

MaaS

Mobility as a Service makes progress in the big cities



MAFEX INFORMS

Virtual Rail Live! 1st and 2nd December 2020



SPECIAL

IFIs: The role of Financial Institutions, a key part in the development of railway projects



INTERVIEW

Dante Mossi, Executive Chairman of the Central American Bank for Economic Integration (CABEI)



At the forefront of Rails Solutions

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

ArcelorMittal's main trending topics for railway:

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

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The Association continues to grow with the addition of three new partners. Mafex reaches with these incorporations a total of 93 members.

EPROMAT R&D PROJECT

Mafex participates in the EPROMAT business R&D project. The objective is the development of a new High Efficiency Composite Manufacturing Cell in Productivity and Materials.

RAIL LIVE! 2020

RAIL LIVE! will be held virtually on 1st and 2nd December 2020

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INTERNATIONAL FINANCIAL INSTITUTIONS (IFIs)

IFIs work to promote social and sustainable development. Every day they play a bigger role in the development of efficient transport models.



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DANTE MOSSI, EXECUTIVE CHAIRMAN OF THE CENTRAL AMERICAN BANK FOR ECONOMIC INTEGRATION (CABEI)

He explains in the Mafex magazine the role that this institution plays in the development of the region, as well as the initiatives they have to promote the railway.



44 / IN DEPTH MOBILITY AS A SERVICE (MAAS)

The advent of mobile applications and new consumption habits have changed the way we travel. With new concepts such as Mobility as a Service (MaaS), the user becomes the centre of transport networks.

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Promoting the railway to advance with new mobility models

In the current global context, one of the key aspects of recovery is based on sustainable infrastructure development and digital transformation.

That is why railway transport is set to become one of the modes with the greatest medium and long-term growth prospects. On the one hand, its many environmental advantages make it the most suitable means of achieving the goals that institutions around the world have set themselves in terms of sustainability. On the other, it will have a special prominence in national and international plans for economic revival.

In line with this trend, Mafex continues its work to support the railway industry, essential in terms of innovation and eco mobility solutions. This representativity function, which already exceeds 80% of the sector's total, is on the increase with the recent addition of three new partners, bringing the total to 93 members.

The Association also starts new business R&D projects such as EPROMAT, focused on Advanced Manufacturing and the search for new high added value products. The Association also continues to work, as co-organizer, in the final details of the next edition of Rail Live!, from 1st to 2nd December. On this occasion, in order to adapt itself to the current circumstances, the event will be virtual. The meeting

is also held at a time of special relevance for the sector, which coincides with high-impact aspects such as the liberalization process and the challenges and the opportunities of digitization.

In this model shift towards emission-free transport, it is necessary to have the support of entities such as the International Financial Institutions (IFIs). Their role of advice and economic support is becoming more and more important every day to launch transport projects around the world. In this sense, the Executive Chairman of the Central American Bank for Economic Integration (CABEL), Dante Mossi, explains in this new issue of the magazine the role of this institution as infrastructure accelerator and why there will be a special commitment to the railway in the coming years.

The advent of digitization and technological applications is another important aspect that also transforms the way to travel and gives way to concepts such as Mobility as a Service (MaaS), where the focus is on the user.

All these advances also involve an increase in business activity. Proof of this are the 21 news updates of partners that are collected in this issue and the innovations they present as an example of their contribution to the new sustainable, digital, and connected era.

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MANAGEMENT: MAFEX.

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New Mafex partners

The number of companies joining Mafex continues to increase. Here are the 3 new partners:

THE SPANISH RAILWAY ASSOCIATION CONTINUES TO GROW WITH THE RECENT ADDITION OF 3 NEW PARTNERS. WITH THESE INCORPORATIONS MAFEX REACHES A TOTAL OF 93 COMPANIES AND ENTITIES REPRESENTING ALL SUBSECTORS OF A LEADING INDUSTRY THAT SUCCEEDS AROUND THE WORLD.



AIMEN Technology Centre

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



ciated companies. Our accredited laboratories provide analysis and testing services, especially failure analysis and in-service behavior of industrial components.



ELECTRANS

Electrans, established in Barcelona in 1977, has had a successful career path that turn it in an international relevant supplier in signalling, particularly in the field of level crossing protection solutions, railway and tramway signalling, detection systems and LED lighting, obtaining its products and solutions worldwide recognition. Electrans' constant progress is motivated by the commitment to innovation, at the service of the adaptability of systems and products for the current needs of railway projects.



ESTANDA

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



capacity, Estanda manufactures from 10 to 2000 kgr. parts in all kinds of batch sizes, with 2.400 mm as its maximum part dimension.

Mafex participates in a new innovation project called EPROMAT

MAFEX is part of a new innovation project called EPROMAT. The project is developed with support for the Business R&D of the Basque Government HAZITEK 2020 programme and it consists of a consortium of 9 industrial partners, 1 cluster, and 2 agents from the Basque Science, Technology and Innovation Network (RVCTI), led by the company Polikea, a manufacturer of components and complete modules for the railway and shipping industry.

Its objective is the development of a new High Efficiency Composite Manufacturing Cell in Productivity and Materials and it will be based on advanced and intelligent organizational

models for the automation of large composite manufacturing processes. The EPROMAT project is fully aligned with the Advanced Manufacturing priority, seeking the development of manufacturing technologies that translate into new products, both for project participants, as well as for Basque companies manu-



ring high added value components, machines and products from sectors driving the Basque economy such as aeronautics, automotive, energy, railway or capital goods.

EPROMAT Consortium

- | | |
|--|-------------------------|
| 1. Polikea S.A. | 7. Oliver Design |
| 2. Abeki Composites S.L. | 8. Sisteplant S.L. |
| 3. Danobat S. Coop. | 9. Mafex |
| 4. Ekide S. Coop. | 10. Composites Quimiber |
| 5. Goiti S. Coop. | 11. Gaiker (RVCTI) |
| 6. INKATEC Automatización y Robótica S.L | 12. Ideko (RVCTI) |



Virtual Rail Live!

Rail Live has already become one of the most important discussion forums to learn about the future of the railway. The global railway sector meets again, this time in a virtual format, at a conference of the highest level to talk about trends, challenges, innovations, and digital transformation. Topics all of them of special relevance in a moment of change where means such as the train are the key to sustainable mobility that responds to the new needs of society.

The next edition of Rail Live! will finally be held virtually from 1st December to 2nd December.

<https://www.terrapinn.com/conference/rail-live/index.stm>

This decision to change the format has been made jointly between Terrapinn and Mafex, as organizer and main partner of the event respectively, calling once again on the responsibility that both entities must show in the face of the evolution of

THE NEXT EDITION OF RAIL LIVE! WILL BE HELD VIRTUALLY FROM 1ST DECEMBER TO 2ND DECEMBER. THIS PROFESSIONAL PLATFORM IS HELD AT A KEY MOMENT IN THE SECTOR. THE LIBERALIZATION PROCESS, FOR EXAMPLE, WILL BE ONE OF THE ISSUES ADDRESSED DURING THE CONFERENCE, AS WELL AS THE TECHNICAL AND TECHNOLOGICAL ADVANCES THAT WILL DEFINE THE NEW RAILWAY SCENARIO OF THE FUTURE WHICH WILL UNDOUBTEDLY PLAY A MAJOR ROLE AS THE BACKBONE OF SUSTAINABLE MOBILITY AS A STRATEGIC PRIORITY AT INTERNATIONAL LEVEL.

the current crisis caused by the Covid-19 pandemic.

It should be noted that this professional platform is held at a key moment in the sector. The liberalization process, for example, will be one of the issues addressed during the conference, as well as the technical and technological advances that will define the new railway scenario of the future which will undoubtedly play a major role as the backbone of sustainable mobility as a strategic priority at international level.

Discussion forums will focus, in addition to those areas mentioned above,

on key aspects such as: digitization, advances in control systems, improvements in mobility and associated services, funding, smart infrastructures, goods, cybersecurity and mega projects among many others.

As in previous editions, Rail Live! 2020 will offer an event of the highest quality, with a programme that will have the participation of the main national and international players in the sector, thus responding to the expectations placed in the event. 🚂

More information:

<https://www.terrapinn.com/conference/rail-live/index.stm>



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Alstom Spain delivers the first trams to Athens

ALSTOM SPAIN
Alstom Spain has delivered to the Athens transport authority (Attiko Metro) the first two last generation Citadis X05 trams, manufactured at the Alstom plant in Santa Perpètua (Barcelona). After their arrival in Athens, the trams will begin dynamic

tests at the end of September 2020, with the aim of starting commercial operation with passengers in February 2021. These trams are part of the contract signed in July 2018 with Attiko Metro, valued at more than 50 million euros, for the supply of 25 Citadis X05 trams. In addition to the manufacturing and supply of the trams,

Alstom is also responsible for the on-site testing, training and warranty services, as well as spare parts for the vehicles. The 25 trams will run on the city's existing network, as well as on any planned extensions. The delivery of the last tram is expected by the end of May 2021.

Kaunas railway node engineering infrastructure development plan will be prepared by Ardanuy Ingenieria

ARDANUY INGENIERIA
The Ministry of Transport and Communications of the Republic of Lithuania, LTG Infra and the Spanish service provider Ardanuy Ingenieria S.A. have signed a contract for the preparation of engineering infrastructure development plans for the Kaunas railway node of the Rail Baltica project.

When designing the plan, the company will perform engineering surveys of the planned territory, archaeological studies, and prepare a development concept for the plan-



ned territory with alternative options for the Rail Baltica railway and its in-

frastructure objects needed for developing the Kaunas railway node.

Bombardier appoints Diego García Rodríguez as general manager of its Trapaga factory

BOMBARDIER SPAIN
Bombardier Transportation has appointed Diego García Rodríguez as general manager of its factory in Trapaga (Basque Country).

Diego graduated as an Industrial Engineer at the University of Deusto in Spain. He joined BT in October 2007 in the Project Management function in PPC and has since held multiple PM roles, followed by appointment as Head of Operations Trapaga in mid 2017. He brings over a decade of knowledge and experience about site Trapaga into his new role as Site General Manager.



The Bombardier factory, located in Trapaga and with a staff of nearly 200 workers, has the capacity to design, manage and supply electric

propulsion and traction systems for any type of railway application in all power ranges: traction systems for vehicles used in general lines (loco-

motives, high-speed trains, long-distance, regional and suburban trains) and urban transport (metros, mono-rails, trams and trolleybuses).



CAF secures maintenance contracts totalling €40m

CAF
The Italian operator AMAT S.p.A., the public agency of the city of Palermo managing transport in the capital of Sicily, has awarded CAF Italia the contract for the maintenance of the trams which provide

service on the 4 lines of the city's tramway network. Maintenance work will be carried out in the customer's own workshops in Roccella and Leonardo.

On the other hand, Companhia Paulista de Trens Metropolitanos (CPTM) of the State of Sao Paulo, in Brazil, has awarded CAF a contract

for the maintenance of 8 commuter trains for a period of 4 years. In addition, CAF has won another project in Latin America, which consists of the long-cycle maintenance reviews of 35 units of Metro Medellín. This fleet was previously manufactured and supplied by CAF.

CETEST and Coronavirus Covid-19

CETEST

The worldwide health alert triggered by coronavirus is generating a great deal of uncertainty among companies. Despite this situation, CETEST has continued to provide support to its clients, trying not to delay the planned projects and ensuring that the situation has as little impact as possible on the planned test campaigns. CETEST tries to accommodate the particularities of each client: the strategy is adapted case by case, using the available technologies, analysing the possibilities of travelling to the destination, and always guaranteeing the safety of CETEST's and client's staff.

In this line, since the beginning of the COVID-19 outbreak, CETEST has carried out tests for the Alstom HS campaign in the USA, CAF



Schönbuchbahn's EMU, Alstom's M7 in Belgium, Naples Metro, Lund Tram... Concerning laboratory testing of bogies and carbody structures, CE-

TEST has worked on Hitachi's Metro SanYng carbody test, as well as CAF's Oslo Tram, De Linj Tram and Metro Amsterdam projects.

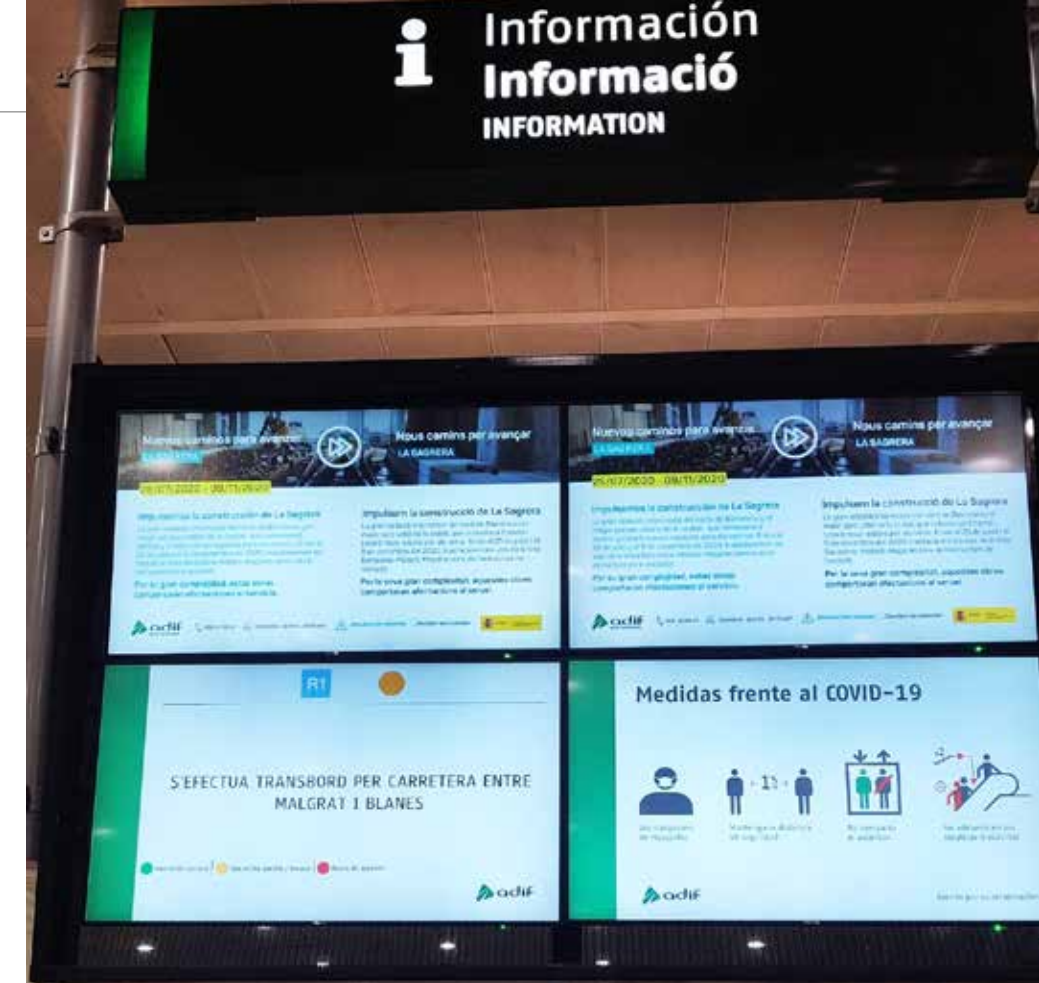
Icon Multimedia expands its services at adif stations

ICON MULTIMEDIA

ICON Multimedia continues its growth with the installations of its DENEVA Passenger Information System at the Elche, Murcia and Orihuela ADIF stations. For this last station, it has been adapted the features of the previous local train station to centrally integrate and manage the information of both stations.

Also, in order to guarantee a better service to ADIF users, ICON Multimedia has updated its PIS, in those stations where it is already present. In this way, DENEVA is updated to its latest version in stations such as Barcelona-Sant, where, in addition, passengers will be informed of the changes caused by the track reconditioning works.

Many of these stations will also have new display devices. This is



the case of the Levante stations such as València Estació del Nord

or Joaquín Sorolla, Teruel or Atocha.



Start of construction works on the first section of the Mondego Metrobus in Portugal

COMSA

COMSA and FERGRUPO have signed the document verifying readiness for the construction project of the Mondego Metrobus section between Serpins, in the municipality of Lousã,

and Alto de São João, in the city of Coimbra (Portugal). The President of Infraestruturas de Portugal, António Laranjo, and the Director of FERGRUPO, Carlos Nunes, were the protagonists of the signing, a step prior to the start of the work. The project includes the construction of the 30 km long underground section of the Mondego Mobility

System. A total of 13 bridges and 7 railway tunnels are also planned, as well as 17 double-track stops for the crossing of vehicles and passengers and 4 specific areas for the passage of vehicles. Among other works, 5 roundabouts for changing direction will also be built near the stations and 8 emergency accesses for rescue operations.

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IDOM is designing the Section 1 of the Maya Train

IDOM
IDOM, in alliance with the Mexican engineering company Dirac, has been awarded the Executive Project of the Maya Train in its Section 1 for the Mota-Engil Mexico Consortium, China Communications

Construction Company (CCCC) and the Mexican companies Eyasa, COSH Group and Gavil Engineering.

This section of the entire project, which in total exceeds 1,450 km, is approximately 228 km and will link the towns of Palenque and Escárcega

in the States of Chiapas and Campeche respectively, in the Yucatan Peninsula. This high-performance railway infrastructure will include 14 railway bridges, 55 viaducts, 13 pedestrian crossings and 48 wildlife crossings. In addition, it will be designed for a speed of 160 km/hr. for passengers and 85 km/hr. for freight.

Indra develops traffic management system for new Irish train control centre

INDRA
Indra has been awarded a contract for 32 million euros by Iarnród Éireann-Irish Rail, the operator of the Irish rail system, to develop a new train control centre in Dublin.

The contract includes the design, supply, installation and commissioning of a fully integrated rail traffic management system (TMS) and control equipment, as well as its maintenance for 15 years, with the possibility of extending it to 20 years. It also includes training facilities, such as a signalling simulator, as well as providing a backup control centre in a secondary location.

Indra will equip the new rail control centre with an integrated and highly automated control system, based on

its Mova Traffic line of solutions. This advanced technology will enable management tasks to be centralized, providing more efficiency and

safety while improving passenger service and information, incident resolution procedures and maintenance.



Lantania to modernise two railway lines in Bulgaria

LANTANIA
Lantania will carry out in consortium with Geostroy, one of the main construction companies in Bulgaria, the modernization of the railway lines of Plovdiv-Krumovo, Plovdiv-Skutare and the Plovdiv railway junction.

This project amounts to EUR 67.7 million and has been awarded by the National Railway Infrastructure Company of Bulgaria (NRIC). The actions of the consortium of which Lantania is a member will last three years and will involve the modernisation of 25 km of track to adapt the speed of trains to 160

km/h, which will require the construction of new routes with platform and structural civil engineering, the renovation of the railway track and the traction and catenary system. In addition, the entire signalling and communications system will be renewed to adapt it to the European ERTMS standard.

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NRF awarded as Best Performer 2019 by Grouauto International

The international trading group Grouauto International awarded NRF as Best Performer 2019. NRF is a Grouauto supplier for many years. As a preferred supplier, Grouauto members from all over the world daily rely on NRF's high quality products.

The Best Performer 2019 Award is an acknowledgement of the strong partnership and the current growth and developments.

The award shows that NRF is performing on the highest level in terms of product range and availability, product quality, global logistics solutions and international support. NRF has a large international sales team, combined with local customer service teams. This local presence ensures personal attention and quick



communication for Grouauto members worldwide.

For the current year and 2021, the target for NRF is become a leader in

railway products in Europe, specifically in Spain, the production plant and R&D department placed in Granada are ready to face the next challenge.

Stadler wins to new orders of trams type TRAMLINK for the cities of Jena and Milan

Stadler Valencia reinforces its position in the European market as provider of urban mobility solutions with two new contracts of its tram family TRAMLINK. TRAMLINK is a modern and modular low-floor light rail vehicle characterized by an innovative real-axle bogie that allows a quiet and comfortable ride.

German local public transport company Jenaer Nahverkehr GmbH has awarded Stadler the contract for the delivery of 24 tramways with an option for up to 19 additional TRAMLINK vehicles. In addition, Stadler will take over the maintenance of the tramways for 24 years with an optional extension of up to 8 more years.

Following the confirmation of the validity of the contract award announced in July 2019, Stadler and Azienda Transporti Milanesi S.p.A. (ATM) have signed recently the framework agreement for the manufacture



and delivery of up to 80 TRAMLINK trams. The framework agreement has a term of six years and an order volume of 172.6 million

euros. At the same time, ATM has made an initial order of 30 vehicles. This is the first time Stadler delivers trams to Italy.

SENER in Mexico will conduct the technical studies for the Monterrey commuter train

SENER in Mexico, part of the SENER engineering and technology group, has signed a contract with FIDE-PROES (Special Projects Trust; Government of Nuevo León), which was awarded a national public tender, to carry out the technical studies for the Monterrey commuter train.

SENER's work in Mexico is divided into two packages: field work (geometric and topographic survey; hydrological study; identification and evaluation of preparatory work; geological and geotechnical studies of the main rail and railway crossings, as well as environmental feasibility) and the preliminary project (general



description and railway engineering for passenger and freight transport). With this contract, SENER in Mexico

solidifies its position as the leading urban transport engineering company in Mexico.

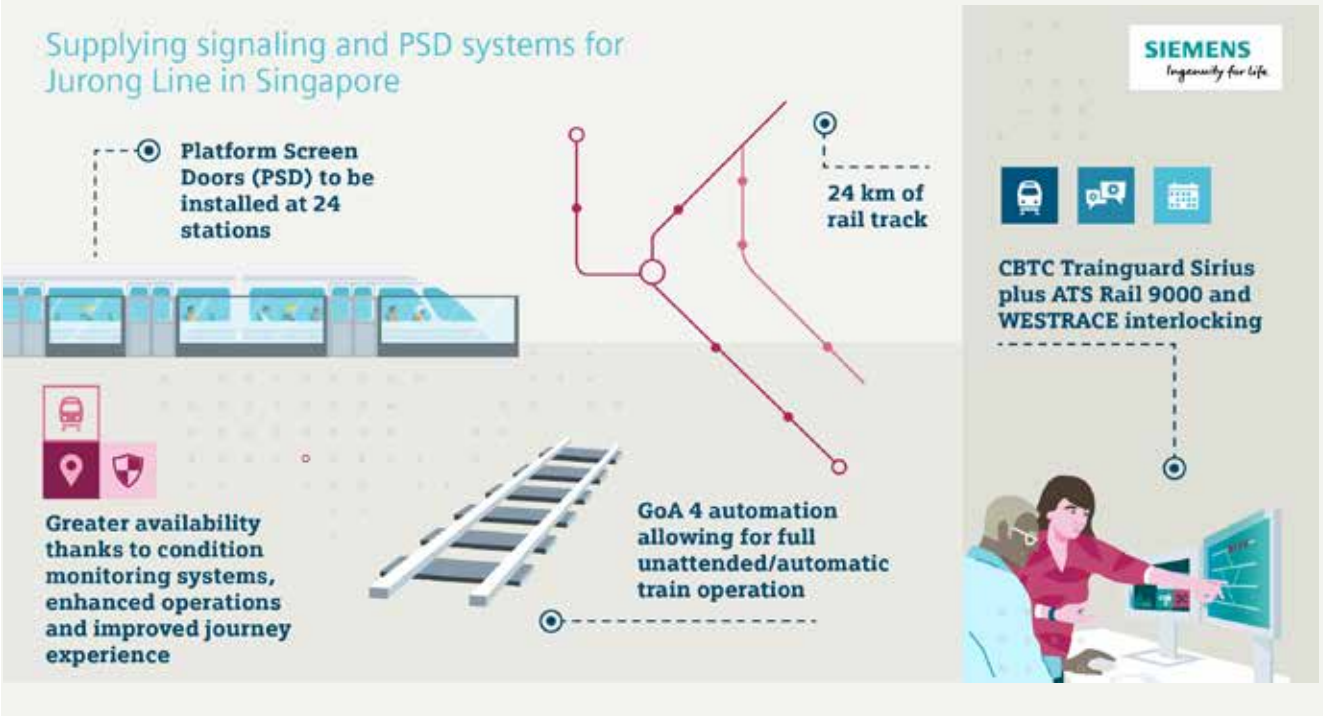
Siemens Mobility to signal the Jurong Region Line in Singapore metro

Siemens Mobility to install its CBTC signalling system on the 24 km of elevated Jurong Region Line in Singapore. To this end, the company will utilize its Trainguard Sirius solution and modern interlocking product Westrace.

The contract awarded by the Singapore Land Transport Authority (LTA), of approximately 135 million euros, also includes the installation of half-height platform screen doors at the 24 stations being built, which will support the GoA 4 automation of the line and allow for full unattended/automatic train operation. The project has been designed by an international team of

Siemens Mobility in Spain and Singapore.

The intelligent infrastructure will provide greater availability, enhanced operations, and will improve passenger experience. In addition, once completed, the JRL will significantly improve connectivity of the region and support the development of the Jurong area.



SF6-Free MV Switchgear wins the Industrial Energy Efficiency Award in Hannover Messe

SCHNEIDER ELECTRIC

Schneider Electric has won the Industrial Energy Efficiency Award category "Energy Economy" for its new SM AirSeT switchgear, a medium voltage technology. The company's innovation makes it possible to end reliance on the now-standard sulfur hexafluoride (SF6) greenhouse gas commonly contained in electrical equipment used to power the grid and industrial electrical installations.

The Industrial Energy Efficiency Award showcases companies' outstanding commitment to investing in and applying energy-efficient solutions. The award



was conferred by Deutsche Messe at the HANNOVER MESSE Digital Days. The switchgear nominated for the awards uses the company's new shunt vacuum interruption technology combined with pure air insula-

tion, which enables the avoidance of SF6 while maintaining the advantages of the compact physical footprint, cost-effectiveness, and trusted operating mode of traditional SF6-based equipment.

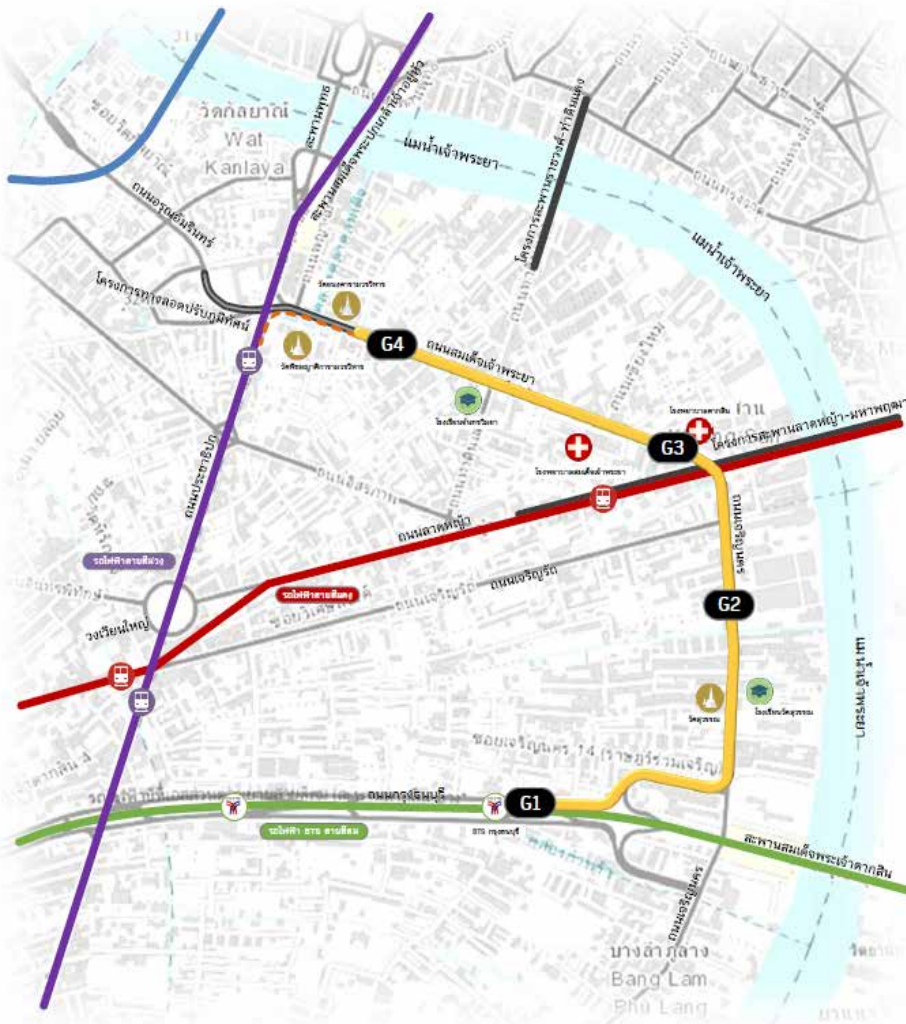
Bangkok Gold line project to rely on Teltronic TETRA radio communications system

TELTRONIC

Teltronic has been appointed by the leading System Integrator AMR Asia as TETRA provider of the Gold Line, an Automatic People Mover (APM) line which is under construction and will be the first feeder line of Bangkok's rapid transit system operated by BTS.

Teltronic will be providing its end-to-end solution consisting of its high capacity Switching Control Node, Site Base Stations that will ensure the full coverage along this new line, world class SC20 handheld terminals, and desktop units. The communications will be managed from the Teltronic's Command and Control Centre (Ce-CoCo).

"Thailand is a key country for us in coming years with a strong growth potential led by a good number of new railway projects" stated Josep Jonch, APAC Regional Director for Teltronic.



New contract for the Inspection of Bridges in Chile

TPF

EFE-Chile has awarded TPF a contract for the technical inspection of the works for the renovation and reinforcement of 20 railway bridges located in the central-southern area of the country.

The aim of the contract is to modernize the railway infrastructure, with a view to optimizing the operating conditions of the network and increasing the efficiency of this transport mode.

Besides, we have been selected to perform on-site technical inspections of the railway radio communi-

cation system all over the country to upgrade the system that is currently in operation, including dispatch consoles, traffic recorders and the location and number of repeater stations, in order to optimize the radio coverage and adapt the system to the administrative and operational divisions for a remote supervision of the operation.

TYPSA supports FONATUR in the management of the Maya Train Project

TYPSA

The Maya Train's objective is to promote the sustainable development of the Mexican Yucatan Peninsula. It boosts economic growth by improving regional integration, with a mixed transport system connecting the region's key production and tourism centres, it

protects traditions of indigenous communities, and it also preserves highly valuable ecosystems. It is a 1,584 km line divided in 7 sections and connecting the states of Chiapas, Tabasco, Campeche, Yucatan and Quintana Roo with a total of 29 stations.

TYPSA in Mexico has been hired by the National Fund for Tourism Development (FONATUR) to pro-

vide technical support for the entire Project and basic engineering supervision of the 7 sections. It will also provide project and construction management of sections 1 to 5, including the technical, legal and economic structuring, the support in the tender processes, and project and construction management and supervision of the 5 sections of a total length of 1,043 km.



Reducing the maintenance costs of the railway system

CEIT
Maintaining the European rail system (trains and tracks) has an annual cost of more than € 10,000M. When it comes to managing maintenance, most solutions are based on inspection points that are tested once a day (for wheels) or once every several months (rail or wheel profile). An optimal maintenance policy, based on knowledge of the conditions of the components, would save between 30% and 85% of total maintenance costs.



The Railfiller project -developed by Ceit, FGG and Tria- seeks to implement an in-situ repair system for metallic components of the railway

infrastructure through additive manufacturing. The project will significantly reduce current maintenance

methods as well as environmental impact in order to contribute to the sustainability of rail transport

Traction systems supply for Polish locomotives

INGETEAM
During 2020, INGETEAM has supplied Traction converters for freight locomotives for the Polish market. The freight locomotives are electric (3 kV dc) with a last mile diesel solution.

Before the end of year, Ingeteam will supply 12 traction systems. The deliveries for this order did start in 2019 and will finish in 2021.

The supply includes an on-board Traction converter, water cooled, with the auxiliary converter integrated and the TCMS system.



Cybersecuring your train journey

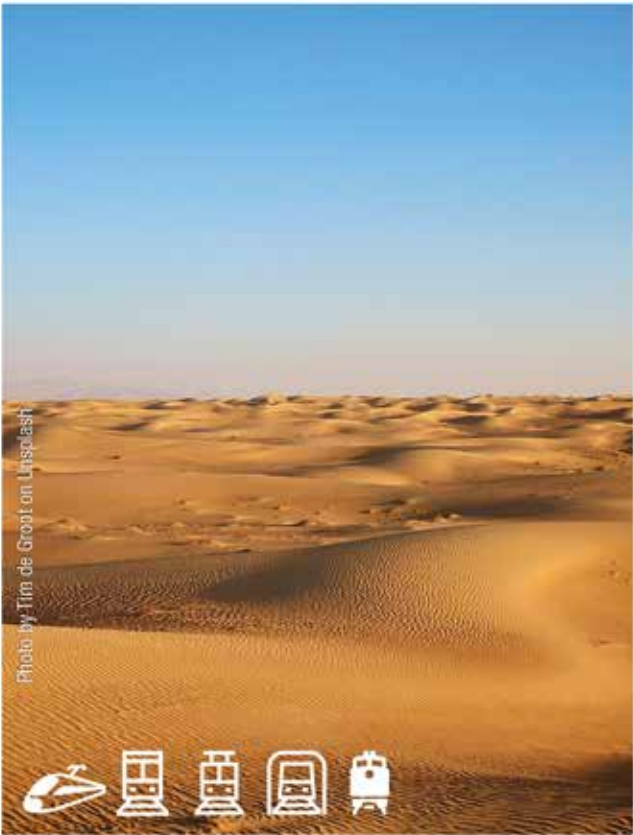
THALES
Thales has published a new whitepaper, "Cyber threats to the railway sector", an analysis that identifies risks and cyber-criminals; it also highlights the measures that the railway sector can take to mini-

mize cyber risks. The recent years have witnessed an upsurge in cyberattacks against the rail sector. At Thales, the mission is to enable rail customers to benefit from every type of digital technology – without the fear of hacking. In the field of ground transportation, the company's products and solutions are Cybersecu-

red by Design, including signalling, train control, fare collection, communications and supervision systems. And everything is backed up with dedicated security services to keep pace with constantly evolving threats. In addition to this, Thales provides cybersecurity upgrades for legacy systems.



Haramain
Amurrio in the Mecca-Medina High Speed Railway

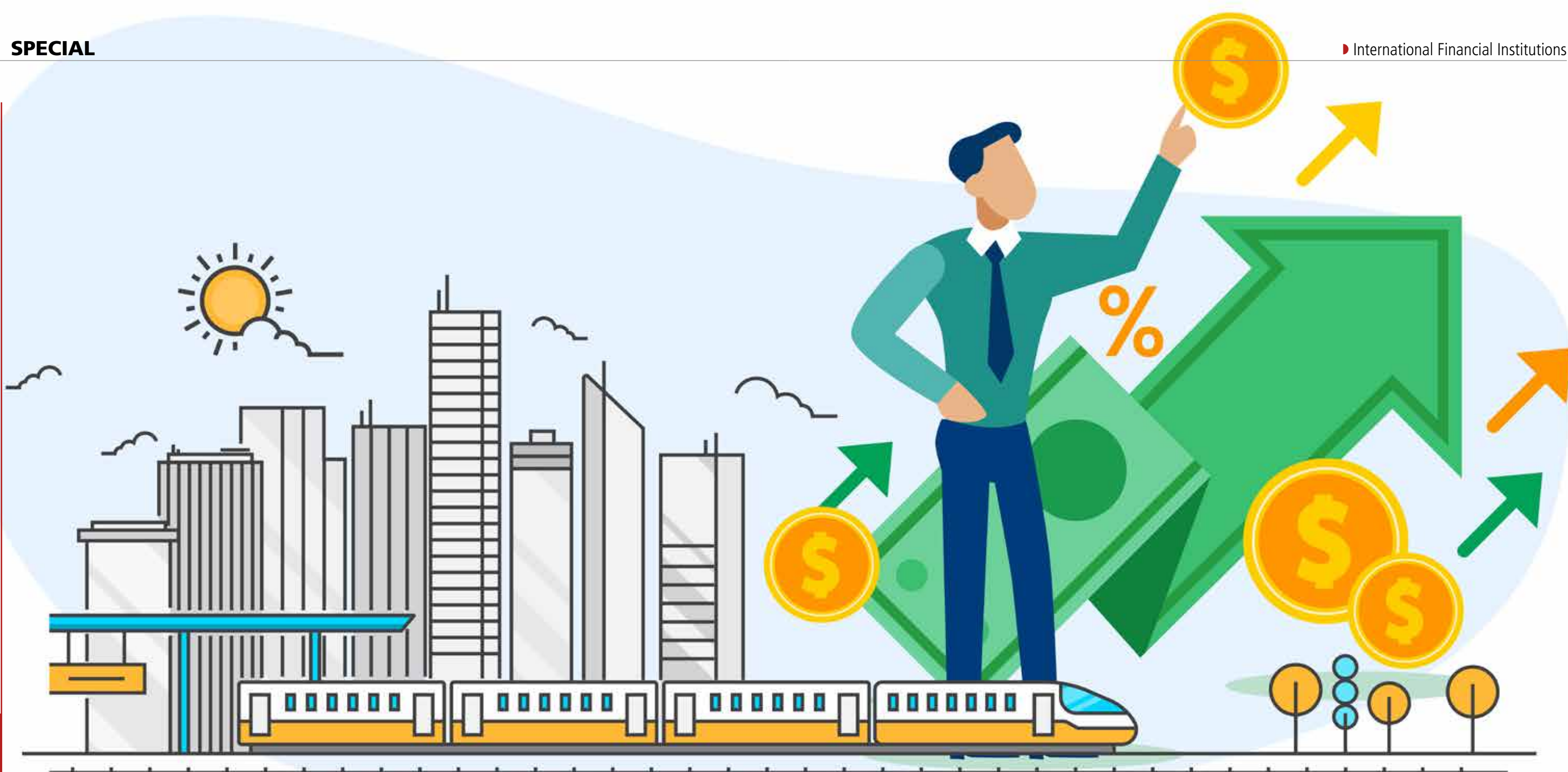


Switch devices able to work in the toughest conditions on the planet

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International Financial key part of the development

INTERNATIONAL FINANCIAL INSTITUTIONS (IFIS.) HAVE PLAYED AN IMPORTANT ROLE FOR THE ACHIEVEMENT OF TRANSPORT INFRASTRUCTURE PROJECTS FOR YEARS. WITH THEIR WORK THEY PROMOTE THE IMPLEMENTATION OF RAILWAY NETWORKS ON FIVE CONTINENTS.

The promotion of railway projects around the world has seen a considerable increase in recent years. The numerous environmental advantages, as well as the territorial structuring, have caused administrations to advocate for modernizing networks, building new systems and providing the population with renewed communication systems for both passengers and freight transport.

Institutions (IFIs), of railway projects

The increase of these networks is often possible because there is already an investment policy consolidated and developed over time and a financial support from diverse administrations and bodies.

IFIs are one of the most important figures in the definition of methodologies and pathways that facilitate the financing of infrastructures of

general interest and making projects in a context of viable social equity. These institutions also contribute to the socio-economic return of investments.

The role of IFIs

An IFI is a supranational entity created by 2 or more countries that, through the funding and resources they combine, contribute to deve-

IFIs work to promote social and sustainable development with the support for efficient transport models.

Although bilateral IFIs do exist, the most prominent ones are those created by multiple nations.

lopment. Shareholders are usually national governments, although occasionally other institutions or organizations may join in. Although bilateral IFIs do exist, the most prominent are those created by multiple nations.

Its origins date back to the post-World War II period when the so-called "Bretton Woods Institutions" were created, which were the International Monetary Fund (IMF) and the World Bank (WB).

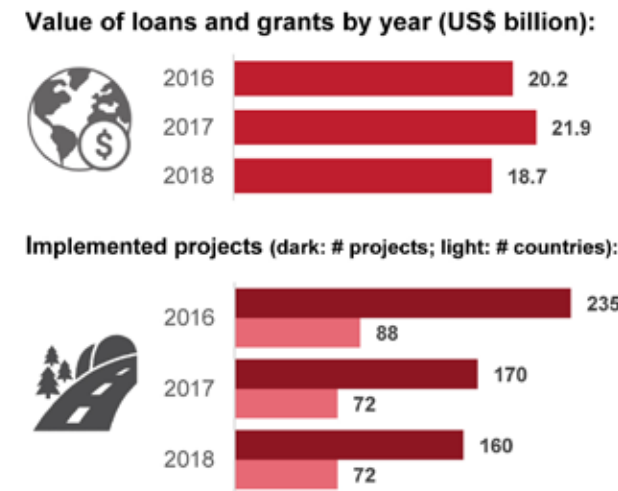
The first one had the role of implementing international cooperation mechanisms associated with the management of the global financial system to stabilize exchange rates. The role of the second one was to help rebuild Europe, following the consequences of the war, and to rebuild the economies of developing countries.

Depending on the geographic area and area of action, there are global financial institutions such as the World Bank Group, the United Nations Conference on Trade and Development (UNCTAD), the World Trade Organization (WTO), the International Monetary Fund (IMF) or the Trade and Development Bank (TDB).

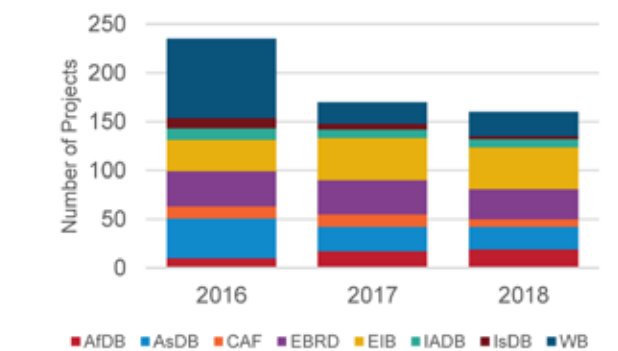
Regional IFIs include entities such as the European Investment Bank (EIB), the Inter-American Development Bank (IDB), the Asian Development Bank (ADB), the Central American Bank for Economic Integration (CABEI), or the Andean Development Corporation (CAF) among others.



Progreso hacia el Compromiso de Rio+20.



Panorama general de los progresos realizados en materia de inversiones y proyectos



Number of transport projects 2016 - 2018

Source: Progress Report (2016-2018) of the MDB Working Group on Sustainable Transport

MULTILATERAL BANKS PROMOTE TRANSPORT PROJECTS

Multilateral Development Banks have specific working groups on sustainable transport that cooperate to make further progress in this field. The objective of this joint collaboration is to launch in various parts of the world those initiatives that promote a more efficient mobility. To this end, 175 billion euros will be allocated in the period 2012-2022.

In September 2019, they presented the report "Progress Report (2016-2018) of the MDB Working Group on Sustainable Transport", which analyses the progress made in this area.

During this period there was a marked increase in the funding of urban transport projects including tram systems, high-speed networks, as well as fleet renewal.

In addition, the railway for both, people and goods, also became more prominent in the list of approved plans.

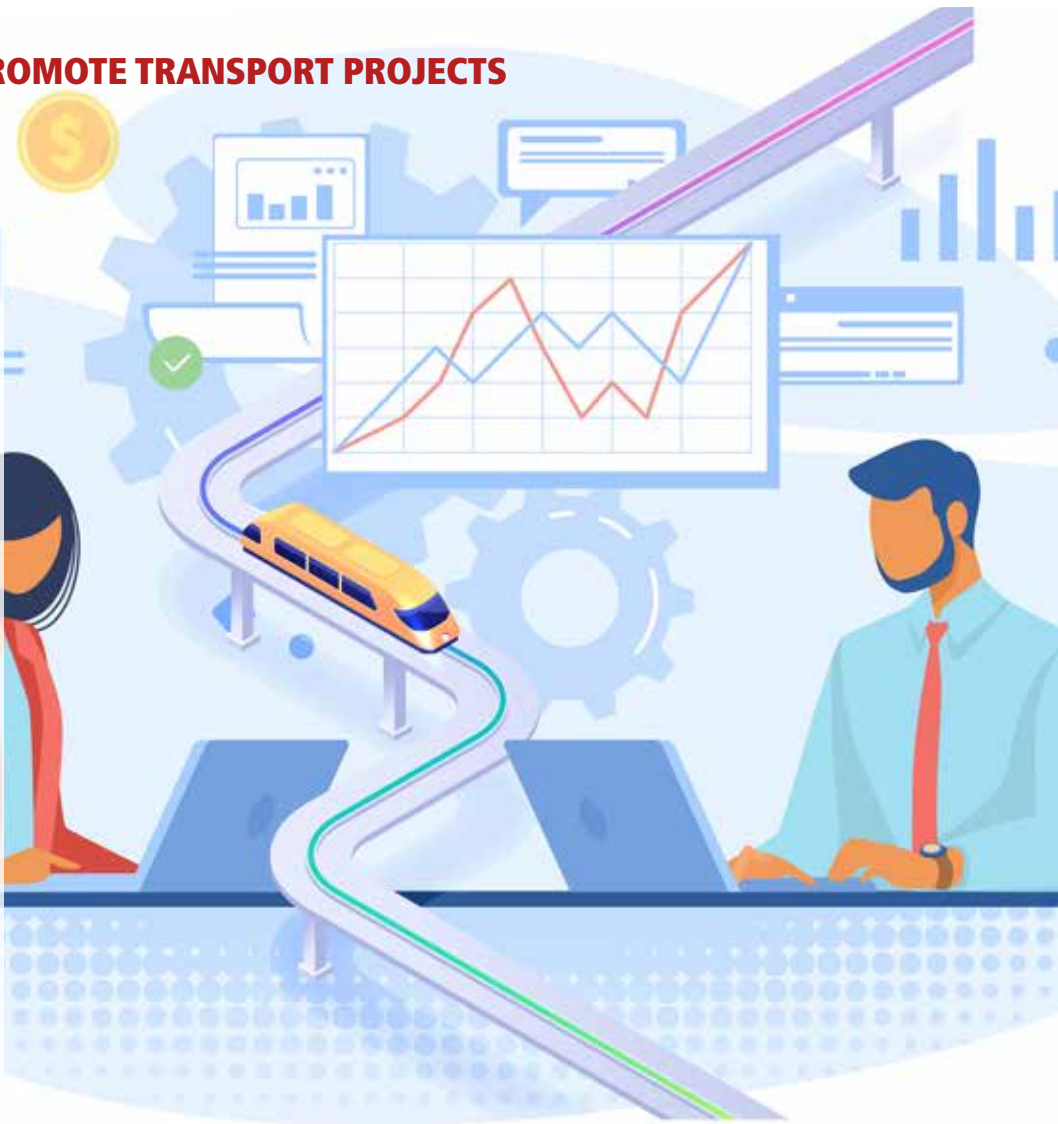
WORLD BANK GROUP

Based in Washington, D.C., (USA) this organization provides financial support and financial and technical assistance especially to developing countries through a wide variety of formulas.

The aim of its work is to reduce poverty through loans on very easy terms and interest-free credit. It currently consists of 189 member countries.

The Bank has its own Department of Transport, Water and Information and Communications Technologies. From this division work is carried out to promote projects associated with these areas.

It also carries out an important work of "knowledge and development" through the preparation of reports and evaluations, as well as tools to know the number of ki-



lometres of railway in the world, passengers and goods transported, etc.

Among the most recently approved projects are improvements in the logistics network in Turkey, additional funding

provided for the Quito Metro (Ecuador), aid to facilitate transport networks in the Balkans, the promotion of a more sustainable freight transport in China, or the modernization of railways in Bosnia and Herzegovina.

WORLD BANK: ACTIVE TRANSPORT PROJECTS IN 2020

ACTIVE PROJECTS	489
Asia Pacific and East Asia:	120
South Asia:	82
West Africa:	79
East Africa:	70
Latin America and the Caribbean:	63
Europe and Central Asia:	50
North Africa and Middle East:	21
Africa: 4	
ECONOMIC AMOUNT	43.64 M€
COUNTRIES	115



EUROPE

prioritizes sustainable transport projects with the support of several institutions

RAILWAY INFRASTRUCTURES MAKE PROGRESS ON THE CONTINENT. THESE PLANS FOR A MODERN AND SUSTAINABLE TRANSPORT NETWORK ARE SUPPORTED BY FINANCIAL INSTITUTIONS SUCH AS THE EUROPEAN INVESTMENT BANK (EIB) AND THE EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (EBRD).

One of the continents where the railway becomes more prominent is Europe. On the one hand, work is being carried out on the implementation of trans-European transport networks (TEN-T),

co-funded by the European Union and the Member States, to promote the movement of people and goods.

On the other hand, the aim is to find a more sustainable mobility, in line with the objectives of the European Green Deal. In this sense, actions are increased in the modernization and expansion of urban transport with metros, commuter trains, trams or tram-train;

Sustainable mobility plans are supported by agents such as IFIs.

in addition to committing to a more efficient freight supply chain and the

implementation of innovative technologies and equipment.

In both cases, there is a collaboration of financial institutions such as the European Investment Bank (EIB) and the European Bank for Reconstruction and Development for the completion of projects with the optimization of the necessary funds.



EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (EBRD)

Established in 1991, it has 67 members including China and two multilateral institutions (the European Union and the European Investment Bank). Its main mission is to support the transition to the market economy in Central and Eastern Europe, Central Asia, Mongolia and in the Southern and Eastern Mediterranean region (Egypt, Morocco, Jordan and Tunisia) through the funding of projects in the private sector (96%) and, to a lesser degree, in the public one. In total, it operates in 38 economies on three continents.

In terms of transport, it acts to achieve efficient, safe and reliable systems. The EBRD is involved in the modernization of Ukraine's railways, the reconstruction of Kosovo's network (2015), the acquisition of electric locomotives in Moldova (2020) and the rolling stock for the Tbilisi metro (Georgia), among many other projects.

EUROPEAN INVESTMENT BANK (EIB)



Pictured, facade of the headquarters of the European Investment Bank (EIB).

The Luxembourg-based European Investment Bank (EIB) jointly owned by the member states of the Union works to strengthen the EU economic and social cohesion.

The EIB secures its funding in the international capital markets via bond issuance. It is the world's largest supranational lender and has the best rating agency score. In addition, it provides assistance in attracting other investors, whether international financial institutions, public or private banks.

Another of its function consists of the quasi-equity operations, holdings and venture capital fund investments. The EIB has the possibility to combine different financial instruments for the same project as well as provide technical assistance.

The projects financed by the EIB should contribute to the achievement of the EU's objectives and must be economically, financially, technically and environmentally viable.

The Union's 'climate bank'

Since its foundation in 1958, the EIB has supported the implementation of nume-

rous transport networks and it currently plays an important role in transforming mobility with low-carbon emissions.

To this end, it is committed to increasing the percentage of investments as part of its priority "climate action and environmental sustainability" to reach 50% by 2025. For this reason, its lending policy will give priority to energy efficiency for decarbonisation and electromobility with the aim of achieving a 32% share of renewable energy across the Union by 2030.

Support for sustainable modes of transport, such as railway, is closely linked to these objectives, as it is the most environmentally friendly. Hence it is one of the core element of its performance.

The proportion of sustainable transport projects has steadily increased in recent years and now accounts for more than 5.5 billion euros in the EU in 2019, more than half of the loans in this sector.

In 2019, the EIB signed agreements totalling 10.5 billion euros for 81 new transport projects within the European Union. Together with investments in transport infrastructure, such as railways, roads,

airports and ports, to develop the Trans-European Transport Network (TEN-T) and the metro and tram lines, as well as bus fleets that use electric and alternative fuels. In addition to its work in Europe, it also funds projects in other countries. For example, this year it will invest 650 million euros in the construction of a railway service for the city of Kanpur in India.

Among the most recent activities, in 2020 it has taken out a corporate bond with Trenitalia to acquire the first 43 trains out of a total of 135 units, it has also collaborated with the refurbishment of locomotives in Moldova.

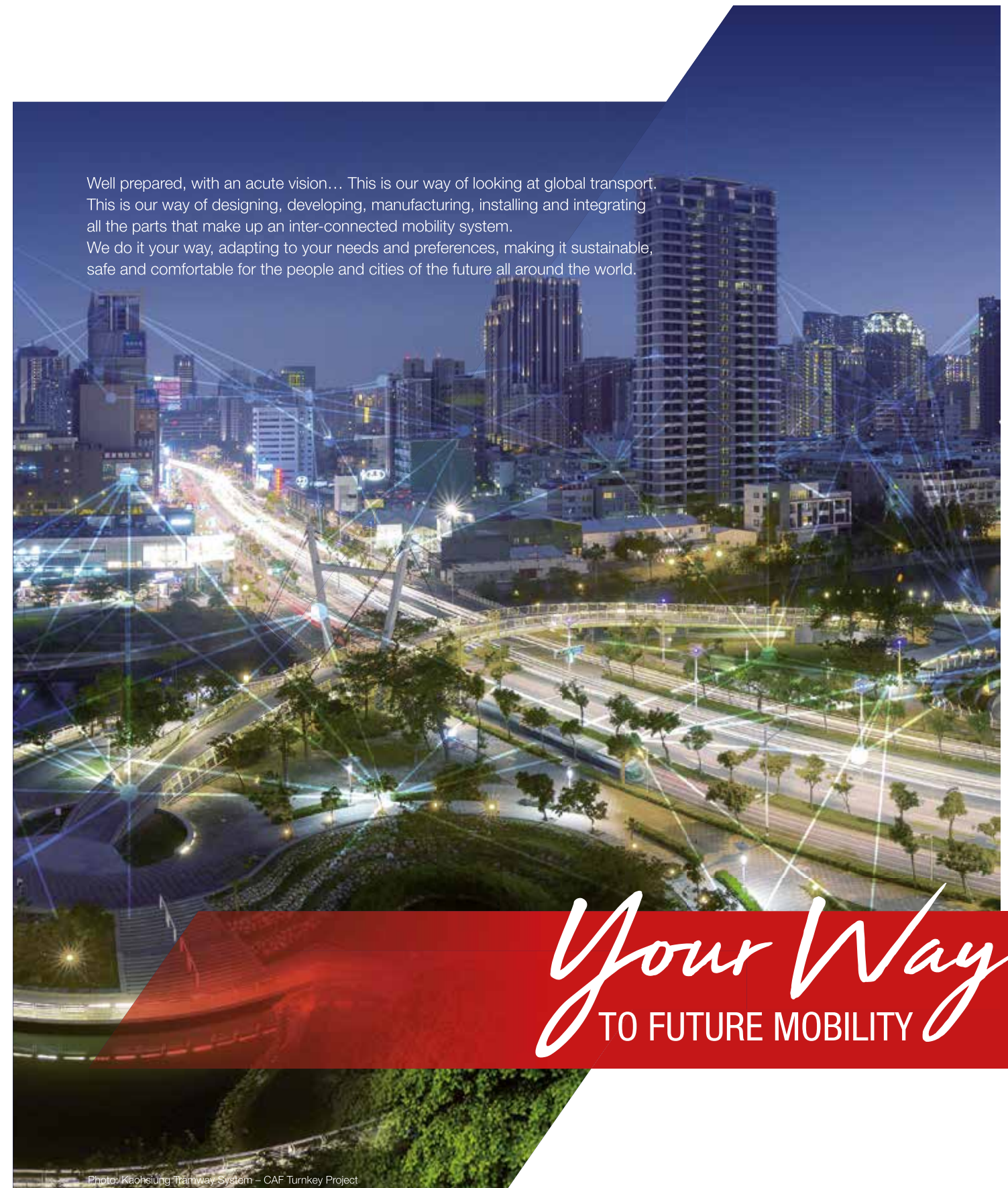
It has also designated funds for the construction of the Mediterranean Corridor, to buy trains to carry out maintenance work on the Spanish High-Speed network or for the purchase of commuter trains by Renfe Operadora. In the area of R&D, it funds activities for the development of new technological solutions for airlines, airports, travel agencies and railways.

Over the years it has granted aid to many other initiatives such as the Basque Y, Barcelona's Metro and Madrid's Metro, to the modernization of networks in Ukraine, Slovakia, etc.



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Your Way
TO FUTURE MOBILITY

Photo: Kaohsiung Tramway System - CAF Turnkey Project

FINANCE



Infrastructure grows in **America** with support from various financial sources

INTERNATIONAL FINANCIAL INSTITUTIONS WORK IN LATIN AMERICA TO PROMOTE INTEGRATION, DEVELOPMENT AND OPTIMIZE DIFFERENT ASPECTS THAT IMPROVE THE LIVES OF PEOPLE SUCH AS MOBILITY PROJECTS. TO DO THIS, THEY USE A WIDE RANGE OF RESOURCES FROM LINES OF CREDIT, SUPPORT IN TECHNICAL STRUCTURING OR RESEARCH.

Social and economic development in Latin America is supported by several financial agencies and institutions that, with their work, promote projects for the advancement of these countries.

Highlights include the Development Bank of Latin America (CAF), the Inter-American Development Bank (IDB) or the Central American Bank for Economic Integration (CABEI).

Development banks promote economic and sustainable growth in Latin America.

DEVELOPMENT BANK OF LATIN AMERICA (CAF)

This body was incorporated in 1970 and consists of 19 countries (17 from Latin America and the Caribbean, Spain and Portugal) and 13 private banks in the region. CAF works on Latin American integration and sustainable development in the region. To this end, it promotes different initiatives through operations and lines of credit, non-refundable resources and support in the technical and financial structuring of projects in the public and private sectors of Latin America (loans, advice, guarantee and guarantees, shareholdings, cooperation, treasury services, etc.). Another of its strategic functions is research on those problems and challenges facing Latin America.

For the performance of its work, CAF has established numerous institutional alliances (UN, Club of Financial Institutions of Development, World Economic Forum, Organization of American States, London School of Economics and Political Science, among others. One of its areas of action focuses, from the beginning, on improving transport connections. This work began in 1972 with the construction of the Rio Limón Bridge to improve connectivity between



Venezuela and Colombia.

Over the past 10 years, the institution has promoted urban mobility projects that have benefitted 77 million people.

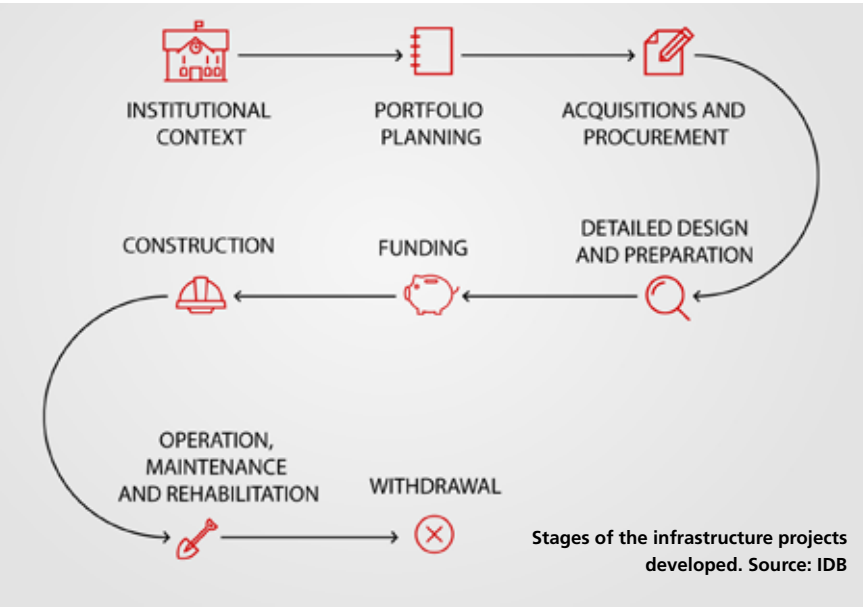
CAF's area of action aims at social integration and sustainable development. Source: CAF.

Among the most outstanding projects is its support for the Central Railway of Uruguay, the renovation of the Belgrano Sur (Argentina) railway, the Bogota Metro (Colombia) or the Metro de Quito (Ecuador). Also public tenders such as research for the analysis of transport infrastructure projects and their impact on the economic development of Latin America.

In addition, with the aim of supporting national infrastructure plans and Public-Private Participation ("PPP") programmes, it has financed parts of projects such as the Ferrocarril Central Railway with a long-term loan in Uruguay.

Some operations also include their participation as one of the structurers. This improves the viability of other lenders' income and it mobilizes the resources needed to achieve their financial closure.

INTER-AMERICAN DEVELOPMENT BANK (IDB)



The IDB Group is composed of the Inter-American Development Bank (IDB), which works with governments, IDB Invest, which collaborates with the private sector, and

the IDB Lab, created to apply innovative formulas to drive more inclusive growth. Its mission is to provide flexible financial solutions to beneficiary countries for their

economic and social development. It is the main source of financing for development in Latin America and the Caribbean. The IDB also funds national and regional technical cooperation programmes in areas ranging from institutional strengthening to knowledge transfer.

On transport, as in other respects, its work is aligned with the Sustainable Development Goals (SDG), as set out in its sustainability report.

The IDB manages other value tools such as the INFRAATAM web, which aims to evaluate and promote the analysis of infrastructure investments. Their extensive action in transport and mobility includes numerous examples such as their support to improve the General San Martín Railway in Buenos Aires (Argentina), and to build the Ferrocarril Central Railway line in Uruguay.



Image of CAF headquarters.

cafpower.com

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Train-land communication systems

Energy storage systems

LOCOMOTIVES

REGIONALS

SUBURBANS

TRAMS

METROS

HIGH SPEED



The CABEL, the great advocate of the growth and modernization of transport in Central America

The Central American Bank for Economic Integration (CABEL) is a multilateral development financial institution that promotes economic integration and a balanced social development in its area of operation.

The members of CABEL are its founding countries (Guatemala, Honduras, El Salvador, Nicaragua and Costa Rica), the non-founding regional countries (Panama, Dominican Republic and Belize) and the extra regional countries (Mexico, Taiwan, Argentina, Colombia, Spain, Cuba and Korea).

To facilitate this regional development as much as possible, it provides the

THE CENTRAL AMERICAN BANK FOR ECONOMIC INTEGRATION (CABEL) HAS BECOME A STRATEGIC PART IN THE DEVELOPMENT OF THE COUNTRIES OF THE AREA. AMONG ITS PRIORITIES IS THE IMPLEMENTATION OF A COMPREHENSIVE REGIONAL RAILWAY TRANSPORT NETWORK.

public and private sector with different forms of financial aid and financial instruments. Among them, direct funding and co-funding, facilitating the creation of intermediary institutions, cooperation, structured and syndicated loans, etc.

In addition, it establishes institutional alliances to generate synergies. This generates joined efforts into the implementation of regional programmes and projects, strengthens relations-

hips and accelerates the achievement of the SDGs.

In this cooperation stands out the joint work and participation in the Central American Integration System, the Secretariat for Central American Economic Integration (SIECA), the Inter-Agency Technical Group of the Mesoamerica Integration and Development Project (MP), the United Nations, or the Organization of American States.



"CABEL's 2020-2024 Institutional Strategy" is the guide that this institution will continue in the coming years to contribute to social improvement.

60 years of work

After 60 years of action, "CABEL's 2020-2024 Institutional Strategy" was recently published. This document outlines the most relevant initiatives that have been carried out in different areas.

In the area of transport, for example, it is worth highlighting projects such as the Electric Passenger Train of the Greater Metropolitan Area in Costa

Rica or the funding of the feasibility study to implement the freight train project in Honduras. This strategy also highlights the global economic and geopolitical context it faces and its own institutional challenges which demand reforms. It is the guide that will be followed to accompany Central American countries in their efforts to achieve new stages of economic development and better opportunities for well-being.

In addition, it encourages the international community to appreciate its possibilities for action in the region, and the added value that the Bank represents in that effort by accompanying other multilateral institutions and organizations of diverse nature.

Environmental and social sustainability is one of the core elements in the medium term, hence the importance that emissions-free mobility projects, the promotion of systems such as the railway and the modernization of collective transport with the promotion of electricity units will have in order to reduce fuel consumption.

CABEL's collaboration agreement with Mafex to cooperate in new railway projects

The Central American Bank for Economic Integration (CABEL) is currently working on the development of a comprehensive regional railway transport network.

The aim is to promote the economic growth of a low-carbon emission transport network in the region. To this end, a collaboration

agreement with Mafex in the field of railway transport has recently been signed.

It is a matter of establishing new ways of promoting the transfer of knowledge from the Spanish railway sector, which is very broad in this field, and to provide advice for the implementation of actions that

promote a sustainable project and technological transformation in the region.

This agreement wants to highlight the opportunity that sustainable mobility represents for economic recovery after the pandemic and to achieve the SDGs of the United Nations.



Mafex Magazine: What is the Central American Bank for Economic Integration's (CABEL) main mission?

Dante Mossi: The Central American Bank for Economic Integration (CABEL) was born within the framework of the Central American Integration Treaty in 1960 with the purpose of promoting economic integration, balanced economic and social development of the Central American region. In these 60 years we have established ourselves as the most relevant provider of resources for Central America, in the last 10 years about 50 percent of the disbursements of multilateral banking come from CABEL.

Our impact is evident in most of the region's infrastructure: roads, hydroelectric plants, transmission lines, sewage, ports, airports, hospitals, and schools. Also in the development of MIPYMEs, tourism, industry, agriculture, and rural development, through financial intermediation. All of this in fulfillment of our goal: balanced development for all of Central America.

We are committed to continuous improvement, our credit rating reflects it (the best in Latin America), this allows us to obtain resources in better conditions for the benefit of the countries that conform us. Our knowledge of the region allows us to identify regional programs and projects that make the ideal of integration a reality.

Mafex Magazine: How has it evolved since its foundation 60 years ago and what have been the major milestones so far?

Dante Mossi: In six decades of history CABEL has accompanied the economic growth and social welfare of the region until becoming the main provider of resources. CABEL has become the strategic partner of the Central American nations, by promoting their economic and social integration, with significant contributions in the areas of roads, port works, airport infrastructure, electrification, and telecommunications development, among others.

Mafex Magazine: What kind of mechanisms and instruments

does CABEL have to promote development in the countries of action?

Dante Mossi: In line with its commitment to promote development, CABEL makes available to the public and private sectors different financing modalities and financial instruments to foster the sustainable development of the Bank's member countries. Among the most common financing modalities I mention the following:

- Direct financing, when done directly to borrowers.
- Through intermediary financial institutions, previously chosen by the Bank.
- Through co-financing when there are other participants besides the Bank in the financing.
- Through Syndication and A/B Loans, when the Bank participates in the financing with other financial institutions, either as a structurer, joint structurer, co-structurer, or participant.
- Investment Project Loans (Project Finance Scheme)

- Reimbursable, non-reimbursable or contingent recovery financial cooperation.

The Bank's team is ready to work with the client to find the financing solution that best suits their needs.

Mafex Magazine: CABEL's "2020-2024 Institutional Strategy" is based on five priority themes, among which is "environmental and social sustainability". What role does the promotion of a less polluting type of mobility, both for people and goods, play in this objective?

Dante Mossi: Environmental and social sustainability is a cross-cutting

issue in the Bank's strategy. In fact, the Bank has been promoting the development of the region through investments with this approach for many years. Likewise, the search for more efficient mobility alternatives is key to promoting the region's sustainable development and competitiveness.

CABEL is working with the countries to advance in the implementation of solutions that in the long term will reduce transportation costs, reduce exposure to external shocks due to dependence on oil prices and above all, to find cleaner solutions, in view of the commitments established by the countries for sustainable develop-

ment and the COP21. This search for alternatives also contemplates the more efficient use of energy sources and solutions adapted to the needs of citizens.

Mafex Magazine: During a recent forum entitled "Central America: Fertile Ground for Investment in Infrastructure during the Crisis", you highlighted the many opportunities that exist in the region. Is it time to put the international spotlight on the area?

Dante Mossi: Indeed, the Central American region presents important investment requirements in sectors such as Electrical energy (at the le-

CABEL'S GREAT MILESTONES

- **1960:** The Central American Integration Treaty is signed. By means of which the CABEL is created, its founding countries being Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica.
- **1989:** Reforms to the Constitutive Agreement are approved for the incorporation of extra-regional partners.
- **1992:** Reforms to the Constitutive Agreement come into force. The authorized capital is increased from US\$600 million to US\$2,000 billion. Mexico and the Republic of China (Taiwan) join.
- **1995:** Argentina joins CABEL.
- **1997:** First bond issue in the Republic of China (Taiwan). Colombia enters as a CABEL partner.
- **2000:** First credit rating equivalent to an investment grade granted by the National Association of Insurance Commissioners (NAIC).
- **2002:** First investment grade ratings granted by international agencies in the BBB grade -.
- **2004:** The 2004-2009 Institutional Strategy is launched.
- **2005:** First credit rating in the range of A. Given by Moody's. Spain enters as the first extra-regional European partner.
- **2006:** Belize enters the CABEL.
- **2007:** The Dominican Republic and Panama join CABEL. Credit ratings of A- were achieved with Fitch Ratings and Standard and Poor's.
- **2008:** International financial crisis impacts economies worldwide and CABEL maintains its solid financial position.
- **2009:** Seventh authorized capital increase of US\$2 billion to US\$5 billion is approved.
- **2010:** The 2010-2014 Institutional Strategy is launched.
- **2012:** Credit ratings of A are achieved with Fitch Ratings and Standard and Poor's.
- **2015:** The 2015-2019 Institutional Strategy is launched. Reforms to the Articles of Agreement are approved to improve governance, increase its membership base, and enable additional financing through diversification of its loan portfolio and additional capital injections.
- **2016:** Green Climate Fund (GCF) certification obtained. Changes to the Articles of Agreement go into effect.
- **2017:** CABEL's risk rating is upgraded to A+ by Fitch Ratings.
- **2018:** Eighth authorized capital increase from \$5 billion to \$7 billion approved. Cuba enters CABEL.
- **2019:** CABEL achieves a credit rating of AA with Standard and Poor's and consolidates itself as the entity with the best credit rating in all of Latin America. First green bond issue in the Formosa market.
- **2020:** South Korea officially joins CABEL. Establishes a new institutional strategy for the next 5 years. CABEL reaches its 60th anniversary.

vel of generation and transmission), transportation (rail, sea and land), telecommunications, etc. In this sense, CABEL is promoting a regional agenda that facilitates undertaking these investments, for which the private sector must play a very important role, as well as Public-Private Partnerships, given the high levels of investment required.

Mafex Magazine: CABEL has more and more weight in the promotion of sustainable mobility and the projects associated to this end. Is it a good way for the economic reactivation in the new post COVID-19 era?

Dante Mossi: Any transport mechanism that is more efficient and promotes cost reduction has impacts on competitiveness and job creation. CABEL believes that these alternatives should be considered as key aspects in the economic reactivation, supporting more solid economies and resilience to external events.

Mafex Magazine: Which rail transport projects, whether for passengers or freight, are in more advanced stages?

Dante Mossi: CABEL, as the financial arm of the Central American region, has established the themes of Regional Integration and Sustainable Competitiveness in its Institutional Strategy. These themes frame actions to support the development of the Railway Transportation System that, in an interconnected way, will allow to lower the logistic costs of transportation of products that currently are around USD 0.17 Ton/Km[1].

As part of the initiatives that CABEL is promoting to have a modern, electro-mobile railway system, oriented to the reduction of CO2 and the resilience of the construction technologies of this mode of transport, to date two important projects in Cos-



Any transport mechanism that is more efficient and promotes cost reduction has an impact on competitiveness and employment.

ta Rica have been approved and are under feasibility study, the first referred to the Electric Passenger Train in the city of San José and the second to the Limonense Freight Train in its Atlantic zone. Likewise, the Pacific Train in El Salvador and the Guatemalan Rapid Train (TRG) are in the process of reviewing terms of reference for design; while in the case of the Pacific Train we are in the process of approving funding from the Korea Trust Fund for feasibility studies (expected in October).

In all cases, private sector investment will be promoted under Public-Private Partnerships (APP's), joining forces to face global challenges.

Mafex Magazine: For these initiatives to be successful, it is also key to have strategic alliances, such as the agreement signed with Mafex in 2019. What objectives are being pursued with this international collaboration? And

how do you assess the first year of this cooperation?

Dante Mossi: The collaboration agreement between CABEL and MAFEX, signed in 2019, establishes in its objective that the relationship will facilitate and promote the advice, exchange and transfer of knowledge of the Spanish railway sector to the Central American regions as a fundamental tool for development through the implementation of various activities.

The first year of cooperation resulted in support to provide CABEL with a list of railway experts who competed to carry out a sectoral diagnosis of railway transport in the six Central American countries and generate terms of reference for feasibility studies in the region, among other exchanges of knowledge.

Mafex Magazine: In addition, the link with Spanish railway compa-

nies for the implementation of infrastructure in Central America is growing. What do you think of this growing collaboration?

Dante Mossi: The MAFEX collaboration with CABEL will promote the

training and improvement of capacities in the railway field, since the Central American agenda is conducive to the region having a modern railway system, through the development of railway infrastructure and its intermodal connection, it will also encourage the development of strategies for the definition of logistically acceptable railway projects with appropriate technical assistance, generating in turn the outreach of the Spanish railway industry to the Central American region.

Mafex Magazine: As an expert in finance programs for development programs, are you optimistic about the challenges you must face at this time to achieve a more sustainable development?

Dante Mossi: One of the positive aspects of the current global context is that it has raised awareness

of the need to seek alternatives to overcome barriers that lead to development.

Creativity and innovation during adverse times give rise to those alternative means which generally, as in the mobility sector, allow for the inclusion and collective benefit of citizens in our case. As a Bank we believe that this gives us an opportunity to work with strategic allies such as MAFEX to collaborate and find those alternatives.

Now more than ever the world will need a common approach to grow and overcome the current context, being part of that international concert of development institutions, I am sure we will. For 60 years CABEL has shown its member countries its support, and this will not be the exception, especially considering that this time we have the best risk at the Latin American level.



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Investments grow in **Asia and Africa** to improve communications

CONTINENTS SUCH AS ASIA AND AFRICA ALSO HAVE SEVERAL AVENUES OF ECONOMIC SUPPORT AND TECHNICAL ADVICE TO PROMOTE SOCIAL DEVELOPMENT AND ECONOMIC GROWTH. AS IN OTHER AREAS OF THE WORLD, TRANSPORT IS ONE OF THE STRATEGIC AREAS OF ACTION.

Social and economic developments in Asia and Africa in recent years are the result of joint action by governments, entities and other stakeholders.

In these plans for the growth and implementation of projects that improve citizens' quality of life, there is the support of several financial institutions such as Asian and African Development Banks, and the Asian Infrastructure Investment Bank.

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ASIAN DEVELOPMENT BANK (ADB)

The Asian Development Bank (ADB), based in Manila (Philippines) focuses its areas of financial activity on the economic development of Asia and the Pacific. It was created in 1966 and consists of 68 members, Spain being one of its donors, 49 of which belong to the region.

The main objective of its work is the eradication of poverty. To this end, it provides

various types of aid in the form of donations, loans and capital to governments and private companies, as well as technical assistance. One of its priorities is to help governments create new infrastructures that promote "inclusive" and environmentally sustainable economic growth.

In the area of railway transport, it has cooperated for the commissioning of nume-

rous metros such as those of Jaipur, Mumbai, Hanoi, Bangalore and Chennai, as well as light rails such as the Astana.

They have also signed loan agreements in investment programmes in the railway sector in India, to improve passenger and freight services on some of their most important routes.

This support has been extended to other countries. For example, with loans for a new line from the city of Malolos and Clark International Airport in the Philippines; as well as aid for the modernization of commercial operations and the efficiency of the Sri Lanka Railways company, by investing in its infrastructure and improving its technical capacity.

Other outstanding support include funding in China for the construction of the network linking the northwestern province of Gansu and the southwestern municipality of Chongqing, or the promotion of the mega Transasian Railway project. It is an important 14,000-kilometre network that seeks to promote freight connections across Europe and Asia.

Its role is also very prominent in the analysis of the implementation of high-speed networks.



The financial mechanisms of the Asian Development Bank will help inclusive growth.

AFRICAN DEVELOPMENT BANK (ADB)

The bank, based in Abidjan (Ivory Coast) began operations in 1964. It consists of 53 African countries and is funded by 24 European, American and Asian states. Its lines of work focus on promoting the continent's economic development and social progress. The group's structure also includes the African Development Fund (ADF), and the Nigeria Trust Fund (NTF).

In terms of transport infrastructure, the bank has co-financed High Speed rail in Morocco. Thanks to its support, studies have been carried out for the railway connection between Ethiopia and Sudan or the construction of a bridge for mixed traffic on the Kinshasa-Ilebo line (Democratic Republic of Congo) or the economic support for the transport plans of several countries such as Tanzania.

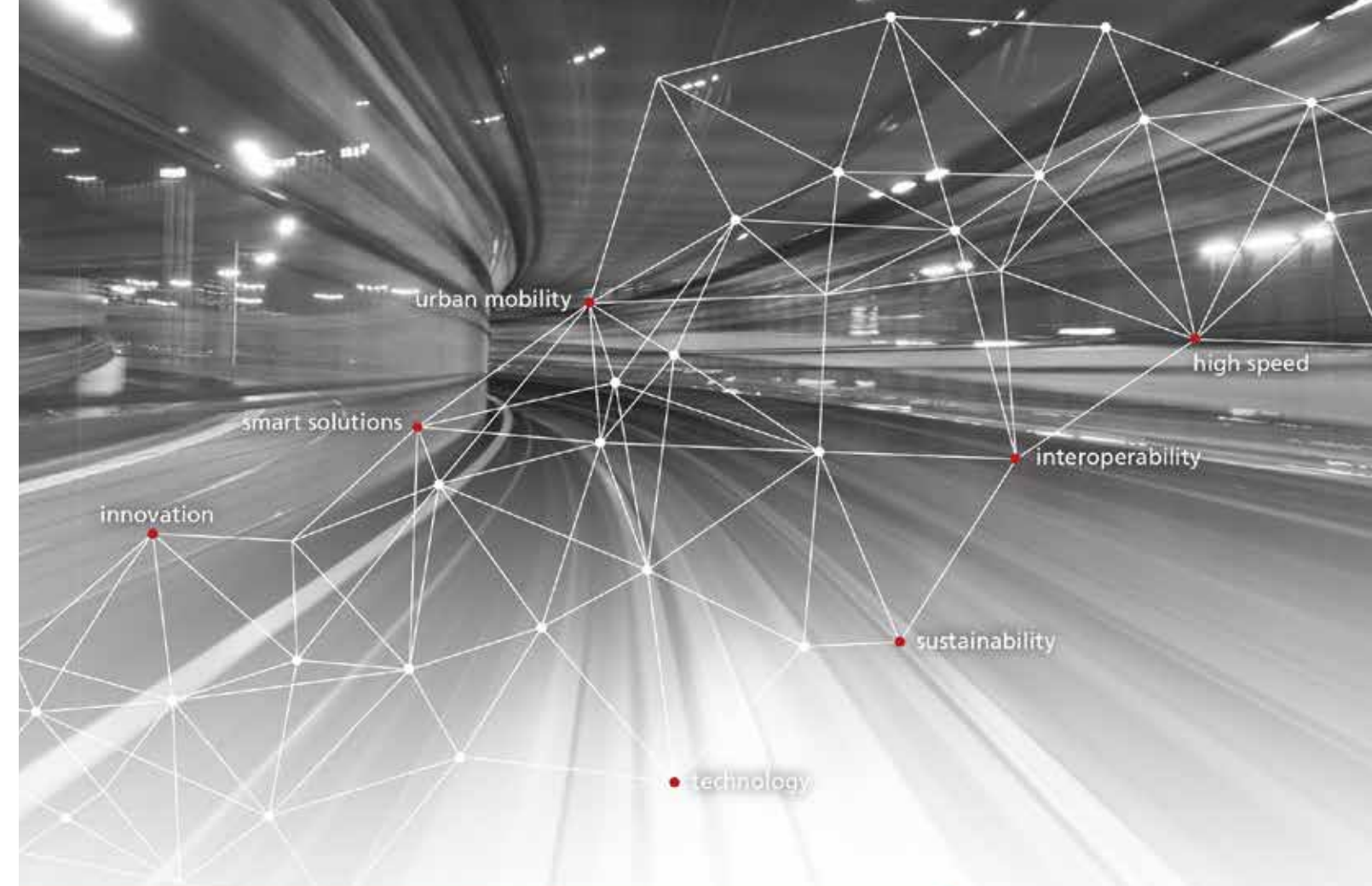
In Senegal, the Bank's support for the development of the Regional Express Train (TER) linking the airport with Dakar and Diamniadio is more than remarkable, also contributing to reducing congestion of the capital city, which suffers numerous traffic jams and crowds.

ASIAN INFRASTRUCTURE INVESTMENT BANK (AIIB)

This recently created multilateral financial institution was established in 2015 by 57 countries at the initiative of China, home to its headquarters, although members have been gradually joining in to become 102 today. Its mission is to promote sustainable economic development and improve infrastructure connectivity in Asia and also in Oceania.

In 2019, 15 transport projects were approved, representing 20.6% of the total initiatives that were launched, as reflected in its annual report.

Among the railway's promotion activities, it has been involved in several initiatives such as the first railway system in Oman (Oman) or numerous operations in India, including the Mumbai and Chennai metros.



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MaaS: A new concept of door-to-door intermodal mobility with the user

ONE OF THE CHALLENGES ASSOCIATED WITH THE TRANSFORMATION OF THE BIG CITIES IS THE NEED TO PROVIDE CITIZENS WITH A COMPREHENSIVE AND EFFICIENT TRANSPORT NETWORK WITH WHICH THEY CAN REACH ANY POINT IN THE WAY THAT BEST FITS THEIR PREFERENCES.

The growth of cities and their expansion into peripheral areas is one of the characteristics of today's large urban areas. As defined by the OECD (Organization for Economic Cooperation and Development) we are in "the Metropolitan Century", where there is a proliferation of mega cities

that demand greater resources and infrastructure.

One of the challenges associated with this transformation is the need to provide citizens with a comprehensive and efficient transport network with which they can reach any point in the way that best fits their preferences.

New forms of travel

This proposal must also respond to new habits in travel, as the way in which citizens travel is constantly evolving.

Trends in individual consumption also reach mobility. On the one hand, the use of rented driverless vehicles (cars, motorbikes, bicycles and electric scooters) and shared journeys is increasingly prevalent. On the other hand, there is an increase in networks connected to each other to optimize journeys; In addition, there is greater environmental awareness on the part of travellers, a fact that leads them to opt for modes that are more respectful of nature and with less emissions of CO₂.

All this promotes sustainable and inclusive mobility in society. In this paradigm shift, the advent of technology and its different applications has been paramount. The increase of digital devices by citizens opens-up a

Trends in individual consumption also reach mobility, where environmental awareness also grows.

new means of communication and allows operators and businesses to expand the services offered to travellers with greater flexibility.

Digital transformation and servitization are global and impact many sectors, including transport. A new concept is born out of this called "Mobility as a Service" (MaaS), where the passenger makes use of transport by booking it online, via the Internet, from a mobile phone and with just one click.

Changing mobility habits

There has been a shift from the habit of buying a car for individual use to paying for a particular service depending on the route and the types of means being used (metro, bus, commuter trains, fleets of private or mixed vehicles, etc.) or the different associated expenses if it is a shared journey with another individual (petrol, insurance, electricity, etc.).

One of the great advantages for the user is the possibility to rent the specific number of seats required, instead of a complete car, and to opt for the vehicle that suits the user best

Technological applications open-up a wide range of possibilities for connected mobility.



depending on the route (bicycle, motorcycle, electric car, etc.). In addition, intermodality is promoted, as a large part of its routes can be done by public transport (commuter trains, metro, bus) and complement a shorter journey with another type of public or private network.

Why is it so innovative?

MaaS combines several key ideas: electric mobility, connected vehicles, real-time information, as well as journey management and mobile phone payment thanks to digital applications.

All this makes MaaS so innovative, as it puts an end to the most traditional model of travel, focused on the sale of the product (vehicle) for its own use, and it makes progress towards new ways of understanding transport, more associated with "servitization", which can be defined as the transition from the acquisition of goods, as private vehicles, to that of service users.

Hence the increase of preferences for shared mobility (carsharing, motosharing, bikesharing, carpooling, etc.) and its combination with public transport networks.

All this transformation entails a paradigm shift in the way transport services are distributed, and also in commercial models.

Technology-based startups

This way, a great number of technology-based startups emerges in the market that must be complemented by urban transport networks to create a robust transport system in large cities.

Throughout this new range of possibilities, railway plays a predominant role. Its numerous environmental and connectivity advantages suggest it is the backbone of this combination of means.



THE USER, IN THE CENTRE OF THE SERVICES

The key concept behind MaaS is that users become the centre of transport services. Currently, mobile applications enable the provision of tailored mobility solutions based on individual needs. The great novelty is that users have a very easy and convenient access to the transport service most appropriate to

their route, within the package of service options that they have at their disposal.

The great potential of this ecosystem is that users have a simple, reliable, flexible door-to-door service at a good price that fits all styles.

CUSTOMIZED DIGITAL ITINERARIES

The use of new technologies is one of the key points also in terms of mobility. The possibility of integrating all transport services into a single platform opens-up a huge range of new possibilities for the traveller. Presently, travellers can check and receive, online and with no need to travel, suggestions about the most suitable

multimodal routes according to the preferences of each person, reducing the chances of encountering delays, congestion or problems associated with validating the purchase of tickets. These options have enabled the "MaaS model" to fully meet the user's needs and to customize their journey.

WIDE RANGE OF MOBILITY PROVISION

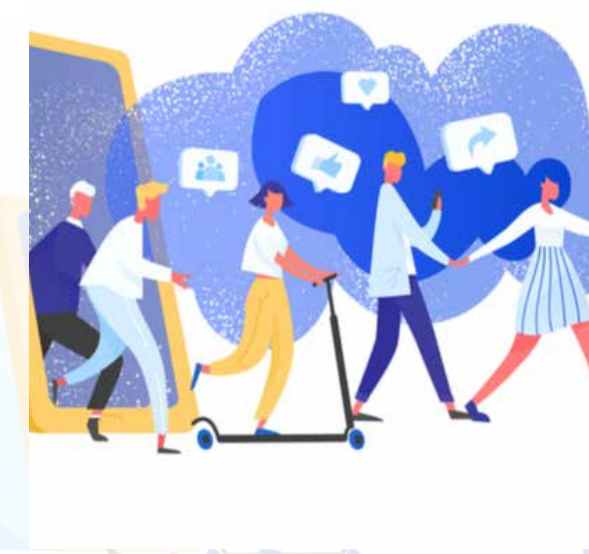
The new way that citizens travel has evolved into a wide range of mobility provision so that they can travel in the most optimal way, according to their needs.

These services offer the possibility to combine different modes of transport, ranging from the most traditional to the most modern ones and provide the opportunity to create an efficient and more sustainable itinerary, where the use of individual private vehicles is decreasing.

The additional factor is that this entire offer is "connected" and available on any user's mobile device, so the accessibility to information to plan a trip in advance is much greater.

The emergence of new platforms for shared travel can have a direct impact on urban mobility.

Public transport operators, unique to date, also evolve to digitize their services, expand customer service and tackle new competitors.





LARGE SECURE DATA EXCHANGE

The fact that users have a wide range of options to plan and finalize their trip via their mobile, or through websites, is possible thanks to the previous large exchange of data. An effective, safe and massive process in which cooperation to generate and share knowledge, aggregate third-party data efficiently and link booking services, payment gateway, etc.) is especially important. This is the way to create new opportunities and expand travel options to the end user.

The challenge now is to achieve full coordination between public transport services

and the growing number of smaller private providers offering a specific service in this chain, as well as to strengthen all security assurances.

Each of the operators usually has their own application, with a separate interface and a payment mechanism, and each service maintains its own relationships with customers. In this sense, aspects such as authentication and security in each API (Application Programming Interface) are essential in each of the providers.

ICTS, THE BASIS OF CHANGE

The MaaS model is characterized by its reliance on Information and Communication Technologies (ICTS), which are the ones that help to make this new mobility model a reality and the joint action of services by different agents (rental companies of diverse vehicles, transport operators, travel cards top up, etc.)

The increased use of web and mobile applications has a direct impact on transport and leads to an increasingly interconnected city. The ability to integrate all transport services into a single platform is an improvement which provides users with an intermodal and uninterrupted mobility network. The big breakthrough is that through a single interface, very diverse functionalities are combined, such as the planning of a journey, the booking of the chosen mode, ticket issuing and payment.

COLLABORATIVE ECONOMY APPLIED TO TRANSPORT

Mobility as a service also helps promote a greater collaborative economy and meet the UN Sustainable Development Goals (SDG). Cooperative models and the availability of electric vehicle networks help to reduce, for example, the vehicle fleet of private cars in circulation, with the positive impact on CO2 emissions into the atmosphere.

In addition, having several alternatives for shorter journeys within the city centre encourages many of the inhabitants of peripheral areas to opt for commuter or metro lines as the main means of travel. This promotes the use of the railway, the least polluting and most environmentally friendly mode and contributes to the improvement of spaces, air quality and a sustainable future.

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Cities are committed to an intelligent user-centric mobility



LARGE URBAN CENTRES ARE MAKING STEADY PROGRESS IN THE USE OF TECHNOLOGY AND DIGITALIZATION TO PROVIDE A COMPLETE SERVICE TO THE PASSENGER ON EACH OF THEIR JOURNEYS.

Mobility as a Service makes its way in the big cities. Railway operators put in place strategies to improve their proposals with integrated applications, and to join the traveller at all stages of their journey with a comprehensive service that includes planning, information, management, payment and onboard entertainment.

In Spain, major cities such as Madrid and Barcelona, which are in the ranking of the best public transport networks in the world, are making steady progress in the use of technology and digitization. They are joined by the strategy carried out by companies such as Renfe to respond to the new needs of passengers.

MAAS MADRID

Madrid's Municipal Transport Company (EMT) also has the MaaS Madrid mobility platform. With an application where all the mobility services of the city (both public and private) can be consulted, booked and even paid without leaving the App.

Since its implementation in 2019, users of public transport and shared mobility in the city have seen how it is easier to decide which means of transport is best for them at all times and places. Due to the importance of the metro and commuter network in the capital, the railway is one of the core elements of this new mobility, which is complemented by other modes of transport that have emerged in recent times.

RAAS: RENFE PUTS ITS BETS ON EFFICIENCY

The company works on an innovative App that will group in a single ticket high speed, metro, taxi and the technological platform of vehicles. With this proposal, Renfe wants to become a comprehensive mobility operator. The goal, to be present in the entire journey and offer all the services that users need on their door-to-door journeys.

This application will allow, among other aspects, to unify payments of various modes of transport into a single ticket, as well as the contracting of other services such as electric scooters, public bikes, taxis or Cabify. Renfe indicates that work is being done not only to make services more efficient, but also to become the centre of a logistics chain and a more sustainable mobility system.



BARCELONA INCENTIVIZES 'MOBILITY AS A SERVICE'

In Catalonia there are initiatives, such as MaaS Catalonia, aimed at encouraging the 'Mobility as a Service' model that seek to be a reference framework for achieving synergies and new opportunities in the region. In addition, they also work to create international cooperation in this field.

The city of Barcelona is already an example of connected mobility. Last year the City Council launched an app that reports on paid street and underground parking services, electric charging points and the shared bike network.

In Europe there are numerous cities putting their bets on MaaS.

EUROPEAN CITIES ADAPT TO THE TRAVELLER

Alongside the Spanish cases, in Europe there are numerous cities that are also examples of this adaptation to the new ways of travelling. Helsinki is one of the clearest examples. At the heart of the Finnish capital

is "Whim" a digital platform that integrates travel planning from the point of origin to the destination. It also allows users to book e-tickets and payment services on all public or private transport models.

This same platform works in Birmingham, United Kingdom, to cover the West Midlands region.

Gothenburg (Sweden) is another of the cities that lead the commissioning of such applications. "UbiGo" provides a simpler and "climate-smart" way to travel by public transport, share the car and rent a car, taxi and bike, by using a single smartphone app. It is one of the first pilot projects in Europe.

This technological focus is also placed by various operators such as Deutsche Bahn which has launched the "Qixxitde" App, at national level, so that passengers can plan public and private travel and make payments within its application.



The railway industry, prepared to bring the best technology to the end user

THE NEED FOR THE MOST CUTTING-EDGE TECHNOLOGICAL DEVELOPMENTS IN THE MARKET MAKES LARGE NETWORK OPERATORS COUNT ON THE R&D ADVANCES THAT THE INDUSTRY MAKES AVAILABLE TO THE MARKET.

Railway systems around the world are making progress on digitization to meet the challenges of mobility as a service. This mode of transport is destined to be the centerpiece of the range of options available to the user in the cities.

The need for the most cutting-edge technological developments in the market makes large network operators count on the R&D advances that the industry makes available to the market. An example is the Spanish

railway sector that in recent years has introduced the most effective innovations to improve the user's experience. Companies from diverse sectors such as communications, passenger information and onboard entertainment, traffic control or collection systems stand out for their contributions to smart cities and mobility as a service.

Significant technological leaps have been made for the public transport sector with comprehensive electronic ticketing systems, unique in the mar-

ket, as they only need QR codes for their validation. In communications, new radio systems have been developed to improve signalling and offer new services.

Another important area is innovation for intelligent fleet management, so important for improving network efficiency, through the use of Big Data and Machine Learning. These advances enable GPS tracking, real-time incident detection, and smart data analytics.

The multiple solutions provided by Spanish companies contribute to improving mobility in the cities, enabling real integration of the different modes of transport and walking towards a connected, digital and sustainable future.

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[siemens.es/mobility](https://www.siemens.es/mobility)

SOME MAFEX MEMBERS WITH MOBILITY AS A SERVICE PROJECTS (MAAS)

► TELTRONIC

The fact that different bus, subway or trams operators can instantly share information results in greater safety and improved service. TETRA technology makes it possible: the different transport systems can use a single radio network, which allows them to manage their communications independently, but also enables the exchange of information between them.

A single system means less costs, improves coordination and facilitates management and maintenance tasks. Moreover, by incorporating another LTE broadband access, the system multiplies its functionalities, being able to offer information about transfers and frequencies, passenger counts, multimedia services... Teltronic has developed successful experiences in this field, such as the Itelazpi network used by Euskotren and Metro de Bilbao.



► INDRA

Indra has a complete MaaS solution to maximize the public and private transport capacity of the city, enhancing the user experience and allowing intelligent mobility management.

The solution is based on its In-Mova Space platform, that integrates information in real time from the entire transport ecosystem,

promoting intermodality, and is supported by new access control technologies such as EMV, NFC, QR or biometrics. In addition, it incorporates the Travel Partner traveler accompaniment application that includes a

complete offer of multimodal trips, placing mobile devices as the engine of the relationship with the user.

By integrating information from all modes of transportation, the solution will be able to reconfigure user routes, reorder flows and optimize the occupation of infrastructures.



AS A SERVICE PROJECTS (MAAS)

► SIEMENS

Siemens Mobility has been working for years in the development of MaaS (Mobility as a Service) solutions that perfectly combine the offers of different transport services (public transport, taxis, shared bikes, etc.) providing details on alternative travel combinations in a transparent way. Its operating system is modular, simple, digital and interconnected, and at the same time

allows a successful integration of all the actors involved to achieve a perfect passenger experience.

Siemens Mobility takes into account travelers, operators and municipalities to offer a new vision of mobility in cities. This is the case of Forces Elèctriques d'Andorra (Feda), which awarded Siemens Mobility the new intermodal mobility platform, which will

report on aspects such as waiting time at bus stops, better public transport route options including connections with bus stops of electric bicycles, as well as availability in car parks (public and private) and electric vehicle charging points. The user may pay for mobility services via mobile. Other examples of intermodality have been developed by Siemens Mobility in Denmark, Luxembourg, among other countries.

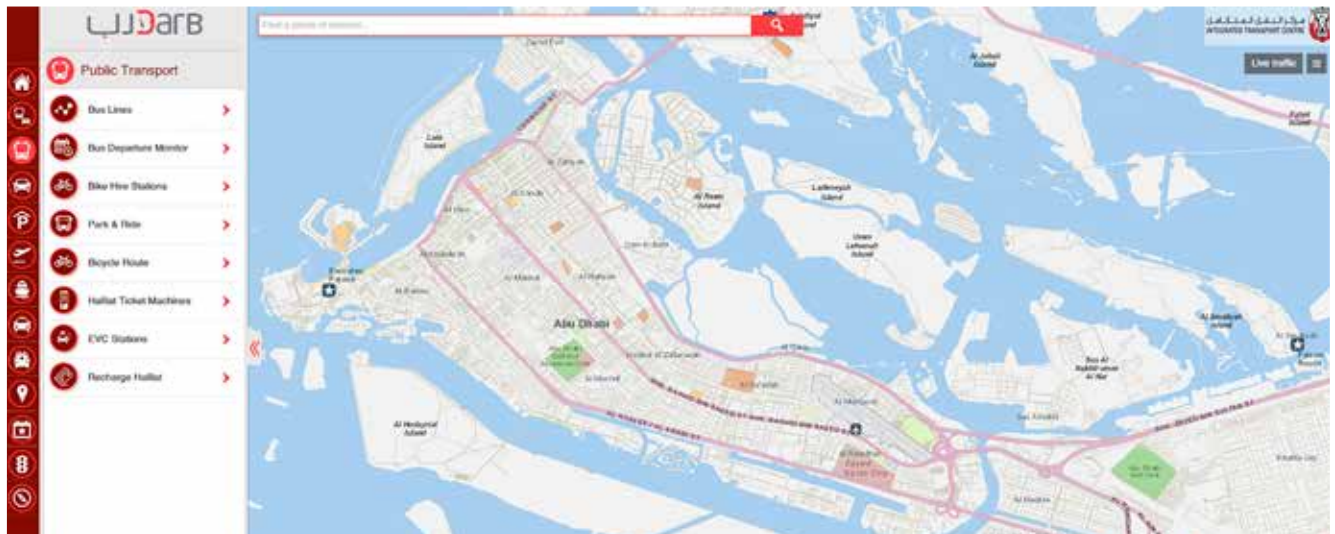


► IDOM

Taking technology as the main driving force for new advances in public passenger transport, IDOM designs and implements technological solutions for the management of intelligent mobility

- from the design of the mobility offer (Project E-Module for Transport Planning and Reporting Project in Poland) - right through to operations (Darb mobility platform, for the Abu Dhabi DoT or the Localiza vehicle location system for

Renfe) – including business intelligence, such as the project recently awarded to IDOM for construction of the Big Data platform for the Madrid Regional Transport Consortium



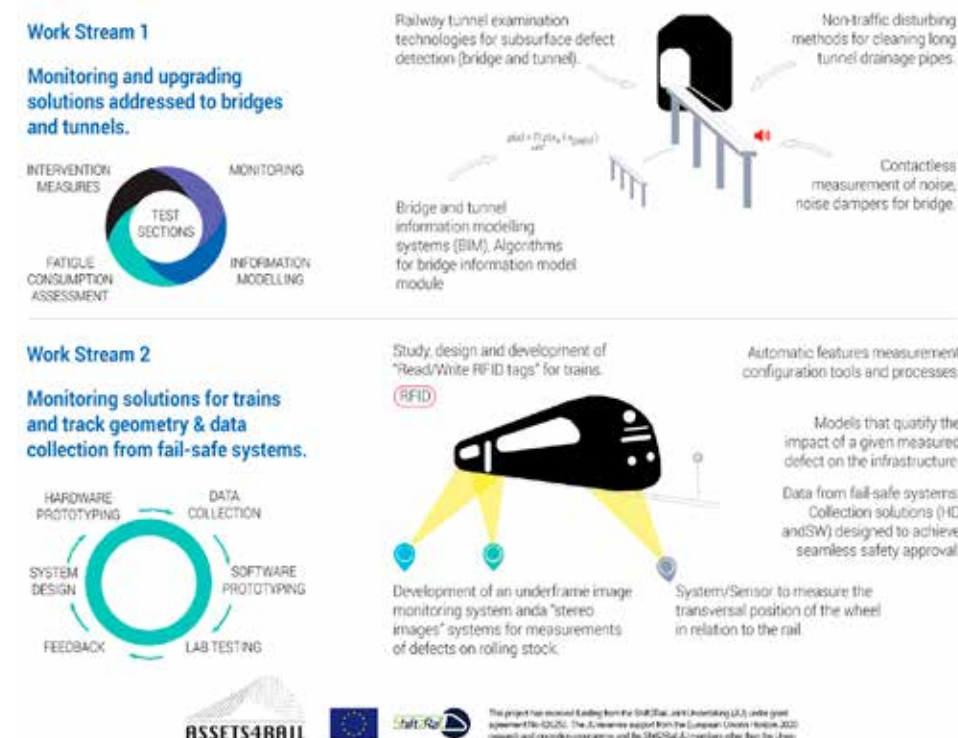
ASSETS4RAIL will use cutting-edge technologies for railway asset monitoring and maintenance

A European initiative which will contribute to the modal shift to rail by exploring, adapting and testing cutting-edge technologies for railway asset monitoring and maintenance.

ASSETS4RAIL shares the Shift2rail view of having an ageing European railway infrastructure that needs to cope with the expected increased traffic in the future. To achieve this, we need an improvement in technology and a cost-effective maintenance and intervention system for infrastructure inspection and monitoring.

The main objective of the project is to develop a set of cost efficient, innovative and asset specific measuring and monitoring devices. These will not only collect and deliver the status data of the railway system (tunnel, bridges, track geometry/safety systems/rolling stock) but also process and analyse the information in Building information Models with integrated algorithms to generate relevant maintenance infrastructure-related information to support asset management decisions.

The initiative has 2 work lines: the first aims to find the most accurate methods to inspect tunnels, bridges and tunnel walls for their correct analysis and integration into management system based on BIM (Building Information Modeling); and the second, in which AIMEN is working directly, seeks to develop a monitoring system for train carriages and track geometry which helps to prevent risks and serious failures in the infrastructures.



A EUROPEAN INITIATIVE WHICH WILL CONTRIBUTE TO THE MODAL SHIFT TO RAIL BY EXPLORING, ADAPTING AND TESTING CUTTING-EDGE TECHNOLOGIES FOR RAILWAY ASSET MONITORING AND MAINTENANCE.

The project is led by Eurecat and 19 partners from 10 countries participate in its development. It has a budget of 4.7 million euros and is funded* by the European Commission.

AIMEN brings its expertise in developing monitoring systems, computer vision systems and Artificial Intelligence, leading the development of imaging train monitoring systems.

**This project has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement no. 826250 The content of this document reflects only the author's view – the Joint Undertaking is not responsible for any use that may be made of the information it contains. The users use the information at their sole risk and liability.*

Infrastructure Smart Services for the Madrid Light train network

This latest digitalization project consisted in the inspection light train lines connecting the west Madrid municipalities with the suburban train stations. The 21-kilometres-track was inspected using TrackTracer technology, Alstom's innovative track monitoring tool, integrated in a special vehicle that measures the infrastructure automatically. This is the first commercial project of its kind in Spain, after the tests carried out with TMB last year and the R&D projects performed jointly with national infrastructure operator Adif.

The vehicle, equipped with four optical units, camera, lasers and an inertial navigation system, analyses

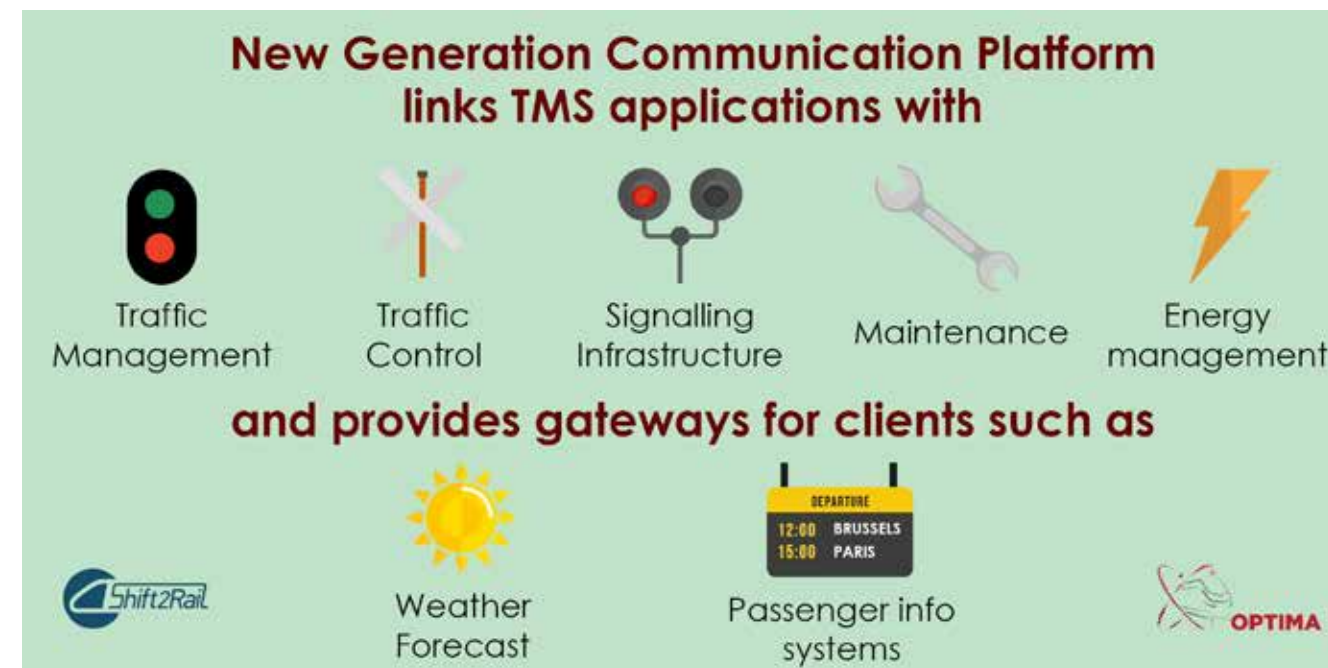
ALSTOM TEAMS HAVE CARRIED OUT AN INNOVATIVE PROJECT IN SPAIN TO DIGITALISE TRACK INSPECTIONS FOR MADRID LIGHT TRAIN NETWORK. THE PROJECT WAS PERFORMED JOINTLY WITH THE MLO (MADRID METRO OESTE) OPERATOR AS PART OF THE SERVICES AGREEMENT BOTH COMPANIES HAVE MAINTAINED DURING THE LAST THIRTEEN YEARS.

various track parameters (such as rail width, levelling, track twist radius, alignment, banking and warping). These measurements are critical for safety operations as track anomalies can cause derailments if not detected and corrected in time. This information can be integrated within the HealthHub platform, also facilitating prediction of future defects to anticipate maintenance tasks.

Traditionally, rail inspection is performed manually, with the process being slower, less reliable and less cost-effective. WINFRAM and TrackTracer technology allows up to 4,000 measurements per kilometre at an average speed of 20 km/h with a resolution of up to 0.02 mm to catch a maximum of details and accuracy.



Optima: A Communication Platform to Manage Rail Traffic Control and Management Support Services



ARDANUY INGENIERÍA IS AN ACTIVE PARTICIPANT IN THE OPTIMA PROJECT, PART OF THE EUROPEAN UNION'S SHIFT2RAIL INNOVATION PROGRAMME. THE OBJECTIVE OF THE PROJECT IS TO DEVELOP A PLATFORM THAT REINFORCES COMMUNICATION BETWEEN DIFFERENT SYSTEMS INVOLVED IN THE RAIL TRAFFIC CONTROL AND COORDINATION.

The purpose of the OPTIMA Project is to design and develop a new Communication Platform to reinforce Railway Traffic Control and Management, with the aim of managing different services (multi-modal operating systems) that support TMS applications (traffic management and control system). To do so, the Communication Platform will link the TMS applications with different systems, such as those including Traffic Management, Traffic Control, Maintenance, Energy Management and Signaling Field Infrastructure. With this in mind, part of the project development will include a technical demonstrator that will be implemented on the premises of the infrastructure managers.

Another 15 Companies, amongst them ADIF and INECO, will also participate in this initiative which is part of the EU's R+D Project, Shift2Rail.

This new tool will connect TMS applications with traffic control and management systems, maintenance / power management and signaling field infrastructure.

The following activities are associated with the main objectives of the OPTIMA Project:

- Use of an Integration Layer to connect real data from commercial rail services, external sources, services running on the application framework and operators' jobs.

The railway services and external sources included in the platform are:

- Development, validation and verification of the following elements:
- Provision of a communication platform that is fully available and ready to install and test prototypes for complementary projects (scalability).

The project is structured in 8 Work Packages (WPs) with different functions to meet its general objectives. There are 6 WPs in which the technical tasks required to meet the technical objectives of the project and develop the demonstrator will be carried out, and two WPs designated to ensure efficient management and coordination of the project, as well as dissemination and interaction with the all parties from S2R and other stakeholders.

Predictive maintenance of railway catenary: the role of physical modeling

Predictive maintenance is involving a qualitative leap in infrastructure management. In this field, Ceit provides innovative solutions with high added value, relying on its knowledge of data analysis and advanced modelling of railway infrastructure and vehicles. Within the framework of the European project SIA (System for vehicle infrastructure Interaction Assets health status monitoring), Ceit has developed physical models of catenary that allow evaluating their status in real-time using sensorized pantographs. Specifically, work has been done on monitoring the stagger, height and wear of the contact wire, and the quality of the pantograph-catenary interaction.

However, predictive maintenance is not only intended to assess the state

CEIT HAS DEVELOPED PHYSICAL MODELS OF CATENARY THAT ALLOW EVALUATING THEIR STATUS IN REAL-TIME USING SENSORIZED PANTOGRAPHS.

of assets but also to predict their evolution. One of the main challenges in its implementation is obtaining and managing large amounts of data and measurements, a task that can take several years before starting to make future predictions. At this point, physical models can be used to speed up and lighten this process by assisting in the creation of digital twins.

A digital twin based on measurements and physical models allows a great variety of future cases to be

considered. Therefore, it will improve its ability to anticipate by using fewer measurements, and in turn, it will reduce the time in which forward-looking predictions become operational. The models developed by Ceit carry out these simulations by faithfully representing the Spanish catenary infrastructure, which largely uses double contact wire, and by introducing algorithms capable of greatly reducing simulation times. The ultimate goal is that these models combine precision, versatility and efficiency.



Technological innovation award 2020-2021



THE XVIII EDITION OF TALGO TECHNOLOGICAL INNOVATION AWARD PRESENTS SOME NOVELTIES AMONG WHICH A NEW SECTION SHOULD BE NOTED, "MOBILITY".

Talگو is looking for the best projects that provide additional value to railway technology and mobility. With this award Talگو expects to encourage researchers, students, startups, entrepreneurs, etc. who work in the different areas related to these fields.

For this XVIII edition, Talگو presents some novelties among which a new section should be noted, "Mobility",

that is added to the already existing one, "Railway technology". On the one hand, the "Railway Technology" section looks for projects which show a clear technological progress for the railway sector. On the other hand, the "Mobility" section will consider projects related to passenger experience, security, accessibility, sustainability, 4.0 industry, Big Data, digital transformation, connectivity, etc. in a much broader way.

The economic amount for the winner of each section will be 15.000 Euros. Besides, Talگو will give the winners the opportunity to publish an article about their project in a renowned journal.

Participants must submit their projects before the 1st of June 2021, using the digital form which can be found in the following site: www.premiotalgoinnovacion.com, where the detailed rules are explained. Among others, they must provide a project description, an explanatory report about the project background, analysis methods and objectives, as well as a video explaining their overall goals and motivations.

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Cutting-edge train control and propulsion technology for the 23 Frecciarossa 1000 trains that will operate in Spain

Hitachi Rail SpA and Bombardier Transportation have signed a contract with Italy's primary train operator Trenitalia to supply 23 Frecciarossa 1000 very high-speed (VHS) trains for the new Intermodalidad de Levante (ILSA) rail operation.

With cutting-edge train control and propulsion technologies deriving from the V300ZEFIRO platform, the Frecciarossa 1000 very high-speed train has been chosen for the new ILSA franchise in Spain to enrich the travel experience for passengers, thanks to its high levels of comfort and reliability.

Trapaga will supply the propulsion equipment for these very high speed European trains, made in collaboration with Hitachi Rail Italy, and desig-

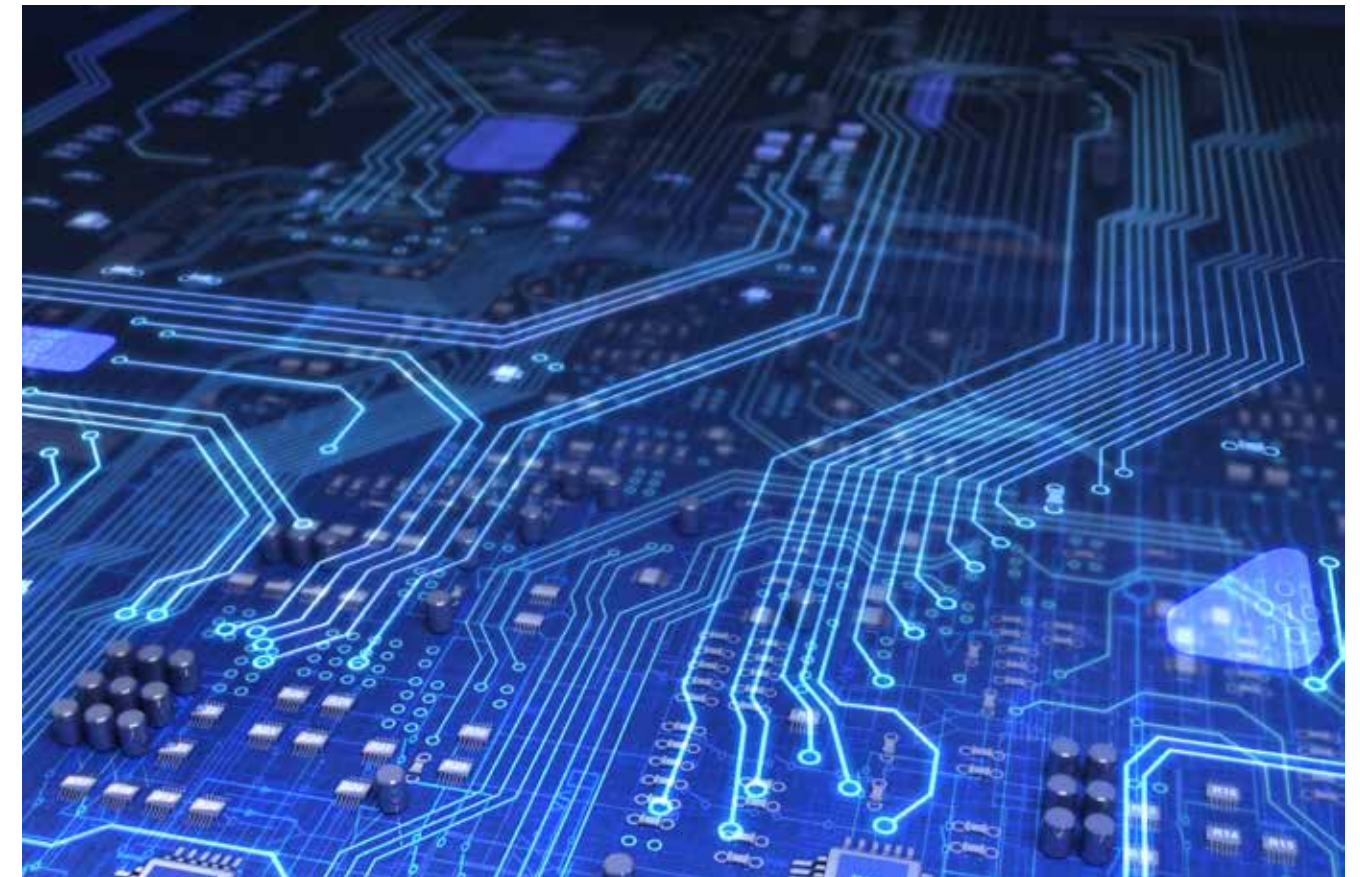
THE PROPULSION EQUIPMENT PRODUCED FROM BOMBARDIER'S FACTORY IN TRAPAGA WILL BE PRESENT IN THE 23 FRECCIAROSSA 1000 TRAINS THAT ILSA WILL OPERATE IN SPAIN

ned to operate at maximum speeds of 360 kilometers per hour (kph) and which in tests have reached speed peaks of 400 kph. The trains, with 8 cars, 4 engines and 4 trailers, will have distributed traction and the capacity to operate at three different catenary voltages: 25 kVac, 3 kVdc and 1.5 kVdc.

"Bombardier Spain's relationship and conversations with our colleagues in Ilsa began years ago, and we are very proud that they have culminated in the signing of this contract. Our site in Trapaga (Basque Country) will be

responsible for the manufacture and supply of the propulsion and control systems for the 23 trains", said Óscar Vázquez, Country Managing Director, Chairman of the Board at Bombardier Spain and CCO of Bombardier Transportation worldwide, who also indicated that "we are confident that in the future our Services team in Spain will be able to form part of the project and put its experience at the service of the project as one of the world's leading companies in the maintenance of high-speed vehicle fleets".

SELENE Project, projects related to CV and AI



CAF Signalling is involved in different research projects related to Computer Vision (CV) and Artificial Intelligence (AI) enhanced systems develop in order to reach a higher autonomy in urban vehicles and align them with railway European normative. However, as many companies across the sector, CAF Signalling is facing up different computational capabilities challenges for CV&AI-enhanced autonomous train operation which needs real-time & safety-critical computing platforms for correct performance.

The future of CV&AI breakthroughs in railway sector will require large arrays of memory devices at the same accuracy as a Graphical Processing Unit (GPU)-based system, hardware accelerators and new platforms. These achievements will expand the scale of CV&AI processing-calculations making them larger and faster (this means energy-efficiency must improve dramatically). In other to conduct a research in this field,

CAF SIGNALLING IS INVOLVED IN DIFFERENT RESEARCH PROJECTS RELATED TO COMPUTER VISION (CV) AND ARTIFICIAL INTELLIGENCE (AI).

CAF Signalling joined SELENE project consortium.

SELENE follows a radically new approach and proposes an open-source Safety-critical Cognitive Computing Platform (CCP) with self-awareness, self-adapting, and autonomous capabilities. SELENE's CCP uses artificial intelligence (AI) techniques fed with on-line monitors and external sensors to adapt the system to the particular internal and external (environmental) conditions with the aim of maximizing the efficiency of the system being able at the same time of meeting application requirements. AI techniques are applied in a transparent way preserving the safety of the system. To ensure safety requirements

are preserved, SELENE's CCP relies on the strong isolation capabilities provided at hardware and software levels. CAF Signalling will use the SELENE approach on AI-enabled computing platforms to execute some functionalities developed in CV&AI field for autonomous train operation.

More precisely:

- a) Automatic platform detection,
- b) Automatic accurate stop at platforms and
- c) Safe passenger transfer.

SELENE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 871467.



System for the **analysis of the passenger** occupancy level in the Seville Metro

The system notifies different occupation levels (low/medium/high) by means of a video observation device that carries out an analysis of occupation density at each of the line's stops. This real-time analysis allows reliable alarms to be generated about an excess of passengers in the areas most sensitive to high concentrations. This information will enable Seville Metro staff to manage the service and adapt it effectively to the real situation.

COMSA Industrial has installed the video analysis devices in all the line's stations, optimising the use of network resources. Every time there is a change in the occupation level of

COMSA INDUSTRIAL HAS INSTALLED A NEW AUTOMATIC STATION OCCUPANCY CONTROL SYSTEM IN THE SEVILLE METRO, WHICH WILL MAKE IT POSSIBLE TO KNOW IN REAL TIME THE NUMBER OF PASSENGERS ON THE PLATFORMS AND LOBBIES IN ORDER TO ADAPT THE SERVICE TO THE NEEDS OF DEMAND.

one of the cameras, a signal is reported to a service located in the CCTV (Control Occupancy) data server, which details the station camera that has generated the change in status and the volume of occupation.

After processing the signal, the service sends the data to the Station

Remote Control servers, which are responsible for providing the information to the room operators, notifying the medium and high occupation levels by means of two alarms. This innovative system and its application to the whole line places Seville Metro among the most technologically advanced underground systems.

Skytrotter EVO, the solution for the **aesthetic** repair of any **rolling stock**

It was Sir Francis Bacon who uttered the words "If the mountain does not come to Muhammad, Muhammad will go to the mountain." The philosopher's words become reality for small paint and rolling stock repair jobs with SkyTrotter EVO in Lagos.

Equipped with a hydraulic lifting platform, lithium ion batteries, a compressor to power the paint gun, vision cameras, collision sensors and 4 layers of filtration including activated carbon, the SkyTrotter EVO allows us to carry out little need of having to move the train or its cars, leaving aside the high energy consumption of the traditional paint booth.

The innovative technology of the Sky Trotter EVO allows the operator to move longitudinally parallel to the track, rise to reach any point of the train and approach it to close a work area in which to spray paint. Its filtration system eliminates the need for annoying evacuation chimneys and achieves complete elimination of the odors of painting jobs.

Savings in time, energy and surface area, added to great flexibility and maximum safety make the SkyTrotter EVO a perfect solution for the aesthetic repair of any rolling stock.

SKYTROTTER EVO OF EQUIPOS LAGOS IS THE PERFECT SOLUTION FOR THE AESTHETIC REPAIR OF ANY ROLLING STOCK.



SUSCRÍBETE A LA REVISTA DE
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<http://magazine.mafex.es>

MAFEX Revista corporativa de Mafex
Asociación Ferroviaria Española



Hyperloop, the next generation of the long-distance **transport systems**

Hyper Poland – the Company that pioneers the implementation of magrail technology – proposes to implement the next generation of a sustainable long-distance mass rapid transport system with magrail technology using existing railway superstructure.

IDOM will support the Polish Company with its rich, global experience in designing high-speed rail systems, traffic research and business analysis. Upon the Agreement, IDOM is officially becoming a Design Implementation Partner of Hyper Poland. In this way, IDOM has joined the prestigious small group of Companies (i.e. Microsoft, DB Schenker, LOT Polish Airlines, TWERD, Transfer Multisort

IDOM IS OFFICIALLY BECOMING A DESIGN IMPLEMENTATION PARTNER OF HYPER POLAND.

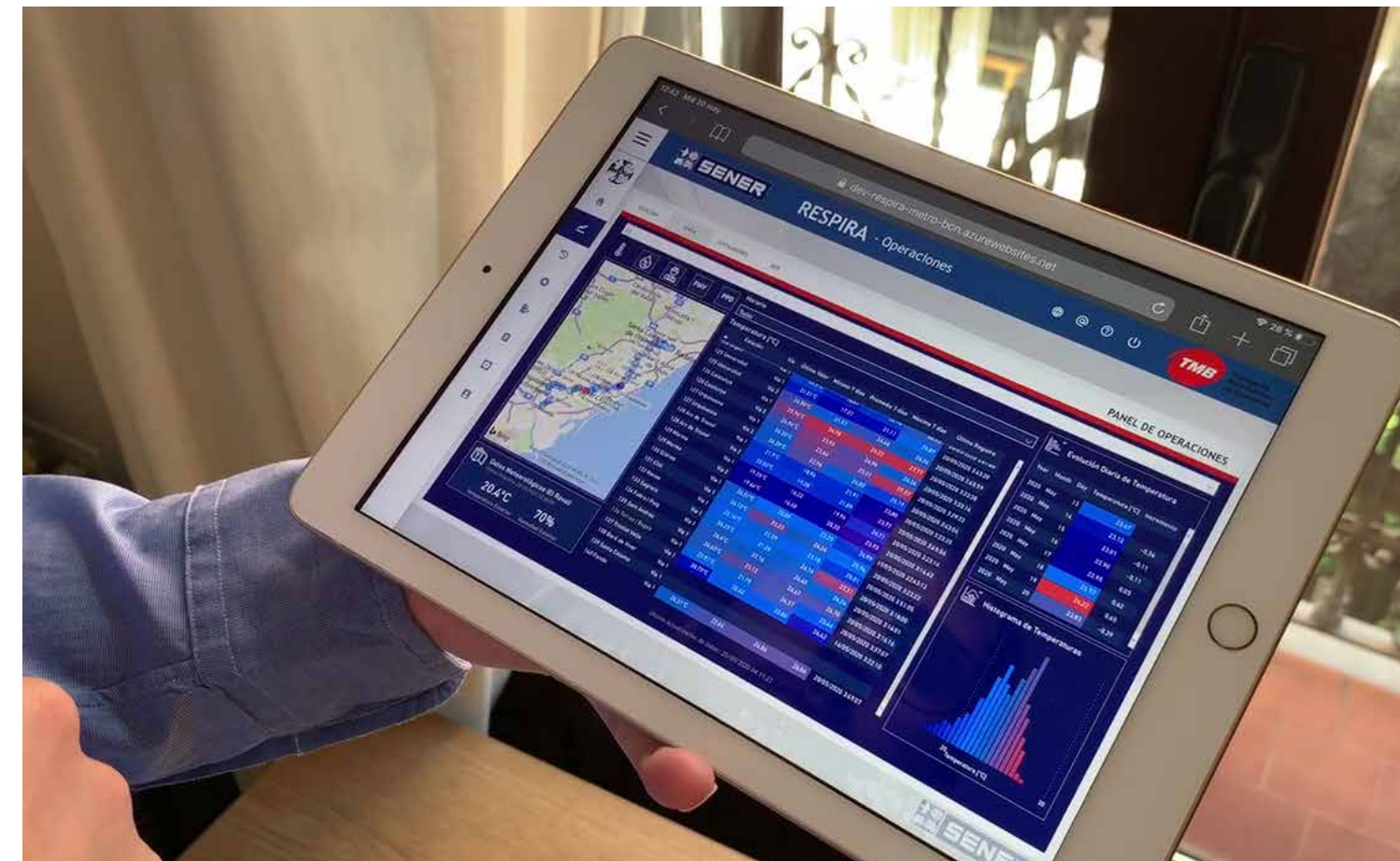
Elektronik, Railway Research Institute, InCredibles by Sebastian Kulczyk) that has already contributed to development of Hyper Poland's transport system.

"Cooperating with IDOM – a global leader in infrastructure designing and research is for us yet another proof that our work on magrail – the innovative passive levitation technology – is gaining more and more attention among the most important players of the transportation industry. With that

next steps to building even more advanced solutions, such as hyperloop, are possible" explains Przemysław Pączek, CEO of Hyper Poland.

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

RESPIRA®, Artificial Intelligence to improve the ventilation of large infrastructures



RESPIRA® predicts the environmental conditions inside the stations and efficiently controls all the ventilation equipment distributed in the network in a centralised manner, which makes it possible to establish the optimum ventilation strategy for each of the metro lines. The system takes into account the thermal sensation of passengers and workers by means of comfort indexes, as well as various criteria and variables, such as temperature, humidity, air quality inside the stations and the electrical consumption of the ventilation. With these data, it implements a dynamic algorithm for predicting environmental conditions inside the stations.

SENER ENGINEERING HAS DEVELOPED RESPIRA®, AN ARTIFICIAL INTELLIGENCE (AI) SYSTEM TO REGULATE THE VENTILATION OF LARGE COMPLEX AND CONNECTED SPACES, ESPECIALLY IN SUBWAY INFRASTRUCTURES SUCH AS METROS.

Therefore, RESPIRA® makes it possible to improve the comfort of passengers and workers in a metro network, as well as optimising energy consumption, which contributes to reducing the carbon footprint. Likewise, thanks to greater air renewal, RESPIRA® allows the risk of microorganism proliferation to be reduced, as in the case of covid-19.

RESPIRA® is already implemented in the Barcelona Metro network, thanks to a collaboration agreement between SENER and Ferrocarril Metropolità de Barcelona (FMB). The system can be quickly implemented in large infrastructures or complex spaces such as metro networks, airports, shopping centers or sports centers.

MCBS, optimal solution for radio communications in Transport

Thanks to its multi-carrier technology, the MCBS is able to offer the performance of a fixed indoor base station in a single compact device which is prepared to operate outdoors without requiring civil works for its installation, which means a significant reduction in costs and deployment time in railway environments where the whole line requires coverage.

Likewise, its RF power can reach up to 40W, much higher than other compact outdoor base stations, so fewer units are needed to provide coverage over a larger area. Also at OPEX level, the MCBS represents significant savings, as it has much lower consumption than other solutions currently on the market.

The new base station is certified according to railway standards and can be used for railway signalling applications. In addition, it supports higher levels of traffic and user concentration and, should it be necessary to improve its capacity, this would not require new hardware and could be increased remotely at the software level.

This new development represents an evolution of Teltronic's NEBULA infrastructure, a solution deployed in more than a hundred transport projects, and which highlights the advantages of TETRA in these environments: less interference, greater spectral efficiency, critical communications functions and data services that facilitate train-ground operation and other applications.

TELTRONIC PRESENTS THE MCBS, ITS NEW OUTDOOR TETRA BASE STATION WHICH, THROUGH THE USE OF SDR (SOFTWARE DEFINED RADIO) TECHNIQUES, PROVIDES UP TO FOUR CARRIERS IN A SINGLE UNIT.



Technology for a more sustainable rail system

The energy transition has driven the need to reduce CO2 emissions in all sectors. Ours is no exception. Actually, transport is responsible for a quarter of emissions and 4.2% of that figure comes from the rail segment. As a result, the main players in the market are already implementing measures to achieve energy improvements.

There have already been several initiatives to optimize the energy consumption of the train traction system - responsible for almost 85% of the consumption of the railway sector - trying to recover the energy from braking to feed it to the grid or, using batteries and supercapacitors, to take advantage of this system and reduce consumption during the journey. Also, market leaders are discussing about creating system to teach train drivers how to be more sustainable while driving or, as consumption is linked to the orography, to seek the most suitable route when building roads.

Regarding train stations, there are several lines of action. Stations are facilities with great potential to integrate renewable energies, as they have enough space on their roofs to install important powers of photovoltaic energy, or energy storage battery systems. In addition, the currently available technology would allow them to focus on efficiency, implementing building control systems to optimize consumption - climate, heating, lighting ... -, monitoring energy and even assigning costs to the purchasing areas included in these facilities.

On the other hand, microgrid control systems could help train stations to use energy cleverly and reduce electricity bills, taking into account

SCHNEIDER ELECTRIC IS ALREADY IMPLEMENTING MEASURES TO ACHIEVE ENERGY IMPROVEMENTS.



weather conditions, energy prices, consumption profiles, etc. In addition, the electric vehicle will have a large presence in large stations - it is expected that in 2025-2030, 100% of the rental vehicle fleets will be electric - and therefore it will be necessary to have charging infrastructures and a system to manage them.

Schneider Electric in this area has solutions of all kinds, for low voltage, microgrid control, BMS... On this matter, the company is working with ADIF to develop systems for passenger stations management, to help

them improve in terms of both operation and energy efficiency.

Visit Schneider Electric's blog in Spanish in order to discover more: blogspanol.se.com



A pioneering Project to enable bank card-based **transport access**



It will allow the public to pass through the entry and exit turnstiles at the stations of the Malaga suburban train network by simply holding the bank's contactless card over the sensor. The system then automatically manages the payment for the corresponding ticket. The new payment method will be valid for one-way tickets.

Indra has made the ticketing system implemented in Renfe smarter. The system, which is one of the Indra Mova Collect family of solutions, is thus able to recognize the bank card at the start and end of the journey and apply the appropriate fare, according to the different zones of the Malaga suburban rail network. This is an advanced and pioneering deve-

INDRA HAS DEVELOPED FOR RENFE THE FIRST RAILWAY PROJECT OF DIRECT PAYMENT AND ACCESS TO TRANSPORTATION BY BANK CARD IN SPAIN.

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

Transport cards normally have all the user's information and record each time the user passes through a turnstile. However, credit card in-

formation is confidential, so, to ensure privacy, all information must be managed from the central system, which must be smart so that it can match the input and output.

Paying with bank cards is more sustainable since it saves paper and protects citizens from Covid-19, as it avoids physical contact, the use of cash and reduces the time it takes to acquire a ticket and board a train.

Analysis of the sealing system of a high performance pneumatic hammer

TEKNIKER HAS CARRIED OUT THIS STUDY WITH THE AIM OF REPRODUCING THE WEAR MECHANISMS OF THE SEALING SYSTEM OF A HIGH SPEED PNEUMATIC HAMMER UNDER DIFFERENT OPERATING CONDITIONS.

Seals are critical elements of a variety of industrial products. The aim of this study, carried out by the Tekniker technology center, member of the Basque and Research Technology Alliance (BRTA), was to reproduce the wear mechanisms for the sealing

systems of pneumatic hammers to know how to respond to each type of seal and material under actual working conditions.

To address this study, a specific test chamber was designed to test piston seals at a linear velocity of 6

m/s and pressurised with compressed air. During the wear testing, the pressure in the chamber and the temperature in the sleeve were monitored with the aim of measuring possible leaks and frictional heating, respectively, during the test. Fatigue, extrusion and thermal degradation were the main failure mechanisms identified. The results of this analysis have their application in different sector such as transport, energy, capital good and machine tools.



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assistances, superstructure, signalling,
communications and ticketing

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Technical Specifications Drafting
and supervision of rolling stock
manufacturing

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Drafting of operation and maintenance
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studies

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- Tekniker

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- Dominion
- Funor, S.A.
- Inserail, S.L.
- Lantania
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- Parrós Obras, S.L.
- Rosni S.L.
- Sener Ingeniería y Sistemas, S.A.

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- Cunext
- Dominion
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equipment and components

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- Dominion
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- Ladícim
- Lantania

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- Talleres Alegría, S.A.
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- Tecnivial S.A
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Track assembly

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TRAFFIC CONTROL AND SIGNALLING
SYSTEMS, COMMUNICATION,
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Traffic control and signalling (safety)

- Alstom Transporte, S.A.
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Protection (security) and infrastructure
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- Alstom Transporte, S.A.
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- Comsa Corporacion

- Dominion
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- Semi- Sociedad Española de Montajes Industriales, S.A.
- Siemens Rail Automation, S.A.U.
- Telice, S.A.
- Thales España Grp, S.A.U.
- Vicomtech

Systems and equipment for collection,
ticketing and access control

- Caf Turnkey & Engineering, S.L.
- Calmell, S.A.
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- Dominion
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- Vicomtech

Communications

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- CEIT
- Comsa Corporación
- Dominion
- Enclavamientos y Señalización Ferroviaria ENYSE S.A.U.
- Eurogestión
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- Indra Sistemas, S.A.
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- Sice Tecnología y Sistemas
- Siemens Rail Automation, S.A.U.
- Tectronic, S.A.U.
- Telice, S.A.
- Thales España Grp, S.A.U.
- Vicomtech

Passenger information and on-board
entertainment systems

- Alstom Transporte, S.A.
- Bombardier España
- Dominion
- Turnkey & Engineering, S.L.
- Gmv Sistemas, S.A.U.
- Icon Multimedia, S.L.
- Indra Sistemas, S.A.
- Inserail, S.L.
- Ikusi SLU

- Revenga Ingenieros S.A.
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- Siemens Rail Automation, S.A.U.
- Tecnivial S.A.
- Telice, S.A.
- Vicomtech

ROLLING STOCK MANUFACTURERS

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

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

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

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

Urban and suburban trains

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

Freight wagons and Locomotives

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

Vehicles for infrastructure maintenance

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

MANUFACTURERS OF VEHICLE
COMPONENTS, AUXILIARY
EQUIPMENT AND SYSTEMS

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- Aimen Centro Tecnológico
- Alstom Transporte, S.A.

- ▶ Artech (Electrotécnica Artech Smart Grid, S.L.)
- ▶ Bombardier España
- ▶ Caf Power & Automation, S.L.U.
- ▶ Flexix, S.A.
- ▶ Ingeniería Viesca S.L.
- ▶ Ingeteam Power Technology, S.A.
- ▶ Mgn Transformaciones del Caucho, S.A.
- ▶ Rosni S.L.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Zeleros

Control, auxiliary and diagnostic systems

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- ▶ Alstom Transporte, S.A.
- ▶ Artech (Electrotécnica Artech Smart Grid, S.L.)
- ▶ Bombardier España
- ▶ Caf Power & Automation, S.L.U.
- ▶ CEIT
- ▶ Endavamientos y Señalización Ferroviaria ENYSE S.A.U.
- ▶ Gmv Sistemas, S.A.U.
- ▶ Hispacold S.A.
- ▶ Indra Sistemas, S.A.
- ▶ Ingeniería Viesca S.L.
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- ▶ Kimua Group
- ▶ NGRT S.L.
- ▶ Schneider Electric
- ▶ Stadler Rail Valencia, S.A.U.
- ▶ Zeleros

Assembly equipment

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- ▶ Fundiciones del Estanda, S.A.
- ▶ Funor, S.A.

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- ▶ Alstom Transporte, S.A.
- ▶ Bombardier España
- ▶ Caf-Construcciones y Auxiliar de Ferrocarriles, S.A.
- ▶ Flexix, S.A.
- ▶ Funor, S.A.
- ▶ Fundiciones del Estanda, S.A.
- ▶ Gamarra, S.A.
- ▶ Hispacold S.A.
- ▶ Metalocauchos, S.L.
- ▶ Mgn Transformaciones del Caucho, S.A.
- ▶ Rosni S.L.
- ▶ Stadler Rail Valencia, S.A.U.
- ▶ Talleres Alegría, S.A.
- ▶ Zeleros

Interiors

- ▶ Agui S.A.
- ▶ Bombardier España
- ▶ Colway Ferroviaria, S.L. (Nexus Management)
- ▶ Flexix, S.A.
- ▶ Fundación Gaiker
- ▶ Satys Interiors Railway Spain, S.A.
- ▶ Technology & Security Developments

Safety

- ▶ Agui S.A.
- ▶ Albatros, S.A.U.
- ▶ Alstom Transporte, S.A.
- ▶ Artech (Electrotécnica Artech Smart Grid, S.L.)
- ▶ Bombardier España
- ▶ Dsaf - Dinamicas de Seguridad, S.L.
- ▶ Endavamientos y Señalización Ferroviaria ENYSE S.A.U.
- ▶ Fundación Gaiker
- ▶ Indra Sistemas, S.A.
- ▶ Luznor Desarrollos Electrónicos, S.L.

MAINTENANCE: EQUIPMENT, MAINTENANCE SERVICES AND REFURBISHMENT

Infrastructure and superstructure maintenance

- ▶ Aimen Centro Tecnológico
- ▶ Alstom Transporte, S.A.
- ▶ Amurrio Ferrocarril y Equipos, S.A.
- ▶ Azvi S.A.
- ▶ Caf Turnkey & Engineering, S.L.
- ▶ CEIT
- ▶ Comsa Corporacion
- ▶ Duro Felguera Rail, S.A.U.
- ▶ Gantrex Spain
- ▶ Inserail, S.L.
- ▶ Ladicim
- ▶ Rosni S.L.
- ▶ Semi- Sociedad Española de Montajes Industriales, S.A.

Rolling Stock maintenance

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

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

- ▶ Aimen Centro Tecnológico
- ▶ Alstom Transporte, S.A.
- ▶ Artech (Electrotécnica Artech Smart Grid, S.L.)
- ▶ Azvi S.A.
- ▶ Bombardier España
- ▶ Caf Signalling, S.L.
- ▶ Caf Turnkey & Engineering, S.L.

- ▶ Dsaf-Dinamicas de Seguridad, S.L.
- ▶ Dominion
- ▶ Electrosistemas Bach, S.A.
- ▶ Gmv Sistemas, S.A.U.
- ▶ Ikusi SLU
- ▶ Indra Sistemas, S.A.
- ▶ Inserail, S.L.
- ▶ Jez Sistemas Ferroviarios, S.L.
- ▶ Luznor Desarrollos Electrónicos, S.L.
- ▶ Patentes Talgo, S.L.
- ▶ Semi- Sociedad Española de Montajes Industriales, S.A.
- ▶ Sice Tecnología y Sistemas, S.A.
- ▶ Siemens Rail Automation, S.A.U.
- ▶ Schneider Electric
- ▶ Telice S.A.

Maintenance of systems, equipment and vehicles components

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

Supply of maintenance equipment

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



AGUI S.A.

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

- ▶ Pol. Ind. Lintzirin-Gaina. Parcela B-1. 20180 Oiartzun - (GUIPÚZCOA)
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- ▶ +34 943 552 066
- ▶ lm.gil@agui.com
- ▶ www.agui.com



ALSTOM SPAIN

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

- ▶ Martinez Villergas, 49 - Edificio V - 28027 (MADRID)
- ▶ +34 91 334 58 00
- ▶ +34 91 334 58 01
- ▶ www.alstom.com



AIMEN TECHNOLOGY CENTRE

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

- ▶ C/ Relva 27 A - Torneiros | 36410 O Porriño (PONTEVEDRA)
- ▶ +34 662 489 181
- ▶ aimen@aimen.es
- ▶ www.aimen.es



AMURRIO FERROCARRIL Y EQUIPOS, S.A.

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

- ▶ Maskuribai, 10 01470 Amurrio (ÁLAVA)
- ▶ +34 945 891 600
- ▶ +34 945 892 480
- ▶ comercial@amufer.es
- ▶ www.amufer.es



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INNOVATION

mafex@mafex.es



AQUAFRISCH, S.L.

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

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- ▶ +34 91 380 03 33
- ▶ jmartin@aquafirsch.com
- ▶ www.aquafirsch.com

**ARCELMITTAL**

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

🚩 **ArcelorMittal Asturias. Edif. de Energías, 2 pl. 33691 Gijón (ASTURIAS)**
 ☎ +34 985 187 750
 📠 rails.specialsections@arcelormittal.com
 🌐 <https://rails.arcelormittal.com/>

**ARDANUY INGENIERÍA, S.A.**

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

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

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

🚩 **Avda. Europa, 34 28023 (MADRID)**
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**ARTECHE**

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

🚩 **Derio Bidea, 28 48100 Mungia (VIZCAYA)**
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**CAF - CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A.**

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

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

🚩 **J.M. Iturrioz, 26 20200 Beasain (GUIPÚZCOA)**
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 🌐 www.caf.net

**CAF POWER & AUTOMATION**

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

🚩 **Mikeletegi, 58 - 2, Parque Tecnológico de San Sebastián (GUIPÚZCOA)**
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**CAF SIGNALLING, S.L**

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

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

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 📠 +34 91 661 37 51
 📧 cafsignalling@cafsignalling.com
 🌐 www.cafsignalling.com

**AZVI**

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

🚩 **Almendralejo, 5. 41019 (SEVILLA) / Maudes, 51, 2º. 28003 (MADRID)**
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**BOMBARDIER TRANSPORTATION**

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

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 📧 javier.hinojal@rail.bombardier.com
 🌐 www.bombardier.com/en/worldwide-presence/country.spain.html

**CABLES DE COMUNICACIONES ZARAGOZA, S.L.**

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

🚩 **Poligono de Malpica, C/D, 83 50016 (ZARAGOZA)**
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**CAF TURNEY & ENGINEERING**

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

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**CALMELL, S.A.**

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

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

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

🚩 **Pol. Ind. Pla d'en Coll C/ Fresser, 12 C 08110 Montcada i Reixac (BARCELONA)**
 ☎ +34 93 564 14 00
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**CEIT**

We are a Basque Technology Center founded by the University of Navarra, whose main objective is to develop applied R+D+i projects with companies to improve their competitiveness. We are part of BRTA (Basque Research & Technology Alliance), which includes 16 agents that constitute the Basque Network of Science, Technology and Innovation (RVCTI). We also participate in Shift2Rail Joint Undertaking as associated members.

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

🚩 **Paseo Manuel Lardizábal 15, 200018 Donostia-San Sebastián (GUIPÚZCOA)**
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**CETEST, S.L. Centro de Ensayos y Análisis**

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

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✉ emartinez@cetestgroup.com

🌐 www.cetestgroup.com

**CITEF**

CITEF (Railway Technology Research Centre) was created in 1997 as part of F2I2 (the Foundation for the Development of Industrial Innovation) for research, innovation, experimentation, study and teaching purposes within the railway knowledge area.

It is a non-profit organisation pursuing aims of general interest within any rail transport technology sector.

🚩 José Gutierrez Abascal, 2, 28006 (MADRID)

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🌐 www.citef.es

**COLIN BUCHANAN CONSULTORES, S.A.**

Buchanan is a Transport Planning consultancy established in Spain in 2007, which origins date back to the innovative study "Traffic in Towns", conducted by a team of researchers led by Sir Colin Buchanan in 1963, on urban mobility in the society of the future..

In railways, Buchanan provides expert advice on pedestrian and crowd simulation studies at metro & rail stations, modal interchanges, rolling stock (boarding & alighting studies), using the leading pedestrian simulation software, LEGION (Bentley Systems Ltd.) of which Buchanan is the only global accredited distributor.

🚩 Infanta Mercedes 73, bajo D 28020 (MADRID)

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**DANOBAT S.COOP.**

Specialised Machine Tools and production systems for railway industry offering technologically advanced solutions and services, including among others engineering, consultancy, which are fully adapted to clients' needs.

DANOBAT focuses its activity in the supply of turnkey solutions for the manufacturing and maintenance of railways rolling stock, incorporating own leading technology products, together with those manufactured by specialised companies.

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🌐 www.railways.danobatgroup.com

**DINÁMICAS DE SEGURIDAD, S.L.**

DSAF is a entrepreneurial society focused on the safety of the movement of people at risk. Committed to the new technologies applied to the design of signaling systems, prevention and emergency in safety, DSAF promotes the development of products that guarantee the highest grade of security according to the standards of type approval current in generalized risk societies such as global ones.

The activity of DSAF focuses on these two major sectors: road / rail tunnels and wind towers.

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🌐 www.dsaf.es

**DOMINION**

Dominion, founded in 1999, is a global provider of multitechnology services and specialised engineering solutions. It combines knowhow, technology and innovation to help its customers make their productive processes more efficient, either by fully outsourcing them ("Services") or by implementing solutions underpinned by specialised technology and platforms ("Solutions"). Application of know-how, technology and innovation to improve customers' productive processes. Focus on selective digitalisation as a tool for driving efficiency gains. Stable presence in 35 countries with the ability to execute projects anywhere. Services and Solutions in three lines of activity: T&T, Industry and Energy.

🚩 Ibañe de Bilbao 28, 8A-B - 48009 Bilbao (VIZCAYA)

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**COLWAY FERROVIARIA, S.L.**

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

🚩 Botánica, 149-151, 08908, Hospitalet de Llobregat (BARCELONA)

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**COMSA**

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

🚩 Julián Camarillo, 6A 2ª planta 28037 (MADRID)

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**CUNEXT COPPER INDUSTRIES**

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

🚩 Av. de la Fábrica, s/n 14005 (CÓRDOBA)

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**DF RAIL, S.A.**

DF Rail is a company specialized in the design and manufacture of turnout systems for metro, conventional, heavy haul and even high speed lines up to 350 kph.. DF Rail has its own designs and patents thanks to an intense effort in research and development, and its technologically advanced facilities, with more than 56,000 m² for the design, manufacturing and assembling of turnout systems as well as machining and flash-butt welding of Mn steel crossings, machining of switches and stock rails. Besides, it designs and manufactures locking systems, fastening systems, wear devices, insulated glued joints and transition rails. Our products are installed in more than 21 countries.

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**ENCLAVAMIENTOS Y SEÑALIZACIÓN FERROVIARIA ENYSE S.A.U.**

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

🚩 Valportillo Segunda, 8 bis ; 28108 Alcobendas (MADRID)

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**ELECTROSISTEMAS BACH, S.A.**

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

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

🚩 Calle de la Mar Mediterrània, 9 Pol. Ind. La Torre del Rector 08130 Santa Perpètua de Mogoda (BARCELONA)

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**EQUIPOS LAGOS, S.A.**

In Cabinas Lagos we are experts in the design of processes and products for surface treatment (sanding, metallizing, shot blasting, painting, drying, polishing). Since 1982 we have been growing and evolving until become a leading company with our own technological development, capable of developing important projects in rail, wind, aeronautical, etc ... sectors.

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**FLEXIX, S.A.**

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

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+34 944 977 180
+34 944 977 190
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www.flexix.com

**FUNDICIONES DEL ESTANDA, S.A.**

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

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**GANTREX SPAIN, S.A.**

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

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**GEMINIS LATHES, S.A.**

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

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**GLOBAL QUALITY ENGINEERING SER. UNA COMPAÑÍA DE TRIGO GROUP**

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

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antonio.peco@trigo-group.com
www.trigo-group.com

**FUNORSA**

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

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www.funorsa.es

**GAIKER CENTRO TECNOLÓGICOS**

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

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www.gaiker.es

**GAMARRA, S.A.**

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

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**GMV SISTEMAS S.A.U.**

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

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**GOAL SYSTEMS SL**

Goal Systems is a company dedicated for 27 years to the production and implementation of software solutions for optimization of human and material resources, especially in the transport sector, as well as to the provision of services related to such projects. These systems form part of the Intelligent Transportation Systems (ITS) family of software for infrastructures and operations in the world of transport.

PC/ Agustín de Foxá, 25, 11° PI
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marketing@goalsystems.com
www.goalsystems.com

**HIERROS Y CARBONES, S.A.**

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

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**ICON MULTIMEDIA, S.L.**

With over 25 years of experience, we have a extensive experience in the Digital Signage sector.

Our DENEVA Digital Signage platform is specially designed for high availability environments such as Smart Cities or as a powerful and comprehensive marketing tool for 'Smart Stations', guaranteeing a reliable and safe travelers and users experience.

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**IDOM CONSULTING, ENGINEERING AND ARCHITECTURE S.A.U**

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

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**IKUSI, S.L.**

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

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**INGENIERÍA VIESCA S.L.**

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

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**INGETEAM POWER TECHNOLOGY, S.A.**

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

🚩 **Pol. Parque Tecnológico, 110 48170 Zamudio (VIZCAYA)**

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**INSE RAIL S.L.**

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

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**IMPLASER 99 SLL**

IMPLASER is a Spanish manufacturer of security signaling products specialized in railway projects. Innovation and quality are our greatest exponents; our design, manufacturing and service procedures have been certified according to ISO 9001:2000 since 2001. Furthermore, we are the first SME being certified in R+D+i in Spain. Our wide range of products is certified by AENOR with photoluminescent values of 150, 300, 580 and 720 mcd/sqm. We are also specialized in the manufacturing of security, informative and accessibility decals for installation inside and outside the railway coaches.

🚩 **Pol. Ind. Borao Nave 5 50172 Alfajarín (ZARAGOZA)**

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**INDRA**

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

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**INECO**

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

🚩 **Paseo de la Habana, 138 - 28036 (MADRID)**

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**INTERNACIONAL HISPACOLD, S. A.**

Hispacold, a World leader Company for climate systems with more than 40 years' experience is specialized in passengers comfort. Hispacold designs and manufactures HVAC solutions for all rail vehicles: trams, metros, EMUs, DMUs, LRVs... with proven and reliable technology solutions. Hispacold is certified in the most recognized International quality management, environment and safety standards: ISO 9001, ISO 14001, OSHAS 18001, EN 15805-2 and the prestigious IRIS ISO/TS 22163.

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**JEZ SISTEMAS FERROVIARIOS, S.L.**

JEZ is committed to the designing, manufacturing, supplying and maintenance of all types of manganese steel switches and railway track systems for railways and tramways, in addition to moulded cast steel parts for the general industry. Our Technical Department (Department 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, spare tongues... as well as the generation of patents. At JEZ we fit our developments to meet clients' needs.

🚩 **Arantzar s/n Llodio (ÁLAVA)**

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**KIMUA ENGINEERING, S.L.**

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

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LA FARGA YOUR-COPPERSOLUTIONS, S.A.

La Farga is able to produce all the range of railway products in an integrated process. Our railway range includes all alloys used, the different measures of grooved contact wire and all supporting and electricity supply elements, feeders, hangers and cables. Furthermore, we offer technical visits and assessment to our clients and we constantly develop new railway products with the aim of introducing the best copper solutions into the market.

La Farga is a family-run metallurgical company, with more than 210 years of history. We produce semi-finished copper products and their alloys for several technological sectors.

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LADICIM - UNIVERSIDAD DE CANTABRIA

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

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LANDER SIMULATION & TRAINING SOLUTIONS

Lander Simulation & Training Solutions, S.A. specialises in designing, developing and implementing cutting-edge commercial simulation devices for training purposes.

On the basic premise of preventing accidents and loss of human life, Lander works with each customer to build training simulators which meet the specific needs of each operation.

Lander was incorporated in 2002, and now operates in more than 20 countries across all 5 continents. Its solutions cover the entire range of railway operations - suburban trains, long-distance units, high-speed trains, freight, monorail systems, metros or light rail.

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MGN TRANSFORMACIONES DEL CAUCHO, S.A.

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

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 enp@mgncaucho.com
 www.mgncaucho.com



NEM SOLUTIONS | NUEVAS ESTRATEGIAS DE MANTENIMIENTO, S.L.

NEM Solutions offers digital solutions to maximize productivity of train fleets; to lengthen life-cycle and to optimize maintenance and operational strategy. The principal purpose is to attain maximum profit, which facilitates the decision-making process and management. Through A.U.R.A. technology NEM Solutions provides real time predictive analytics. The operator gets total data control and enables the decision-making process and the follow-up of set objectives, in real time, with a global vision of the fleet situation. NEM Solutions look after the safety and efficiency of 250 train fleets, which means looking after 4,4M train passengers managing more than 67.000 assets in 25 countries.

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

NGRT S.L. is a company focusing on railway safety, working with railway regulators and helping infrastructure managers and train operators secure their infrastructure and operations. NGRT's products are designed to detect any anomalies that occur in the railway infrastructure.

The NGRT applications will detect rolling stock, independent of speed, direction and track conditions at any location, in all weather conditions, as well as anomalies impacting on the railway infrastructure.

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LANTANIA

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

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LUZNOR DESARROLLOS ELECTRONICOS, S.L.

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

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METALOCAUCHO, S.L. (MTC)

MTC, being part of Wabtec Corporation, designs and manufacture rubber-metal components for suspension and vibration control systems used on railway, automotive and industrial applications. With headquarters in Spain, MTC has 4 production facilities in 1) Spain, 2) China, 3) India and 4) USA, which offers to customers the possibility to localize production in any of these countries. Thanks to a wide commercial presence in any country of the world, MTC gives local support to develop projects for both OE and Aftermarket business.

Our main products are related to Primary Suspensions, Secondary Air Springs, Bushings, Buffers, Layer Springs, Subassemblies, Elastic Wheels, etc.

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



NEWTEK SOLIDOS, S.L.

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

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NRF

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

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PARRÓS OBRAS, S.L.

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

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 www.parros.es

**PATENTES TALGO, S.L.U.**

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

🚩 Pº del tren Talgo, 2 28209 Las Matas (MADRID)
 ☎ +34 91 631 38 00
 📧 marketing@talgo.com
 🌐 talgo.com

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

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

🚩 Espronceda, 38 (Local 3) 28003 (MADRID)
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 🌐 www.preconsa.es

**PRETENSADOS DEL NORTE, S.L.**

PRETENSADOS DEL NORTE, is one of the most important producers of pre-stresses steel in the word. Our products are recognised for having the best quality on the market. Our high standards of quality mean that we are talking about the best pre-stresses steel you can find. Our company has more than 30 years' experience in manufacturing and investment that have led to what we are today: PRETENORTE. Technologically, we have equipped our company in Vitoria-Gasteiz with the best state-of-the-art machinery. We continue to incorporate the latest novelties for your complete satisfaction. Pretenorte is highly specialised in pre-stressed steel and its many applications.

🚩 Miravalles, 4 Zona Indus. de Betoño 01013 (VITORIA)
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 🌐 www.pretenorte.com

**SCHNEIDER ELECTRIC**

At Schneider Electric, we believe access to energy and digital is a basic human right. We empower all to make the most of their energy and resources, ensuring Life Is On everywhere, for everyone, at every moment. We provide energy and automation digital solutions for efficiency and sustainability. We combine world-leading energy technologies, real-time automation, software and services into integrated solutions for Homes, Buildings, Data Centers, Infrastructure and Industries. We are committed to unleash the infinite possibilities of an open, global, innovative community that is passionate about our Meaningful Purpose, Inclusive and Empowered values.

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 📧 +34 93 484 33 16
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**SEGULA TECHNOLOGIES**

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

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**SOCIEDAD ESPAÑOLA DE MONTAJES INDUSTRIALES, S.A.**

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

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**REVENGA SMART SOLUTIONS**

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

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 🌐 www.revenga.com

**ROSNI S.L.**

ROSNI has the necessary capabilities to manufacture, repair and provide design on railway elements of significant dimensions, considered basic in structures and equipment. In addition, ROSNI is considered autonomous, as an important base in the manufacturing, both in the configuration of mechanical welding, as well as in machining, shot blasting, priming and painting, in addition to having the capacity to provide the corresponding quality documentation. certificates, welding, painting, in addition to others that may be required.

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**SATYS INTERIORS RAILWAY SPAIN**

Satys is a Spanish company specializing in the design and manufacture of galley systems for railway rolling stock. A galley system is broken down into 3 main families of equipment:
 - Refrigerated cabinets
 - Functional systems. Cooling, electricity, water, lighting, etc.
 - Interiors. Countertops, lining, etc.
 Satys offers a wide range of products specifically for each one. Thanks to the unique and highly efficient Satys technology, our products are internationally recognized as the best in their class in terms of quality, safety, availability, reliability, accessibility and environmental friendliness.

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**SENER INGENIERÍA Y SISTEMAS, S.A.**

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

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 🌐 www.ingenieriaconstruccion.sener

**SDEA SOLUTIONS, S.L.**

SDEA Solutions is a technical consulting firm specialized in providing engineering and design solutions for the railway sector, Energy and Transport mainly. We have a team of highly qualified engineers working in 3 main areas, Rail Sector Designs and BIM projects for linear works; Advanced Calculation and Simulation (FEA/FEM and CFD Calculations); Process Engineering and Thermo-mechanical designs. With our participation we hope to provide new knowledge using tools that the sector is demanding, especially in the development of BIM methodology with international presence and bidding for the R+D development.

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**SGS GROUP SPAIN**

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

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

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

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SIEMENS MOBILITY, SLU

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

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STADLER RAIL VALENCIA, S.A.U.

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

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TECHNOLOGY & SECURITY DEVELOPMENTS

Technology & Security Developments (TSD) is a Spanish company localized in Herencia (Ciudad Real) which operates in more than 80 countries in the world and has an experience of more than 30 years in the sector of the design, development, fabrication and maintenance of special vehicles. TSD offers adapted solutions to the security forces, security companies and another fields of the physical security. Since 10 years ago, TSD has a line of product specialized in railway. Under the name of TSD Rail, the activity is focused on the fabrication of new components, restoration and makeover process, as well as the rehabilitation and maintenance of these vehicles.

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TELICE, S.A

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

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TELTRONIC

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

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Talleres Alegría, s.a.

TALLERES ALEGRÍA, S.A.

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

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TECNIVIAL

TECNIVIAL, S.A.

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

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TEKNIKER

R&D center oriented to technology transfer through research projects. Specialization areas:
- Advanced manufacturing: laser processes, LMD coating and repair, cutting processes
- Surface engineering: friction and wear studies, physical-chemical coatings seeking to improve anti-corrosion, wear, easy cleaning, anti-adherence, optical and aesthetic characteristics
- ICTs: solutions for inspection and measurement based on vision and AI techniques, O&M, condition monitoring, data management, Smart components, sensor development
- Product engineering: new product development, tribological testing, fault diagnosis.

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THALES ESPAÑA GRP S.A.U.

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

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TPF GETINSA EUROESTUDIOS, S.L.

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Today, TPF is ranked among the most important multidisciplinary companies active in the following sectors: building, transport infrastructure, water and energy.
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TYPESA

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

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**VALDEPINTO, S.L.**

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

We have four main product lines:

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

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**VICOMTECH**

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

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**WSP SPAIN**

As one of the world's leading professional services firms, WSP provides engineering and design services to clients in the Transportation & Infrastructure, Property & Buildings, Environment, Power & Energy, Resources and Industry sectors, as well as offering strategic advisory services. Our experts include engineers, advisors, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. With approximately 49,000 talented people globally, we are uniquely positioned to deliver successful and sustainable projects, wherever our clients need us.

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**ZELEROS**

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

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**ZITRON, S.A.**

ZITRON is a world-wide leading company in designing, manufacturing, commissioning and maintenance complete ventilation systems for metro and tunnels. ZITRON has the world's biggest aerodynamic test bench, certified by AMCA, for testing fans at full load and 100 % speed. ZITRON's extensive reference list includes more than 500 metro and tunnel projects. The latest and more significant ones are Crossrail in London and Doha Metro. Experience and know-how, providing innovative and tailor-made solutions, are our most appreciated values. The global growing market of ZITRON's fans, along with the high level of satisfaction of the Clients is the best mark of its equipment and services quality.

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