintenance equipment

- Aimen Centro Tecnológico
- Alstom Transporte, S.A.
- Aquafrisch, S.L.
- Bombardier España
- Danobat, S. COOP.
- Electrosistemas Bach, S.A.
- Kimua Group
- Ingeniería Viesca S.L.
- Newtek Solidos S.L.
- Patentes Talgo, S.L.
- Tecnivial S.A.

AGUI S.A.

AGUI is a B2B subcontractor and manufacturer of complex integrated assemblies for OEMs.
In recent years we have evolved from being a reactive subcontracting firm, adaptable to clients' needs, to become a subcontracting services partner, anticipating to market needs; innovation and continuous adaptation.
AGUI currently provides services in more than 10 different sectors including lifts and railway, exporting production to more than 25 countries.
Within the Railway sector, AGUI is certified in ISO-3438 and EN-15085, which positions us as a reference supplier for complex welded assemblies.

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lm.gil@agui.com
www.agui.com

AIMEN TECHNOLOGY CENTRE

We are an innovation & technology Centre specialized in materials and in advanced manufacturing technologies, especially joining technologies and laser technologies applied to materials processing and robotics. We develop R&D&I in collaboration with companies in the field of the technologies for industry 4.0, and we offer technological services to industry in the field of welding and corrosion engineering, manufacturing engineering, design and simulation and mechatronics; developing customized and integral technological solutions which respond to the needs of our clients and associated companies. Our accredited laboratories provide analysis and testing services, especially failure analysis and in-service behavior of industrial components.

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www.aimen.es

ALSTOM SPAIN

As a promoter of sustainable mobility, Alstom offers a complete range of solutions (from high-speed trains to metros, tramways and e-buses), passenger solutions, customized services (maintenance, modernization), infrastructure, signalling and digital mobility solutions. The company recorded sales of €8,2 billion in the 2017/18 fiscal year. Alstom is present in over 60 countries and employs 38,900 people. In Spain Alstom employs around 2,000 people on 18 sites, including a rolling stock manufacturing site and 4 innovation centres where it runs R&D programmes for rolling stock and railway signalling, safety, security, digital mobility and services.

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AMURRIO FERROCARRIL Y EQUIPOS, S.A.

Design, production, installation of turnouts, track devices, crossings. For all type of purpose. Metro, tram, regional, conventional, high speed, heavy haul, ports and industrial.

Maskuribai, 10 01470 Amurrio (ÁLAVA)
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AQUAFRISCH, S.L.

More than 20 years of experience in the railway sector guarantee Aquafrisch as a manufacturer of train washing tunnels, bogies, WC extraction systems and other equipment for the maintenance of rolling stock in railway workshops. Our equipment is installed in more than 30 countries on 5 continents. Aquafrisch is also a reference in industrial water treatment, potabilization and purification. In Aquafrisch we take care of the design, manufacture, installation, commissioning, training and maintenance of the machines according to the customer's needs. Aquafrisch is certified in ISO9001:2015, ISO14001:2015 and OHSAS2007.

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ARCELORMITTAL

ArcelorMittal, as the steel industry leader in product and process innovation, is fully geared to meet the future requirements of the rail industry. With rail production facilities in Spain, Poland, Luxembourg and USA offers a wide portfolio of rails for subways, trains, trams, light rails, crane rails, crossings and rail accessories. We area specialist in rail for high-speed net, with over 1 million tons produced, and presence in infrastructure of over 30 countries, the high technologic quality allows participating in the more demanding tenders all over the world. ArcelorMittal has its own R&D Rail Excellence Centre for developing new products and processes.

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ARDANUY INGENIERÍA, S.A.

Ardanuy Ingeniería, S.A. is an engineering consulting firm specialized in studies, projects, works management, safety engineering (ISA), operation / maintenance studies; and technical guidance for railways (high-speed, conventional, freights, metros, trams, cable cars), electrical engineering (sub-stations and high-voltage lines), roads (highways, freeways, BRT's, streets, etc.), buildings (architecture and facilities) and telecommunications.

The company was established in 1992 and is comprised of a permanent team of more than 200 professionals.

Ardanuy Ingeniería develops activities worldwide, in more than 60 countries in all 5 continents.

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ARTECHE

The Arteche Group is focused on offering equipment and solutions for the electricity and railway business worldwide. The expertise of more than 70 years manufacturing instrument transformers and electromechanical relays gives the client the assurance of a technological leader. With projects over more than 40 countries, our dedicated range of railway relays are designed to meet the highest standard requirements of the sector and its reliability and durability allow them to be used not only as general purpose relays, but also in all kind of safety functions, both for on-board and signalling applications making them suitable to be used in circuits requiring up to SIL-4 safety integrity level.

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AZVI

Azvi is the company which undertakes construction within Grupo Azvi. For over 100 years, Azvi has carried out a significant number of large scale civil engineering and building projects. Azvi has extended its activity to all construction areas in Europe, America and the Middle East, without losing sight of its origins and railway background. By applying principles of responsibility to the whole business sphere, seeking the creation of value, maintaining a strong commitment to all its stakeholders in all countries where it is present and investing in R&D Azvi continues constructing a company capable of facing the new challenges of an increasingly globalised market.

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CAF - CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A.

CAF is one of the world leaders in the design and implementation of comprehensive transit systems. CAF provides comprehensive project and engineering management throughout all stages of the project including feasibility analysis and investigations, system design, civil work, signalling, electrification and other electromechanical systems, rolling stock supply and system operation and maintenance.

In terms of rolling stock, CAF supplies and maintains high speed trains, regional and commuter trains, locomotives, metro units, tramways and buses.

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CAF POWER & AUTOMATION

CAF Power & Automation designs and develops electric traction systems, energy storage systems and control & communication, which guarantee adaptable reliable and committed solutions with transport. Our systems are modular and flexible and can be integrated both in new vehicles and in those in service or that need refurbishment. Traction systems; Energy Storage (GREENTECH) and Control & Communication (COSMOS). Railway systems modernisation and refurbishment: Equipment and components, system integration, installation, maintenance and guarantee. Railway system maintenance: Technical support, spare parts, training courses, test benchs.

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CAF SIGNALLING, S.L

CAF Signalling, the technological subsidiary of the CAF Group, designs and provides Integral Signalling Solutions, both in Spain and abroad. The company has its own advanced technology products, both for onboard and wayside applications that make up the core of its integral solutions. As a result of a significant and growing effort in R&D&I, particularly in the area of critical safety systems, CAF Signalling promotes continuous innovation and customer focus.

CAF Signalling, boats the Company's own in house engineering and expertise to take on "turn-key" railway signalling projects.

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BELGORAIL S.A.

Belgorail SA is a certification, inspection and safety evaluation entity for the guided transport sector, both conventional railways and subways and trams. We are an accredited body for the certification of interoperability (NoBo), national regulations (DeBo), safety evaluations under CENELEC standards (ISA) and under CE Regulations (AsBo).We are part of the Certifer Group, with a presence, in addition to Spain, in Belgium, France, the Netherlands, Germany, Austria, Italy, Sweden, Turkey, Algeria, Brazil, Australia, Vietnam, the United Arab Emirates and China.

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BOMBARDIER TRANSPORTATION

Bombardier is today a key company of the Spanish railway industry, with around 1,000 employees between direct and indirect job positions, in its offices, workshops and factories located in Trápaga (Centre of excellence in propulsion equipment), San Sebastián de los Reyes (Centre of excellence in signaling systems), Alcobendas and Pinto (fleet maintenance). The company's activity ranges from the design, manufacture and sale of railway vehicles, propulsion and traction control systems (diesel and electric) and signaling systems, to the delivery of railway maintenance services for fleets, repair and modernization of railway material.

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www.bombardier.com/en/worldwide-presence/country.spain.html

CABLES DE COMUNICACIONES ZARAGOZA, S.L.

Cables de Comunicaciones is one of the main European companies dedicated to the design, manufacturing and commercialisation of telecommunication, signalling and optic fibre cables. Ever since its foundation in 1971, it has contributed to the development and extent of the telecommunications infrastructures. Railway companies from the main European countries entrust us with the manufacture of their cables. Among them, they stand out: Adif, SNCF, NetworkRail, Infrabel etc. Cablescom undertakes its activity in Zaragoza, in the Malpica industrial park, over a surface of 77,000 m2, which includes a production plant, offices and warehouses.

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CAF TURNEY & ENGINEERING

CAF Turnkey & Engineering was created in 2007 with its head office is in the Technological and Scientific Park of Biscay (Zamudio). It began its business in Integrated Engineering of Transport Services and in 2015, after merging with the company CMFS (Mexico), it increased its portfolio of services with the inclusion of EPC projects for both civil works and subsystems. Following solid and constant growth, the company currently has a workforce of 200 with offices in Zamudio, Madrid and Mexico, providing service to both companies within the CAF Group and national and international private and public customers.

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CALMELL, S.A.

The Calmell Group is the leader in access control and identification, through its companies Calmell S.A., Affix S.L., Idoneum S.A., which are respectively engaged in producing the supports (tickets, cards,…), developing specific software and hardware, personalization and security.

In the public transport sector it works for integrators and operators supplying any kind of support for ticketing and reader/writer systems.

With a strong international presence through its network of representatives and distributors, the Calmell Group is able to satisfy your needs on a global level.

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CEIT

We are a basque Technology Center founded by the University of Navarra, whose main objective is to develop appliead R+D+i projects with companies to improve their competitiveness.

We are part of BRTA (Basque Research & Technology Alliance), which includes 16 agents that constitute the Basque Network of Science, Technology and Innovation (RVCTI). We also participate in Shift2Rail Joint Undertaking as associated members.

We focus our R+D+i activity within the railway sector in the following topics: energy efficiency, maintenance, railway dynamics, component design and characterisation, embedded systems (SIL4), positioning, data intelligence.

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CETEST, S.L. Centro de Ensayos y Análisis

Fully accredited ISO17025, CETEST is an experienced laboratory in railway vehicles and components testing. Its offering covers a wide variety of component test benches at their facilities as well as portable ones. CETEST provides a global on-track measurement deployment capacity. From validation and verification test in the development phase to product homologation and failure detection / root cause analysis in the after-sales operation, CETEST can assist you during the full lifecycle of your product.
Their customers include passenger, freight and special track maintenance vehicle manufacturers, component suppliers, as well as Notified Bodies, engineering firms and authorities.

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CITEF

CITEF (Railway Technology Research Centre) was created in 1997 as part of F2I2 (the Foundation for the Development of Industrial Innovation) for research, innovation, experimentation, study and teaching purposes within the railway knowledge area.
It is a non-profit organisation pursuing aims of general interest within any rail transport technology sector.

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COLWAY FERROVIARIA, S.L.

COLWAY FERROVIARIA S.L., a company belonging to the COLWAY Group, is specialized in the design, engineering, manufacture, installation and commissioning of turnkey railway interiors and toilet modules projects. Revamping of seats and floors for a significant improvement of the coaches, with a controlled investment, is included among its capabilities. Through the integrated management of modular supplies & systems, based on experience, research and innovation, satisfaction and expectations of railway constructors and Public Administrations are achieved. Its work is based on the application of strong values: commitment, professionalism, ethics and agility.

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COMSA

COMSA is the company of COMSA Corporación specialised in railway infrastructures. Founded in 1891, the company provides a comprehensive service in the field of construction, maintenance, electrification and control and communication systems for high-speed and conventional lines, metros and tramways. In this business activity, it is leader in Spain, where has been involved in the carrying out of all high-speed lines, and has permanent operations in Argentina, Brazil, Croatia, Denmark, Mexico, Poland, Portugal and Uruguay.
It has also taken part in a large number of projects in other markets such as Italy, the Philippines, Taiwan, Malaysia, India, etc.

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CUNEXT COPPER INDUSTRIES

Cunext in the way to continuous development has created the entire cable product range for overhead line electrification adapting at any speed from local transport to high speed line. Our modern technology together with a wide experience at cable and alloy manufacturing makes us the best partner for railway companies offering best product quality and service.
Cunext Group locate production plants at strategic places such us Cordoba for copper products, Vitoria and Brescia for aluminium products.

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DANOBAT S.COOP.

Specialised Machine Tools and production systems for railway industry offering technologically advanced solutions and services, including among others engineering, consultancy, which are fully adapted to clients' needs.
DANOBAT focuses its activity in the supply of turnkey solutions for the manufacturing and maintenance of railways rolling stock, incorporating own leading technology products, together with those manufactured by specialised companies.

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DINÁMICAS DE SEGURIDAD, S.L.

DSAF is a entrepreneurial society focused on the safety of the movement of people at risk.
Committed to the new technologies applied to the design of signaling systems, prevention and emergency in safety, DSAF promotes the development of products that guarantee the highest grade of security according to the standards of type approval current in generalized risk societies such as global ones.
The activity of DSAF focuses on these two major sectors: road / rail tunnels and wind towers.

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ENCLAVAMIENTOS Y SEÑALIZACIÓN FERROVIARIA ENYSE S.A.U.

Enyse is a Signalling company belonging to the Industrial Services division of the ACS group.
For Enyse, the success of their projects is based on a high level of adaptation to functional and operational needs of the various railways - flexibility is the key word. In an industry increasingly integrating technology standards, the required Reliability, Availability, Maintainability and Safety standards not only apply to system design level, but are the actual premises to properly implementing and commissioning turn-key Signalling projects.

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ELECTROSISTEMAS BACH, S.A.

Electrans, established in Barcelona in 1977, has had a successful career path that turn it in an international relevant supplier in signalling, particularly in the field of level crossing protection solutions, railway and tramway signalling, detection systems and LED lighting, obtaining its products and solutions worldwide recognition.

Electrans' constant progress is motivated by the commitment to innovation, at the service of the adaptability of systems and products for the current needs of railway projects.

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FEX, FASTENING EXCELLENCE CENTER

The creation of the Fastening Excellence Center association responds to the concern of several companies to promote the transformation and competitiveness of the bolted joint sector, going from being companies more focused on the day-to-day and manufacturing process, to companies that also direct their attention to the finished product and the market. Currently, we have 17 companies in the association, which intends to develop two lines of activity, one focused on internal activities for members, and the other open to the market offering services on demand. Many of the partner companies work the railway market and we have a table to deal with this sector specifically.

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FLANKER TECH SOLUTIONS

Flanker produces components in the field of wood and its derivatives (tablex, HPL, OSB, plywood), as well as in fibreglass, plastic or composites. We integrate CNC technology, stamping, assembly and painting, for roof, floor, boot, carpeting or side cladding applications, among others.
We are present in the Railway, Automotive, Packaging and Laboratory Furniture sectors.

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FLEXIX, S.A.

FLEXIX, develops, manufactures worldwide since 1950 INJECTION and EXTRUSION RUBBER PARTS, rubber-metal, rubber-plastic, special elastomers and assemblies. We are part of the KÄCHELE-FLEXIX Group, with 2 plants in Germany, 1 in Spain and a warehouse in USA. For the RAILWAY SECTOR we produce mainly for infrastructures, absorption of vibrations under track, tie pads for sleepers, different range of stiffness (14-152 kN/mm). We provide development in geometries (FEM), materials, (conductivity, non-harmful gases...)
TYPE OF PARTS: Pads, Ducts, bellows, tubes, silentblocks, joints, bumpers, axles, links, valves, bearings.
MIXTURES: NR, SBR, EPDM, CR, H/NBR, ECO, AEM, ACM, Silicone, FPM.

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FORGING STEEL PRODUCTS, S.L.

Manufacturing of machined and if needed painted forged components ready for assembly destined to the railway rolling stock manufacturers for chassis, brakes, clutches, hooks etc.

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GAMARRA, S.A.

GAMARRA S.A. is one of the foremost producers of Low Alloy Carbon Steel Castings in Europe. We produce Steel castings for most Railway Carriage and Locomotive Manufacturers throughout Europe and beyond. We also produce a wide range of castings for Commercial Vehicles, Off-Road Construction Machinery, Public Works, Ministry of Defence, Lifting and Farming Machinery and General Industrial requirements. Our products can be supplied in rough cast, machined or assembled with other accessories. We produce more than 7,000 tonnes of castings per year in the range of 10 kg to 300 kg and dimensions up to 1,100 x 1,100 mm.

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GANTREX SPAIN, S.A.

Gantrex is the global market leader in production, distribution installation and maintenance of high quality crane rail solutions.
Gantrex products are used in may different applications and end-markets including ports, shipyards, steel mills aluminion smelters railway depots and heavy industries..

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GEMINIS LATHES, S.A.

Leaders in the development of horizontal and multiprocess lathes, and specialized in railway sector, where we are proud to support the manufacturers of trains and maintenance lines, among other agents in the value chain. We offer customized solutions with highly reliable machines for the maintenance of rolling stock. Our lathes are specialized in the machining of axles, axle-wheel set and wheels.

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FUNDICIONES DEL ESTANDA,S.A.

Since 1957 Estanda has been providing various sectors with steel castings. The half of all its activity is focused on the high-speed train brake discs manufacturing, being one of the first worldwide manufacturers, the other half is focused on a wide range of sectors such as the cement and mining industry, defence, off-shore, automotive industry, and bogie components for the railway equipment. Mostly low alloy steels , wear resistant steels, refractory steels, stainless steels and white irons are casted. With its 14.000 tonnes per year production capacity, Estanda manufactures from 10 to 2000 kgr. parts in all kinds of batch sizes, with 2.400 mm as its maximum part dimension.

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FUNORSA

Funorsa is a Steel casting foundry with more than 20 years in the railway sector. We are specialized in pieces of high responsibility as couplers, Pivots, connection rods and different parts of the bogies. We are able to cast low alloy, alloy and inox castings up to 1.300 kg with a capacity of 2.000 Tons per year.

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GAIKER CENTRO TECNOLÓGICOs

GAIKER Technology Centre, located in the Technological Park of Bizkaia, is devoted to the development of new technologies to be transferred to the industry. Since 1985, the Centre has carried more than 2,000 R&D Projects in the areas of Plastics and Composites, Environment and Recycling and Biotechnology. Besides, GAIKER offers to its customers Advanced Technological Services, Analysis and Tests and Technological Dissemination Services. GAIKER counts on 87 employees and was awarded in 2008 by the European Foundation for Quality Management (EFQM) with the "Prize Winner" for the best European organisation in "Management for Process and Facts".

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GLOBAL QUALITY ENGINEERING SER. UNA COMPAÑÍA DE TRIGO GROUP

TRIGO Spain is a supplier of quality services and support in the supply chain in industrial sectors. Founded in 2001, it offers quality assurance services in products, maintenance, industrial means management and metrology with more than 600 quality professionals in Spain. TRIGO GROUP is present in 25 countries with a team of more than 10,000 professionals.
TRIGO Spain exports to the railway sector good practices of high added value developed in sectors such as aerospace and automotive.

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GMV SISTEMAS S.A.U.

GMV is a leading firm in the design, development, implementation and rollout of Intelligent Transportation Systems (ITS) guaranteeing compliance with the railway sector standards. Main products and services: On board units for location and communications, Fleet Management Systems, Fare Collection Systems, Passenger information systems, CCTV systems, PA & Intercom system, Systems for security reinforcement, Eco-driving systems, Software for planning and scheduling of services. Conceived for all railway modes (tram, metro, commuter train, long distance, high speed trains...)

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HIERROS Y CARBONES , S.A.

Since 1997 Hicasa is specialised in transformation, tailored cut, storage and distribution of railway tracks materials, all kinds of rails and railways accessories with a permanent stock of more than 3.500 MT.
In 2006 we have incorporated to our Group of companies a factory specialised in manufacturing light rails from 7 kg/m to 48 kg/m, manufacture according European and American Standard, Australian or South African together with other types of Standard (AREMA).
Our own experience allows us the optimal management of the supply chain, exporting to more than 30 countries all over the world.

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ICON MULTIMEDIA, S.L.

With over 25 years of experience, we have a extensive experience in the Digital Signage sector.
Our DENEVA Digital Signage platform is specially designed for high availability environments such as Smart Cities or as a powerful and comprehensive marketing tool for 'Smart Stations', guaranteeing a reliable and safe travelers and users experience.

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INGENIERÍA Y CONTROL FERROVIARIO, SAU

ICF offers technical and sustainable solutions for railway signalling. In this area, our vocation is betting heavily on the development and innovation, constantly releasing new products that can be used to improve and optimize existing technology solutions. All the level crossings since June 2001 have been protected by ICF with its level crossing protection system SPN-900. We are working worldwide with more than 1000 international references. For us it's very important to be sustainable so we have worked hard to design systems that reduces dramatically its power consumption which allows it to work taking its energy only from sun, getting a zero CO2 emissions and zero external power supply.

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IDOM CONSULTING, ENGINEERING AND ARCHITECTURE S.A.U

IDOM is one of the leading companies in the field of professional services in Engineering, Architecture and Consultancy. An independent company established in 1957 and it has participated in over 30.000 projects in five continents. In 25 countries with 42 offices. More than 3.500 staff posseses the expertise and experience to cover all the phases of a railway project(high speed, conventional, freight, metro, light rail, tramway, depot and workshops). From conception to commissioning and beyond and facing the challenges of an innovative, efficient and resilience Transport System.IDOM accompany the client by providing the correct technical assistance required for the decission making process.

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IKUSI, S.L.

At Ikusi, we provide complex turnkey integration project design, engineering and development services both for rolling stock and for infraestructure, with the agility and flexibility required by the rail industry. We are oriented towards improving our clients' competitiveness and innovation capacities, thanks to our deep business knowledge developed during these years.. Our business focus is the design and supply of innovative technological solutions to help vehicle builders, transport operators and authorities optimize and transform their business while guaranteeing quality of service and enhancing passenger experience in terms of security, information, comfort and accessibility.

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INDRA

Indra is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defense markets, and a leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait Its business model is based on a comprehensive range of proprietary products, with a high-value focus and with a high innovation component. In the 2018 financial year, Indra achieved revenue of €3.104 billion, with 43,000 employees, a local presence in 46 countries and business operations in over 140 countries.

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www.indracompany.com

INECO

Global leader in transport engineering and consultancy, it has contributed to the development of transport infrastructures for over 50 years in more than 50 countries. Its high level technical specialisation allows its activity to diversify into new markets and reinforce its presence in those where it is already established. Its participation in the whole railway system in Spain has led the company to develop important international projects like the Makkah-Madinah high speed in Saudi Arabia, the HS2 project in the United Kingdom or the deployment of ERTMS in Europe.

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INGENIERÍA VIESCA S.L.

We are specialists in design and manufacture of power electronic equipment.
Our equipment work satisfactorily in all the continents with high reliability and availability, making efficient use of the available energy.
We adapt our products to customer needs and requirements according with the applicable standards and the best quality.
The expected functionality is guaranteed by means of specific test protocols.
Our innovation is present in all our products: auxiliary power converters, battery chargers, flat battery starters, ...

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www.ingenieriaviesca.com

INGETEAM POWER TECHNOLOGY, S.A.

Ingeteam is an international group specializing in power and control electronics (inverters, frequency converters, controllers and protections) and electrical engineering and automation projects. The company operates in 22 countries, with 3,900 employees. R&D is at the backbone of its business activities.
In railways, the traction converters INGETRAC are based on an smart integration of proved Proved Modules, comprising all necessary elements to be fully operational, on each required application.

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INSE RAIL S.L.

Inse Rail is an engineering firm that is highly specialized in the railway industry and specifically its installations and systems.
Founded in 1994, it is dedicated to engineering, consulting and project management in the railway, industrial, energy and building construction industries, carrying out its activities in the different stages of planning, design, construction and operation of investments.
Inse Rail participates in the international development of the High Speed Rail and metropolitan transportation, with a strong specialization in electrification, signaling, security and communication systems, and other railway transport installations.

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INTERNACIONAL HISPACOLD, S. A.

Hispacold, a World leader Company for climate systems with more than 40 years' experience is specialized in passangers comfort.
Hispacold designs and manufactures HVAC solutions for all rail vehicles: trams, metros, EMUs, DMUs, LRVs… with proven and reliable technology solutions.
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IBÉRICA TECNOLOGIA EN SISTEMAS DE SEGURIDAD FERROVIARIOS SL (ITSS)

IBERICA TECNOLOGIA EN SISTEMAS DE SEGURIDAD FERROVIARIOS SL (ITSS), founded in 2005, is a leading manufacturer and supplier of railway hazard monitoring equipment, focusing mainly on hot axle box / hot wheel and Wheel impact load / Weighing in motion detectors.
The ITSS systems use state-of-the-art infrared and fibre-optic technology. The PEGASUS HABD/HWD multi beam system monitors the axle box and brake temperatures of coaches. The AGUILA WIM/WILD system uses fibre-optic sensors to detect off-centre wheels and flat spots. It can also report train weight and overloading. ITSS products are the model representation of a perfect combination of experience and innovation.

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KIMUA ENGINEERING, S.L.

Kimua designs and produces different types of auxiliary tools for lifting, transporting, assembling and doing maintenance of rolling stock and its components during any stage of the Railway value chain. Additionally, Kimua has added 2 new business units to its portfolio; one for providing renting services of standard solutions and a second one for providing its clients with specific training courses in areas like handling and lashing of big and large loads.

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LA FARGA YOUR-COPPERSOLUTIONS, S.A.

La Farga is able to produce all the range of railway products in an integrated process. Our railway range includes all alloys used, the different measures of grooved contact wire and all supporting and electricity supply elements, feeders, hangers and cables. Furthermore, we offer technical visits and assessment to our clients and we constantly develop new railway products with the aim of introducing the best copper solutions into the market.
La Farga is a family-run metallurgical company, with more than 210 years of history. We produce semi-finished copper products and their alloys for several technological sectors.

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LADICIM - UNIVERSIDAD DE CANTABRIA

LADICIM participates in R&D projects focused on the innovation of the railway superstructure, carrying out studies on the development of its elements, acc to national (Adif), European (EN) and American (AREMA) reference standards. The results are reflected in more than 500 reports, 25 research papers with a high impact index and 7 Doctoral Theses. The projects include collaborations in countries such as the USA, Canada, Saudi Arabia, Turkey, Germany, Senegal, Tanzania, Morocco or Ethiopia. LADICIM has implemented a quality system according to the UNE-EN ISO/IEC 17025 standard, being accredited by ENAC (Spanish Accreditation Board) for the testing of fastenings, sleepers and rail welds.

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LANDER SIMULATION & TRAINING SOLUTIONS

Lander Simulation & Training Solutions, S.A. specialises in designing, developing and implementing cutting-edge commercial simulation devices for training purposes.
On the basic premise of preventing accidents and loss of human life, Lander works with each customer to build training simulators which meet the specific needs of each operation.
Lander was incorporated in 2002, and now operates in more than 20 countries across all 5 continents. Its solutions cover the entire range of railway operations - suburban trains, long-distance units, high-speed trains, freight, monorail systems, metros or light rail..

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www.landersimulation.com

LANTANIA

Lantania specializes in the construction of heavy civil works (roads, highways, dams, water treatment plants, maritime works, railways and airports), building construction and energy projects. The company began its activity in 2018 with the acquisition of the construction, energy and services business units of the Isolux Corsán Group and the subsequent purchase of the Velasco Group in 2019. One of the differential characteristics of Lantania is its ability to execute any kind of rail project in an integral way. The company has built more than 150 km of infrastructure, tunnels and railway viaducts, as well as more than 50 traction power substations and more than 1,500 km of overhead line..

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LUZNOR DESARROLLOS ELECTRONICOS, S.L.

LUZNOR is a company specialized in the design and manufacture of professional torches, emergency lighting and other electronic security devices. LUZNOR puts at your disposal highly qualified technicians, a high quality standard, efficient development, manufacturing and control systems and, above all, a philosophy of commitment to clients that allows LUZNOR to offer innovative products with advanced technology and recognised prestige.

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MAINRAIL S.L.

MainRail is a high-tech startup devoted to providing IT-based solutions to help you digitizing and optimizing the railway infrastructure maintenance operations.
We combine our expertise in a wide range of technologies (e.g. big data analysis and visualization, digital twins, IoT, machine learning, etc.) with a solid knowledge in railway maintenance and operations.
Our solutions are based in a customizable IT platform (MainRailMT) for the management of all maintenance-related operations and a family of IoT devices (MainRailID) for a continuous and cost-effective inspection of your infrastructure.

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METALOCAUCHO, S.L. (MTC)

MTC, being part of Wabtec Corporation, designs and manufacture rubber-metal components for suspension and vibration control systems used on railway, automotive and industrial applications.
With headquarters in Spain, MTC has 4 production facilities in 1) Spain, 2) China, 3) India and 4) USA, which offers to customers the possibility to localize production in any of these countries.
Thanks to a wide commercial presence in any country of the world, MTC gives local support to develop projects for both OE and Aftermarket bussinness.
Our main products are related to Primary Suspensions, Secondary Air Springs, Bushings, Buffers, Layer Springs, Subassemblies, Elastic Wheels, etc.

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www.wabtec.com/business-units/metalocaucho-mtc

MGN TRANSFORMACIONES DEL CAUCHO, S.A.

MGN was established in 1957 and since then it has been developing its activity both designing and manufacturing rubber-metal components, mainly for the railway industry. MGN invests in research and innovation as a basis for the development of elements to be adapted in the new understanding of passenger and freight trains, taking the latest technological advances of the rubber world, vibration control and damping systems. - Primary and secondary suspensions. - Conical springs - Bushes and spherical bearings - Rods, Bogie subsystems - Pivot Bushes - Elastic Supports - Compression buffer and Draw Gear springs - Bellows, Gangway protections - Profiles, o-rings and seals.

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NEXT GENERATION RAIL TECHNOLOGIES, S.L. (NGRT)

NGRT S.L. is a company focusing on railway safety, working with railway regulators and helping infrastructure managers and train operators secure their infrastructure and operations. NGRT's products are designed to detect any anomalies that occur in the railway infrastructure.
The NGRT applications will detect rolling stock, independent of speed, direction and track conditions at any location, in all weather conditions, as well as anomalies impacting on the railway infrastructure.

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NEWTEK SOLIDOS, S.L.

NEWTEK is mainly active in the manufacture of systems for filling sand in trams, trains and locomotives. NEWTEK supplies installations composed of storage silos, fixed sand feeders, sand feeding mobile units, aspiration systems and dust collection devices. The company also designs, manufactures and maintains custom installations according to the needs of each client.

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NRF

Since 1927 NRF is a leading manufacturer and supplier of cooling products for the automotive market, industrial, railway and marine sector. NRF is known for the production of high quality radiators, but also produces and supplies a large range of other engine cooling and air conditioning products. NRF has global engineering, testing and development facilities. Railway and ship manufacturers, large retailers of vehicle parts, radiator shops and specialists in more than 80 countries worldwide daily rely on NRF's high quality products.

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PARRÓS OBRAS, S.L.

Family business with over 25 years experience in civil construction and iron and steel industry for the railway sector. Parros Group which is specialized in pile driving and catenary foundations, has implemented the 80% of the foundations of the entire Spanish High Speed Network. Whether conventional railway network or Highspeed Railway (AVE), PARROS GROUP is distinguished by the versatility of our machines adapted "Ad hoc" for auxiliary civil works from the railway, with automatic switching to the three Spanish gauges. Also innovative is our implementing system of noise barriers from the railway track and its foundations. Generic activities of building and general construction.

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www.parros.es

PATENTES TALGO, S.L.U.

Talgo is a Spanish company with more than 70 years of experience, specialized in designing and manufacturing trains, maintenance equipment as well as providing maintenance services to railway operators worldwide. Today, Talgo is the leading global reference for Spanish High Speed Technology and the number one player in Spain's railway market. Due to Talgo´s successful expansion strategy and its globally acclaimed products, the company has become truly international. Its key success factors are innovation, unique technology, sustainability, safety, competitiveness and tailor-made projects with clear focus on customer. Talgo trains are internationally recognized as the best in their category.

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SATYS INTERIORS RAILWAY SPAIN

Satys is a Spanish company specializing in the design and manufacture of galley systems for railway rolling stock.
A galley system is broken down into 3 main families of equipment:
- Refrigerated cabinets
- Functional systems. Cooling, electricity, water, lighting, etc.
- Interiors. Countertops, lining, etc.

Satys offers a wide range of products specifically for each one. Thanks to the unique and highly efficient Satys technology, our products are internationally recognized as the best in their class in terms of quality, safety, availability, reliability, accessibility and environmental friendliness.

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SEGULA TECHNOLOGIES

SEGULA Technologies is an engineering group with a global presence, helping boost competitiveness within all of the major industrial sectors: automotive, aerospace, energy, rail, naval and defense, pharmaceutical and oil & gas.
Present in 30 countries and with 140 offices worldwide, the Group fosters a close relationship with its customers thanks to the expertise of its 12,000 employees. A leading engineering specialist placing innovation at the heart of its strategy, Segula Technologies conducts large-scale projects, ranging from studies to industrialisation and production.

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jmartin@segula.es
www.segula.es

SOCIEDAD ESPAÑOLA DE MONTAJES INDUSTRIALES, S.A.

Activities in 2018/2019: *Execution of Works and maintenance SS/EE traction and autotransformer centers associated with, for the section: Plasencia-Badajoz in the High Speed railway Madrid-Extremadura. *Electrification, safety installations and telecommunications of Medina del Campo – Salamanca – Fuentes de Oñoro Line, in section Salamanca – Fuentes de Oñoro.
*New SS/EE traction in Parets del Vallés at the p.k. 20/285 of Barcelona-French border line.
Innovations in 2018: Design and development of a new overhead contact line C-200, powered to 25 kV and versatile in their different sections.

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PREFABRICACIONES Y CONTRATAS, S.A.U. (PRECON)

PRECON is the Spanish leader in design and supply of precast concrete products for railway tracks, either ballast and ballastless tracks.
It has supplied monoblock, twinblock, block slabs and sleeper for switches and crossings, Either for high speed, conventional lines, haul, subways and tramways.

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REVENGA SMART SOLUTIONS

Revenga Smart Solutions offers comprehensive solutions for the transport sector: railways and metros, roads, ports & airports. In railways & metros we focus on passenger experience solutions, ranging form intercomms, public address and information panels, to systems related with revenue/cost issues, like ticketing, tolling and access control, and also with operator oriented solutions like railway telephony, signalling (level crossings, point heaters and inspection systems) and station control. More than 45 years of experience. Projects deployed in 24 countris.

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SENER INGENIERÍA Y SISTEMAS, S.A.

SENER is one of the leading engineering and technology groups in Europe with over one billion euros of annual turnover, more than 2,000 professionals and a continuously growing international presence with offices in over 15 countries. In the field of railway engineering, Sener counts on an extensive experience in metros, light rail trains systems and tramways, conventional railway line, freight transport and High Speed Lines. SENER's activities range from preliminary, conceptual and feasibility studies, basic and detailed engineering to project management services, supervision of works, value engineering and ICE services.

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SGS GROUP SPAIN

SGS is the world's leading inspection, verification, testing and certification company. We are recognized as the global benchmark for quality and integrity. With more than 97,000 employees, we operate a network of more than 2,600 offices and laboratories around the world.
Our core services can be divided into four categories: Certification , Inspection, Testing and Verification.
We are constantly looking beyond customers' and society's expectations in order to deliver market leading services wherever they are needed. Our independent services add significant value to our customers' operations and ensure business sustainability

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SICE TECNOLOGÍA Y SISTEMAS, S.A. (SICE TYS)

SICE Tecnología y Sistemas, (SICE TYS) is a group of companies that provides solutions and systems for Transport and Traffic, Environment and Energy efficiency, Smartcities and Telecommunications.
SICE TyS, as systems integrator, offers technological solutions adapted to the railways sector, conceiving a centralized management with functionalities oriented to the operation of public and private transport, integrating: - Security Systems - Telecommunications Systems - Signaling (Interlockings, Level Crossings, CTC) (ENYSE) - Automatic Fare Collection - Traffic Prioritization of Public Transport - Engineering (OFITECO): railway lines; Tunnel monitoring; Load test (railways bridges).

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SIEMENS MOBILITY, SLU

Siemens Mobility is a separately managed company of Siemens AG. As a leader in transport solutions for more than 160 years, Siemens Mobility is constantly innovating its portfolio in its core areas of rolling stock, rail automation and electrification, turnkey systems, intelligent traffic systems as well as related services. With digitalization, Siemens Mobility is enabling mobility operators worldwide to make infrastructure intelligent, increase value sustainably over the entire lifecycle, enhance passenger experience and guarantee availability.

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SMART MOTORS

Smart Motors(R) applies new technologies to generate added value from the monitoring of critical railway assets that believe that Digitalization and the uses of advanced analytics are the way to service excellence. The priority is to generate new knowledge about the operation of railway assets that satisfies the requirements of the most demanding environments and with a real day to day contribution.
smart motors(r) has its own Digitalization Platform to help maintenance and operation that brings together signaling monitoring systems, infrastructure and rolling stock, as well as IoT sensors adapted to the railway sector.

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info@smartmotors.org
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STADLER RAIL VALENCIA, S.A.U.

International rail vehicle construction company, Stadler, is headquartered in Bussnang in Eastern Switzerland. Founded in 1942, it has a workforce of over 8,500 based in various production and over 40 service locations. Stadler provides a comprehensive range of products in the heavy and urban transport segments: High-speed trains, intercity trains, regional and commuter heavy rail trains, underground trains, tram trains and trams. Stadler also manufactures main-line locomotives, shunting locomotives and passenger carriages, including the most powerful diesel-electric locomotive in Europe. It is the world's leading manufacturer in the rack-and-pinion rail vehicle industry.

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TALLERES ALEGRÍA, S.A.

Talleres Alegría, s.a. is a family owned company devoted since 1900 to design, manufacturing and after sales assistance of all kind of fixed track material, its accessories and spare parts. Developing of Designing and Commissioning Integral projects of turnouts to be installed at Depots and Industrial Ports and Factories. Design, manufacturing, repair and maintenance of self propelled vehicles to carry out works at the infrastructure. Design, manufacturing, retrofitting, repair and maintenance of freight wagons.

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TECNIVIAL,S.A.

In TECNIVIAL we specialize in all types of fixed signalling for track (Marker Boards), conventional lines and High Speed lines. We are one of the companies approved by the Spanish Railway Infrastructure Administrator (Adif) and the others. The last product boosted to the market have been the NANOTEC SIGNS (R+D). The incorporation of cutting-edge materials (carbon nanoparticles) to the signs manufacturing , allows the improvement of its behavior and mechanical features: light, corrosion-free, low residual value and maintenance, eco-friendly, resistant to loads (snow/wind). Besides, we develop Corporative Image projects according to the needs of the customer; design & installation.

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TEKNIKER

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- Product engineering: new product development, tribological testing, fault diagnosis.

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TELICE, S.A

Telice is an international company, with more than 45 years of experience in different markets related to cutting-edge technology and standing out in the railway market. Its activity covers the design, installation and maintenance of railway electrification systems, safety and railway signalling, electrical substations, civil engineering projects, industrial electricity, fibre optic installation, industrial automation and safety systems in tunnels, underground and mining projects. Due to its wide expertise, Telice has become preference collaborator for the main railway administrations. Telice has international presence in Norway, United Kingdom, Portugal, Peru, Chile and Brazil.

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TELTRONIC

Backed by over 40 years of experience in the design, manufacturing, and deployment of Professional mobile radio projects on a turnkey basis, Teltronic presents a broad portfolio of critical communication solutions for transport sector, providing complete solutions: network infrastructure, control centre, and end-user equipment, including specialized onboard systems specifically designed for train, metro, tram and LTR. Besides voice and data transmission solutions, the company offers integration services with other subsystems: PA and intercom, applications to manage and control fleets and for operating aid, real time CCTV or communications support for signalling systems ETCS, CBTC, PTC…

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THALES ESPAÑA GRP S.A.U.

Thales is a World leader in Mission Critical Solutions for Land Transportation. Thales Spain, with more tha 60 years of experience, has been pioneer and leader in the thecnological development of the Spanish railways, beein one of the main suppliers of safety and telecommunication systems for the Spanish Railways Administrations and present in countries as Turkey, Mexico, Algeria, Malaysia and Morocco.
Its activity goes from the development, manufacturing installation, commissioning to the maintenance of equipments and systems for railway signalling, train control, Telecommunication, Supervision ticketing and critical infrastructures security.

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TPF GETINSA EUROESTUDIOS, S.L.

Passion for excellence
Our priority : developing solutions that meet our client needs. This approach is based on three pillars: expertise, efficiency and continuous innovation.
Today, TPF is ranked among the most important multidisciplinary companies active in the following sectors: building, transport infrastructure, water and energy.
Over the years, the group successively expanded in Europe, Asia, Africa and America through a series of acquisitions and became a key player, internationally recognized in its field.

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TYPSA

Founded in 1966, TYPSA is a leading consulting engineering group in the fields of transport, buildings, water, environment, energy and rural development. We have a long-standing relationship with public, private and institutional clients in the Americas, Europe, Africa, Asia and the Middle East, assisting them in the development of infrastructure, energy and city projects from concept to completion. In addition to providing world-class engineering services, TYPSA has extensive experience in building the capacity of local firms and in strengthening institutions to guarantee the sustainability of the infrastructure.

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VALDEPINTO, S.L.

Valdepinto, S.L. was established in 1986 and focuses its activities in the Railway sector.
We have four main product lines:
- All types of machining (specialists in electrical insulation).
- Screen printing, Signs and Engraving low-relief.
- Metal transformation and welding.
- Design and fabrication of transformers and coils of high/low voltage. Our philosophy is to always offer all our clients an unbeatable value for Money, combined with an excellent service.

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VICOMTECH

Vicomtech is an applied research centre specialising in Artificial Intelligence, working on technological solutions based on Computer Vision, Data Analytics, Computer Graphics, Advanced Media Technologies and Language Technologies. It aims at meeting the innovation requirements of the local companies and institutions to face new economic and social challenges, and improving their competitiveness in a global market. The transfer mechanism for this research is the creation of R+D+i projects geared to companies' needs. Furthermore, the centre works intensively on cooperation projects, through cooperative technology development promotion schemes at local, national and international level.

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voestalpine Railway Systems JEZ SL

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ZELEROS

Zeleros is the Spanish company developing a hyperloop transport sytem, already considered as "the fifth means of transport". Its focus on the vehicle optimization allows to reduce infrastructure costs and to operate at safer pressures for the passengers. Zeleros has already raised substantial private and public support, and collaborates with companies such as Renfe (Trenlab) and Altran, research centers (Universitat Politècnica de València, CIEMAT, UPM) and is supported by investors such as Plug and Play, Angels or ClimateKIC. Currently Zeleros is preparing the construction of its own 2-kilometer test-track in Sagunto to demonstrate the system at high speed.

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