

SOUTHEAST ASIA

Road towards a new rail map



IN DEPTH: RAIL BALTICA
A priority mega project for Europe.



INTERVIEW:
Kaspars Rokens, Chief Operating Officer
de Rail Baltica.



MAFEX
Characterisation and
international presence
of its partners
2016

MAFEX INFORMS:
Submission of the report into the characterisation
and international presence of its partners.

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This plan aims to enhance the joint work between the private and public sectors to gain improved standing worldwide.

LATEST DETAILS FOR THE "14TH WORLD METRO & LIGHT RAIL BILBAO 2018"

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120 YEARS BUILDING TRAINS IN VALENCIA

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STADLER

The Spanish railway industry opens pathways around the world

Dear friends,

A new year begins, full of initiatives to boost our sector throughout the world. From the association, tasks are ongoing intensively to ensure this. One of the final steps is the publication of the report "Mafex. Characterisation and international presence of its partners. This study seeks to provide partners with a general overview of the Spanish rail industry. For this purpose, the most relevant parameters of the companies that are part of the association and develop their activity in this sector have been analysed. Amongst them, aggregate business figures, number of employees, volume and destination of exports or international presence.

In the last months of 2017, the association has also been present in the main institutional events that have had the railway as their focal point. On the one hand, the submission of the "Plan for the Internationalization of Transport and Infrastructure 2018-2020" of the Group of Public Works; which seeks to promote joint endeavours between the private sector and public companies under the auspice of The Ministry of Public Works to gain standing abroad. On the other hand, the conference on 'Spanish companies, at the forefront of state-of-the-art railways', in which the weight of this sector in the Spain Brand was highlighted. Likewise, in this issue Mafex informs of the latest details of the "14th

World Metro & Light Rail Bilbao 2018", with little more than three months prior to its doors opening. In the section entitled "Partner News", the latest news from 14 of the associated companies can be found, which the spotlight is on their progress and consolidation: achievement of new contracts, changes within the organisation, anniversaries, etc. In the section "In depth", a report is included on one of the most important rail projects in Europe; Rail Baltica, a modern corridor that will integrate Estonia, Latvia and Lithuania into the European network and that will bring about significant change in terms of mobility.

On the other hand, the first issue of the Mafex magazine of the year focuses its "Destination" report in one of the emerging areas with the best prospects for the sector, Southeast Asia. Specifically, a comprehensive article on future infrastructure plans approved in the Philippines and Indonesia. Alongside this, there are eight technological advances that are detailed in "Innovation" and that highlight the importance that R + D + i holds in associated companies.

We hope, once again, that this year 2018 you will continue to rely on Mafex magazine as a communication tool so that you can learn first-hand all the news of the railway industry and the contribution of Spanish companies to its development throughout the world.

MANAGEMENT: MAFEX.

MAFEX COMMUNICATION COMMITTEE: Albatros, Alstom Transporte, ArcelorMittal, Bombardier España, CAF Signalling, Idom, Indra Sistemas, Ingeteam, La Farga Lacambra, Patentes Talgo, Siemens España, Thales España and Stadler Rail Valencia S.A.U. **ADMINISTRATION:** comunicacion@mafex.es. **ADVERTISING:** comunicacion@mafex.es. **SUBSCRIPTIONS:** comunicacion@mafex.es. Mafex magazine is not responsible for the opinions, images, texts and works of authors and readers that will be legally responsible for their content. It is understood that the signing authors have given their consent to be included, for which he or she will be responsible. Also, the magazine is not responsible for typographical errors contained in the original documents submitted by the authors.

Mafex publishes the report into the characterisation and international presence of its partners 2016

THE ASSOCIATION HAS DRAFTED A STUDY INTO THE MAIN CHARACTERISTICS OF THE SPANISH RAILWAY INDUSTRY, THE DESTINATION OF ITS EXPORTS AND FUTURE CHALLENGES FACED.



The report entitled "MAFEX: Characterisation and international presence of its partners 2016" aims to offer an overview of the Spanish railway industry. For this purpose, the most relevant parameters of the companies that are part of the association.

In the first chapter "Report Presentation and Aims", an explanation is given to the aims of this document to obtain a swift and simple overview of the companies that comprise the association and the export work that they and the sector as a whole have developed in recent times, and especially throughout 2016. The second section focuses on "Trends within the Sector", and spotlights

the positive forecasts predicted until 2021, as has been duly seen in the data provided by the "World Rail Market" from Roland Berger drafted for Unlfe (European Railways Association). Along these lines, based on a worldwide business volume of 159 billion euros, growth rates are projected of an annual average of 2.6%, particularly in the sphere of inter-urban transport. Alongside this, progress in legislation is summarised, such as the Fourth Railway Package or the approval of the Resolution for the Competitiveness of the Sector. In addition, the main factors that ensure the increase and sustained growth of the demand for investments in this field in forthcoming years, along

with the challenges to which the railway industry must respond and work on are highlighted: R + D + i; new technologies within the digital ecosystem; fostering of the analysis of the life cycle of the product, services associated with the product; dimension of the companies, more sophisticated proposals or professional training.

In the third section the "Definition and Sectorial Characterisation" is touched upon. Worthy of special mention herein, amongst other aspects, are the sectorial distribution of MAFEX companies: Infrastructure / Superstructure 43%; Systems, Equipment and Components for Rolling Stock 36%, Rolling Stock 14% and Information and Data Systems 7%. Likewise, data on export figures for 2016 is included in which these stood at 8.259 billion euros. If this amount, approximately 3.312 billion euros are strictly attributable to railway activities.

Fourthly, the report analyses the "External Activity of Spanish Railway Companies". This section includes an export map of the industry, and provides information on the main destinations abroad, as well as in the autonomous communities of the country. At the present time, MAFEX partner companies are present in 88 countries, with more than 233 delegations and production facilities.

Finally, this information is completed with the description of some of the most representative examples of the contracts awarded to the MAFEX partners in 2016 and its 10 main destination markets: France, Finland, Portugal, Germany, United Kingdom, Romania, Saudi Arabia, Chile, Algeria and Kazakhstan.

For more information or to request the document, please contact: mafex@mafex.es

Mafex, attendee of the *Marca España* event on Spanish railway technology

The Railway Museum hosted, on October 31, the act 'Spanish companies, at the forefront of state-of-the-art railways'. An event in which the Minister of Public Works, Íñigo de la Serna, and the High Commissioner of the Government for Marca España, Carlos Espinosa de los Monteros, participated. The occasion served to present a promotional video of Marca España focused on the strength of Spanish industry in this sector. Furthermore, a new brochure was presented to publicise the flagship projects in the world in which firms from our country are involved in. The event brought together executives from companies and institutions in the world of transport, representatives of international investment funds, as well as ambassadors and the diplomatic corps of

THE EVENT SPOTLIGHTED THE WEIGHT OF THE RAILWAY SECTOR IN THE WORLD AND THE FORTITUDE OF ITS INDUSTRY.

countries interested in infrastructure projects. Alongside them, members of the main associations such as Mafex.

The information material presented highlights Spain's global leadership in the entire railway value chain: design, civil works, signage, safe management of rail traffic, supply of rolling stock, operation and maintenance. In addition, it underlines a highly competitive, highly professional and highly integrated industrial fabric. This strength has made it possible for the industry to lead the most outstanding railway projects throughout the world, with a presence in more than ninety countries spread over five continents. 🌐



Image: Spanish Ministry of Public Works.

Countdown to the "14th World Metro & Light Rail Bilbao 2018"

The organisation of the "14th World Metro & Light Rail Bilbao 2018", with little more than three months before it opens its doors, enters its final phase. At this stage, we are working on finalising the details of the programme one of the most important international professional platforms devoted to metropolitan and light rail. Representatives from more than 35 countries can find out more about the latest technological advances in the sector in the exhibition area. In addition, an extensive programme of simultaneous conferences has been prepared in which approximately 150 international speakers will be giving addresses. On this occasion, the headquarters will be Bil-

THE BEC (BILBAO EXHIBITION CENTER) WILL HOST FROM 18 TO 19 APRIL 2018 ONE OF THE MOST RELEVANT TRADE FAIRS AND CONGRESSES IN THE METROPOLITAN RAIL AND LIGHT RAILWAY TRANSPORT SECTOR.



bao and has the support of Mafex in the organisation of the event. Also, amongst the wide range of institutions that support the event is the Basque Government, SPRI group, ETS, Euskotren, Metro de Bilbao and the collaboration of Adif and RENFE. The entire programme, the list of exhibiting companies, as well as the speakers and scheduled technical visits are available for download at the following address: <http://www.terrapiinn.com/conference/metrorail/index.stm>. 🌐

Presentation of the "Plan for the Internationalisation of Transport and Infrastructure 2018-2020"



Picture taken at the time of the event. Photo: INECO.

Mafex attended, on December 13th, 2017, the presentation of the "Plan for the Internationalization of Transport and Infrastructure 2018-2020" hosted by the Ministry of Development. This represents an initiative that aims to promote joint work between the private sector and public companies of the Development Group - Aena, Renfe and Adif as maximum exponents - to gain acknowledgement abroad and generate more numerous and greater business opportunities for Spanish companies overseas. This project, developed by Ineco, has had the collaboration of the construction and engineering sector, and highlights the business opportunities, worth more than 2.5 billion euros, in 11 priority countries over the next 10 years.


The 11 markets that are highlighted in the plan are: Saudi Arabia, Australia, Canada, Colombia, United Arab Emirates, Mexico, United States, Norway, Peru, Sweden, United Kingdom.

The plan will serve to specify the markets in which the Spanish offer has a better standing. To achieve

this, six lines of action have been defined, including 110 initiatives in two years. These include the organisation of specific Spanish summits in the priority countries, the organisation in our country of conferences on innovation in transport, the presence of the sector in the media, the participation of the companies of the Development Group in the forums of technical, regulatory and legislative natures, as well as inter-ministerial collaboration. With all this, the image generation of the sector is pursued, the maximum use of the comprehensive capabilities of

IN THE EVENT, VÍCTOR RUIZ, CEO OF MAFEX, PARTICIPATED IN THE ROUND TABLE "KEYS TO INNOVATIVE INTERNATIONALISATION" WITH THE PRESIDENTS OF OTHER ASSOCIATIONS AS ANCI, FIDEX, SEOPAN AND TECNIBERIA.

the Spanish offer, along with institutional influence.

Additionally, as explained by the Minister of Development, Íñigo de la Serna, the Spanish Ombudsman for Transport and Infrastructure will be launched; a meeting platform for the sector that will have the representatives of Seopan, Anci, Tecniberia and Mafex, amongst others, whose aims will be to assess the evolution of the conjuncture of the different markets, oversee the actions carried out in the countries, bringing together information and knowledge of the different agents involved, as well as outlining the required institutional support. All this will contribute to providing greater coherence, coordination and complementarity to the international actions of Spanish companies. 

On the 2nd of November, Mafex was in attendance at the event presented by the Minister for Public Works, Íñigo de la Serna, on the Innovation Plan for transport and infrastructures 2017-2020, which fosters Spain's worldwide leadership in the sphere of transport and infrastructures, with the final user as the focus of the process and the participation of society as a whole.

The plan entails a road map that aims to integrate and coordinate the entirety of the activities involved in the framework of innovation in companies and institutions forming Grupo Fomento. In line with this, the aim is to foster the promotion constitution of an innovative space that integrates all sectors of society and coordinates a network of connections between them, with standout role for start-ups that allow for the acceleration of the integration of technology into the projects undertaken.



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Egypt National Railways relies on thales to modernise and cybersecure railway network

THALES SPAIN

Thales has been awarded a 3-year contract by Egypt National Railways (ENR) for the modernisation of the signalling and telecommunications systems and all works related to a 180 km section of line between the towns of Asyut and Nagh Hammadi,

located in the Upper Egypt portion of the Alexandria–Cairo–Aswan rail corridor.

The project is part of an ambitious plan, promoted by the Ministry of Transport and completely financed by the World Bank, aimed at transforming Egypt's railway infrastructure.

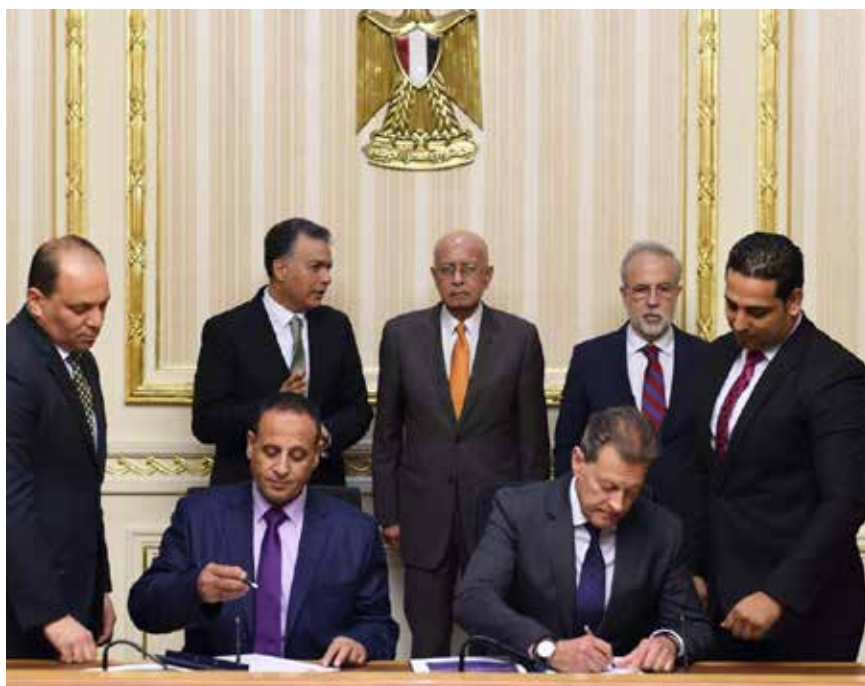
This project will improve traffic safety and security to allow trains to travel at speeds of up to 160 km/h,

as opposed to the current 120 km/h, and traffic volumes are expected to double. All of these changes will increase passenger and goods transport capacity across the backbone line that links the North and South of the country from Alexandria to Cairo all the way up to Aswan.

This solution is designed to work together with the existing ATP system (Automatic Train Protection) and a future European Train Control System (ETCS).

The project includes full protection of signalling and telecommunications systems against cyberattacks to ensure safety and system availability.

This is Thales's second contract in this domain in Egypt and follows the project awarded in 2013 to modernise the line connecting Alexandria with Cairo. ENR is the second-largest railway operator in Africa. The network includes more than 5,000 km of lines and is the longest-established rail network in the world after the United Kingdom's. Today, Thales's ETCS solutions have been deployed on the world's most prestigious and demanding rail projects.



CAF signs a contract with Naples metro

CAF

CAF has entered into a contract with Naples City Council for the supply of 10 units of 6 cars for Line 1 of the city underground to be delivered during 2019.

This project award was provisionally announced in mid 2016 for an approximate amount of €90 million and envisages an extension of the original scope of supply with 10 additional trains.

CAF has a strong presence in Italy and has carried out the following projects, among others: Rome Metro; the supply of commuter units for Bari and the north region of Friuli Venezia Giulia, the supply of diesel trains for Sardinia regional lines; as

well as retrofitting E-401 locomotives for Trenitalia.



ICON Multimedia leads smart mobility in Medellín Metro

ICON MULTIMEDIA

ICON Multimedia will implement its Communication System, Deneva, in Medellín Metro, with the collaboration of the colombian company Grupo Union. The contract is part of the smart mobility projects of the city, to achieve technological transformation in the intermodal transport area.

The solution of ICON Multimedia covers the installation in all metro stations in Medellín and involves the updating of the same platform already installed in the tram and cable network of Aya-cucho.

Deneva will be integrated as part of the Citizen Information Center (CIC). Through large format screens located in the main accesses, it will show real-time information to passengers about traffic



and incidents in the metro, news, the weather forecast or social net-

works, as well as any other interesting communication.

SEGULA TECNOLOGIAS develops new interior design concepts for the Railway Sector

SEGULA TECNOLOGIAS SPAIN

The Centre for International Excellence in the Railway Division of

SEGULA TECNOLOGIAS, located in Saragossa, has developed two new seating concepts for lightweight high capacity trains: GECKO and KATHISNEA, with flexible layouts adaptable to any manufacturer of rolling stock.

These modular concepts include anchoring, folding and hiding systems, so that the capacity of the car adapts automatically to the demand of passengers in real time, increasingly required in special events (trade fairs, sporting events, rush hours ...).

Modularity of the train in use

GECKO SYSTEM is a method located in the side cladding of the car, with an electronic activation module operating on demand. The folded seat is hidden and fully integrated into the wall.

On the other hand, KATHISNEA SYSTEM consists of a folding rectangular module that integrates two folding seats on each side, with two different uses: fold down (anchored to the side of the train) so that two users can sit, and unfolded (perpendicular to the train axis), so that four passengers can use them.



ArcelorMittal Rails launches its Rail Tool app

ARCELORMITTAL

ArcelorMittal Europe – Long Products Rails & Special Sections is now launching the ArcelorMittal Rail Tool app in continuation of the permanent evolution in the rail sector.

Available now in stores for iPhone, iPad and Android, it allows rail key players to:

- Get interactive information regarding standards and profiles for different rail product typology.
- Calculate rail length or tonnage for different types of railway projects (rail calculator available online and offline).
- Download the dimensional profile drawing for transport, tram, light and crane applications.

Do you want to know more, visit:
rails.arcelormittal.com



Alstom Spain ships the first additional train for Line 1 of the Metro of Lima, Peru

ALSTOM SPAIN

Alstom has started the shipment of the new trains for the additional order for Line 1 of Lima metro. In 2016, Alstom signed a contract

with Graña y Montero Ferrovías for the supply of 20 additional trains and 39 cars in order to increase Line 1's fleet.

The factory of Santa Perpetua, Barcelona, is in charge of the design, manufacturing and commissioning of the new trains.

The Lima metro line 1 is 34 km-long and includes 26 stations. It crosses the city from South 'Villa El Salvador' to North 'San Juan de Lurigancho'. The ridership, which has been growing ever since the

line opened in 2011, is of about 320,000 per day.

Thanks to the new metro cars, the headway will be reduced to 3 minutes thus increasing the capacity to 48 000 passengers per hour.

The Metropolis for Lima features large doors, low floor, extra wide seats and gangways between the coaches. Additionally, dynamic information displays and an interior design favoring natural light will improve passengers' safety and comfort.



GMV inaugurates new offices in Castilla y León

GMV

The multinational technology GMV has opened new offices in the Technology Park of Boecillo, Valladolid. The facilities will house the Cybersecurity Incident Response Center and the automotive software development center.

Attendees had the opportunity to visit the automotive software development center from which GMV has been responsible for the software of the TCUs (Telematic Control Units) for more than two million vehicles.

The tour continued at the Cybersecurity Incident Response Center, which will analyze the state of global network and equipment security, providing incident response services and offering advice on security threats and systems solutions.



Stadler Valencia celebrates its 120 anniversary and faces the future with the aim of growing in Spain

STADLER VALENCIA

On December 13, Stadler, the leading international company in the design and manufacture of trains, celebrated the 120 anniversary of its plant in Valencia with a commemorative event that was attended by the President of the Generalitat Valenciana, Ximo Puig, by the Vice General Secretary of the Ministry of Public Works, by the Regional Minister of Economy, by the Regional Minister of Public Works and by the

President of RENFE among other prominent guests.

Since Miguel Devís and José Noguera created Talleres Devís and Noguera in December 1897, the current Stadler plant has gone through all kinds of vicissitudes evolving to become one of the benchmarks in the design and manufacture of rolling stock in Spain and one of the great poles of economic growth and innovation of the Comunidad Valenciana.

Nowadays, Stadler Valencia is a company specialized in

the design and manufacture of locomotives, urban and regional trains, with an important presence in the Spanish market and with numerous contracts at international level, which employs 900 professionals, of which almost 200 are dedicated to the design and development of railway vehicles, and faces the future with the aim of continuing to grow in Spain.



Aitor Iñiguez de Heredia, CEO for the Mobility Business Unit at NEM Solutions

NEM SOLUTIONS

Alberto Conde Mellado is no longer linked to NEM Solutions after 10 years as CEO at the company. NEM would like to express its gratitude for his work and leadership to build up the company they have turned into during these years. The announcement also stressed that "2018 appears as the best year in our history and with the aim of facing our new challenges, we wish to express our personal commitment with the project, the culture and NEM's talent".

This new stage of the company will be led by the same board of directors who will ensure NEM's continuity. Aitor Iñiguez de Heredia, as the Mobility CEO and Idoia Iceta Hernández, as the Energy CEO, will also be the persons in charge of setting the dialogue terms with the shareholders. "The major objective and spirit is to continue working to keep NEM as a leader company in the development of digital solutions based on cutting-edge technologies to transfer our core knowledge to the key actors in the Operation and Maintenance of complex assets in this digital era", they added.



Cetest gets new test contracts for main rolling stock manufacturers. Anytime, anywhere

CETEST

CETEST continues its consolidation process as reference laboratory for the main rolling stock manufacturers. In the coming months, CETEST will perform the ride dynamic test campaign for Bombardier new pro-

ject of commuter double deck train in Belgium (M7DD), as well as for the Riyadh Metro tests (in their factory in Mexico, and also in the Saudi line).

Apart from that, CETEST is also working hard with Alstom in their projects in Latin-America (Panama and Guadalajara Metro): comfort tests, wheel unloading and flexibility coefficient measurement, re-

frigeration test campaign... After working for Alstom India in several Metro projects (Lucknow, Kochi, Sydney – also manufactured in India), CETEST has recently won a new contract for the ride dynamic campaign (including instrumented wheelsets) for the new Indian Railways electric locomotive that will be manufactured in Madhepura, India.

TPF Getinsa Euroestudios, a Spanish leading player in rail transport engineering

TPF GETINSA EUROESTUDIOS

In 2003, TPF Getinsa Euroestudios expanded its footprint to South-East Asia with a branch office in the Philippines. The opening of this branch has allowed us to play a pioneering role among the Spanish companies that export transport engineering and water engineering services in the region.

So far, we have secured over 25 contracts in south-eastern countries, such as the Philippines, Vietnam, Laos, Thailand and Singapore. Recently, our achievements in the region's railway engineering market include two major contract wins in the Philippines and Vietnam.

TPF Getinsa Euroestudios was awarded a contract to provide Independent Engineering services



for an 11.7-km extension of the Manila Light Rail Transit System Line 1 and the construction of 8 new stations, with provision for 2 future stations. It is also worth

mentioning that a relevant contract has recently been signed to deliver Project Management services in Vietnam for Phase 2 of the Hanoi Metro Line 3.

SICE improves the travel experience of users of Line 6 of the Santiago de Chile Metropolitan Railway

SICE

The line was opened by the President Michelle Bachelet, last November 2nd. In this project, SICE has implemented a modern comprehensive communication and security solution on Line 6 of the Santiago de Chile

Metropolitan Railway that allows more than 65 million estimated annual passengers to plan their trip, know their travel time, destinations, sites of interest, contingencies, etc. all in real time. The system is able to gather all the information of interest for the passenger, monitor all the facilities through an extensive CCTV network and connect to traffic management systems and Metro

incidents. The solution is completed with interactive posts in each station that present intermodal information, and allow travellers to search to locate destinations and services of interest.

The information and communication technology with the passenger implemented by SICE allows the ten new stations distributed along the 15 kilometres of line to offer timely information in real time through large digital screens located at each station and public-address messages. The screens offer different types of information such as destination or waiting time, but also on the level of occupancy of each car to facilitate the distribution of passengers on the platforms and trains. The stations also have intercoms to communicate with the control centre in case of incidents or to provide information needs.

This differential solution with great added value is part of SICE's portfolio of solutions and has been hitherto already implemented in other projects in Spain, Colombia, Algeria and Saudi Arabia.



Siemens brings digitalization to the extension of Line 2 of Tbilisi Metro

SIEMENS SPAIN

The Prime Minister of Georgia, Giorgi Kvirikashvili, presided last October the opening ceremony of the extension of the Line 2 of the Tbilisi Metro, a great milestone for Siemens Spain as it is the first project of the global Siemens Mobility in Georgia.

The Municipal Development Fund of Georgia awarded the contract for the construction of the new University metro station to the joint venture of two Spanish companies Cobra Instalaciones y Servicios and Assignia Infraestructuras, which trusted Siemens Spain for the supply and installation of the signalling systems.

The core of the new signalling system is the electronic interlocking Westrace Mk II, located at University station to control 2.6 km from Vazha Pshavela station. The project



Photo by courtesy of Cobra Instalaciones y Servicios.

includes the installation of point machines and LED signals and also the interface from the new interlocking with the Control Traffic Center, with the existing relay interlocking at Delisi and with the existing signalling system based in speed codes, very common in the countries of the ex URSS. The extension of the Line 2

has been a challenging project from the technological point of view as the new interlocking technology had to interface with existing technology in order to guarantee compatibility with the rest of the line, fitted with the technology deployed in the 1960's in most of the former Soviet Union countries.

Bombardier Marks a Quarter Century of Rail Control Excellence in Bilbao

BOMBARDIER TRANSPORTATION

Bombardier Transportation is proudly marking a quarter century of rail control success in Bilbao, a milestone made possible after completing the recent signalling upgrade at Urduliz station on the city's Metro's Line 1. The signaling system has been developed and delivered by the Center of Excellence in Signalling Systems located in San Sebastián de los Reyes (Madrid).

Thanks to the latest functionality, the new EBI Lock system already installed, will allow to increase the operational efficiency and capacity, maintaining the security level of the line. In addition, the project has improved traffic flow above ground by replacing Bilbao Metro's last level crossing with a new underground section.

This recent upgrade project for Urduliz station, awarded in 2015, was carried out under an infras-

tructure improvement programme led by Biscay Transport Consortium.





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The Philippines focuses its investments on



PHILIPPINES

THE GOVERNMENT HAS LAUNCHED AN INFRASTRUCTURE PLAN FROM 2017 TO 2022 (PHILIPPINE DEVELOPMENT PLAN 2017-2022) WITH WHICH IT WISHES TO GRADUALLY INCREASE INVESTMENT UNTIL REACHING THE TARGET OF 7% OF THE ANNUAL GDP FOR 2022. THE RAILWAY IS ONE OF THE MAIN CENTREPIECES OF THIS ACTION.

The Republic of the Philippines, with an area of 300,000 km², is an archipelago containing 7,100 islands located in Southeast Asia, east of Vietnam, south of Taiwan. It is surrounded by the Philippine Sea to the east, the Celebes Sea to the south and the South Chi-

a modern railway network



na Sea to the west. It has a population of 102 million inhabitants, the largest in the region after Indonesia. Its constant progress in recent years suggests that it will be amongst the 16 largest world economies in 2050. The IMF forecasts indicate that the Philippine economy will maintain

its growth at rates of around 7% during the coming years (2022). To continue with this development, the Government has launched the infrastructure plan 2017-2022 (Philippine Development Plan 2017-2022) with which it aims to gradually increase investment le-

vels until reaching the 7% annual GDP target for 2022, which would be equivalent to 170 billion euros in five years. In 2018, an amount of 1,169.5 billion Philippine pesos (19.7 billion euros) was approved. This ambitious programme has been dubbed the "Build Build Build Plan".

In addition, the Executive has decided to give continuity to the public-private partnership (PPP) projects embarked upon by the previous Government in matters of transport (metro, light rail and airports).

With this new medium-term projection, the purpose is to give a historic boost to transport with the aim of achieving modern networks that respond to the growing needs of the population. Certain aims that take into account the orography of the country that, in many cases, makes it difficult to start up new routes. Chapter 19 of this programme, entitled "Accelerating the Infrastructures' Development", highlights the flagship role of the

railway. The current network, as indicated in this section, will be expanded through the development of new lines on the main island regions. In accordance with the aim of increasing this means of transport compared to vehicular traffic, in the new projects priority will be given to the right of way, both on passenger and freight lines. Likewise, to avoid future issues involving connectivity and interoperability, the use of standard width (1,435 mm) will be implemented for works in the processing stage. Broadly speaking, in this rehabilitation process the recovery of the railway is sought out through the connection of the north and south of the

Island of Luzon; the expansion of the metro network in Manila that is forecast to offer new lines; and the increase of the airport network for regional transport, along with the 2,000 kilometre rail system on the Island of Mindanao.

Structure

The railway network is entirely on the Island of Luzon, which has an area of 104,688 km², meaning it is the world's seventeenth largest island. Therein, both the capital of the country, Manila, and its most populous city of the country, Quezon are located.

This route is divided into three areas: Manila metropolitan area (26 ki-



The Philippines seeks to give a historic boost to transport with the aim of achieving modern networks.

Rail transport has become the focus of attention of infrastructure plans.



PHILIPPINES

lometres), Manila-Legazpi section (480 kilometres) and Northrail, in the northern zone that is currently without service. There are two more sections on the islands of Panay and Negros, which are not operational either. The sector is composed of the public railway company, Philippine National Railways (PNR), which owns the network and is also in charge of the commercial operation; the Light Rail Transit System or Metro Rail Transit (MRT 3) and the Light Rail Transit Authority (LRTA). All of them are dependent on the Ministry of Transport and Communications (DOTC). There is also Northrail, the deputy agency of the Department of Transportation that is entrusted with

▮ MAIN RAILWAY PROJECTS IN THE "BUILD BUILD BUILD" PLAN

PROJECT	AMOUNT
Metro Manila (Mega Manila Subway)	227,000,000,000 (€3.826 billion)
Mindanao Railway Tagum-Davao-Digos (TDD)	31,544,407,000 (€531.5 million)
PNR North 1 (Northbound Southbound Regional Rail)	105,313,000,000 (€1.774 billion)
PNR North 2 (Bulacan, Pampanga)	150,000,000,000 (€2.527 billion)
PNR South Commuter	134,000,000,000 (€2.257 billion)
Shared Stations (Unified Common Station)	2,800,000,000 (€47.1 million)

the construction, operation and management of the rail systems that provide services to Metro Manila, Central and Northern Luzon.

Upward investments

Of all the forecast plans, the most pertinent are those that have been

recently approved by the Investment Coordination Committee (ICC) of the Board of the National Economic and Development Authority (NEDA) of the Philippines. There are three railway projects whose total value stands at 9.110 billion euros. This involves the Mindanao network, several commuter connections, interchange stations with other transport modes, refurbishment and expansion of the Manila light railway network, as well as the first underground subway network in the country.

The main cities of the Philippines will see improve their metro and rail networks.





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NORTH-SOUTH RAILWAY PROJECT (NSRP)

This connection, known as (NSRP) aims to reactivate the railroad on the Island of Luzon. The purpose is to provide better transport and logistics services between two fast-growing urban regions. The

project has an estimated cost of 285 billion Philippine pesos (4.801 billion euros) and will be financed through the Official Development Assistance (ODA). The Metro Manila area and the city of Legaspi, the capital of the province of Albay, will be

connected via the ongoing project. The design includes a 581-kilometre long-distance network and a 56-kilometre commuter line that will go from Manila to the south to Calamba, in the province of La Laguna. Its implementation will be carried out jointly by the Department of Transportation and Communications of the Philippines (DOTC) and the country's railways manager (PNR). Once under commercial operation, it is estimated that there will be ten daily trips, with seven trains stopping at 66 stations. It is also estimated that in the first year, 316,000 passengers will be carried per day.



MINDANAO RAILWAY LINE

After two decades of feasibility studies, the renowned project "Mindanao Railway Network" will be released in 2018. It is a network that will boast 2,000 kilometres of track. The line will connect key urban centres in the south of the archipelago,

including Davao, Zamboanga, Butuán, Surigao, Cagayande Oro, Iligan and General Santos. In addition, there will be a new bridge that will unite the central islands of Panay, Guimará and Negros. Likewise, it will be extended to the main ports and

other entry gateways. The idea is to provide Mindanao with modern railways and state-of-the-art rolling stock. In the first stage will be carried out the construction of the commuter section, 108 kilometres, which will link the cities of Taúm (Davao del Norte) and Digos (Davao del Sur). The estimated cost of the project is 31.504 billion pesos (531 million euros) and will be financed with local funds.

The Deputy Secretary of Transportation of the country, Cesar Chavez, announced that the Department of Transportation (DOT) has already allocated 6,500 million pesos (109.5 million euros) for the acquisition of land and the preliminary engineering works involving the initial stage. In the second stage, the section will be carried out to the city of Butuán, while in the third stage, the network will extend to that of Cagayán de Oro. Finally, there will be a connection between this urban centre with Iligan and the Zamboanga peninsula.



MALOLOS-CLARK CONNECTION

The Malolos-Clark project (MCRP) will be carried out in two stages. The first one from Malolos, in the province of Bulacan, to Clark International Airport, northwest of Manila. In the second stage, the route will be extended to Clark's Green City. The project has an estimated cost of 211.43 billion Philippine pesos (3.5 billion euros). The construction will be financed through official assistance for the development of Japan (ODA), while operations and maintenance will be carried out through Public-Private Partnerships (PPP). This connection will connect with the ongoing Tutuban-Malolos portion of the Commuter Northbound - Southbound Railway. Stage I will begin in the second quarter of 2019 and is expected to be completed in the year 2022. Stage II will be implemented between 2022 and 2024. With this new network, journey times from Manila to Clark International Airport will be reduced from two hours to 55 minutes. The Department of Transportation of the Philippines has already

defined the first five stations, which will be built along a route of 106 kilometres. These stops will be in Marilao and Meycauayan in Bulacan, Valenzuela, Caloocan and Tutuban, in Metro Manila. A further 12 will be: Solís, Bocaue, Balagtas, Guiguinto, Malolos,

Calumpit, Apalit, San Fernando, Angeles, Clark, Clark International Airport and the proposed New Clark City in Pampanga. The network will connect with the current Tutuban-Malolos part of the northbound-southbound rail project.



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Urban transport: More light rail projects in Manila

The main urban centres of the Philippines have to respond to the growing demand for more means of public transport, given the mass traffic issues. Hence, the Executive has proposed to reduce congestion problems. Most of the approved funds will be awarded to developments in Luzon and the Manila Metropolitan Railway, as well as in the urban centres of Cebu and Mindanao. The aim is to provide travellers with a more efficient and modern transport system. One of the key focuses is in Metro Manila, the metropolitan area of the capital of the Philippines has around 10 million people. The current system consists of three lines and is mostly overland.

The lines LRT-1 and LRT-2 are in charge of Light Rail Transit Authority (LRTA), a corporation controlled by

THE LARGE TRANSPORTATION INFRASTRUCTURE PROJECTS OF THE ADMINISTRATION IN THE PHILIPPINES ALSO INCLUDE TRANSPORT IN CITIES. THE PLANS ARE INTENDED TO SOLVE THE MOST PRESSING CHRONIC CONGESTION PROBLEMS IN AREAS SUCH AS THE METROPOLITAN AREA OF MANILA.

the government under the authority of the Department of Transportation (DOTr). The first one (LRT-1) of 19.65 kilometres runs from north to south, has 20 stations and serves 500,000 passengers a day. The 13.8-kilometre LRT-2 covers an east-west route with 31 stops. Despite being classified as a light rail, it has characteristics that make it more like a metro network due to its technology, high passenger volume and exclusive passage. In addition to these two branches, since 1999,

the MRT3 (Mass Rapid Transit 3) is in operation. This network, also called the new "Yellow Line", has a daily traffic of 650,000 passengers. They are joined by the commuter connection of the National Railways of the Philippines. There are two stations that serve as interchangers, the one at Araneta-Cubao and the one at Avenida Taft. At present, a renewal plan for L1 and L2 is being carried out, along with the extension of the network with the addition of new kilometres of track.

The plan to improve public transport includes new stations.



LRT- 1: EXTENSION TO CAVITE

The extension to Cavite will cover 11.7 kilometres. The works will start in 2018 and end in 2022. The project will be financed by the Japan International Cooperation Agency (JICA). Building work shall be entrusted to the consortium formed by Ayala Corporation and Metro Pacific Investments Corporation (MPIC), and has an allotted budget of 64.9 billion Philippine pesos (1.094 billion euros). It will run from Baclaran station to Bacoor. There will be eight new stations with intermodal facilities in Pasay City, Paranaque City, Las Pinas City and Cavite. Regarding the new trains, on December 1, 2017, the Department of Transportation

of the Philippines (DOTr) signed a contract for the supply of new rolling stock

for this expansion with Mitsubishi Corporation and CAF.



LRT1 line will reach Cavite.

LRT-4: ORTIGAS-TAYTAY

Line 4 (LRT-4) will be built in Metro Manila and Rizal. It is also known as "Ortigas-Taytay". With this branch the suburban Taytay, in Rizal, will be joined with the Ortigas Center commercial district, in the east of Manila.

The route will have a length of 11 kilometres and feature six stations. The project will cost approximately 50.2 billion Philippine pesos (846 million euros). In June 2015, it was approved by the Investment

Coordination Committee (ICC) of the National Economic and Development Authority as a public-private partnership project and the current Government has kept it on the agenda.

When completed, it is expected to significantly reduce the volume of vehicular traffic along Ortigas Avenue and improve connectivity in the eastern parts of the metropolis, including nearby municipalities in the south of Rizal.

LRT-6: DASMARIÑAS

The Line 6 project, which has a budget of 65 billion Philippine pesos (1,096 million euros), will cover a 19-kilometre route from Niyog, Bacoor (the extension of the Cavite LRT 1 extension) to the city of Dasmariñas. The proposed alignment will have seven stations: Niyog, Tirona, Imus, DaangHari, Salitran, Congressional Avenue and Governor's Drive.

METRO MANILA

The Philippines will have its first metro system for the second quarter of 2024. The Department of Transportation recently indicated that the route has been extended to include a station at the Ninoy Aquino International Airport.

The network will extend from north to south from Mindanao Avenue in Quezon City, to the airport in Pasay City. The initial stage requires an investment of 355,600 million Philippine pesos (5,998 million euros) and will have an assistance loan for the development of the Japan International Cooperation Agency (JICA).

Construction is expected to begin in mid-2018, and end in 2025. There will be 25 kilometres of underground track that will connect the main business districts and this is expected to service 370,000 passengers a day in its first year of operations.

Another of the planned lines is the LRT-4.



In the Philippines, rail freight is essential for domestic and foreign trade.



Freight rail: Strengthening foreign trade

THE INCREASE OF FREIGHT TRAFFIC BY RAIL IS ANOTHER OF THE AIMS SET OUT BY THE DEPARTMENT OF TRANSPORTATION OF THE PHILIPPINES. THE AIM IS TO IMPROVE COMMERCIAL COMPETITIVENESS AND INCREASE COMMUNICATIONS WITH THE OUTSIDE WORLD.

Along with the transport of passengers, with the investment in infrastructures, the is to further foster the mobility of goods by rail to strengthen the foreign market. As the Philippine Ports Authority (PPA) points out, there are almost a thousand ports in the country. Due to its insular nature, 98% of all foreign trade is carried out by sea, hence the importance of investing in its modernisation.

Port development, to be more competitive leads to improvements in intermodal connections, especially in the main ports for container traffic such as Manila (Manila International Container Terminal), Cebu and Subic Bay. Also important are those of Iloilo, Zamboanga and General Santos. The Government fosters the reconversion of some ports and the creation of new ones to optimise communications between the different islands.

PORT OF MANILA AND CALAMBA

The company MRAIL, Inc. has partnered with International Container Terminal Services, Inc. (ICTSI) for developing a railway goods project valued at 10 billion pesos (168 million euros €).

With this initiative, operations between the ports of Manila and the container

terminal in Calamba (Laguna) will be re-activated. The project aims to provide an uninterrupted transport of containers by moving them through the railways instead of by road. This would help improve traffic flow by reducing the output of between 300 and 600 trucks per day.



RAILWAY SUBIC-CLARK

One of the main freight rail initiatives is the rail connection between the "Subic Bay Freeport Zone" and "Clark Freeport" area with Clark International Airport. It would also reach other important economic centres in central Luzon, especially New Clark City.

This would form an integrated logistics centre with the aim of decongesting the current situation. It is estimated that it be operationally ready in the year 2021.

Railways connections with ports, is a must in the Philippines.

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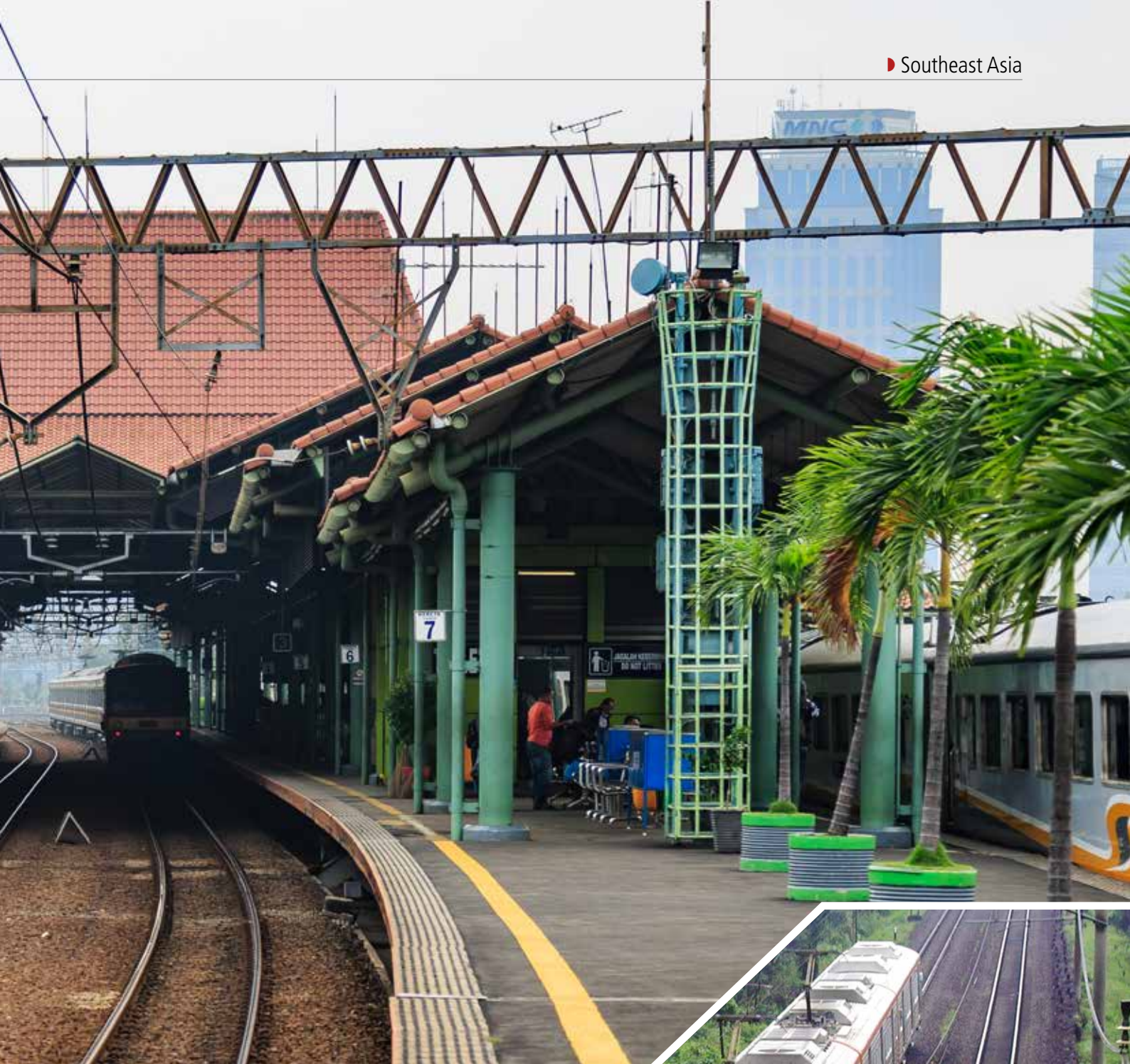
GOVERNMENT TRANSPORT PLANS INCLUDE THE IMPROVEMENT OF THE RAILWAY NETWORK WITH THE CONSTRUCTION OF NEW LINES, HIGH-SPEED RAIL PROJECTS, DIRECT ACCESS, DOUBLE ROUTES IN JAVA, SUMATRA AND KALIMANTAN AND SIGNALLING IMPROVEMENTS.

Indonesia is an archipelago formed by about 17,508 islands, more than 11,500 of these being populated, and has 255 million inhabitants. The geographical characteristics make the transport and logistics sector a key element for the country's economic development. It is the fourth most populated country in the world. The growing needs for internal connections and their plans to open the country to world trade have led to the design of an

ambitious long-term infrastructure plan that will be carried out until 2025. One of its aims is to respond to the increase in rail transport, both passenger and freight, which has experienced an upward shift of between six and seven percent in recent years.

Sectorial Structure

The railway infrastructure of Indonesia occupies good standing in comparison with other means of trans-



infrastructures

port, as highlighted in the Global Competitiveness Report 2014-2015 of the World Economic Forum. In this study, Indonesia ranks 41 (out of 144 countries evaluated) for the quality of this type of service. However, a large part of the country's operational channels, according to the World Bank indicator, are in poor condition or must be modernised to adapt to growing demand. In addition, there are large areas outside of Java that still lack rail connec-



DESTINATION



tions. Currently, renovations of both roads, bridges and obsolete communications and signalling systems are necessary.

It is worthwhile noting that Indonesia has a rail density of 0.25 km / km², a low figure compared to other surrounding countries such as Thailand which has more than triple that. Hence, the medium and long-term plans are to increase investments in this area to offer a transport system according to a country that is the largest economy in Southeast Asia.

At present, the network has an extension of 8,159 kilometres with a gauge width measuring 1.067 meters, of which 565 are electrified, although only 4,816 kilometres are operational. The lines provide rail services to two islands in Indonesia: Java and Sumatra. In the first, most of its cities are connected by rail. It transports 196 million passengers per year and mobilises 3.9 million tons of goods per year. This network also includes the commuter train in Jabodetabek, which is operated by the subsidiary KCJ. However, in Sumatra there is no network that connects the three regions. The southern lines are generally used for the transport of coal. In this archipelago, the train has 5.25 million pas-

INDONESIA: MAIN RAILWAY PROJECTS

PROJECT	ESTIMATED COST (BN€)
Jakarta-Bandung high-speed section	4.750
Jakarta MRT (Mass Rapid Transit)	1.410
Jakarta Light Rail (LRT)	1.880
KA Trans Papua	601
Trans-Kalimantan Railway (Freight)	2.760
Trans-Sumatera	2.300

sengers and mobilises 15.25 million tons of freight per year.

The management and ownership of the network corresponds to the public-sector company Kereta Api Indonesia (KAI). The sole company in charge of urban rail system is KRL Jabodetabek. Along with the public-sector networks, there are private routes on the island of Kalimantan for the transport of goods from the mines to the piers of private ports.

Promotion of infrastructures

The government wishes to eliminate trade barriers and open the country up to world trade routes. For this reason, it has launched a renovations package to reduce logistics costs by improving connections between the individual islands. The Government's infrastructure plans include the improvement of the railway network with the construction of new lines, shortcuts, double tracks in Java, Su-

matra and Kalimantan and signalling improvements.

All the aims that must be achieved are outlined in an ambitious 20-year long-term investment programme called "National Long-Term Development Plan (RPJPN 2005-2025)". The plan is divided, in turn, into four-year terms. Presently, the "National Medium-Term Development Plan-PJMN 2015-2019" is underway. Together with these, the "Master Plan for the Acceleration and Expansion of Economic Development of Indonesia (MP3EI) 2011-2025" has been duly approved. As for the rail sector, the one finalised for the national railways is to strengthen land connections and support the seven key maritime centres. This plan will require approximately 300,053 billion euros in investments between 2015 and 2019. Such is its magnitude that it has been classified as the largest



The purpose for the railways is to strengthen land connections and support the seven key maritime centres.

Map with the railway connections.

railway project in the country since its independence. These funds will be allocated to more than 3,258 kilometres of roads, for passenger and freight rail which will cross the islands of Sumatra, Java, Kalimantan, Sulawesi and Papua. With these connections, the offer more transport links without interruptions between cities, towns, tourist and in-

dustrial areas is sought. In the latter case, the aim is to improve access to seven key ports: Kuala Tanjung (North Sumatra), Batam (Riau Islands), Tanjung Priok (Jakarta), Tanjung Perak (Surabaya), Makassar and Bitung (Sulawesi) and Sorong (Western Papua). Many of the projects described in MP3EI will be open to private sector participation in the form of public-private partnerships (PPP).

Likewise, worthy of special mention are linking plans for the main airport of Jakarta (Soekarno Hatta) with the city and with the one of Halim, the high-speed Jakarta-Bandung, as well as a circular line in Bali to offer improved access to all the regions and the undertaking of new tourist developments. There are also local projects in Jakarta such as the MRT project or potential plans for an LTR, as well as possible urban railways in Surabaya or Bandung.



RAILWAY IN BALI

Bali will have a circular line to offer better access to the undeveloped parts of the tourist island where new tourism undertakings are planned. This route will go around the island and reach areas where there is still no access by public transport. The railway will connect Denpasar with Ubud in the Gianyar region and Singaraja in the Buleleng region. Construction will begin in 2018, as the feasibility project has already been carried out by the University of Udayana in cooperation with the World Bank.



The port of Padang Bai, viewed from above.

HIGH SPEED JAKARTA-BANDUNG AND SURABAYA

One of the major projects underway is the high-speed line between Jakarta and Bandung. The 142.4-kilometre network will be built in eastern Java and will be financed at a rate of 75% by the Development Bank of China.

The consortium that will take over the project is Kereta Cepat Indonesia China (KCIC), composed of Pilar Sinergi BUMN and China Railway International Co Ltd. Initially, a budget of 4.750 billion euros had been allocated, although the cost could increase to 5.584 billion euros. This initiative will be financed by China Development Bank.

Regarding the deadlines, it is estimated that the works will end in 2019 and the trains will enter into commercial operations in 2020.

This section is part of a major route of 750 kilometres of high speed rail that will cross four provinces of Java and reach the second largest city on the island, Surabaya. In this sense, the modernisation plans for rail links include track duplication through the updating of existing lines, mostly single-track. It is estimated that works in the northern area may end in 2020.

► HIGH SPEED JAKARTA-BANDUNG

Raised section	73.0 kilometres (51.3%)
Overland	52.6 kilometres (37.0%)
Tunnel	16.8 kilometres (11.7%)
Travelling Speed	250 kilometres / hour

In Jakarta, there are high-speed rail plans to reduce traffic congestion.



REGIONAL TRAN-SUMATERA

The regional railway project "Trans-Sumatera" aims to connect the provinces of the westernmost continental zone of Indonesia.

The works consist of the duplication of the 370-kilometre road between Palembang and Bandar Lampung, as well as a 26-kilometre line between Medan and the Kuala Namu International Airport.

The main cities from north to south will have a modern network for which an investment of 2.700 billion euros is estimated.

This railroad will link the three provinces of North Sumatera, Riau, and Aceh. At the moment, work is currently underway on the 80 km section "Binjai-Besitang" (Langkat), on the "Besitang-Sei Liput" section to connect with Aceh and in a 48 km Rantau Prapat area near the city of Pinang.

TRANS-SULAWESI RAILWAY

This project started with the construction of the Makassar-Parepare line of 145 kilometres, within the first stage. In total, this railway will offer 1,700 kilometres and will run southbound to South Sulawesi to Manado, in the north. The network consists of the following routes: Makassar-Parepare; Parepare-Mamuju; Makassar-Bulukumba-Watampone; Manado-Bitung and Bitung-Gorontalo. It is expected to come into operation in 2018, upon reception of the rolling stock.

CONNECTION WITH AIRPORTS

One of the priorities in the field of transport in Indonesia is to provide the thirteen national airports with a rail connection. This initiative includes those of Padang, Batam and Palembang in Sumatra; Makassar in Sulawesi; Banjarmasin in Kalimantan; Jakarta, Yogyakarta, Surabaya and Kertajati Majalengka in Java.

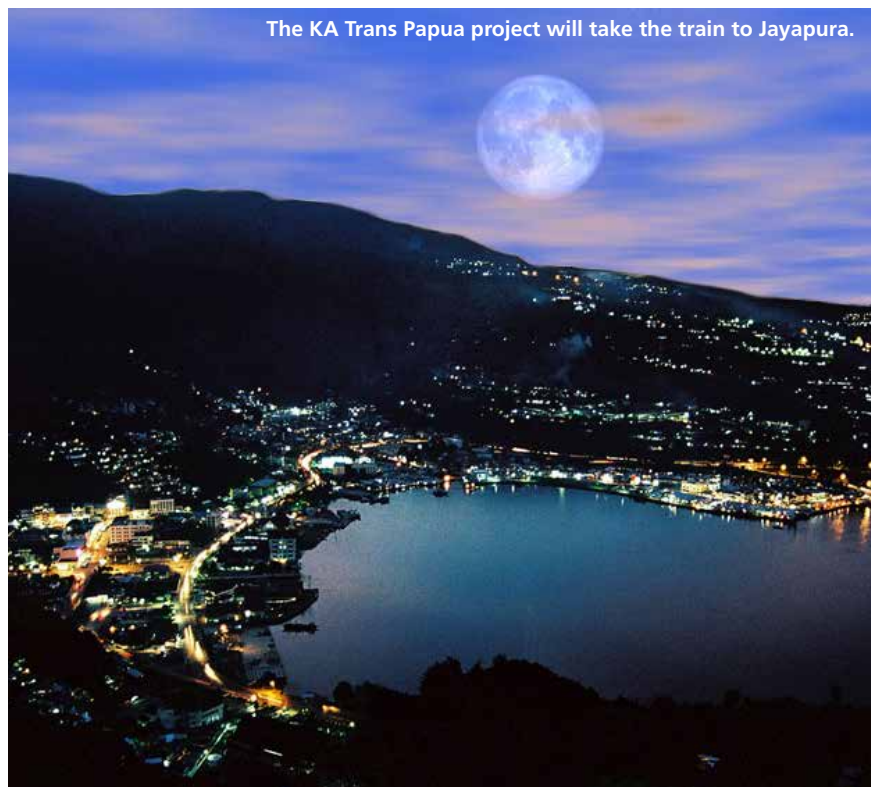
One of the main connections is the one links the international airport Soekarno-Hatta from Jakarta. The project under the auspice of the operator Kereta Api Indonesia (KAI) and its subsidiary Railink. The line starts at the east station of Manggarai, passes through Sudirman, in the centre, and Batu-ceper on a route of 37.6 kilometres.



The SoekarnoHatta airport will also have a rail connection.

KA TRANS PAPUA (WEST PAPUA)

The Indonesian government wishes to build a 595-kilometre railway. This project is known as "KA Trans Papua". Its development will run from Sorong to Manokwari passing through Nabire and ending in Jayapura. The work will be performed over several stages. The first one will be completed in 2019 and will focus on the construction of the 390km section between Sorong and Manokwari. Secondly, between 2020 and 2024, the section running from Manokwari to Nabir will be finished. The third stage, from 2025 to 2030, will connect Sarmi-Nabire-Timika until it reaches Jayapura. The construction is planned to begin in 2018 and will be financed with state budget funds. The project has an estimated cost of 601 million euros. Although funding is expected to be fully provided through the state budget, the government is open to potential investors.



The KA Trans Papua project will take the train to Jayapura.

Railway investments will also come to Manokwari.



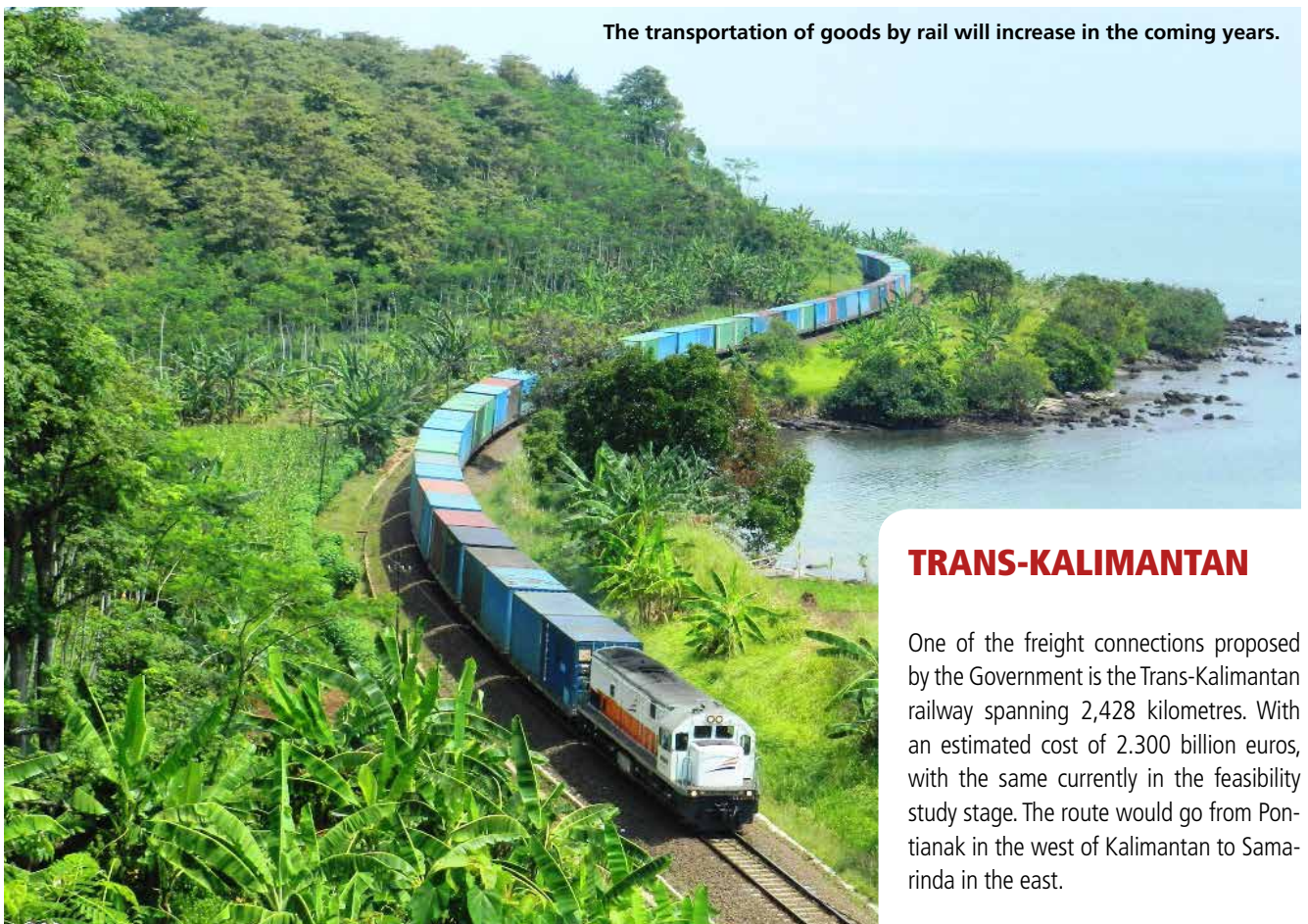
Above, panoramic view of Sorong.

INDONESIA

Freight rail: Inter-modality gains weighting

BOOSTS FOR FREIGHT RAILWAYS FEATURES THE AIM OF IMPROVING THE CONNECTIONS WITH THE PORTS AND BEING CONDUCTIVE TO FOREIGN TRADE. AMONGST THE KEY PROJECTS, THE MODERNISATION TO THE SOUTH OF SUMATRA OR THE RAILROAD TRANS-KALIMANTAN.

The need to transport the abundant natural resources of Indonesia, such as (coal, oil, minerals, etc.) has led to the promotion of new railway developments in order to improve the connection with ports and boost foreign trade.



The transportation of goods by rail will increase in the coming years.

TRANS-KALIMANTAN

One of the freight connections proposed by the Government is the Trans-Kalimantan railway spanning 2,428 kilometres. With an estimated cost of 2.300 billion euros, with the same currently in the feasibility study stage. The route would go from Pontianak in the west of Kalimantan to Samarinda in the east.

CONNECTIONS WITH THE PORT OF KUALA TANJUNG

The port of Kuala Tanjung, which will be developed in four stages, will also incorporate a railway connection from Sei Mangke KEK.

These facilities will have a terminal and a transformation centre, both located rather close to an industrial zone. The container port will have capacity for two million TEU.

MODERNISATION SOUTH OF SUMATRA

The state company PT Bukit Asam, owner of the coal mine, wishes to increase its annual distribution capacity to 65 million tons by the year 2023. To fulfil this aim, it will partner with state railway operator PT Kereta Api Indonesia (KAI).

The idea of this link is to modernise the two railway lines existing in South Sumatra. Work on the first route will renew the journey from the Bukit Asam mine in Tanjung Enim to the Kertapati coal port. With these improvements, the annual capacity

to transport five million tons of coal in 2019 will be expanded upon.

The second project will focus on the branch that runs from Tanjung Enim to the Tarahan terminal, which will have an annual capacity to transport 25 million tons once the works are completed in 2020.

The company also plans to develop three new routes to the ports of Prajin and Kra-masan in South Sumatra and that of Srengsem in Lampung.



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Urban transport: More lines to improve urban mobility

THE IMPROVEMENT OF URBAN MOBILITY IS ONE OF THE PRIORITIES IN THE MAIN CITIES OF INDONESIA. PROJECTS LIKE THE LIGHT RAIL NETWORK AND THE MRT SYSTEM OF JAKARTA WILL PROVIDE SOLUTIONS TO THE GROWING DEMAND FOR PUBLIC TRANSPORTATION.

MRT PROJECT

The "Mass Rapid Transit (MRT)" project in Jakarta is an infrastructure initiative that aims to solve the widespread traffic congestion of the Indonesian capital.

Currently, the North-South line is under construction. The works on the network, of 1067mm and electrified to 1.5kV, have been divided into two stages and will connect Kampung Bandan (in the north of Jakarta) with Lebak Bulus (south of Jakarta), along a stretch of 23.3 kilometres.

The first one, which has been financed by the Bank of Japan for International Cooperation (JBIC), is expected to be opened to the public this year 2018. In turn, the east-west line's study stage is underway.

It is estimated that MRT will cost 1.416 billion euros, an amount that includes electrical, mechanical and rolling stock systems. According to the planned schedule, in the year 2027, it should be finished.



► MRT JAKARTA: NORTH-SOUTH SECTION

	FIRST STAGE	SECOND STAGE
Length	15.2 kilometres 9.2 km overland 6.05 km underground	8.1 kilometres
Stations	13 (7 overland, 6 underground)	+7 underground between Bunderan HI-Kota; +1 on surface (Kampung Bandan)
Daily passengers (Target)	412,700	629,900
Operation	2016	2018

► MRT JAKARTA: EAST SECTION

Feasibility study	
Length	87 kilometres
Operation	2024-2027



PALEMBANG LIGHT RAIL (SUMATRA)

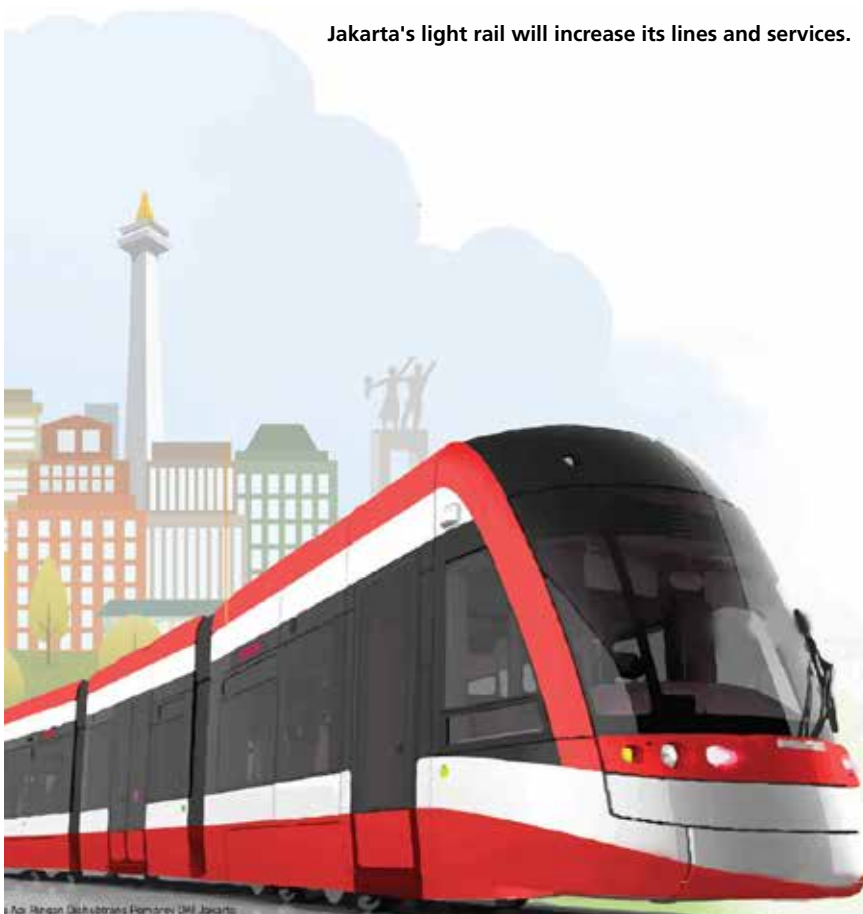
Palembang, in South Sumatra, will have a new light rail network. It is expected to be completed this year, in time for the Asian games (18th Asian Games). It will have 24.5 kilometres and 13 stations.

LRT1 light rail line will help to decongest traffic.

Jakarta's light rail will increase its lines and services.

JAKARTA LIGHT RAIL (LRT)

Another one of the flagship projects in urban transport is the Jakarta Light Rail Network. It is estimated that it will cost 1.880 billion euros, which will be financed by the provincial and central governments. The civil works of the first section of 5.8 kilometres between Kelapa Gading and Velodrome started in June 2016, and the idea is that it could enter into commercial operation for the Asian Games of next August 2018, organised in Jakarta. In August 2017, the tender contract for the systems of the first stage was awarded to the consortium formed by the Korea Rail Network Authority (commercial administration), Daea TI (signals), Samjin (energy supplies), Woojin Industrial Systems (inspection) and LG CNS (door screens). At the same time, the feasibility study of the second section, which would be between eight and nine kilometres in length, is currently underway. The long-term plans foresee a network of 110 kilometres containing seven lines.



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SOME MAFEX MEMBERS WITH



CAF

The Republic of the Philippines Department of Transportation and Communications has awarded Mitsubishi Corporation and CAF (as train manufacturer) a new rolling stock supply contract for Manila Light Rail Transit (LRT) Line-1. This elevated track line covers 20

km in length and crosses Manila from north to south. The line is currently being extended with a further 12 km section towards the Cavite Province.

CAF's scope includes the manufacture of 30 LRV-type units to be delivered within the 2020 - 2022 period. These units will be bi-directional trains with catenary power

supply (750 Vdc) and sixteen doors on each side, which will provide access for passengers to board and exit the train comfortably. The LRVs, designed to run at a design speed of 70km/h, will have a length of 106 m and offer a 276-seat layout which will in turn maximise capacity for standing passengers.

TPF GETINSA EUROESTUDIOS

TPF Getinsa Euroestudios, a Spanish leading player in rail transport engineering. In 2003, TPF Getinsa Euroestudios expanded its footprint to South-East Asia with a branch office in the Philippines. The opening of this branch has allowed us to play a pioneering role among the Spanish companies that export transport engineering and water engineering services in the region. So far, we have secured over 25 contracts in south-eastern countries, such as the Philippines, Vietnam, Laos, Thailand and Singapore. Recently, our achievements in the region's railway engineering market include two major contract wins in the Philippines and Vietnam. TPF Getinsa Euroestudios was awarded a contract to provide Independent Engineering services for an 11.7-km

extension of the Manila Light Rail Transit System Line 1 and the construction of 8 new stations, with provision for 2 future stations. It is also worth mentioning that a

relevant contract has recently been signed to deliver Project Management services in Vietnam for Phase 2 of the Hanoi Metro Line 3.



PROJECTS IN SOUTHEAST ASIA

► ARCELORMITTAL

ArcelorMittal had been selected as rail supplier for the project of Manila Metro Rail Transit (MRT) Line 7. Project began in April 2016 and operations are expected to be completed and begin by the fourth quarter of 2019, when completed, will be 23 kilometers long serviced by 14 stations, and will be connected to MRT Lines 1 and 3.

Rails remains one of the most environmentally friendly transport solutions, with much lower CO2 emissions. With a growing number of people living in urban areas, cities need various means of transport to reduce congestion in city centres; this new line is estimated to carry approximately 28,000 passengers an hour in each direction and increase to 800,000 passengers a day when completion.



► SIEMENS SPAIN

The Indonesian Company PT LEN Railway Systems awarded Siemens the

project for the supply of the signalling systems of the Palembang light rail line last March. The line, located at the ca-

pital of South Sumatra province, is 22 kilometers length and includes 13 stations.

The Palembang Light Rail Transport (LRT) project includes the supply, installation and commissioning of the ETCS Level 1 trackside and onboard systems for 14 trains, Trackguard Westrace MkII electronic interlockings, Controlguide Rail9000 Centralized Traffic Control (CTC), BSG9 point machines and ACM250 axle counters and training for installation, tests, operation and maintenance.

The commissioning of the line, that will connect the Sultan Mahmud Badaruddin International Airport and the Jakabaring Stadium Complex, is scheduled for August 2018, on time for the celebration of the Asian Games, a great Asian sports event with one of its two venues in Palembang.

Palembang LRT will be the first line equipped with technology ETCS Level 1 in Indonesia and also a great milestone for Siemens as it means the introduction of the most advanced technology of electronic interlocking in the country for the first time.

PHILIPPINES AND INDONESIA:

NATURAL WEALTH DISTRIBUTED OVER THOUSANDS OF ARCHIPELAGOS

The Islands of South East Asia are renowned for their great beauty.



The Philippines is this island country made up of 7,107 islands that offer secluded beaches, rocky natural areas, wild nature and highly characteristic landscapes, such as the rice fields of Luzon. Its capital, Manila is known as one of the most cosmopolitan cities in Southeast Asia. In this city, you can visit **Intramuros**, the home of the Spanish Governor, as well as **San Ignacio** temple. Furthermore, the area of the **Cruz de Magallanes** and the **Makati Center** are idyllic picturesque settings.

The geographical conditions and the existing biodiversity of this archipelago means that the country has an endless number of natural parks for the enjoyment of tourists. Alongside these, its spectacular beaches are renowned worldwide. Amongst them, **El Nido** offers some of the most astounding, with crystal clear waters, while the **White Beach** of **Boracay** is also especially popular. The **Negros** archipelago, whose shape resembles a boot, also offers a very complete variety, from the possibility of diving on the island of Apo, trekking and rambling in **Twin Peaks**, as well as watching dolphins and whales in **Bais**. Another of the most renowned landscapes are those formed by the rice terraces of the

Philippine Cordilleras, which have been granted the status of World Heritage Site by Unesco. In Southeast Asia, Indonesia also brings together places of great diversity and beauty: tropical jungles, coral reefs, volcanoes, idyllic islands, etc.

The island of **Bali** resembles a paradisiacal setting with places of incredible tropical beauty, stunning beaches and staggered rice fields. Furthermore, it is a reflection of years of history, a culture that came into being as a mixture of Hinduism with indigenous beliefs in other Gods that has resulted in spectacular temples, sculptures in stone guarding the entrances, sanctuaries in the countryside.

SOUTHEAST ASIA OFFERS BREATHTAKING LANDSCAPES AND CORNERS FOR TRAVELLERS. THE PHILIPPINES AND INDONESIA ARE TWO DESTINATIONS WITH NUMEROUS ITINERARIES WHERE THE LIVES OF THE GREAT CITIES AND THEIR IMMENSE NATURAL WEALTH GO HAND-IN-HAND.

In the central region of Java is the city of **Yogyakarta**. It is considered the cultural and artistic "elixir" of the Island and has become the stand-out point of reference to develop different incursions and routes the island. Particularly noteworthy are the Hindu temples of **Prambanan**, which are part of the World Heritage List; as well as **Borobudur**, the largest Buddhist monument in the world built by the year 850 AD. Another compulsory stop for visitors is at the islands of **Komodo** and **Rinca**, famous for housing the revered Komodo dragon.

Another place with great charm is the **archipelago of Flores**, with unique corners such as the **Kelimutu volcano** (with its three coloured lakes), **Labuanbajo** and its bay full of islands of crystal clear waters ideal for diving. In **Borneo**, the **Tanjung Puting** National Park (Kalimantan) is worthy of special mention. 🌿

The Philippines and Indonesia boast unique natural spaces.



Railway solutions for our small world



Turnout for the Mecca-Medina High Speed line



Double crossover installed in Metro Buenos Aires



Toluca-Ciudad de México Intercity Train



Tram crossover for Athens - Piraeus line



High-speed turnouts that work in the most adverse conditions of the planet: the Arabian desert.

Renovation of track apparatus in an underground station inaugurated in 1934 in Buenos Aires. With twenty-first century performances, of course.

Track apparatus for a line that will carry 230,000 passengers a day, between Toluca and Mexico City.

Or for the tram Athens-Piraeus. In Amurrio we bring all our knowledge in each of our projects, big or small. Anywhere on the globe.

Read on our website amurrio.es the details of these and other solutions. They are our modest contribution to a world that is getting more connected by the day.

That is getting smaller by the day.



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IN DEPTH

Rail Baltica

a mega priority
project for
Europe

THE PROJECT IS NOT ONLY CONSIDERED AS A BOOST TO MOBILITY IN EUROPE, BUT WILL BE THE MEANS OF ESTABLISHING A NEW ECONOMIC CORRIDOR IN NORTHEASTERN EUROPE. THIS APPEARS AS ONE OF THE PRIORITY OF THE EUROPEAN UNION WITHIN THE TRANS-EUROPEAN TRANSPORT NETWORKS (TEN-T) ".



Northern Europe will boast a modern railway corridor that will contribute to significant change in terms of mobility. The project is entitled "Rail Baltica" offering an infrastructure that aims to integrate the states of this area into the European network. To this end, a continuous international link has been designed that will depart from Tallinn (Estonia) and will run

through Parnu and Riga; where it will feature a stop at the airport; then the journey will continue towards Panevezys until arriving in Kaunas (Lithuania). Also, from this city there will be a connection to Vilnius, near the border with Poland. In turn, this country is building its Rail Baltica segment from Warsaw through Bialystok and Elk to connect with the Lithuanian

border. From the technical point of view, it will be an electrified and high-speed connection devised for both freight and passenger traffic. For its implementation, a working schedule has been divided into three stages: planning, design and construction. In the first one, the studies associated with the possible routes have already been carried out. However, there are still less re-



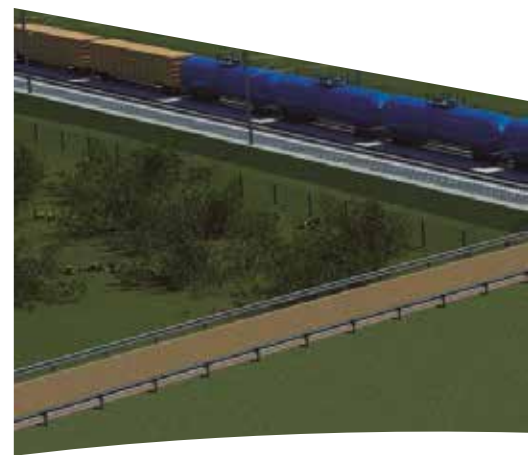
levant studies pending that will be performed out in the later phases. It should also be noted that there are some parts of the project that overlap within the times marked out for design and construction. After the global planning phase, the design phase (2016-2022) began, whose global guidelines were awarded, in July 2017, to Systra. The company will provide engineers with a standardised approach featuring guidelines that will ensure the interoperability of the new line and accelerate the two remaining periods to be implemented.

Progress

The year 2017 has marked a stage with several significant milestones. On the one hand, the international agreement on the project, which defines the general technical parameters, the route and the deadline for construction, was ratified by the Legislative Assembly of Estonia, the Riigikogu, in June 2017. In addition, a cost and benefit analysis of Rail Baltica was carried out, which revealed that the socio-economic benefits of the project standing at 16 billion euros. In 2017, an environmental impact assessment was also completed successfully, which highlights, amongst other issues, that the railway has a very positive impact on climate. Hence the importance of promoting new routes like this one. In this last year, progress has also been made in some aspects, such as the awarding, in March, of the design of the reconstruction of Riga's Central station to become a multimodal

Rail Baltica is the largest infrastructure project in the region in the last 100 years

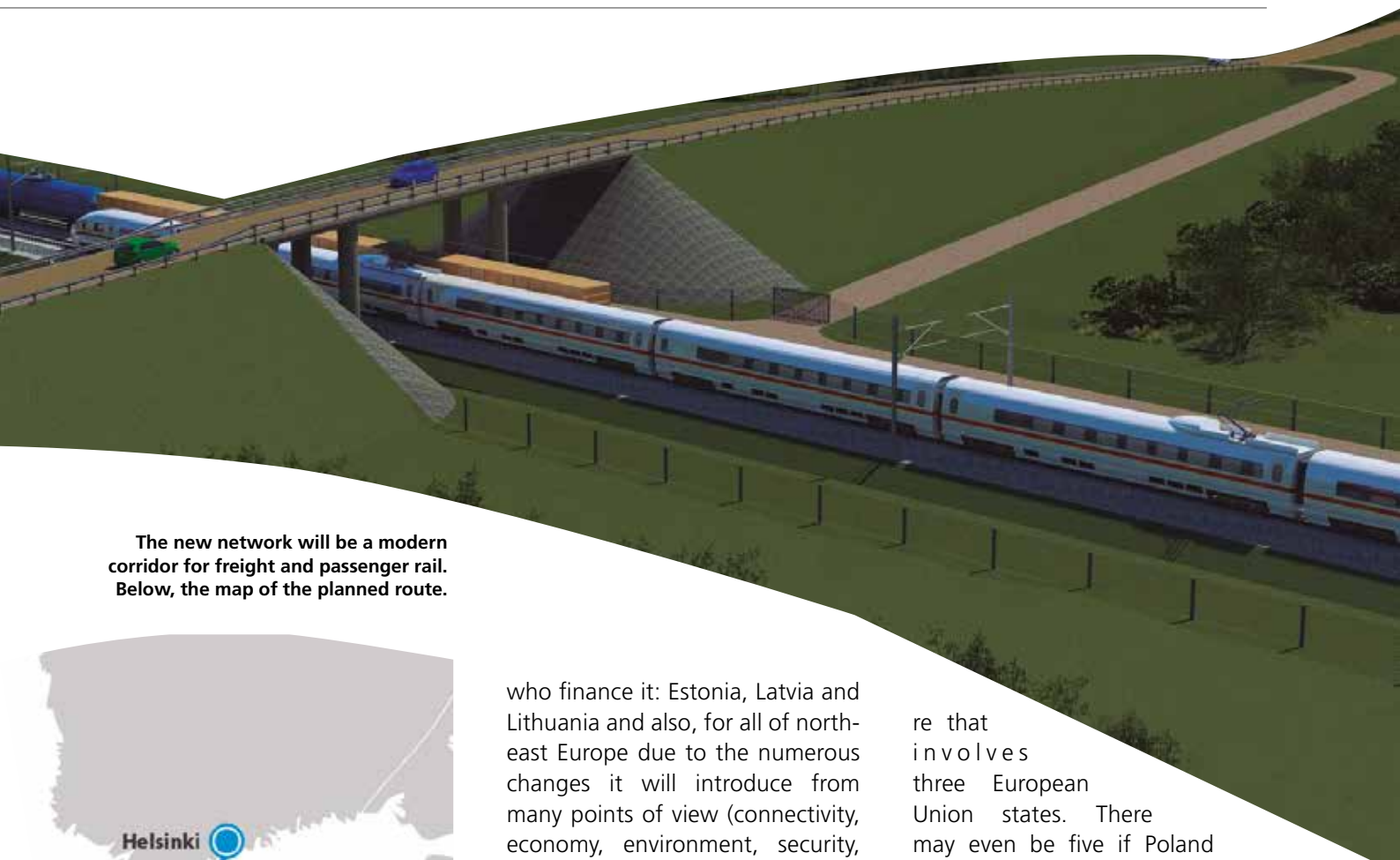
transport hub, as well as the provision of a bridge over the Daugava river. The tender was awarded to the Danish architecture firms PLH and the Cowi engineering. Construction is expected to be underway by 2022. At this moment, the study of the technological and spatial needs of the terminal in Muuga (Estonia) is in its final phase. In 2018, acquisitions will be announced for the design work of the passenger terminals at Ülemiste and Pärnu. Furthermore, early in 2018, the country itself will assume the chairmanship of the Supervisory Board of AS RB Rail, a joint venture located in Latvia. Construction will take place from 2019 to 2026. The Baltic route must be completed before 2025 while the link to Warsaw is scheduled for



2030. The route, of 870 kilometres, will be designed with a standard track gauge measuring 1435 mm, confirming all the requirements of the Interoperability Technical Specifications (ETI). Of the planned extension, 270 kilometres will cross Estonia, 265 kilometres Latvia and another 392 kilometres will pass through Lithuania. The line, electrified (2 x 25 kV AC), will be double track and equipped with ERTMS. Additionally, it will be prepared to reach a maximum speed of 240 km / h on the Tallinn route through Pärnu-Rīga-Panevezys-Kaunas to the Polish border.

The corridor appears as one of the European Union's priorities within the trans-European transport networks (TEN-T). This ambitious initiative has been deemed the "project of the century" for the three countries at the forefront and





The new network will be a modern corridor for freight and passenger rail. Below, the map of the planned route.



who finance it: Estonia, Latvia and Lithuania and also, for all of north-east Europe due to the numerous changes it will introduce from many points of view (connectivity, economy, environment, security, etc.). A completely new layout that makes a difference, since it is the only cross-border infrastruc-

ture that involves three European Union states. There may even be five if Poland and Finland decide to become stakeholders. The project's implementation has the co-financing of

This initiative will also entail major changes in terms of sustainability.



the European Union providing up to 85% of the total costs. These funds are part of the Connect Europe Facility (CEF).

Economic corridor

The project is not only considered as a boost to mobility in Europe, but it will be the means of establishing a new economic corridor in north-eastern Europe. A modern infrastructure key to boost wealth and competitiveness in the Baltic nations. Once under way, it will serve for the integration of the Baltic countries into the new regional and European supply chains. It is worthwhile noting that it is designed to be part of the The trans-European transport network TEN-T Corridor; specifically, it will be included in the main network

► RAIL BALTICA: MAIN DATA OF THE NEW CORRIDOR

Infrastructure	The largest infrastructure project in the Baltic region in the last 100 years.
Time	A construction period of 10 years.
Transport Modes	For the traffic of passengers and goods.
Longitude	870 km: 270 (Estonia), 265 (Latvia), 392 (Lithuania).
Maximum speed	240 km / h (passengers), 120 km / h (freight).
Inter-modality	Three intermodal terminals: Muuga (Estonia), Salaspils (Latvia) and Kaunas (Lithuania).
Track	Double electrified track 2 x 25 kV AC.
Conditions	22.5 T.
Traffic management	ERTMS Level 2.
Other information	Investment of more than 5 billion euros in the region. Part of the Baltic TEN-T corridor of the EU in the North Sea. Implemented by Estonia, Latvia, Lithuania. Financed by the EU (CEF), Estonia, Latvia, Lithuania.

Three intermodal terminals will be operational: Muuga (Estonia), Salaspils (Latvia) and Kaunas

Riga station, one of the main Baltic Rail stops.

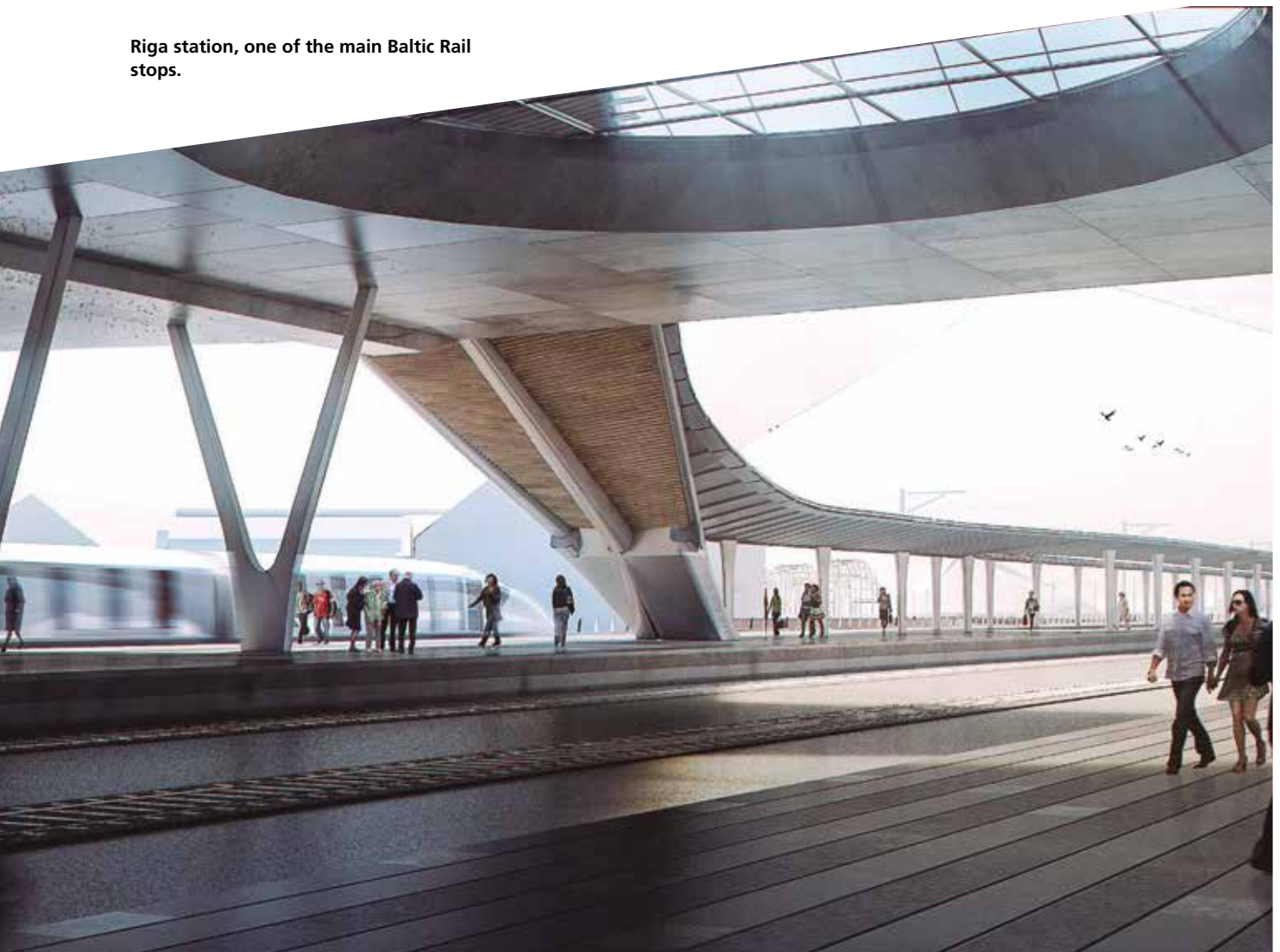




Image of the future Riga station.

of the North Sea-Baltic of the European Union. This layout will connect the larger ports of the Netherlands and Germany with the three Baltic States; an additional union with Finland will also be enabled. The possibility of enabling a future link between Tallinn and Helsinki is also being studied. Precisely, the possibility of exten-

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Traction systems



Train-land communication systems



Energy storage systems

LOCOMOTIVES

REGIONALS

SUBURBANS

TRAMS

METROS

HIGH SPEED

ding the route to the north facilitates its future connection with the Arctic corridor. A key aspect of the prospects of having an alternative maritime route in the North Circle between Europe and Asia are taken into account. Likewise, as it will cross the Baltic-Adriatic Corridor in Warsaw, the line will give the opportunity to create new developments in the supply chain between the Baltic and Adriatic seas. In this way, synergies between North-South and West-East freight flows will be reinforced.

Cost-benefit analysis

In the sphere of freight traffic, as stated in the Rail Baltica Cost-Benefit Analysis (CBA) prepared by Ernst & Young Baltic Ltd (EY), it is estimated that approximately 57% of all transactions will be established with Finland. Secondly, due to the trans-shipment between the rest of the EU and the Commonwealth of Independent States (CIS). And in addition, there will be an important flow of exports and imports between the three Baltic States. Overall, it is estimated that the freight potential would be 13 million tons in 2030, 13.5 million tons in 2035 and approximately 16 million in the year 2055.

Environmentally Friendly Measures

Rail Baltica will also entail major changes in terms of sustainability. On the one hand, by inducing a modal shift from road to rail, an economy of scale will be fostered, and there will be a significant reduction in the monetary resources allocated to mitigate climate change (approximately 3,000 million euros). The costs associated with noise pollution will also be reduced (approximately 843 million euros).

A priority project with far-reaching potential

The Rail Baltica project is one of those that receives most backing



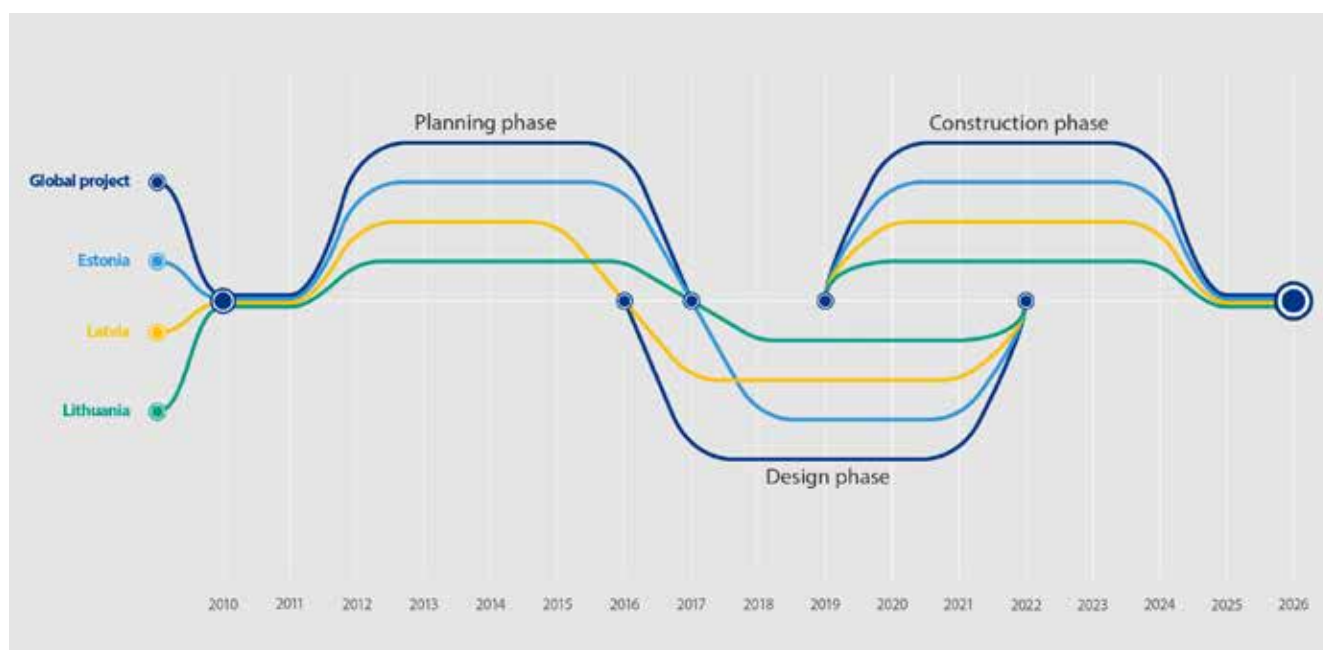
The great regional and European value reflects the importance of this railway project.

from the European Union. This was clearly visible in its presentation at the G7 Transport Ministers Meeting in the summer of 2017. After signing the third Grant Agreement with the Executive Agency for Innovation and Networks, this initiative will have attracted 683 million euros of funding from the Connect Europe Facility (CEF) for activities in the planning and design phases.

It should be noted that in the last CEF invitation to bid, for the first time, the Commission has awarded additional funding beyond national allocations, which demonstrates the Commission's firm commitment to the Rail Baltica project. The great regional and European value reflects its importance and the power to provide benefits beyond the Baltic Sea region.



Below, image of how the future station of Parnu (Estonia) will look.





Mr. Kaspars Rokens Chief Operating Officer

"Rail Baltica boasts major future potential"

KASPARS ROKENS, CHIEF OPERATING OFFICER OF RAIL BALTICA, UNVEILS THE DETAILS OF ONE OF EUROPE'S FLAGSHIP RAIL PROJECTS. THIS NETWORK IS PART OF THE BALTIC NORTH SEA CORRIDOR.

Mafex: "Rail Baltica" is one of the widest-reaching and most significant railway projects in Europe. What does this rail corridor consist of?

Kaspars Rokens: It concerns the most significant rail project in the Baltic region. The aim is to construct a new corridor for both passenger and freight traffic. It will be European gauge (1435 mm) railway which will connect Tallinn, Riga, Kaunas and Vilnius, with the Polish – Lithuanian border in the north of Poland. Rail Baltica forms part of the Northern Sea – Baltic Corridor. However, we are not just building

the physical railway infrastructure, we are building solid preconditions for establishing a new economic corridor in the region.

Mafex: What is the schedule forecast, and which phase of the working plans is currently underway?

Kaspars Rokens: The implementation of the "Rail Baltica" project has been divided into three stages: Planning, design and construction. During the planning stage, activities involved with route alignment, along with miscellaneous major studies on the three Baltic states. However, certain less important studies will also

be commissioned in the subsequent stages. Furthermore, some stages of the project overlap as certain acquisitions of infrastructure elements undertaken by Rail Baltica are scheduled as part of "Design and Construction". The design period which we have already entered is carried out between the years 2016-2022. The forecast working plan for the construction of the railway line, stations, terminals and maintenance installations will be completed in 2024. Within a few years, in 2019 and up to 2025 will be the implementation period for the ERTMS system. In 2026, rail traffic will commence and passengers will be able to use this new train.

Mafex: What benefits will it bring?

Kaspars Rokens: The 'Rail Baltica' Corridor has major potential as a catalyst for socio-economic development in the region. The benefits encompass all the key groups and interested parties, ranging from passengers, to freight operators, railway administrators and the general public. It will be a highly modern and competitive infrastructure compared to other means of transport that will improve connectivity and provide a boost to cross-border connections. It is calculated that the sum of the total benefits accomplished (including GDP multiplier) will be in excess of 18 billion euros, and will contribute to a substantial improvement in numerous aspects, such as safety, climate change, journey times, etc. To give an example, at the present time it takes around four hours to travel from Tallinn to Riga, a journey time that will be considerably reduced - the travel time will be a bit less than two hours - once this railway



The future station of Pärnu (Estonia).

line is operational. Furthermore, model integration and interoperability will be fostered, thus contributing to a reduction of road traffic and the elimination of bottlenecks.

Mafex: What is the role of RB Rail AS?

Kaspars Rokens: Our main role is coordination of the project implementation in three countries and

also implementation. RB Rail AS represents the project with the aim of ensuring its success, effective resource spending, interoperability of the railway line and benefit to the Baltic and European public.

Thus far, the project has been the beneficiary of 765 million euros in financing granted by the Mechanism "Connecting Europe" (CEF) and national states.



SICE
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Security and Communication systems for metro and railway infrastructures



Automatic Fare Collection



Railway Signalling

SOME MAFEX MEMBERS WITH WITH PROJECTS IN RAIL BALTICA



► TPF GETINSA EUROESTUDIOS

TPF Getinsa Euroestudios will provide expertise for the development of the Rail Baltica project in Poland. TPF Sp. z o.o., one of TPF Getinsa Euroestudios' subsidiaries, was awarded a contract on 1 December 2017 to develop a preliminary design of the project "Works on the E 75

Railway Line Białystok – Suwałki – Trakiszki – Polish Border, Stage II Elk – Trakiszki (Polish Border) Section", covering 6 railway segments totalling 108.6 km in length.

The E 75 line is part of the North Sea-Baltic transport corridor, which is connected to the Trans European Network for

Transport (TEN-T). The project is of vital importance for the EU since it involves upgrading the railway corridor connecting Warsaw with Tallinn via Kaunas and Riga. The implementation of the project will enhance rail safety and transport services, while reducing travel times and environmental impacts.

► CAF

CAF is one of the main suppliers of comprehensive rail transport solutions. The company, which celebrated its centenary in 2017, plays a particularly important role for its ability to offer a wide range of innovative products and services that guarantee sustainable mobility in today's cities. The company is present in more than 30 countries around the world and boasts manufacturing plants in Spain, France, the United States, Mexico and Brazil. Furthermore, a new manufacturing plant in Newport, Wales is scheduled to open, to meet the orders placed by CAF in the United Kingdom. One of its main aims in the international field is to consolidate its

presence in Europe and bring its experience, know-how and technological advances

in projects of special relevance where the highest skills standards are required.



The wireless charging technology in the railroad sector



CAF AND IK4-IKERLAN COOPERATE IN THE DEVELOPMENT OF A NOVEL INDUCTIVE CHARGER FOR TRAMS WHICH DOES NOT NEED GROUND-VEHICLE COMMUNICATION

The wireless charging methods are increasingly more common in the automotive and mobile telephony sectors, where many manufacturers bet on devices which do not require wires or plugs to charge the batteries of electrical vehicles and smartphones. This type of chargers, called inductive, transfer the energy from the issuer to the receiver through an electromagnetic field induced in between.

Public transport has been the last one to benefit from this method. The railroad company from Guipuzcoa CAF and the Technological Centre IK4-IKERLAN have developed a wireless charging system of trams which does not require, unlike the conventional methods, any type of direct electrical contact, such as catenaries, wires or plugs, to charge train batteries.

The novel device comprises two coils which are in charge of inducing the electromagnetic field which enables

the transfer of energy. The first coil, called primary or issuer, is buried underground, where it remains connected to the electrical network, in areas where the tram makes its stops. The second coil, called secondary or receiver, is installed at the bottom of the train and carries a small converter.

Thus, when the tram reaches the area where the primary coil has been placed, this one generates current and produces an electromagnetic field which induces another current in the secondary coil, transferring the power which charges the train batteries.

This energy transfer is safe by nature and does not affect passengers, since it can only be activated when there is a tram on top.

Thanks to this development, we can take advantage of the stops the tram makes along its way to charge the batteries automatically, with no need to perform any action by the

driver, such as the moment we wait for a traffic light, while passengers get off at a stop or when parking in the own parking space.

Prototype for tram

The development has been carried out within the framework of the project ICPT (Inductive Coupling Power Transfer), which started in 2014 and has lasted three years. This proposal is framed within the NUSUR initiative which is in turn subsidized by the Etorgai program of the Basque government.

During this time, IK4-IKERLAN has worked on a prototype designed to transfer 50kW of power which, after validating it in its laboratories, it has been installed in a tram CAF model URBOS, on the test track which it has in Zaragoza.

The result is a compact piece of equipment completely automatic of fast installation and easy maintenance. It offers a power of 50kW, and taking into account the technology used, it could reach the 100kW, values much higher than those dealt with in the automotive sector.

Innovating with Advanced Fare Collection Systems



In the last 10 years IDOM has witnessed a cycle of redefinition of collection systems throughout the world of transport.

IDOM has a long experience in the world of intelligent transport systems ITS, and especially in fare collection systems named IFM AFC (Interoperable Fare Management-Automatic Fare Collection systems), with numerous references at a national and international level, and covering all the technological aspects mentioned.

There are already many clients that rely on the team of collection experts or ticketing at the time of defining the complete life cycle of their fare collection systems, from their implementation or renewal, to their start-up, operational readiness and start of a new cycle. Within IDOM a special dedication is endowed to technological innovation, which comes into being as R & D projects, such as the case of Mugitu for Interoperable Validation NFC in all modes metro, railway, tramway, buses, cycles and parking facilities, the use of new technologies such as the contactless one-off ticket or Smart ticket, based on NXP Mifares Ultra-high technology. or the collaboration in the obtaining of specific patents of advanced ticketing systems.

IDOM services cover the wide range of services required for the definition and implementation of fare collection systems throughout their life cycle:

- Conceptual design, business model and relational model AFC-IFM
- Business model and fare collection processes
- Feasibility and preliminary design studies
- Equipment design
- Detail design, Projects and Tender Documents
- Budget analysis, Selection of suppliers
- Overseeing the implementation phase
- Test protocols, contactless smart card tools
- Professional training and qualifications
- Technical support during operational phase



IDOM HAS DEVELOPED THE MUGITU R&D PROJECT IN WHICH NFC INTEROPERABILITY IN ALL MODES (METRO, RAILWAY, TRAMWAY, BUSES, CYCLES AND PARKING FACILITIES) AND MOBILE PAYMENT PLATFORMS.

The range of technologies covers the entire range of fare collection systems, either new conception or technological updating, amongst which we have:

- State-of-the-art contactless cards, mapping and internal structures
- Single journey rf-id or Smartticket
- Vulnerability analysis of cards
- High security systems based on SAM module and HSM systems
- System or Clearing House
- Application of mobile devices fitted with NFC technology
- Account Based Systems
- Payment and Validation with EMV bank card
- On-line purchasing
- Multi-application systems (transport, leisure, etc.)
- MaaS (Mobility as a Service), ITS
- Other advanced systems

All these services have been developed thanks to the trust placed in us by our customers and amongst which we find the Cairo Metro (Egypt), the Lima Metro (Peru), the Transportation Authority of Jordan, the Bizkaia Transport Consortium, the Basque Government, Euskotren, ETS, the Transport Authority of Gipuzkoa, RENFE, FEVE, different Metros, Trams and BRT on a national and international level.



Wheel Measurement Systems Benchmark / Handheld Systems

The pace of innovation advances at a huge speed. Even the most conservative sectors such as the railway is enjoying a fast digitalization at all levels. Within this digital transformation the area of maintenance has become the most change-oriented one, thanks to all the knowledge that can be obtained from the data the train provides and in that way, reach the so-wished condition-based maintenance.

This new approach helps, amongst other aspects, reduce costs, improve the availability of the fleet and extend the critical assets life-cycle, such as the train wheel set. In this sense, wheel profile measurement systems play a key role.

These systems involve a medium high investment which is easy to quantify and represent only the tip of the iceberg in the integral system of assets. There are other as-

pects and processes underlying beneath this first layer that are not as tangible or quantifiable cost wise. The analysis and determination of wheel wear rates, the stops and reprofiling planning or the use of information for the establishment of KPIs and decision making at the highest level.

All and every of those aspects imply a more invisible part of the costs of our management system. However, an apparently trivial affair such as purchasing a wheel profile measurement system acquires a certain level of importance and becomes a critical decision in the management process.

Even worse, a bad decision or a bad characterization of the real needs can even jeopardize the digitalisation strategy in which we have invested so much. For this reason, this analysis intends to describe those aspects that should be used to choose the wheel profile measurement systems more accurately and precisely based on benchmarking the different options the market offers.

This study is based on the knowledge generated by NEM Solutions after spending 10 years analysing and monitoring wheels. 18,000 daily measurements and more than 120 manual installations connected to A.U.R.A Wheel back us up.

MAFEX 57



New electronic interlock for Moroccan rail service

The interlocking location controls 50 point machines, 264 signals, 143 track circuits and 495 balises, being the first of a total of 4 EBI Lock Bombardier systems to be set up on the line. The new electronic interlock controls the first 40 km of the 360 km of the Tanger-Casablanca line in Morocco. This stretch is the first to be commissioned of the Kenitra- Rabat- Zenata line; a line that connects the capital Rabat to Casablanca, the most important economic city in Morocco. EBI Lock 950 computer based interlocking systems supervise and control wayside objects such as signals, point machines and level crossing protection equipment. The interlocking system receives among others, route commands from traffic control centres or local control systems, and sends indications or status reports back. The interlocking system

THE RAIL CONTROL SOLUTIONS DIVISION OF BOMBARDIER TRANSPORTATION SPAIN SUCCESSFULLY COMPLETED THE INSTALLATION OF THE NEW ELECTRONIC INTERLOCK THAT CONTROLS THE FIRST 40 KM OF THE 360 KM OF THE TANGER - CASABLANCA LINE IN MOROCCO.

checks that conditions for the commands are fulfilled, locks routes, and releases them after the train passes.

The Interflo 250 solution of that installation is also commissioned by Bombardier and has the latest EBI Lock 950-R4, as well as the modern EBI Link system (ERTMS L1), making it possible for these lines to be made available to the most advanced European safety standards, allowing them to increase the maximum speed of the line up to 220 kilometers, thus reducing travel times between the two main cities of the country. In addition, and consid-

ring the reliability and maintenance of the facilities, Bombardier is installing its OPTIFLO maintenance solution which allows the monitoring of all subsystems to optimize maintenance.

Kenitra- Rabat -Casablanca line has a total of 15 stations along its 130 kms. Two of the three stretches of this line (currently in service) are being modernized with Bombardier technology, whose Center of Excellence in Signalling Systems, located in San Sebastian de los Reyes, also works to enable the entry into commercial operation of the third line, as part of this project.

New test bench for traction systems

The new test bench, has been installed By INGETEAM on its Zamudio facilities and has required a relevant investment. It comprises the installation of cells, traction motors and control and monitoring systems, together with the traction and auxiliary converters.

The main objectives of system tests are to optimize equipment control parameters, to analyze all the traction equipment characteristics and the accomplishment of the required standards for every project.

Optimization of energy efficiency, route profile simulations and the evaluation of the different protection systems of the equipment are other key issues that are analyzed, together with the thermal characterization and resistance test to extreme weather conditions.

The new premises, added to the existing one and to the High Power Electronic Laboratory, will allow us



THE NEW PREMISES, ADDED TO THE EXISTING ONE AND TO THE HIGH POWER ELECTRONIC LABORATORY, WILL ALLOW US TO IMPROVE OUR PRODUCTS AND SYSTEMS AND TO GO FURTHER ON OUR R&D ACTIVITIES, ONE OF INGETEAM GROWTH ENGINES.

to improve our products and systems and to go further on our R&D

activities, one of INGETEAM growth engines.



New production of high-quality 108m-long rails

THE 108M-LONG RAILS OF ARCELORMITTAL PROVIDE FURTHER TRACK SAFETY, COST SAVINGS IN WELDING, TRACK LAYING AND MAINTENANCE, IMPROVED RAIL SURFACE QUALITY, DIMENSIONAL TOLERANCE AND INCREASED PASSENGER COMFORT.

This investment in Asturias rail mill after the successful extension to long rails in ArcelorMittal Poland, one of only two sites in Europe capable of producing 120m-long rails for the railway industry, ArcelorMittal will be the only rail European rail producer, in Europe, to have dedicated high quality long rail production in Western and Eastern Europe perfectly located for supplying both European and export markets. As

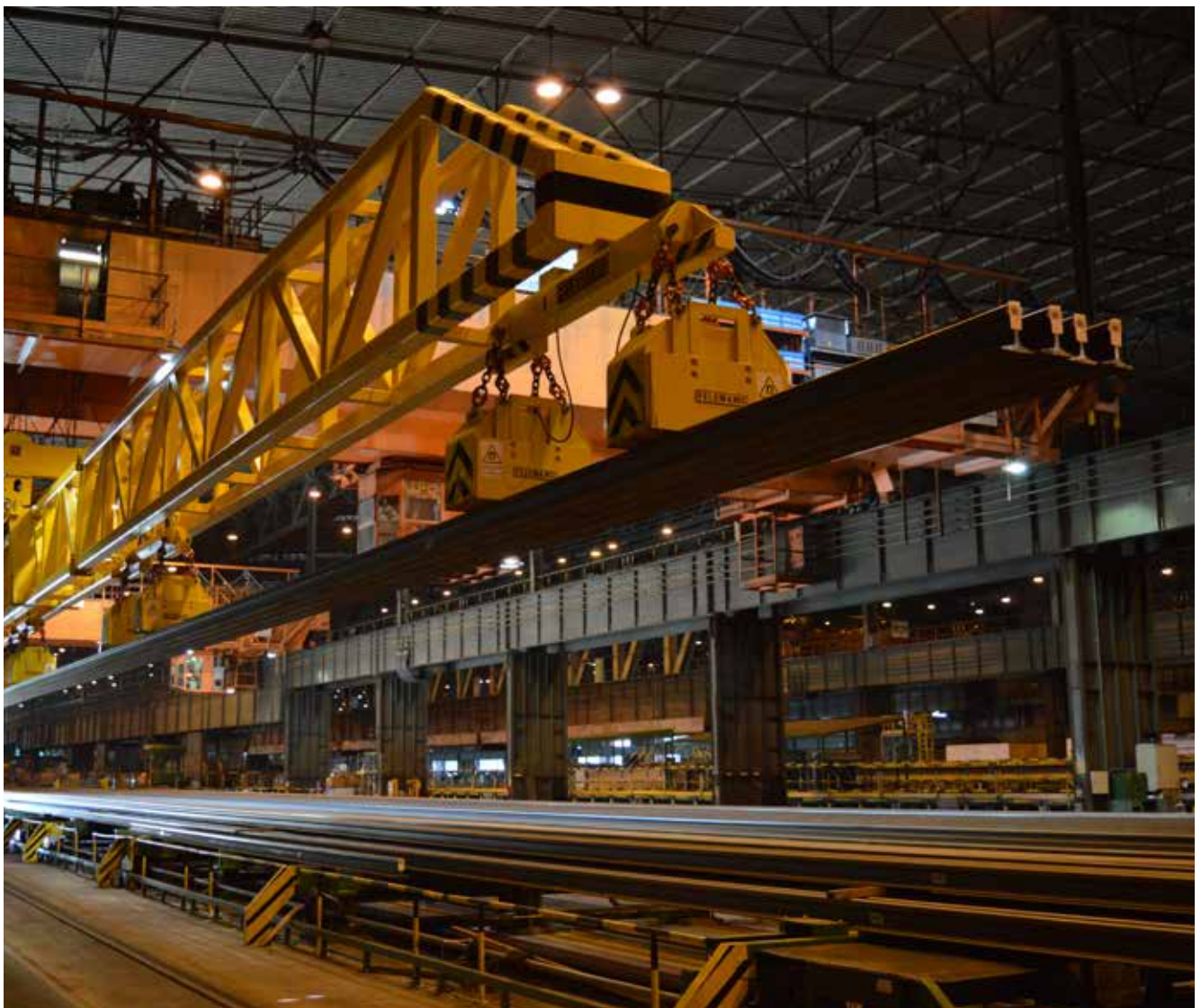
a leading supplier of rails worldwide and the steel industry leader in product and process innovation, ArcelorMittal is fully geared to meet the future requirements of the rail industry. This is made possible by leveraging the company's research and development capabilities.

Customer benefits

The 108m-long rails provide further track safety, cost savings in welding, track laying and maintenance, im-

proved rail surface quality, dimensional tolerance and increased passenger comfort. This also allows faster development of new profiles and grades in order to fulfil customer requirements.

The main upgrades in the Spanish facility linked to the investment are: change of rolling technology - from DUO to Universal – extension of the rail cooling bed and improved finishing line (to adapt to the production of 108 m rails), and state of the art rails inspection. ArcelorMittal is fully committed to the quality and reliability of its rail products, earning the full confidence and trust of its customers.



Satellite-based technology applied to railway signalling in the 1st **Galileo User Assembly**

Galileo is the European global satellite-based navigation system (GNSS) that is currently being created by the European Union (EU) through the European Space Agency (ESA) and the European GNSS Agency (GSA). This European Global Navigation Satellite System (EGNSS) provides an independent high-precision positioning system to the European Union do not have to rely on the Russian GLONASS and US GPS systems. The first phase of the system was launched in 2016 and is expected to be completed by 2020.

The European program has been the central topic of the first "Galileo User Assembly", celebrated in Madrid last November. The assembly congregated almost 300 Galileo users that shared their experiences and discussed their needs in this first EGNSS User Consultation Platform.

Siemens has participated in the assembly with the exposition of its works in the application of Galileo to railway signalling technologies. In the framework of the project STARS (Satellite Technology for Advanced Railway Signalling), a European Union's Horizon 2020 R&I program, Siemens is investigating how to fill the gap between ERTMS needs for safety critical applications and EGNSS services, through a characterization of the railway environment.

GNSS has a long history of safety critical applications in aviation, but this cannot be used as a basis for similar applications in the railway domain because the railway environment for GNSS is significantly more challenging and the certification procedures and related requirements are totally different.

To push GNSS applications into safety applications a much better understanding of GNSS behavior in the rail-

THE EUROPEAN PROGRAM HAS BEEN THE CENTRAL TOPIC OF THE FIRST "GALILEO USER ASSEMBLY", CELEBRATED IN MADRID LAST NOVEMBER. SIEMENS HAS PARTICIPATED IN THE ASSEMBLY WITH THE EXPOSITION OF ITS WORKS IN THE APPLICATION OF GALILEO TO RAILWAY SIGNALLING TECHNOLOGIES.



way environment is needed, especially for standardized applications, such as ERTMS. The main expected results from STARS project are to predict performance in the railway environ-

ment in terms of accuracy, availability and safety; to achieve interoperability between equipment of different suppliers and to allow inclusion of GNSS into ERTMS.



Latest generation **ERTMS** technology in Adif's laboratory trains

Alstom has been awarded a project by the Spanish railway infrastructure manager Adif to equip three auscultation trains with its latest ERTMS technology solution Atlas. This upgrade of the on-board signalling systems on ADIF's monitoring trains will contribute to increase its services portfolio and improve performance. With this new on board solution, Adif laboratory trains will be fully aligned with the new European technical requirements for safety and interoperability. The new on-board equipment supplied by Alstom incorporates the latest version (baseline 3) of ETCS Level 2 technology in these rolling laboratories for the validation of new and on-going trackside ERTMS projects and for routine inspections along the

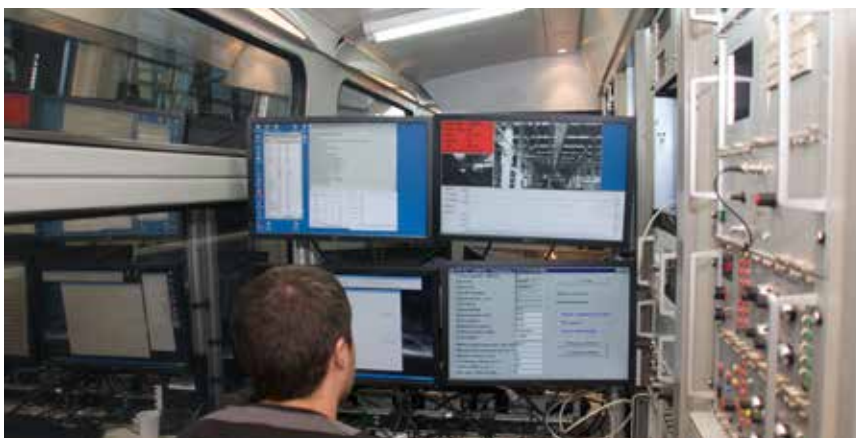
ALSTOM HAS BEEN AWARDED A PROJECT BY THE SPANISH RAILWAY INFRASTRUCTURE MANAGER ADIF TO EQUIP THREE AUSCULTATION TRAINS WITH ITS LATEST ERTMS TECHNOLOGY SOLUTION ATLAS. THIS UPGRADE OF THE ON-BOARD SIGNALLING SYSTEMS ON ADIF'S MONITORING TRAINS WILL CONTRIBUTE TO INCREASE ITS SERVICES PORTFOLIO AND IMPROVE PERFORMANCE.

entire Spanish ERTMS-equipped rail network. Adif's laboratory trains monitor the Spanish high-speed network to guarantee quality and safety, ranging from aerodynamic behaviour in tunnels to infrastructure (catenary and track), mobile communications and signalling systems.

With over 15 years of experience installing ERTMS solutions, Alstom is a global pioneer in its development and implementation and a worldwide leader in on-board equipment. With

projects in 30 countries, Alstom has equipped 18,000 km of tracks and over 6,000 trains of 130 different types with its Atlas ERTMS solution. Atlas is a scalable solution that can be adapted to all types of traffic and operational needs: passengers and freight, high-speed or suburban.

Alstom's signalling technology centre in Spain executes national projects and take part in some international projects. Highlights of ERTMS references recently awarded in Spain include the high-speed lines of the West Coast corridor (Albacete-Alicante), the Mediterranean corridor (connection with the French border), the Zaragoza-Huesca link and the Northwest corridor (Valladolid-León-Burgos). Alstom has also installed or is installing the on-board equipment for the suburban networks of Madrid and Barcelona; for Renfe Ave high-speed trains (Series 100, 104 and 114) and for the Haramain project high Speed trains.



2018

► 10 April-11 April 2018
MARKET MISSION TO ESTONIA - RAIL
BALTICA
Tallin (Estonia)

► 26 February-28 February 2018
MARKET MISSION TO GERMANY
Berlin (Germany)

► 13 May-15 May 2018
MARKET MISSION TO COREA
Seul (Corea)

► 16 April -20 April 2018
INVERSE DELEGATION - PUBLIC
TRANSPORT

► 18 April-19 April 2018
14th METRO LIGHT RAIL CONGRESS
Bilbao (Spain)

► 8 May-11 May 2018
UIC WORLD CONGRESS ON
HIGH SPEED RAIL
Ankara (Turkey)

► 19 May -24 may 2018
TRADE DELEGATION TO ISRAEL/ EGIPTO
Tel Aviv (Israel)-El Cairo (Egypt)

► 19 February-23 Februry 2018
TRADE DELEGATION TO INDONESIA- THE
PHILIPPINES YAKARTA (INDONESIA)
Manila (The Philippines)

► 12 March-13 March 2018
MIDDLE EAST RAIL 2018
Dubai (U.A.E.)

INFRASTRUCTURE

Engineering and consultancy

- ▶ Aquafrisch, S.L.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ CAF Power & Automation
- ▶ CAF Turnkey & Engineering
- ▶ Colway Ferroviaria, S.L.
- ▶ Gantrex S.A.
- ▶ Idom
- ▶ Ineco
- ▶ MB Sistemas, S.Coop.
- ▶ NEM Solutions, S.L.
- ▶ Newtek Sólidos
- ▶ Segula
- ▶ Sener Ingeniería y Sistemas, S.A.
- ▶ Tecnival Infraestructuras
- ▶ TPF Getinsa-Euroestudios
- ▶ Typsa

Civil engineering construction

- ▶ Azvi
- ▶ COMSA
- ▶ Instalaciones Inabensa, S.A.
- ▶ Parrós Obras, S.L.
- ▶ PRECON - Prefabricaciones y Contratas, S.A.U.
- ▶ Pretensados del Norte

Electrification

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Artech
- ▶ Idom
- ▶ Ineco
- ▶ Ingeteam Power Technology, S.A.
- ▶ La Farga Lacambra, S.A.U.
- ▶ Luznor
- ▶ Parrós Obras, S.L.
- ▶ SEMI, S.A.
- ▶ Telice
- ▶ TPF Getinsa-Euroestudios
- ▶ Typsa

Fixed material: components and equipment

- ▶ Alstom Transporte, S.A.
- ▶ Amurrio Ferrocarriles y Equipos, S.A.
- ▶ Aquafrisch, S.L.

- ▶ Artech
- ▶ Duro Felguera Rail, S.A.U.
- ▶ Elektra - Grupo Elektra, S.A.
- ▶ Gantrex S.A.
- ▶ HICASA - Hierros y Carbones, S.A.
- ▶ Idom
- ▶ Ikusi
- ▶ Ineco
- ▶ ITK Ingeniería, S.A.
- ▶ JEZ Sistemas Ferroviarios, S.L.
- ▶ Parrós Obras, S.L.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Talleres Alegría, S.A.
- ▶ Thales España GRP, S.A.U.
- ▶ Valdepinto, S.L.

Security

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ DSAF. Dinámicas de Seguridad
- ▶ Ecocomputer S.L.
- ▶ Idom
- ▶ Ikusi
- ▶ Implaser 99, S.L.L.
- ▶ Ineco
- ▶ SICE
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Telice
- ▶ Tecnival Infraestructuras
- ▶ Thales España GRP, S.A.U.

Signaling and traffic control

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Bombardier España
- ▶ Cables y Comunicaciones Zaragoza S.A.
- ▶ CAF Signalling
- ▶ DSAF. Dinámicas de Seguridad
- ▶ GMV Sistemas S.A.U.
- ▶ Idom
- ▶ Ikusi
- ▶ Implaser 99, S.L.L.
- ▶ Indra Sistemas, S.A.
- ▶ Ineco
- ▶ Luznor
- ▶ P4Q Electronics, S.L.

- ▶ SEMI, S.A.
- ▶ SICE
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Telice
- ▶ Tecnival Infraestructuras
- ▶ Thales España GRP, S.A.U.
- ▶ TPF Getinsa-Euroestudios
- ▶ Typsa

Maintenance

- ▶ Alstom Transporte, S.A.
- ▶ Amurrio Ferrocarriles y Equipos, S.A.
- ▶ Azvi
- ▶ COMSA
- ▶ Danobat
- ▶ Duro Felguera Rail, S.A.U.
- ▶ Idom
- ▶ Ikusi
- ▶ Ineco
- ▶ Instalaciones Inabensa
- ▶ Parrós Obras, S.L.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Telice
- ▶ Thales España GRP, S.A.U.

Stations

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Idom
- ▶ Ikusi
- ▶ Ineco
- ▶ Luznor
- ▶ Parrós Obras, S.L.
- ▶ Thales España GRP, S.A.U.
- ▶ Typsa

INFORMATION AND DATA SYSTEMS

Systems and equipment for collection and ticketing

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Calmell Group
- ▶ Ecocomputer
- ▶ Idom
- ▶ Ikusi
- ▶ Indra Sistemas, S.A.
- ▶ SICE

- ▶ Thales España GRP, S.A.U.

Communications, Information systems and passenger information equipment

- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Cables de comunicaciones Zaragoza, S.L.
- ▶ CAF Power & Automation
- ▶ Ecocomputer
- ▶ Icon Sistemas de Información y Datos
- ▶ Idom
- ▶ Ikusi
- ▶ Indra
- ▶ Ineco
- ▶ P4Q Electronics, S.L.
- ▶ SICE
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Telice, S.A.
- ▶ Thales España GRP, S.A.U.
- ▶ TPF Getinsa-Euroestudios
- ▶ Typsa

ROLLING STOCK

Passenger car manufacturers

- ▶ Alstom Transporte, S.A.
- ▶ Bombardier España
- ▶ CAF - Construcciones y Auxiliar de Ferrocarriles, S.A.
- ▶ Cetest
- ▶ Patentes Talgo, S.L.
- ▶ Stadler Rail Valencia S.A.U.

Manufacturers of freight wagons

- ▶ Alstom Transporte, S.A.
- ▶ Bombardier España
- ▶ CAF - Construcciones y Auxiliar de Ferrocarriles, S.A.
- ▶ Talleres Alegría, S.A.
- ▶ Stadler Rail Valencia S.A.U.

Locomotive manufacturers

- ▶ Alstom Transporte, S.A.
- ▶ Bombardier España

- ▶ CAF - Construcciones y Auxiliar de Ferrocarriles, S.A.
- ▶ Patentes Talgo, S.L.

EQUIPMENT AND COMPONENTS ROLLING STOCK

Traction and control systems

- ▶ Alstom Transporte, S.A.
- ▶ CAF Power & Automation
- ▶ Cetest
- ▶ Ingeteam Power Technology, S.A.
- ▶ P4Q Electronics, S.L.
- ▶ Patentes Talgo, S.L.

Components

- ▶ Albatros, S.L.
- ▶ AL-KO Record
- ▶ Alstom Transporte, S.A.
- ▶ Artech (Electrotécnica Artech Smartgrid, S.L.)
- ▶ CAF Power & Automation
- ▶ Cetest
- ▶ Elektra
- ▶ Fundiciones Garbi, S.A.
- ▶ Funor, S.A.
- ▶ Gamarra, S.A.
- ▶ Hispacold
- ▶ Ikusi
- ▶ Indra
- ▶ Ingeteam Power Technology, S.A.
- ▶ Metalocauchó, S.L.
- ▶ MGN Transformaciones del Caucho, S.A.
- ▶ P4Q Electronics, S.L.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Teknorail Systems, S.A.
- ▶ Valdepinto, S.L.

Equipment and machinery for the manufacture of rolling stock

- ▶ Aquafrisch, S.L.
- ▶ Cetest
- ▶ Danobat
- ▶ MB Sistemas, S.Coop.

Interiors

- ▶ Alstom Transporte, S.A.
- ▶ Colway Ferroviaria, S.L.
- ▶ Idom
- ▶ Kelox, S.A.
- ▶ Teknorail Systems, S.A.
- ▶ Valdepinto, S.L.

Security

- ▶ Albatros, S.L.
- ▶ Alstom Transporte, S.A.
- ▶ Ardanuy Ingeniería, S.A.
- ▶ Cetest
- ▶ DSAF. Dinámicas de Seguridad
- ▶ Idom
- ▶ Ikusi
- ▶ Implaser 99, S.L.L.
- ▶ Indra
- ▶ Luznor
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Tecnatom
- ▶ Thales España GRP, S.A.U.

Maintenance

- ▶ Albatros, S.L.
- ▶ Alstom Transporte, S.A.
- ▶ Aquafrisch, S.L.
- ▶ CAF - Construcciones y Auxiliar de Ferrocarriles, S.A.
- ▶ Cetest
- ▶ Danobat
- ▶ Goratu
- ▶ Ikusi
- ▶ Ingeteam Power Technology, S.A.
- ▶ Kelox, S.A.
- ▶ Luznor
- ▶ Metalocauchó, S.L.
- ▶ NEM Solutions, S.L.
- ▶ Patentes Talgo, S.L.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Talleres Alegría, S.A.
- ▶ Teknorail Systems, S.A.
- ▶ Stadler Rail Valencia S.A.U.

Quality control, inspection and certification

- ▶ Tecnatom



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Albatros Corporation is specialised in the design, manufacture, commercialization, and maintenance of equipment for the railway industry.

Albatros is formed by various units of engineering and manufacture in Spain as other countries.

We have a team of over 500 employees, selling over 100 million Euros a year, specially on export markets, with over 27,000 static converters, 35,000 passenger information systems, 6,000 HVAC systems, 10,000 WC modules and a variety of designs for the exterior as the interior of the trains, metros and tramways all over the world.



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- 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.



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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.



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- 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

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- 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

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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.)

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- **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 Arteche's history, becoming an asset which has contributed to our international growth and to the development of innovative solutions.



AZVI

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- **www.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 MachineryPark, 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

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- **susana.bargsten@es.transport.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 represent already more than 85% of its activity.



CABLES DE COMUNICACIONES ZARAGOZA

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- **F: +34 976 72 99 72**
- **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 telecomm 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.

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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

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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 world wide including, metros, light rail, locomotives and high-speed trains.

One of the main strategic lines is the development of its own technology. To do 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

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- 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

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- P: +34 946 819 550
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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

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The first company of the group, Calmell, S.A. was founded in 1970, focusing its activity on the manufacture of 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 specific software and hardware, personalization and security.

In the public transport sector it works for integrators and operators supplying any kind of support for ticketing and reader/writer systems. With a strong international presence through its network of representatives and distributors, the Calmell Group is able to satisfy your needs on a global level.



CETEST

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- 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).



COLWAY FERROVIARIA, S.L.

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► F: +34 936 39 8 610
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► 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, Front hoods, saloons, walls, Buffet, Restaurant areas, vestibules.



COMSA CORPORACIÓN

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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

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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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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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► www.durofelguera.com

DF Rail is a Spanish company specialized at the design, manufacturing and supply of turnout systems and components for Metro, Conventional, Heavy Haul or High Speed Lines. Turnouts, single and double crossovers, diamond crossings, single and double slip crossings, single and double junctions, switch expansion joints, ..., on wooden or concrete sleepers; for ballasted or unballasted tracks; for single or combined gauges; with monobloc Mn steel crossings or with swing nose crossings; insulated glued joints; transition rails.



ECOCOMPUTER S.L.

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Ecocomputer S.L. is a technology firm based on North Spain (Asturias and Cantabria) and focused on the design, development and implementation of IT solutions on the railways industry (ie: ticketing, booking, passenger information system) and access control and time&attendance business. Founded on 1999, it holds a wide portfolio of own products as a result of years of evolution and adaptation to customer needs. Ecocomputer provides as well onsite IT maintenance services for the railways operators and administrator infrastructure companies (Railway Control and Regulation Centres, security infrastructure, IT equipment).



ELEKTRA-GRUPO ELEKTRA, S.A.

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Grupo Elektra is a market leader in the field of electrical and electronic equipment distribution for manufacturers of rolling stock, maintenance and railway equipment manufacturers.

Being the leading company in the railway sector in the supply of electrical equipment. Your solution provider in electrical products for railway, with specific technical support. Elektra Group is composed of an extensive Spanish national network and has companies in Romania, India and USA.



FUNDICIONES GARBI, S.A.

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Founded back in 1972, Fundiciones Garbi has evolved from a traditional foundry to a Global Service Company for industry.

We offer a full catalogue of services starting from the casting or other materials till delivery of "ready to use" parts or assembly sets. With this aim, we have developed an organization oriented towards solid and competitive processes, ensuring quality from design phase using APQP tools. Well aware of customer satisfaction, we offer to our clients additional global services including a full range of heat treatments, machining, product inspection and testing (NDT's, etc), protection and finishing surface treatment (Painting, Metallization, Others...), including final assembly of different parts. For the Railway industry we are specialized on production of rolling stock material.



FUNOR, S.A.

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Castings in carbon steel, alloy steel and stainless steel.

Our products:

- Steel casting.
- Raw castings or fully machined.

Examples:

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



GAMARRA, S.A.

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Gamarra, S.A. at a glance: Spanish steel foundry -located at Vitoria Gasteiz- annual production: 4,000 tons - customers: European State Railways, - producers of rolling stock and their subsuppliers - as foundry and supplier homologated by DB AG (HPQ), ÖBB, SBB, SNCF (AFQ) (extract) as well as according to DIN EN ISO 9001: 2000 + DIN 6700 - 2. Products: brake discs, brake block shoe holders, buffers, spigots and essential steel castings for bogies.



GANTREX, S.A.

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Gantrex Spain, S.A. is the global market leader in specialty rail tracks fixation including design, production, supply of goods and installation of turnkey contracts. Rail fixation at train workshops, embedded rails accesses for Ports or logistic terminals and private rail installations together with other Subway's and Tram's required installations are some of Gantrex Spain's main activities.

Products:

- All sections of rails
- Metallic railway sleepers
- Rail fixing Clips
- Rubber pads for rails
- Steel columns for trains maintenance
- Embedded rail fixation systems (recycled rubber)
- Embedded rail fixation systems (polyurethane)
- Hydraulic buffers



GMV SISTEMAS, S.A.U.

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Since 1994 GMV provides Intelligent Transport Systems, offering turnkey solutions and specific products. GMV develops applications adapted to sector needs, including satellite navigation, mobile communications, passenger information, fare collection systems and monitoring-and-control centers.

GMV's railway portfolio includes fleet management system, SAE-R®, providing operators with an all-in system for planning and management, and other products like CCTV, PA-Intercomm and Passengers Video Information, as well as electronic fare collection systems for railway sector.



GORATU

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Under the trademark of the prestigious market leader GEMINIS, Goratu develops horizontal and multiprocess lathes of the highest technology.

We offer customized solutions for high specialization technologies.

60 years of experience and specialized knowledge in the Railway Sector have let us to the design and manufacture of lathes for manufacture and maintenance of axles, wheels and wheelsets.



HICASA - HIERROS Y CARBONES, S.A.

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► **info@hicasa.com**

► **www.hicasa.com**

HICASA specialises in the storage, transformation, distribution and commercialisation of railway materials, rails and railway accessories of all types in accordance with

both European (UNE EN), as well as American (ASTM) Standards, not to mention others such as AREMA, etc.

HICASA belongs to a private group of companies, GEVIR, which is made up of four enterprises in Spain, and is special in the sense that it combines its role of distributor with that of manufacturer, given that it possesses its own specialist light rail factory, a fact which endows it with a unique market profile.

We can boast of a roofed surface area at our installations of over 13,000 m², where we dispose of modern cutting and drilling machines that enable us to transform iron and steel and to supply orders of any format and measurement, in accordance with the specifications requested by our clients. We export over 50% of our products abroad.



ICON SISTEMAS DE INFORMACIÓN Y DATOS

► **Avd. Santiago Amón, 3-52-**

34005 (Palencia)

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► **F: +34 979 70 20 21**

► **ehornos@iconmm.com**

► **www.iconmm.com**

► **www.denevads.com**

Software development company specialized in passenger information systems, digital signage and advertising schedules, covering all areas of transport, either rail/metro, airports, bus or port. ICON Multimedia also has a significant presence in the world of commerce/retail, menuboards, and the banking sector, with worldwide reference clients with more than 40.000 points deployed around the world.

It stands out for the wide degree of customization of your product to suit the needs or requirements of any client or that may be contained in a statement of technical conditions.



IDOM

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IDOM is one of the European leading companies in the field of professional services in engineering, architecture and consultancy. It is an independent company established in 1957 and it has participated in over 30.000 projects in five continents. In 20 countries with 39 offices throughout 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 possesses the expertise and experience to cover all the phases of a railway project (high speed, conventional, freight, metro, light rail, tramway, stations, depot and workshops), from conception to commissioning and beyond. IDOM will accompany the client by providing the correct technical assistance required for the decision-making process: technical specifications for design, alternatives studies, demand and traffic studies, financial and socioeconomical analysis, basic and detailed design, operational and maintenance plans, works supervision, testing and commissioning.



IKUSI

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► **movilidad@ikusi.com**

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Ikusi offers integral solutions for exploiting the diverse means of urban public transport (Bus/BRT/Tramway/Light Rail/

Metro/Suburban), as well as in intermodal transport hubs. One proposal, backed up with a track record reaching back more than 20 years in the sector, has the main goal of improving passenger experience, guaranteeing safety, increasing revenue from secondary sources independent from the main activity, and streamlining operational efficiency.



IK4 RESEARCH ALLIANCE

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- otegi@ik4.es
- www.ik4.es

IK4 Research Alliance is a private and independent alliance of R&D centres, a benchmark in the European R&D context. It comprises 9 organisations in the Basque Country: AZTERLAN, CEIT, CIDETEC, GAIKER, IDEKO, IKERLAN, LORTEK, TEKNIKER and VICOMTECH.

The IK4 Research Alliance sets out to generate, capture and transfer scientific and technological knowledge mainly to the business framework. This way it contributes towards improving the competitiveness of companies and the progress of society. Nowadays it gathers a staff of 1275 and an income of 102M€ in 2014.



IMPLASER 99, S.L.L.

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Implaser is a Spanish company focused in developing innovative security signs for railway projects. Innovation and quality are our mainstays, as we were the first SME being certified in R+D+I in Spain. Implaser has all the range of products certified by AENOR with photoluminescent values of 150, 300, 580 and 720 mcd/m².

We are also specialized in the manufacturing of informative, security and accessibility stickers for coaches, to be used both indoor and outdoor. Hard work and great concern for innovation has allowed us to develop new products, such as photoluminescent systems combined with electroluminescent and guiding systems by LEDs.



INDRA

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Indra is a world leader and pioneer in the supply of technological platforms for railway operations management, control and supervision, having specific solutions already tested on high speed and conventional lines and metropolitan operations. Indra is also a leader in ticketing systems for transport operators and has facilities and projects all over the world. Furthermore, Indra develops high-precision safety and signalling systems. At this moment in time, Indra's solutions are completely unique because of their high level of integration and adaptation to the current and future necessities of the railway environment whatever may be the most state of the art technological and operative options. Indra has managed to open a competitive market for the first time based on technological and economical competitiveness.



INECO

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- www.ineco.com

Global leader in transport engineering and consultancy, it has contributed to the development of transport infrastructures

for over 45 years in more than 45 countries. Its high level technical specialisation allows its activity to diversify into new markets and reinforce its presence in those where it is already established.

Its participation in the whole railway system in Spain has led the company to develop important international projects like the Makkah-Madinah high speed in Saudi Arabia, the Ankara-Istanbul line in Turkey and the HS2 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 technological solutions that significantly contribute to reach our customers strategic objectives, leading to maximize operational efficiency. We strive towards on offering in-house/ state-of-the-art developments for:

- Rolling Stock: Traction Systems and TCMS
- Infrastructure: Energy Recovery Systems.



INTERNACIONAL HISPACOLD, S.A.

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Hispacold is a World leader company for climate systems specialized in comfort for people with more than 30 years' experience.

Hispacold designs and manufactures HVAC solutions for all rail vehicles: trams, metros, EMUs, DMUs, LRVs... with proven and reliable technology solutions. In Hispacold each activity is based on a solid quality culture and on a real commitment with the environment.

Quality certifications ISO 9001, ISO 14001, OSHAS 18001 are only the smallest part of this working way.

Hispacold is a company of Irizar Group SC, which employees more than 3.000 people in the five continents and has a global turnover of more than 550 Million €.

This gives Hispacold the benefits from a multinational organization while maintaining an individual company spirit.

Hispacold's presence in the five continents guarantees the best technical assistance at any place of the world.



JEZ SISTEMAS FERROVIARIOS, S.L.

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JEZ Sistemas Ferroviarios, S.L. is committed to designing, manufacturing, supplying and maintenance of all types of manganese steel switches and railway track systems, in addition to moulded cast steel parts for the general industry. Our Technical Department (Department of R&D) ensures we have the capability of designing and producing points and crossings (turnouts, crossovers, scissor crossovers and diamond crossings) or parts for them, such as hard steel manganese crossings or spare tongues. At JEZ Sistemas Ferroviarios, S.L. we fit our developments to meet clients needs.



KELOX, S.A.

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Kelox launched its railway activity in 1977, manufacturing catering equipment for dining cars on longdistance 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.



LA FARGA LACAMBRA, S.A.U.

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La Farga Lacambra is a model company in the railway sector, with more than 200 years' experience in the copper industry. A solid international presence and continuous innovation in the search for new alloys have enabled it to produce high-service materials.

La Farga Lacambra provides global solutions for copper materials and its alloys such as CuMg, CuSn or CuAg, integrating the whole productive process and ensuring the maximum technical qualities.

These products satisfy the needs of the market for all kind of lines and speeds around the world.



LUZNOR

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Luznor Company is specialized in the design, manufacture and commercialization of professional torches (for railway industry), emergency lighting (for industry and architecture) and other Electronic devices.

Luznor offers you (in its factory in Vitoria) highly qualified technicians, a high standard of quality, an effective system development, manufacture and testing, and above all, a philosophy of commitment to our customers allowing us to offer innovative products equipped with advanced technology and recognized prestige.



MB SISTEMAS, S. COOP.

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MB SISTEMAS is part of MONDRAGON CORPORATION. We develop turnkey "World Class" engineering projects, implementing automation solutions into the Assembly and welding phases of manufacture process for car body structures of railroad passenger cars.

We give "ad hoc" solutions for the customer's needs; having implanted successfully our facilities around the world. As engineering we develop both, robotic installations and special machines for any assembly process.



METALOCAUCHO, S.L.

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MTC specialises in the design and manufacture of anti-vibration and suspension solutions for Rolling stock.

The Company was established in 1982 and currently has three manufacturing sites, located in Spain (HQ), China and India. In 2009 the company was awarded IRIS Certification. MTC, being among the leading companies in its sector, supplies to the main Rolling stock Constructors worldwide, including Alstom, Bombardier, CAF, CSR, CNR, Hyundai Rotem, Siemens, Talgo, Vossloh). We also collaborate with Operators for the supply of spare components for their overhaul projects. Our main products are rubber-metal primary and secondary suspensions, focusing on primary 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.

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MGN was established in 1957 and since then it has been developing its activity both designing and manufacturing rubber-metal components, mainly for the railway industry.

MGN invests in research and innovation as a basis for the development of elements to be adapted in the new understanding of passenger and freight

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



NEWTEK SOLIDOS S.L.

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NEWTEK SOLIDOS, S.L. manufactures sand filling systems for the railway equipment industry, sand feeders, storage silos, pneumatic transport, dust return systems, sand loading equipment and facilities maintenance.



NEM. NUEVAS ESTRATEGIAS DE MANTENIMIENTO, S.L.

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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.



P4Q ELECTRONICS, S.L.

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- www.p4q.com

At P4Q we are involved in the complete development of electronic devices and lean production services. We are structured as an integral supplier of electronics solutions, focused in flexibility and quick development. We design under customer specs and approval. Being a partner of our customers giving global support attending local production demands. Is the basis of our strategy. We have facilities in Albuquerque (NM), USA as well as in Spain.



PARRÓS OBRAS, S.L.

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



PRETENSADOS DEL NORTE S.L.

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Vitoria (ALAVA)
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- 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.

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- ▶ www.talگو.com

Talگو, 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

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

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- ▶ 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.



SEMI, S.A. (GRUPO ACS)

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- ▶ ferrocarril@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

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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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- ▶ dep.infraestructurasytransporte@sener.es
- ▶ www.ingenieriaconstruccion.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

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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's 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

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SIEMENS RAIL AUTOMATION S.A.U.

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► 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

STADLER RAIL VALENCIA S.A.U.

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► 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.

TALLERES ALEGRÍA, S.A.

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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.



TECTATOM

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Tecnatom has more than 50 years of experience in the application of Non Destructive Testing (NDT) to the

inspection of components. It also offers its high technological level in the development and application of inspection systems and techniques to the railway market, where security and quality control are increasing required. Tecnatom can provide its depth knowledge on materials currently used or tested in the railway sector (metals or new materials carbon-fiber based), taken advantage of its activities in the nuclear and aerospace sectors.

The main fields where it is carrying out activities in the railway sector are:

- Inspection services for infrastructures and rolling stock
- Development of inspection techniques and procedures
- Development of inspection equipment and systems (ultrasonics, eddy currents) for rail transport components (track, axles, bogies, wheels)
- Training of operators on Non-Destructive Testing (NDT) techniques
- Development of training simulators for train drivers.



TECNIVIAL

TECNIVIAL

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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-Figueras or Olmedo-Orense sections, and internationally, Ave Medina-La Meca.

TeknoRail

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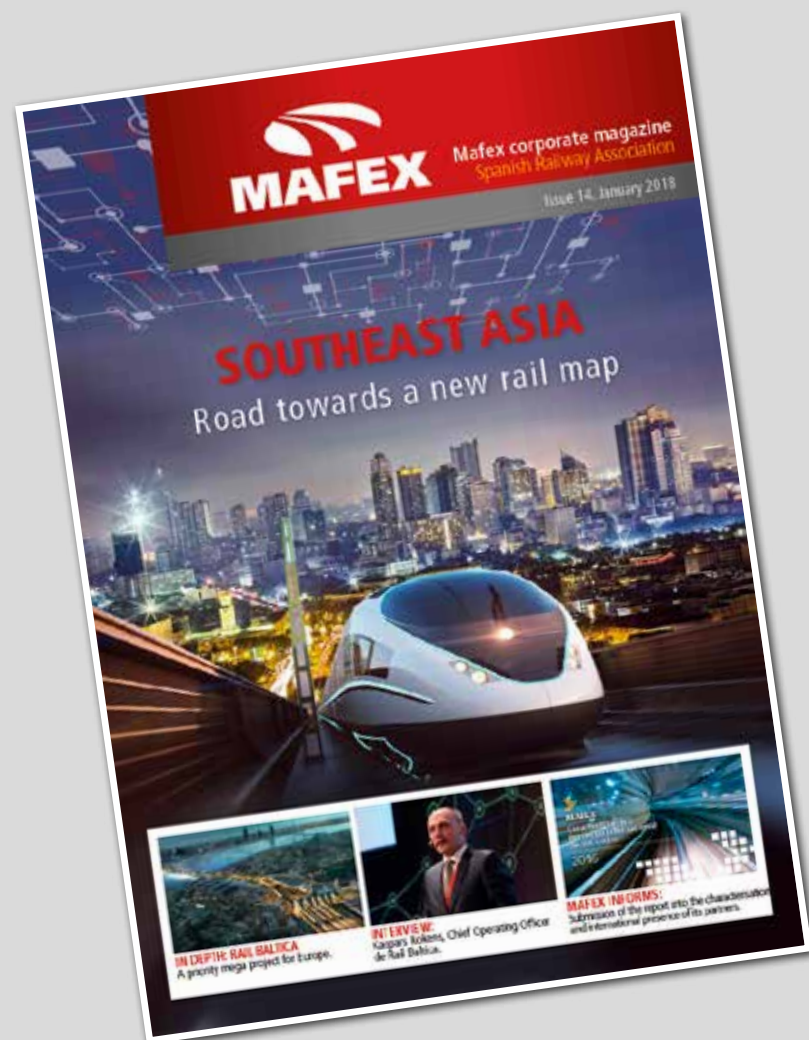
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Teknorail Systems, S.A. is a company belonging to the EUROFinsa Group, whose activity focuses on the development of railway interior projects, aimed both for the refurbishment of existing vehicles and also for new rolling stock, with a scope of supply 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.



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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.



THALES ESPAÑA GRP, S.A.U.

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Thales is a World leader in Mission Critical Solutions for Land Transportation. Thales

Spain, with more than 60 years of experience, has been pioneer and leader in the technological development of the Spanish railways, being one of the main suppliers of safety and telecommunication systems for the Spanish Railways Administrations and present in countries as Turkey, Mexico, Algeria, Malaysia, Egypt and Morocco. Its activity goes from the development, manufacturing installation, commissioning to the maintenance of equipments and systems for railway signalling, train control, Telecommunication, Supervision ticketing and critical infrastructures security.



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With more than 50 years of experience, TPF GETINSA EUROESTUDIOS has grown into a leading business group in Spain and an international benchmark in the engineering sector of transportation infrastructures and the environment. The projects and studies required to develop public works and linear infrastructures are achieved thanks to our human and material resources.

We are experts on the comprehensive management of infrastructure in all its phases, starting from the preliminary design up to the operation and maintenance, including all the intermediary steps as profitability analysis, studies, projects, works control and supervision, as well as financial management.

These activities are developed both in Spain and abroad. Our international delegations have been established in different countries and our experience extends over 40 countries in Europe, Asia, America, Middle East and Africa. We are currently working international projects in 30 countries.

At present, the TPF Getinsa-Euroestudios employs more than 1200 professionals, two thirds of whom are university graduates.



TYPsa

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Typsa Group is one of the most important European consulting groups and leader in the fields of civil engineering, architecture and the environment. Since its creation, in 1966, Typsa Group's ever-increasing activities, having focused both on preliminary assessment and on design, as well as supervision and/or management of construction projects in Europe, the Americas, Africa and the Middle East. Typsa is one of the most experienced Spanish consulting firms in the field of railways and metro systems. We have been involved in more than 4,700 km of High Speed lines (HSL), 2,600 km of conventional lines, 390 km of conventional metro and 450 km of tram and light-rail transits.



VALDEPINTO, S.L.

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Valdepinto, S.L. was established in 1986 and focuses its activities in the Railway sector.

We have four main product lines:

- All types of machining (specialists in electrical insulation).
- Screen printing, Signs and Engraving low-relief.
- Metal transformation and welding.
- Design and fabrication of transformers and coils of high/low voltage. Our philosophy is to always offer all our clients an unbeatable value for Money, combined with an excellent service.



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