MAFEX
Mafex corporate magazine
Spanish Railway Association
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SPAIN

A railway at the forefront with regard to technology and innovation

IN DEPT
Urban intermodality: future of transport in cities is digital.

INTERVIEW
Isaías Táboas, President of Renfe Operadora.

MAFEX INFORMS
Theassociationpublishesapositioningnote to support railway R&D.

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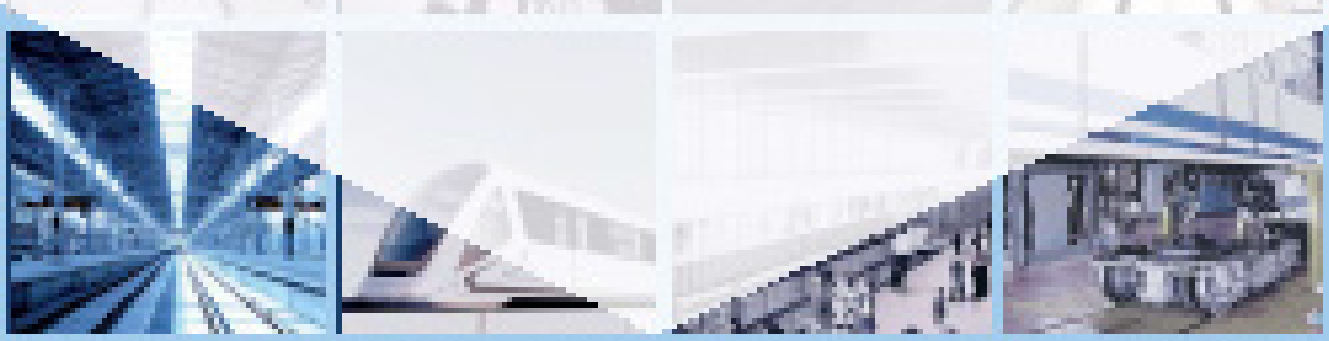

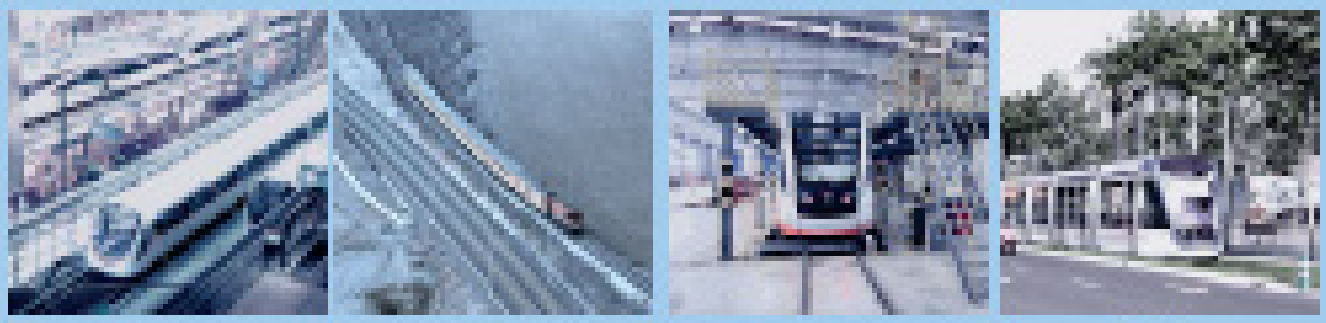

Intense schedule of railway innovation activities and promotion

Dear Friends,

The year 2019 lies before us with major developments in the railway field ahead. Changes that are marked, especially, by innovation, digital transformation and new user demands. Challenges, all of them, to which the Spanish industry responds with its forthright commitment to R&D and the continuous advance in cutting-edge technological solutions.

To help disseminate this innovative commitment, MAFEX has designed an intense activities schedule that will be carried out in the coming months. In the international sphere, it is committed to continue promoting Spanish services and advances in countries with important portfolios of projects such as Australia, the Nordic countries or the USA, amongst others. In addition, MAFEX will organise together with Terrapin, the trade fair / congress Rail Live 2019!, for the second consecutive year, from 6 to 7 March. This unmissable professional platform will be attended by 3,000 attendees from 80 countries, 300 speakers and 150 exhibiting companies. It should also be noted that this year the seventh edition of the International Railway Convention will be held in Malaga, from June 3 to 5, where the participation of representatives from approximately 30 countries and more than 125 senior posts from within the Spanish industry is expected. Presently, we are working on the preparation of an extensive programme of conferences, business meetings and technical visits.

Alongside the promotional activities, Mafex will pay special attention this year to issues of trade policy and industry impact, such as Brexit or the financing framework, as well as the negotiations of the EU Trade Agreements with third party countries.

Another key aspect will be innovation. Within this field, the scope of automation, digitisation and the development of innovation throughout the system will be deepened, where the value of cooperation between industries and international support is greater.

Aware of the great weight it has within the industry, the association has published the positioning note "Support for railway R&D as a key factor in the sector's competitive improvement." In this document, whose key points are shown in this edition, it is recalled that it is necessary for public administrations and government bodies and firms to promote R&D+i programmes and that there must be a clear, stable and lasting State-run investment policy.

In the section "Destination" a broad monograph is dedicated to the railway sector in Spain. The country is at the cutting-edge of railway transport and boasts advanced solutions both for high-speed, as well as long and medium-distance rail services, and also in urban mobility.

In the "In-depth" section, the latest trends in urban intermodality are analysed. The transformation of public transport systems, due to the emerging digitisation process, brings with it the constant incorporation of technological advances that seek their full integration. In this era of changes, aspects such as the evolution of the stations towards smart centres and the user experiences take on special relevance and thus shape future mobility.

Furthermore, the latest news from 22 member companies forming Mafex that are collected in the section "Partner News" as well as the five articles in the section "Innovation" where our partners unveil their most recent developments and technologies are also noteworthy.

We hope that the broad content of this issue is of interest to all readers and serves to provide greater understanding of the current situation in the sector.

MANAGEMENT: MAFEX.
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Mafex publishes a positioning note to support railway R&D in order to improve competitiveness

THE ASSOCIATION HIGHLIGHTS IN THIS REPORT THE NEED TO PROMOTE TECHNOLOGICAL EVOLUTION WITH INNOVATION SUPPORT POLICIES TO ACHIEVE GREATER COMPETITIVENESS ON THE PART OF SPANISH COMPANIES.

The future of mobility is closely linked to R&D. Innovation, alongside internationalisation, plays an essential role as a differentiating element and as an axis of improvement for Spanish industry. Furthermore, it is a key element to guarantee its effectiveness. Aware of the challenges posed by the growing demands of society in this area, as well as technological progress achieved by other modes of transport and new developments, Mafex has published the positioning note entitled "Support for railway R&D as a key factor in the competitive improvement of the sector."

The railways, cornerstone

The association considers that the railway is, nowadays, a key pillar both in the field of passengers and freight transport. However, we are reminded that "a radical change is necessary to face the challenges that the sector faces in issues such as digitisation, automation, urban development and climate change".

In this report, Mafex requests strident backing for innovation both nationally and internationally, to achieve greater competitiveness on the part of Spanish companies, as well as increasing its presence in major European R&D programmes, such as Shift2Rail, and in management bodies. Likewise, the need to assign a greater allocation of economic resources is stressed in order that the sector may continue to spearhead the technological changes that occur.

Financing plans

For this, it is necessary that public administrations and government bodies promote R&D+i programmes that include long-term financing plans. With this support, an automated rail transport might be achieved that improves the effectiveness and safety of the current system; In addition to a mobility seen as an uninterrupted service that provides customers with

(passengers and cargo) tailor-made and efficient door-to-door trips. Sustained investment in this area would also bring major advances in key areas such as the digitisation of the supply chain (Industry 4.0), the development of the new digital and smart train and a zero emission railway. In addition to progressing on aspects of special relevance such as efficient maintenance and optimised infrastructure to achieve multimodal transport.

Investment policy

The association believes that, in order to meet the good expectations of the railway, "it is necessary to set forth a clear, stable and long-lasting state investment policy for the railways that allows for the companies involved in the sector to be able to scale up and establish strategies to accompany nationwide rail development."

Mafex requests the support and active involvement of Spanish Public Administrations in different financing programs, included Shif2Rail 2.

Investment in research and innovation is essential for smart, sustainable and inclusive growth in the European Union.

Mafex advocates public policy measures that promote R&D+I activities such as granting resources to companies with innovative potential. On a national and European level, different financing programmes are already underway that seek to raise the technological level of the participating companies in order to augment their competitiveness in the market.

Shift2Rail

In the railway field, it is the Shift2Rail Public-Private initiative that contributes mainly to this smart and sustainable growth of the sector, fostering research and innovation therein.

The main aims of Shift2Rail are to achieve a sinle European railway area, improve the attractiveness and competitiveness of the European railway system to ensure a modal shift from the road to the railway, and maintain the leadership of the European railway industry in the global market. The programme, which has the direct involvement of several Spanish companies in its governing bodies, has benefited, as of March 2018, a total of 87 Spanish companies that are involved in the implementation of 35 projects, of which 12 are SMEs.

According to the data offered by Shift2Rail, the financing received by Spanish firms and bodies up to March 2018 in projects granted amounted to 23.6 million euros. It is also worth noting the achievement of the Shift2Rail for the Spanish founding and associated bodies, which are allocated 18% of the total budget available for all these bodies at European level.

Initiatives such as Shift2Rail offer a unique set of opportunities for the sector and in particular for Spanish companies.


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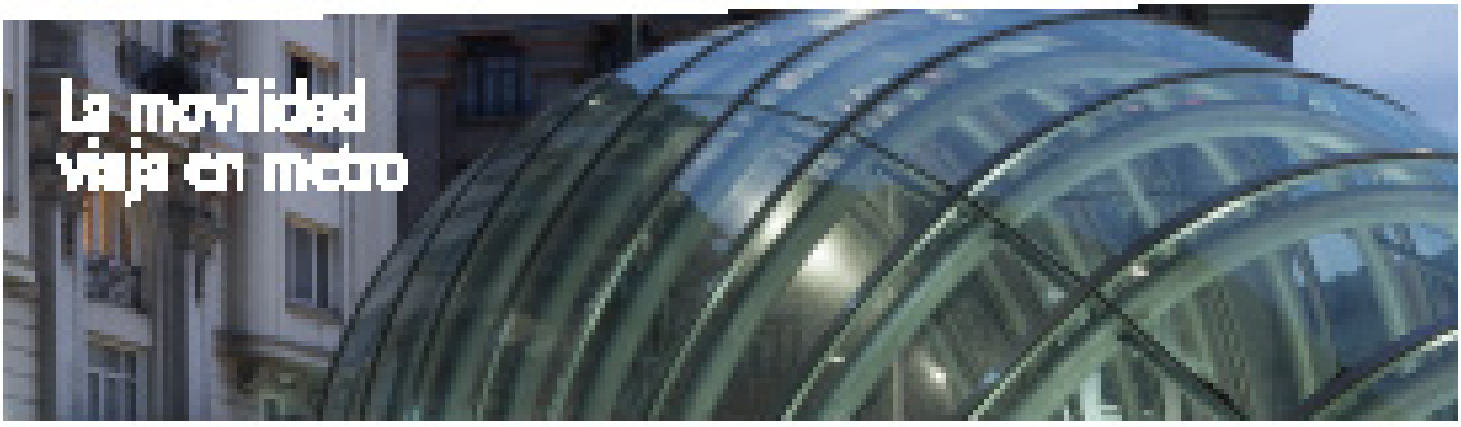
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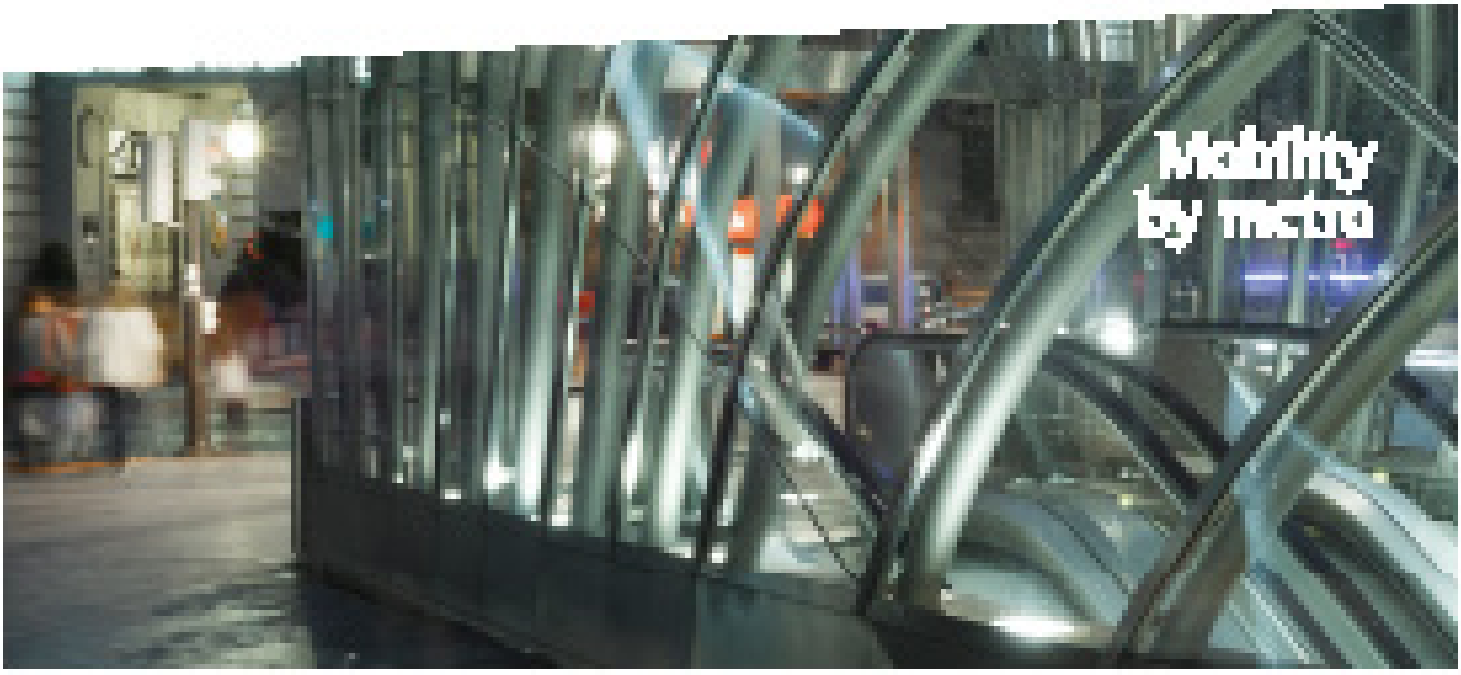
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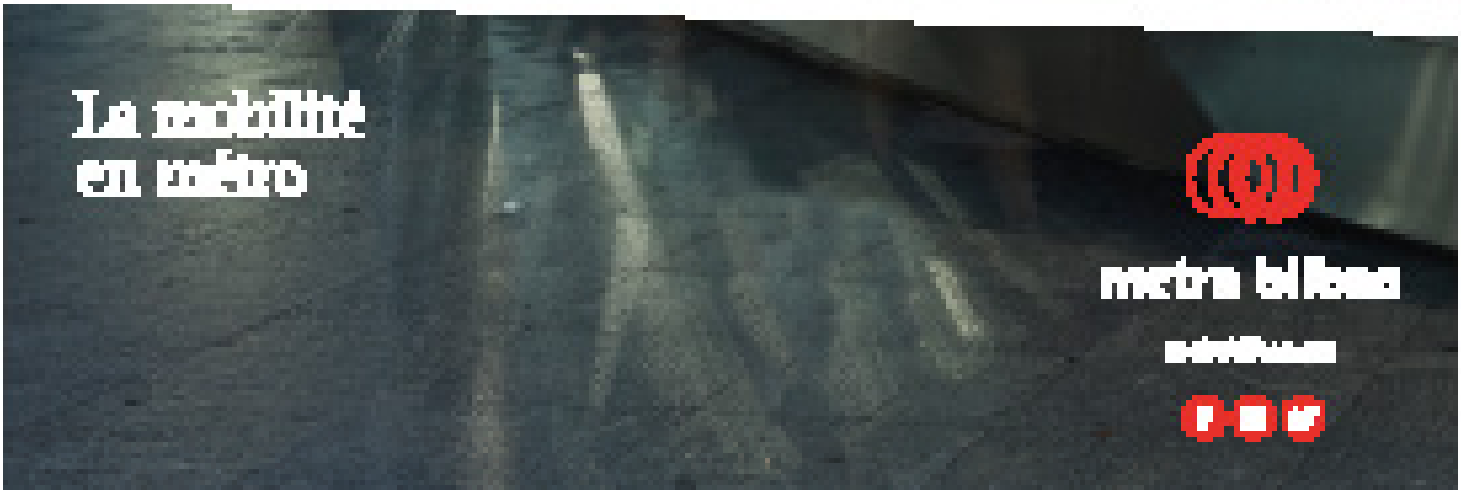

La mobilité
en métro
metro bilbao

Mafex prepares an intense activity schedule for 2019

IN ADDITION TO THE ACTIVITIES INVOLVING INTERNATIONALISATION, THE ASSOCIATION CONTINUES TO BACK INNOVATION AS A BRIDGE TOWARDS EXCELLENCE.

In the international area, Mafex is backing for a further year to continue promoting Spanish railway services and technologies in countries with significant investment plans and project portfolios, such as the US, Brazil, India or Australia, where its presence will also be reinforced with a sectorial stand at the main trade fair in the country: AusRail Plus. In turn, the participation of Mafex in reference trade fairs such as UITP, which in 2019 will take place in Stockholm, or Middle East Rail (Dubai) will be consolidated.

Conventions and trade fairs

The Association will also hold a new edition, the seventh, of the International Railway Convention in Malaga, running from June 3 to 5, where the participation of representatives from approximately 25 countries and more than 125 high-ranking Spanish industry officials will be expected with an extensive programme of conferences, business meetings and technical visits and on which work is already well underway.

Particularly noteworthy is the holding, for the second year in a row, of the international fair and congress "Rail Live!", From March 6 to 7, 2019, and in which the organisers work in tandem with Mafex to prepare a comprehensive agenda in order to address for two days the new trends in rail transport.

Amongst them, the challenges it faces in an environment of digital transformation, new ways of travelling, as well as the future needs of users will be taken on board.

Trade policy

The Association will pay special attention to issues of trade policy and their industry impact, such as Brexit or the financing framework, as they are aware that trade in goods and services contributes significantly to greater sustainable growth and employment creation. The negotiations of the EU Trade Agreements with third party countries will be followed particularly closely, since in order to create new

Mafex will foster Spanish railway services and technologies in countries with significant investment plans.

EXTERNAL PROMOTION PLAN 2019

ACTIVITY	LOCATION	DATES
Middle East Rail Fair	UAE (Dubai)	February 26-27
Rail Live!	Spain, Bilbao	6-7 March
BOR Fair -Negocios Nos Trilhos	Brazil (Sao Paulo)	March 19-21
Trade Delegation to Brazil	Brazil (Pending)	March 19-22
UITP Fair	Sweden (Stockholm)	June 9-12
7th International Railway Convention	Spain (Malaga)	3-5 June
Trade Delegation to the USA	USA East Coast	7-11 October
Trade Delegation to India and visit to Iree Fair	India (Pending)	14-18 October
Ausrail Plus Fair	Australia (Sidney)	3-5 December

business opportunities and overcome trade barriers, it is necessary to observe first-hand trade defence instruments, whilst also ensuring effective protection of sectorial interests of sector and preventing bad practices.

Competitiveness and innovation

In addition to internationalisation activities, in recent years innovation has garnered importance as a differentiating element in the competitive improvement of companies. It is for this reason that Mafex acts as a facilitator of supply and demand of innovation in different activities, supporting R&D with the aim of continuing to maintain the technological pace with other means of transport and looking for partner companies to be more competitive, innovative and technologically advanced. The Association believes that collaboration and the implementation of joint initiatives are necessary to bolster the sector in different areas such as: projects' technical offices and R&D, working groups, attraction of talent and institutional relations, along with the organisation of training sessions and technological missions. Likewise, and as is being done, Mafex will continue with the continuous approach to universities and technology centres, as well as start-ups with technology to promote collaboration between academia and the industrial sector.

During the year, working groups will continue to focus on identifying national and European invitations to bid, tracing and managing consortiums to submit projects and promoting the participation of partner companies in R&D projects in a collaborative way.

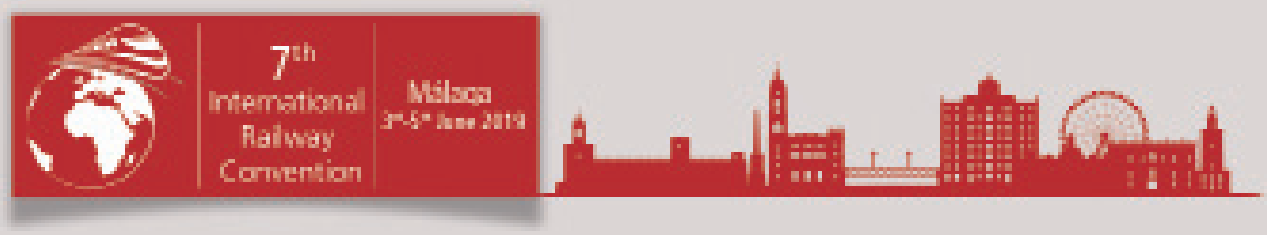
7th Mafex International Railway Convention

From June 3 to 5, 2019, the main operators and administrators of railway infrastructure and companies from more than 25 countries will meet in Malaga (Spain) together with the Spanish railway industry.

The aim of this event is to connect the main operators and administrators of infrastructures and railway companies from all over the world with the Spanish railway industry. In this way, foreign guests will have the opportunity to unveil the present and future plans of investments and railway developments in their respective countries and organisations, and at the same time to know first-hand the different technological solutions developed and that can best respond to their current needs through B2B meetings.

In this edition, the conference programme will feature a series of technical addresses given by experts in different areas in which topics such as: an automated rail transport that improves the efficiency, effectiveness and safety of the current system, mobility as an uninterrupted service that provides customers (passengers and freight) with customised and efficient door-to-door trips, the digitisation of the supply chain (Industry 4.0), development of the new digital and smart train., an efficient zero emission railway., efficient maintenance of both infrastructure and rolling stock or an infrastructure optimised for multimodal transport.

Furthermore, within the convention schedule, on Tuesday, June 4, Metro de Málaga (the firm responsible for the construction of lines 1 and 2 of the light railway network in the city, as well as its subsequent commercial operations) will offer a guided technical visit to all guests with the aim of showing how a sustainable transport system can connect different areas of reference in the city, facilitating the mobility of its citizens.



Everything ready for the second edition of Rail Live! in Bilbao

FOR THE SECOND CONSECUTIVE YEAR, BILBAO WELCOMES ONE OF THE MOST TALKED ABOUT TRADE FAIRS AND CONGRESSES IN THE SECTOR: RAIL LIVE 2019. THIS YEAR, MORE THAN 3,000 ATTENDEES FROM 80 COUNTRIES WILL DEBATE ON TOPICS OF SPECIAL RELEVANCE SUCH AS DIGITISATION OR MOBILITY AS A SERVICE, AMONG OTHERS.

Bilbao hosts, from 6 to 7 March 2019, the international trade fair and congress entitled "Rail Live!". For the second year in a row, BEC will host one of the flagship trade fairs and congresses in the sector. After the success of the last edition, this year's expectations are even greater. According to the organisers' data, there will be 3,000 attendees from 80 countries, 300 speakers and 150 exhibiting companies.

Rail Live! once again, will enjoy the support of the Spanish railway association (Mafex) in the organisation of the event, as well as the collaboration of firms and bodies such as the Basque Government, The SPRI Group, ETS, Euskotren, Metro Bilbao; besides the support of Adif and Renfe..

During the two days of the event, professionals from around the world will address the new trends in rail transport and the most prominent changes in urban mobility. Amongst them, the challenges it faces in an environment of digital transformation, new ways of travelling, as well as the future needs of users.

Congress

Bearing the title "Technology, innovation and strategy for the entire railway supply chain", the conference will analyse, through presentations and round tables, the latest developments and their impact on the connection of 21st century cities. Amongst the topics to be discussed, we find aspects of particular importance for the future of mobility such as intelligent infrastructures, advances in metro, tram or light rail networks, the digital revolution, Internet of Things (or IoT), telecommunications and control, as well as the new concept of stations. The conferences will also deal with current issues such as the MaaS concept (Mobility as a service), financing models or advances in ticketing procedures.

In this edition will have an outstanding presence of administrations and railway operators from many countries, which will present some of the mega projects that are currently carried out in the world and will publicise the role they play in the promotion of sustainable urban mobility.

Amongst the main international speakers include executives from California High Speed Rail Authority and RTA Chicago (United States); SNCF and RATP Group (France); SBB (Switzerland), Indian Railways (India), besides NS Reizigers (Holland) and Rail Baltica (Latvia) among many others besides the participation of ETS, Euskotren, Ferrocarrils de la Generalitat de Catalunya (the Catalonian Rail Manager), Metro Madrid, Metro Tenerife, Tramway of Zaragoza, Adif and Renfe as part of the congress programme.

Alongside the conference, at Rail Live! the attendees will be able to see first-hand, in the area of exhibition, the most recent developments that incorporate to the market to respond to these new technological demands. In this area there will be 150 companies, as well as start-ups that will announce the latest innovations in innovation that will revolutionise the sector in the future.

For Mafex, collaborating in the accomplishment of important events such as Rail Live! represents a unique opportunity to boost the global development of transport. This professional platform once again places the Spanish railway sector in a sectorial showcase of great relevance within an important pole of industrial reference such as the Basque Country.

Mafex expands the number of partners with the incorporation of new companies

Consulting company focused on the transport market and renewable energies. With a high degree of specialisation in the railway sector, they develop tailor-made applications that allow the automation of data processing to build an information system that provides value to its customers. They also have a set of computer support tools that help them carry out their management.

This is a private non-profit making organisation, devoted to research and the provision of technological and innovative services for companies. Since its inception in 1985, it has contributed to the technological development and competitiveness of businesses through learning and specialisation and ultimately transferring technologies related to our Areas of Knowledge: Biotechnology, Environment, Recycling and Plastics & Composites to the members of our Foundation and our clients.

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.

Revenga Smart Solutions started in 1972 as Revenga Ingenieros SA As of 2006, the Revenga Group was formed, which through four business lines / companies serves the Transport (GRTechnologies), Security (Triedro), Telecommunications (3dnet.es) and Energy (Ge2) sectors. Currently they are integrated under a single brand and company, Revenga Smart Solutions, focusing on the transport, telecommunications and security sectors.

ZITRON is an international leading company, with over 50 years of experience, in designing, manufacturing, installing and commissioning complete ventilation systems for metros and railways tunnels.
ZITRON has more than 500 references world-wide, including the largest projects currently in progress, such as Crossrail-London and Doha Metro.

AGEX Group unveils its new facilities

The AGEX Group, a federation to which Mafex belongs, inaugurated its new facilities in the Leioa Business Park on February 1st.
The event boasted the participation of different personalities and executives of the world of the agricultural, steel, foundry and rail sector as well as CEOE International president, Marta Blanco, and Antonio Garamendi, president of the Spanish Confederation of Business Organisations (CEOE), who was entrusted with the unveiling of a commemorative plaque in the new headquarters of one of the most important export groups in the State.

With 300 associated companies, 13 billion euros in turnover, 8,500 million euros worth of exports and 35,000 direct jobs, AGEX is a world benchmark through the Spanish companies that comprise each of the four associations that make up the group; agricultural machinery (AGRAGEX), smelting (FUNDIGEX), steelworks (SIDEREX) and railroad (MAFEX). They are present in more than 100 countries and with more than 80 foreign promotion activities. The President of the AGEX Group, Carlos Álvarez, took the opportunity to thank all its partners and institutions for their support during these years and his presence at the event to stress "the unconditional commitment and backing of the group whose purpose is still to provide value services to companies partners and provide the best support in their promotional actions in foreign markets as they have been doing now for 41 years.

Isaías Táboas, President of Renfe Operadora

"The perspective of liberalisation in 2020 represents a great opportunity to grow and to be better"

Mafex Magazine: Renfe Operadora's services, according to the latest annual data, continue to achieve good results. The train gains users in our country, both in high speed, as well as in suburban and regional services. What do you think is the reason for this growing demand? What are the most outstanding figures? What are your prospects for 2019?

Isaías Táboas: 2018 has been a very positive year in terms of passenger traffic. For the first time since 2008, a decade later, we have once again surpassed the 500 million passengers, regaining 20 million trips in a single year. The growth of passengers has been especially relevant in the suburban services of Madrid, with 256 million passengers, 6% more than the previous year, and in Rodalies de Barcelona, with 116 million, 2.4% more.

Similarly, Ave services (up 3.8% on 2017), Long Distance (up 4.5%), and Avant (up 5.9%), consolidate a growth trend already noted in recent years in our country.

This shows that there is a relaunch of economic and professional activity and that society is on the move. For Renfe, the trust that citizens have in the services we provide is another incentive to continue working and improving the quality of our services. In 2019 we expect the level of activity and turnover to continue to grow in all the services we provide within our borders, both public and commercial, while we continue to explore business opportunities abroad to increase and diversify our sources of income.

Mafex Magazine: Among the most relevant investments planned there is the tender for new passenger rolling stock for 3,000 million euros. How does the roadmap for these acquisitions go?

Isaías Táboas: Last January, Renfe started the tendering process that will lead to the renewal of a large

part of its train fleet. In total, close to 3,000 million euros will be tendered, thanks to the Public Service Obligation contract that we have signed with the Ministry of Public Works and Transport, which will lead to the renewal of approximately 50% of the train fleet dedicated to public service. The calendar began in January, with the tendering of the new metric gauge trains; in February there will be a tendering of motor heads for high-speed services; and in March the purchase of the new high-capacity rolling stock for the large suburban area will be undertaken. Subsequently, in April, the acquisition of new regionals trains, both electric and hybrid, will be addressed. The aim of these tenders is to reduce the average age of the railway fleet, especially of suburban and regional trains that have materials that, in some cases, are more than 40 years old.

Mafex Magazine: Your Company plans to invest almost 650 million euros in 2019 in equipment and services with the aim of improving comfort and traveller service. Is this a new commitment that focuses on users? How do you plan to distribute these funds?

Isaías Táboas: The client has always been and must continue to be at the centre of Renfe's strategy. For this reason, we will double the investment devoted to passenger service. Out of the 855 million euros that the Group plans to invest in 2019, 838 million euros will be used to improve comfort and customer service. Mainly by increasing and improving the train fleet at the service of passengers, but also by making it accessible to all and by making a firm commitment to the improvement and renewal of the information and client service systems.

The details of these investments include purchasing new trains (408 million euros), improvements to trains currently in service to increase their capacity and improve accessibility (281 million euros) and actions to improve accessibility at suburban stations, the only ones Renfe is competent to manage (40 million euros).

Mafex Magazine: You are currently preparing a new strategic plan with a five-year horizon until 2023 that aims to improve your competitiveness against other transport modes. What are the priorities of this programme?

Isaías Táboas: The objectives of this new strategic plan are three. To increase the company's turnover; to gain in terms of efficiency; and, finally, to preserve the high quality of our services, both public and commercial, increasing even further our safety levels.

To this end, the plan recently approved by the group's Board of Directors relies the company's strategy on three key pillars: focus on the client, internationalisation and efficiency and safety. In order to carry out this strategy, we will use three fundamental levers for change: digital transformation, cultural change and the development of strategic alliances, both inside and outside our borders.

Mafex Magazine: The year 2020 is a key date for the sector, as

other operators are entering the market of passenger transport. How is Renfe preparing for this new scenario?

Isaías Táboas: Indeed, the perspective of liberalisation in 2020 is a great challenge for our company. But at the same time it represents a great opportunity to grow and an opportunity to be better as professionals and as a company. For this reason, the 2019-2023 strategic plan that we have just approved, includes nearly 50 projects that seek to deeply transform Renfe so that it can compete successfully in this new scenario. Among the most outstanding actions of this plan, I would highlight the launching of new low-cost high-speed services, the firm commitment to internationalisation and strategic alliances, the transformation of Renfe Viajeros into an integral mobility operator based on the concept of "mobility as a service", which involves the provision of services throughout the entire journey, from the origin to the final destination. And with regard to Renfe Mercancías, the objective is to transform the company into an integral and international logistics operator.

Mafex Magazine: Likewise, the sector is undergoing a transformation determined by constant technological advances. How is Renfe going to respond to the challenges of innovation in the face of such a changing ecosystem?

Isaías Táboas: Technological disruption is, along with liberalisation, the other major challenge that Renfe is facing. In view of this challenge, the company will increase its investment in R+D+i, from the current 1.3% to 3% on the horizon of the strategic plan, a plan that includes the digital transformation itself as a lever or facilitator. This transformation will contemplate both the interface with the client, with new web and mobile applications, as well as the digitalization and automation of the company's processes.

The Spanish railway industry is at the forefront of technology and R&D.

But, in addition, we will substantially increase investment in the training of our employees and we will continue to support open innovation, increasing the information available in our open data channel, and participating in the innovation ecosystem through initiatives such as TrenLab, Renfe's startup incubator and accelerator in collaboration with Wayra, where we share experiences and challenges with the most outstanding entrepreneurs.

Mafex Magazine: In the international arena, Renfe also stands out for the outstanding role it plays as a benchmark in know-how and as a partner in important projects such as the high-speed Medina-La Meca or the HS Houston-Dallas. What is the weight of the foreign market in its plans for the future?

Isaías Táboas: Internationalization is one of the 3 key pillars of our strategic plan, and in that sense it is a priority for the company in the coming years. Our objective is that, by 2028, 10% of the Group's turnover will come from foreign markets. Cu-

rrently, in addition to being present in the high-speed Madinah - Makkah project in Saudi Arabia and in the first phase of the private capital project that will connect Houston and Dallas, in Texas, Renfe is part of one of the three consortia pre-qualified by the UK Department of Transport to operate the WCP (West Coast Partnership) franchise that would include the future operation of high-speed services between London and Birmingham in 2026 in its first phase. In addition to these projects, Renfe is working intensively to increase its international presence, analysing business opportunities worldwide, not only for high-speed, but also for the operation of public service obligations.

Mafex Magazine: In this sense, a collaboration agreement on railway matters has just been signed with the Chinese Railways (China Railway Corporation). What objectives are being pursued with agreements of this nature?

Isaías Táboas: Out of the three levers included in the strategic plan that will help us transform the company, the development and consolidation of strategic alliances within and beyond our borders is undoubtedly one of the most outstanding novelties. As part of this commitment, in addition to agreements to participate in consortia such as the one led by the Hong Kong operator MTR for the West Coast Partnership franchise in the United Kingdom, Renfe regularly collaborates with companies, governments and public administrations in multiple territories.

The aim of the agreement signed with China Railway Corporation is to share information and experience in railway management and development, especially in the field of High Speed. These agreements will make it possible to strengthen bilateral collaboration and explore alliances of mutual interest in third markets, such as Latin America and Asia.

Mafex Magazine: Regarding the Spanish railway industry, as a sector expert, what do you think of the Spanish business framework and its growing international presence? What is the collaboration of these companies and entities such as Renfe Operadora?

Isaías Táboas: Spanish companies are world leaders in many sectors of activity, not only the railway sector, increasing their presence in new international markets year after year. In addition, exports continue to increase, generating wealth and employment in our country.

The Spanish railway industry is at the forefront of technology and R&D, and participates in the most important projects in the world. We are one of the international references in rail transport, partly as a result of our commitment to High Speed.

As I mentioned earlier, internationalisation is one of our strategic priorities and one of the pillars of our plan. But, in addition, this plan considers strategic alliances essential to achieve our objectives as a company.

Renfe is a world leader and a benchmark regarding the operation of both high-speed and suburban rail services. The reputation and recognition of this leadership makes us a key partner for sharing and exploring international business opportunities. For Renfe, it is also an advantage to have the international experience of the Spanish business community which, for decades, has exported the reputation of our industry all over the world.

> The client has always been and must continue to be at the centre of Renfe's strategy.

Alstom in Spain to supply 25 Citadis X05 trams for Athens

ALSTOM SPAIN

Alstom has signed a contract with the urban transport authority of Athens for the supply of 25 Citadis X05 trams. The trams will run on Athens existing tramway network, as well as on any planned extensions. Deliveries are expected in the year 2020. The trams will be manufactured in the Alstom industrial site in Barcelona, which is currently manufacturing trams also for the cities of Sydney (Australia), Frankfurt (Germany) and Lusail (Qatar).

The Citadis X05 trams for Athens offer superior passenger experience, with 20% more glass surfaces, LEDs lighting, large individual seats, and travel information on large screens via a telematic system. As the latest addition to the Citadis range, the Citadis X05 boasts a number of new technologies, including permanent magnet motors, which together reduce its energy consumption by 25%.

Alstom rewards Innovation developed by its Spanish teams

ALSTOM SPAIN

For the fourth consecutive year, the Alstom Innovation Awards internal contest ("I Nove You") have distinguished one of the R&D projects developed in Spain as part of the best and most innovative projects carried out in the company in 2018. Grabcad, a CAD crowdsourcing design project, developed by the engineering teams based in Madrid and Barcelona has received the « Golden award » in the Innovative Processes category.

The I Nove You Alstom Innovation Awards is a company-wide internal programme organised every year since 2008 with the objective to reward the most innovative ideas and thus foster innovative projects throughout the Company. This year the contest reached an outstanding number of 599 project submissions from 53 different sites representing 27 countries and involving more than 2,000 employees.

Open to all employees across all business lines and sites, the competition rewards creativity in every shape and form, spanning products, systems, processes, sustainable development, and even Open innovation.

In previous editions, Alstom teams in Spain were awarded for their respective innovations in predictive maintenance (TrainScanner, I Nove You 2015), in security control rooms architecture (Sydney tram control center, I Nove You 2016) or in digital mobility (Mastria, I Nove You 2017).

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Bombardier will supply 19 regional trains with Spanish propulsion to France

BOMBARDIER SPAIN

Bombardier will supply 19 BOMBARDIER OMNEO Premium double-deck trains to the Hauts-de-France region. The Spanish factory in Trápaga will be responsible for the manufacture and supply of the propulsion equipment, whose first units will be delivered in 2022. These vehicles adapt to the specific needs of the different railway markets and this is one of the reasons why Bombardier's engineering is present in 50% of the global suburban transport market.

The new trains will operate on the high frequency Paris-Amiens and Paris-San Quintín-Maubeuge / Cambrai lines and will have capacity of 926 seats with lighting, plugs and USB ports, as well as large storage spaces and improved accessibility.

Bombardier is an experienced company in the supply of this type of trains. To date, ten French regions have requested the supply of a total of 401 trains from the OMNEO platform (Regio 2N and OMNEO Premium).

Bombardier Spain, from its Pinto site in Madrid, is also responsible for the supply of the energy measurement equipment for more than 341 electric multiple-units of the OMNEO platform.

Bombardier Sifang will supply 168 high-speed railway cars to China Railway Corp. (CRC)

BOMBARDIER SPAIN

Bombardier's joint venture in China, Bombardier Sifang (Qingdao) Transportation Ltd. (BST), which recently celebrated its factory's 20th anniversary, will supply 168 high-speed train cars to China Railway Corp. (CRC). The new vehicles will be configured in fifteen 8 car trains and three 16 car trains, being able to circulate at a speed of 350 KMH.

The Spaniard Martín Tello, who formerly worked at Bombardier Transportation Spain, is the current CEO of the joint venture, a company with 3,900 employees and a site of more than 700,000 m2, with a production capacity of up to 4 railway cars a day. During his time at Bombardier Transportation Spain, Martín held several positions of responsibility, leading important projects such as the supply of propulsion equipment for HST Haramain.

In September 2018, BST won its first contract for the supply of 120 cars (five 8 car trains and five 16 car trains), whose delivery is expected by the end of the year. Bombardier Transportation in China is a provider of integrated solutions throughout the entire value chain.

Ardanuy Ingenieria consolidates its International Presence over the last five years

ARDANUY INGENIERÍA

The international business volume of Ardanuy Ingenieria has been consolidated with 80% of its order book in 2018, a stable percentage over the last 5 years. The Spanish Consulting Company, has become a benchmark engineering company with railway projects in more than 60 countries.

Some of our most recent projects have included Supervision of the L1 Metro in Lima, Peru, the design of over 1,600 km of catenary for the conventional railway line in Algeria and reconstruction of the track between Rokai and Kaunas for the Rail Baltica Project. Furthermore, the Company has participated in key R+D projects financed by the EU such as ETALON, ASTrail or Mistral.

For the CEO of Ardanuy Ingenieria, Carlos Alonso, "The international consolidation of the company has been in response to our firm commitment to internationalization. Since our first international project in 1995, the company has worked on almost 700 projects abroad on all five continents". Currently, Ardanuy has subsidiaries and branches in Lithuania, Colombia, India, the United States, Algeria, Panama and Peru.

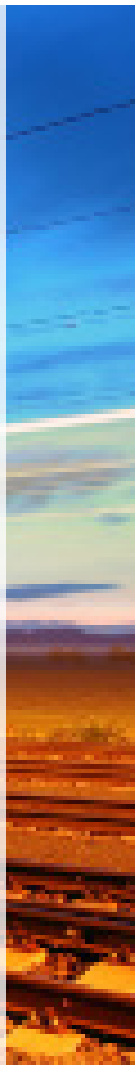
Ardanuy Ingenieria: Over 850 Railway Projects in Spain

ARDANUY INGENIERÍA

The trajectory of Ardanuy Ingenieria in Spain is quite extensive. The company has worked on over 850 projects in this country regarding the following disciplines: consulting, technical assistance, construction management and safety engineering.

Some of the most relevant works that the company has participated in are the new railway complex for the Atocha Station in Madrid, railway access in the Levante as well as the new high-speed networks for the following lines: Seville-Cádiz, Medina del Campo-Salamanca lines, Mediterranean Corridor and the Atlantic Axis.

In terms of Urban Transportation, Ardanuy has been awarded numerous engineering jobs such as the Metros in Barcelona, Madrid, Valencia and Granada, the Trams in Alicante and Jerez de la Frontera, in addition to the Metropolitan Railway in Tenerife. Apart from the previously mentioned works, Ardanuy combines all these expertise with its proven experience in designing and executing conventional railway lines for which it also has a comprehensive list of references.



CAF designated by Metro Medellin for the refurbishment of 42 units

CAF

CAF has been chosen by the city of Medellín (Colombia) for the rehabilitation of 42 x 3-car units manufactured in the mid-90s and currently operating in the Colombian city's metro network. The operation amounts to approximately €80 million.

The scope of the work covers the modernisation and upgrading of the units in their structure and interior and exterior decoration, as well as the replacement and retrofit of some of the vehicles' main equipment and systems, such as the traction systems, auxiliary equipment, brakes and lighting.

In recent years, CAF has developed several projects for the Medellín Metro, and has supplied a total of 36 units since 2011, which are now providing revenue service in the Colombian city, and therefore, this new agreement demonstrates the Colombian Authorities' trust in the Company.

CAF consortium secures Aarramatta Light Rail contract in new south wales (Australia)

CAF

CAF has been awarded the Supply, Operate and Maintain contract for the Parramatta Light Rail Project (Stage 1), as part of the Great River City Light Rail consortium, including CAF Rail Australia and Transdev Australasia. For the Parramatta Light Rail Supply, Operate, Maintain contract, CAF will supply thirteen 7-module Urbos Light Rail Vehicles, as well as the systems and their integration, which includes the traction system, substations, signalling system, communications and control centre for the project. CAF's scope also includes the design and construction of the Stabling and Maintenance facility and the above ground fit out of 16 light rail stops. This work will be subcontracted to the global engineering company Laing O'Rourke.

For the CAF Group, the contract amounts to approximately €300M and services to commence operation in 2023.

CAF Signalling has been awarded two new projects for the refurbishment of Centralised Traffic Control Systems (CTC) in Spain

CAF SIGNALLING

The Railway Infrastructures Manager (ADIF) has awarded CAF Signalling with two tenders in Spain valued at 16 million euros. Firstly, the company will undertake the drafting of the project for the refurbishment of the centralised traffic control centre in several command posts along the railway network for the amount of 8.28 million euros. In addition, CAF Signalling has been selected by ADIF to draft the project and provide maintenance assistance to the centralised traffic control centre systems (CTC) along the conventional rail line between Leon and Oviedo at a cost of 7.7 million euros. These new assignments are added to the company's wide-ranging trajectory in the expansion and modernisation of the Spanish network, in which it boasts a standout presence, both in terms of high-speed rail, along with regional rail lines and urban mobility projects.

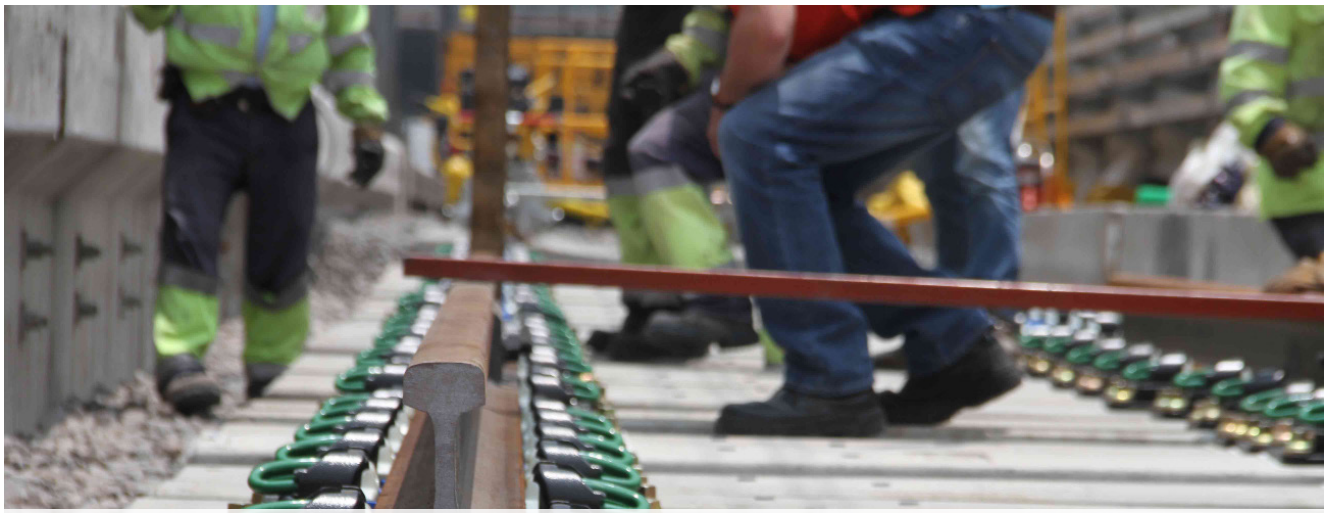
Personal CETEST.

CETEST´s tenth anniversary

CETEST

CETEST celebrates this year its tenth anniversary! During the last years, CETEST has shown a continuous and steady growth both in turnover and personnel. The staff of the Spanish testing accredited laboratory CETEST, has been increasing up to today´s 83 employees, thanks to an intensive test execution period.

During this year 2018, CETEST has carried out 67 test campaigns, some of which consisted of complete homologation campaigns. Altogether 158 tests have been performed during 2018. From these, 121 tests (77%) have been on-track tests, i.e. dynamic behavior, electric, noise tests… and have taken place all over the world: Different European countries, USA, Chile, Ecuador, India, Australia, Argelia, Mexico, Saudi Arabia… The remaining 37 tests (23%) represent structural strength and fatigue tests on test benches, and also instrumented wheelsets´ calibration and instrumentation (more than 30). Remarkable projects this year are Flytoget Oslo, EMUs and DMUs ARRIVA Civity UK, Mexico L1 Metro, Kiruna R&D Wagon, Calcutta Metro, Riyadh Metro, M7 SNCF Belgium, Boston Tram…



COMSA to enhance the railway connection at the Port of Veracruz (Mexico)

COMSA

COMSA has been awarded the contract for a double-track section that will connect the port of Veracruz with the adjacent town of Santa Fe. Through the expansion of this railway infrastructure, the construction company will help to enhance the competitiveness of the equipment and optimize its operations. The contract involves the construction of nearly three kilometres long branch line, equipped with concrete sleepers, which will run through uninhabited areas. This project adds to the portfolio of infrastructure contracts that COMSA has carried out in Mexico, which include the renovation of Line 12 of the Mexico City metro, the maintenance of Line A in the same city, the expansion of the federal Sonoyta - San Luis Río Colorado motorway in Sonora and the extension of the Libramiento Sur de Guadalajara motorway.

ICON Multimedia improves travelles experience on Line 3 of Santiago de Chile

ICON MULTIMEDIA

DENEVA, ICON Multimedia's Passenger Information System, it have been consolidated as a reference in the Santiago's metro in Chile. The President Sebastian Piñera has recently inaugurated the line 3, which links Quilicura with La Reina in approximately 30 minutes.

The solution, that it have been implemented together with SICE, informs in real time about destinations or incidents in the metro line of the capital trough digital screens.

In addition, interactive stations have been installed in the main stations that shows intermodal information. Travelers can used them for seach help in order to locate destinations or services of interest.

ICON Multimedia is recognised with the "SME of the Year" 2018 Award

ICON MULTIMEDIA

ICON Multimedia has been recognized with the "SME of the Year" 2018 award from Palencia. This prize is given by the Spanish Chamber of Commerce and Banco Santander.

These recognizes the work of small and medium enterprises in the province, whose activity is essential for the creation of employment and wealth.

The jury chose ICON Multimedia because of its "internationalization commitment, innovation and development, as well as it great growth experienced in the last year." Its key project is DENEVA, a software that mixes Passenger Information Systems in stations with promotions and advertising and with which it is present in multiple countries. The company will participate in the "SME of the Year" Award of Spain, which will be awarded in the first quarter of 2019.

La Farga restructures the eight Group's trading companies under the La Farga Yourcoppersolutions brand

LA FARGA

LaFargahasrestructuredtheGroup'smetallurgicaltradingcompaniesintoasinglecom-pany,namelyLAFARGAYOURCOPPERSOLUTIONS SA.

InkaGuixà,ChiefExecutiveofLaFarga,liststheadvantagesofthemerger:"Thenewly-mergedGroupwillfacilitatetomakingoperationalfunctioningmoreagileandabetterbrandpositioning,alongwiththeadaptationofthebusinessstructuretocurrenttimes.Despitethesechanges,asfarasitscustomersandagentsareconcerned,LaFargawillremainfaithfultoitspolicyoftransparency,competitivenessandconstanteffortinitsefficientworkmethodology".Interms of production there are no changes;LaFargawillcontinuetomanufacturetheproductsthathavemadeitoneoftheworld'sleadingcompaniesincopperproducts and its alloys.

Together we go further

NEM SOLUTIONS

NEM Solutions is pleased to announce that their predictive technology gives another step forward with proven results. They have been able to predict critical incidents on HVAC two weeks in advance; in just 1 fleet avoided 20 critical incidences on wheel bearing failures, by predicting them 1 week in advance. Gearbox failures are also predictable 1 week earlier. NEM Solutions starts 2019 with more than 250 fleets controlled worldwide independently to OEMs (Siemens, Alstom, CAF among others). Including Trams, High Speed, Passenger and Freight vehicles. One step forward on the long-term partnership agreements with key Railway Authorities.

With their belief of "Together We Go Further" extended their partnership agreements to offer a wider ecosystem towards customer success. Platform-based agreement with Siemens Mobility, Rolling Stock specialist partnership with Ricardo Rail, partnership with hardware-based manufacturers and CMMS-based partners.

"We are ready to extract as much knowledge from every OEM in order to ensure continued excellence in predictive analytics," said NEM Solutions Business Developer, Álvaro Zevallos.

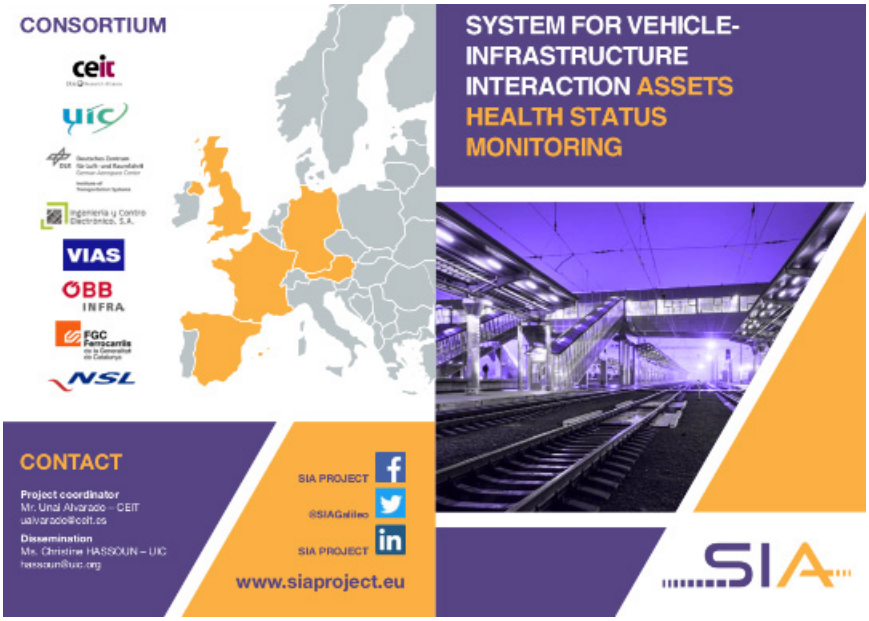
Ceit coordinates a Project that will bring a 15% reduction of maintenance costs

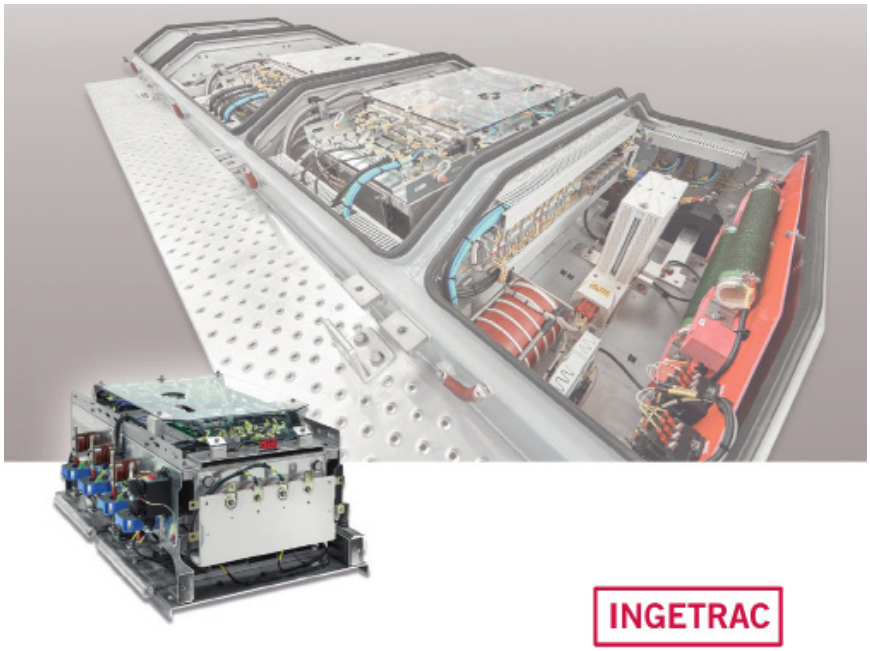
CEIT

Ceit-IK4 technology center is coordinating SIA Project (www.siaproject.eu), financed by the European Comission and the European Global Navigation Satellite Systems Agency, in which other eight european partners are collaborating.

The goal of the Project is to develop four new services that provide information about both present and future status of those railway assets that require most maintenance costs, (i.e. wheelset, pantograph, rail and catenary) and reduce related maintenance costs 15%.

The challenges of the Project rely, on the one hand, on the exploitation of the new services brought by EGNSS in order to have a more precise and reliable positioning of trains; on the other hand, in the modelling of the damage and degradation of components to leverage predictive maintenance.





INGETEAM has consolidated its position on the Railways sector during 2018

INGETEAM

The investments made during 2018 have showed the consolidation on the railways market. The group has invested on a 5,500 m^2 manufacturing plant, where all the INGETRAC traction converters will be manufactured, with additional capactity to make tests and protyping tasks. Alongside, a new system test facilitiy for traction systems for rolling stock was inaugurated early in 2018 and is now at full operation.

INGETRAC High + Medium Power

During 2018, INGETEAM manufactured traction converters for electic locomotives powered 2.8 MW for the Polish market, having supplied more than 50 converters of its kind. On those vehicles, traction converters are located on board,water-cooled and integrate the auxiliary inverters. Another supply to be underlined this year, is the traction converter for 5-car Emu (Line Voltage: 3kV); the INGETRAC Medium Power converters are located on the vehicle´s roof, are air-cooled and have auxiliary converters integrated. By the end of year, INGETEAM has delivered more than 300 traction converters for EMUs at 3kV line voltage.

The concept design proposed by INGETEAM is based on an smart integration of standardized and proved modules that integrate all necessary elements. This will allow to adapt the traction converter to the particular technical and physical vehicle´s requirements.

Both traction converters have been submitted to combined system tests and temperature, noise and different tests on the new traction facilities.

INGETRAC traction converters for mutivoltage special vehicles

INGETEAM has also supplied INGETRAC multi-voltage traction converters for an innovative hybrid diagnostic vehicle , that can work on different catenary systems.

INGETEAM has already commissioned the first delivery, a process that was specially complex due to coupling with the different energy sources and diagnostic equipments.

The converter for special vehicles can also work on eletric traction, diesel and/or battery, allowing great service versatility.

SENER President, Jorge Sendagorta, receives the Honorary Member's medal from the Spanish Institute of Engineering

SENER

The President of the SENER engineering and technology group, Jorge Sendagorta, has been awarded the Honorary Member's medal, which is granted by the Spanish Institute of Engineering (Instituto de Ingeniería de España, IIE), in its own words, "to engineering professionals who have contributed to advancing society through their work and projects."

Jorge Sendagorta received the medal on Tuesday, November 13, at an award ceremony held in the auditorium of the Spanish Institute of Engineering (IIE) in Madrid. The medal was presented by the IIE's President, Carlos del Álamo Jiménez, following a laudatio delivered by the previous President of the IIE, Manuel Moreu. Together with Jorge Sendagorta, the Honorary Member's medal has also been presented to the President of Iberdrola, Ignacio Sánchez Galán.

The Spanish Institute of Engineering decided to give this distinction to Jorge Sendagorta (who is Ph.D. in Naval Architecture by Universidad Politécnica de Madrid) after he was nominated by the Spanish Association of Naval and Ocean Engineers, in recognition of his professional career. According to the institution: "It's a prize to the engineer, but undoubtedly also to the engineering carried out at SENER, which is spearheading Spanish engineering around the world and in the most innovative sectors."

Jorge Sendagorta has served as President of SENER, where he started working in 1986 as Deputy General Manager, since the year 2000. Under his oversight, the SENER engineering and technology group has employed 6,000 people and generated revenues in excess of 1,300 M€. It has also become an international benchmark for its ability to innovate.

Adif awards to Siemens Rail Automation the new railway traffic management systems for the Montcada Bifurcació station (Barcelona)

SIEMENS RAIL AUTOMATION

The contract awarded to Siemens Rail Automation, for an amount of 14.17 million euros, contemplates the installation at the Montcada Bifurcació station of the Cercanías de Barcelona network of a new electronic interlocking of the latest generation and based on microprocessors.

In addition, new videographic systems will be installed for local control, audio frequency circuits, signaling devices and replacement of the current analog beacons by digital beacons, electrical connections and technical buildings.

In parallel, the laying and connection of the security and communications facilities will be carried out, as well as the integration of the new interlocks and associated blocks in the current CTC (Centralized Traffic Control) system of the Barcelona França station to the new conditions of exploitation. Likewise, the renovation and interlocking of tracks 8 and 9 of the station will be carried out and roads 4,5, 6 y 7 wil be rehabilitated.

SICE-ENYSE to supply 6 new Interlockings to ADIF in the section Torrelavega-Santander

SICE

DIF (the Spanish railways operator) has awarded to SICE-ENYSE the Design, Built and Maintenance contract of the signaling and communications package of the Torrelavega-Santander section of the Palencia-Santander line.

With a budget of more than 19.5 million Euros, the scope includes the replacement of 6 old electrical interlocks by the electronic interlocking of ENYSE (EiS23) and the deployment along the line of all the field equipment, reliable power to the signaling equipment, fixed telecommunications and auxiliary systems. It also involves the construction of new technical buildings to house the new Signaling and Communication devices.

30 months is the expected term of the works for the installation and 20 years for the maintenance.

Segula Technologies and Limmat Group join forces in predictive maintenance in the rail sector

SEGULATECHNOLOGIESYLIMMATGROUP

Segula Technologies and Limmat groups have reached a collaboration agreement this december 13th in the field of predictive maintenance in the rail sector.

Segula, through its Center of International Excellence of Zaragoza dedicated to the railway sector, is a leader in multiple services: design, conceptual development, engineering, virtual layout, engineering, FEM, EDS, ERTMS or RAMS among others.

Limmat Group, specialized in railway digitalisation and developer of the predictive maintenance platform IMAS, will team up with Segula, offering the French group its digital experience in predictive maintenance and benefiting from the extensive experience in the design, engineering and execution of international Segula projects. The architecture of the IMAS platform of Limmat, is focused on monitoring and predictive maintenance with the aim of optimizing the information, time and operational cost of the client. This is done through an efficient and non-intrusive data acquisition of the systems to be monitored, which combined with an advanced data analysis with Big Data techniques and Machine Learning, IMAS is able to identify failures in early stages as well as anticipate the deterioration of the system depending on the expected working conditions in order to anticipate failures, plan maintenance actions at the optimum time and avoid unscheduled shutdowns in the facilities.

Segula and Limmat hope to be reinforced with this collaboration, complementing each other in the areas in which each collaborator has more experience, thus offering a more complete catalog of services.

Stadler Valencia obtains the new IRIS quality certificate based on ISO/TS 22163: 2017

STADLER VALENCIA

Stadler Valencia obtains ISO/TS 22163: 2017 certification, the new international standard for Quality Management Systems in the railway sector that replaces IRIS, the previous norm promoted by UNIFE under which Stadler Valencia was certified since 2010. This confirms the commitment to the quality of the plant that Stadler has in Albuixech and its undeniable commitment to all its customers.

The company also has other certifications such as OHSAS 18001: 2007, ISO 14001: 2015 and EMAS Regulation that confirm its commitment to the environment as well as occupational safety and health, working every day to meet the objectives of Zero accidents and Prevention of pollution, collected in its Safety, Health and Environment Policies.

The flexible and modern production center of Albuixech, near Valencia, covers an area of 200,000 m^2 and employs around 900 people, including 200 engineers dedicated to the design and development of products. Stadler Valencia develops and manufactures high performance locomotives, as well as comfortable passenger trains and a wide range of bogies.

The UK´s first tram-train enters service with Stadler vehicles

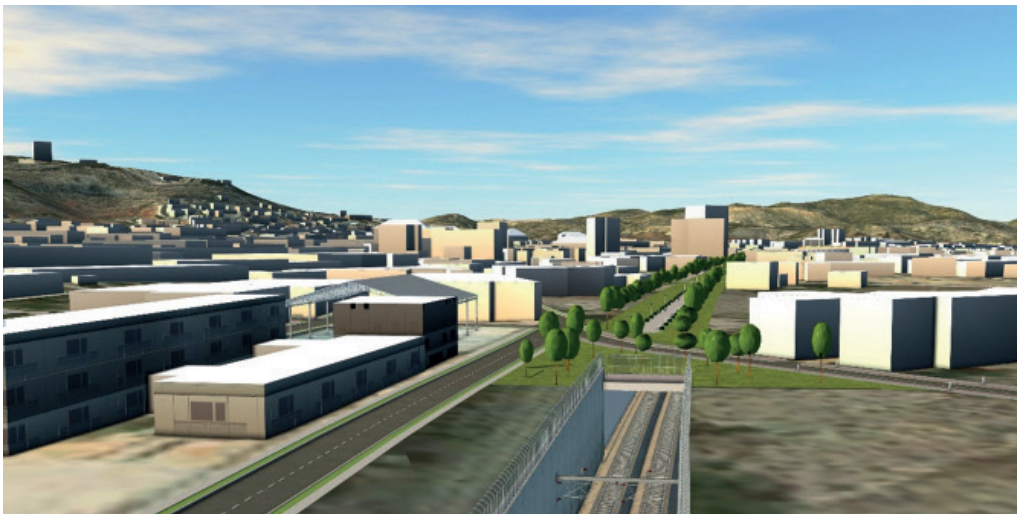
STADLER VALENCIA

Passengers in South Yorkshire have been the first in the country to benefit from innovative tram-trains from the Citylink family, seven light rail vehicles designed and produced by Stadler Valencia to run on both, Sheffield´s the city's tramlines and the rail network between Sheffield and Rotherham. The project is part of the Sheffield Region's transport objectives to improve local connectivity and enhance economic growth. The inaugural trip took place on October 25, 2018.

The vehicles meet British standards; higher crashworthiness standards than trams and are able to operate on tracks with a maximum gradient of 10 per cent. The new bidirectional tram-trains are 37 m long, can carry 300 passengers. Citylink refers to a series of light-weight modular vehicles. They are fully accessible with low flooring and specially designed to provide direct connections between the city centre and outlying areas. These vehicles assure a comfortable, quiet and safe ride. Stadler has become a European benchmark in the tram-train segment, with over 120 fully-outfitted vehicles supplied in 5 different countries, including 75 for Karlsruhe, the birthplace of the train-tram concept.

Public consultation regarding the feasibility study to underground the railway line at Lorca (Murcia)

TPF GETINSA-EUROESTUDIOS



On 5 November 2018, the Ministry of Public Works submitted to public consultation the feasibility study conducted by TPF GETINSA-EUROESTUDIOS to ensure integration of Lorca's railway network in the city centre and its upgrading to high-speed rail. This is the last step towards the completion of the design of the HSR Line Murcia – Almeria.

The study examines the feasibility of putting the HSR Line Murcia-Almería underground through Lorca over a length of 2,550 m, taking into account key design parameters for passenger and freight rail transport systems. Accordingly, it is planned to build a new underground high-speed rail station at the location of the old Lorca-Sutullena station.

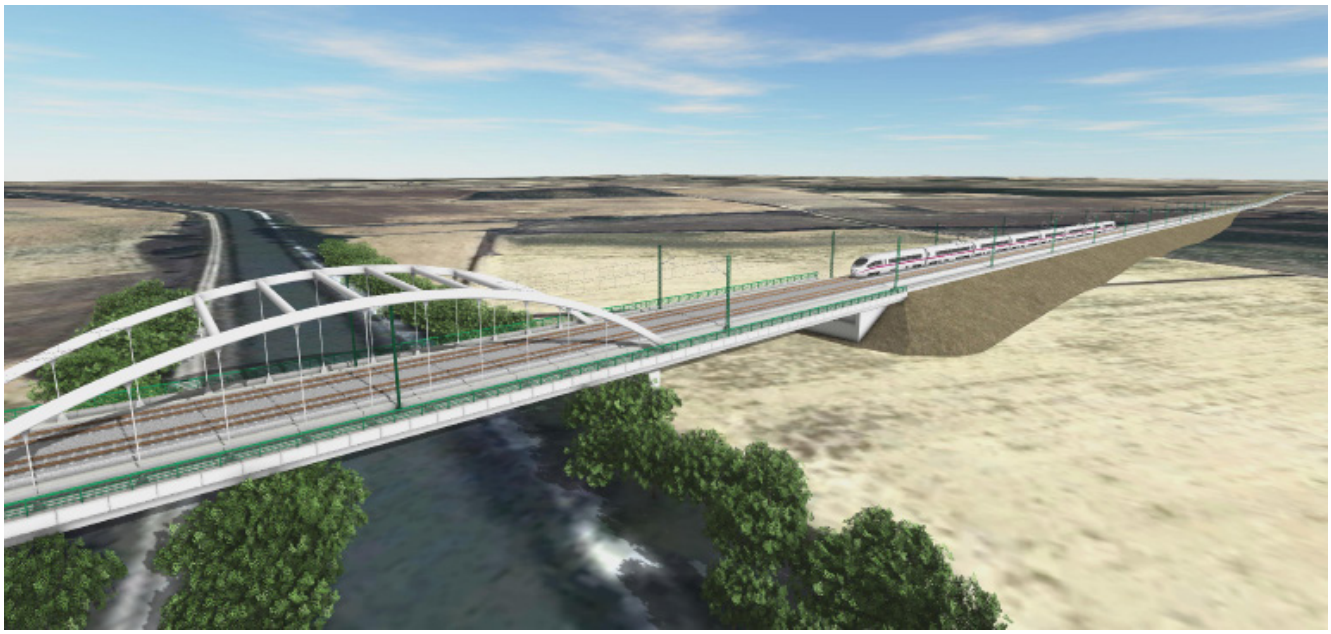
The solution proposed answers the need to eliminate the constraints imposed by the rail line. Urban spatial restructuring will be undertaken, the city's road network will be reorganized and more public space and corridors will be created for pedestrians. Another major advantage is that the city of Lorca will be accessible by high speed rail thanks to the construction of a new station in the city centre, while maintaining commuter train services and improving inter-modality.

TPF Getinsa-Euroestudios will perform the detailed design of the Amusco – Osorno section of the HSR line Palencia – Aguilar de Campoo

TPF GETINSA-EUROESTUDIOS

This stretch of the new high-speed rail line that links Palencia to Santander extends over a length of 21.90 km. It consists of a standard-gauge double track designed for a maximum speed of 350 Km/h. The estimated construction period is 12 months.

Ever since the line was first put into service, the route and the environment of the corridor between Palencia and Santander have remained the same, except for some track alignment modifications that were required when track renewals were taking place. Therefore, it is necessary to design new works in order to improve connection between Madrid and Cantabria and get competitive journey times, which is completely in line with modern, operational and efficient transport systems. The main structures within the scope of the project are two viaducts: one over the Canal de Castilla and another one over the Arroyo Berco, one portal frame crossing over the existing railway line, and 12 overpasses and 2 underpasses allowing for the restoration of the original roadways.



Low Carbon and Low Carbon Vanadium (LCV) R290V Grooved Rails: the best options for city transport network

ARCELOR

Use of Low Carbon and Low Carbon Vanadium (LCV) rails, with the addition of very small amounts of Vanadium provides an increased grain refinement throughout the entire rail and not just the outer surface.

In fact, experience has shown Low Carbon (softer steel) rails are most suitable for City Transit embedded tracks. Thus, extending the life of the rail, and avoiding the high cost of replacing embedded grooved rail and street disruption. ow carbon and LCV grades such as R290V provide increased performance effectively solving rolling contact fatigue / head checks linked with extreme hardness levels (HBW). One Grade = One Rail, with no outer rail treatment for best deposit welding techniques. In addition, rail bar welds of R290V do not loose performance at the weld point. ArcelorMittal has developed a Rail Tool App available for Android and iOS, allows city transport key players to:

- get interactive information regarding standards and profiles for different grooved products
- calculate rail length or tonnage for different types of urban railway projects
- download the dimensional profile drawing

Thales will present its new 'smart' Operational Control Centers at Rail Live 2019!

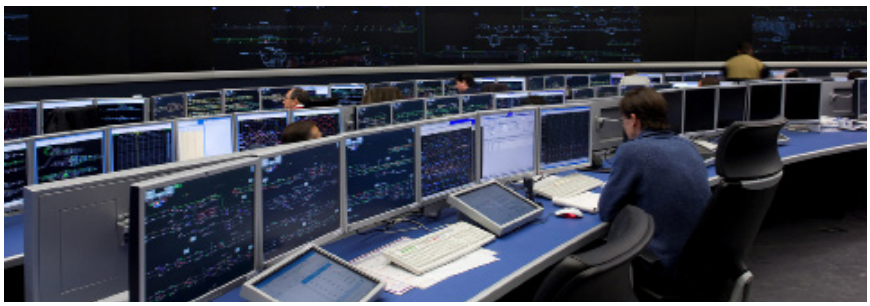
THALES SPAIN

Thales is immersed in a process of digitization that will affect the railway industry and whose evolution has implications not only for the railway, but also for the future of mobility.

During Rail Live 2019 edition Thales will take the opportunity to present the new 'intelligent' Operational Control Centers or advanced traffic management centers based on the use of artificial intelligence and big data to analyze the large amount of data generated by sensors in trains and connected equipment, external data such as geographic or climatological data. It's part of a new Mobility Platform that turns raw data into accurate real-time information with predictive insights for both passengers and operators. The platform is able to adapt its behaviour dynamically to match constantly changing operational scenarios, with data taken from many operational sources including signalling systems, fare collection, video analytics and anonymous location data from passengers' mobile devices to offer passengers a better service.

On the other hand, the company will show digital solutions such as Naia and Tiris based on data analysis or large data analysis of passenger flow in the case of the first solution, and predictive maintenance in the cloud, in the second one, detecting problems in assets and prescribing corrective actions before any incident occurs.

NAIA is a passenger journey analytic tool that creates insights around passenger journeys allowing the operator to improve the experience of the travelling public by optimising the timetable, and maximising revenue collection through better informed planning of fare policy. It can also increase revenue streams through more targeted marketing and advertising campaigns, and better customer satisfaction will generate savings on the deployment of customer service resources.



TIRIS is a predictive maintenance service that provides operations and maintenance intelligence to customers.

The vast swathes of data are processed and analysed to provide customers with a prediction of when a part may fail so that they can accurately schedule in and budget for 'just-in time' maintenance. As part of the data driven OCC, Thales will present also, their new video analysis concept, DIVA (Distributed Intelligent Video Analytics), equipped with state-of-the-art security and operations management services such as: track intrusion detection, monitoring people in stations using facial recognition, detecting people in emergency situations in stations or on trains and counting passengers on trains or platforms.

Aditionally, Thales presents the new intelligent sensor technology for railways consisting Lite4ce and the new Thales track circuit. The Thales Lite-4ce™ sensor is based on Fibre Bragg Grating technology, which enables sensors on the rail to safely detect a variety of parameters on rolling stocks. These include the safe detection of wheels, the quality of the wheels as well as the speed and weight of vehicles.

GMV supplies CAF with a video-surveillance and video-information system

GMV

Fuente: CAF

CAF, a global benchmark in the railway sector, has turned to GMV for the design, development and supply of the onboard video-surveillance and video-information system for the ten new series-5000 and -6000 trains to be manufactured for Barcelona's metropolitan transport company (Transports Metropolitans de Barcelona: TMB).

The core of the video-surveillance system is made up by the EGRU digital recording equipment, designed and manufactured by GMV, while the video-information system will comprise a central video broadcasting server, another inhouse GMV product. The whole system will be rounded out with a set of passenger-information IP monitors distributed throughout the whole train.

With this all-in, purely digital solution CAF will be supplying TMB with an architecture of totally renewed systems that integrates seamlessly with Barcelona Metro's video-surveillance system, currently supplied by GMV to TMB.

Metrolink Dublin. Urban transport 4.0

IDOM

IDOM, partnering with Jacos into a JV, carries out the Engineering Works the implementation of the MetroLink Project, which will develop in 5 stages over the next 10 years, from preliminary design to commissioning. The Project Owner is Transport Infrastructure Ireland (TII) and the National Transport Authority (NTA) of Ireland.

MetroLink will link the north and south of the city along 26 km. The centre of Swords will connect to the airport, and then on to the city centre, and then the service will travel southwards from Charlemont to Sandyford. The line has 25 stations and the alignment runs underground, elevated or at grade level, depending on the section. On the southern section, the existing tram line (LUAS) will be upgraded to the automatic Metro Standard (GoA 4), the standard to be used for the operations of the entire MetroLink system.

MetroLink is a project tailored to the people of Dubling. Fluid and sustained dialogue is maintained with individuals and associations, whose opinions are analyzed to define the requirements for the construction and operations of MetroLink. This exciting dynamism adds dimension, nuance and richness to the services we are providing. We are developing an urban transport system 4.0: accessible, efficient, respectful to the environment and sensitive to all social sectors. IDOM is developing all the engineering associated with the implementation of MetroLink as an urban rail system: the layout of the tunnels, viaducts and stations, in addition to the railway systems, rolling stock and depots/workshops. Including the operations study. BIM Level 2 is being used for the design, across all disciplines, which has a built-in Asset Data Management engine to make easier design, construction, operation and maintenance activities.

Spain:

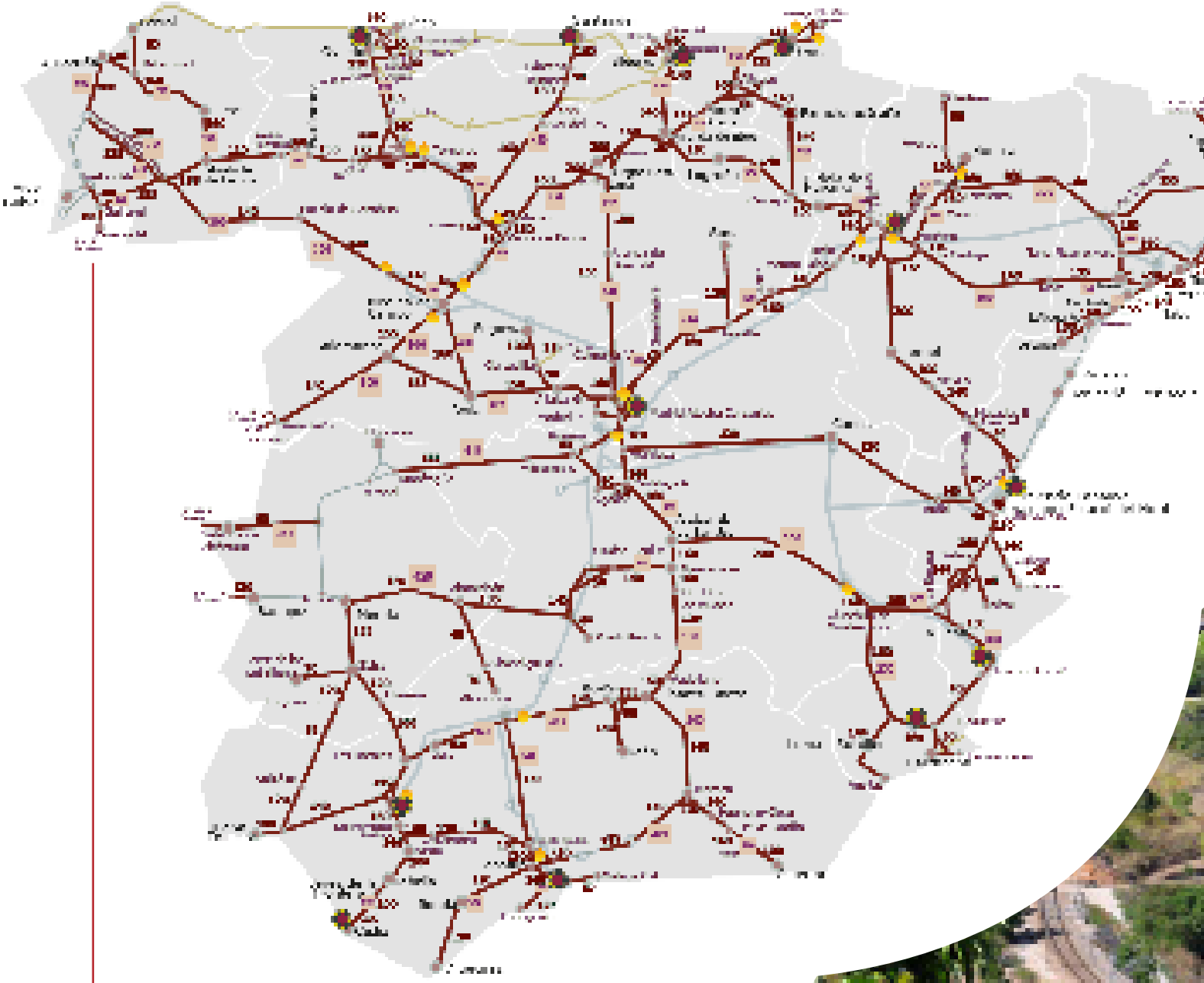
A railway at the forefront with regard to tec

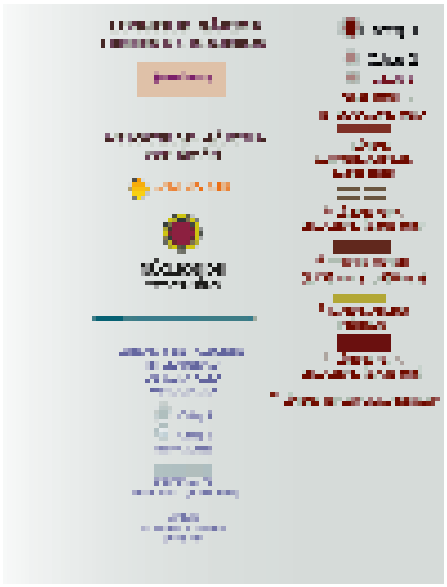
SPAIN IS ONE OF THE MAIN COUNTRIES IN THE WORLD WHERE THE RAILROAD HAS BECOME THE ESSENTIAL PART OF ITS MOBILITY.

The railroad in Spain is one of the key means of transport, which stands out, mainly, for its extensive and modern network. The decisive backing that has been made in recent years, the major investments in advanced infrastructures, as well as the constant effort in R & D have placed the country at the forefront in technological vanguard and know-how in the development of projects of significant outreach throughout the world. The facts reflect this. In terms of high-speed rails, Spain spearheads the top positions of the main powers, with a network spanning 3,240 kilometres, the second most extensive in the world only after China, and in which 51.775 billion euros have been invested in its 26-year history. Furthermore, the most avant-garde advances in the market are operative, showing the outstanding role played by new technologies. It is the European country with the highest degree of implementation of the European singling system ERTMS (European Traffic Management System), with

hnology and innovation

Renfe Chamartín Station.
Photo by Bryant Borrego Alvarado.





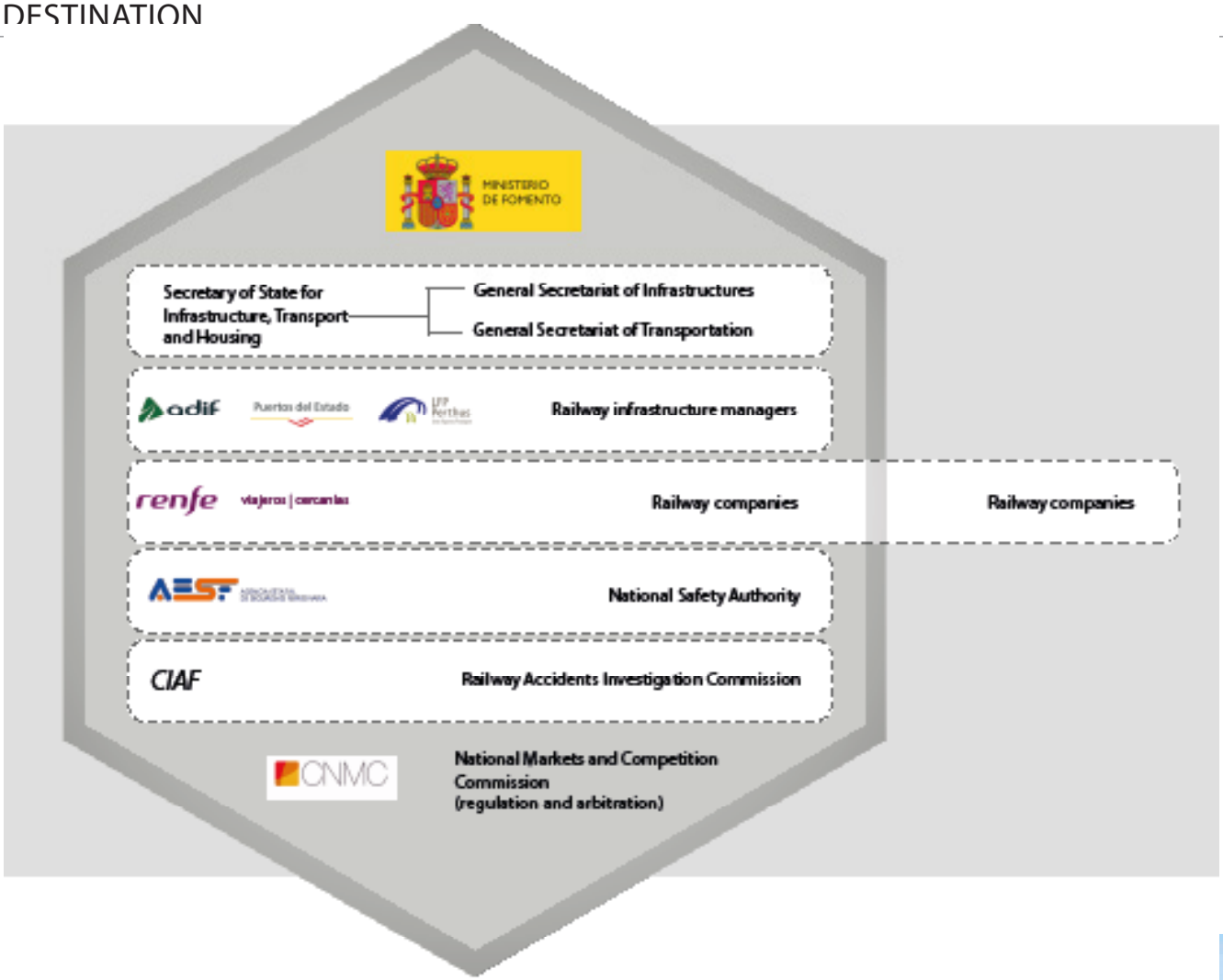
The sizeable investments in infrastructure and R&D have placed Spain at the forefront in rail transport.

SPAIN

more than 2,000 km equipped with this system, the most modern and advanced to ever installed. In addition, it has the longest interoperable routing system throughout Europe, which runs between Barcelona and Malaga, in which rolling stock equipped with ERTMS it circulates through an infrastructure with signalling systems supplied by four different manufacturers. An outstanding feature is that there are different types of track width: Iberian or conventional gauge (1,668 millimetres) and in force in most of the network; standard UIC or international width (1,435 millimetres), on high speed lines; and the narrow gauge width (less than 1,435), which in Spain is practically wide metric (1,000 millimetres). All of these are combined in a highly efficient manner thanks to the advances of the national rolling stock manufacturers, who have developed track gauge changeover systems meaning that the operation can be compatible for passenger trains. Alongside the modern high-speed network, the country has a complete railway network of regional and commuter rail lines, which make the railway a priority vehicle throughout its territory. All of the foregoing is combined with the modern metropolitan rail and tramway systems, as well as the recent train-tram models that have also been implemented in several urban centres.

The seven largest Spanish cities have underground rail networks: Madrid,

Arch "Camino de Santiago Irún/Bilbao".
Photo by Pablo Nieto Abad



Seville and Granada. With regard to freight corridors, we are working on an even greater boost in the connections with Europe.

Sectorial Structure

Amongst the main stakeholders of the Spanish railway sector is the Ministry of Public Works, which is responsible for the administration of the sector as a whole, strategic planning, the general organisation and regulation of the system, especially in everything related to safety and interoperability, along with the relationships between sectorial stakeholders.

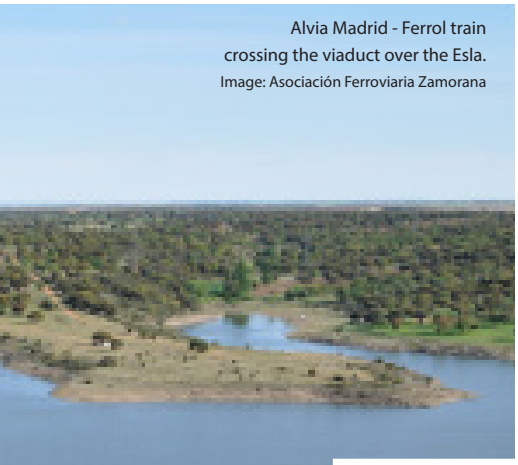
For its part, the Railway Infrastructure Administrator (ADIF), created in 2003, manages the new UIC high speed and width lines that appear in its balance sheet (Madrid-Seville, with the access branch to Toledo, and Madrid-Saragossa-Lleida, a total of 1,010 km) and the conventional Iberian gauge network (11,780 km).

Furthermore, it is also entrusted with the construction of new branches.
Another key player is Renfe Rail Manager, the only company that manages passenger transport (commuter, long and medium-distance and high-speed). This public business holding company has four subsidiaries: Renfe Viajeros (Passenger), Renfe Mercos (Freight), Renfe Fabricacion y Mantenimient (Manufacture and Maintenance)o and Renfe Alquiler de Material Ferroviario (Railway Material Rentals). It also offers freight services.

Regional Express destination Saragossa as it passes through the aqueduct of Noáin.
Photo by Dabid Guty.

Autonomous entities

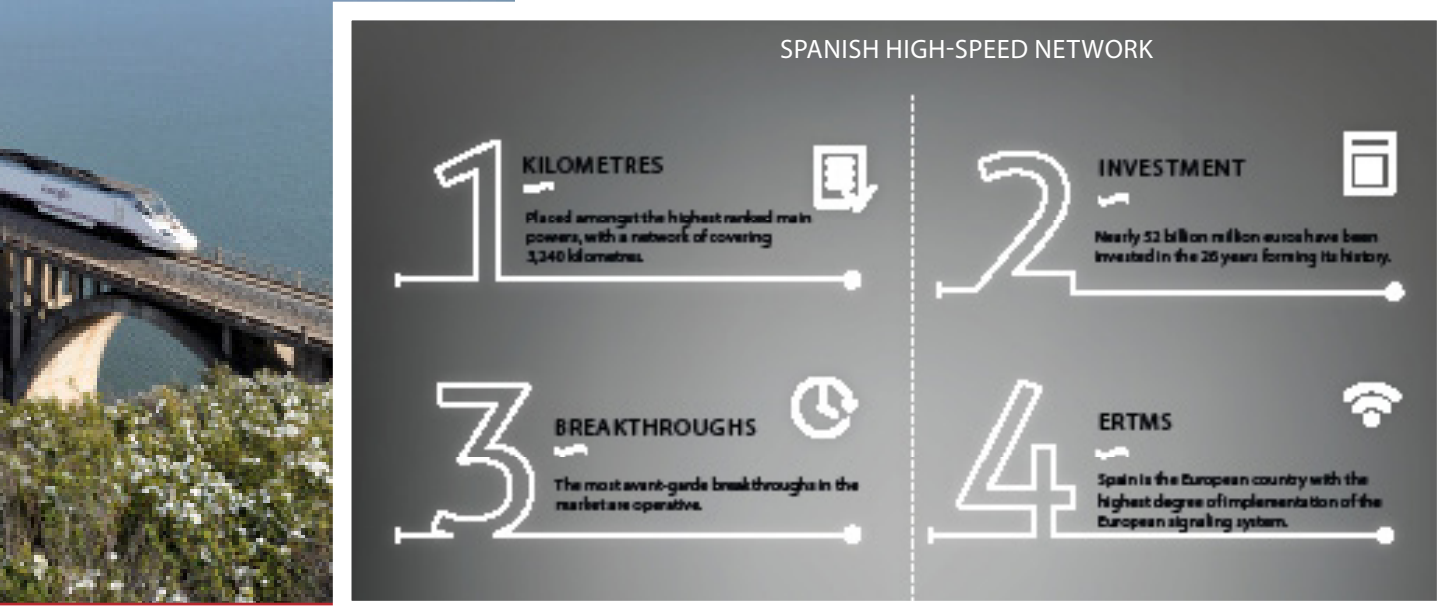
Likewise, the structure of the sector includes other entities that have tasks similar to ADIF and Renfe, but at a regional level. Among them, the Ferrocarrils de la Generalitat Valenciana (FGV) in the Valencian Community; the Railways of the Generalitat of Catalonia (FGC) in Catalonia; Serveis Ferroviaris de Mallorca in the Balearic Islands, as well as Euskotren and EuskalTrenbideSarea (ETS) in the Basque Country.
In the freight rail transport of sphere, Renfe Mercancías, Acciona Rail, Captrain Spain, Continental Rail, Ferrovial, Pecovasa, Logitren, Traction Rail, Transfesa and Transitia are present.



Alvia Madrid - Ferrol train crossing the viaduct over the Esla.
Image: Asociación Ferroviaria Zamorana

Railway deregulation

The Spanish sector undergoing a period of change, involving in the rest of the member countries a period of regulations issued by the European Union (EU) in 2016 in the "Fourth Railway Package". This set of proposals comes into force in full in July 2019.
This legislation, with which we want to achieve a single space in the whole area of the EU, has a threefold aim. Firstly, to specify the role of each of the actors involved (infrastructure managers and railway companies) in order to ensure that they play a role completely independent of their functions. Secondly, opening up the passenger market to the competition in the year 2020. For both goals, the three standards included in the "Pillar of Governance and Market" were approved: Directive 2016/2370 / EU of the Eu-



SPAIN

ropean Single Space; the Regulation (EU) 2016/2338 on public rail and road transport services and Regulation (EU) 2016/2337 of the European Parliament and of the Council, of December 2016, on the common rules for the standardisation of the accounts of railway companies.

The third aim is addressed in the "technical pillar" to streamline and railway companies) in order to ensure that they play a role completely independent of their functions. Secondly, opening up the passenger market to the competition in the year 2020. For both goals, the three standards included in the "Pillar of Governance and Market" were approved: Directive 2016/2370 / EU of the European Single Space; the Regulation (EU) 2016/2338 on public rail and road transport services and Regulation (EU) 2016/2337 of the European Parliament and of the Council, of December 2016, on the common rules for the standardisation of the accounts of railway companies.

The third aim is addressed in the "technical pillar" to streamline safety and includes three other rules: the 797/2016 Interoperability Directive, the Railway Safety Directive 798/2016 and the Regulation 796/2016 of the Railway Agency of the European Union.

This transformation entails the participation of private companies in the operation of railway transport services, which will compete with the publicly run company Renfe. In terms of freight rail, since 2007 a number of private companies have already entered the market, while in the area of passengers, the process is still ongoing, and certain licenses have already been granted.

SPANISH RAILWAY NETWORK: MAIN DATA

Length	15,301 kilometres
Iberian gauge network	11,333 kilometres
Standard width network	2,591 kilometres
Mixed gauge network	190 kilometres
Metric width	1,207 kilometres
Number of stations	1,498
Users: AVE transport	21.10 million passengers (2017)
Users: conventional average distance	23.67 million passengers (2017)
Passengers: Cercanías	423 million users (2017)
Freight transport terminals	39
Number of circulations trains / years	2,206,905
Lines equipped with ERTMS	157
Lines equipped with ASFA	10,500
Cities with metropolitan rail networks	Madrid, Barcelona, Bilbao, Palma de Mallorca, Malaga, Valencia and Seville
Cities with light rail and tram networks	Madrid, Barcelona, Bilbao, Valencia, Tenerife, Saragossa, Murcia, Alicante, Vitoria, Seville and Granada

*Source: Ministry of Public Works.

In the next few years, the railway will continue to be promoted.

Investments

Several programmes are focused on the creation of a modern railway system, consolidated in which the new technologies and the most cutting-edge advances that partner digital transformation in all fields continue to be incorporated.

The Infrastructure, Transport and Housing Plan 2012-2024, definesthe portfolio of public services

High Speed Train of Renfe Rail Manager in Navarre.
Photo by André Marques.

in the area of transport. The aim is the optimisation of the existing infrastructures and the planning adapted to the real needs. An important point is that this will boost the participation of the private sector in investments, the optimisation of the use of infrastructures and the improvement of competitiveness.

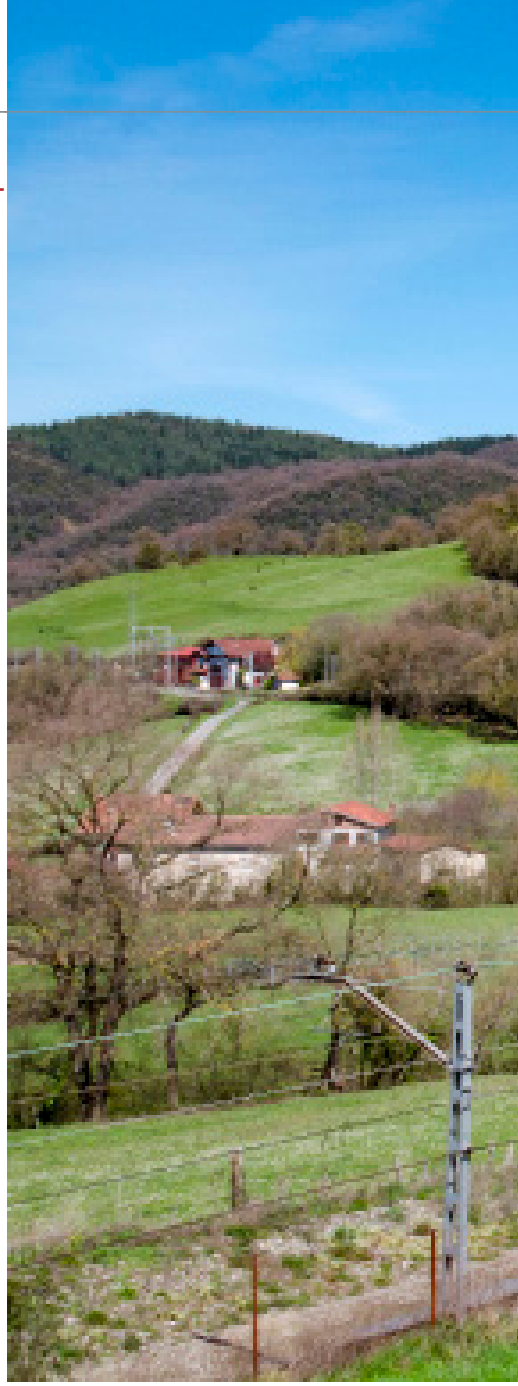
Added to this is the "Innovation Plan for Transport and Infrastructures", which promotes smart routes as well as energy efficiency and sustainability. These sections are grouped, in turn, into 21 lines that are specified in 67 initiatives. The programme has been allotted the amount of 50 million for a period of three years. For its part, Renfe Operadora, is finalising a five-year strategic plan (2019-2023). The aim is to prepare for the opening to competition of passenger transport in 2020. This programme includes a 'macro agreement' for the purchase of new

trains, with an estimated investment of around 3 billion euros. Likewise, the "Plan to Promote Freight Transportation by Rail 2017-2023" which aims to improve its efficiency is similarly underway. The acquisition of these vehicles may involve an investment in excess of 100 million euros.

SPAIN

The pathway to a global logistics hub featuring new rail corridors

THE TRANSPORT OF FREIGHT BY RAIL WISHES TO MAKE ITS MARK IN SPAIN. IN THE FORTHCOMING YEARS, EFFORTS WILL BE FOCUSED ON BOOSTING CONNECTIONS ACROSS EUROPE AND BOLSTERING THE COUNTRY'S ROLE AS A WORLDWIDE LOGISTICS HUB.

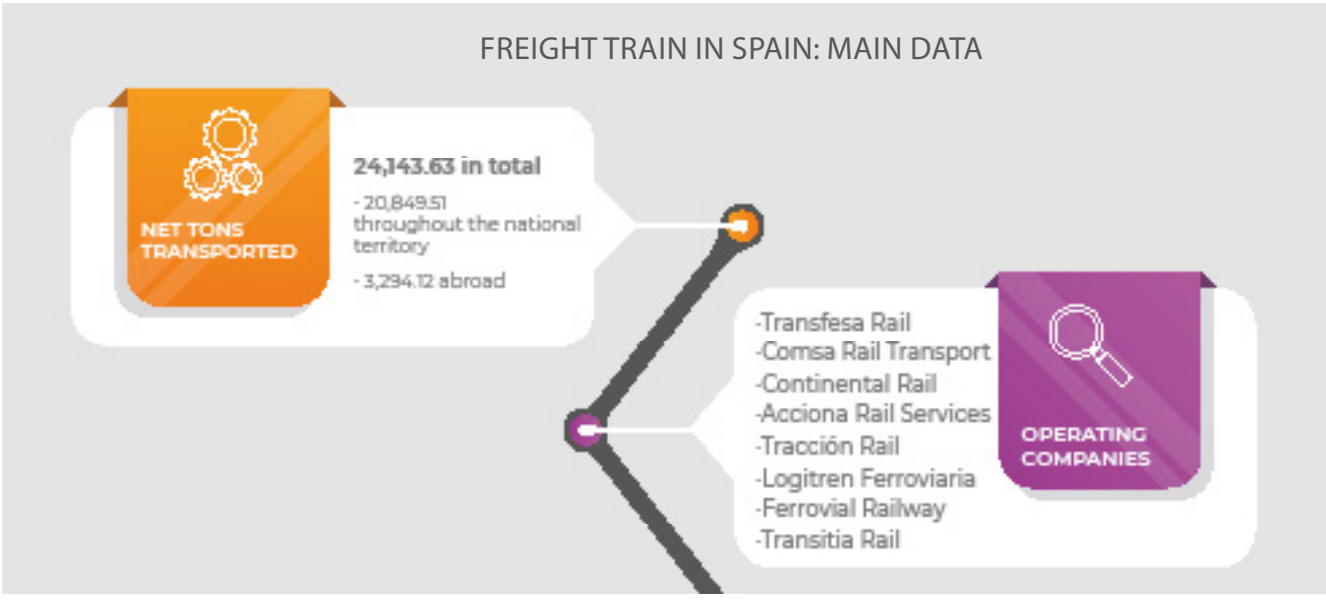


The modal share of rail freight transport in Spain is low compared to road mobility. It is a field in which endeavours are undertaken to unify operational criteria with Europe, due to the special characteristics of the infrastructure and the size of Spanish trains and locomotives, in order to gain market presence and become an alternative to the highway. Some of the already operative facilities are focused on that aim. An example of the foregoing is the Zaragoza PLAZA Railway Logistics Centre, which has become the largest freight terminal in southern Europe, with an area of 755,000 square metres.

After the publication of Royal Decree Law 22/2012, passed on July 20, which marked the beginning of the deregulation process of the railway sector, new stakeholders have been introduced in this transport sphere. Currently, the activity of the sector is shared between the public operator and private companies (Transfesa Rail, CAPTRAIN Spain, Continental Rail, Acciona Rail Services, Rail Traction, Railway Logitren, Ferrovial Railway, Transitia Rail). They are joined on regional networks, FGC and Euskotren Kargo.

According to 2017 data from the Observatory of the Railway in Spain, in 2016 private companies operated 20.7% of the trains circulated, with 29.5% of the kilometres travelled and 28.8% of the hours operated. In turn, according to the Transport Observatory of the Ministry of Public Works, the net tons of freight transported totalled

FREIGHT TRAIN IN SPAIN: MAIN DATA



TECO Silla-Bilbao leaving behind the Artomaña station, Bilbao.
Photo by ililo23.

24,143.63 (20.849,51 € in national territory and 3,294.12 abroad).

Along with this opening-up process, Spain wishes to increase the role of the railroad in freight transport in the coming years. The target is to increase the modal share of this medium and to strengthen the role of Spain as a logistics hub at European and global scales. For this purpose, promotion measures will be implemented for the competitiveness of the sector.

For this reason, tasks are being performed to improve structures in order to unify the track width with Europe (Iberian gauge of 1.668 metres to the European standard of 1.435 metres), electric voltage (from 3,000 to 1,500 volts), signalling systems and the size of the convoys of goods (from 450 metres long to 700 or 1,000) thus reducing costs per ton, and accomplishing full interoperability. Another point in which work is undertaken is in the improvement of connections with seaports. In this context of change, the Ministry of Public Wors launched the "Plan to Boost Freight Transport Infrastructure by Railroad 2017-2023". A program in which it is stressed that this mode is a "key element of the country's logistic strategy", so that aid to the sector is contemplated, according to the EU directives, for a value of 125 million euros.

Others that form the most relevant actions in the promotion of rail freight in Spain are the two corridors that run through the country and are part of the new ones that the European Union marked as priorities in the Regulation (EU) 913/2010 of the European Parliament and of the Council of September 22, 2010. It deals with the routes of the Atlantic and Mediterranean axis. Both boast the participation of Adif, in accordance with the provisions of the Regulation, for their development.

Spain wishes to significantly increase the role of rail in terms of freight transport.

SPAIN

Logistics centres

Saragossa Plaza logistics centre	This logistics platform is the largest cargo terminal in southern Europe.
Logistics Centre at Abroñigal.	ThemostimportantinSpain.ReferencepointinthemodalinterchangeintheCommunityof Madrid.
Logistics Centres of Can Tunis and Morrot (Barcelona)	destination throughout Europe measuring 750 metres.
Logistics Centre of Valencia Fuente de San Luis.	Theadaptationofitsfacilitiestoaccommodatetrainsofspeciallengthhasdriventhe Madrid-Valencia freight corridor.

Adif intermodal terminals

Intermodal terminals	Barcelona Can Tunis, Barcelona Morrot, Bilbao Merchandise, Constantí, Córdoba merchandise, Granollers Mercaderíes, Irún, Júndiz, León merchandise, Madrid Abroñigal, Merida merchandise, Murcia merchandise, Noaín, Port Bou, San Roque, Seville La Negrilla, Seville Majarabique, Sevilla, Merchandise Chair, Tarragona Mercaderíes, Torrelavega, Valencia San Luis Fountain, Vigo Guixar, Villafría, Saragossa Plaza.
Main corridors currently underway	
Atlantic Corridor	Of the 6,200 kilometres of track, the branch on the Iberian Peninsula will run alongtheaxesSines/Setúbal/Lisbon/Aveiro/Leixões-Algeciras/Madrid/Bilbao/Saragossa.
Mediterranean Corridor	This corridor will connect Madrid, Algeciras and the main ports of the Spanish East Coast with Europe through France, totalling more than 6,000 kilometres. It runs along the axis Almería-Valencia / Algeciras-Madrid-Saragossa / Barcelona-Marseille-Lyon-Turin-Milan-Verona-Padua / Venice Trieste / Oper-Ljubljana-Budapest-Záhony.

ATLANTIC CORRIDOR: A STRATEGIC ROUTE TOWARDS EUROPE

TheAtlanticCorridor,formerlycalled"RailwayFreightCorridorNo.4",isequipped with around 6,200 kilometres of track. Itrunsalongthe Sines/Setúbal/Lisbon/Aveiro/Leixões-Algeciras/Madrid/Bilbao/Saragossaaxes/Bordeaux/LaRochelle/Nantes/Paris/LeHavre/Strasbourg-Mannheim.Itisavitalcommunicationnexusthat connectstheIberianPeninsula(SpainandPortugal)withthelargestlogisticsnodesin thecontinentalinteriorandwiththemain Atlantic ports of France and Germany. FortheIberianPeninsula,itisakeyroute fromthecommercialpointofview,since throughit50%offreighttrafficismobilised withtherestofEurope.ItincludesAdifand theInfrastructureManagersofPortugal(IP), France(SNCFRéseau)andGermany(DB Netz).DuetotheimportanceforSpainand Portugal,bothcountrieswanttoaccelerate theworkwithwhichthenetworkcanbe adaptedtotherequirementsdemandedby EuropeandbeabletocompetemoreeffectivelywithroadtransportTheEuropeanstandardrequiresdoubletrack,thetotalelectrificationoftherailwayline,sidingsofatleast 750 metres.

MEDITERRANEAN CORRIDOR: A CONNECTION ROUTE TOWARDS A GREAT FUTURE

TheMediterraneanCorridorwillconnectMadrid,AlgecirasandthemainportsoftheSpanishEastCoastwithEuropethroughFrance,totallingmorethan6,000kilometres.Itrunsalongtheaxis Almería-Valencia/Algeciras-Madrid-Saragossa/Barcelona-Marseille-Lyon-Turin-Milan-Verona-Padua/VeniceTrieste/Oper-Ljubljana-Budapest-Záhony

Adifalongwithotherpartnersfromfivecountries,ispartofthiscorridor:(France(SNCFRéseau),Italy(RFI),Slovenia(ASZ),Hungary(MAV),Croatia(HZInfrastruktura),FigueraslinePerpignan,andHungarycapacityadjudicator(VPE).

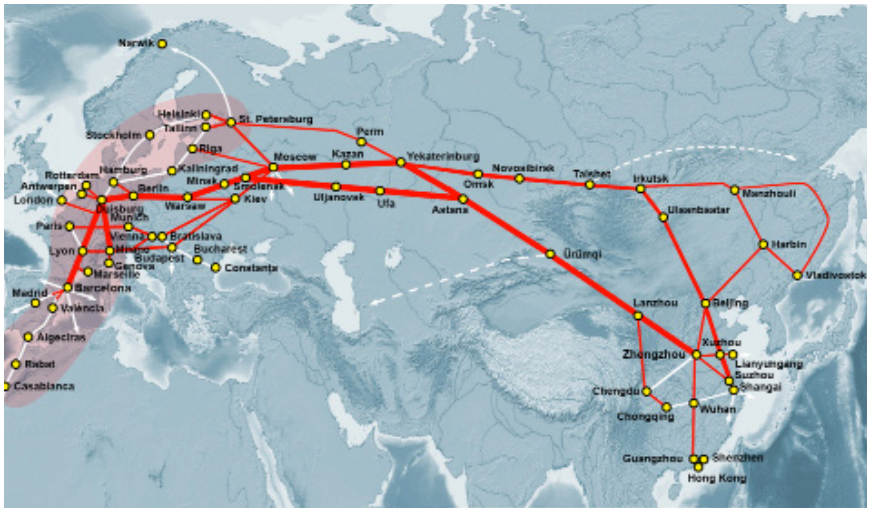
ForSpain,itmeansagreatstrideforwardsthatwouldunitethecommunitiesofAndalusia,Murcia,theValencianCommunityandCataloniawithEuropeandthuspromoteinternationalcommercialtransactionsandrailwaymobility.Indevelopmentphase,theMinisterofDevelopment,JoséLuisAbalos,recentlyclaimedthat"TheMediterraneanCorridorisinitsfinalphase,financinghasbeengranted,andourtaskisthatthetechnicalimpulsedoesnotwane".Accordingtotheministry'scalendar,theconclusionwouldbein2021.Inthissense,theyindicatethatinMarch2019allthestretcheswillbetendered,soitwillonlybeamatteroftechnicalimplementation."Ofthetotalbudgetof23.363billioneurosthattheprojecthasbeenallocated,9billioneurosarestilltobeassigned,accountingfor39.2%ofthetotal.Thisentrywillincludetheconstructionofnewsections,includingplatform,superstructureandfacilities;theadaptationofthesuperstructureonanexistingplatform,orthereplacementofonetrackgaugewithanother.

FERRMED: PURPOSEFULLY LINKING EUROPE FROM NORTH TO SOUTH

Theimportanceforspainofimprovingfreightconnectionsisreflectedintheinitiativesthathavearisenforitsdefence.Alongthisworkingline,FERRMEDcameintobeing,amulti-sectorialbusinessassociationofwhichpublicandprivatefirmsandbodies,companies,chambersofcommerce,portauthorities,etc.formpart.FERRMEDproposesalayoutofthemaininterconnectedEuropeancorridorsalongintermodalnodesthatmeettheso-called"FERRMEDstandards".

Amongstthem,arailwaynetworkintheformofapolycentricmeshnetworkbasedonhighsocio-economicandintermodalincidencewithtrackwidth.

Threelargeaxesareconsideredinanorthbound-Southbounddirectionandthreemoreinan Eastbound-Westbounddirection.Inthemainbranches,theaimistohave,ontheonehand,conventionallineswithfulldoubletrack,electrified(recommendedvoltage:25,000volts)andwithpreferentialorexclusivededicationforgeneralfreighttraffic,suitablefortrainsof22.5÷25tonsperaxis.Andontheother,parallellinesofhigh-performanceexclusiveorpreferentialusearecontemplatedforthetransportofpassengersandlightgoodsathighspeed.Thesestandardsalsoincludeanothersetofspecificationssuchasaunifiedmanagementandcontrolsystematthelevelofeachmajoraxis,UICgaugeandUICGantry,trainsofupto1,500metresinlengthand3,600÷5,000tonsoranetworkofintermodalterminals in ports and logistic nodes.



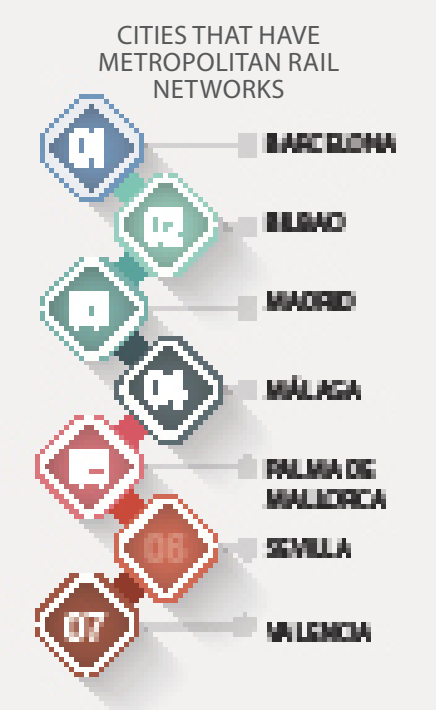
SPAIN

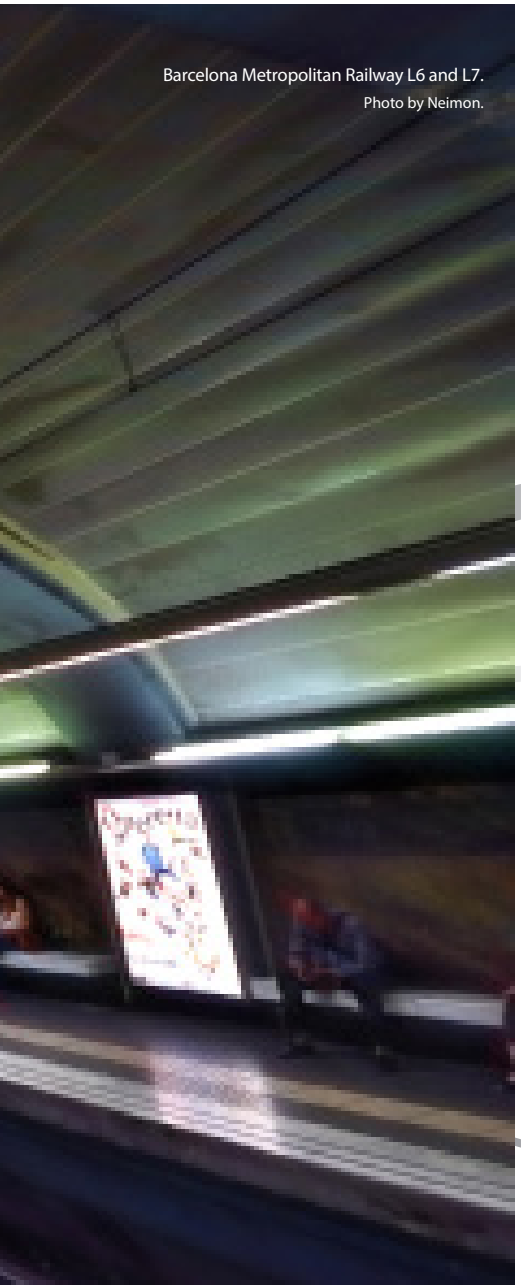
Urban mobility backing the railways in Spain

SPAIN HAS CARRIED OUT IN RECENT YEARS CONTINUOUS BACKING OF THE RAILWAYS AS A MEANS OF TRANSPORT IN THE CITIES AND THEIR SURROUNDING ENVIRONMENTS. HENCE IT BOASTS ONE OF THE MOST INNOVATIVE AND ADVANCED SYSTEMS IN THE WORLD.

The ideal means for mobility and connections with the periphery. Its great advantages from the viewpoint of environmental, economic and capacity have been key to the existence of a consolidated mesh throughout the territory. In this way, Spain is one of the countries with one of the most advanced urban transport systems in the world. Currently, seven large cities feature a metropolitan rail network: Barcelona, Bilbao, Madrid, Malaga, Palma de Mallorca, Seville and Valencia. Light rail and tram systems are also operational in Madrid, Barcelona, Bilbao, Valencia, Tenerife, Saragossa, Murcia, Alicante, Vitoria, Seville and Granada.

They are joined by an extensive commuter network run by Renfe Operadora, which is key in the daily commutes in the cities of Alicante, Asturias, Barcelona, Bilbao, Cádiz, Madrid, Malaga, Murcia, San Sebastian, Santander, Seville, Valencia and Saragossa. The figures prove this is in great demand. In 2017, Renfe's suburban rail network 'Cercanias' reached 423 million users. Alongsi-





Barcelona Metropolitan Railway L6 and L7.
Photo by Neimon.

de this network, this transport company also manages Mallorca Railway Services (SFM), Euskotren, Ferrocarrils de la Generalitat de Catalunya (FGC) and Ferrocarrils de la Generalitat Valenciana (FGV).

State-of-the-art systems

This extensive network is equipped with state-of-the-art systems for traffic control, ticketing and tele-communications. All this has placed Spain at the head of the world in urban transport. A clear example of these advances is line 9 of Metro de Barcelona, the longest automatic network in Europe, which has been an international milestone.

The Spanish industry has made available to the national and international market innovations of special relevance such as trams without catenary, modern train-tram, payment systems with mobile or retrieval systems for brake energy, amongst many other examples. All pioneering solutions that are deployed in numerous countries on five continents.

Furthermore, there is a growing commitment to smart systems, accessibility, user experience, security, energy efficiency, etc.

Engineering, talent and technical know-how

The deployment of this state-of-the-art technology is possible thanks to the talented and highly-skilled Spanish engineers. Amongst the numerous examples, particularly noteworthy are the development of the driverless system in Spain, in operation since 2006, or the Communications-Based Train Control (CBTC) system for lines 1 and 6 of the Madrid Metropolitan Railway.

Investments

The plans of the administrations for the coming years are aimed at im-

Barcelona Metropolitan Railway Line 9, the longest automatic network in Europe, represents a milestone in urban transport.

SPAIN

proving services, infrastructures and continuing to incorporate new technological advances.

Investment

The Government has announced an investment of 1.151 billion euros until the year 2025 as part of an action plan for commuter and medium distance routes. This entry will be used mainly to modernise the rolling stock, acquire new units and remodel stations in Asturias, Cantabria, the Valencian Community and Madrid.

In the capital, the "Urgent Action Plan for the period 2018-2019", endowed with 580 million euros, will be carried out.

With these funds, new trains will be purchased (243.5 million) as well as updating the existing fleet (81 million). Likewise, another 200 million will be allocated to modernise infrastructures and improvements will be made in stations with tenders amounting to 45.8 million more. 349.8 million euros will be allocated for the Valencian Community in the next seven years. Of this entry, 312 million will be set aside for the acquisition of new trains. In addition, 25.4 million euros will be used to modernise the existing fleet, while for miscellaneous tasks in stations almost 12 million will be allocated.

In the Cantabria Commuter Rail Plan, an investment of 158.5 million euros is planned up to the year 2025. The aim is to purchase new trains, worth 133 million euros, and modernise the existing fleet through the use of another 19.2 million euros.

In Asturias, new rolling stock will also be acquired for the amount of 45 million euros, while for the renewal of its fleet another 10.2 million will be used. In addition, works are planned at commuter stations with different types of tenders worth 7.2 million.

In the Basque Country, progress is also made in this matter. Amongst other aspects, the regional government will invest 11.4 million euros in the refurbishment of the stations and the line of the Txorierri railway. Of these, 1.9 will be for the renewal of the Derio-Zamudio section, while the remaining 9.5 will be dedicated to the integration of the Txorierri stations with those of Line 3 of the Bilbao Metropolitan Railway Alongside these plans, metro networks also look to the future with new investors.

In the capital, they have the backing of the European Investment Bank (EIB). This body has granted 85 million euros (the first instalment of a global loan of 200 mi-

▸ RAILWAY URBAN TRANSPORTATION NETWORKS IN SPAIN

NETWORK	KILOMETRES
Metropolitan / Light Railway of Madrid	294 kilometres / 27.8 kilometres
Bilbao Metropolitan Railway 4	5.10 kilometres
Valencia Metropolitan Railway and Tramway	156.38 km (underground 27.30 km and surface 129.08 km)
Palma de Mallorca Metropolitan Railway	15.55 kilometres
Barcelona Metropolitan Railway and Tramway	119 kilometres / 14,9 and 14 kilometres (Trambaix and Trambesòs)
Malaga Metropolitan Railway	11.3 kilometres
Alicante Tramway (Train-tram)	129 kilometres
Light rail / M. Centro (Seville)	18 kilometres / 2 kilometres
Granada light railway	16 kilometres
Murcia Tramway / Vitoria	18 kilometres / 7.80 kilometres
Saragossa Tramway	12.8 kilometres

Light railway and tramway systems are also operational in Madrid, Barcelona, Bilbao, Valencia, Tenerife, Saragossa, Murcia, Alicante, Vitoria, Seville and Granada.

llion) to finance 50% of Metro de Madrid's investments until 2019. The plan is aimed at refurbishing and modernising its infrastructures.
Amongst the works planned, improvements in accessibility in the stations, increase in the capacity of the lines, renovation of safety installations in electrical substations, modernisation of mechanical staircases, renovation of ventilation systems, trains and tunnels, along with ticket vending machines.
In a similar vein is Ferrocarrils de la Generalitat Valenciana (FGV), which doubled the investment budget in 2018 compared to previous years and allocated close to 45 million euros to new actions in Metrovalencia and TRAM d'Alacant. A trend that follows over the next couple of years.
The Metrovalencia network thus meets the needs in terms of electrification, signalling (level crossings, interlocking and safety systems in circulation) and control of facilities (air conditioning, pumping and ventilation). Work is being carried out on the renovation of roads and crossings, level crossings and fencing, improvement of stations, accessibility and modernisation of toll equipment. Also, in the improvement of the passenger information systems, as well as in the resumption of the works of Line L10, and the renovation and modernisation of Line 9 linking Benidorm-Dénia Tramway.
In Catalonia, the Generalitat (Regional Government) has embarked upon detailed planning of works and budget allocations to unite the 16 kilometres that separate the two ends of line 9 of the Barcelona Metropolitan Railway, from La Sagrera to Zona Universitària, and thus end the largest pending infrastructure in the Barcelona metropolitan area. All that remains is for the European Investment Bank (EIB) to give the green light to credit.
For its part, in the Basque Country, the Bizkaia Transport Consortium (CTB) has allocated 2.5 million euros to the provision of a redundant command post for Metro Bilbao.

SPAIN

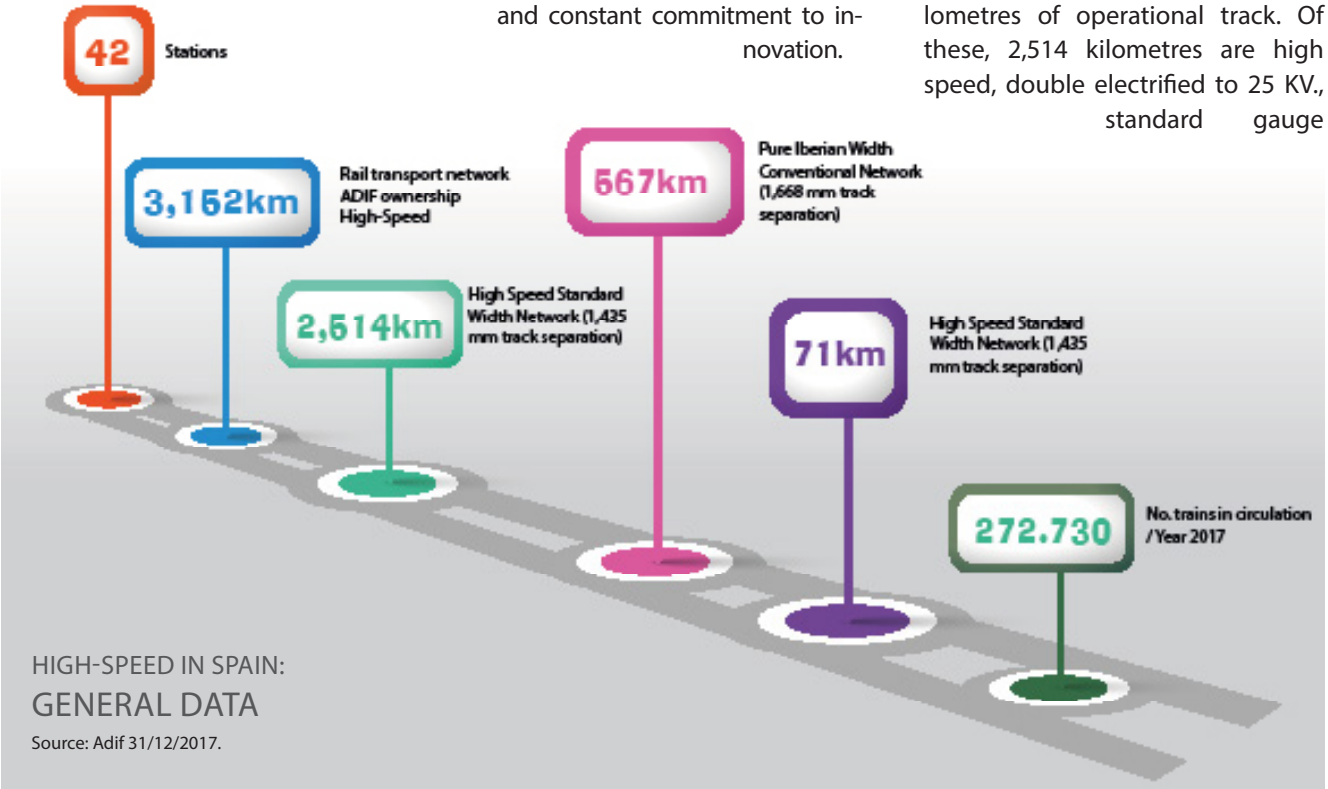
High-speed Rail: Spain, a pow

SPAIN WILL CONTINUE TO BOLSTER ITS HIGH-SPEED NETWORK IN THE UPCOMING YEARS WITH NEW INVESTMENTS TO MAINTAIN LEADERSHIP BOTH IN TERMS OF EXTENSION AND INNOVATION.

The High-Speed Spanish Rail Network (AVE) has established itself as one of the most important networks in the world. The country occupies the first place in Europe and the second in the world by number of kilometres built and with regard to the quality of its infrastructure. A position that is the result of more than 25 years' intense work and constant commitment to innovation.

In this way, the industry (which has contributed to its implementation) has developed a consolidated technical knowledge and pioneering advances in rolling stock, engineering, signage or telecommunications that is now being exported to projects of significant magnitude in other countries.

Currently, Adif AVE runs 3,152 kilometres of operational track. Of these, 2,514 kilometres are high speed, double electrified to 25 KV., standard gauge



HIGH-SPEED IN SPAIN:
GENERAL DATA

Source: Adif 31/12/2017.

ver to spearhead the world

width (1,435 mm.); 567 kilometres correspond to the conventional network of pure Iberian gauge width (1,668 mm.) and 71 kilometres feature mixed network (combination of standard and Iberian gauge width). This state-of-the-art network has state-of-the-art security and control technology solutions implemented on the road and in its control centres. Alongside this, it has the most modern and best equipped train fleet in Europe, reaching travelling speeds of up to 350 kilometres per hour.

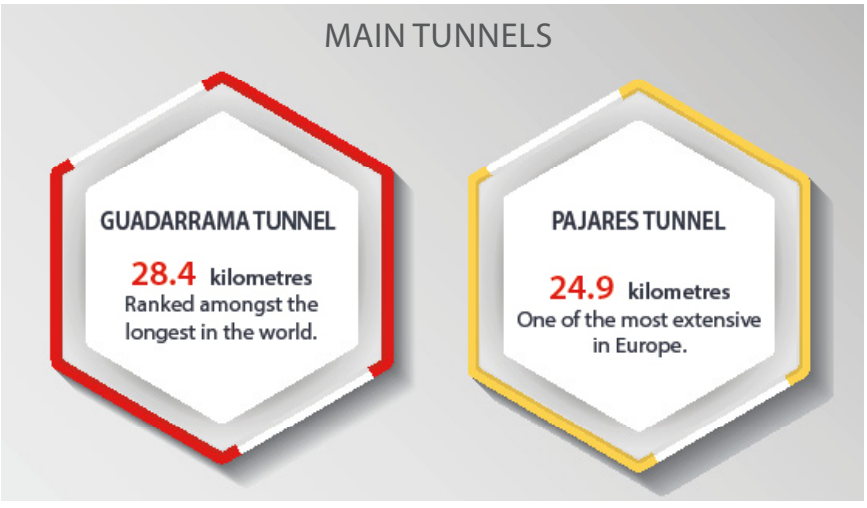
Since the first commercial trip was made on April 21 of the year 1992 between the cities of Madrid and Seville, the Spanish high speed has grown at an astounding pace up to the present time where it is now a symbol of international identity.

Major challenges overcome

For the implementation of this modern network, major challenges have had to be overcome, especially due to the complexity of the orography of the country. As a result of these challenges, large tunnels and viaducts have been designed and built, which have soon become amongst the most noteworthy throughout the world. Amongst them, the Guadarrama tunnel, 28.4 kilometres long, one of the longest in the world and the Pajares tunnel, 24.9 kilometres long, on the list of the largest in Europe.

Another of the characteristics that make Spain a world leader in high-speed technology are its advances in signage and signalling. Presently, it is the country with the highest degree of implementation of the European ERTMS Level 2 system (European Traffic Management System), which is the most modern available on the market. Around 2,000 kilometres of network have been equipped with this system; of which more than 1,000 kilometres are fitted with Level 2, which is also being implemented in the new lines now under construction.

Spain country ranks first in Europe and the second in the world in terms of number of kilometres built.



SPAIN

It should also be noted that one of the longest interoperable journeys in Europe takes place in Spain, between Barcelona and Malaga. In this country, avant-garde advances have also been introduced, such as the DaVinci System, the most advanced tool for the control of rail traffic that has already been transplanted to other networks around the world, such as Colombia, Great Britain, Lithuania, Morocco or Saudi Arabia. Its great quality is that it is capable of integrating into a single application all the systems that comprise the elements of a regulation and control centre. Furthermore, it is adaptable to conventional networks.

New developments

To all of foregoing, the Spanish developments in the field of electrification are united, with the creation of the wholly Spanish ADIF overhead catenary system, called C-350 and powered at 2 × 25 KV CA.

Likewise, in new track superstructure new systems have been put in place to change the width; solutions that facilitate railway interoperability and that have already aroused interest in countries such as Russia, where they use a measurement different to the standard. For all of these reasons, the Spanish high-speed rail figures in the upper echelons of the world ranking worldwide in terms of extension, technology and know-how. This experience is now exported in the implementation of networks of these characteristics in countries such as Turkey, Saudi Arabia, Great Britain and the United States.

HIGH-SPEED SCHEDULED ACTIONS: PERIOD 2018-2019

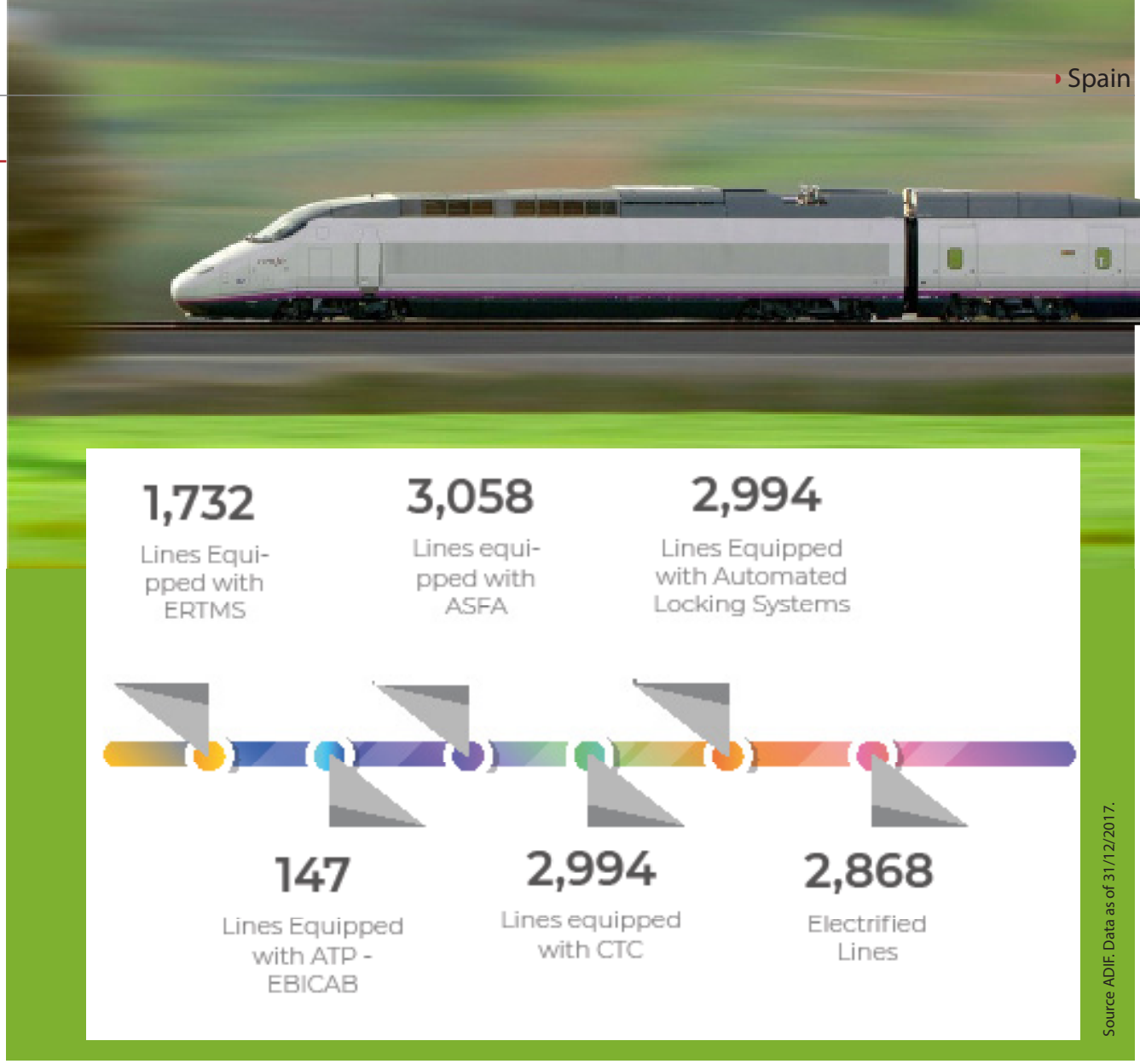
Mediterranean Corridor	- Station of La Sagrera.
	-Vandellós- Tarragona.
	-Castellón-Vandellós. Variable gauge width.
	-Valencia-Castellón. Second track featuring mixed gauge width.
	- Valencia-Xátiva-Nudo de la Encina.
	- Monforte del Cid-Murcia.
	- Murcia-Almería.
	- Murcia-Cartagena.
HSL Antequera-Granada	- Almodóvar del Río connection.
HSL Asturias	- Integration in León.
	-León-La Robla. Track featuring mixed gauge width.
	- La Robla-Pola de Lena. (Pajares by-pass). Y Vasca
	- Vitoria - Bilbao.
Y Vasca	- Vitoria - Bilbao.
	-Bergara-Astigarraga (entrusted to the Government of the Basque Country for the construction of the Infrastructure).
Extremadura HSL	- Talayuela -Plasencia.
	- Plasencia-Cáceres-Badajoz.
HSLMadrid-Galicia	- Zamora-Pedralba de la Pradería.
	- Pedralba de la Pradería-Taboadela.
	- Taboadela-Orense.
HSL "Conexión Chamartín	- Atocha-Torrejón de Velasco".
HSL Palencia-Nogales	
Cantábrico-Mediterráneo Corridor	-Tramo Castejón-Pamplona:
	Vilafranca-Peralta.
	Peralta- Olite.
	Olite - Esquiroz.
Electrification South of Chamartín Terminus (tracks 18-21).	

Source Adif Data as of 31/12/2017.

The Spanish high-speed rail network figures in the upper positions of the world ranking in terms of technology, extension and know-how.

Investments

According to the plans foreseen by Adif in the forthcoming years, the deployment of the high-speed network planned by the Ministry of Public Works will continue. The purpose is "to consolidate railway routes connected to the European high-speed network that guarantee maximum performance, maximum



reliability and operational safety, as well as the best travelling times between all regions".

Currently, there are several sections under different phases of construction. Adif points out that "the company's investment efforts are ongoing and aimed at making the new infrastructures available to citizens in the shortest timeframe possible, always ensuring that the new lines meet the highest safety standards".

Among the most flagship projects are those that are in a stage of works or that will begin shortly. Amongst these, the corridor Murcia-Almería, the Navarre corridor, the Basque Y or the branch of the line to Galicia between Pedralba and Taboadela (Ourense) and the one for Extremadura. Adif Alta Velocidad has recently approved several tenders and adjudications for the Madrid-Extremadura high-speed line, for a combined value of more than 70 million euros.

The majority of them refer to supply contracts for the main elements of the railway superstructure, with special incidence on the Plasencia-Cáceres route and on the sections Ramal Sur de Cáceres and Navalmoral de la Mata-Casatejada.

Secondly, we have corridors with superstructure works, among which is the Pajares Variation, La Encina-Valencia, Valencia-Castellón (phase 2), and the Monforte-Murcia section with the exception of the works pertaining to the Murcia underground section.

Furthermore, there are lines in which the works are already very advanced such as Venta de Baños- Burgos, and the Zamora-Pedralba de la Pradería section. And in the testing phase are those for Antequera-Granada, Chamartín-Atocha-Torrejón de Velasco and Vandellós-Tarragona.

In the forthcoming years, the deployment of the high-speed network will continue.

SPANISH HIGH SPEED: CROSS-BORDER SECTIONS

	Section	Administrator of Railway Infrastructures	Gauge	Electrification
Spain /France	Figueres Vilafant-Perpignan	Adif - LFP, S.A. SNCF Resèau	1435 / 1435 (mm)	25 KV CA / 1,5 KV CC
Spain /Portugal	Badajoz- Elvas	Adif -IP	1668/1668 (mm)	NO / NO

SPAIN

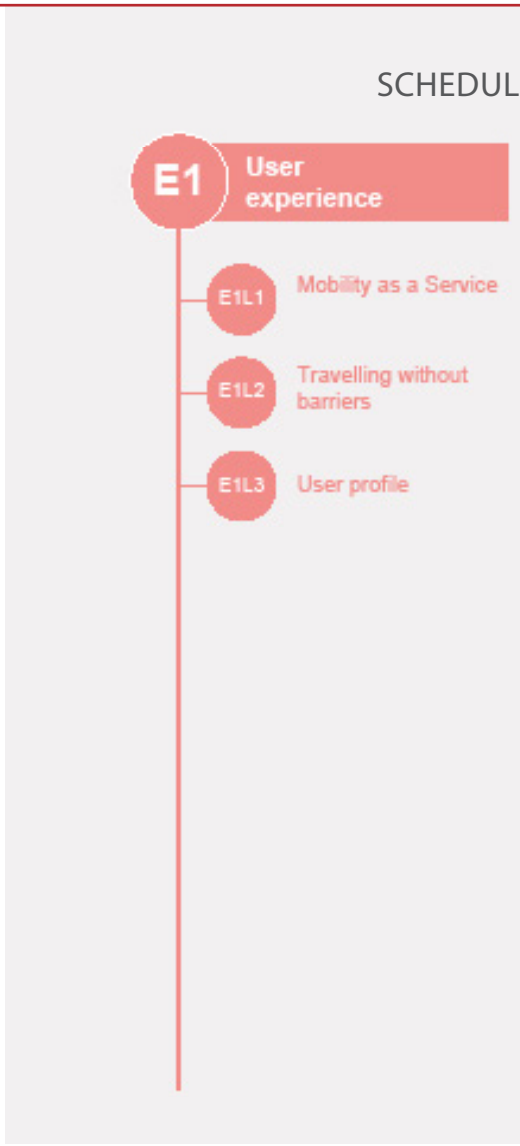
Fostering innovation: the differentiating value of a cutting-edge service

THE CONSTANT BOOST TO R&D IS THE DIFFERENTIATING HALLMARK OF THE SPANISH RAILWAYS. INNOVATION WILL CONTINUE IN THE FORTHCOMING YEARS TO RESPOND TO THE TECHNOLOGICAL DISRUPTION THAT IS TRANSFORMING SERVICES AND PROCESSES. THE AIM, TO TAKE ADVANTAGE OF THE NEW TECHNOLOGIES THAT FACILITATE THE CONSTRUCTION OF SMARTER SAFER AND BETTER INTEGRATED SYSTEMS.

Spain works intensely to maintain the technological leadership that characterises its industry and provide smarter, safer and better integrated transport systems. With the aim of responding to the technological transformation and the changes it introduces in rail services. In this sense, the "Innovation Plan for transport and infrastructures 2018-2020" came into being.

This initiative has an estimated investment of more than 76 million euros in three years and seeks to integrate and coordinate all the innovation activity of the companies and institutions of the Public Works Group.

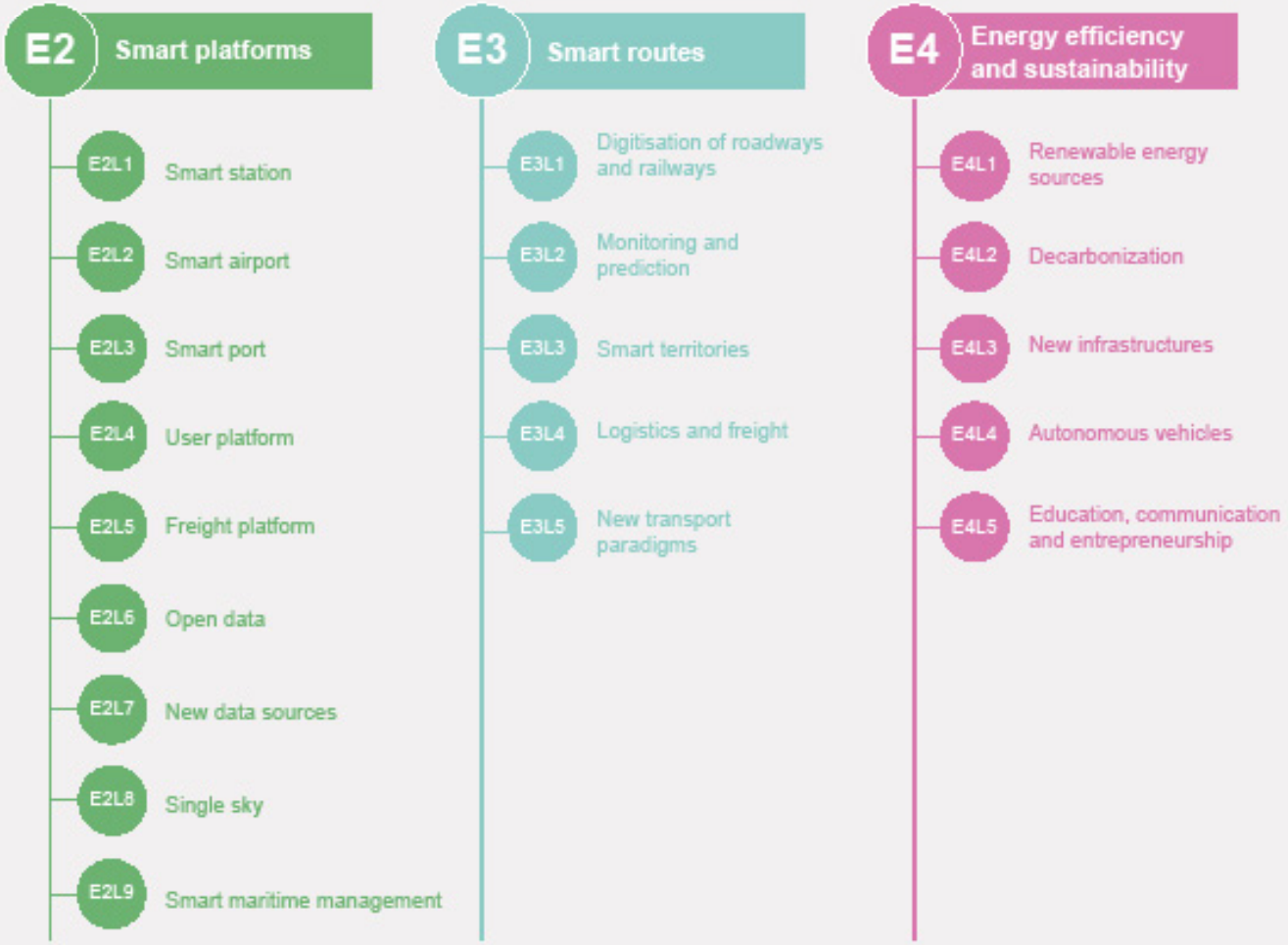
The strategy of this program revolves around four axes aimed at promoting digitisation and associated services. It seeks to "combine efforts and generate synergies among the different actors, unifying visions through an analysis of the current situation and a common vision for the future".



This road to digital transformation is structured on four fundamental axes. These axes are grouped, in turn, in 22 strategic lines that are

Chamartin Train Station, Madrid. Photo by Gallego Atomico.

E OF "INNOVATION PLAN FOR TRANSPORT AND INFRASTRUCTURE 2018-2020"



Source: Innovation Plan for Transport and Infrastructure of the Ministry of Public Works.

specified in 70 initiatives.

The first axis, entitled "User Experience", intends to personalise the offer according to the passenger's preferences so that it is, insomuch as possible, fluid in all its possible facets, namely physical and digital. This block has three strategic lines of action: mobility as a service (MaaS), travel without barriers and the user's profile. The aim is to "expand the traditional concept of travel, offering the user products and services according to their tastes and preferences, as well as user loyalty through the personalisation of the transport offer". To accomplish this, work will be carried out on digital platforms that integrate the plan bookings, purchase and electronic payment, the multiple business models linked to on-board services as professional multi-media content. The second strategic line includes all initiatives aimed at improving the user experience by redesigning or eliminating barriers to travel, whether via terminals, on-board, or global accessibility to the network (new methods of payment, development and implementation of advanced payment systems, ticketless va-

Innovation will continue in the coming years to respond to the technological disruption that is transforming services and processes.

Innovation Plan for Transport and Infrastructure 2018-2020

Source: Innovation Plan for Transport and Infrastructure of the Ministry of Public Works.

lidation systems implementation of security controls without shutdown, universal accessibility), as well as the positioning in interiors in transport terminals. The third line of this axis revolves around Big Data and data science, the creation of the user profile and new operator-user communication channels, amongst other aspects.

The second point, called "Smart Platforms", is configured as a transversal axis that gives technological support to all the initiatives of this plan. These innovative Platforms gather and process information from the companies of the Public Works Group. In this way, quality, safety and efficiency will be improved.

Along its strategic lines, it is worth highlighting the work around the new generation stations, the inclusion of their data with the shape of the city or the integration of BIM models.

The desire is also to develop the "platform user "as a central repository of information regarding passengers. The axis also includes the creation of a smart freight platform and another of intermodal and automated logistics innovation.

In the third axis "Intelligent Routes" covers the aspects related to route digitisation, as well as the connection between vehicles, infrastructures and territories. In addition, it focuses on predicting patterns regarding mobility in order to improve the system's efficiency and thus make the most accurate decisions.

Finally, the fourth axis of this plan is dedicated to "Energy Efficiency and Sustainability". The lines of action are aimed at achieving a transport system that is energy efficient and respectful of the environment. Amongst the main initiatives, the use of renewable energy generation systems or the use of surplus energy for self-consumption or reinvestment into the grid is promoted.

> Innovation is behind new initiatives that focus on technological advances.

Supporting innovation

Innovation is also behind other development initiatives that focus on technology as a means of improvement. The fourth axis of this program is also dedicated to promoting start-up entrepreneurship through synergies with the companies of the Public Works Group. In this way, the aim is to weave a network in which all sectors are connected and in which companies, universities, technology centres and entrepreneurs are actively involved.

SPAIN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SPAIN

International expansion: Leading Spanish technology and top-level know-how

THE CONTINUED EFFORT TO PROMOTE THE RAILWAY IN SPAIN IN THE LAST 25 YEARS HAS NOT ONLY RESULTED IN ONE OF THE MOST EXTENSIVE AND MODERN NETWORKS IN THE WORLD, MOREOVER IT HAS CROSSED BORDERS.

More than 25 billion invested in the complete renovation of a network of 15,000 kilometres and 2,000 stations, including infrastructure, security and rolling stock, have endowed the Spanish industry with a powerful technical capacity and a relevant consolidation in the world.

Technological excellence that forges its path throughout the world. Similarly noteworthy is that the private sector is one of the main players in this internationalisation process. The 78 partners that form Mafex, which account for 80% of rail exports and are currently present in more than 95 countries on five continents is also worthy of special mention.

Furthermore, Renfe Operadora and Adif, together with a large group of leading Spanish companies, export now unique knowledge at the highest level to successfully carry out projects of major significance. Both parties have combined their advancements in R&D and know-how and have become the favou-

High speed train Medina-Mecca. The Haramain project is the largest civil work carried out to date in the Middle East and one of the largest on the planet.

red technological partners for the construction and operation of new high-speed lines, conventional networks, metros and trams in the five continents, as well as in the supply of state-of-the-art rolling stock. For high-speed rail, particularly noteworthy is the commissioning of the first lines of these characteristics in different countries. Such is the case of the HSL Mecca-Medina, where Renfe and Adif are present in the consortium selected for its start-up. Another relevant example is the HSL Ankara-Estambul in Turkey.

Another step forward in the world is the recent selection of both companies as strategic partners in the design, construction and subsequent operation and maintenance of the high-speed project to unite the cities of Houston and Dallas /Fort Worth, in the State of Texas (USA).

Beyond the projects for the construction and start-up of new networks, Spanish know-how is closely linked to the transmission of acquired knowledge. In this connection, Adif has advised India HSRC (High Speed Railway Corp) in the planning process of the high-speed lines.

Agreements

There are also Framework Agreements, such as the one signed with the Russian Railways (RZD) for the exchange of experiences in innovation, research and development of railway technology. Furthermore, ground-breaking Spanish solutions have meant Morocco has selected the DaVinci rail traffic control and management system, developed by Indra and ADIFs intellectual property, for its rail network. In Colombia, it also provided technical assistance for the maintenance and development of the Greta rail traffic management tool in the Chiriguaná-Santa Marta section of the Fenoco company.

Another country that has relied on the Spanish administrator and operator has been Egypt. The two companies, together with Ineco, were also selected by the Egyptian National Railways (ENR) to collaborate in the implementation of the regulatory framework and the improvement of their railway safety management system. Together with the projects carried out in the world and advisory agreements, the Spanish technological advances continue to arouse the interest of professionals in the sector. In recent years Spain has received the visit of numerous international delegations interested in to discover more of one of the most advanced rail systems in the world, as well as the experience of Renfe and Adif in their implementation.

Amongst them, Sweden, China, Bosnia-Herzegovina, Saudi Arabia, India, Tunisia, Algeria, United Kingdom, Bulgaria, Japan, Czech Republic, Hungary, Uzbekistan, Croatia, United Arab Emirates, Nigeria, Australia, Qatar, Vietnam, Korea, Indonesia and South Africa.

A promising future

The challenges achieved up to now are of special relevance for Renfe and Adif and both wish to continue along this growth path in the forthcoming years. This is reflected in the new strategic plan in which Renfe Operadora is involved in, where one of the key sections is the foreign market. One of its priorities is to expand its presence in North and South America. On the one hand, it has already shown interest in high-speed projects in Ontario (Canada) and in the Rapid Passenger Train of Costa Rica.

On the other hand, the company has collaboration and advisory opportunities in countries such as Bolivia, Cuba, El Salvador, Costa Rica, Paraguay, Mexico or Peru, where there are important plans such as the Bioceanic Train. Renfe Operadora also studied a cooperation alliance with the Hong Kong MTR group. The aim, to participate in the West Coast Partnership (WCP), which includes the future high-speed service London-Birminghan-Manchester-Leeds. Likewise, work is being undertaken on a principle of agreement with China Railway.

For its part, Adif International has also transferred years to the market cutting-edge technology and ex-

Spanish technological excellence in the field of rail transport is now finding its way around the world.

MAIN PROJECTS AND INTERNATIONAL AGREEMENTS INVOLVING ADIF AND RENFE

Source: Adif International/Renfe.

perience. The company has a wide range of services ranging from technical advice, design and construction, cutting-edge advances for rail traffic management, through technology transfer programs, financing systems and asset management. All of them made-to-measure projects that are increasingly sought after throughout the world.

In this sense, they position themselves as a company that possesses one of the most consolidated and advanced knowledge of the sector in terms of network construction and improvement of existing ones, as well as an innovative management and maintenance systems. A perk of its international success is that it "works with the most competitive railway cluster in the world: the one formed by leading Spanish companies in, present in some of the most important projects in the world".

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Urban intermodality:

future of transport in cities is dig

THE TRANSFORMATION OF URBAN TRANSPORTATION SYSTEMS, OWING TO THE EMERGING DIGITISATION PROCESS, BRINGS WITH IT THE CONSTANT INCORPORATION OF TECHNOLOGICAL ADVANCES. A TIME OF CHANGE IN WHICH R&D TAKES ON SPECIAL RELEVANCE TO PROVIDE SOLUTIONS TO CHALLENGES SUCH AS THE INTEGRATION OF DIFFERENT SYSTEMS.

The world population continues to grow at a rate of 74 million people per year, according to statistics published by United Nations Organisation. In 2050, the figure of 9 billion inhabitants will be reached. Although this growth is not homogeneous, concentration is present, in more than two thirds of the total, in large and medium cities and in their peripheral areas.

This characteristic makes it more necessary than ever to have swift accessible, safe and comfortable public transport systems in favour of private vehicles The aim is to mitigate traffic congestion and pollution, in addition to contributing to the planet's sustainability.

The figures indicate how the use of different modes of transport increases. For metropolitan railways, for example,

168 million passengers use the metro systems per day in 182 cities in 56 countries around the world, according to UITP data. In addition, there are more than 10,000 railway stations in the world and the tendency is to integrate different modes of

gital

The impact of new technologies presents a great challenge in terms of mobility.

transport in public spaces in the neuralgic centre of cities. Therefore, mobility in cities and their surroundings, it requires actions that advance the growth of the different public transport systems in a sustainable manner and the optimisation of intermodality, an aspect where new technologies can foster proper decision-making processes.

In this panorama of upheaval, in which inhabitants are increasingly more numerous and, in turn, more demanding, the impact of new technologies presents a great challenge in terms of mobility. In a hyper-connected world, digital transformation (Big Data, IoT, analytics, cloud, etc.) also represents a great opportunity to provide more and better services.

Urban digitalisation

One of the basic pillars to achieve a new sustainable and integrated city model is through mobility. The use of different means of transport (buses, metropolitan and regional rail links) in terms of passengers continues to rise, and requires a constant process of improvement on the part of operators and transport authorities to promote a network that is as unified and advanced as possible.

In this section, the intermodal centres continues to garner greater relevance, where the different systems are channelled in strategic points throughout the city. Technology and data intelligence are essential here, as they help to map the modalities and travel needs in a highly efficient manner. Likewise, they allow us to interact with citizens and improve quality standards and user experience during their journeys (connectivity, real-time information, etc.).

The digital universe provides a wide range of solutions that open the way to a new stage full of advantages from numerous viewpoints: design, infrastructure, management, operation, security and user services (direct information, comfort while waiting). The digital revolution reaches all areas of urban mobility and has a special relevance in intermodality where the use of new technological advances has a highly positive effect and can achieve a comfortable, safe "door-to-door" and tailor-made journey.

The digital universe provides a wide range of new solutions.


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Technology at the service of an integrated state-of-the-art mobility

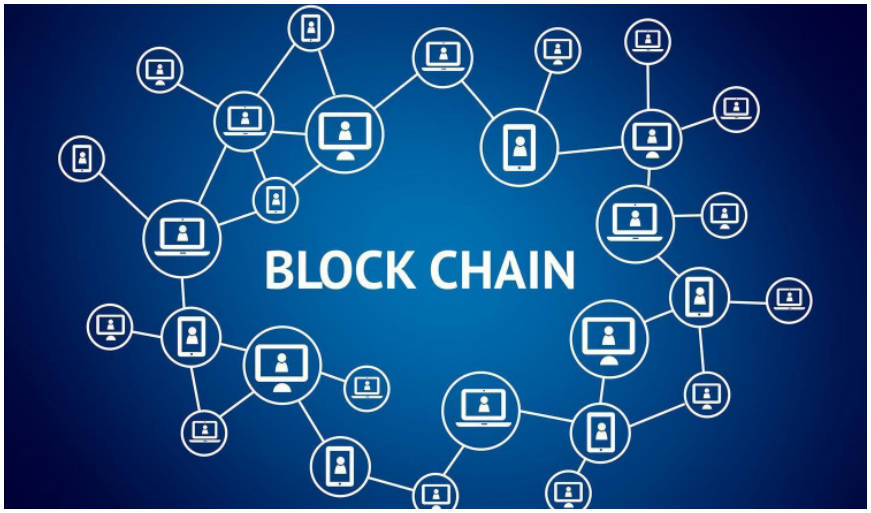
The essential technologies of this innovative transformation through mobility are based on high capacity connectivity (new generation) of mobile telephony or 5G), Internet of Things (IoT) and Big Data.

These advances facilitate the user's journey and help foster public transport, intermodality in cities and their peripheral areas, thanks to the advantages they boast for full integration of the different systems (underground, tram, suburban railways, etc.)

BIG DATA: DATA TO OPTIMISE MOBILITY

The use of Big Data, a large volume of data, opens the door to greater and better knowledge of public transport in the cities. The possibility of having a permanent connection to the different user devices can mean that operators foresee the user's needs and provide more services for their greater convenience. With this knowledge, applications are developed that automate and endow the system with the possibility of converting huge amounts of data into information that helps decision-making become more efficient, to grow in terms of research and development. This has a repercussion in terms of logistics, in the modelling of operations and traffic management in real time. It also serves for a complete analysis of mobility patterns (mobile phone data, social networks, etc.), and the detection of accidents.

BLOCKCHAIN



Blockchainisalsoalreadyaprioritytechnologyforintermodalcentres,duetoitsmultipleuses:identificationofpassengers,issuanceoftickets,administrationofmoreintuitiveloyaltyprogrammes,improvedbaggagetracking,simplifiedpaymentmethods,etc.

It is an option that allows for different agentsofpublictransporttoworktogetherand with greater efficiency.

Thisnewsystemofdistributeddatabasesallowsseveralactorstoshareaccesstothesameinformationinasecureandconfidential manner.

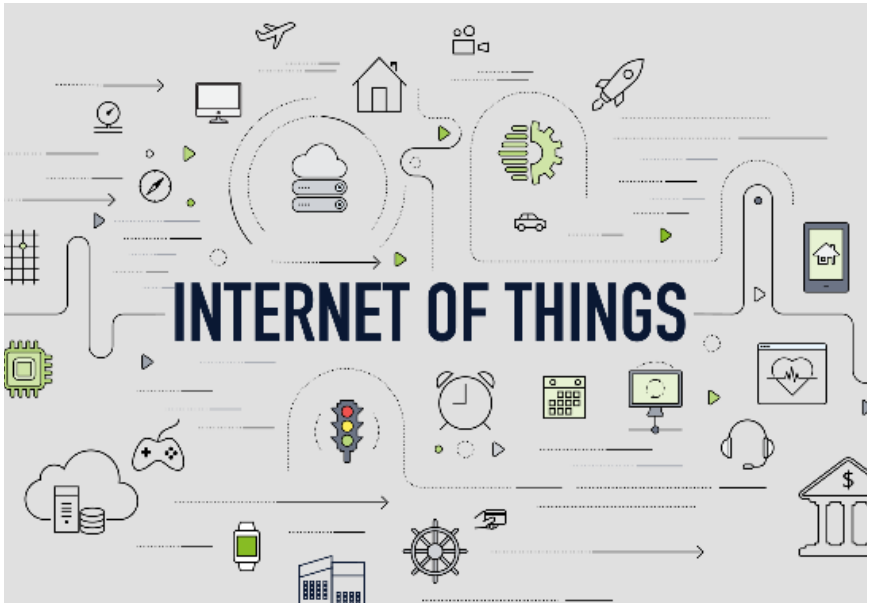
MACHINE LEARNING: EFFICIENT ROUTING MANAGEMENT

Innovationssuchas"MachineLearning"offertheopportunitytoanalysetheenormousamountofdatathatisgeneratedcontinuously in urban transport networks.

Theapplicationsofmachinelearningwithinurbanintermodalitycanbeusedtousealgorithmsandanalysedatatosubsequentlycarryoutpredictiveanalysesthatallowfor advance routing management.

It is an ideal option to deploy a system of self-managementofpublictransportina Smart City.

INTERNET OF THINGS (IOT)



Thedigitalinterconnectionofeverydayobjectswiththe Internetiswhatisknownas IoT,inlinewithitsinitials.Theuseoftechnologythroughthe Internetisakeyfactorintransportsystemstoday,sinceitallowsfortheconnectionofinfrastructures,stations,administrationsystems,andotherassetshithertounknownuntilthepresenttime.Connectedtransportsolutionshelpinnumerouswaysinthefieldofintermodality.Forexample,theoperatingcostsoffleetmanagementandunitlocationandmaintenancearereduced,thusincreasingtheefficiencyofthenetworks;securityisincreased(videosurveillanceandmonitoringsolutions)andnewservicesareprovidedtousers(betterexperienceforWi-Fiaccess,ticket purchasing, etc.).

Innovation: promotion of the cohesion of the different networks for full urban mobility

THE TECHNOLOGICAL ADVANCES OF THE DIGITAL ENVIRONMENT HAVE CONTRIBUTED GREAT ADVANTAGES TO ACHIEVE A TRANSPORTATION NETWORK THAT IS AS UNIFIED AND EFFICIENT AS POSSIBLE.

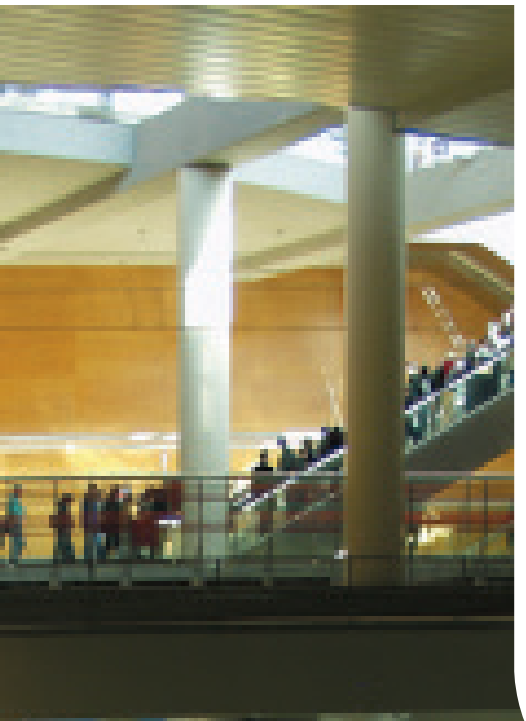
The major cities of the world are committed to implementing models of "smart transportation" to achieve a combination of modern networks that are comfortable and safe for the user.

The aim of the introduction of new technologies and the arrival of the digital era is to improve the end-user experience of multimodal transport. The commitment to R&D is shifting towards automated rail transport in which improvements are achieved in aspects such as efficiency, effectiveness and safety. In the field of mobility, it translates into providing passengers with uninterrupted service, as made-to-measure and comfortable as possible.

Within this transformation, there are key elements such as mobile devices, which become a centre of communication and interaction in real time. Its usage is increasing on the part of the passenger. In fact, 76.05% of on-line reservations for train and bus tickets for medium and long-distance journeys that were made in the year 2018 were booked via smartphones.

Mobility understood as service (MaaS) guides this change in which we wish to offer customised solutions based on individual needs to ensure easy access to the most appropriate mode of transport for each passenger. Another substantial change that is included in this concept is the increase in the use of shared travel services, which also opens a stage to new business models. The aim is to offer customers combined mobility packages as a viable alternative to car ownership.

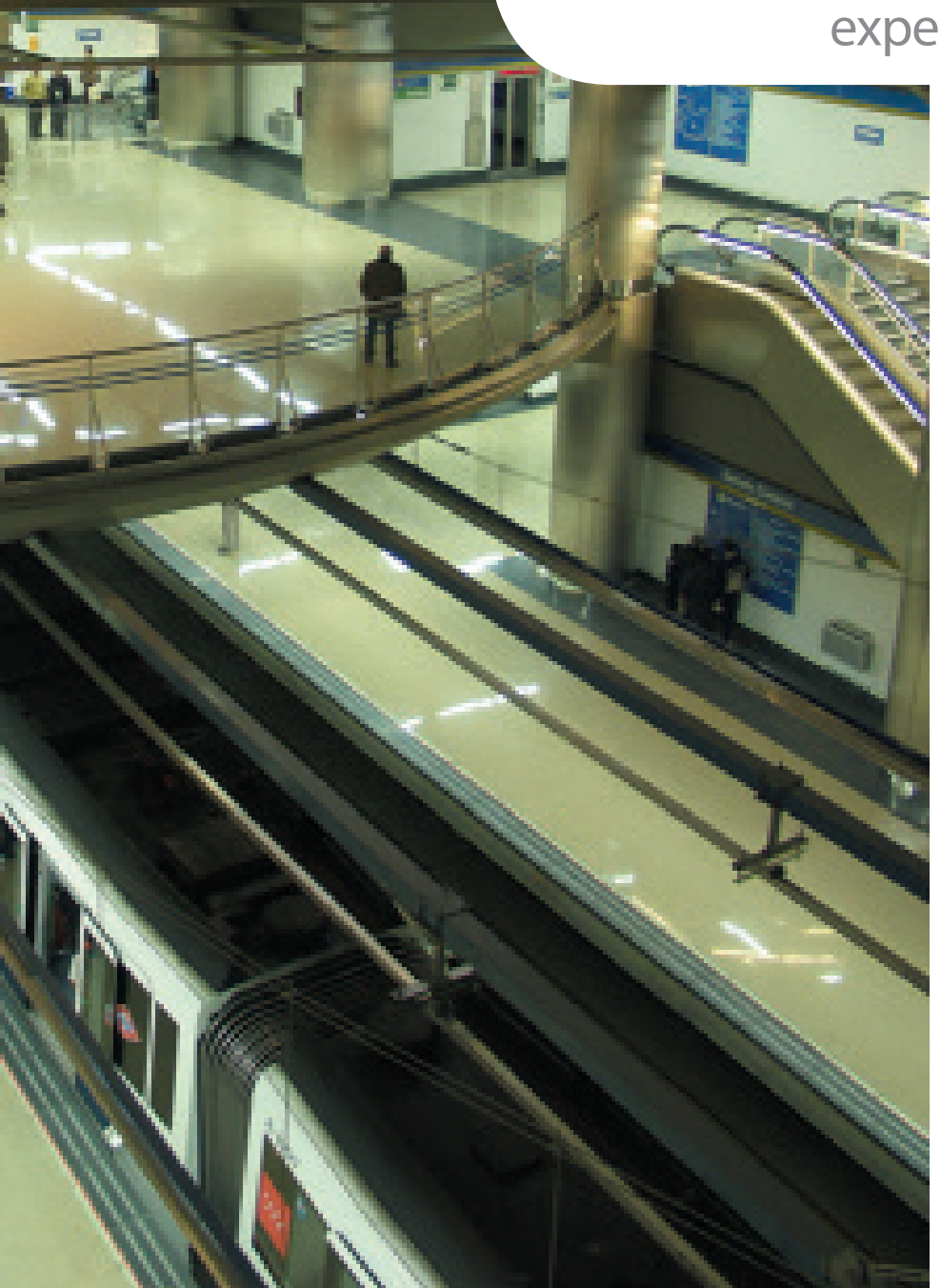
To this end, the railway industry works on making the market available constant advances in rolling stock (intelligent digital train), energy efficiency (zero emissions), optimised infrastructures (stations and intermodal terminals), safety, etc.



SMART DESIGN

Technological advances also reach the design of stations where several means of transport converge. The construction information modelling (BIM) assumes the evolution of the traditional civil engineering design systems based on the plan.
The BIM methodology will provide leverage to the development of innovative infrastructures.
Now aspects such as geometric (3D), time (4D), cost (5D), environmental (6D) and maintenance information have a bearing.
BIM also entails the implementation of the project and extends to throughout the life cycle of the intermodal building, which allows for the optimal management of the facilities and a considerable reduction in operating costs.
The merger between technology and architecture will also bring great advantages for the user, who will be able to obtain, for example, complete on-site information in an innovative way: virtual assistance and tour on interactive floors, sensitive data panels, dynamic signalling, Wi-Fi, etc. Its passage through the multimodal transport terminals will thus be easier, more streamlined and comfortable.

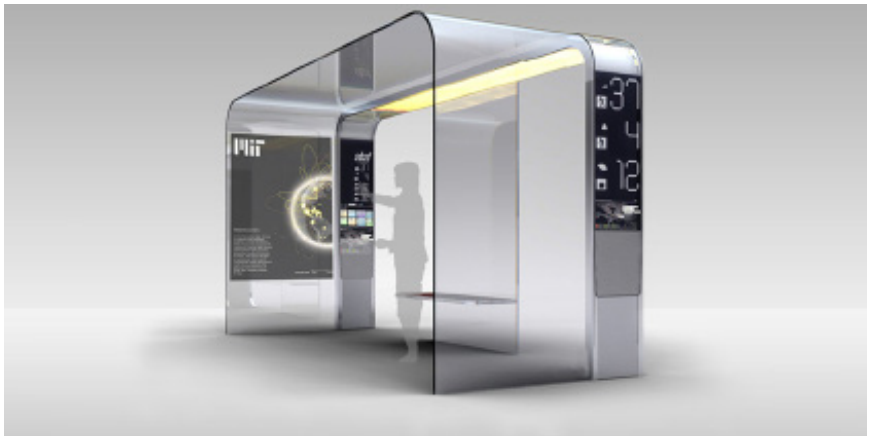
> The arrival of the digital age is aimed at improving the user's final experience.



SMART STATIONS

The intermodal stations (buses, subway, commuter trains) are moving towards a new model where technology plays a key role.
These are smart centres that apply the latest developments in the Internet of Things (IoT), the Cloud and Big Data that allow users to enjoy a wide range of services in real time while making their trip a unique experience.
This is a new model that provides direct monitoring and assistance through mobile devices for installations and assets (lifts, cameras, ticketing, check-in, escalators, etc.) and a wide range of services.
In these areas of exchange, advanced communications infrastructures such as the 4G and 5G networks are implemented, as well as facilitating access to the Wi-Fi network for passengers.
These advances allow for the improvement of the operational, economic and sustainable performance of urban mobility networks.
The examination of large volumes of data (Big Data) improves the decision making in the planning of operations and results in greater security and efficiency.
Adaptation to this new technological evolution makes it possible for these terminals to be connected with other transport systems and with the different urban services; all this as part of the concept of "Smart City".

INTERACTIVES STOPS



Technological integration in public intermodal transport also translates into advances such as the multiple services provided in the different stops along the route. In them, the new options (monitors, touch screens and interactive with services such as Google Outside) are highly extensive: information on waiting times in real time, weather, alternatives to reach ones destination, tourist routes and cultural programmes and shopping areas in the city, free Internet access, etc.

Examples are found in London, Paris or Madrid, amongst many other cities. This is complemented by the expansion of on-site proposals for the passenger such as the provision of spaces for the sale of groceries, free libraries and connections for charging electronic devices such as tablets or smartphones.

DIGITISED ENVIRONMENTS AND TERMINALS

The traditional transport terminals give way, thanks to new technologies, to digitised infrastructures, with movement, where facilities and passengers can be interconnected through networks and sensors.

We are shifting towards a new era where automation brings new services that will improve intermodal travel. There already innovative systems for managing the environment in stations, such as the city of Toulouse (France). Through centralised sensors, it adapts the lighting levels, ventilation or the displays of data of the environment taking into account the time of day or passenger flow. In other occasions, as in the Suseo

station of the operator Korail (Korea), connection times have been improved notably through the optimisation of signalling and access to the facilities.

SINGLE TICKET: INTEGRATE ALL MEANS

The diversity of tickets that a passenger must use on several networks in a single journey can have a dissuasive effect on the use of public systems over the private car. Hence, numerous cities such as Barcelona, Valencia, Lisbon, Rome, Brussels, amongst others, have already implemented the single ticket system, a modern alternative that favours intermodality.

The technology applied in these cases makes the route more comfortable for the user and avoids duplications in the network.

Furthermore, the industry of the sector has made available to the market a high range of integral solutions for the integral fare management of multimodal transport.

FULL STEAM AHEAD!

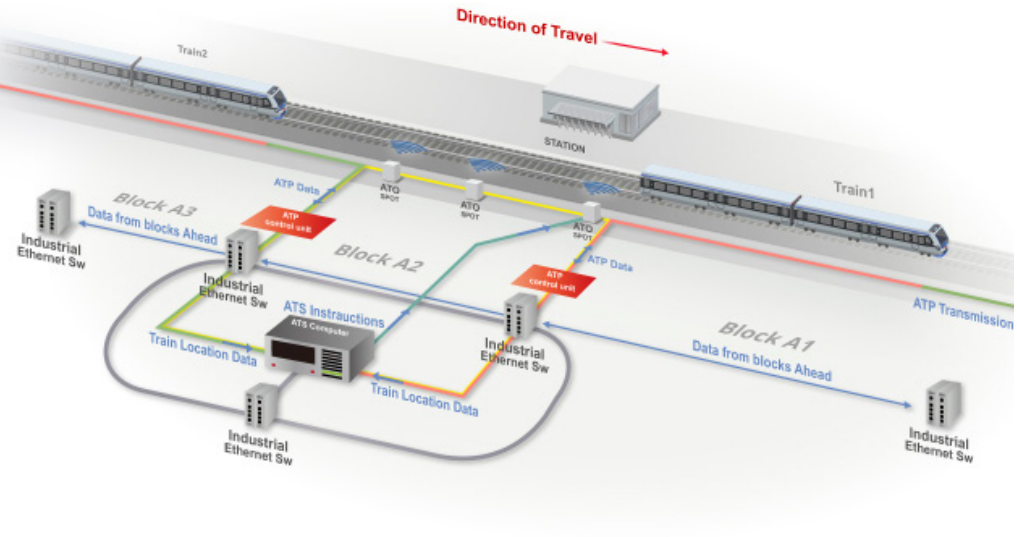
Stadler provides a comprehensive range of products in the commuter rail and railway segments: high-speed trains, intercity trains, regional and commuter rail trains, underground trains, tram-trains and trams.
Stadler remains there as the leading manufacturer in the rack-and-pinion rail vehicle industry. www.stadlerrail.com

STADLER

CONTACTLESS TECHNOLOGY AS A MEANS OF PAYMENT

The way of acquiring the ticket also tends to be digital. Innovative means of payment are promoted, such as contactless technology. With it you can make the payment inside the vehicles or directly in the ticketing point.
This eliminates the need to previously purchase tickets, cards, transportation tickets or having to go to ticket offices or vending machines.
On an intermodal trip it allows for faster and simpler access, minimises the costs of issuing tickets for the operator, facilitates the identification of the user when dealing with nominal cards.
It also allows us to obtain data such as recurrence, behaviour, origin and carrying out studies on users.

AUTOMATION



Progress involving vehicle instrumentation and GPS self-navigation are also highly noteworthy. The industry is developing autonomous vehicles that will be a part of urban intermodality in the future. In the railway field, these advances reach spheres such as automatic driving systems.
The technological solution used, "Automatic Train Operation" (ATO), is being installed in urban trains endowed with a CTBC platform (Control of Communications-Based Trains). In a network where there is intense traffic, as in large cities, having these advances helps to optimise management by reducing the interval between trains and shortening journey times.

BIOMETRY SYSTEMS

The single recognition system based on the passenger's straits (fingerprints, retina, facial patterns, voice, etc.) is proving highly useful in train stations, buses, airports and, in general, in places where there is a constant traffic of people, it allows for the optimisation of authentication processes in on-line payment processes to protect operations, etc.

INTEGRATED CONTROL CENTRES

The management of railway operations in urban systems has advanced in reliability thanks to the centralised control centres (CTC). The integration of the control systems contributes to the optimisation of the operation of the networks and the maintenance of the infrastructure.
Traffic control is unified from a single station from where the signals and diversions are monitored through a remote connection using computerised means. The information is displayed on screens showing the trains in circulation and the routes available.
The technological developments make scheduling and regulation of circulation more secure and user-friendly, as well as the management of work, incidents and the supervision of associated facilities.

SECURITY: VIDEO SURVEILLANCE

The increase in the number of passengers and the greater complexity of transport terminals, such as large exchanges, make it necessary to have a central management system as advanced as possible that protects users from criminal activities or prevents behavioural patterns that disturb public order.

In these platforms key data is loaded, as well as the information of global positioning systems "Global Positioning System" (GPS) and alarms.

The new systems of video surveillance and analysis, access control allow to identify the faces of people with greater clarity.

The communication between the platform and the devices lies, increasingly, in 3G and 4G wireless networks.

MODULAR AIRCRAFT TO CONNECT WITH THE STATIONS

More in the long-term, in Switzerland, researchers work on the well-known "Clip Air". These are modular, dockable airplanes designed for passengers to disembark on the platform of the train station of their destination without having to enter the airport.

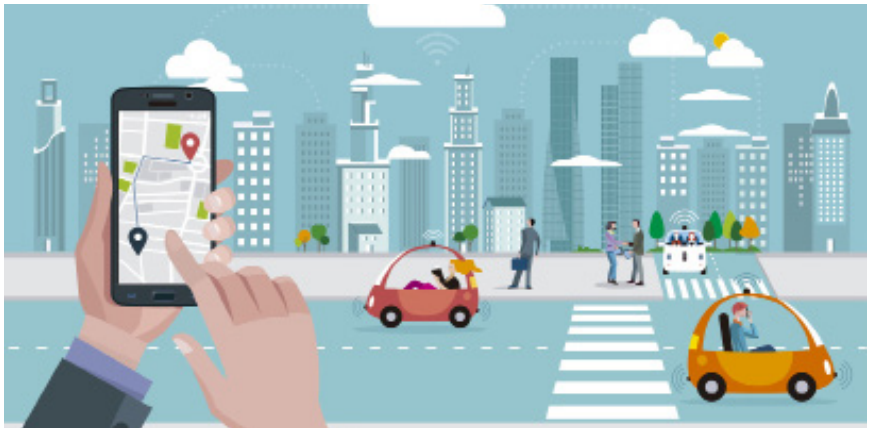
DIGITAL TRAINS: A NEW TRAVEL CONCEPT

Digitisation has also reached the highest rolling stock and other vehicles such as buses. Some trains already offer a trip 100% connected to users, with Wi-Fi and online communication.

Different apps provide information about where the route is, places it passes through augmented reality or activities of interest at the destination. Furthermore, the users can connect with management centre and communication via their phone.

Some more cutting-edge developments focus on the development of new modular platforms that can even operate on the painted lines of the asphalt, since they are equipped with sensors that allow them to follow the white lines on the streets.

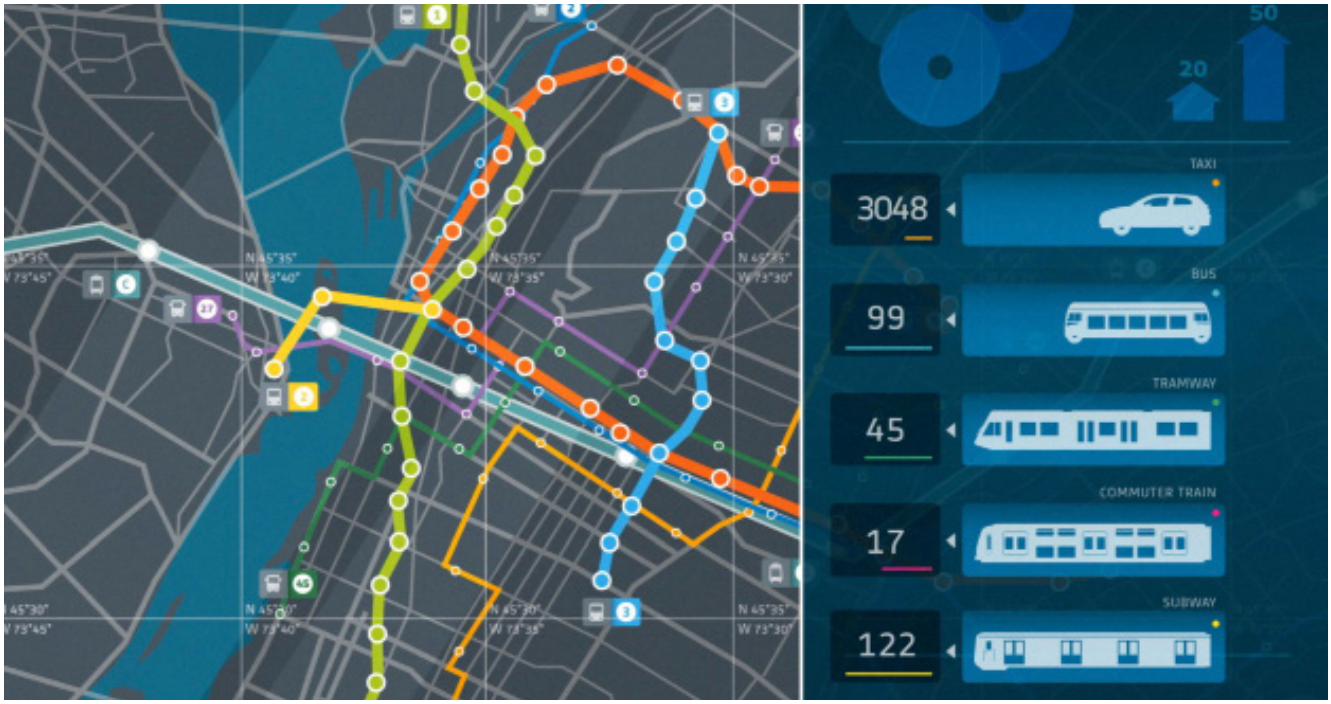
MOBILE APPLICATIONS AND COLLABORATIVE ECONOMY



Passengers' connectivity is becoming more functional on urban rental points for bicycles, services for motorcycles and car sharing, etc. Another substantial change is the tendency to unify in a single app, in real time and in the same space, all the relevant information that makes it unnecessary to visit several websites to make queries. It also allows for the visualisation of schematic and geographic maps of each network and the twitter accounts of the operators. Also included is asynchronisation service with the cloud that allows the user to not lose the information if they switch devices.

These advances encourage the use of transport journeys where more than one means of transport must be used. Applications that reveal routes, incidents. Cities such as Madrid, Barcelona, London, Moscow, New York, Sao Paulo or Tokyo have apps that include all the networks that are available in the city, and allow you to know schedules, calculate routes, public and the collaborative economy with new concepts such as crowd-parking "Car as a Service" or "Car-sharing" that join the chain of options that complement urban mobility networks.

SOME MAFEX MEMBERS WITH



ALSTOM ESPAÑA

Withincreasingurbanization,ourcitiesandoperatorsneedtoprovideanefficientmobilitysystem.Theoptimizationofthemultimodaluseoftransportcanhelpachievingthesegoals.Therefore,AlstomSmartMobilityLablocatedinSpainhasdevelopedtheMastriasolutiontooptimizetheuseofmultimodaltransportationsystems.ThankstoMastria,alltheactorsofmobilityinagivencityarelinked:bus,tramandmetronetworksbutalsotaxi,sharedcarsandbikes,police,etc.Theobjectiveistomaximisefluiditybetweenallthemeansoftransportationinacityandtoorchestratepassengerroutes.Thankstotheapplicationofadvanceddataanalytics,itcanalsopredictandanticipatepossibleincidents,inordertoimprovemobility management within the city.
InthelatestSmartCitiesExpoWorldCongress(SCEWC)heldinBarcelona,Mastriawasrecognizedasoneofthebesttechnologiespresentedintheareaofurbanmobility.

BOMBARDIER SPAIN

TheBEMU(battery-electricmultiple-unit)versionoftheBombardierelectricbatterytrain,knownasTALENT3,wasawardedtheBerlinBrandenburginnovationawardforitscontributiontopromoteanenvironmentally-friendlymobility,asitisanemission-freetrain.
Bombardierwillallocatethewholeprizetopromoteinnovationandsocialresponsibility.TheSpanishfactoryofBombardierinTrápaga(Vizcaya)ispresentintheengineeringofthe'family'ofTALENTtrains,participatingin thedevelopmentoftheTALENT3tractionconverter.Specifically,theTrápagateam,madeupof9professionals,startedworkinginthisprojectlastAprilandperformsthemanagement,purchaseandmanufacturingof2modelsofconverters(TC3423V01andTC3423V02)and2modelsofcontrolboxofthetransformer(TCB4Wand TCB 2W).
The BEMU version of the TALENT 3 is equippedwithlithium-ionbatteries,beingabletooperate,inaddition,onnon-electrifiedlines,thusallowinguninterruptedrailconnectionsandprovidinganecological alternative to diesel trains, significantlyreducingCO2andnoisepollutionemissions.

PROJECTS IN URBAN INTERMODALITY

TPF GETINSA-EUROESTUDIOS

The new technological paradigms of Big Data & Analytics and of the IoT are changing the way transport planners and operators obtain information about mobility and calibrate their demand models to evaluate investment projects. This implies the need to redesign the information systems and especially the way in which new data, both structured and unstructured, is collected, stored and processed.

TRNTÁRYET has bet on this new technology to carry out the mobility studies and overcome the growing difficulties of the traditional survey methods. In this sense, the company is leading two significant projects: Analysis, design, installation and commissioning of an analytical platform for traffic and transport modeling in Madrid and Analysis of mobility and modeling of the Tenerife Island transport system.

TELTRONIC

An intermodal transport operator, or even if the different means of transport are managed by different entities, can use a single communication system for all of them, facilitating coordination and interoperability. This is possible using the same TETRA infrastructure, radio technology with the necessary functionalities and interoperability and spectral efficiency conditions to make it possible. Employing a single system reduces costs, facilitates management and maintenance tasks and boosts connectivity.

Teltronic has already developed successful experiences, such as the Itelazpi network used by Euskotren (trains) and Bilbao Metro.

The Basque Country is committed to future mobility

ARANTXA TAPIA, MINISTER OF ECONOMIC DEVELOPMENT AND INFRASTRUCTURE

We live in a society of constant changes; changes that take place with ever increasing speed. Our way of life, our way of communicating and of travelling have all changed. Today, mobility is facing a transition period to a new model that is still unknown but full of opportunities. For this reason, it is the task of the Public Administrations to ease this transition to sustainable mobility by implementing actions designed to overcome the barriers and reluctance to change, which requires the involvement of our industry, our civil society and of the public administrations.

Consequently, I would like to reaffirm the commitment of the Basque Government to a Sustainable Mobility Model for the entire Basque Country, with the railway system as the central axis, based on environmental, economic and social principles. Sustainable Mobility includes cross-cutting issues that require the coordination of many elements at executive, sectoral and policy levels, with different outlooks to be considered.

The Basque Country is not starting from scratch but we need to come up with alternatives that will help alleviate the social, environmental and economic costs of the current model and move forward towards a sustainability-based system. Indeed, this change will require a level of organisation and deadlines capable of meeting the needs of all stakeholders, public administrations, industry and users so that the new scenario to which we aspire can be seen as an opportunity and not as a threat.

The railway is the key transport system in the Basque Country. The railway is the most sustainable system that exists for travelling. It is 100% electric and does not emit CO2 to the atmosphere. It is a system that is accessible to all users and is on time and efficient every day of the year. It is a high-capacity system that enables us to transform our cities into user-friendly places: today, a train can carry 400 people, which is the equivalent of 5 buses or 100 cars.

The Basque Country is working to achieve a competitive rail network, for both people and goods. A network at different levels: High-speed,

intercity, suburban or urban based on underground and tram services.

The railway system has become the backbone of the public transport system. We are extending the Vitoria-Gasteiz tram network to the south and, soon, to Salburua/Zabalgana; in Gipuzkoa, we are modernising the system and the new underground route of the TOPO in Donostia will enable us to reach the universities and new neighbourhoods; in Bizkaia, the Metro is still growing and Line 3 will improve connections to more neighbourhoods of Bilbao, Galdakao or Txorierri. The Basque "Y" is on the final stretch with a view to building the high-speed stations and accesses to the Basque capitals.

We are moving towards a more sustainable mobility system in the Basque Country by increasing the demand and use of both the railway and the electric transport systems. We are working on three sectoral indicators, which are the increase in the use of electric vehicles, the need to promote the recharging infrastructure, and the electrification of public transport.
We are prioritising public and collective transport schemes, opting for means of transport that do not use fossil fuels. There are several examples of the implementation of electric public transport, such as the BEISEB (Smart Electric Bus) in Donostia or Gasteiz (with exclusive lanes and traffic priority).

We need to boost the development of the local economy and knowledge, being capable of producing most of our supplies, services, innovation and resources required by future mobility solutions at an international level: technological and industrial development.

Indeed, we are talking about putting together a single system. We want to design an integrated transport framework that will provide users with what we call a single system, full interoperability. And it must come with a truly attractive offer.
The Basque Country enjoys a favourable environment for the adoption by civil society and businesses of sustainable mobility options through its experience, training, promotion and awareness-raising actions. We are preparing ourselves for the transport of the future.

We are developing projects at the TAV stations in Donostia, Bilbao and Gasteiz.

Line 3 of the Bilbao Metro system connects several new areas and more people.

Work on the underground section of the Topo is making good progress in Donostia.

Gasteiz has had a tram system for 10 years and, in 2019, it will extend toward the south of the city.

Progress in energy storage for signalling and communications systems

ARDANUY INGENIERÍA PARTICIPATES IN THE EUROPEAN PROJECT ENTITLED "ETALON", WHICH WILL CONTRIBUTE TO THE IMPROVEMENT OF TRAINS' FUNCTIONALITY AND REMOTE CONTROL OF TRACK OBJECTS IN ORDER TO FACILITATE THE ADOPTION OF ERTMS L3.

The European R&D projects geared towards energy harvesting and storage for railway applications such as ETALON are of major significance for the train of the future as they seek out new solutions that optimise its performance while increasing safety.

ETALON will provide improvements to the train's functional aspects, by offering an alternative energy supply and sturdy radio communications system between vehicles that will form the basis for the verification of train integrity, once ground detection systems have been removed (track circuits, for example). Furthermore, a solution has been proposed whereby energy and field communications cabling will be reduced, thus providing an independent energy source and radio communications operating via remote wayside objects.

This initiative has been managed under the auspice of the UNIFE (Union Des Industries Ferroviaires Europeennes), which is formed by nine partners and boasts the participation of the Spanish firm Ardanuy Ingeniería.

Ardanuy Ingeniería works, alongside the rest of the participants, in the development of solutions for energy harvesting and storage that can power controllers of remote wayside objects and on-board train integrity detection systems. These must be suitable for their installation in areas where energy supply is troublesome (remote areas and those with difficult access, freight lines and trains etc). In addition, the aim is to submit a solution that allows for the minimisation of energy and communications cabling. The project includes the identification of technological candidates, the creation of technical specifications and functioning requirements, the development of prototypes along with the integration, testing and validation in a simulated environment running in real time.

The final aim, as well as providing a technically feasible solution, is to reduce the cost of the installation, testing, service start-up and commercialisation stages.

The age of the digital customer

PREDICTIVE MAINTENANCE IS NOW A REALITY AND OFFERS ITSELF AS A DIGITAL TRANSFORMATION SERVICE THAT ENSURES SUCCESS.

To survive the disruption and thrive in the digital era, companies must transform themselves, redefining every element of their value chain. Due to the rapidly changing environment, the market still needs to understand and gain trust in what is behind this digital business transformation.

A growth mindset is necessary, as well as an end-to-end expert assessment and transformation guidance. Digital Business Transformation is only successful and sustainable when you combine both Digital Culture and Digital Capability.

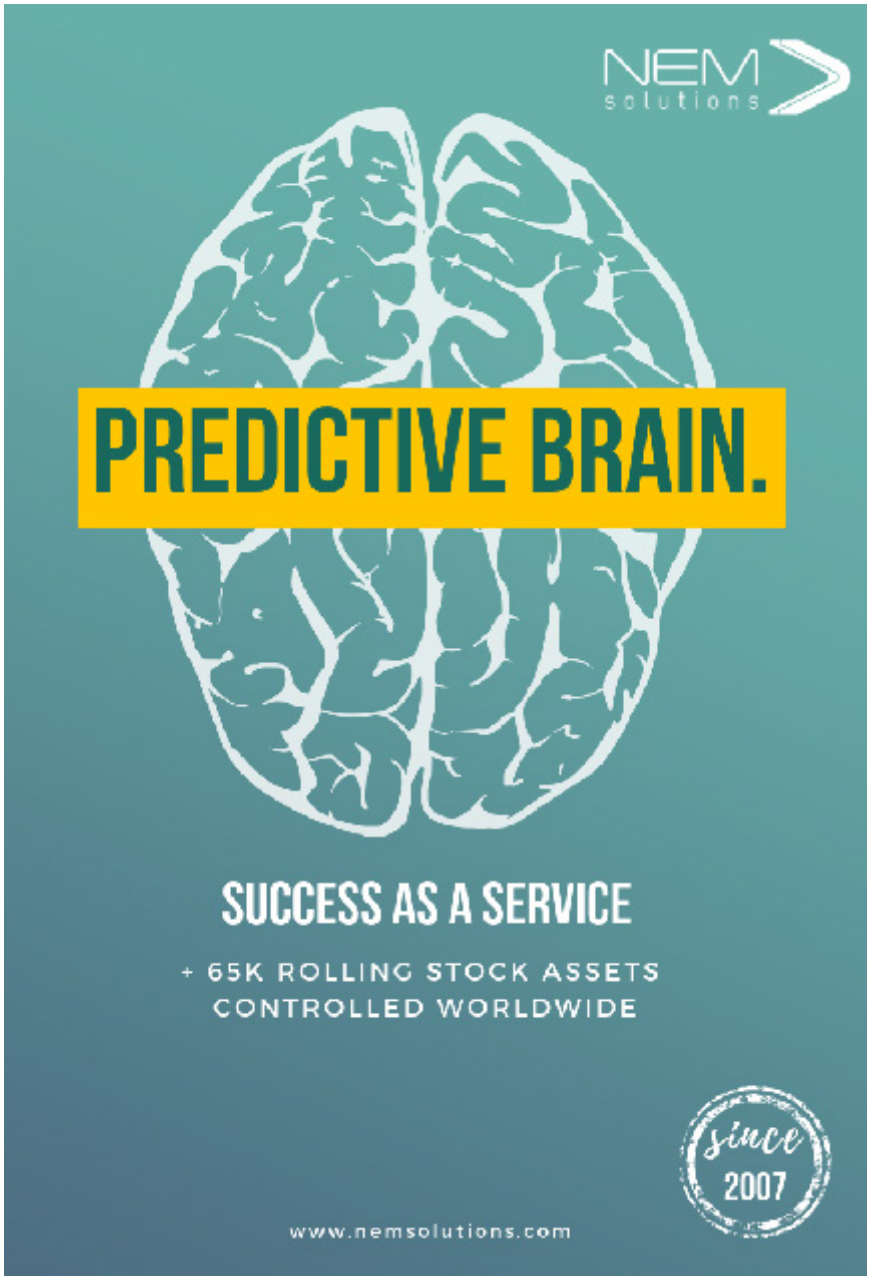
Digital Culture must be encouraged internally within the organization. That´s why leaders with Digital Vision differentiate between Digital Investment and Digital Advantage. The key elements for Digital Culture are to spread the digital strategy from top to bottom, in addition to the strategic definition of new roles and skills and people commitment.

Regarding Digital Capability, it is important to start from the point that digital technologies are in service to offer excellence in the digital customer experience. A key tool to promote new business models and, above all, to offer digital operational excellence.

If predictive maintenance implementation is one of your digital business transformation goals, `Product-based´ and `Software as a Service´ business models are obsolete.

How are you going to ensure a successful business transformation towards predictive Maintenance if you are only contracting software? Who is assuming the risk of that investment? What is your core? What do you really need?

The truth is that monitoring and predicting are not the same, currently in the market, 96% are monitoring solutions. Just 4% of the solutions are predictive digital services, 3% (out of the 4%) belongs to OEMs own platform. So, just 1% of the current market services are predictive specialized open Suppliers.



Data has to be transformed into a Monetizable Asset. Suppliers have to demonstrate how they can make money out of data. "Black-boxes" are not an option for Data-Driven Businesses.

Predictive Maintenance is a reality and it is offered as a Digital Transformation Service guaranteeing success.

Spanish Engenieering, present in Akiem locomotives

BOMBARDIER TRANSPORTATION HAS SIGNED TWO CONTRACTS WITH AKIEM, A ROLLING STOCK LEASING FIRM, FOR THE SUPPLY OF 33 LOCOMOTIVES.

Bombardier Transportation has signed two contracts with Akiem, a rolling stock leasing company, for the supply of 33 BOMBARDIER TRAXX locomotives. The delivery of these locomotives, which include the TRAXX MS2 (multi-system), TRAXX AC3 (alternating current) and TRAXX DC3 (direct current) models, is scheduled between 2019 and 2021.

The Bombardier site in Trápaga, Spain, is the center where the traction converters and auxiliary converters for these locomotives are manufactured, being also responsible for the management of the operational project, covering from the selection of suppliers and stockpiles to the final tests and shipment of the converters, passing through the intermediate stages of supplies, manufacturing, testing and final inspections.

The Biscayan site is currently the center of excellence in the manufacture of high-power converters for the Bombardier TRAXX locomotive platform. These include the new families of AC3 converters, 1 and 2 systems for alternating current, DC3 for direct current supply and the new MS3, the latest generation of multi-system locomotives, equipped with the Last Mile function, which enables them to drive in non-electrified sections.

Among the advantages of the TRAXX platform for rail freight transport, in addition to the high traction power, stand out its economic and ecological operation, having an Ecomode system able to reduce the total energy consumption by 5% when switching off the traction motors individually.

The locomotives are also designed with a modular maintenance that allows to reduce the downtime making the mechanical service faster and easier.

Compared to similar locomotives in their class, these locomotives increase the traction capacity, being able to pull one more car and increasing its efficiency by 1.9%, which in the long term means significant savings for the operators.

Centralisation of intermodal transport within DENEVA

ICON MULTIMEDIA TACKELS THE CENTRALIZATION OF THE INTERMODAL TRANSPORT OF FERROCARRILS GENERALITAT VALENCIANA (FGV) WITHIN DENEVA PLATFORM.

The main task is the interfaces design that consolidate the management of the different means of transport. This establishes a point of control for the management of incidents. Also, its increases the communication of available data, being able to insert other information sources such as Smart City, Puerto de Valencia, etc.

The project manages data from different sources through DENEVA, which has a powerful content presentation layer. The Business Intelligence module adapts different configurable contents and it is available for the use of spaces by third parties.

The future wagon: The intelligent wagon

THE SHIFT2RAIL INITIATIVE'S IP5 INNOVATION PROGRAMME, SETS THE PATH FOR THIS FUTURE VIEW OF RAIL FREIGHT. CEIT-IK4 TECHNOLOGY CENTER IS COORDINATING THE WORK WITHIN THE JOINT UNDERTAKING TOWARDS THE INTELLIGENT WAGON.

The future wagon will be an intelligent wagon that integrates an IoT ecosystem that leverages innovation opportunities, in terms of noise emission, weight, capacity, logistics and life-cycle costs. Several new services enabled by key technology-drivers will be available, such as wireless communications and accurate positioning capabilities. Moreover, both the performance enhancement and lower cost of components such as sensors and processing units will also leverage the services expected from the intelligent wagon.

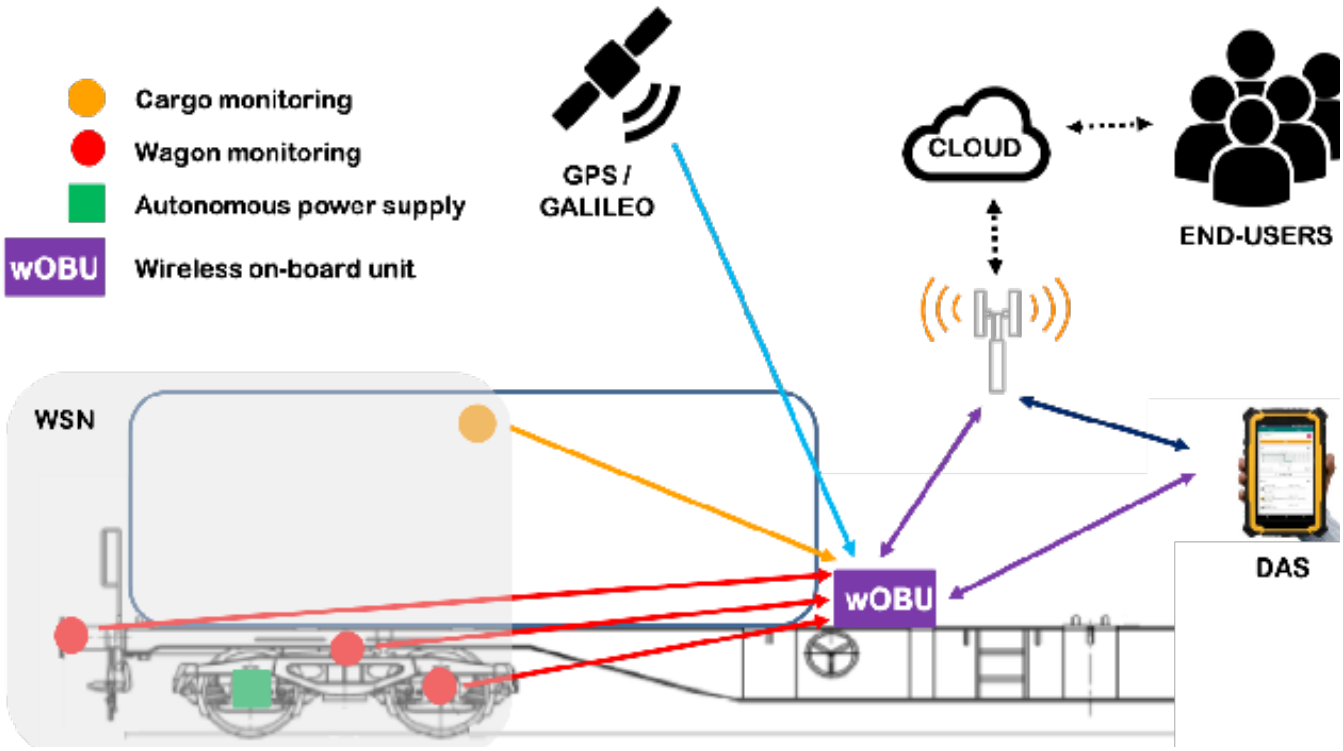
Cargo and wagons will be monitored through the use of sensors, thereby improving logistics and LCC by means of CBM.

The wOBU (wagon On-Board Unit) component will use low-cost and high-performance processing units and their corresponding interfaces to manage all the intelligent wagon data. These data could also be employed for the driver assistance system (DAS).

Finally, intra-train communication and trackside communication will provide cloud connectivity and allow operators and customers to manage relevant information. As a consequence, new services and business models will be leveraged. The figure attached depicts the intelligent wagon concept.

With the aim of answering the freight market's demands for the modal shift to rail, in addition to the intelligent wagon, the future freight train will also include a number of other innovations.

Next-generation freight bogies and wagons will be lightweight, faster and safer. New freight propulsión concepts will offer more attractive rail freight services by maximising flexibility and efficiency and reducing operational and maintenance costs. And autonomous train operation (ATO) for freight operation will increase the competitiveness of rail freight transport, improve operational efficiency and optimise the use of resources.



More complete projects thanks to Implaser's BIM signaling

EN IMPLASER SE HAN DIGITALIZADO LAS SEÑALES EN AUTODESK REVIT Y ARCHICAD. EN SU WEB TIENEN DISPONIBLE LA DESCARGA DE LOS BLOQUES DE EXTINCIÓN (6 UNIDADES) Y EVACUACIÓN (20 UNIDADES) EN AMBOS PROGRAMAS.

The BIM methodology involves a collaborative work system. It stores data, makes calculations or manages projects.

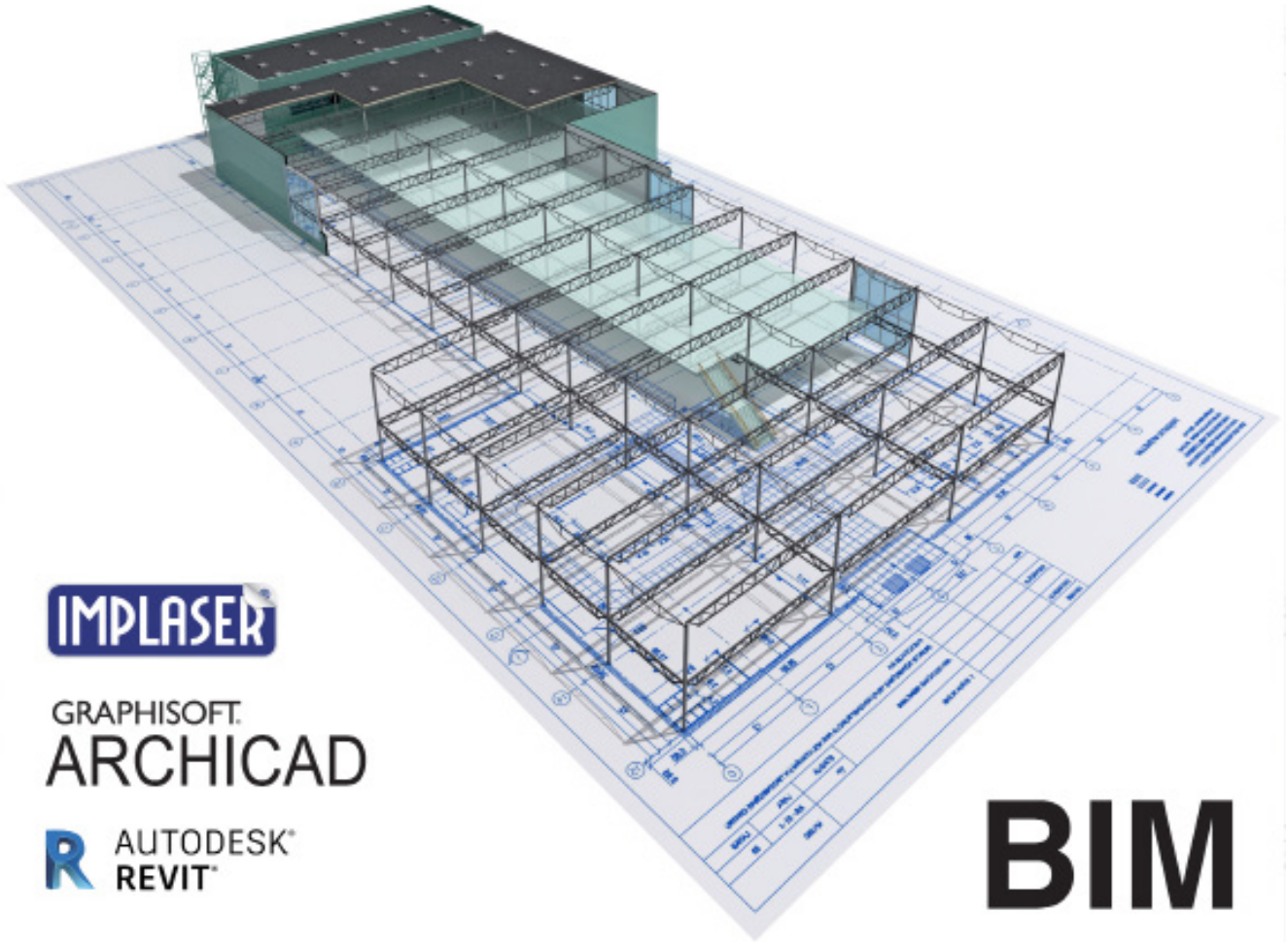
Programmes like Auto-cad used it for designing. Now, most architects, engineers, etc., likewise, work with the BIM methodology. What does it comprise? It is a collaborative work system. It is used to store data, make calculations or manage projects.

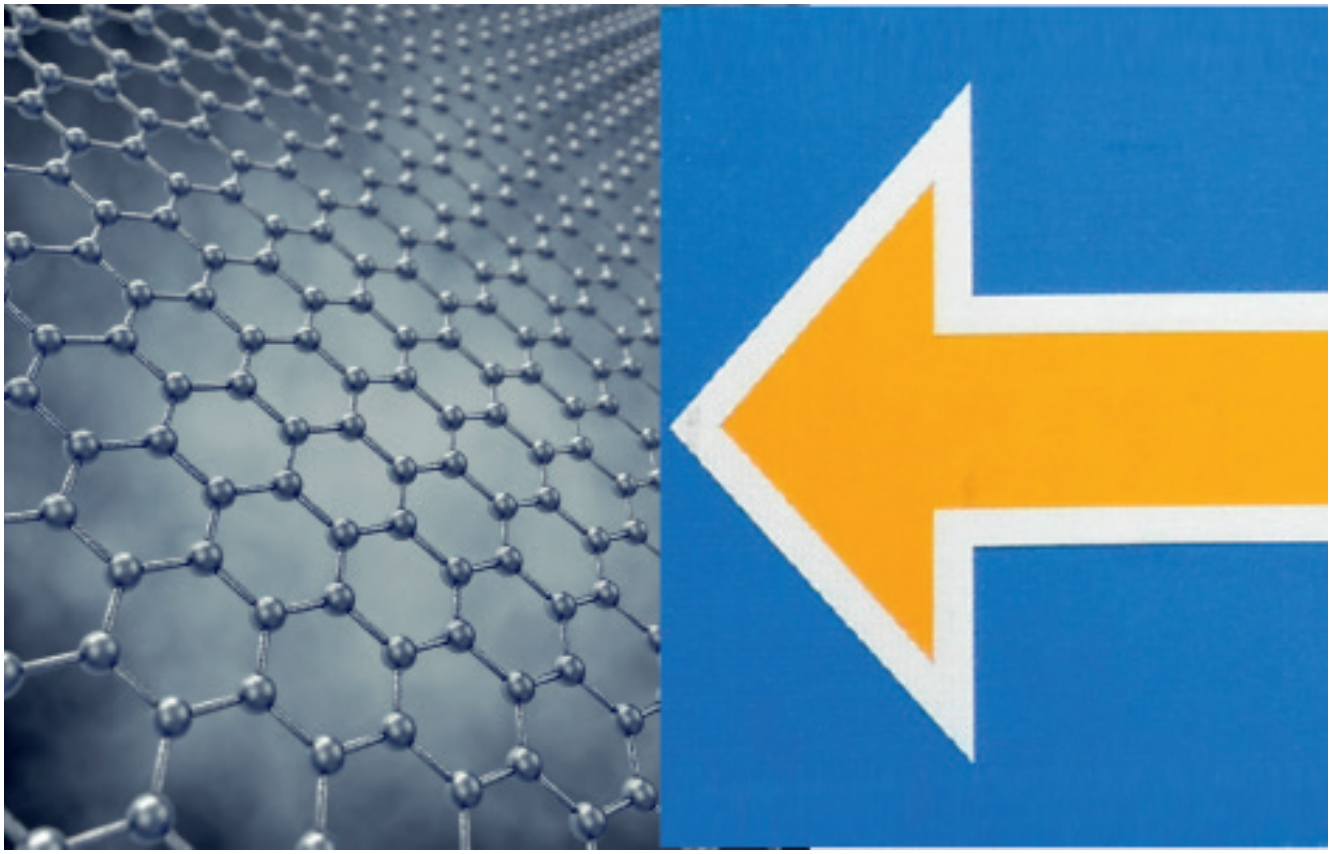
Engineers, architects, technical architects, draughtsman, builders, etc. often work on projects in which all elements completely influence all defined information (including costs). With the BIM methodology, the moment one of these professionals enters the slightest modification, the rest of the affected elements will be changed or adapted automatically. And these changes will be available to the rest of the project's participants.

BIM our products

Fire safety and evacuation signaling is mandatory. Thanks to BIM application of Implaser products, you can create more comprehensive projects. Include these signaling elements afterwards, and very quickly, do a recount of the building's needs (number of signs of each BIM signal type: evac or fire safety).

At Implaser, we digitalize signs in Autodesk Revit and Archicad. On our web, you can download fire safety (6 units) and evac (20 units) blocks in both programs.





Nanotec, new-generation composite

TECNIVIAL UNDERTAKES A PROJECT, CO-FINANCED BY CDT, GEARED TOWARDS THE CREATION OF STATE-OF-THE-ART COMPOSITES.

For the last two years, TECNIVIAL, S.A. has been working on a project co-financed by Spain's CDTI (Centre for Industrial Technology Development) to create latest-generation composites by adding nanoparticles to the conventional raw materials used in manufacture of GFRP (glass-fibre-reinforced polyester) products. Its focus on graphene and other carbon-derived nanoparticles has led to development of a composite that almost exponentially improves the product's mechanical behaviour, giving it high tensile strength, compression, impact and shear stress values that, along with its lightness, make it an attractive alternative to steel or aluminium.

These latest-generation composites, branded Nanotec, have wide-ranging applications in the railway sector, from manufacture of marker boards through to track junction boxes and terminals, cable ducts and even overhead line poles.

All Nanotec signals are made at our factory to strict quality criteria that assure compliance with current railway legislation.

In 2018, TECNIVIAL, S.A. installed its first Nanotec marker boards on the high-speed lines operated by Spain's ADIF. The response has been exceptional and in 2019 we will continue to install our new Nanotec signals on railway lines throughout the country.

This year will also see the international launch of our Nanotec signals, which because of their outstanding combination of physical and mechanical properties and behaviour, low maintenance costs, ease of transportation and installation and exceptional capacity to withstand aggressive environments, are set to replace conventional signalling (in aluminium or sheet metal) in coming years.

The future looks bright as we start to explore the potential railway applications for our new Nanotec technology.

TECNIVIAL, S.A. will continue to innovate as part of its commitment to customer service.

ETCS over TETRA, a reliable and proven solution

TELTRONIC HAS COMPLETED THE INTEGRATION OF ITS NEBULA SOLUTION WITH THE CONTROL SYSTEMS OF SOME OF THE MAIN TRAIN MANUFACTURERS WORLDWIDE.

Although GSM-R is the standard defined by the European regulation for the transmission of ETCS, Teltronic has developed some successful experiences with TETRA, the accepted digital radio standard for critical communications. The company has completed the integration of its solution NEBULA with the control systems of some of the world's leading train manufacturers, proving the viability of this technology for railway signalling applications and becoming an alternative facing the upcoming obsolescence of GSM-R in 2025 according to forecasts.

TETRA provides a series of additional advantages that make it even more interesting. Since it is specified to operate in the lower part of the UHF, propagation losses are lower than with GSM-R and it needs fewer base stations to cover the same area. In addition, GSM-R uses bands which are close to those employed by commercial operators, and this fact can create interference and access problems.

TETRA has a spectral efficiency four times higher than GSM-R; provides critical communication features included natively in the standard such as group calls, emergency call or priority management, and the data services that facilitate train-ground operation and other railway management applications. Likewise, TETRA technology is able to comply with the QoS requirements specified in the ERTMS (EIRENE) regulation, being a viable alternative to support railway signalling applications in high-speed environments outside of Europe, where the use of GSM-R technology is not compulsory.

Another significant advantage is that TETRA allows a smooth migration to hybrid and broadband solutions, meeting transport sector's increasing needs of greater data capacity, and becoming a suitable solution for other signalling systems such as Communication Based Train Control (CBTC) and Positive Train Control (PTC).

ENGINEERING, CONSULTANCY AND CERTIFICATION

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

- Albatros, S.A.U.
- Ardanuy Ingeniería, S.A.
- CAF Signalling, S.L.
- CAF Turnkey & Engineering, S.L.
- Calmell, S.A.
- Dsaf-Dinamicas De Seguridad, S.L.
- Duro Felguera Rail, S.A.U.
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- 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.
- Teknorail - Grupo Eurofinsa
- Tecnivial S.A
- Tectronic
- Thales España Grp, S.A.U.
- TPF Getinsa Euroestudios, S.L.
- Trigo Group
- Typsa - Técnica Y Proyectos, S.A.
- Vicomtech

Systems, environmental, financial management and IT consulting

- Aquafrisch, S.L.
- Ardanuy Ingeniería, S.A.
- Citef(Fundaciónparaelfomentodelainnovaciónindustrial)
- Fundación Gaiker
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Idom-Engineering, Consulting, Artchitecture, S.A.U
- Ik4 Research Alliance
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- Teknorail - Grupo Eurofinsa
- TPF Getinsa Euroestudios, S.L
- Vicomtech

Technical Specifications Drafting and supervision of rolling stock manufacturing

- Albatros, S.A.U.
- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Hispacold S.A.
- Idom-Engineering, Consulting, Artchitecture, S.A.U
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Segula Technologies España, S.A.U.
- Sener Ingeniería y Sistemas, S.A.
- Teknorail - Grupo Eurofinsa
- Trigo Group

Work supervision

- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Idom-Engineering, Consulting, Artchitecture , S.A.U
- 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.
- Sice Tecnología y Sistemas
- Tpf Getinsa Euroestudios, S.L
- Typsa - Técnica y Proyectos, S.A.

Product and process certifications

- Ardanuy Ingeniería, S.A.
- Cetest, S.L.
- Citef(Fundaciónparaelfomentodelainnovaciónindustrial)
- Dsaf-Dinamicas De Seguridad, S.L.
- Fundación Gaiker
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Trigo Group
- Idom-Engineering, Consulting, Artchitecture, S.A.U
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Sener Ingeniería y Sistemas, S.A.
- Trigo Group
- Teknorail Group

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

- Ardanuy Ingeniería, S.A.
- Caf Turnkey & Engineering, S.L.
- Citef(Fundaciónparaelfomentodelainnovaciónindustrial)
- Duro Felguera Rail, S.A.U.
- Gantrex Spain
- Idom-Engineering, Consulting, Artchitecture, S.A.U
- Ineco-Ingeniería y Economía del Transporte, S.A.
- Segula Technologies España, S.A.U.
- Teknorail Group
- Tpf Getinsa Euroestudios, S.L
- Typsa - Técnica y Proyectos, S.A.

Training and simulations tools

- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Ik4 Research Alliance
- Segula Technologies España, S.A.U.
- Lander

INFRASTRUCTURE AND SUPERSTRUCTURE

Civil works (platforms,stations, depots)

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

Infrastructure and superstructure equipment and components

- 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.
- Comsa Corporacion
- Dsaf-Dinamicas De Seguridad, S.L.
- Duro Felguera Rail S.A.U.
- Flexix, S.A.
- Funor, S.A.
- Hicasa-Hierros y Carbones, S.A.
- Ik4 Research Alliance
- Ikusi S.A.U.
- Inserail, S.L.
- Jez Sistemas Ferroviarios, S.L.
- Ladicim
- Mb Sistemas, S.Coop.
- 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.
- Pretensados del Norte, S.L.
- Talleres Alegría, S.A.
- Tria Ingenieria, S.A.

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

Traffic control and signalling (safety)

- Albatros, S.A.U.
- Alstom Transporte, S.A.
- Bombardier España
- Cables de Comunicaciones Zaragoza, S.L.
- Caf Signalling, S.L.
- Caf Turnkey & Engineering, S.L.
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Ik4 Research Alliance
- kusi S.A.U.
- Implaser 99, S.L.L.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Jez Sistemas Ferroviarios, 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.
- Teknorail - Grupo Eurofinsa
- Tecnivial S.A
- Tectronic, S.A.
- Telice, S.A.
- Thales España Grp, S.A.U.

Protection (security) and infrastructure monitoring

- Albatros, S.A.U.
- 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.
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Ik4 Research Alliance
- Indra Sistemas, S.A.
- Inserail, 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
- Ecocomputer S.L.
- Gmv Sistemas, S.A.U.
- Ikusi S.A.U.
- 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

- Albatros, S.A.U.
- Azvi S.A.
- Cables de Comunicaciones Zaragoza, S.L.
- Caf Turnkey & Engineering, S.L.
- Comsa Corporación
- Gmv Sistemas, S.A.U.
- GrupoEurogestiónIngenieríadeTelecomunicaciones,S.L.
- Ik4 Research Alliance
- Ikusi S.A.U.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Revenga Ingenieros S.A:
- Semi-SociedadEspañoladeMontajesIndustriales,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

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

ROLLING STOCK MANUFACTURERS

High Speed trains (over than 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.

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.

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

- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- CAF Power & Automation, S.L.U.
- Flexix, S.A.
- Ik4 Research Alliance
- Ingeteam Power Technology, S.A.
- MGN Transformaciones del Caucho, S.A.
- Siemens Rail Automation, S.A.U.

Control, auxiliary and diagnostic systems

- Albatros, S.A.U.
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- CAF Power & Automation, S.L.U.
- GMV Sistemas, S.A.U.
- Hispacold S.A
- Ik4 Research Alliance
- Indra Sistemas, S.A.
- Ingeteam Power Technology, S.A.
- Kimua Group
- NEM Solutions
- Stadler Rail Valencia, S.A.U.

Assembly equipment

- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Danobat, S. COOP.
- Funor, S.A.

Mechanical components

- Alstom Transporte, S.A.
- Bombardier España
- CAF-Construcciones y Auxiliar de Ferrocarriles, S.A.
- Flexix, S.A.
- Fundiciones Garbi, S.A.
- Funor, S.A.
- Gamarra, S.A.
- Hispacold S.A.
- Ik4 Research Alliance
- Metalocaucho, S.L.
- MGN Transformaciones del Caucho, S.A.
- Stadler Rail Valencia, S.A.U.
- Talleres Alegría, S.A.

Interiors

- Bombardier España
- Colway Ferroviaria, S.L. (Nexus Management)
- Flexix , S.A.
- Satys Interiors Railway Spain, S.A.

Safety

- Albatros, S.A.U.
- Alstom Transporte, S.A.
- Arteche (Electrotécnica Arteche Smart Grid, S.L.)
- Bombardier España
- Dsaf - Dinamicas de Seguridad, S.L.
- Indra Sistemas, S.A.
- Luznor Desarrollos Electrónicos, S.L.

MAINTENANCE: EQUIPMENT, MAINTENANCE SERVICES AND REFURBISHMENT

Infrastructure and superstructure maintenance

- Alstom Transporte, S.A.
- Amurrio Ferrocarril y Equipos, S.A.
- Azvi S.A
- CAF Turnkey & Engineering, S.L.
- Comsa Corporacion
- Duro Felguera Rail, S.A.U.
- Gantrex Spain
- Inserail, S.L.
- Ladicim
- SEMI-SociedadEspañoladeMontajesIndustriales,S.A.
- Tria Ingeniería, S.A.

Rolling Stock maintenance

- 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.
- NEM Solutions
- Patentes Talgo, S.L.
- Siemens Rail Automation, S.A.U.
- Stadler Rail Valencia, S.A.U.
- Talleres Alegría, S.A.
- Talleres Zitrón

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

- Albatros, S.A.U.
- 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.
- Gmv Sistemas, S.A.U.
- Ikusi S.A.U.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Jez Sistemas Ferroviarios, S.L.
- Luznor Desarrollos Electrónicos, S.L.
- Patentes Talgo, S.L.
- Semi-SociedadEspañoladeMontajesIndustriales,S.A.
- Sice Tecnología y Sistemas, S.A.
- Siemens Rail Automation, S.A.U.
- Telice S.A.

Maintenance of systems, equipment and vehicles components

- Albatros, S.A.U.
- 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.
- Gmv Sistemas, S.A.U.
- Geminis Lathes, S.A.
- Grupo Trigo
- Hispacold S.A.
- Indra Sistemas, S.A.
- Ingeteam Power Technology, S.A.
- Kimua Group
- Mgn Transformaciones del Caucho, S.A.
- Nem Solutions
- Patentes Talgo, S.L.
- Satys Interiors Railway Spain SA
- Sice Tecnología y Sistemas
- Stadler Rail Valencia, S.A.U.

Supply of maintenance equipment

- Albatros, S.A.U.
- Alstom Transporte, S.A.
- Aquafrisch, S.L.
- Bombardier España
- Danobat, S. COOP.
- Kimua Group
- Nem Solutions
- Newtek Solidos S.L.
- Patentes Talgo, S.L.
- Tecnivial S.A.

ALBATROS, S.L.U.

- Albatros 7 y 9 - P.I. "Pinto Estación"28320 Pinto (MADRID)
- T: +34 91 495 70 00
- info@sepsa.es
- www.sepsa.es

Albatros is a Spanish company, with trademark SEPSA and subsidiary of the German group Schaltbau, specialized in the design, manufacture and marketing of equipment for trains, metros and trams. It consists of two engineering units: Power electronics (design and manufacture of auxiliary power converters and battery chargers) and On-board Systems (design and manufacture of PACIS, communication systems, control systems and other integrated systems).

SEPSA is a leader in providing of auxiliary components for trains and is one of the first supply companies in such competitive markets as Europe, the United States and Latin America. The headquarters are located in Spain, where a powerful engineering department is located. In addition, Albatros has factories in Pinto (Spain), New York (USA) and Sao Paulo (Brazil).

ALSTOM TRANSPORTE, S.A.

- C/ Martínez Villergas 49, edificio V 28027 Madrid (MADRID)
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- F: +34 91 334 58 01
- german.ruiz@transport.alstom.com
- www.alstom.com

As a promoter of sustainable mobility, Alstom Transport is the only railway manufacturer present in the full spectrum of transport systems, equipment and services.

The company offers a complete range of high performance products: rolling stock, signalling, maintenance and modernisation, infrastructure and integrated solutions. In Spain, Alstom Transport employs around 2000 people in 19 working sites, has a manufacturing site in Barcelona and develops R&D programmes both for rolling stock and railway signalling and safety projects. The technological laboratory located in Madrid has become a benchmark for signalling projects throughout the world.

AMURRIO FERROCARRIL Y EQUIPOS, S.A.

- Maskuribai, 10 01471 Amurrio (ÁLAVA)
- P: +34 945 89 16 00
- F: +34 945 89 24 80
- info@amufer.es
- www.amufer.es

Amurrio Ferrocarril y Equipos, S.A. is one of the international market leaders in the design, production and installation of railway materials. Our rolling stock interchanges and crossings are installed in high-speed rail lines, underground lines, tram lines, and conventional railways throughout Europe, Asia, America and Africa.

In the area of metal foundry, we have the experience, the knowledge and the people to produce, process and mechanize machine tool parts and sets of great technical complexity in carbon steel manganese steel and other steel alloys.

AQUAFRISCH, S.L.

- C/ Ignacio Zuloaga, 10 28522 Rivas Vaciamadrid (MADRID)
- P: +34 91 380 03 33
- F: +34 91 778 60 02
- aquafrisch@aquafrisch.com
- www.aquafrisch.com

Aquafrisch is a service oriented company. Our task is to provide our customers needs with reliable results.

Aquafrisch provides a wide offer in equipment and services in both working fields for the company:

1. Aquafrisch Rail: solutions for railway equipment in depots and workshops.
2. Aquafrisch Agua: solutions for water treatment both in consumption and waste waters.

ARCELORMITTAL ESPAÑA, S.A.

- Apdo. 570. Edificio Energías, 2ª pl. 33691 Gijón (ASTURIAS)
- P: +34 985 18 77 50
- rails.specialsections@arcelormittal.com
- www.rails.arcelormittal.com

ArcelorMittal is the world's leading steel and mining company and it is part of a small group of rail manufactures whose production has developed notably in the specialized high-speed, heavy-haul, metro, conventional lines and other applications are light rail and tram in the different qualities of normal carbon steel, micro alloyed and head hardened rails. ArcelorMittal quality has been recognized by customers around the world, from Europe through Asia to Oceania, America and Africa.

Next time you travel by train, no matter the continent where you are, you may be doing it on rails manufactured by ArcelorMittal.

ARDANUY INGENIERÍA, S.A.

- Avda. Europa, 34 28023 Madrid (MADRID)
- P: +34 91 799 45 00
- F: +34 91 799 45 01
- madrid@ardanuy.com
- www.ardanuy.com

Ardanuy is a consultancy company that specializes in studies, designs, works management and technical consultancy pertaining to Rail, Metro, Tram and Cable Transport.

The company was founded in December 1992 and is made up of a team of over 100 Engineers and Architects. Other experts also act as consultants to Ardanuy staff on specific projects.

In Spain, Ardanuy carries out work from offices in Madrid, Barcelona, Valencia, Seville and Tenerife. It also has offices in Lithuania, Poland, India, Colombia, Algeria and USA.

Ardanuy has always had a marked international vocation. Currently over 90% of new contracts are won on the international market, in Western Europe: United Kingdom, Ireland and France; Central and Eastern Europe: Poland, Bulgaria, Latvia, Lithuania; America: Bolivia, Chile, Colombia, Mexico, Peru, USA; Africa: Morocco, Mozambique, Algeria, Egypt, South Africa; and Asia: India, Vietnam, Kazakhstan.

ARTECHE (ELECTROTÉCNICA ARTECHE SMARTGRID, S.L.)

- Derio Bidea, 28
  48100 Mungia (VIZCAYA)
- P: +34 94 601 12 00
- F: +34 94 615 56 28
- aol@arteche.com
- www.arteche.com

Arteche Group's business is focused on providing equipment, applications and solutions for the electricity and railway sector worldwide.

In power generation, transmission, distribution, industry, and railway technologies, the group has become a key player in the search for answers to new challenges.

A position maintained by a deep knowledge of the different international electricity systems, efficient client-oriented organization and remarkable investment in research and development.

This is shown by over 50% increase in the brand references in the past five years. Arteche's decisions over the years made our group a symbol of reliability, quality and trust, both in solutions and in corporate relations.

Corporate alliances have taken a key role in Arteches's history, becoming an asset which has contributed to our international growth and to the development of innovative solutions.

AZVI S.A.

- C/ Almendralejo, 5
  41019 SEVILLA
- P: +34 954 999 320
- F: +34 954 999 200
- azvi@azvi.es
- ww.azvi.es

Azvi is a hundred-year-old Company specialised in Civil Works whose origins are in railways, forming part of the history and evolution of the railways and its infrastructures in Spain and abroad. Throughout these years, Azvi has participated in numerous construction, rehabilitation, conservation and maintenance projects over more than 1,000 kilometres of track, of which almost 450 km have been High-Speed Rail built within the last 25 years.

Azvi also has a large and modern machinery park which allows the company to carry out works with its own machines and a Logistics Centre equipped with modern facilities and state of the art resources in order to centralize a variety of support services to railway activity, such as Machinery Park, materials, maintenance, checking and repairing shops.

Research and Development is also an important issue for Azvi.

Through its own R&D department, Azvi invests in railway research and development, in collaboration with various public and private entities and investigation groups.

BOMBARDIER ESPAÑA

- Complejo Miniparc III – Edificio K
  1ª Planta C/Caléndula 93 - 28109
  Soto de la Moraleja (MADRID)
- P: +34 91 658 55 00
- F: +34 91 650 75 18
- javier.hinojal@rail.bombardier.com
- www.bombardier.com

Bombardier Transportation, a global leader in rail technology, offers the broadest portfolio in the rail industry.

Bombardier Transportation Spain is one of the leading exporters of the Spanish railway industry, employing more than 750 people in its plants and offices in Trápaga (Biscay), San Sebastian de los Reyes and Alcobendas (Madrid), Madrid and Barcelona, and taking part in some of the major railway projects in the country. Its Propulsion Systems plant located in Trápaga (Biscay) and its Centre of Excellence in Rail Signalling Engineering located in San Sebastian de los Reyes (Madrid) are world top technological centres, leading the requests for Bombardier's propulsion and signalling systems for Spain and for the rest of the world. Exports represental ready more than 85% of its activity.

CABLES DE COMUNICACIONES ZARAGOZA S.L.

- Polígono de Malpica,
  Calle D, nº 83
  50016 Zaragoza
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- P: +34 976 72 99 00
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- comercial@cablescom.com
- www.cablescom.com

Founded in 1971, Cables de Comunicaciones has been steadily building its reputation as a respected business in the field of communications cables. Cables de Comunicaciones has cemented its position and its products are now used in over 50 countries around the world.

The company has a wide range of products that are certified according to the standards of the leading telecom and railway operators in the majority of countries in Europe. It is dedicated to designing and developing excellent telecommunications, signalling, instrumentation, data and fibre optic cables.

CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A.

- José Miguel Iturrioz, 26 20200 Beasain (GUIPÚZCOA)
- P: +34 943 880 100
- F: +34 943 881 420
- caf@caf.net
- www.caf.net

CAF is a firm focused on investigation, development, design, production and maintenance of Rolling stocks for the railway industry. Our product range include from High Speed, to regional and suburban trains, articulated units, underground trains, LRVs, light underground trains and locomotives. Maintenance of the whole range. It boasts production premises throughout Spain (Beasain, Irun, Zaragoza, Castejón and Linares), as well as in the USA (Elmira NY), France (Bagnères de Bigorre), Mexico (Mexico Df) and Brazil (Sao Paulo) and Rail Technological Centres in Beasain and Zaragoza. CAF's projects are distributed in over 25 countries around the world in the five continents.

CAF POWER & AUTOMATION S.L.U.

- Parque Tecnológico de San Sebastián. Pso. de Mikeletegi, 58 -2º. 20009 San Sebastián (GUIPÚZCOA)
- P: +34 943 30 92 51
- F: +34 943 30 92 52
- info@cafpower.com
- www.cafpower.com

CAF P&A is a global manufacturer of electric power solutions as well as information and communications systems for the rail industry.

CAF P&A have equipped more than 5,000 vehicles worldwide including, metros, light rail, locomotives and high-speed trains. One of the main strategic lines is the development of its own technology. Todo so, as a major asset, CAF P&A has a team of experienced, competent and dynamic specialists. CAF P&A develops, manufactures and deliver high reliability solutions adapted to each and every client's specific needs in compliance with railway standards.

CAF SIGNALLING S.L.

- Avenida de la Industria, 51 28108 Alcobendas (MADRID)
- P: +34 91 789 27 50
- F: +34 91 661 37 51
- cafsignalling@cafsignalling.com
- www.cafsignalling.com

CAF Signalling, the technological subsidiary of the CAF Group, provides rail traffic signalling, both in Spain and abroad. As such, it offers railway signalling solutions and remote control for Railway infrastructures. CAF Signalling, boats the Company's own in-house engineering and expertise to take on "turn-key" railway signalling projects with recognition from several Railway Administrations in Spain and other countries in Europe, America, Africa, Middle East and Asia.

CAF TURNKEY & ENGINEERING S.L.

- Parque Científico y Tecnológico de Bizkaia, Laida Bidea, Edificio 205. 48170 Zamudio (VIZCAYA)
- P: +34 946 819 550
- F: +34 94 623 29 29
- comercial@cafte.com
- www.cafte.com

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.

CALMELL GROUP

- Pol. Ind. Pla d'en Coll C/ Fresser, 12 C 08110 Montcada i Reixac (BARCELONA)
- P: +34 93 564 14 00
- F: +34 93 564 58 22
- calmell@calmell.net
- www.calmell.com

The first company of the group, Calmell, S.A. was founded in 1970, focusing its activity on the manufacture or graphic products. Currently, 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 specifics oftware 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.

CETEST S.L.

- Lazkaibar, s/n 20200 Beasain (GUIPÚZCOA)
- P: +34 943 028 690
- cetest@cetestgroup.com
- www.cetestgroup.com

Test and analysis services for:

- Design verification and validation.
- Full homologation of new products and vehicles.
- Failure analysis and optimization.

Fully accredited test lab with more than 40 years of experience in railway testing.

Test services cover the following areas:
- Structural components.
- Running gear.
- Suspension systems.
- Vehicle dynamics.
- Noise and vibrations.
- Aerodynamics.
- EMC and energy consumption.
- Mechatronics.
- Special instrumentation (Instrumented wheelsets, instrumented pantograph).

CITEF (FUNDACIÓN PARA EL FOMENTO DE LA INNOVACIÓN INDUSTRIAL)

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Tecnalia is a leading research and technological development centre in Europe. They offer a vision of innovation, developing alongside companies solutions that provide value through technology and competitive solutions that transform and grow businesses, improving the future of companies and society.

COLWAY FERROVIARIA, S.L.

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- P: +34 93 414 65 12
- F: +34 936 39 8 610
- acolomerf@colway-08.com
- www.colway-08.com

Colway Ferroviaria, S.L., company belonging to the COLWAY Group, specializes in the design, engineering, manufacture, supply, installation and commissioning of turnkey railway vehicle interiors. Through the integrated management of modular supplies, based on experience, knowledge, research and innovation, the company achieves the satisfaction of the needs and expectations of its customers: railway manufacturers and public administrations. Colway capabilities include Modular System solutions for Rail Interiors as Toilet Modules, Fronthoods, saloons, walls, Buffet, Restaurant areas, vestibules.

COMSA CORPORACIÓN

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  (MADRID)
- P: +34 913 532 120
- F: +34 913 504 954
- jalvarez@comsa.com
- www.comsa.com

COMSA is the company of COMSA Corporación specialised in the construction of railway infrastructures.
Founded in 1891, the company provides a comprehensive service in the field of railway construction and maintenance, electrification, and control and communication systems of high speed rails, conventional rails, metros and tramways. In this business activity, it is leader in Spain, where has been involved in the construction of all high speed lines, and has permanent operations in Argentina, Brazil, Lithuania, Mexico, Poland, Portugal and Turkey.
It has also taken part in a large number of projects in other markets such as Italy, the Philippines, Taiwan, Malaysia, India, etc. This extensive experience has been the key for its consolidation in the railway sector and has enabled it to become the leader in the railway construction industry.

DANOBAT S. COOP.

- Arriaga Kalea, 21
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- P: +34 943 748 044
- F: +34 943 743 138
- danobat@danobat.com
- www.danobat.com

Danobat Railways business unit focuses its activity in the supply of turnkey solutions for the manufacturing and maintenance of railways rolling stock, incorporating own products of leading technology, together with those manufactured by specialized companies. It gathers extensive experience and qualification in the rendering of services such as engineering services, equipment integration, complex project management, and collaboration with the customer all along the life of the project. Danobat has a strong international presence and references in the most relevant customers.

DSAF – DINÁMICAS DE SEGURIDAD, S.L.

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  Polígono Industrial de Gojain
  01170 Legutiano
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- info@dsaf.es
- www.dsaf.es

DSAF is a company structure devoted to People's Movement Safety. It is committed to providing new technologies applied to design and project implementation, as well as initiatives that guarantee an approved evacuation safety level in this generalized risk society.
Emergency signalling is DSAF's main application area; it develops photoluminescent, electroluminescent and LED signalling systems for people evacuation in risk situations and environments: tunnel evacuation safety, vessel evacuation safety, building evacuation safety…
DSAF safety applications are developed in three big areas: tunnel safety (road / railway), safety in vessels, and buildings.

DURO FELGUERA RAIL, S.A.U.

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  33600 Mieres (ASTURIAS)
- P: +34 985 45 63 31
- F: +34 985 45 61 64
- dfrail@durofelguera.com
- www.durofelguera.com

DFRailisaSpanishcompanyspecializedatthedesign,manufacturingandsupplyofturnoutsystemsandcomponentsforMetro,Conventional,HeavyHaulorHighSpeedLines.Turnouts,singleanddoublecrossovers,diamondcrossings,singleanddoubleslipcrossings,singleanddoublejunctions,switchexpansionjoints,...,onwooden or concrete sleepers; for ballasted or unballasted tracks; for single orcombinedgauges;withmonoblocMnsteelcrossingsorwithswingnosecrossings;insulated glued joints; transition rails.

FLEXIX S.A.

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  Zamudio (VIZCAYA)
- P: +34 944 97 71 80
- F: +34 944 977 190
- flexix@flexix.com
- www.flexix.com

Flexix develops, manufactures and sell worldwideinjectionandextrusionrubberparts,rubber-metal,rubber-plasticandassemblies.
WebelongtoKächele-FlexixGroup,withplants near Stuttgart and Munich (Germany),Zamudio(Spain)andalogisticwarehouse in Houston (USA).
Our products for the railway sector, are mainlyforinfrastructures,absorptionofvibrationsundertrack,tiepadsforsleepers,withdifferentstiffness,newdevelopments,materials,competitiveness,non-conductivity(oryes,ifnecessary),non-harmfulgases.
TypeofpartsFlexixproduces:Ducts,bellows,tubes,silentblocks,joints,bumpers,axles, links, valves, bearings.
Mixtures:nr,sbr,epdm,cr,nbr/hnbr,eco,aem, acm, vmq/silicone, fkm/fpm.

FUNDACIÓN GAIKER

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This is a private non-profit making organisation, devoted to research and the provision of technological and innovative services for companies. Since its inception in 1985, it has contributed to the technological development and competitiveness of businesses through learning and specialisation and ultimately transferring technologies related to our Areas of Knowledge: Biotechnology, Environment, Recycling and Plastics & Composites to the members of our Foundation and our clients.

FUNDICIONES GARBI, S.A.

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Foundedbackin1972,FundicionesGarbihasevolvedfromatraditionalfoundytoaGlobal Service Company for industry.Weofferafullcatalogueofservicesstartingfrom the casting or other materials till deliveryof"readytouse"partsorassemblysets.Withthisaim,wehavedevelopedanorganizationorientedtowardssolidandcompetitiveprocesses,ensuringqualityfromdesignphaseusingAPQPtools.Wellawareofcustomersatisfaction,weoffertoourclientsadditionalglobalservicesincludingafullrangeofheattreatments,machining,productinspectionandtesting(NDT's, etc), protection and finishing surfacetreatment(Painting,Metallization,Others...), including final assembly of differentparts.FortheRailwayindustrywearespecializedonproductionofrollingstock material.

FUNOR, S.A.

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  C/ Condado de Treviño, 41
  09001 Burgos
  (BURGOS)
- P: +34 947 29 84 80
- F: +34 947 29 82 93
- info@funorsa. es
- www.funorsa.es

Castingsincarbonsteel,alloysteelandstainles steel.
Our products:

- Steel casting.
- Raw castings or fully machined.

Examples:

- Bogie components.
- Pivots.
- Motor housings.
- Pressure rings.
- Axle boxes.
- Links.

GAMARRA, S.A.

- Portal de Vergara, 6
  01013 Vitoria (ÁLAVA)
- P: +34 945 25 16 77
- F: +34 945 27 49 48
- gamarra@gamarrasa.es
- www.gamarrasa.es

Gamarra, S.A. at a glance: Spanish steel foundry-locatedatVitoriaGasteiz-annual production: 4,000 tons - customers: European State Railways, - producers of rolling stock and their subsuppliers - as

foundryandsupplierhomologatedbyDB AG(HPQ),ÖBB,SBB,SNCF(AFQ)(extract) aswellasaccordingtoDINENISO9001: 2000+DIN6700-2.Products:brakediscs, brakeblockshoeholders,buffers,spigots and essential steel castings for bogies.

GANTREX, S.A.

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- www.gantrex.com

GantrexSpain,S.A.istheglobalmarketleaderinspecialtyrailtracksfixationincluding design,production,supplyofgoodsand installationofturnkeycontracts.Railfixation attrainworkshops,embeddedrailsaccesses forPortsorlogisticterminalsandprivaterail installationstogetherwithotherSubway´s andTram´srequiredinstallationsaresome of Gantrex Spain´s main activities.

Products:

- All sections of rails
- Metallic railway sleepers
- Rail fixing Clips
- Rubber pads for rails
- Steelcolumnsfortrainsmaintenance
- Embeddedrailfixationsystems(recycled rubber)
- Embeddedrailfixationsystems(polyurethane)
- Hydraulic buffers

GMV SISTEMAS, S.A.U.

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- P: +34 983 54 65 54
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- ahernandez@gmv.com
- aags@gmv.com
- www.gmv.com

Since 1994 GMV provides Intelligent Transport Systems, offering turnkey solutions and specific products. GMV developsapplicationsadaptedtosector needs,includingsatellitenavigation,mobile communications,passengerinformation, farecollectionsystemsandmonitoring-and-controlcenters.GMV'srailwayportfolio includes fleet management system, SAE-R®,providingoperatorswithanall-in systemforplanningandmanagement,and otherproductslikeCCTV,PA-Intercomm andPassengersVideoInformation,aswell aselectronicfarecollectionsystemsfor railway sector.

GERATU GEMINIS LATHES, S.A.

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- P: +34 943 74 80 60
- sales@geminislathes.es
- www.geminislathes.es

Underthetrademarkoftheprestigious marketleaderGEMINIS,Goratudevelops horizontalandmultiprocesslathesofthe highest technology.

We offer customized solutions for high specialization technologies.

60 years of experience and specialized knowledgeintheRailwaySectorhavelet ustothedesignandmanufactureoflathes formanufactureandmaintenanceofaxles, wheels and wheelsets.

GRUPO EUROGESTIÓN INGENIERÍA DE TELECOMUNICACIONES, S.L.

- Valle del Roncal, 12 28232 Las Rozas de Madrid (MADRID)
- P: +34 91 639 84 75
- jmmartinez@eurogestion.eu
- www. eurogestion.eu

Consulting company focused on the transport market and renewable energies. With a high degree of specialisation in the railway sector, they develop tailor-made applications that allow the automation of data processing to build an information system that provides value to its customers. They also have a set of computer support tools that help them carry out their management.

HICASA - HIERROS Y CARBONES, S.A.

- Polígono de Asipo, P48 33428 Cayés-Llanera (ASTURIAS)
- P: +34 985 26 04 73
- F: +34 985 26 09 05
- info@hicasa.com
- www.hicasa.com

HICASAspecialisesinthestorage,transformation,distributionandcommercialisationofrailwaymaterials,railsandrailway accessoriesofalltypesinaccordancewith bothEuropean(UNEEN),aswellasAmerican(ASTM)Standards,nottomention others such as AREMA, etc.

HICASA belongs to a private group of companies,GEVIR,whichismadeupof fourenterprisesinSpain,andisspecialin thesensethatitcombinesitsroleofdistributorwiththatofmanufacturer,given thatitpossessesitsownspecialistlight rail factory, a fact which endows it with auniquemarketprofile.Wecanboastof aroofedsurfaceareaatourinstallations of over 13,000 m^2, where we dispose of moderncuttinganddrillingmachinesthat enableustotransformironandsteeland tosupplyordersofanyformatandmeasurement,inaccordancewiththespecifications requestedbyourclients.Weexport over 50% of our products abroad.

ICON MULTIMEDIA, S.L.

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- F: +34 979 70 20 21
- ehornos@iconmm.com
- www.iconmm.com
- www.denevads.com

Softwaredevelopmentcompanyspecialized inpassengerinformationsystems,digital signageandadvertisingschedules,covering allareasoftransport,eitherrail/metro,air-ports,busorport.ICONMultimediaalsohas asignificantpresenceintheworldofcom-merce/retail,menuboards,andthebanking sector,withworlwidereferenceclientswith morethan40.000pointsdeployedaround theworld.Itstandsoutforthewidedegree ofcustomizationofyourproducttosuitthe needsorrequirementsofanyclientorthat maybecontainedinastatementoftechni-cal conditions.

IDOM CONSULTING, ENGINEE-RING, ARCHITECTURE, S.A.U.

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- F: +34 944 75 93 64
- cortega@idom.com
- oscar.rico@idom.com
- www.idom.es

IDOM is one of the european leading companies in the field of professional servicesinengineering,architectureand consultancy.Itisanindependentcompany establishedin1957andithasparticipated inover30.000projectsinfivecontinents. In20countrieswith39officesthroughout regions(America:Argentina,Brazil,Canada, Chile,Colombia,USA,Mexico,Perú),Asia (India), Africa (Argelia,Lybia, Morocco), Middle East (Saudi Arabia, UAE), Europe (Belgium,Slovenian,Spain,Poland,Portugal, United Kingdom).More than 3.000 staff possesestheexpertiseandexperiencetoo coverallthephasesofarailwayproject(high speed,conventional,freight,metro,lightrail, tramway,stations,depotandworkshops), from conception to commissioning and beyond.IDOMwillaccompanytheclientby providingthecorrecttechnicalassistance requiredforthedecision-makingprocess: technicalspecificationsfordesign,alternatives studies,demandandtrafficstudies,financial and socioeconomical analysis,basic and detailed design, operational and maintenanceplans,workssupervision,testing and commissioning.

IKUSI S.A.U

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  20014 San Sebastián
  (GUIPÚZCOA)
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- F: +34 943 44 88 20
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- www.ikusi.com

Ikusioffersintegralsolutionsforexploiting the diverse means of urban public transport(Bus/BRT/Tramway/LightRail/ Metro/Suburban),aswellasinintermodal transporthubs.Oneproposal,backedup withatrackrecordreachingbackmore than20yearsinthesector,hasthemain goalofimprovingpassengerexperience, guaranteeingsafety,increasingrevenue fromsecondarysourcesindependent fromthemainactivity,andstreamlining operational efficiency.

IK4 RESEARCH ALLIANCE

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IK4 Research Alliance is a private and independent alliance of R&D centres, a benchmarkintheEuropeanR&Dcontext. It comprises 9 organisations in the Bas-queCountry:AZTERLAN,CEIT,CIDETEC, GAIKER,IDEKO,IKERLAN,LORTEK,TEKNI-KER and VICOMTECH.
TheIK4ResearchAlliancesetsouttoge-nerate,captureandtransferscientificand technologicalknowledgemainlytothe businessframework.Thiswayitcontri-butestowardsimprovingthecompetiti-venessofcompaniesandtheprogressof society.Nowadaysitgathersastaffof1275 and an income of 102M€ in 2014.

IMPLASER 99, S.L.L.

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ImplaserisaSpanishcompanyfocusedin developinginnovativesecuritysignsfor railwayprojects.Innovationandqualityare our mainstays, as we were the first SME beingcertifiedinR+D+linSpain.Implaser hasalltherangeofproductscertifiedby AENORwithphotoluminescentvaluesof 150, 300, 580 and 720 mcd/m^2.
Wearealsospecializedinthemanufacturing ofinformative,securityandaccessibility stickersforcoaches,tobeusedbothindoor andoutdoor.Hardworkandgreatconcern forinnovationhasallowedustodevelop newproducts,suchasphotoluminescent systemscombinedwithelectroluminescent and guiding systems by LEDs.

INDRA S.A.

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Indra is a world leader and pioneer in the supply of technological platforms for railway operations management, controlandsupervision,havingspecific solutionsalreadytestedonhighspeed andconventionallinesandmetropolitan operations. Indra is also a leader in ticketingsystemsfortransportoperators andhasfacilitiesandprojectsalloverthe world.Furthermore,Indradevelopshigh-precisionsafetyandsignallingsystems.At thismomentintime,Indra'ssolutionsare completelyuniquebecauseoftheirhigh level of integration and adaptation to thecurrentandfuturenecessitiesofthe

railwayenvironmentwhatevermaybethe moststateoftheart technologicaland operativeoptions.Indrahasmanaged to open a competitive market for the first time based on technological and economical competitiveness.

INECO-ECONOMIA E INGENIERIA DE TRANSPORTE, S.A.

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  28036 Madrid (MADRID)
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- www.ineco.com

Globalleaderintransportengineering andconsultancy,ithascontributedtothe developmentoftransportinfrastructures forover45yearsinmorethan45countries. Itshighleveltechnicalspecialisationallows itsactivitytodiversifyintonewmarkets andreinforceitspresenceinthosewhere itisalreadyestablished.Itsparticipation inthewholerailwaysysteminSpainhas ledthecompanytodevelopimportant internationalprojectslikethe Makkah-MadinahhighspeedinSaudiArabia,the Ankara-IstanbullineinTurkeyandtheHS2 project in the United Kingdom.

INGETEAM POWER TECHNOLOGY, S.A.

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Ingeteam is an expert leader in the development of electrotechnical and power electronics systems providing involving energy exchanges at large. Our capacities and the experience on the railways sector allow us to offer technologicalsolutionsthatsignificantly contributetoreachourcustomersstrategic objectives,leadingtomaximizeoperational efficiency.Westrivetowardsonofferingin-house/state-of-the-artdevelopmentsfor: -RollingStock:TractionSystemsandTCMS -Infrastructure:EnergyRecoverySystems.

INTERNACIONAL HISPACOLD, S.A

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HispacoldisaWorldleadercompanyfor climatesystemsspecializedincomfortfor peoplewithmorethan30years'experience. HispacolddesignsandmanufacturesHVAC solutionsforallrailvehicles:trams,metros, EMUs, DMUs, LRVs… with proven and reliabletechnologysolutions.InHispacold each activity is based on a solid quality cultureandonarealcommitmentwiththe environment.
QualitycertificationsISO9001,ISO14001, OSHAS18001areonlythesmallestpartof this working way.
HispacoldisacompanyofIrizarGroupSC, whichemployeesmorethan3.000people in the five continents and has a global turnover of more than 550 Million €. This gives Hispacold the benefits from a multinational organization while maintainingan individualcompanyspirit. Hispacold'spresenceinthefivecontinents guaranteesthebesttechnicalassistanceat any place of the world.

INSERAIL, S.L.

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Thisisanengineeringandconsultingfirm oundedin1994andfocusedontherailway, energyandbuildingsectors,developingits activityinthedifferentstagesofplanning, design,constructionandexploitationofin-vestments.

JEZ SISTEMAS FERROVIARIOS, S.L.

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JEZ Sistemas Ferroviarios, S.L. is committedtodesigning,manufacturing, supplyingandmaintenanceofalltypes ofmanganesesteelswitchesandrailway tracksystems,inadditiontomoulded caststeelpartsforthegeneralindustry. OurTechnicalDepartment(Department ofR&D)ensureswehavethecapability ofdesigningandproducingpointsand crossings(turnouts,crossovers,scissor crossovers and diamond crossings) or parts for them, such as hard steel manganesecrossingsorsparetongues. AtJEZSistemasFerroviarios,S.L.wefit ourdevelopmentstomeetclientsneeds.

KIMUA ENGINEERING, S.L.

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- www.kimuagroup.com

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.

LADICIM (UNIVERSIDAD DE CANTABRIA-LABORATORIO DE LA DIVISIÓN DE CIENCIA E INGENIERÍA DE LOS MATERIALES)

- Avda. de los Castros, 44
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- ladicim@unican.es / casadoja@unican.es
- https://ladicim.es/

ThemechanicallaboratoryLADICIM-UC transferstosocietytheknowledgeavailable intheUniversity,throughcontinuousdvisory servicesandagreementswithcompanies and institutions for the development of R&D+i,andcapturestheareasinwhichthe knowledgemustbefurtherenhanced,to then offer a better service.

LA FARGA YOURCOPPERSOLUTIONS, S.A.

- Colonia LaCambra s/n 08509
  Les Masies de Voltregà
  (BARCELONA)
- P: +34 93 850 41 00
- F: +34 93 859 55 30
- gustau.castellana@lafarga.es
  jordi.vilaro@lafarga.es
- www.lafarga.es

La Farga Yourcoopersolutions is a modelcompanyintherailwaysector, withmorethan200years'experience in the copper industry.
A solid international presence and continuousinnovationinthesearch fornewalloyshaveenabledittopro- duce high-service materials.
La Farga Lacambra provides global solutionsforcoppermaterialsandits alloys such as CuMg, CuSn or CuAg, integrating the whole productive processandensuringthemaximum technical qualities.
Theseproductssatisfytheneedsofthe marketforallkindoflinesandspeeds around the world.

LANDER SIMULATION & TRAINING SOLUTIONS, S.A.

- Portuetxe, 23ª Local B3
  20018 San Sebastián
  (GUIPÚZCOA)
- P: +34 943 21 74 91
- F: +34 943 21 74 91
- aohlsson@landersimulation.com
- www.landersimulation.com

LanderSimulation&TrainingSolutions, S.A.,isaCompanyspecialisinginthede- sign,developmentandimplantationof state-of-the-artcommercialsimulationde- vicesaimedattrainingprofessionaldrivers ofalltypesofrailwayrollingstock(under- ground,tramways,regional,longdistance andhigh-speedrailnetworks).Itboastsa powerfulsalesteamsthathasdevelo- pedadirectsalestechniquetopotential clients both in Spain and abroad.

LUZNOR DESARROLLOS ELECTRÓNICOS, S.L.

- Paduleta, 47 01015 Vitoria
  (ÁLAVA)
- P: 945 200 961
- F: 945 200 971
- iarbeloa@luznor.com
- www.luznor.com

Luznor Company is specialized in the design,manufactureandcommercialization ofprofessionaltorches(forrailwayindustry), emergency lighting (for industry and architecture)andotherElectronicdevices. Luznoroffersyou(initsfactoryinVitoria) highlyqualifiedtechnicians,ahighstandard ofquality,aneffectivesystemdevelopment, manufactureandtesting,andaboveall,a philosophyofcommitmenttoourcustomers allowingustoofferinnovativeproducts equippedwithadvancedtechnologyand recognized prestige.

MB SISTEMAS, S. COOP.

- Pol. Ind. Igeltzera - C/ Igeltzera, 8
  48610 Urduliz (VIZCAYA)
- P: + 34 94 403 06 26
- F: + 34 94 403 06 27
- amacias@mbsistemas.es
- www.mbsistemas.es

MB SISTEMAS is part of MONDRAGON CORPORATION.Wedevelopturnkey"World Class"engineeringprojects,implementing automationsolutionsintotheAssemblyand weldingphasesofmanufactureprocessfor carbodystructuresofrailroadpassengercars. Wegive"adhoc"solutionsforthecustomer's needs;havingimplantedsuccessfullyour facilitiesaroundtheworld.Asengineering wedevelopboth,roboticinstallationsand specialmachinesforanyassemblyprocess.

METALOCAUCHO, S.L.

- Polígono Erratzu, 253
  20130 Urnieta
  (GUIPÚZCOA)
- P: +34 943 33 37 55
- F: +34 943 33 37 51
- info@metalocaucho.com
- www.metalocaucho.com

MTCspecialisesinthedesignandmanufacture ofanti-vibrationandsuspensionsolutionsfor Rollingstock.TheCompanywasestablished in1982andcurrentlyhasthreemanufacturing sites,locatedinSpain(HQ),ChinaandIndia. In 2009 the company was awarded IRIS Certification.MTC,beingamongtheleading companies initssector,suppliestothemainRollingstock Constructorsworldwide,includingAlstom, Bombardier,CAF,CSR,CNR,HyundaiRotem, Siemens,Talgo,Vossloh).Wealsocollaborate with Operators for the supply of spare componentsfortheiroverhaulprojects.Our mainproductsarerubber-metalprimaryand secondarysuspensions,focusingonprimary

springs (conical or chevron type), guiding bushes, guiding links, secondary air springs and emergency springs, traction rods, elastic bushings, buffers, layer springs as well as a diverse range of associated rubber-metal solutions.

MGN TRANSFORMACIONES DEL CAUCHO, S.A.

- C/ Candelaria, 9 - Pol. Ind. Camino del Calvario 28864 Ajalvir (MADRID)
- P: +34 91 887 40 35
- F: +34 91 884 45 84
- enp@mgncaucho.com
- www.mgncaucho.com

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 fright trains, taking the lastest technological advances of the rubber world, vibration control and damping systems.

NEWTEK SOLIDOS S.L

- Pol. Abendaño. Urdaneta bidea, 3B. Zarautz (GUIPÚZCOA)
- P: +34 943 83 59 42
- contact@newteksolidos.com
- www.newteksolidos.com

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.

NEM. NUEVAS ESTRATEGIAS DE MANTENIMIENTO, S.L.

- Paseo Mikeletegi, nº 54 - 1ª planta 20009 San Sebastián (GUIPÚZCOA)
- P: +34 943 30 93 28
- F: +34 943 30 93 26
- info@nemsolutions.com
- www.nemsolutions.com

At NEM Solutions we offer total control of business operations and maintenances for the railway industry. Our products and services project the assets' future from data generated daily. The objective is to give our client the possibility to control his/her own business and to avoid surprises. Thanks to our expert knowledge we provide wheel life management, productivity improvement and O&M cost reduction.

PARRÓS OBRAS, S.L.

- Ctra. Virgen del Monte, 1 13260 Bolaños de Calatrava (CIUDAD REAL)
- P: +34 926 88 47 05
- F: +34 926 88 47 06
- rocio@parros.es
- www.parros.es

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 High speed Railway (AVE), PARROS GROUP is distinguished by the versatility of our machines adapted "Adhoc" 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.

PRETENSADOS DEL NORTE S.L.

- Miravalles, 4 (Zona Industrial de Betoño) 01013 Vitoria (ALAVA)
- P: +34 945 258 431
- F: +34 945 261 400
- pretenorte@pretenorte.com
- www.pretenorte.com

PRETENSADOS DEL NORTE produces the best prestressed wire for railway sleepers in the world. More than 30 years' experience, PRETENORTE only uses the best raw materials and we can supply any need required by the client. We have supplied prestressed steel for several projects around the world and our material is considered the one with the best quality in prestressed WIRE world. We have the best and most modern machinery and a highly qualified team of experts and engineers. We also produce prestressed steel used in precast concrete parts and structures.

PATENTES TALGO, S.L.

- C/ Paseo del Tren Talgo, 2 28290 Madrid (MADRID)
- P: +34 91 631 38 00
- F: +34 91 631 38 93
- marketing@talgo.com
- www.talgo.com

Talgo, leading High Speed rolling stock manufacturer in Spain, has over 70 years of experience manufacturing very high speed, high speed, intercity and regional trains, tilting passenger coaches and locomotives.

The company is also a pioneer in providing complete maintenance solutions to railway operators worldwide, and is specialized in the design and manufacture of maintenance equipment for any type of rail vehicles.

PRECON; PREFABRICACIONES Y CONTRATAS, S.A.U.

- C/ Espronceda, 38, local 3
  28003 Madrid (MADRID)
- P: +34 91 343 03 48
- F: +34 91 359 12 46
- fsanchez@precon.cemolins.es
- ferroviario@precon.cemolins.es
- www.cemolins.es

PRECON is the Spanish leader in design and supply of precast concrete products for railway tracks, either ballasted and ballastless tracks.
PRECON has supplied solutions based on monoblock, twinblock, block, slabs and sleepers for switches and crossings. Either for high speed, conventional lines, heavy haul, subways and tramways.
PRECON from its two Spanish factories has supplied more than 15 millions twinblock sleepers, 5 millions monoblock sleepers, 500,000 ml sleepers for switches and crossings and currently manufacture most of the slab track systems in use in Spain.

REVENGA INGENIEROS, S.A.

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  (MADRID)
- P: +34 91 806 18 10
- F: +34 91 804 19 55
- marketing@revenga.com
- www.revenga.com

Revenga Smart Solutions started in 1972 as Revenga Ingenieros SA As of 2006, the Revenga Group was formed, which through four business lines / companies serves the Transport (GR Technologies), Security (Triedro), Telecommunications (3dnet.es) and Energy (Ge2) sectors. Currently they are integrated under a single brand and company, Revenga Smart Solutions, focusing on the transport, telecommunications and security sectors.

SATYS INTERIORS RAILWAY SPAIN S.A.

- Isla de Jamaica, 8
  28034 Madrid (MADRID)
- P: +34 91 334 15 90
- F: +34 91 358 05 64
- marketing@kelox.es
- www.kelox.es

Kelox launched its railway activity in 1977, manufacturing catering equipment for dining cars on long distance lines. The experience and knowledge acquired over the years have become Kelox specialist in the design and full supply of galleys and catering equipment for high-speed, shuttle and regional trains. Our style of design is characterised by harmony; it is beautiful, ergonomic and functional, always according to the customer specifications.

SEMI, S.A. (GRUPO ACS)

- Avda. de Manoteras, 6 2ª Planta
  28050 Madrid
  (MADRID)
- P: +34 91 308 93 35
- F: +34 915 218 597
- ferrocar@semi.es
- www.semi.es
- www.grupoacs.com

A society in international expansion. With the adaptability of a small business, the infrastructure of a big company and the financial backing of a large group. SEMI is encompassed in the major companies of Industrial Services sector of the ACS group. Focused in the industrial field, SEMI build infrastructures for energy, transport, communication, environment and non-residential building. Activity in the railway area: Electrification and Traction Substations for AC and DC, Auxiliary Electrical Equipment, Engineering and Consulting, Maintenance of Catenary and Substations, Infrastructure for Railway Signaling and Communications.

SEGULA TECHONOLOGIES SPAIN

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- F:+34 917 991 113
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SEGULA Technologies is an international engineering consultancy group specialised in cutting-edge innovation.
Since 2002, SEGULA Technologies is present in Spain. We are an engineering services company with more than 1.000 professionals working in Staffing, Consultancy, PLM and Fixed Price Projects.
It is based in 12 locations in Spain: Madrid, Barcelona, Vitoria, Zaragoza, Bilbao, Pamplona, Vigo, Valladolid, Vigo, Valencia, Sevilla and Cartagena close to the main customers.
In 2016, SEGULA Technologies turnover in Spain was more than 54 million Euros.
More than 60% of our collaborators are university graduates. Our customers include leading companies in leading sectors: aeronautical, automotive, energy, industry, IT, rail, etc…

SENER INGENIERÍA Y SISTEMAS, S.A.

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  48930 Getxo Las Arenas
  (VIZCAYA)
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- F:+34 94 481 75 01/+34 91 807 87 32
- dep.infraestructurasytransporte@sener.es
- www.ingenieriayconstruccion.sener

Sener is one of the leading engineering and technology groups in Europe with over one billion euros of annual turnover, more than 5,000 professionals and a continuously growing international presence with offices in more than 15 countries. In the field of railway engineering, Sener count 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 or ICE services.

SICE TECNOLOGÍA Y SISTEMAS S.A.

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- P: +34 916232200
- F: +34 916232201
- sice@sice.com
- www.sice.com

SICE Tecnología y Sistemas, (SICE TyS) is a multinational group of Companies, technology and systems integrators operating in the fields of traffic and transport, environment and energy, telecommunications and all types of industrial processes.

SICE TyS' transport activities are focused on meeting the needs of users, operators and transport operation concessionaires in the transport sector.

As a systems integrators and systems suppliers, they offer unique technological solutions tailored to all kind of installations. Design of the Centralized management of all services that complement any form of public or private transport and integrates different solutions and systems:

- Security & Safety Systems for Metros and Railways
- Telecommunications Systems for Metros and Railways
- Signaling: (Interlocking, Level Crossing, CTC)
- Electric BRTs
- Ticketing
- Public transport prioritization
- Consulting Engineering (OFITECO): Railways lines, Tunnels, Load test (railways bridges).

SIEMENS RAIL AUTOMATION S.A.U.

- Ronda de Europa, 5 28760 Tres Cantos. (MADRID)
- P: +34 91 514 80 00
- www.siemens.es/railautomation

Siemens Rail Automation is the resulting Company after the acquisition of the Invensys Rail Dimetronic group by Siemens. The new division offers integrated mobility solutions through the most advanced technologies for railway signalling and train control. Our main purpose is the supply of "turn-key" projects, including all the phases of design, development, supply, manufacturing, installing, testing, commissioning and maintenance of railway signalling systems and automatic train control systems for either mass transit applications as main line and high speed lines.

The solutions and systems of Siemens Rail Automation allow railways and metropolitan networks to improve the safety of their railway application; increase the capacity of the lines; reduce operating costs; optimize maintenance works; obtain a better usage of its rolling stock, having at the same time lower energy consumptions rates and to decrease energy consumption.

STADLER RAIL VALENCIA S.A.U.

- Pol. Ind. del Mediterráneo C/ Mitjera, 6 – 46550 Albuixech (VALENCIA)
- P: +34 96 141 50 00
- F: +34 96 141 50 02
- stadler.valencia@stadlerrail.com
- www.stadlerrail.com

The new Spanish División of Stadler has a long history as rail vehicles provider. Stadler Rail Group completed the purchase from the Vossloh Group of its Spanish business unit of manufacture of locomotives and light rail vehicles at the end of 2015. This acquisition falls within the long term growth strategy of the Stadler and reinforces its position as one of the leading manufacturers of railway vehicles with new products and the access to new markets.

Technology and quality are the key points of the entire range of products developed and produced in the Valencia plant. Closely linked with the industrial heritage of railways and with the benefit of more than a century of experience, Stadler Rail Valencia designs and manufactures state-of-the-art locomotives as well as passenger trains and provides a comprehensive range of services such as the maintenance of the vehicles, spare parts logistics, technical support or training.

TALLERES ALEGRÍA, S.A.

- C/ Peña Santa, 7 - P.I. Silvota 33192 Llanera (ASTURIAS)
- P: +34 985 26 32 95
- F: +34 985 26 60 1
- talegria@talegria.com
- www.talegria.com

Talleres Alegría with more than 100 years at the service of railway´s networks, offers to its customers a wide range of fixed track equipment with the best quality and service conditions. Following its own technical design or its customer's, Talleres Alegría manufactures among other turnouts for High Speed Lines, conventional Lines, subway and Tramway lines, as well as End Forged Switch Points and Track Vehicles. Being aware of the relevance of comfort within the railway sector, Talleres Alegría has collaborated with leading companies developing and applying technical solutions for mitigating noise and vibrations during the crossing over the turnouts.

TALLERES ZITRÓN S.A.

- Autovía AS II. nº 2386
  33211 Gijón (Asturias)
- P: +34 985 168 132
- zitron@zitron.com
- www.zitron.com/

ZITRONisaninternationalleadingcompany, withover50yearsofexperience,indesigning, manufacturing,installingandcommissioning completeventilationsystemsformetrosand railways tunnels.
ZITRONhasmorethan500referencesworld-wide,includingthelargestprojectscurrently inprogress,suchasCrossrail-Londonand Doha Metro.

TECNIVIAL

- C/ Livorno nº59
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  (GUADALAJARA)
- P: +34 949 32 50 00
- F:+34 949 25 20 80
- export@tecnivial.es
- www.tecnivial.es

Created in 1973, Tecnivial is the Spanish reference in traffic safety. It contributes giving solutions regarding Airport, Railways, and Road Signaling and marking.
The challenge for a permanent evolution, technological innovation, and customer´s satisfaction are our identity signs. In Tecnivial we specialize in all types of fixed signalling for roads, both conventional and high speed lines; in this last section are one of the companies approved by the Railway Infrastructure Administrator (ADIF).
We have extensive experience in railway stations signalling, carefully following the specifications of the corporate identity manuals. We develop comprehensive and customised signage projects, from project design to final installation and maintenance service.
Tecnivial has always been committed to the I+D+i, which has allowed it to be a reference in the fixed railway signaling, high-speed and conventional network, while being present in the most relevant projects at the national level; this is the case of the Madrid-Figuerasor Olmedo-Orense sections, and internationally, Ave Medina-La Meca.

TEKNORAIL SYSTEMS, S.A.

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  28046 Madrid
  (MADRID)
- P: + 34 91 515 60 00
- F:+ 34 91 564 72 86
- info@teknorail.com
- www.teknorail.com

Teknorail Systems, S.A. is a company belonging to the EUROFINSA Group, whose activity focuses on the development of railway interior projects, aimed both for the refurbishment of existing vehicles and also for new rolling stock, with a scope of supply that ranges from the design and engineering to the industrialization and material supply, including the technical assistance to the car commissioning.
Teknorail's main goal is to provide its customers with high-quality solutions for railway interiors by means of innovation, global project management, modular supply and flexible solutions.

TELICE S.A.

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- www.telice.es

Telice is a Spanish company with 39 years of experience in several fields of technology installation, especially for the railway sector. Our activities cover design, installation and maintenance for Railway Electrification Systems, Railways Safety and Signalling, Optical Fiber, Industrial Automation and Electrical Installations
Our extensive experience has made Telice a preferred partner for carrying out work and providing services for important railroad administrations and major construction and technology companies in the railroad industry.

Teltronic, S.A.U.

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  50016 Zaragoza
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- P: +34 976 46 56 56
- F: +34 976 46 57 20
- fsanjuan@teltronic.es
- www.teltronic.es

Backed by over 40 years of experience in the design, manufacturing, and deployment of Professional mobile radio projects worldwide, Teltronic presents a broad portfolio of critical communications solutions for transport sector, providing complete solutions: network infrastructures, control centres, and end-user equipment, including specialized onboard systems specifically designed to meet train, metro, tram and LTR needs.
The company's technical independence and willingness to customize its solution to each specific project allow Teltronic to fulfil the most demanding requirements in both communication and security systems.
Besides voice and data transmission solutions, the company offers a wide portfolio of integration services with other subsystems, such as interconnection with PA and intercom systems, applications to manage and control fleets and for operating aid, real time CCTV in trains and stations or communications support for signalling systems ETCS, CBTC, PTC, among others.

THALES

THALES ESPAÑA GRP, S.A.U.

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- F: +34 91 273 78 67
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- www.thalesgroup.com

ThalesisaWorldleaderinMissionCritical Solutions for Land Transportation. Thales Spain, with more tha 60 years of experience,hasbeenpioneerandleaderin thetechnologicaldevelopmentoftheSpanish railways,beeinoneofthemainsuppliers ofsafetyandtelecommunicationsystems fortheSpanishRailwaysAdministrations andpresentincountriesasTurkey,Mexico, Algeria, Malaysia, Egypt and Morocco. Its activity goes from the development, manufacturinginstallation,commissioning to the maintenance of equipments and systemsforrailwaysignalling,traincontrol, Telecommunication,Supervisionticketing and critical infrastructures security.

getinsa-euroestudios

tpf INGENIERÍA

TPF GETINSA-EUROESTUDIOS S.A.U.

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- F: +34 91 456 09 83
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Withmorethan50yearsofexperience,TPF GETINSAEUROESTUDIOShasgrowninto aleadingbusinessgroupinSpainandan

internationalbenchmarkintheengineering sectoroftransportationinfrastructuresand the environment.
Theprojectsandstudiesrequiredtodevelop publicworksandlinearinfrastructuresare achievedthankstoourhumanandmaterial resources.
Weareexpertsonthecomprehensivema-nagementofinfrastructureinallitsphases, startingfromthepreliminarydesignupto theoperationandmaintenance,including alltheintermediarystepsasprofitability analysis,studies,projects,workscontrol andsupervision,aswellasfinancialmana-gement.Theseactivitiesaredevelopedboth in Spain and abroad.
Ourinternationaldelegationshavebeen establishedindifferentcountriesandour experienceextendsover40countriesin Europe,Asia,America,MiddleEastandAfri-ca.Wearecurrentlyworkinginternational projectsin30countries.Atpresent,theTPF Getinsa-Euroestudiosemploysmorethan 1200professionals,twothirdsofwhomare university graduates.

TRIA INGENIERÍA Y TÉCNICA DEL TRANSPORTE S.A.

- C/ Romería, 6
  28600 Navalcarnero
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- P: +34 91 811 49 84
- F: +34 91 811 16 28
- triaingenieria@triaingenieria.com
  ngonzalez@triaingenieria.com
- www.triaingenieria.es

TRIA started with a core of railway engineers, providing solutions for automatic gauge changing technolo-gies. They were demanded EPC type solutions that included civil works, fabrication of mechanisms, electrical engineering and installations, auto-mation and control, track & catenary, comunications, signalling, etc.
Thus, the company eagerly became railway infrastructure and rolling stock experts. They built its own workshops, adquired railway machi-nery and above all, they have put to-gether, a highly motivated, and qua-lified human team.

TRIGO GROUP

- Parque Empresarial La Negrilla, C/ Papiro, 8- 9, 41016
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- antonio.peco@trigo-group.com
- www.trigo-group.com

TRIGOEspañaisasupplierofqualityservi-cesdevotedtoindustrialsectors,throughout theentiresupplychain.Foundedin2001,it providesquality-assuredservicesinproducts, maintenance,managementofindustrial meansandmetrologywithmorethan600 QualityStandardsofficersinSpain.TRIGO GROUPispresentinmorethan25countries withaworkforceofmorethan10,000pro-fessionals.
FromTRIGOEspañaweexporttotherailway sectorhigh-valuegoodpracticesdevelopedin the aerospace or automotive sectors.

TYPSA

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TypsaGroupisoneofthemostimportant Europeanconsultinggroupsandleaderin thefieldsofcivilengineering,architecture and the environment.
Since its creation, in 1966, Typsa Group's ever-increasingactivities,havingfocused both on preliminary assessment and on design, as well as supervision and/or management of construction projects in Europe,theAmericas,AfricaandtheMiddle East.Typsaisoneofthemostexperienced Spanish consulting firms in the field of railwaysandmetrosystems.Wehavebeen involved in more than 4,700 km of High Speedlines(HSL),2,600kmofconventional lines,390kmofconventionalmetroand450 km of tram and light-rail transits.

VALDEPINTO, S.L.

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- F: +34 91 691 57 03
- lauraparra@valdepinto.net
- www.valdepinto.com

Valdepinto,S.L.wasestablishedin1986and focuses its activities in the Railway sector. We have four main product lines:
- Alltypesofmachining(specialistsinelectrical insulation).
- Screenprinting,SignsandEngravinglow-relief.
- Metal transformation and welding.
- Design and fabrication of transformers andcoilsofhigh/lowvoltage.Ourphilosophy istoalwaysofferallourclientsanunbeatable valueforMoney,combinedwithanexcellent service.

VICOMTECH (FUNDACIÓN CENTRO DE TECNOLOGÍAS DE INTERACCIÓN VISUAL Y COMUNICACIONES)

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- mtlinaza@vicomtech.org
- www.vicomtech.org

Vicomtech is an applied research centre, founded in 2001 and located in the San SebastiánTechnologyPark,whichdevelops technologicalolutionsinthefieldsofCom-puterVision,DataAnalytics,ComputerGra-phics,AdvancedInteraction,andLanguage Technologies.Theresultsoftheirresearch projectsareappliedtovarioussectorssuchas automotive,rail,intelligenttransportsystems, industryandadvancedmanufacturingand energy,amongstothers.Allofitsactivitiesare regulatedwiththeR&D+Imanagementsys-tem,suchasthecontinuousimprovementof resultsanditsmeasurement,theoptimisation oftechnologicalinnovationprocesses,aswell asthetransferandgenerationofknowledge, thusensuringthatitusesmethodologiesof the very highest quality.

At the forefront of Rails Solutions

ArcelorMittal Rails & Special Sections has rail production facilities in Poland, Luxembourg, Spain and the United States that offer a wide portfolio of products, covering rails for subways, trams, trains, light rails, crane rails, crossings and rail accessories. The company is a specialist in rails for high-speed rail networks, with over one million tonnes produced and is present in infrastructure projects in over 30 countries. Its high technologic quality allows ArcelorMittal to participate in the more demanding tenders all over the world.

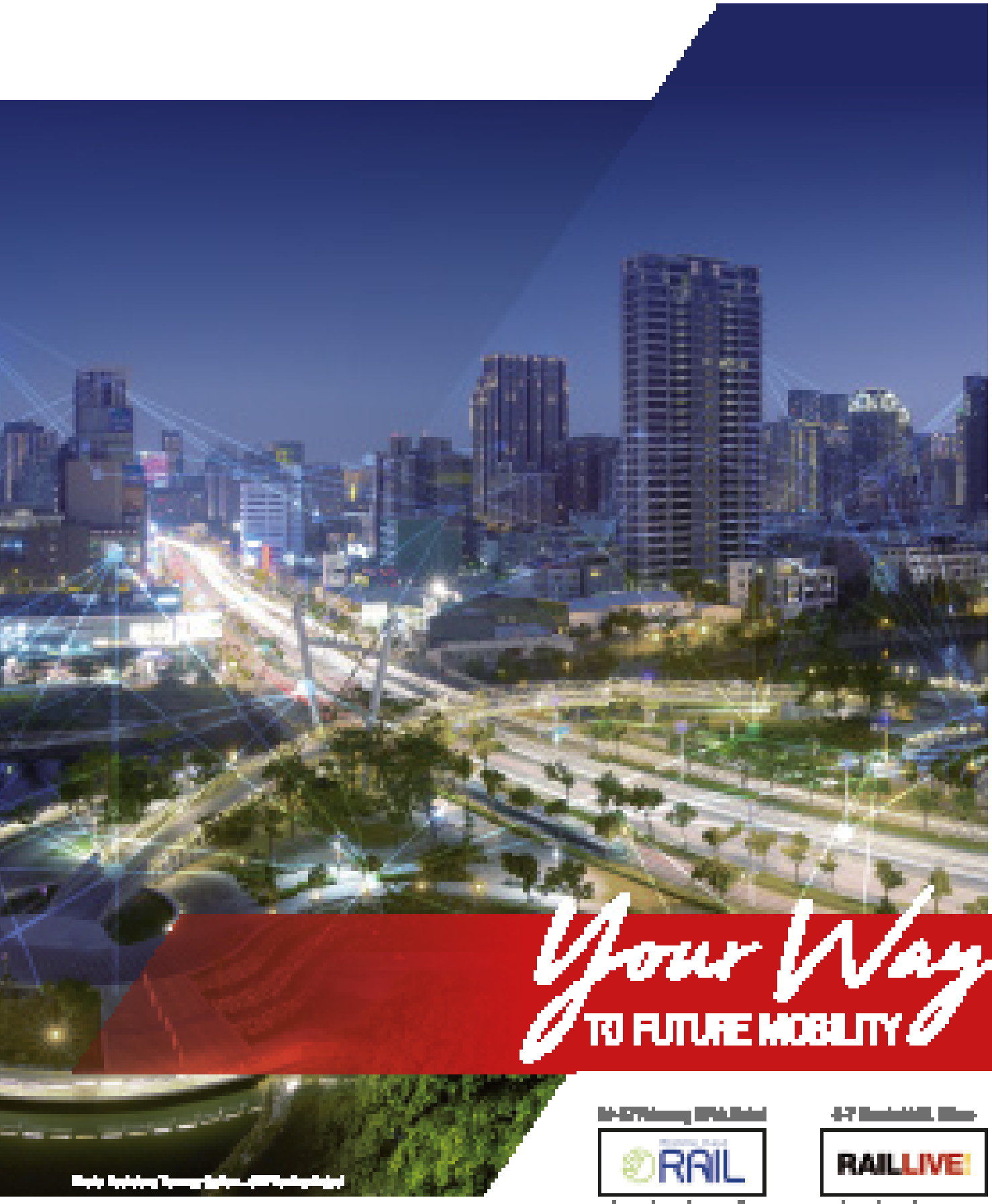
ArcelorMittal's main trending topics for railway:

- **Corporate Social Responsibility:** ArcelorMittal has received the Ecovadis Gold rating.
- **R&D**: ArcelorMittal operates a dedicated rail research and development unit which includes pilot plants and prototyping facilities. Its Rail Excellence Centre also includes a dedicated welding centre which can provide advice and support for current and future grades for its customers.
- **Digitalisation:** ArcelorMittal Rails & Special Sections is extending its 4.0 transformation with the launch of several digital tools.
- **Increasing the length of rails**: in order to provide further track safety, welding, track laying and maintenance cost savings.
- **Increasing the service life of rails**: with the most appropriate solution related to different applications; LCV (Low Carbon Vanadium) for tramway or new hardness grades for heavy haul applications.

New ArcelorMittal rails calculation tool
Available now for download
in your app store

Rail Tool

rails.arcelormittal.com



Your Way

TO FUTURE MOBILITY