MAFEX

Mafex corporate magazine
Spanish Railway Association

Issue 11. May 2017

Urban transport systems in Canada

The country commits itself regarding the rails and tramways in big cities with the largest investments in history.

DESTINATION: IRAN
The railway network, a priority in the Sixth Five-Year Investment Plan.

MAFEX INFORMS
The General Board of Mafex approves the "Strategic Plan 2017-2020".

INTERVIEW: JUAN ALFARO
Renfe Operadora's President presents the company's future plans.

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Urban railway transport: a firm commitment in Canada and the world

Dear friends,

The commitment to the railway as a sustainable, efficient and high capacity urban transport means is one of the priority objectives of many countries, including Canada. The tramway, light rail and commuter networks are among the federal and regional investment projects, as reflected in the section Infrastructure Plans, such as the "New Building Canada Plan". Details of the great breakthrough regarding this communication means in Canada, a priority market for the Spanish pioneering railway industry, can be found in the Section "In Depth".

Issue 11 of Mafex's magazine also includes an article on Iran's railway sector. This transport means plays a very important role among the "Priority Investment Projects" of the "Sixth Five-Year Plan 2016-2021" approved by the Iranian Government. It aims to enhance the geostrategic location of the country as a transit route, making Iran a reference logistics center and promoting a better integration. Added to that is the information on the projects carried out by Spanish companies in the region, a strategic area where the presence of these companies has experienced a strong growth in recent years.

The Section "Mafex Reports" includes the latest activities of the Association, such as the survey mission to Egypt and Kuwait, the trade delegation to Argentina and Uruguay and the participation in the Middle East Rail Trade Fair from Dubai. An extensive agenda that will continue this month with the participation in the UITP international public transport exhibition in Canada and in the Expo Rail Trade Fair from Iran. This section also summarizes the Association's General Assembly in 2017, which analyzed the profits of the last year activities, as well as the progress of the different working committees. In addition, the Association's Strategic Plan 2017-2020 was presented and approved. A document intended to serve as a guide to establish the action lines for the achievement of the representation, external promotion and competitiveness improvement objectives of the industry.

It also reports on the latest contracts and innovations of 13 associated companies, as well as seven new technological advances. All these, in the Sections "News about partners" and "Innovation", respectively.

A special mention deserves the interview granted by the current President of Renfe, Juan Alfaro Grande, to Mafex's Magazine. It analyzes the Company's main challenges and the objectives on medium term, as well as the future plans.

Once again we hope to provide a varied content, with information of your interest and bring you closer to the varied news of a thriving railway sector.

MANAGEMENT: MAFEX.
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Gantrex, new Mafex partner

THE GANTREX COMPANY, SPECIALIZED IN SPECIAL RAIL TRACK FASTENING SYSTEMS, JOINS THE SPANISH RAILWAY ASSOCIATION.

The Company has participated in numerous railway projects.

Gantrex Spain, S.A. joined Mafex as a new partner. According to the Company's CEO, Alberto Beraza, being part of the Association is a positive step towards Gantrex's presence reinforcement in the railway industry, while contributing in its development within the national and international environment."

Rail track fastening systems

The Company is one of the main world leaders in the special rail track fastening systems market. A wide portfolio of products with multiple solutions both for railway workshops or embedded track ranges, port solutions, logistic fleets and private facilities, and its own line of flexible fastening systems for metro and tramway lines.

Its extensive product range includes all types of rails, metal sleepers, fastening clips, rubber pads, pillars, recycled rubber rail fastening systems, polyurethane rail fastening systems and hydraulic buffers.

Furthermore, it should be emphasized that Gantrex Spain is consolidated as one of the international leaders in this field, due to its capacity to provide comprehensive proposals to its clients, which cover the entire life cycle of a project, since the design phase and to production, supply and turnkey installation.

Gantex is leader in the special rail track fastening systems market.

Projects

Among the numerous projects belonging to Gantrex Spain, we can mention its participation in the ADIF networks, Bilbao Metro, Granada light tramway, Santiago de Chile Metro, and the Algeciras and Valencia Port.

Mafex's survey mission to Egypt and Kuwait

EGYPT AND KUWAIT, TWO COUNTRIES OF INTEREST FOR THE SPANISH RAILWAY INDUSTRY.

Mafex meeting with directors of Cairo Metro.

The objective of this mission was to reach a greater degree of knowledge regarding the railway investment level in the area, and to make the high capacity of the Spanish sector in the implementation and coordination of transport projects known. In Egypt, the working agenda started with the officers of the authority holding the Cairo Metro, the *National Authority For Tunnels (NAT)*. In this meeting, the ongoing projects and future plans were analyzed. Among them, L1's rehabilitation, expansion of the lines 3, 4 and L5 and L6 branches. The round of institutional contacts included a visit to the railways of Egypt, *Egyptian National Railways (ENR)*. There, the track renovation, new rolling stock and high-speed network plans were discussed.

Kuwait

In Kuwait, together with senior officials of the Kuwait Authority for Partnerships Projects (KAPP), large portfolio projects were studied in detail. Among them, the track modernization in order to strengthen both the freight and passengers transport. The network linking Nasseb (Saudi Arabia) to the City of Kuwait, which is part of the GCC railway linking project, was also discussed. Another issue was the improvement of urban transport in the capital through a rail network. All projects in which the Spanish railway industry is very interested.

Mafex travels to Argentina and Uruguay

THE MAIN RAILWAY AGENCIES OF ARGENTINA AND URUGUAY SHOW A GREAT INTEREST FOR THE SPANISH RAILWAY TECHNOLOGY.

Spanish representatives met with senior officials of Metrovias.

A delegation of Spanish companies traveled with Mafex in the month of March to Argentina and Uruguay. During the first stage of the displacement, the Spanish representatives met with senior officials of the Administración de Trenes Argentinos Infraestructura (ADIFSE), Trenes Argentinos Operaciones (SOFSE) and members of the Ministry of Planning (Ministry of Transport). Likewise, the working agenda included meetings with Subterráneos de Buenos Aires, Metrovías and Trenes Argentinos Cargas, among others.

Uruguay

In Uruguay, the Administración de Ferrocarriles del Estado (AFE), CFU and the Ministry of Transport and Public Works received with great interest the Spanish railway delegation. This delegation was undertaken at a key moment in boosting the railway as a transport means in both countries. On one hand, Argentina plans an investment in this sector until 2023, amounting to 14,187 million dollars (13,200 million Euros). In its turn, Uruguay also plans to recover the railway, to strengthen multimodal links and to promote freight transport and modernization of existing infrastructures.

Positive balance resulting from the participation in Middle East Rail 2017

POSITIVE PROFIT RESULTING FROM THE SPANISH PARTICIPATION IN THE MOST IMPORTANT RAILWAY EXHIBITION OF THE REGION.

The Spanish Railway Association participated once again in the Middle East 2017 trade fair, from Dubai (United Arab Emirates). Aquafrisch, Arcelormittal Comercial Profiles España, Construcciones y Auxiliar de Ferrocarriles (CAF), Implaser, TYPSA Técnicas y Proyectos and SENER Ingeniería y Sistemas companies represented Spain, under Mafex.

Results

The results of the exhibition were positive for the Spanish participation in the most important railway exhibition in the region. At present, the solutions of the Spanish railway industry are already implemented in the main networks, both metropolitan and medium and long distances, of the Middle East.

For this reason, several players in the sector, such as Mafex, are working to strengthen the presence of these companies in the planned transport programs and the trade relations. It should be recalled that, in the GCC region, an investment of 350 billion dollars (328,000 M€) is planned for the next ten years in order to boost the railway infrastructure.

Middle East Rail has become an essential professional platform for the sector. The example is particularly focused on products and services related to engineering and construction, rolling stock, signaling, safety, communications, operations, maintenance and integration of systems. It involves the participation of government authorities, representatives of transport organizations and numerous suppliers from around the world.

In the image above, Mafex's stand in the latest edition of Middle East Rail.

We participate in the UITP and ExpoRail Iran trade fairs

The Spanish railway industry will be present in two key trade fairs for the sector worldwide: the UITP public transport systems trade fair to be held in Canada from 15 to 17 of May and the Rail Expo trade fair from Iran, which will take place on the same dates, in Tehran.

Both platforms will count on a significant presence of Spanish companies under Mafex, official organizer of the Spanish pavilion, which will occupy around 150 m^2 in Teheran and 145 m^2 in Montreal.

All these are prepared for the 6th International Railway Convention

The organization of the "6th Mafex International Railway Convention" is in progress. This biennial event will take place in the City of Valencia, from the 17 to the 23 of June of 2017. The large number of international participants, as well as the extensive program of technical presentations has made this convention one of the most important events in the railway sector in Spain.

As in previous years, the program that has been developed for this sixth edition includes individual meetings between Spanish railway companies and more than 50 international railway authorities and companies, as well as the possibility of participating in technical visits to facilities and different points of interest of the Spanish railway sector. There will also be other parallel events, such as the lunch meetings and technical presentations specific to certain countries that contribute to fostering the contact between the Spanish industry and representatives from different countries. The Convention will be supported by ICEX España Exportación e Inversiones and the Ministry of Economy, Industry and Competitiveness, as well as the Ministry of Development, Adif, Renfe, Alamys and Unife.

Madrid host the General Assembly of Mafex 2017

Madrid was the host of the General Assembly of Mafex 2017, held last April 6th at the premises of the Spanish Confederation of Business Organizations (CEOE). The event opened with the words of welcome by Javier Calderón, Executive of Companies and Organizations of CEOE and the intervention of the Vice President of CEOE, Antonio Garamendi.

At the meeting, which was attended by representatives and executives of the majority of the 71 companies associated with Mafex, the "Strategic Plan of the Association 2017-2020" was presented and approved. A detailed report that outlines the strategic objectives of the Association, future guidelines and work lines in which the Association will pay special attention in the next four years. The intensification of the railway sector representation works, the improvement of internationalization and

the competitiveness of the associated companies, together with the provision of a strategy that ensures the operational and financial viability of the Association, will be the main challenges of Mafex until the 2020.

A year later, the meeting also highlighted the important role of Mafex in the sector and the fact that it still occupies the top position of a total of 92 Spanish exporting associations, representing 85% of Spanish railway exports, not only regarding the representativeness levels, but also in relation to the activities developed and the service capacity in the industry.

At the meeting the "Strategic Plan of the Association 2017-2020" was presented and approved.

The 2016 foreign promotion action plan's profit was also presented during the General Assembly, with positive figures, especially due to the high participation in trade fairs, such as Innotrans, with more than 50 Spanish exhibitors.

Other initiatives, such as the trade delegations to Iran, Brazil, Peru, Chile, Denmark, Sweden or countries in the Middle East, among others have been added. Special attention is also given to the conference on "Business Opportunities in the Railway Sector of Rolling Stock Suppliers, Manufacturers, Chairpersons and Integrators" and the second conference on "Business Opportunities in Urban Public Transport Systems: rails, tramways and commuters", which together with the rest of activities brought more than 230 participating Spanish railway companies close to the railway bodies and companies from more than 40 countries.

Likewise, special attention should be given to the presentation of the works carried out by the Management, Communication and Internationalization Committees, as well as the consolidation of the Competitiveness Committee, an area highly demanded by the railway SMEs.

Finally, the presentations regarding the integration of three new companies in Mafex earlier this year, Icon Multimedia, Gantrex Spain and Tecnivial should be mentioned.

Finally, the event ended with a cocktail in which the representatives of the participating companies had an opportunity to exchange views on the general situation of the Spanish and international railway sector.

Technical seminars in Electric hazards and Electrical safety in Railway environment

GRUPO ELEKTRA

With a view to improve and provide technical solutions in railway, past March 8th in Valektra facilities and organized by Grupo Elektra took place "Technical seminars in Electric hazards and Electrical safety in Railway environment", in both sessions were presented legislation and regulations, practical cases and railway card line.

This session was made possible with the invaluable support of SBI, CATU, Cegers, close collaborators of Grupo Elektra in terms of Safety and Industrial PPE's.

The session was a great success. A total of 40 people assisted on behalf of railway administrations and integrator companies. The end of the session was occasion to enjoy a lunch where it was took the opportunity the share different opinions and experiences about subjects discussed in the sessions.

Stadler to supply ten EURODUAL locomotives for HVLE in Germany

STADLER RAIL VALENCIA

The Spanish Division of Stadler and German rail freight operator Havelländische Eisenbahn (HVLE) have announced a purchase agreement for the supply of ten six-axle EURODUAL locomotives in German configuration and a corresponding full service maintenance agreement. The powerful locomotives will be used in freight transport services in the German network combining both 15kV AC and 25 kV AC electric and diesel operating modes.

HVLE becomes the launch customer of the new generation of six-axle bi-mode locomotives developed by Stadler for the European market who is currently supplying four-axle bi-mode locomotives Class 88 to British operator Direct Rail Services Stadler's EURODUAL is a bi-mode locomotive with impressive performance, both in diesel and in electrical mode, available in different configurations, gauges and overhead voltages. The modular platform also offers a wide range of different power in diesel mode to adequately meet individual customers' needs. The versatile locomotive platform is designed for freight and passenger mainline applications, at speeds of up to 160 km/h, on electrified and non-electrified lines.

CETEST will deliver instrumented wheelsets to Kawasaki

CETEST

CETEST signed an agreement with Kawasaki to supply Instrumented Wheelsets for M9 truck for Long Island Rail Roads. This wheelset instrumentation (based in a patented advanced methodology) is calibrated in static and rolling conditions, that provides a more accurate solution together with shorter lead times. They have been used for vehicle homologation tests up to 215 mph. In North America, CETEST has tested with instrumented wheelsets (AMTRAK Viewliner I and Viewliner II) under supervision of the FRA representatives.

COMSA extends its railway portfolio in Latin America with new contracts in Argentina

COMSA

COMSA has seen its activity in Argentina strengthened with five new contracts for the conservation and improvement of tracks belonging to the General Belgrano Railway in the provinces of Santa Fe, Salta and Chaco. With the awarding of these contracts, the construction company confirms its growth trend in international markets with high demand for the construction and modernisation of infrastructure.

The country's Rail Infrastructure Manager has selected COMSA, operating in consortium, for the renewal of more than 25 kilometres of track between the towns of Los Frentones and Pampa del Infierno in the province of Chaco. The contract also includes the supply of 80,000 tonnes of ballast, the mechanised treatment of an additional 36 kilometres of track, and the renovation of nine level crossings and the stations of Los Frentones, Pampa del Infierno and Concepción del Bermejo.

In the province of Santa Fe, COMSA will modernise a 23-kilometre rail link between the municipalities of Rosario and Luis Palacios, which will involve the laying of more than 18,000 sleepers and 11,500 tonnes of ballast. It will also carry out the upgrading of twenty level crossings and part of the sewerage system of the section. Meanwhile, ADIF Argentina has also entrusted the company to carry out the replacement of track in the railway bridges of Arroyo Serodino, Monje, Bragado and Arroyo Matadero, located in the same province.

Additionally, the company will execute the rail replacement on four bridges that belong to C12 and C18 branch line in the province of Salta and will carry out the construction project to strengthen five additional bridges. The total value of these contracts amounts to 23.4 million Euros.

Arteche adapts its factory to fit the railway sector needs

ARTECHE

The Arteche group, in accordance to its continuous improvement policy, has tailored the factory where it manufactures, checks and validates the full range of auxiliary relays and sockets for the railway sector. Thanks to the adaptation, the factory fits all of the railway sector needs.

This project is part of Arteche's Strategic Plan of increasing the range of products focused on the sector, in which the auxiliary relays and the new front connection spring sockets stand out.

Auxiliary relays for railway applications have been installed in more than 35 countries, and are already part of some major projects, such as the high speed line between Medina and Meca. The new factory layout answers to the expansion of the Arteche railway sector product range after the presentation, at the world's leading trade fair for the sector, InnoTrans, of the new front connection spring socket product line.

CAF Signalling awarded the renewal of the Valparaíso metro control systems

CAF SIGNALLING

CAF Signalling reinforces its footprint in Chile with the award of a new contract for the renewal of the Data Acquisition and Control System, SCADA, of the Valparaíso Metro. Valparaíso Metro has awarded CAF Signalling a contract for the renewal of the Data Acquisition and Control System (SCADA), for all the company's facilities. The platform covers everything from high voltage substations to network station premises.

This new deal underpins CAF's presence in the Chilean market where the Company has implemented various projects, both for conventional lines, and high density transport and metro networks.

The company will undertake the engineering, supply, installation, commissioning, configuration, integration and testing of the equipment required for the refurbishing of the SCADA on the entire Valparaíso network, by applying its advanced technological solution: The NAOS Integrated Control Centre.

This technology provides real time feedback with ground devices (sensors and actuators), allows for the process to be controlled automatically and provides for management and operation.

The award of the Valparaíso Metro contract secures the company's foothold in Chile, a priority market in the Company's strategy plan.

CAF Signalling has implemented solutions for various projects in the country on conventional lines of the Government Railways Company Empresa de los Ferrocarriles del Estado (EFE). These include the Railway Signalling Systems and the Centralised Rail Traffic Control Centre (CTC) for the Alameda-Chillan and Concepción lines.

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SICE: Ticketing system for line 2 and line 4 branch of Metro de Lima

SICE

Line 2 of Lima and Callao Metro, is the first underground line of the subway of city of Lima. It will connect the East Lima districts with the town centre of Lima and Callao. With a total length of 27kms, there will be 27 stations and 2 Control Centres.The extension branch Av. Faucett - Av. Gambetta (line 4) will connect the International Airport Jorge Chavez with the city centre. Branch 4 will have a total length of 8 kms with 8 stations and its own control Centres.

SICE will supply and install a full ticketing system based on contactless smart cards, including:

- Attended Ticket Office machines and Automatic Ticketing Vending Machines
- Access control gates
- Portable inspection devices
- Station Servers
- Main Control Centres and Redundant Centres for emergency operation

All equipment and systems are monitored and operated from Portare, a specific SICE'S software Platform for ticketing sales and fare collection.

Portare allows the configuration, parameterization, management, control and supervision of the ticketing system. It is able to manage different tariff structures, products and transactions and the consolidation of all data of sales and cancellations.

INGETEAM has already more than 20 references in the field of the energy recovery systems

INGETEAM

INGETEAM is aware of the challenges currently faced by railways operators and of the growing interest on improving energy efficiency of rail systems. The main causes are to strength the railway position as the most ecological transport and to reduce the operating costs of the operators.

As an expert in the development and supply of solutions to improve energy exchanges, INGETEAM offering to the rail sector is completed with INGEBER® energy recovery system that contributes in terms of maximum utilization of the energy present in the railways system. Our 10-year experience, having more than 20 references installed, most of them in Europe, allow us to offer a solution proved and tailor-made to each operator´s needs.

The INGEBER system enables all the limitations associated with the return of energy from the units to be overcomed. The system, dimmensioned thanks to the energy analisys and simulations continuously monitors the catenary until it detects the point at which there is braking energy from one vehicle that is unable to be used by another vehicle. At this time, the system extracts the energy from the catenary and transforms it according to the quality parameters of the supply grid so that this energy can be injected into the grid, used by the operator or stored, according to the needs.

Bombardier close the supply of traction equipment for the Haramain project

BOMBARDIER SPAIN

Bombardier has completed the manufacture and supply of the traction equipment for the Talgo trains for Haramain project.

These traction equipment's, manufactured entirely in Trápaga's Factory, are part of the contract between Talgo and Bombardier for the design, delivery and commissioning of converters, Bogies and TCMS for 36 high-speed trains between Medina and Mecca.

Bombardier will also be responsible for the maintenance of the equipment from the beginning of operation. The Manufacturing began early 2014 and have finished in February 2017 with the delivery of the last compromised equipment. The project, whose work on propulsion has been led by Bombardier Transportation Spain, is now going to start the homologation phase in Saudi Arabia.

Siemens is to install its railway technology on the first two lines of the Nagpur Metro

SIEMENS SPAIN

Siemens is set to install its advanced railway signalling technology on the first two lines of the Nagpur Metro, in India, on its North-South and East-West Corridors. The project includes the development and installation of its CBTC (Communications Based Train Control) solution – Trainguard MT – for 38 kilometres of double track, 36 stations and two depots, the on-board equipment for 23 three-cars trains, as well as Trackguard Westrace Mk II electronic interlockings and Rail 9000 Centralized Traffic Control.

The award of this project by Maharashtra Metro Rail Corporation Limited (MAHA-METRO) is an important milestone for Siemens, as it represents its first installation of a CBTC in India, and comes as reward for a collaborative effort made by the Siemens Mobility divisions in Spain, India and Germany. In addition it serves to demonstrate Siemens' high level of commitment in this country.

Trainguard MT is Siemens' system for automatic control and operation of metropolitan railway lines where varying levels of automation are required, a solution very capable of adapting to the Indian city's urban rail transport requirements. The East-West Corridor will have 19 stations, while the North-South Corridor will have 17 stations and will connect the Airport with Automotive Square, in the north of the city.

The installation of Siemens' CBTC technology will allow Nagpur Metro to achieve intervals between trains of 90 seconds or shorter, as well as precise localisation of trains at all times. All of this amounts to an optimisation of the metropolitan system that will benefit passengers and the operator alike.

Nagpur is located in the centre of India and, with over two million inhabitants, it is the largest city in the region and a growing metropolis. The setting in motion of the plan for investment in infrastructure is to contribute to the economic development of both the city and the region. "The Nagpur Metro railway project will be a key factor for economic development and improved quality of life in both the city and the region. At Siemens we will be working in close coordination with our Indian and German partners to successfully install our signalling and communications technology and to contribute to the efficiency of the new transport system, which is vital to satisfying the needs of both the operator and passengers", explained Jesús Guzmán, Managing Director of Siemens Spain's Mobility Division.

La Farga opens a route to Israel

LA FARGA LACAMBRA

La Farga has been awarded a part of one of the most important rail electrification projects in Israel. The forge has been assigned to provide the catenary conductors for one of the largest railway electrification projects in Israel. The project, led by the ACS Group's industrial subsidiary SEMI, consists of 1,080 km of railway electrification and 14 substations from Tel Aviv to Jerusalem. La Farga will supply the copper conductors, mainly alloys, which will be installed in the catenary, and the material will be delivered over the next 5 years.

This is one of the world's most important rail corridors, and will substantially improve the transport of goods in Israel. This project is part of an electrification programme promoted by the Israeli government that is estimated at 13,700 million NIS (about 3,400 million euros) which aims to put the country on the high speed map, in addition to changing all the rail lines that run on diesel fuel to electrical lines.

The 1,080 kilometres of catenary run on 420 kilometre stretch, in which there are areas where there are two, four or even five tracks. This line will reduce the current route from 80 minutes to less than 30 minutes, thereby providing a reduction of more than 37.5%.

Consultancy services for the Ankara-Istanbul High Speed Railway

GETINSA-EUROESTUDIOS

The Getinsa-Euroestudios Group has provided the consultancy services for the preparation of the design, Project Coordination and construction supervision of the Ankara-Istanbul High Speed Railway Project.

The new Ankara-Istanbul High Speed Rail Line was designed for an operational speed of 250 km. It has 490 km of electrified double track and 250 km/h of operational speed, 15 stations, 41 km of tunnels and 15 km of viaducts, and incorporates the European Rail Traffic Management and Signaling System ERTMS.

The project was financed by the EIB and complies with the technical specifications set out for interoperability of the Trans-European high-speed rail system.

It should also be highlighted the fact that, to date, the Getinsa-Euroestudios has conducted 33 projects in the country during the last 5 years, of which 11 are railway projects.

At the forefront of Rails Solutions

ArcelorMittal is the world leading steel and mining company, is part of a small group of rail manufacturers with rail production facilities in Spain, Poland, Luxembourg and the United States. Our production has experienced significant developments in all rail markets: high speed, tram, metro, heavy loads, urban transport and port operations.

ArcelorMittal have the widest range of products, offering a wide portfolio covering all sizes and types of steel in the best conditions of quality and service. Proximity and customer satisfaction, Research and Development focus, a wide range of premium rails and our unmatched capacity, are ArcelorMittal Long Products Europe - Rail and Special Sections strategic bases. The next time you take a train anywhere in the world, you may be traveling in rails manufactured by ArcelorMittal.

rails.arcelormittal.com

AcelorMittal es el principal productor siderúrgico y minero a escala mundial, y forma parte de un reducido grupo de fabricantes de carril, con plantas productoras en España, Polonia, Luxemburgo y Estados Unidos. Nuestra producción ha experimentado un importante desarrollo en todos los mercados de carril: la alta velocidad, tranvía, metro, cargas pesadas, transporte urbano y operaciones portuarias.

En ArcelorMittal contamos con la oferta más variada de productos, fabricando una amplia gama de dimensiones y tipos de acero en las mejores condiciones de calidad y servicio. Proximidad y la satisfacción de nuestros clientes, apuesta por la Investigación y el Desarrollo (I+D), una amplia gama de carriles premium y nuestra incomparable capacidad, son la base estratégica de ArcelorMittal Europe Long Products – Carril y Secciones Especiales. La próxima vez que coja un tren en cualquier parte del mundo, es posible que esté viajando en carriles fabricados por ArcelorMittal.

Spanish university students rank Alstom as one of the most innovative companies

ALSTOM SPAIN

Alstom ranks among the top ten companies that university students associate most with innovation, according to the annual Universum Most Attractive Employers study. This international study, in which 30,000 students and professionals took part in Spain, shows how some companies are perceived as more innovative workplaces than others, which positively impacts their capacity to attract and retain talent.

In Spain, the engineering and IT students who took part in the study ranked Alstom among the top ten most innovative companies it the sector. Other state-of-the-art, innovative companies such as Apple, Google, Roche, Thales, bq, Michelin, Airbus, Samsung and Intel also made the list.

The survey, carried out by Universum, a leading global Employer Branding consultancy firm, compares the career expectations of Generation X (professionals born in the sixties), with those of Generation Y (millennials born after 1980) and Generation Z (born in the nineties), analysing their attitude towards technology.

Technological innovation, as described in this study, has transformed the professional world by introducing concepts such as flexibility, connectivity, instant feedback and management of virtual teams, in an increasingly global context. This international survey gathers information that is useful for designing workplaces that meet the expectations of the different generations, improving their ability to attract, retain and create loyalty among talent.

With around 2,000 workers in Spain, Alstom is present with an industrial train manufacturing plant and four innovation centres that work on R&D programmes in rail transport safety, signalling, maintenance and trains. Between 2014 and 2016, the Alstom Spanish teams contributed to a total of 38 international projects.

IDOM, the engineer of the prequalified design and build consortium for the copenhagen ring 3 tramway

IDOM

The Government of Denmark together with the capital of the country and eleven other municipalities have decided to execute the design and build of the Ring 3 tram. This 27.44-km tram will link the municipalities of Lyngby-Taarbæk, Gladsaxe, Herlev, Rødovre, Glostrup, Albertslund, Brøndby, Høje-Taastrup, Hvidovre, Vallensbæk and Ishøj, improving the existing public transport system in the suburbs on the outskirts of the capital.

LETBANE PÅ RING 3 has carried out a prequalification process for the design and build of the project to be developed between 2017 and 2024. This process includes several design and build lots:

- Infrastructures, separated into five geographically different sections.
- Transport Systems:
  - Energy and catenary
  - Tracks
  - Communications and information systems for passengers
  - Tramway signalling
  - Offices, workshops, depots
  - Rolling Stock
- Operations and maintenance

IDOM Consulting, Engineering, Architecture, S.A.U., is participating with international construction companies who have been prequalified in the tender preparation process for the lots related to Transport and Civil Works systems, together.

As a leading company in the design of tram and light metro systems, IDOM has implemented tramway projects in more than 50 cities in 17 countries, all in all, over 760 km. For Ring 3, IDOM has provided support to the construction company in the preparation of the tramway designs of the different cross-sections, track sections, construction processes, equipment and tramway systems (track, power and catenary), quantifying the necessary volumes for construction and analysing the interfaces with the other contractors involved in the process.

CAF Power closes has concluded a collaboration agreement in Turkey with Medel Elektronik

CAF POWER

CAF Power & Automation has concluded a collaboration agreement with Medel Elektronik, a Turkish company that supplies on-board electronic equipment, to approach the market in this country according to the Company's requirements, as this country harvests a highly significant potential for rolling stock demand over the coming years.

As a highlight of this new collaboration, CAF Power took the opportunity to exhibit a tram traction converter with production localised in Turkey on the Medel Elektronik stand at the last Eurasia Rail fair, held on March 2-4 at the Expo Center in Istanbul.

For CAF Power "the railway industry is presently imposing a clear requirement for localised production. It is increasingly common for the rolling stock tenders issued by operators to specify a certain fraction of both rolling stock and on-board systems that must be unconditionally localised. This means that a part of the purchases of materials to manufacture the systems, and the assembly of the materials as well, must be conducted in the country that is promoting the project".

The location in the Turkish market

This condition, says, "leads to companies in the railway industry to implement solutions to meet these requirements either by opening production sites in the specific country or by partnering agreements with local players". In this way is the agreement sealed in Turkey.

Thus, CAF P&A can now count on Medel Elektronik as the Company's strategic partner to meet the demand in the Turkish railway market, where localised production it is estimated to eventually reach up to 60%. CAF Power intends to leverage this alliance to gain foothold in the Turkish market, while Medel Elektronik will benefit from technology transfers in the railway control and power electronic field.

President of Renfe Operadora, Juan Alfaro

"We want to commit to a better relationship with the client"

JUAN ALFARO APPRECIATES RENFE OPERADORA'S PATH AND THE COMPANY'S OBJECTIVES ON MEDIUM TERM. IN ADDITION, HE TALKS ABOUT THE FUTURE CHALLENGES AND THE ROLE IN PASSENGERS AND FREIGHT TRANSPORT IN SPAIN.

Mafex: Renfe Operadora is the only passenger railway operator and the main freight transport operator from Spain. The latest figures indicate that many of its services broke the record in 2016. In which way does this increase in demand stand out?

Juan Alfaro: There are several factors involved. From the point of view of the railway infrastructure development and the service level regarding the passengers transport, Spain has a prominent position. There is no doubt that we are a world reference. The tourist sector registers record figures, and this is also partly due to the level of our infrastructures, as the World Economic Forum has recently pointed out. And for our part, Renfe has strived to expand our range of offers to make the train more attractive to more clients, taking advantage of its strengths: comfort, reliability, safety and long distance travel times that have been revolutionized thanks to the high-speed development. Our effort is to always make progress with the client at the core of our strategy.

Mafex: What do you consider to be the key aspects for which your company is one of the world's railway references?

J.A.: It is clear that the large public operators are reference companies for historical reasons. However, the modernization of the railway in Spain required Renfe a very important effort regarding the management of new trains, facilities and services that has made the current Company and quality levels possible. Renfe absorbed a new technology from different manufacturers in an intense manner and a considerable knowledge in terms of signaling and traffic management and, therefore, today is a reference in providing services that are at the forefront of the world's railway sector. However, all this makes us very demanding and we know that there is always room for better in providing the best possible service and being a more efficient company every day.

Mafex: Since January 2014, Renfe Operadora has been incorporated as a public holding company with four subsidiaries: Renfe Viajeros, Renfe Mercancías, Renfe Fabricación y Mantenimiento and Renfe Alquiler de Material Ferroviario. Is this structure's profit positive at present?

J.A.: This is a structure coordinated by our General Directorate of Opera-

tions, which allows us to identify the key aspects of each market in which Renfe operates and the behavior conducted thereof. The adoption of this organizational structure, the incorporation of the new companies, has served to clear accounts and to promote, in a very special way, the exercise of professional responsibility, which has resulted in a greater motivation of the teams and a profit improvement.

Mafex: You took office as President at the end of 2016. What are the main challenges you face and the objectives you would like to achieve?

J.A.: We intend to always make progress with the client as the company's primary point of reference. We want to commit to a better relationship with the client so as to provide better services. We want to continue working on the improvement of renfe.com, increasingly visited from mobile devices, and to better adapt our offer to each client's profile. We know that in a very competitive digital environment, we are obliged to seek excellence characterizing the provision of passenger transport services, which place Renfe as a world reference brand. Our vision is also directed at freight transport services with the objective of improving our business and being more competitive in a free market. And all this go with a double business strategy: our commitment to innovation and the search for new markets, especially abroad, in which we export our experience and know-how, especially regarding the high-speed transport services' exploitation, where we are a world reference.

Mafex: From your point of view, what role has the Spanish railway industry and respectively, the private companies played in positioning Spain as a current global leader?

J.A.: A key role as a know-how bearer and an experience that many countries want to get acquainted with. International markets are very competitive, but Spain and the group of companies belonging to our railway sector cannot miss the knowledge accumulated during these years. Due to the modernization of our railway network and our trains, the high-speed allows an economic development sustained by an industry that has always been a leading player in our country. The high-speed system developed due to the efforts of all Spaniards has provided citizens with numerous benefits and has made the Spanish AVE, 25 years later, an exportable and expanding transport means and one of the engines for socio-economic development in our country.

> "We know that in a very competitive digital environment, we are obliged to seek excellence characterizing the provision of passenger transport services."

Mafex: As regards the world leadership, one of the most emblematic railway projects for Spain is the construction of the high-speed line between Mecca and Medina in Saudi Arabia. What are Renfe Operadora's functions in this consortium?

J.A.: As part of the consortium, Renfe is in charge of the operation design to the date on which the service will be commissioned, with all elements involved: train drivers' training, maintenance schedules, commercial planning, sales channels, customer service, etc. In addition, we have worked on the design of the workshops that will serve as key support for the entire service. This is a very important and exciting challenge for the in-house professionals, capable of mobilizing the best of the company and that will undoubtedly increase the echo of our activity and our know-how.

Mafex: What aspects can you point out as the main lessons learned as regards the future projects of such magnitude in which your entity participates?

J.A.: Perhaps it is too early to draw conclusions, although it is true that a project of such magnitude increases your experience in a very intense manner. Our team has identified the key points of a project that continues to mature and we are sure that it will be a great example of railway service on its inauguration date. Moreover, if we talk about the international market, each project and each country has its own features and, therefore,

they may require a specific adaptation.

Mafex: Recently, 144 applications with Spanish participation have been submitted for projects funded by the CEF Funds, "Connecting Europe", for the development of the Trans-European Transport Network. What role does your organization play in this program?

J.A.: Renfe is committed to contribute with its innovative capacity to initiatives of high strategic value not only for Spain. In 2015, proposals for innovation projects were submitted to the European Shift2Rail (S2R) calls, which channel the entire European grant in terms of innovation until 2020, and the Connecting Europe Facility (CEF) calls. Among them, the proposals aimed at developing the ERTMS signaling system should be pointed out, since it is one of the most strategic innovations for Spain and based on which both its own natural evolution (simplification of validation processes, adaptation to particular needs, introduction of virtual tests, etc.), and the development of future applications on ERTMS, which allow other types of high value functionalities for railway development, are oriented towards progress. More recently, we are working on several innovation projects related to alternative traction sources, such as liquefied natural gas and hydrogen fuel cells, batteries and supercondensers, which can also be accommodated in European environmental programs, such as the LIFE Program 2014 -2020.

Mafex: Returning to the national market, according to the Plan of Infrastructures, Transport and Housing, PITVI 2012 - 2024, one of the specific objectives is to promote the railway freight transport. Could you detail the measures that Renfe Operadora plans to take to achieve this objective?

J.A.: Renfe Mercancías currently carries an economic deficit that should be surpassed in order to grow and make the railway freight transport an alternative, which is no longer necessary, but essential. To approach the future with guarantees, we have to improve the Company and our productivity in a free market. Our effort is focused on a Management Plan that enhances the business activity, improves our exploitation ratios, makes us more competitive and, which focuses on profit improvement.

This Management Plan will allow the Renfe Mercancías Company to reach the economic balance in the next two years and consolidate its profitability starting from 2019. From thereon, we will be able to grow and enhance the necessary freight transport by railway.

Mafex: Following the last contract involving 30 high-speed trains awarded in 2016, Renfe Operadora will count on one of the most modern fleets in Europe. Does the Spanish railway network provide one of the best services in this segment?

J.A.: Without doubt, in recent years, the railway service has been transformed in Spain. Twenty-five years after the inauguration of the first high-speed line, the train is the preferred collective transport means for long-distance displacements in the country and more than 35 million passengers per year use Renfe's high-speed services. The integration of new trains is part of a logical programming process regarding the possible development of the infrastructure in different points of the network and a forecasting process regarding the service life of our fleet.

> "More than 35 million passengers per year use Renfe's high-speed services."

Mafex: Finally, in relation to the collaboration agreement signed with Mafex two years ago to promote the Spanish railway sector abroad, how would you appreciate the work performed based on this collaboration?

J.A.: All Spanish companies of the railway sector have the same interests as regards our international expansion and each one is a leader in its field of activity: construction of infrastructure, communications, signaling, traffic management and, in our case, operation.

Mafex seeks business opportunities abroad for its associates and we are a good support to reach the objectives, especially when the Contractor requires the experience of a reference operator, like Renfe. The agreement that we have signed is the necessary tool so that the Spain brand in the railway sector may remain a world reference.

Thirty years in movement FGV

On January 1, 1987, once completed the transfer process of FEVE lines (Narrow-Gauge Spanish Railways) of Valencia and Alicante, Ferrocarrils de la Generalitat Valenciana - Valencian Government Railways - (FGV) started to provide its services. During these 30 years, Metrovalencia and TRAM of Alicante have undergone an ongoing growth process, which has enabled the former regional narrow-gauge network called *trenet* to become a modern metro and tram network.

GENERALITAT VALENCIANA | TOTS A UNA veu

FGV metrovalencia TRAM METROPOLITÀ D'ALACANT

IRAN

Iran intends to double i railway network until 2

IT AIMS TO REACH THE 20.000 KILOMETERS OF NETWORK BY THE YEAR 2025. THE IDEA IS TO MODERNIZE THE CURRENT ANCIENT LINKS AND TO DOUBLE MANY OF THE ROUTES AND TO BUILD NEW LINES.

The Islamic Republic of Iran is a key geographical area for communications with Europe, the Middle East and Western Asia. This country, the eighteenth largest in the world, has 1,648,195 km2 and is divided into 30 provinces. At present, it has 79 million inhabitants, making it the seventeenth most populous country in the world, with increasing urban transport needs. It is also ranked 27th among the world's economies.

Its strategic position has led to a very representative historical weight in the connection and transit routes between continents. The country has land and maritime borders with 15 states (with a coastline with the Caspian Sea, the Persian Gulf, the Sea of Oman) and

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The improvement and expansion of the railway networks, including international links, are a priority in terms of investment in Iran. Photo by Jean-Marc Frybourg.

The administration has increased the investment to achieve powerful railway networks.

it is very close to the Strait of Hormuz, which is crossed by almost 20% of the oil; therefore, it is a very important strategic point for international trade, and the Indian Ocean. A combination that makes Iran an essential logistical transit route. Hence, in recent years, the investment plans have intensified so as to achieve powerful railway and airport networks.

At present, the major weight of transport by train is in the freight area, especially in the links from North to South.

Strategic crossing area

One of the main axes that are the most promoted is precisely the one that links Iran to Kazakhstan and Turkmenistan, provided that, once full capacity is achieved, the country would become a strategic area of the Eastern Caspian. As regards the passengers, the two most important routes are those linking Tehran to the cities of Isfahan and Mashhad.

Since August 2013 a stage marked by the desire to promote sectors of special relevance, including the railway industry, has started. This means of transport plays a very important role among the "Priority Investment Projects" of the "Sixth Five-Year Plan 2016-2021" approved by the Iranian Government. The objective is to enhance the geostrategic location of the country as a transit route, making Iran a reference logistics center and to promote a better integration of the Iranian, Western Asian and international communities with each other.

The Iranian railway network has 13,600 kilometers, of which 1,426 are double-track, while there are around 150 electrified tracks according to the data provided by the Ministry of Roads and Urban Development. 35 million tons of freight are annually transported and 27 million passengers are registered, representing 8% and 6% of the total, respectively.

Although, these figures are planned to improve so that the 20,000 kilometers of network may be reached by the year 2025. The idea is to modernize the current ancient links and to double many of the routes and to build new lines and give greater prominence to metropolitan transport with the opening of numerous metro networks.

Structure of the railway industry

The RAI (Islamic Republic of Iran Railways) is the national state-owned railway system of Iran. On its turn, it has two major subsidiaries. The first one, the Railway Transportation Company, manages and coordinates freight transport. The second, Zarand Company, which is in charge of the track system, both for the transport of passengers and freight.

The major passenger transport operator "Raja Passenger Trains Company" was founded in 1996. Its services include international routes with Damascus and Istanbul.

In recent years, the role of the private sector has grown, as the Iranian

In the "Sixth Five-Year Plan 2016-2021" the railway is one of the pillars in terms of transportation.

railways have been delegating areas and functions. Thus, it has gained prominence in both the rolling stock ownership and services operation and in the participation in financing, network maintenance works and development projects and infrastructure plans' tendering.

At present, there are a number of government, public-private and private companies that operate in the industry and which play an active role.

The 20,000 kilometers of network are intended to be reached by 2025.

Freight

In freight transport, the most relevant are: Rail Tarabar Tous,Foulad Rai Jonoub,MCPars,Samand Rail,Touka Rail,Gohar Tarabar Sirjan,Tajarob Koushesh Sepahan,Bana Gostar Karaneh, Rah Ahan Homl o Naghl (RAI) and Rail Tarabar Fajr.

As regards the plans for the construction of new railway kilometers, it directly depends on the Ministry of Roads and Urban Development (MRUD). Three of its subsidiaries are in charge of the projects' implementation and performance: the Iranian Railways (RAI), Iran Rail Transport Company (IRTC), in charge of the metro networks, and Construction and Development Transportation Infrastructure Company (CDTIC).

Railway: essential until 2021

The Government plans to allocate 40,000 million Euros for land and air transport infrastructures over the next four years.

This matter is included in the "Sixth Five-Year Plan 2016-2021" where the railway is one of the pillars in terms of transportation. More than 100 leading projects are included in this extensive program and, as a center of many of these initiatives, the train in all its versions (international branches, freight, electrification and modernization of lines, etc.).

For this reason, a significant amount of the global budget, i.e. around 23,000 million Euros will be aimed

to re-launch the industry and modernize the entire network. Of the 1,000 kilometers of network planned, a part will be high-speed, with speeds that could reach up to 250 km / h.

Iran's Vice Minister of Roads and Urban Development, Saeid Mohammadzadeh, has recently pointed out that the objective of these investments is to increase passenger traffic to at least 18%, while freight traffic will increase by around 30% after completing this action plan.

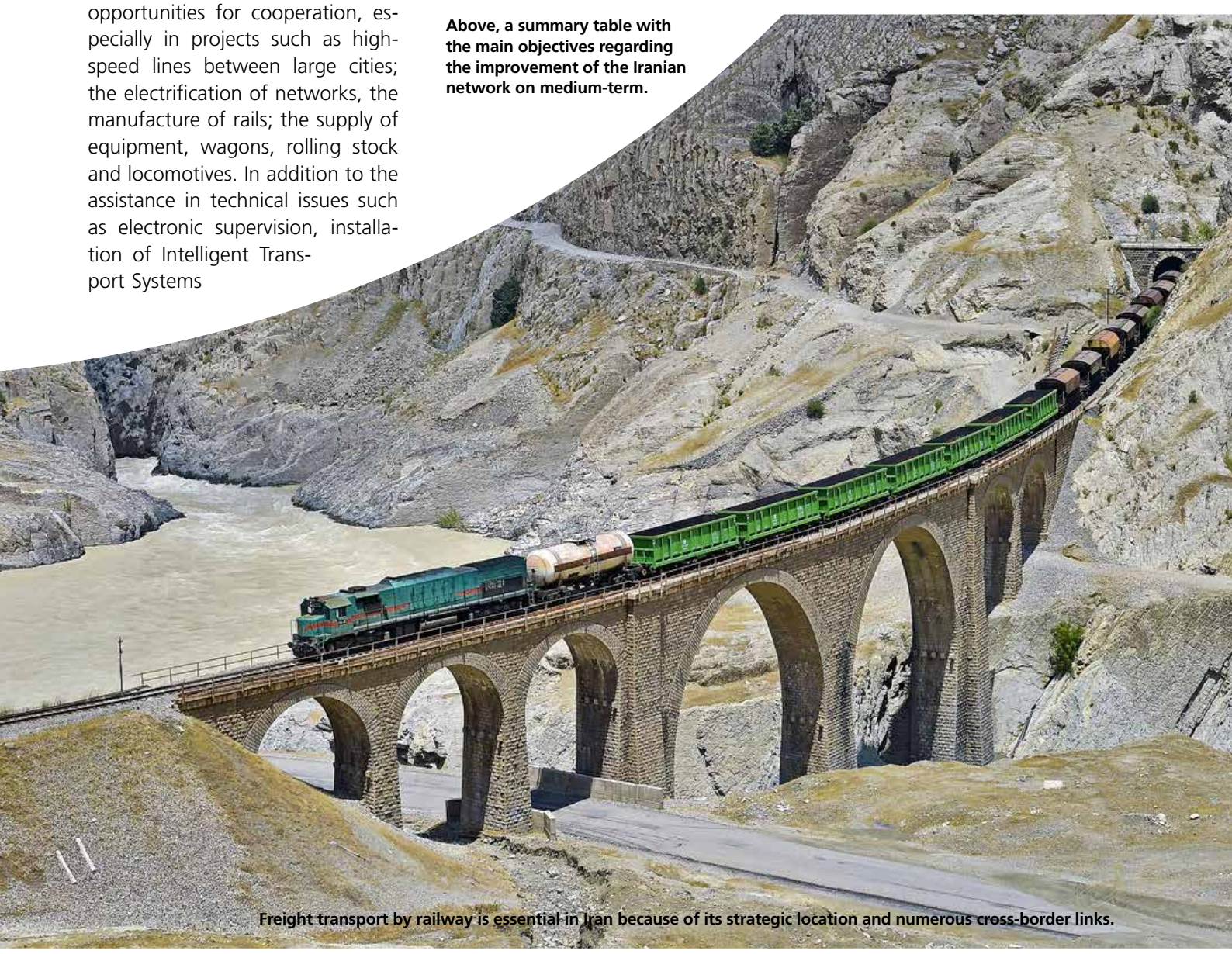
This progress towards new and modern transport infrastructures pays a special attention to the participation and attraction of private sector investment.

Iran's railway industry has great opportunities for cooperation, especially in projects such as high-speed lines between large cities; the electrification of networks, the manufacture of rails; the supply of equipment, wagons, rolling stock and locomotives. In addition to the assistance in technical issues such as electronic supervision, installation of Intelligent Transport Systems

Objectives of railway projects in Iran 2015-2025

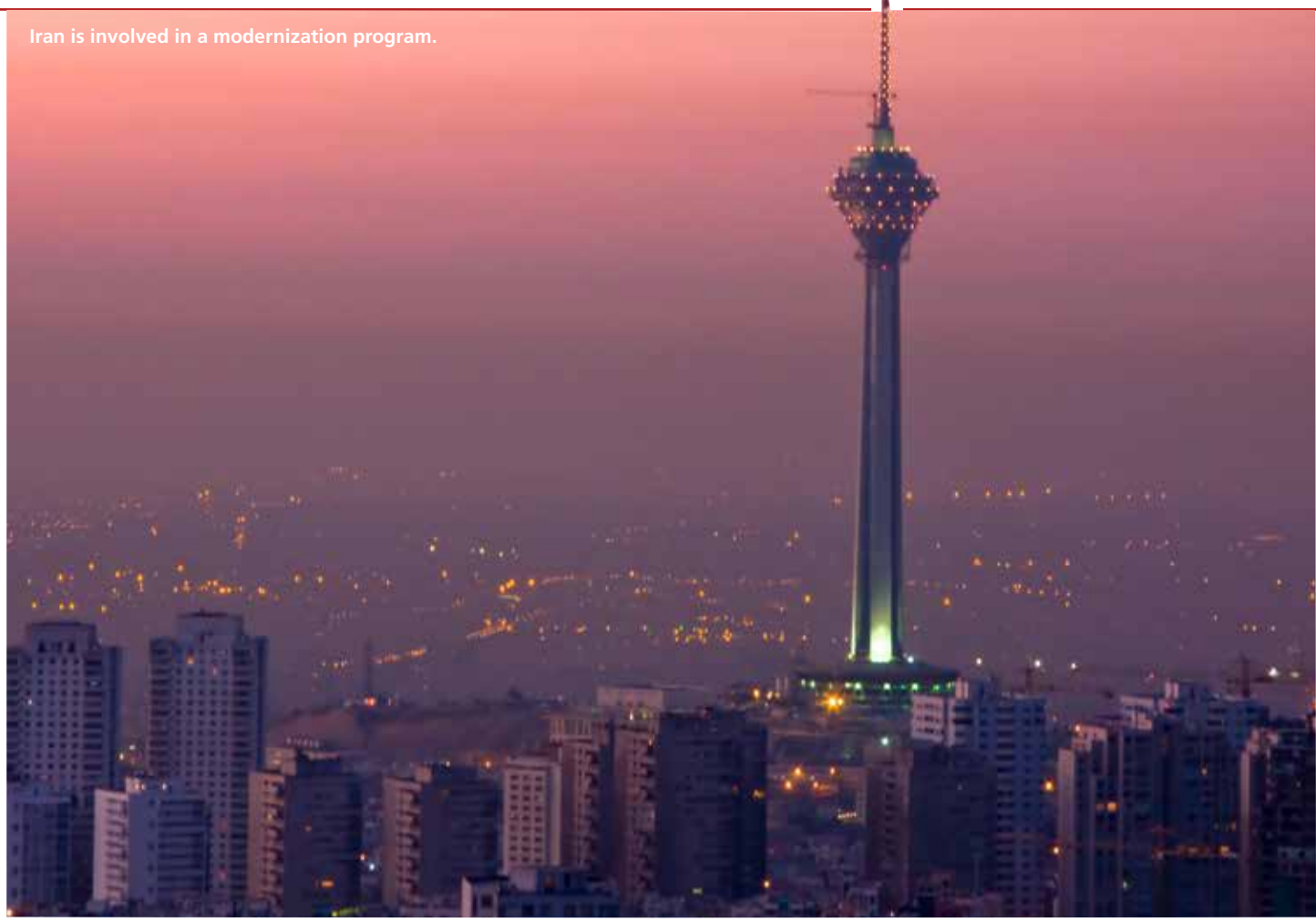
	2015	2025
Network length (Km)	13.600	20.000
Double-track (Km)	1.900	5.800
High-speed lines (Km)	0	1.000
Track electrification (Km)	150	2.000
Freight Ton/Km (Thousands of millions)	30	120
Passengers-Km (Thousands of millions)	20	40
Railway freight weight in the mix of Transportation	11%	30%
Railway passenger weight in the mix of Transportation	12%	18%
Percentage of freight traffic	5%	30%
Freight wagons	24.000	32.000
Passenger cars	2.400	4.100
Locomotives	500	800
Average service life of freight wagons (years)	22	15
Average service life of passenger cars (years)	29	15
Average service life of locomotives (years)	29	25

Above, a summary table with the main objectives regarding the improvement of the Iranian network on medium-term.



Freight transport by railway is essential in Iran because of its strategic location and numerous cross-border links.

IRAN



Iran is involved in a modernization program.

(ITS) or signaling, railway communications.

Collaboration in infrastructures

In September 2015, a Spanish business delegation, coordinated by the Ministry of Development, carried out an official visit to Iran. In this round of meetings, it has shown an intention to collaborate in the infrastructure plan to be performed by 2021.

The so-called "Persian gold", for its great development programs. Representatives of more than 40 Spanish companies in the petrochemical, gas, transport, automotive and infrastructure sectors joined it during this visit.

The Development Officers met then with the Minister of Roads and Urban Development, Abbas Ahmad Akhoundi, to whom they offered the proven experience of Spanish construction and transport companies.

Transport plans in Iran open business opportunities for railway companies.

Time of the visit of the former Minister of Development of Spain, Ana Pastor, to Iran.

Investment opportunities: Interregionals corridors

One of the key points in Iran's railway links is represented by the interregional corridors. The Construction and Development of Transportation Infrastructure Co. (CDTI) body, under the Ministry of Roads and Urban Development, proposes seven priority routes. For these projects' performance, the "turnkey" modality is chosen, mostly with government funds, and with additional funding from banks, participating companies, development bodies, etc.
At present, there are numerous tenders open for railway corridors.

DOROUD-KHORANABAD-ANDIMESHK CORRIDOR

The Doroud-Khoranabad-Andimeshk corridor aims to end the bottleneck of the southern routes, the closest to the Persian Gulf. It is also intended to provide greater transport coverage to the steel industry and mining sector in the Khorramabad city area, capital of the Lorestan province, as well as to increase the capacity of the Bandar Imam Khomeini Port. This route is part of the "Euro-Asian Transport Links" railway routes. It will have 339 km and a budget of 1,114 million Euros.

Planned length	367 kilometers
Capacity	1.8 million tons / year
Location	Provinces of Khouzestan & Lorestan
Investment	1,114 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	25 years

Source: Ministry of Roads and Urban Development.

SHIRAZ- BOSHEHR-ASALOUYE LINK

The "Shiraz-Boshehr-Asalouye" railway union is carried out to optimize international transport through Iran, Iraq, and the Syrian Port of Lazeghiye.
It will be a route of 647 kilometers that will cross the Province of Kermanshah and will have an investment of 1,179 million Euros.

Planned length	644 kilometers
Capacity	1.6million tons / year
Location	Province of Kermanshah
Investment	1,176 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	30 years

Source: Ministry of Roads and Urban Development.

RASHT-ASTARA LINE

The Rasht-Astara link is encouraged for the improvement of the commercial exchange with the European and Asian countries through the railway routes of Azerbaijan.

Planned length	152 kilometers
Capacity	6 million tons / year
Location	Provinces of Khouzestan & Lorestan
Investment	479 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	20 years

Source: Ministry of Roads and Urban Development.

IRAN

KERMANSHAH-KHOSRAVI RAILWAY

The Kermanshah-Khosravi Railway will link the western provinces of Iran with the national network and the capital, Tehran. This corridor is intended to support the social, economic and cultural development of the western provinces. It will also reduce transport costs in the Western corridor, which links to Iraq, and will improve traffic safety and will substantially increase passenger and freight traffic.

Planned length	260 kilometers
Capacity	6.5 million tons / year
Location	Province of Kermanshah
Investment	463 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	25 years

Source: Ministry of Roads and Urban Development.

CHABAHAR- ZAHEDAN-BIRJAND- MASHHAD-SARAKHS RAILWAY LINK

This project includes 1,123 kilometers, according to the Ministry of Roads and Urban Development. The objective is to develop a powerful transit route for the Eastern side of Iran in order to reduce the route between the countries of Central Asia and the Southern seas. It will also link the Province of Central Khorasan with the national railway network.

MASHHAD-BOJNOURD-GORGAN CORRIDOR

The more than 600 kilometers of this corridor will also contribute to increasing the transport capacity in Iran. The branch is built in the Province of Kermanshah and will link Mashhad-Bojnourd-Gorgany. It involves an amount of 1,084 million Euros.

The network will run very close to Turkmenistan and Afghanistan, therefore, it will be essential for international links.

Planned length	635 kilometers
Capacity	6.5 million tons / year
Location	Province of Kermanshah
Investment	1,084 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	20 years

Source: Ministry of Roads and Urban Development.

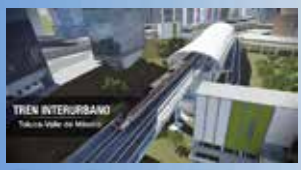
Planned length	1,123 kilometers
Capacity	7 million tons (1st year)
Location	Provinces of Sistan & Balouchestan & Khorasan
Investment	2,201 million Euros
Construction period	4 years (Starting in 2016)
Operation & concession period	27 years

Source: Ministry of Roads and Urban Development.

Railway solutions for our small world

Turnout for the Mecca-Medina High Speed line

Double crossover installed in Metro Buenos Aires



Toluca-Ciudad de México Intercity Train

Tram crossover for Athens - Piraeus line

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

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IRAN

New lines, electrification and track doubling plans

The railway investment areas entrusted to RAI (the national state-owned railway system of Iran) are quite diverse and extensive due to the scope of the planned projects. Due to the high volume of investments, especially in infrastructure and a new fleet, support packages have been presented regarding the participation of the private sector in the implementation of all these initiatives.
This is reflected in the document "Opportunities for Investment and Participation in Development Plans of Railways of the Islamic Republic of Iran". These include new linkss, track doubling in existing routes, as well as railway electrification works, procurement of new rolling stock to reinforce and modernize the current fleet. The high-speed deserves special mention, provided that 1,000 kilometers with links are planned between Tehran and Mashhad, Tehran-Qom-Ispahan, and Tehran-Hamedan.

Tehran-mashhad line. Foto: Mapna Group.

Route	Kilometers	Investment
Ghazvin-Zanjan	171 km	125 M€
Chadormalou-Ardakan	201 km	100 M€
Badroud-Mohammadieh	145 km	80 M€
Mohammadieh-Samangan	157 km	120 M€
Samangan-Doroud	130 km	92,5 M€
Chadormalou-Jandaq-Mobarakeh	145 km	105 M€
Jandagh-Tabas-Torbat-eHeydarieh	542 km	282 M€

New Isfahan-Ahvaz line

One of the projects is a new line of 545 kilometers that will cross the provinces of Isfahan, Khuzestan and Chaharmahal. The main cities of this route are Mobarakeh-Borujen-Lordegan-Ize-Ram Hormoz. An investment of 2,075 million Euros is planned. Once in full operation, it is expected to have a transport capacity of 45 million tons and two million passengers.

Track doubling projects

The projects entrusted to RAI include numerous improvements to existing networks, such as track doubling in the following sections: Ghazvin-Zanjan, Chadormalou-Ardakan, Meybod-Badroud, Badroud-Mohammadieh, Mohammadieh-Samangan Samangan-Doroud,Chadormalou-Jandaq-Mobarakeh and Jandaq-Tabas-Torbat-eheydarieh.

Procurement of rolling stock

Renewal of the current fleet for both passenger and freight transport is another of the major transport investment programs. Iranian railways are seeking collaboration with local partners to supply a modern, competitive, state-of-the-art train park capable of meeting the planned freight and passenger transport objectives. The specific program for these stock procurements includes the incorporation

New Towns Development Company: Railway electrification projects

Location	Amount (M€)
Baharestan	95 M€
Fooladshahr	157 M€
Golbahar	300 M€
Pardis (Roudehen/Tehran)	162 M€
Sadra	55 M€

RAI: Rolling stock renewal program

Project	Amount (M€)
Procurement of 618 locomotives	1,700 M€
Incorporation of 1,558 passenger cars	1,169 M€
Procurement of 28,500 freight wagons	2.38 M€
20 sets of repair and maintenance machinery (65 pieces of equipment)	148 M€

of 618 locomotives, 1,558 passenger cars, 28,500 freight wagons, as well as 20 sets of repair and maintenance machinery.

Development of new corridors

The Railways of the Islamic Republic of Iran have a second ongoing development program for new routes. Under the title "2nd Lane Development", there are initiatives totalizing 1,600 kilometers of rail.

High speed: Ongoing projects

The high-speed lines in Iran are included within the development plans until 2021. Specifically, 1,000 kilometers of this type of branch are planned. The most important sections will be: Mashhad ,Tehran Quom Isfehan and Tehran Hamedan.

The implementation of these projects counts on the collaboration of international railway industries such as the Spanish and Italian one. For example, in September 2016, a consortium represented by Ineco, the Iranian Moshanir and Hexa companies and the Italian Geodata company have all been awarded the electrification works related to the railway line between Tehran and Mashhad. Works that have a performance deadline of 42 months.

This new infrastructure, of about 1,000 kilometers, will reduce in half the time of travel of passengers on this route. In addition, the freight transport capacity will

Renewal of the current fleet is another of the major transport investment programs.

IRAN

Mashhad is included in Iran's high-speed railway plans.

be increased. There are also the tendering documents and specifications drafting for the works tendering and monitoring of rehabilitation works.

Tehran-Qom-Ispahan

Early in 2016, the Italian railways (Ferrovie dello Stato Italiano) signed a collaboration agreement with RAI. Its objective is to support the technical assistance for the future Tehran-Qom-Ispahan high-speed line. This is a network of about four hundred kilometers. This agreement also includes support for the electrification works of the Tehran-Masada line.

Iran plans to build 1,000 kilometers of high-speed lines. The sections will be Mashhad,Tehran-Quom-Isfahan and Tehran-Hamedan.

"Lane Development" program of the Iranian railways

Section	Kilometers	Amount (M€)
Ghazvin-Zanjan	171	125 M€
Samangan-Doroudyeh	130	92,5 M€
Mohammadieh-Samangan	157	120 M€
Badroud-Meybod	254	80 M€
Ardakan-Chadormalou	201	100 M€
Chadormalou-Jandagh-Mobarakeh	145	105 M€
Jandagh-Tabas-Torbateh-Heydarieh	542	282 M€

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IRAN

Urban transport: the Metro reaches a

THE MUNICIPAL GOVERNMENTS HAVE INCLUDED IN THE INFRASTRUCTURE PLAN THE CONSTRUCTION OF NEW METRO SYSTEMS IN MAJOR CITIES, AS WELL AS THE EXPANSION OF THOSE ALREADY EXISTING, SUCH AS THE ONE FROM TEHRAN.

Iran has a population of 79 million inhabitants, mostly concentrated in large cities like Tehran, Mashhad, Isfahan, Tabriz and Shiraz. As in many countries, efficient and modern solutions are currently being sought for traffic congestion, pollution and constant increase of residents in urban centers and peripheral areas.

Millions of people are daily traveling between their homes and workplaces, whether inside or outside these cities, using public or private transport means. The influx of people during rush hour in the morning and afternoon causes traffic jams lasting for hours on the city's streets and highways flowing in and out of them, resulting in heavy air pollution and a fuel consumption increase, not to mention the inevitable waste of time.

The municipal governments of the major cities have included in the infrastructure plan the construction of new metro systems, as well as the expansion of those already existing, such as the one from Tehran, adding an extra kilometers.

1. Tehran's Metro

The capital of Iran, Tehran, has 13 million people. The metro, opened in 1999, is a key transport means for displacements. Therefore, this network is to be extended in order to decongest the city.

There are currently four operating lines, with 95 stations and standard track gauge, which transport three million passengers per day, plus an additional regional railway. In addition, the construction of two new sections started ten years ago.

The investment plans in this network aim to reach 430 kilometers in 2028 and to have nine lines. The authorities of the Municipality of Tehran also study a light railway.

Iran seeks efficient and modern solutions, such as the rail networks, for urban mobility.

Tehran Metro Line 3. Photo: Mapna Group.

2. Mashhad's Metro

This network is the second most important in the country. Its construction began in 1999, and two years later the L1 was being inaugurated. It serves the City of Mashhad, with 5.2 million inhabitants, in the Razavi Khorasan province.

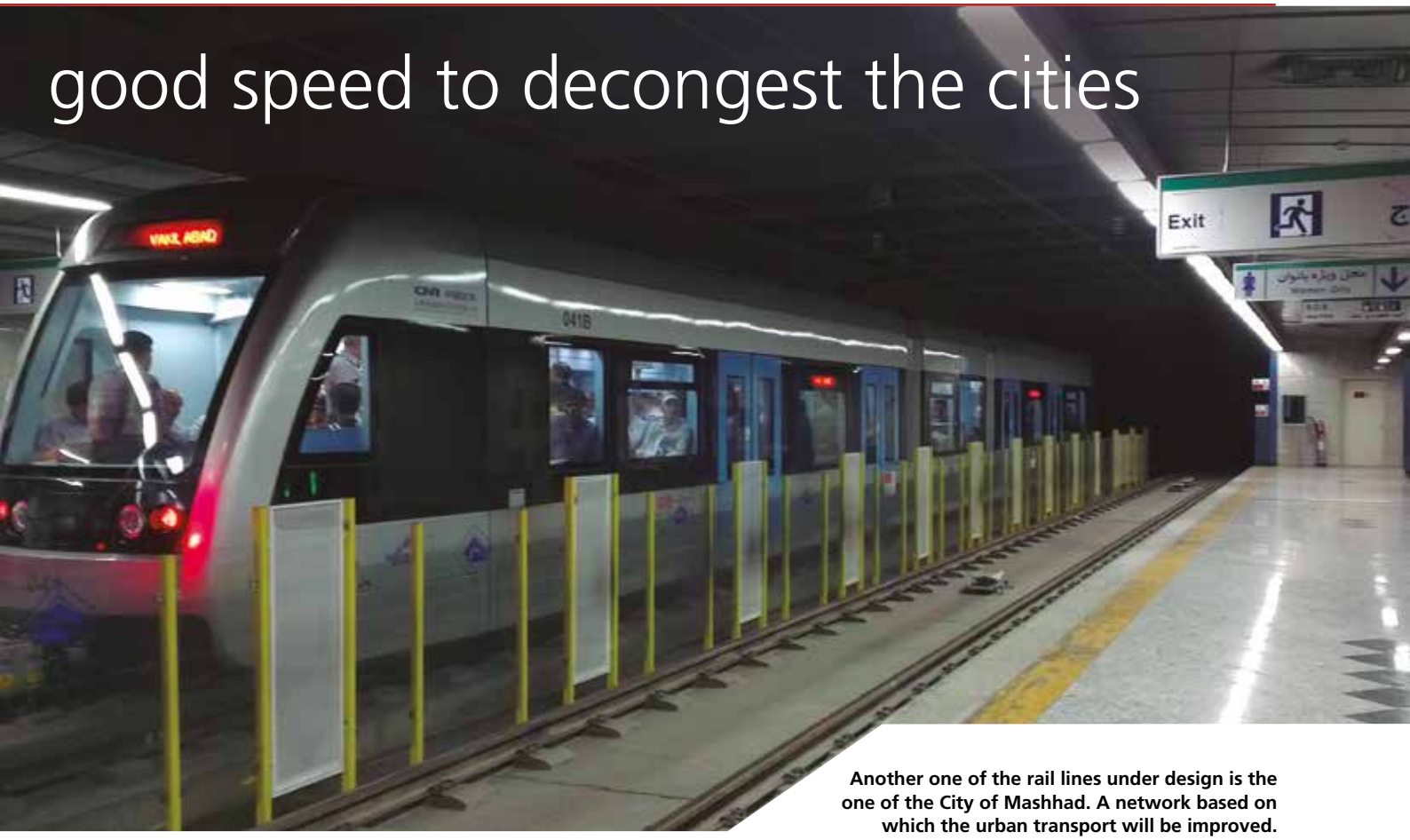
The operator is Mashhad Urban Railway and the system is also known as "Mashhad Light Rail" and "Mashhad Urban Rail". It currently transports 17,000 passengers / hour in each direction.

The progress continues and new sections are being gradually incorporated. Thus, in February 2016, the L1 connection to the city's international airport was officially inaugurated, while on February 20th 2017, an eight-kilometer section was opened from Shohada to Kashfrood, belonging to the second line, which is still under construction.

After conducting a thorough analysis of the city's growing transportation needs, the "Mashhad Master Plan of Transportation in 2021" was approved.

This is a program that includes five priority projects. On one hand, the expansion of L1 by 24 kilometers, from the Southeast to the West. In

good speed to decongest the cities



Another one of the rail lines under design is the one of the City of Mashhad. A network based on which the urban transport will be improved.

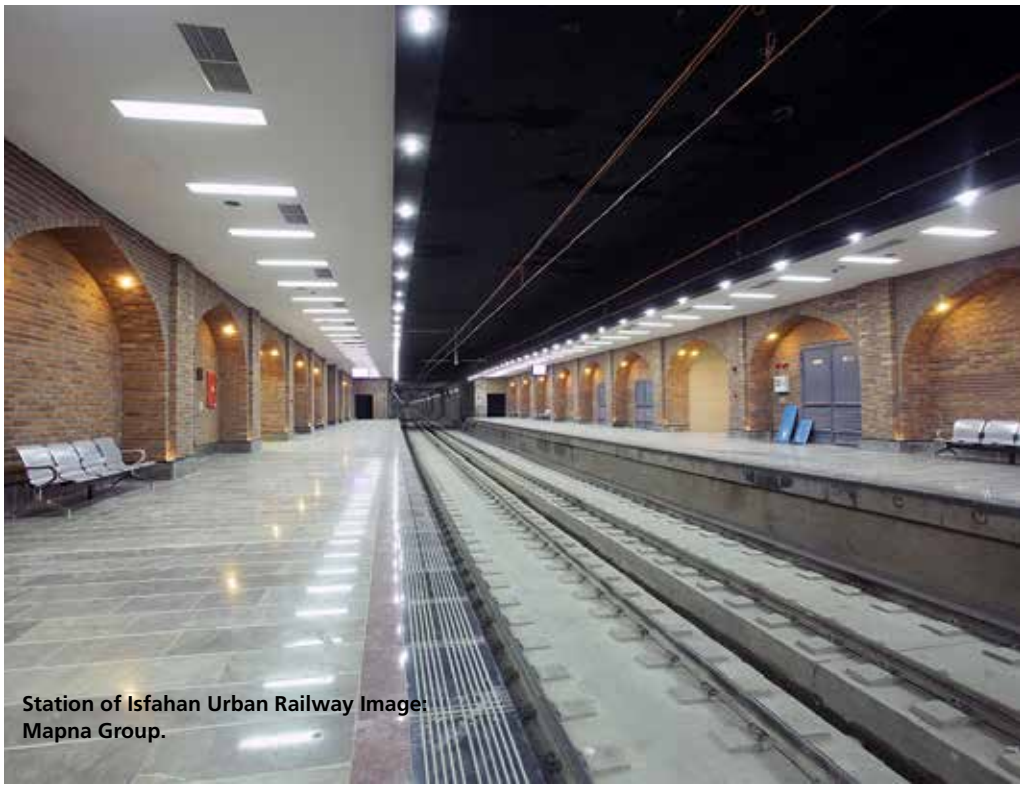
addition to four new lines: L2, L3, L4 and L5.

Line 2, from Koohsangi to Tabarsi, will have 13 stations and 14.3 km, of which 14 will be located underground. This branch will be connected to lines 1, 3 and 4. Pars Metro Sazan Contracting is in charge of the consulting and engineering phase.

For its part, line 3 will have 28.5 kilometers and 24 stations, while L4 will have a route of 17.5 kilometers and 15 stops. L5, which will be a monorail, joins them.

3. Shiraz Metro

The Shiraz metro, the capital of the province of Fars, is another of the most relevant urban projects. Its construction started in 2001 being in charge of the Shiraz Urban Railway Organization. The first phase of Line 1, which has 10.5 kilometers from Ehsan in the Northern Shiraz to Namazi in the central part of the city, entered into commercial operation in October 2014. On Fe-

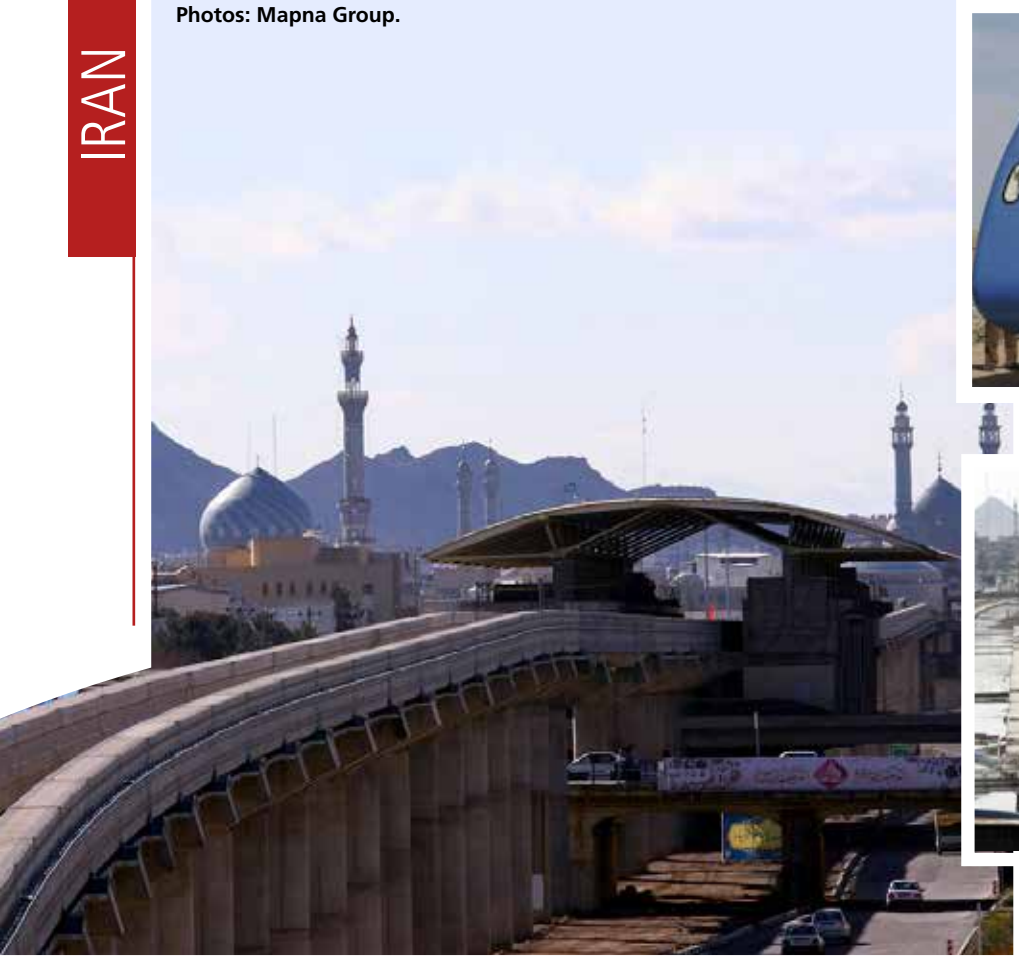


Station of Isfahan Urban Railway Image: Mapna Group.

Iran's large cities will have their rail networks improved in the future years.

IRAN

Metro works advance in Iran.
Photos: Mapna Group.



bruary 13th 2016, new stations such as the one from Motahari were opened to the public.
Currently, its expansion is still ongoing aiming to extend the Namazi line to Gol-e-Sorkh Square near the airport. Thus a total length of 24.5 kilometers would be achieved. In addition, a second line, the L2, of 10 kilometers, which will connect with the first one in the Plaza Imam Hosein is in progress.
There are also plans to build four more lines and to reach a length of 88 kilometers. This program includes a monorail (Line 10) that will have a route of 10 kilometers.

4. Tabriz Metro

The first metro line of the City of Tabriz, having 16 kilometers and 18 stations, was completed in 2016. Tabriz Urban Railway Organization (TURO) plans to expand this system with the construction of new branches so as to consist of four lines.

5. Isfahan Metro

The City of Isfahan is the fifth in the country that has a two-line review metro system.
The first phase of the L1 was inaugurated from Shohada, in the center of the City of Qods in October 2015.
This branch has 12.5 kilometers and 15 stations, all being located underground. In turn, the Line 2 will have 43 kilometers (0.7 kilometers located underground and 9.6 kilometers overhead) with 13 stations. It is also proposed to construct two lines from East to West.

6. Ahvaz Metro

This network, under construction and in charge of Ahvaz urban railway, will have 23 kilometers and 24 stations.

7. Qom monorail

At its first phase, as MAPNA Group informs, "this EPC Project consists of about 6.8 kilometer Monorail line, 8 stations, one depot and parking, E&M equipment (including power supply system, communication system, signaling system, depot equipment, AFC) and 20 monorail cars. It is going to be via a trilateral consortium including MAPNA Co., Kayson Co. & MRC Co".

Among the railway projects underway in Iran are known subway lines.

SOME MAFEX MEMBERS WITH

CAF SIGNALLING

The company wants to reinforce its presence in this area. CAF Signalling, accounting its own Turkish subsidiary (CAF Sinyalizasyon), has participated in the implementation of the modern transportation network of Turkey, as is the case of the Antalya Municipality Light Rail.

The projects in Turkey are joining other great achievements of the company, as the first line in Egypt with modern signalling, where last generation SIL-4 electronic interlockings were implemented by CAF Signalling.

SIEMENS SPAIN

Egypt

Siemens is developing a project for the Egyptian railway company ENR, to deliver 260 kilometres of signalling on the rail corridors between Zagazig and Abu Kebir, in the north of Cairo, and between Banha and Port Said. The project includes the installation of electronic interlockings, level crossings and communications, among other systems.

Saudi Arabia: Mecca-Medina High-Speed Line

Siemens is implementing its rail signalling and control technology, including its ERTMS Level 2 systems on track and on board for the line's 34 trains, as well as its Centralized Traffic Control, electronic interlockings and LED signals. The contract also includes a twelve-year maintenance period.

Turkey

Ankara-Konya High-Speed Line

Siemens has commissioned its ERTMS Level 1 system and is currently working on doing the same with its ERTMS Level 2. In addition it is supplying electronic interlockings, jointless track circuits and its Controlguide Rail 9000 Centralized Traffic Control system.

'Marmaray' Project This project includes the ERTMS Level 1 and CBTC track systems, electronic interlockings, train detection equipment, LED signals, Centralized Traffic Control, telecommunications and SCADA systems for the entire project, as well as maintenance for a two-year period. The section that runs under the Bosphorus Strait was opened on 29 October 2013.

Bandirma-Balikesir-Manisa-Menemen Line

Siemens is installing its ERTMS protection system, Levels 1 and 2, both on track and on board, as well as its automatic train braking system, electronic interlockings, jointless track circuits, motors machines, track signals, GSM-R, fixed voice and data communications, and Centralized Traffic Control.

Hasanbey Logistics Centre

Siemens has installed the signalling system, which includes electronic interlockings, train detection equipment, LED signals, electrical point drives and point heaters, as well as the power, distribution and UPS systems and the technical buildings.

Algeria

In 2006, Invensys Rail Dimetronic (now Siemens) was awarded the contract to supply the signalling for Line 1 of the Algiers Metro. In 2015 Siemens was again awarded a signalling contract in which Siemens Spain is participating with the supply of electronic interlockings, as well as drives, motors and signals.

PROJECTS IN THE MENA REGION

GMV

Morocco

Project: Operations Management System for the Moroccan Rail Operator ONCF.

The system includes the on board equipment supplied by GMV for a fleet of 410 locomotives and a modern control center from where the fleet is managed in real time. The project includes integration with existing corporate systems and the provision of information on the position of the vehicles to of third parties. The various extensions of the system include the web page for passenger information as well as 200 alert terminals for ONCF operators.

Saudi Arabia

Project: On Board Systems for Saudi Arabia's High Speed.In this project, GMV has supplied Talgo four on board systems: Public address and intercommunication; CCTV video surveillance; a specific event capturing system in the Ethernet backbone of the train, which incorporates a multi - interface communications in-terface between the train and ground communications; and an interface for onboard diagnostic display at each train car. After finishing the engineering and development phase, the first article inspection (FAI) for each of the systems supplied have recently been executed. To do this, Talgo and the auditor Deutsche Bahn International visited GMV factory in Valladolid.

Kazakhstan

Project: Supply of equipment for the new Talgo trains in Kazakhstan.

Talgo has awarded GMV an EGRU supply system 603 of cars of various types, forming up to 22 compositions. This system allows, via Ethernet connection to the onboard network event, the recording and capture of diagnostic information from existing systems; routing between different local train networks and a redundant communication channel with several interfaces: WiFi and cellular. It incorporates 4G cellular communications; and: HSPA (3.5G), UMTS (3G), EDGE (2.5G) and GPRS (2G). It is approved by major European standards (EN 50155, EN 50121, EN 61373) and in this project it will also meet GOST standards commonly used in Kazakhstan.

SOME MAFEX MEMBERS WITH PROJECTS IN THE MENA REGION

CAF

CAF is the one of the main rolling stock suppliers in Algeria. In 2009, the company supplied 14 metro units to Entrepise du Metro d'Argel (EMA), the operator of Algiers metro system.

These units run on the first Alger metro line that joins Haï el Badr and Tafourah Grande Poste. At present, CAF is manufacturing 12 new metro units for line 1 extension of this metro system.

Furthermore, Algeria's national railway operator (SNTF) operate regional diesel trains supplied by CAF, between 2007 and 2009.

INDRA

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

Indra is setting up a new control center in Ankara, equipped with cutting-edge technology, from which operational planning will take place for the country's 12,000 km railroad network, both conventional lines and high-speed tracks.

Furthermore, the DaVinci system, which has established itself as the world's most advanced rail traffic management platform, will support comprehensive high-speed rail traffic management in Turkey, where the Ankara-Estambul and Ankara-Konya high-speed lines are currently operational

In Saudi Arabia, the company is going to implement the entire ticketing and access control technology and cell phone payment solutions in the new public transportation system currently under construction in the capital of Saudi Arabia, Riyadh.This is the biggest ticketing project in the world up-to-date that includes the most advanced technology for pricing control, a control center, systems for 1,000 buses, and access control and ticketing equipment for six subway lines and bus stops. In this country Indra deployed its cutting-edge technology in Mecca-Medina High Speed Line.

In Algeria, Indra will supply the ticketing systems for the 27 stations and four interchanges planned for the first section, which is 16.2 km long, as well as the validation equipment for the first 26 trolleys of a total fleet of 39 vehicles. Indra's technology will be used to process and manage both magnetic tickets and contactless cards simultaneously, speeding up boarding times. As an open system it will also guarantee interoperability-in other words, multimodal management, by incorporating and integrating with the payment systems of other types of transport, and multi-operator management since different companies will be able to use the system.

In Egypt, Indra implemented in 2103 a new control and ticket sales system with contact-less technology in Cairo's Subway, the first network to be built on the African continent, in order to reduce operating costs, provide an information technology platform that streamlines and improves the efficiency of its administrative and offer improvements to its passengers.

In Morocco, The Spanish consortium formed by Adif and Indra will install the Da Vinci technological platform as a computer solution for the integrated management of traffic on the Moroccan railway network.

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SOME MAFEX MEMBERS WITH

ARCELORMITTAL

ArcelorMittal has participated in high-speed first line of North Africa and the Middle East; Tangier-Kenitra line, first step to create 1500 km of railways in Morocco and "Mecca-Medina high-speed railway" project in Saudi Arabia, where we collaborated in other projects as Hoffuf-Riyadh renewal line and also Metro projects as Riyadh's Metro new lines 4,5 and 6. We were also present in Tram projects such as Tunisia's Tram renewal and we were involved in rail supplying for several projects in Algeria and Tunisia.

ArcelorMittal has developed the most modern systems for its manufacture and control, which allows us to develop products that meet the most stringent requirements: greater reliability, geometric precision, strict flatness and the highest quality of the market.

GETINSA-EUROESTUDIOS

The Getinsa-Euroestudios Group has conducted the studies and the detailed design of ventilations systems for three stations on Line 4 of Tehran Metro: Darvaze Dolat; Darvaze Shemroun and Ferdosi, including the associated tunnels.

The scope of the ventilation studies comprise all the equipment and systems required to pull fresh air into the stations in normal operating conditions, and to ensure fast smoke extraction in the event of a fire in the stations or in the tunnels.

The assignment includes the architectural and structural drawings of the 3 stations and the associated tunnels, three-dimensional simulations with CFX software and the detailed design of the said facilities.

BOMBARDIER SPAIN

Bombardier has participated in the development project of 6 Metro lines in the city of Riyadh (Saudi Arabia), which is carrying out the Ar-Riyadh Development Authority (ADA).

Specifically, Bombardier participates in the consortium of Line 3, and supplies the vehicles. The project includes the delivery of 47 2-car trains Innovia Metro 300, equipped with Mitrac propulsion engines.

Bombardier Trápaga's Factory carried out RoQ's project management (propulsion and bogies), the development of the propulsion control software, and led the start-up and support in the scope of RoQ. The first vehicle arrived in Riyadh a few months ago and is currently undergoing testing.

PROJECTS IN THE MENA REGION

NEM SOLUTIONS

One of the most ambitious and iconic projects currently in development in Middle East, Riyadh Metro, will be equipped with NEM Solutions technology. The contract, signed in December 2016, includes the supply of NEM Solutions' Wheel & Rail Dr. (WRD) for Line 2 of the new metro systems in the Kingdom's capital city. NEM Solutions' Wheel & Rail Dr. (WRD) is designed to identify surface defects in railway vehicle wheels, reporting its findings through A.U.R.A wheel, the world's most advanced railway wheel wear management platform, with over 58 million wheel measurements (and counting). On the other hand, SAR and SRO have advanced critical asset management thanks to Nem Solutions. A.U.R.A and its different railway critical assets expert management modules A.U.R.A wheel, A.U.R.A trace and A.U.R.A lube, are currently in operation both in SAR (North South Line) and in SRO (Riyadh-Dammam Line). These modules are generating incredible value in advanced management of bogies and lubricated equipment, enabling life cycle optimization and critical failure anticipation. NEM Solutions brings technology and expert industry knowledge that minimize the consequences associated to the extremely adverse operational conditions that are ever present in the Kingdom of Saudi Arabia.

CAF POWER & AUTOMATION

CAF Power & Automation has wide presence in MENA area where several railway references incorporate COSMOS TCMS (Train control & monitoring system) In Saudi Arabia, 12 regional trains of SRO company are equipped with this control system.

So does SAR company, by integrating this solution in 9 locomotives and 45 multifunctional cars.

From 2007, High Speed trains of TCDD company in Turkey have incorporated TCMS System in 10 train units.

Also, in 2015 CAF Power & Automation was granted a contract for the supply of TCMS system for 51 metro units of Metro Istambul.

ALSTOM SPAIN

Over half of Alstom Spain's revenue comes from exports. And the region composed of North Africa and the Middle East is, due to its proximity, one of Alstom's main markets.

All the business divisions (signalling, security, train manufacturing, electrification, maintenance and services) have projects in this region.

For example, over 200 trams manufactured in Barcelona are running in the main cities of Algeria (Annaba, Algiers, Constantine, Ouargla, Mostaganem, Oran, Sétif and Sidi Bel Abbès). At present Alstom Spain's plant has already begun production on 25 trains for Qatar's tram network, one of the key mobility projects for the 2022 World Cup.

As a global centre of excellence, Alstom Spain's engineering centre and its technology laboratories located in Madrid are in charge of developing and implementing passenger safety and information systems on all the projects that the Alstom Group carries out in the region.

As an example, Alstom Spain is developing the passenger safety and information system for three of the six lines making up the future Riyadh metro, the largest urban project in the world currently being developed.

Other teams are also implementing projects in the region, such as the infrastructures area, which has developed the electrification systems of around ten tram projects in Algeria. Regarding projects of the railway maintenance unit, we could highlight the projects executed in Tunisia, Israel and Algeria, where Alstom Spain has fine-tuned the braking systems of various tram units.

SOME MAFEX MEMBERS WITH

AMURRIO FERROCARRIL Y EQUIPOS

Amurrio Ferrocarril y Equipos S.A. has supplied more than 50 AV4 model turnouts for ballast installation, designed and also manufactured to allow speeds up to 350 km/h in direct track and 170 km./h.in the deviated track.

Its design and manufacturing are taking into consideration the exceptional environmental and climatic conditions they have to endure.

The logistics of this project are also especially complicated, since there are pieces up to 54 m. length, which must be shipped from several ports of Spain.

CETEST

CETEST has been involved in some projects in Saudi Arabia. Supply and installation of train instrumentation for track measurements in Haramain project, on field dynamic test campaign on lines Riyadh - Al Hadita and Zabirah - Raz as Khair for SAR (CAF).

EMC and noise tests have already been scheduled. Previously, on field dynamic tests were also performed on line Damman - Riyadh for SRO.

In Abu Dhabi, CETEST developed EMC tests for a Sand remover in Etihad Rail Project.

IDOM

IDOM Consulting, Engineering, Architecture, a firm providing services in these specialist areas, has intensified its presence in MENA and Central Asia in recent years. As can be seen on our website (www.Idom.com), we now have 5 offices in the region. IDOM's contribution to railway development in these countries has been has been in the design and modernization of railway infrastructure of all types of rail transport (metro, tram, conventional rail). All the projects we develop involve the analysis and design of new urban transport lines including urban architecture and integration, the design of stations, workshops and depots, tracks, signalling systems, ticketing, energy, and information systems. The work we undertake allows these lines to be operated following international standards while considering local constraints.

IDOM has developed in the following infrastructure projects, from the previous studies (alternatives, demand, traffic, financial and economic studies), to the preliminary and basic designs, and the operations and maintenance plans necessary for the bidding of the works. On some of our projects, such as the tramway of Constantine in Algeria, we are also undertaking the supervision of the works and testing.

The following are some of the projects being undertaken by IDOM, which thanks to the investment by different railway authorities, will be providing service in the coming years.

- Almaty tramway (Kazajastan). 14 km of a new tramway (LRT) line, financed by the EBRD under a PPP scheme.
- Extension of line 1 of the Tramway of Constantine (Algeria). The 10.3 km line with 12 stations departs from the Zouaghi multimodal station to connect with the new urban development of Ali-Mendjeli.
- On the Metro of Algiers, IDOM is developing the Ain Naadja - Baraki section. Running over 6.2 km and with 6 stations, this line will connect these two congested districts to the city centre.
- On the Istanbul Metro (Turkey), IDOM is designing the Vezneceli- Sultangazi line, 17 km with 12 stations running east to west from Vezneciler to Sultangazi, and passing under the Famous Fatih Mosque district.

PROJECTS IN THE MENA REGION

ICON MULTIMEDIA

Saudi Arabia: The Ministry of Finance of the Kingdom of Saudi Arabia introduced a network of communication in customs with 36 large-format totems of high performance with the DenevaDS communication platform. The platform of ICON Multimedia was fully adapted into Arabic. The objective was to offer to all the people who pass by their customs offices, information and signage of diverse interest, mainly of the customs services that monitor the entry and exit to the country.

The whole of the content offered by Saudi Custom and Deneva comply with Sharia Law. Platform Deneva and also ICON Multimedia had to be approved in content Halal, being the 1st European Halal Certified in digital content.

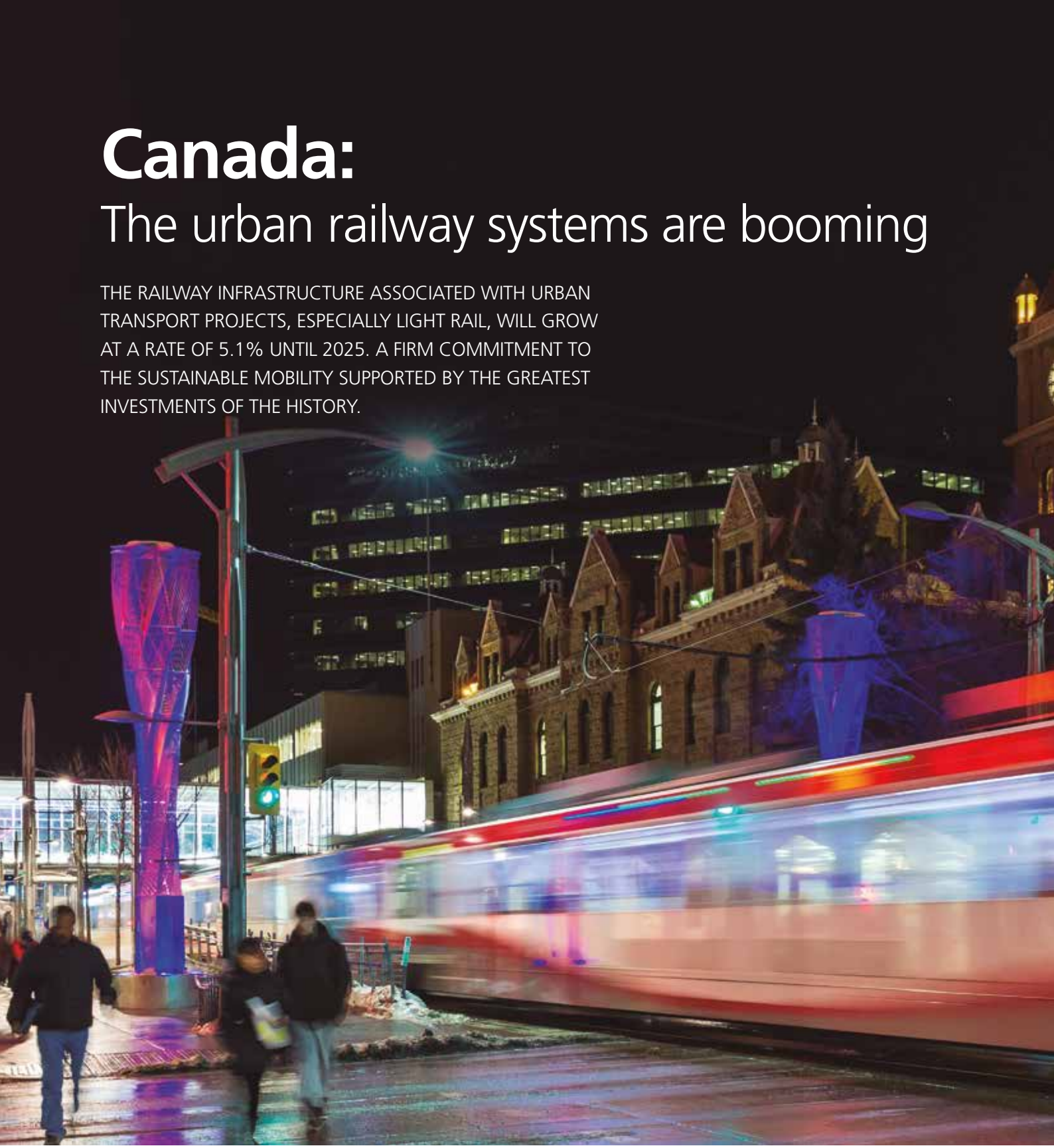
This project was awarded to ICON with The "Astrolabya Mariam to the Model of Innovation", for his contribution to the development of innovation through the concept 'halal' as well as the recognition CEX for Business Excellence in cases of international success.

Algeria: Within the project for the improvement of the railway line Thenia-Tizi Ouzou in Algeria, the Iberian Society of Electric Constructions, S.A. (SICE), implemented as a system of information management to the traveler DenevaDS transIT's new line of ICON Multimedia, the system manages the information on both monitors, indicators and a PA system of the ten stations that make up the line between the two populations, showing contents related mainly with the schedules of the services, in the Arabic, French and English. In total managing more than 80 devices.

As in the previous case, both the platform and the contents offered in line with the platform Deneva meet the Halal certification of digital content.

Canada:
The urban railway systems are booming

THE RAILWAY INFRASTRUCTURE ASSOCIATED WITH URBAN TRANSPORT PROJECTS, ESPECIALLY LIGHT RAIL, WILL GROW AT A RATE OF 5.1% UNTIL 2025. A FIRM COMMITMENT TO THE SUSTAINABLE MOBILITY SUPPORTED BY THE GREATEST INVESTMENTS OF THE HISTORY.



The public railway transport has become an increasing mobility option in many countries, including Canada. One of the most extensive territories in the world, ranked 2nd regarding the number of kilometers, it deals with its own peculiarities of climate and concentration of residents in very specific areas. Aspects that have made it essential to find a solution for the continuously growing demand for communication means in the main cities and their surrounding areas.

Light rail boom

All this, with infrastructures adapted to the particular features, such as the low temperatures registered. This is the reason for which the maintenance issue has so much weight.

At present, Canada has a population of 36.2 million inhabitants, but, despite its enormous expansion, it is condensed into large urban centers. Almost 90% is located at the border with the United States. Here is where, in the future years, a real "boom" of sustainable mobility systems will be experienced, with the regional and local administrations' clear commitment

Rail, light rail, tramway, commuter, etc. All these systems will concentrate Canada's largest infrastructure investments over the next decade.

to the light rail, which benefit from federal support. In particular, the most important projects will be developed in the provinces of Alberta, Ontario and Quebec. British Columbia and Manitoba joins them. The objective is to stop road congestions, to reduce the number of private vehicles and provide a fast, efficient and environmentally friendly urban transport system. A new mobility model that also transforms lifestyle while travelling to big cities and their surrounding areas.

The largest light rail projects are in the provinces of Alberta, Ontario and Quebec.

Sustainable mobility

The federal administration, being aware of the growing need to strengthen the urban public transport, has responded with a strong investment for the future years. This is the "New Building Canada Plan" (NBCP) program in force until 2025. This plan has an investment of 53,000 million Canadian dollars (36.9 M€) for infrastructures at provincial, territorial and municipal levels. This plan carries on with the investment path of the previous "Building Canada Plan", which was in force during 2007-2014; therefore, the total sum allocated for infrastructures amounts to 60,000 million Canadian dollars (41,800 M€), for the period 2014-2025.

Investment stages

In 2016, the federal government approved an investment of 120,000 million Canadian dollars (83,600 million Euros) in 10 years, besides an additional amount of another 60,000 million Canadian dollars (41,800 million Euros), which will be distributed in two stages. In the first stage, 3,400 million Canadian dollars (2,300 M€) is allocated for a period of five years for water treatment and "green infrastructures", with the aim of achieving more efficient transport.

Structure of the urban transport sector

More than 95% of the public infrastructures belong to the provin-

ces and municipalities. However, since 2006, the federal government has allocated certain amounts for the construction and modernization of light and heavy rails, as well as commuter lines, participating in improving the citizens' quality of life and the progress of the country.

Commuter lines

As regards the railway commuter lines, there are currently 13 major lines that are managed by the respective regional transport agencies. The most important are the "Agence Métropolitaine de Transport", which manages and coordinates the five lines operating in Montreal or "Translink" in Vancouver, in charge of the network linking the city to Mision through the "West Coast Express" service. "Toronto Go Transit", which has seven commuter lines covering this urban area, is also operating.

The Federal Government, through the Ministry of Transport and Infrastructures, Communities and Intergovernmental Affairs, ensures the financing and support in order to implement the many existing projects, especially the light rail. An activity that is carried out by several public entities such as "Infrastructure Canada", "PPP Canada" or "Transport Canada".

The major amounts are concentrated in the areas with the largest population in the country, Alberta, Ontario, Quebec and British Columbia.

There, the respective Transport Departments of each Government and its organisms are responsible for the impetus given to infrastructures. It should be noted that many of these projects outstand with Public Private Participation (PPP) formulas.

In the areas of greater population, there is a great demand of public transportation systems.

Canada has the first five light rail projects in North America.

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Stadler provides a comprehensive range of products in the commuter rail and railway segments: high-speed trains, intercity trains, regional and commuter rail trains, underground trains, tram-trains and trams. In addition, Stadler manufactures mainline dual-mode locomotives, shunting locomotives and passenger carriages, including the most powerful diesel-electric locomotive in Europe. Stadler remains the world's leading manufacturer in the rack-and-pinion rail vehicle industry. www.stadlerrail.com

STADLER

History of urban systems

Until recently, the network's great weight has always been represented by the freight transport, followed by the passenger transport on long distances. Therefore, the urban systems have a short existence when compared to other European countries where they have been rooted longer as mobility means in large cities. The first steps were taken in Toronto in 1954 and in Montreal in 1966. Since then, lines and routes have been added. The first light rail branch from Edmonton (Edmonton Light Rail Transit) was completed in 1978. A few years later, in 1981, Calgary also added to its network a line of these features. It is followed by the Vancouver Sky Train, which enters in commercial operation in 1986 and the O-Train, in Ottawa in 2001.

New lines under construction

The construction associated with the development of railway transport is so important that the public works associated with this subsector will have an annual average growth of 5.1% between 2014 and 2025. In particular, the major players are the urban railway projects, such as the "Eglinton Crosstown Light Rail Transit" in Toronto. This ambitious initiative benefits from one of the largest public-private partnerships in the world.

Canada follows the path of its commitment to

the railway regarding the development of cities.

The largest projects

In fact, the five largest urban transport projects in North America, all of them involving the light rail, are in this country: Valley Line (Edmonton-Alberta), Eglinton Crosstown Light Rail, Transit and Finch West (Toronto-Ontario), Hurontario-Main Street LRT (Mississagua/Brampton-Ontario) and Confederation Line (Ottawa-Ontario). New lines under construction in these provinces and others are added. For example, in Ontario, the Kitchener-Waterloo light rail (K-W Light Rail); and in Quebec, the "Quebec City LRT" network. In British Columbia, there are two outstanding projects. On one hand, in Vancouver, the "Dowtown Streetcar"; on the other hand, in Victoria, the "Douglas Street Light Rail". In the Province of Manitoba, in the capital, another network of these features called "Winnipeg Rapid Transit" is also in place. As regards the heavy rail, Toronto is working on the expansion of the current network. This is the well-known project "Toronto-York Spadina" Subway Extension Projects (TYSSE), which exceeds the investment of more than 3,100 million Canadian dollars (2,096 M€).

The light rail will play a major role in the urban transport and the main investments.

Light rail and tramway networks, an increasing option in Canada and the world.

Together with the main infrastructure projects, they will promote urban railway transport systems with amounts allocated for the rolling stock modernization, procurement of new trains and rehabilitation of lines.

MAIN "INFRASTRUCTURE CANADA" PROJECTS

Project	Province	Federal funds	Total cost
Light Rail Trasit Traction Power Upgrades	Alberta	10,000,000,00€	30,000,000,00€
Light rail vehicles (LRVs)	Alberta	12,500,000,00€	25,000,000,00€
Renovation of light rail stations	Alberta	13,485,000,00€	26,970,000, 00€
Design of the NAIT-Blatchford light rail line	Alberta	13,001,000,00€	26,002,000,00€
Preliminary design of the Blatchford-Campbell light rail	Alberta	19,501,000,00€	39,002,000,00€
Procurement of train sets	Ontario	20,000,000,00€	40,000,000,00€
Light rail (2nd stage): Engineering	Ontario	45,000,000,00€	90,000,000,00€
Program for the rehabilitation of switches and crossings	Ontario	11,470,000,00€	22,940,000,00€
Fich West light rail: first works	Ontario	25,000,000,00€	50,000,000,00€
Track rehabilitation program	Ontario	14.097,500,00€	28,195,000,00€
Train door monitoring systems (T1 & TR)	Ontario	17,569,500,00€	35,138,000,00€
Rail cars for T1 (Rehabilitation)	Ontario	11,191,500,00€	22,383,000,00€
Rehabilitation of underground trains	Quebec	17,500,000,00€	35,000,000,00€
Procurement of new rolling stock	Quebec	20,500,000,00€	51,500,000,00€
Rehabilitation of the rail infrastructure (Phase I)	Quebec	49,900,000,00€	105,100.000,00€

VALLEY LINE (EDMONTON)

Edmonton's new light rail line in the Province of Alberta will be the so-called "Valley Line". It will be built between 2016 and 2020.

The route has 27 kilometers. Its complete development has been scheduled in several stages.

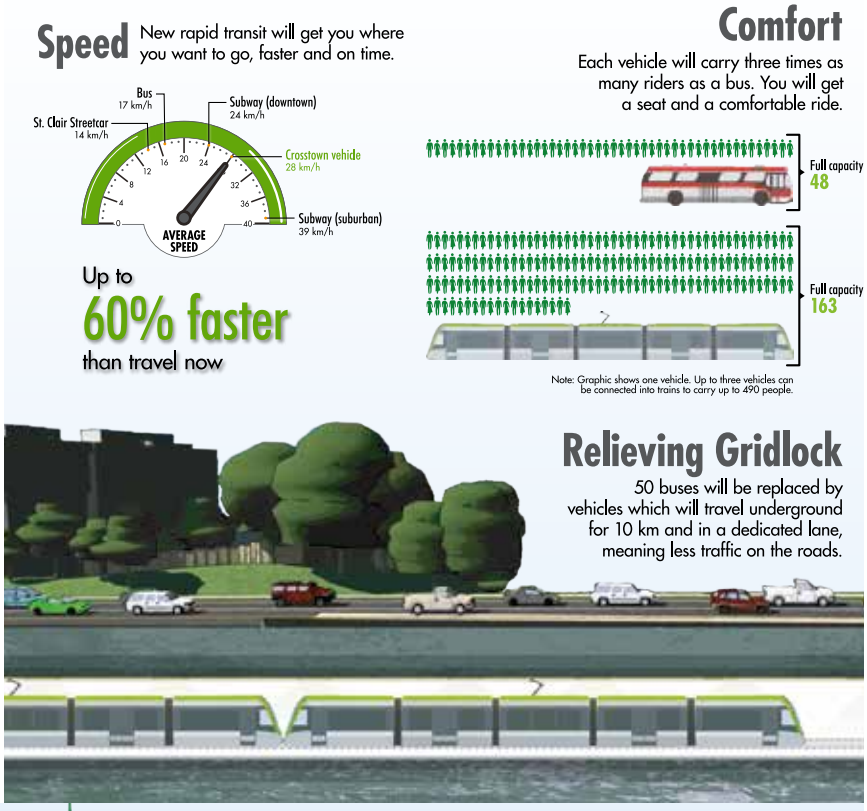
The first of them, of 13 kilometers, partly South-East from the center at Mill Woods. It will have 11 surface stations and an exchanger in Churchill Square to access the rail lines and the light rail network "Capital LRT", running from North-West to the South of the city. This first stage benefits from an investment of 1,800 million dollars (1,257 M€) and is entrusted to a public-private partnership (P3).

EGLINTON CROSSTOWN LIGHT RAIL TRANSIT (TORONTO)

In 2008, the provincial transportation company, Metrolinx, approved the regional transportation plan "The Big Move", for the next 25 years, with projects amounting to 50,000 Canadian dollars in Toronto and Hamilton (GTHA). One of the priority initiatives is "Eglinton Crosstown Light Rail Transit", with an investment of 5,300 million Canadian dollars (3,700 M€) to improve mobility in Toronto.

It is a 19-kilometer light rail network that will run from Eglinton Avenue to Kennedy Station and will include a 10-kilometer underground section.

These works benefit from the Spanish experience of companies such as ACS and Dragados, through its Iridium and Dragados Canada subsidiaries with Aecon. The construction is currently ongoing and will enter into commercial operation in 2021, according to the planned calendar.



FINCH WEST LIGHT RAIL (TORONTO)

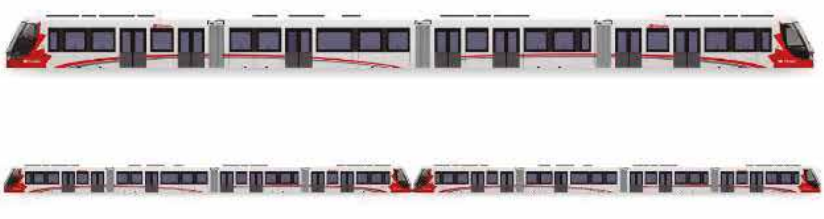
Among the first five light rail projects in North America, there is also the "Finch West LRT". It is an 11 kilometers line that will cross 13 neighborhoods in the Northwestern side of the City of Toronto. It is estimated that in 2031, due to its high capacity, it could serve about 2,800 passengers per hour in the sections of greater demand. In March 2016, ACS, in consortium with Aecon and CRH, was invited in the bid regarding the design, construction, financing and maintenance contract for this line, amounting to about 870 million Euros. A summons performed by the Department of Infrastructures of Ontario and the transport agency of the city. The network will have 18 stops and will include an underground exchange station on Keele Street. In addition, there will be links to the "Finch West Station" and to the new Toronto-York rail extension.

CONFEDERATION LINE (OTTAWA)

In Ottawa (Ontario) the light rail branch "Confederation Line" is under construction. The line will be part of the "O-Train" network managed by the OC Transpo Company. According to the action plan, it will be commissioned in 2018 and it will replace part of the city's bus service. The contract was awarded in 2012, with a budget exceeding 2,100 million Canadian dollars (1.484 M€), which has made this initiative the largest in terms of infrastructures approved by the City Hall. The second stage amounts to 3,000 million Canadian dollars (2.121 M€) for the line's expansion with four or five stations to the East and another ten to the Western section. The rolling stock is from Alstom, 34 units of the Citadis Spirit model.

HURONTARIO-MAIN STREET LIGHT RAIL (MISSISSAUGA AND BRAMPTON)

The Ontario Government has allocated an amount of 1,600 million Canadian dollars for the "Hurontario-Main Street" light rail. The network will have 23 kilometers, running between Mississauga and Brampton. The route will include up to 26 links to many of the region's transit lines, such as the Kitchener West, Milton and Lakeshore or Brampton Zum train lines. It is expected to reach 35 million passengers per year by 2031.



TORONTO RAIL NETWORK EXTENSION

With the "Toronto-York-Spadina Subway Extension" project, 8.6 kilometers of network will be added so as to link the Toronto rail from Downsview Station to the Municipality of York, also running by its University. It will have six new stations and its commissioning is expected to be later this year.

RÉSEAU ÉLECTRIQUE MÉTROPOLITAIN (REM) (MONTREAL)

REM, Réseau Électrique Métropolitain is a light rail project (LRT) that will have 67 kilometers. It will be the third largest automatic railway network of these features in the world. It stems from the proposal of the CDPQ Infra Body, belonging to the Caisse de Dépôt et Placement du Québec.

The objective is to provide a modern, fast and environmentally friendly urban transportation system to the major metropolitan areas of Montreal.
The system will link the urban center with the South Coast, West Island (Sainte-Anne-de-Bellevue), North Shore (Deux-Montagnes) and Pierre-Elliott Trudeau International Airport.
This light rail will help reducing the greenhouse gas emissions (GHG) by 16,800 tons per year. This initiative was announced last year and its commissioning is expected by the end of 2020. Montreal has chosen to include a light rail network considering it as a comprehensive, efficient and reliable public transportation system.

LIGHT RAIL SURREY-NEWTON-GUILDFORD (VANCOUVER)

The "Surrey-Newton-Guildford" light rail is the first of the two stages of the regional transport network for South Fraser. The project will provide street-oriented light rail transit along King George Boulevard and 104 Avenue, connecting Surrey City Centre, Newton Centre and Guildford Town Centre with high-quality rapid transit.

HAMILTON LIGHT RAIL (ONTARIO)

The City of Hamilton, Ontario, is close to signing an agreement with Metrolinx, the provincial transportation agency, to build the first light rail line. The works are scheduled to start in 2019, while the inauguration is scheduled for 2024. For this project, provincial funds of 1,000 million Canadian dollars (790 M€) were approved in May 2015. In February 2017, Infrastructure Ontario tendered the design, construction, operation and maintenance of this Light Rail Transit (LRT). This tender includes 11 new kilometers between McMaster University and Queenston Circle and 14 stops, as well as a first batch of rolling stock. The construction of the first phase will be completed this year and it will be inaugurated in 2018.

K-WLIGHT RAIL: KITCHENER-WATERLOO LIGHT RAIL (ONTARIO)

This transportation system, which is built in the Waterloo region, will link the three major urban centers of the cities of Cambridge, Kitchener and Waterloo. In a first stage will be performed a section of 19 kilometers.

This "Stage 1" includes the construction of LRT from Kitchener to Waterloo. The idea is to provide new mobility means, as the Ontario region is expected to increase population by an additional 200,000 inhabitants in the next 20 years. It has been designed to replace the era of the automobile.

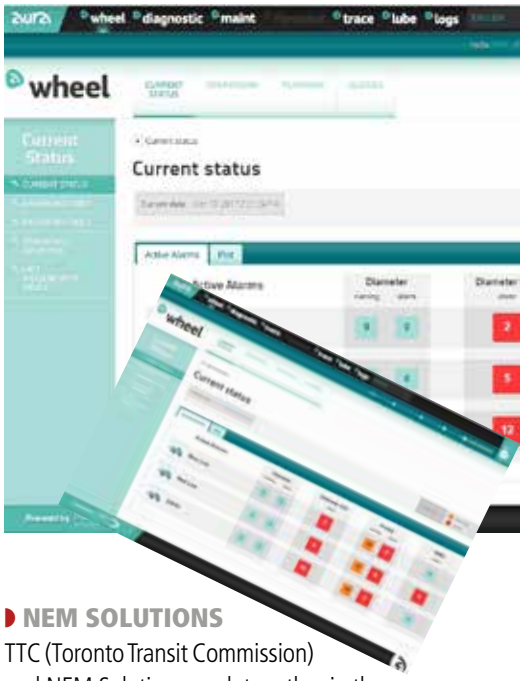
LRT will operate separately from traffic, making it a more efficient, reliable, comfortable, convenient, and effective way to travel.

SOME MAFEX MEMBERS WITH

IDOM

IDOM Consulting, Engineering, Architecture, a leading European firm providing professional engineering services in these fields, is an independent company founded in 1957. IDOM has an office in the city of Mississagua, Canada. Having designed over 764 km of tram lines in more than 42 cities in 19 countries (Sweden, Denmark, Spain, Portugal, Ecuador, China, Algeria, Macedonia, among others), IDOM firm has extensive experience in developing urban light rail transit (LRT) projects. We have provided support to international contractors in tendering for projects in Canada, such as the Ottawa LRT, Eglinton LRT...

IDOM's activity in Canada is not limited to railway infrastructure. We have also participated in large-scale projects in country such as a 2x40 MW Biomass Plant in British Columbia or the White River hydraulic Project. This means that as an engineering firm, IDOM has a deep knowledge of the region and its regulations.



NEM SOLUTIONS

TTC (Toronto Transit Commission) and NEM Solutions work together in the early detection of wheel defects thanks to the installation of two WILD (Wheel Impact Load Detection) systems and the advanced railway wheel wear management tool A.U.R.A wheel. The WILD systems supplied by NEM Solutions are installed in the YUS Line (Yonge-University-Spadina) and the BD Line (Bloor-Danforth). AURA wheel (the world's most advanced railway wheel wear management platform, with over 58 million wheel measurements, and counting) and NEM Solutions enable advanced railway wheel wear management thanks to expert industry knowledge that results in the optimization of life cycles.

CETEST

CETEST performed ride quality and vibrations testing on Diesel Multiple Units manufactured by Japanese manufacturer Nippon Sharyo for Metrolinx Toronto. The aim was to check that the vehicle had a smooth ride without abnormal vibration during the operation on the service track.

URBAN TRANSPORT PROJECTS IN CANADA

ALSTOM SPAIN

Alstom Spain, from its Information Technologies Solution Centre located in Madrid, is developing the passenger safety and information system for Ottawa's new light rail system, which Alstom is developing in consortium with ACS.

Alstom Spain's engineering centre and technology laboratories are responsible for designing and running the central system that will manage video surveillance, public address and passenger information displays, both in the stations and on the trains. It will also implement the internal wireless communications network (radio communications based on TETRA) for operations and maintenance.

Overall, the system will ensure safety of passengers who will use the first light rail network of the Canadian city, which will begin operating in 2018. The technology developed by the Alstom Spain teams has the capacity to simultaneously manage million pieces of data regarding the status of the lines, incidents at stations, alterations in electrical power supply, operational management, schedules and safety warnings, thereby providing information in real time to both the passengers and the operator.

SICE

SICE has been awared of the integrated controls and communication equipment in the expanded wilson yard and new wilson yard substation north in Toronto. The Toronto-York Spadina Subway Extension Project is undertaking an extension of the existing Spadina Subway Line from Downsview Station, in the City of Toronto, to the Vaughan Corporate Centre.

To accommodate the extra trains required by the subway extension, extra storage tracks are required to store the trains in Wilson Yard.

In this project, SICE is in charge of the supply, installation, testing and commissioning of communication equipment, that includes 26 Harsh Environment Telephone, 21 Emergency Trip Switchs and Emergency Trip Control Cabinet, Station Control System Cabinet, RF radiant and non-radiant coaxial cable and Fiber optic cable and Fiber Optic Cabinets.

CBM: Condition-Based Maintenance strategy implementation service

NEM SOLUTIONS LAUNCHES CBM (CONDITION-BASED MAINTENANCE) STRATEGY IMPLEMENTATION SERVICE.

NEM has been providing the market with a new potential service since 2016. It consists of the definition of a customised Roadmap to help their customers achieve a competitive implementation of a CBM (Condition-Based Maintenance) strategy.

The results have been outstanding and the most important thing is the collaboration and trust-based relationship that is created between the customer and NEM. Moreover, through this service, NEM also ensures the correct and necessary digital transformation inside companies (processes and people) when it comes to implementing this kind of technology.Nowadays, Industrial innovation is about Data and the information that can be obtained through it (the so-called Big Data era, the Internet of Things or Industry 4.0). Technological companies are specialising on the acquisition, storage, knowledge and analysis of big amounts of data in order to maximise the use of such data and turn it into key information for companies.

In the Railway Maintenance Industry for instance, the technological advances are growing exponentially and so are the CBM (Condition-Based Maintenance) solutions that can be found in the market. However, NEM's client's day-to-day reality may not be at the same level, and here is when uncertainty and the lack of knowledge in customers may be increased. It is when we should stop and start thinking and reflecting.

We need to understand the client's present day situation with the clear objective of helping them choose the best way to reach their goal. Many times it is not about implementing the most advanced technology in the market and waiting it to change their Business. It is about listening to our customers in order to understand whether they are prepared for it or not. And if not, help them define the Roadmap that will ensure the correct implementation.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Video analysis as a complement to tram signalling

THE TEAM FROM THE ALSTOM DIGITAL MOBILITY CENTRE OF EXCELLENCE LOCATED IN MADRID IS ALREADY WORKING ON A SOLUTION THAT WILL COMPLEMENT TRAM SIGNALLING SYSTEMS, AIMED AT AVOIDING COLLISIONS AT URBAN INTERSECTIONS.

How can coexistence between trams and vehicles be improved? Intersections and the daily coexistence between different traffic systems are at the heart of most tram collisions. The solution? Taking some of the devices of the autonomous car, such as cameras, sensors and radar, and applying them to tram signalling.

The team from the Alstom Digital Mobility Centre of Excellence located in Madrid is already working on a solution that will complement tram signalling systems, aimed at avoiding collisions at urban intersections.

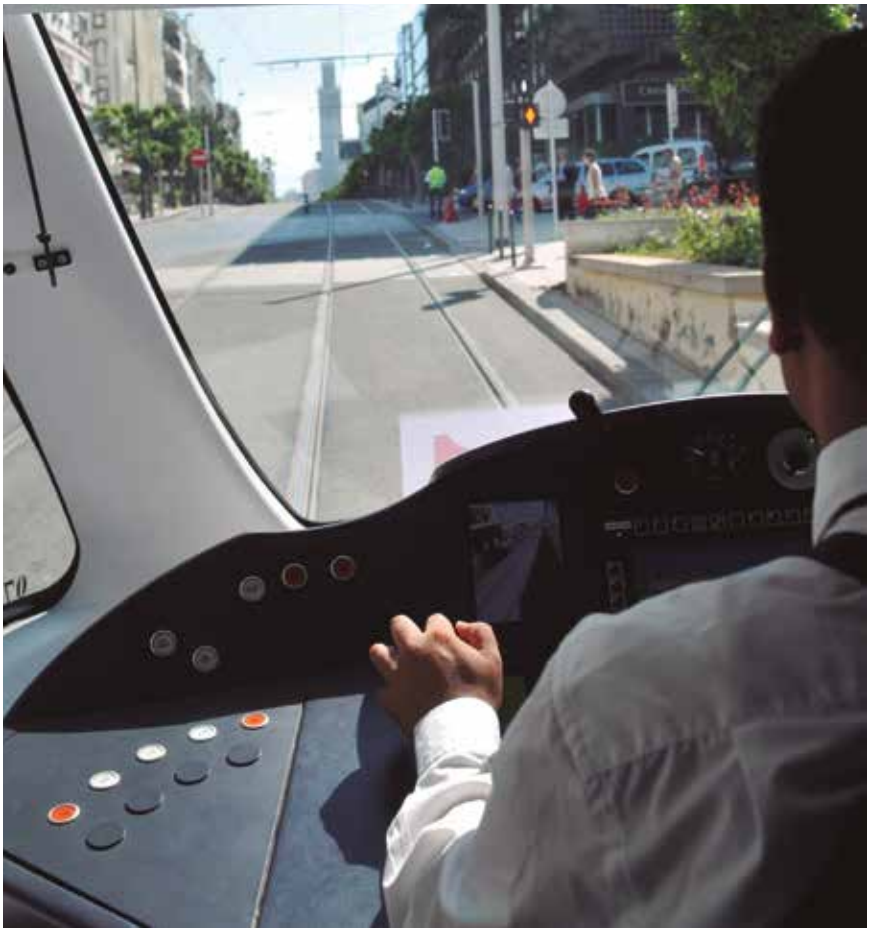
The experience in the tramway system currently in service says that the majority of accidents in crossroads are not caused by the tramway but by the other vehicles.

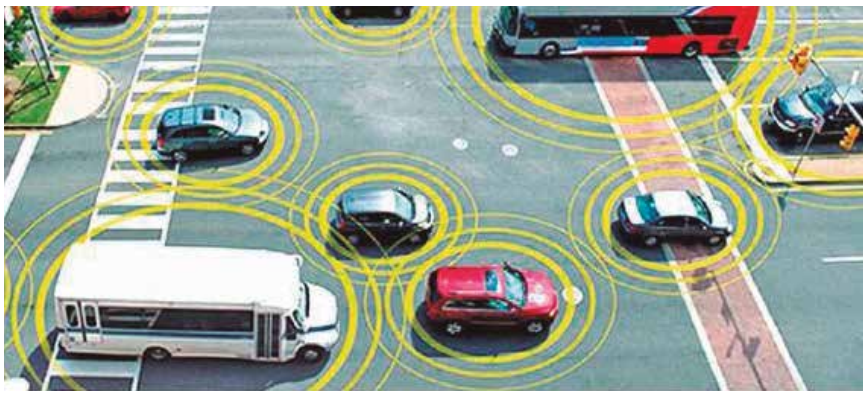
Conventional protection systems for trains (ATP) or driverless systems (ATO) provides extra protection against tramway driver errors, but does not mitigate accidents caused by cars, vans or motorcycles.

There are several behavior patterns of the vehicles nearby a crossroad which might cause an accident with a tramway that can be anticipated. For instance:

- A vehicle approaches a crossroad at a speed too high to halt with comfort before a red light
- A vehicle shows its intention to perform a left turn forbidden
- A vehicle still in the intersection zone with the tramway tracks
- A vehicle passing a signal at danger

The installation of additional technologies at these intersections, such as those used in autonomous cars, plus real-time computerised analysis of the data obtained, can detect these behaviours and warn tram drivers sufficiently in advance. Identification of these behaviours using cameras, radars and other sensors would, in this way, complement traditional railway signalling, thereby improving and complementing current safety systems.





Navigation system for Renfe trains, reinforcing signaling systems

GMV HAS BEEN SELECTED BY RENFE TO PROVIDE THE SYSTEM THAT WILL MONITOR THE INSTANTANEOUS SPEED OF THE TRAIN IN REAL TIME. THE CURRENT SCOPE OF THIS PROJECT INCLUDES THE 44 TRAINS THAT MAKE THE 130 AND 730 RENFE SERIES.

GMV has been selected by Renfe to provide the system that will monitor the instantaneous speed of the train in real time, alerting the driver if it does not meet the allowed values, both on the current section as in the next ones.

The project, called internally "navigation system as reinforcement of signaling systems" is an evolution of a first pilot study conducted by GMV on the Madrid - Albacete project.

The design of this system arises in the wake of the fatal accident in Angrois in July 2013. Based on the instantaneous velocity and other parameters such as the type of train and braking curve, this system is able to calculate the braking distance required for the train to reduce its speed to a value acceptable in the next section of the railtrack.

To calculate the current position on the raltrack, the system combines information obtained from an integrated high sensitivity GPS receiver with the train's own odometer, thus enabling the use in tunnels and areas of no GPS coverage. The system consists of one of GMV's standard OBUs (R-M20), connected to a touch terminal on the desk of the train, which will show all the travel information and travel plans to the driver, as well as the necessary warnings well in advance, should the train be required to slow down. The system also mounts a speaker that will issue an audible warning in the cab depending on the level of importance of the message.

Additionally, the system includes a maintenance module which allows to download the records containing, among others, the maximum speed excesses detected through an application that will also allow detailed analysis of all data stored by the system.

The current scope of this project includes the 44 trains that make the 130 and 730 Renfe series, which make the journey Albacete - Alicante, although it is expected that in the future be extended to other Renfe lines and trains.

Transformation project of the propulsion systems of 12 Madrid Metro units

BOMBARDIER TRAPAGA'S FACTORY WILL TRANSFORM THE PROPULSION SYSTEMS OF 12 MADRID METRO UNITS.

Madrid Metro has requested a project to transform 12 train units S3000 mono-tension (1500V) to bitension (1500V / 600V). The target of this project is to get more operation flexibility, so these units could be in operation on Line 5. This is done in parallel to infrastructure modernization executed in this line.

For that purpose, Bombardier will be the company responsible for the modification of the traction inverter, as well as the disconnector-circuit breaker box, including its transfers to both the Bombardier Trapaga's Factory and Madrid Metro site, to proceed with its final installation. The Bombardier MITRAC propulsion system will provide more flexibility in operation, as the metros can be used on different lines.

In addition, the Canadian company will also be responsible for the development of the new train software, as well as the supply of the bitension charging box and the filter reactance box, defining together with Madrid Metro the new stress curves for Line 5.

The contract has been get due to Madrid Metro reliance in Bombardier know-how and technology, in addition to the performance of the vehicle manufacturer consortium (CAF-BT-Siemens), which repeats the same agreement formula for the development of this new order.

Bombardier will also be responsible, together with Siemens, of the modification of the traction system elements, as well as to prepare the technical documentation of this system.

First unit should be ready by end of 2017 and the rest during 2018.

Transforming Transport Project: Big Data to improve mobility in Europe

THIS R&D&I PROJECT, WHICH DEMONSTRATE HOW THE USE OF DATA MAY IMPROVE MANAGEMENT AND SERVICES RENDERED TO CLIENTS IN THE LOGISTICS AND TRANSPORT SECTOR, INCLUDES A RAIL PILOT IN COLLABORATION WITH ADIF AND FERROVIAL AGROMAN.

Indra leads the R&D&i project Transforming Transport, which intends to be the tangible demonstration of how massive amounts of data generated by the transport and logistics sector can be exploited in an innovative way using state-of-the-art big data technologies to improve the management of mobility and services rendered to users.

This project is one of the largest funded by the European Commission within the framework of the Horizon 2020 program, both in terms of budget, €18.7 million, as well as with the participation of 47 partners from Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, United Kingdom and Spain, including some of Europe's leading infrastructure managers and transport operators.

Transforming Transport includes 13 pilot projects that will be implemented in several countries and in different areas of transport: roads, airports, ports, rail infrastructures, sustainable connected vehicles, integrated urban mobility and logistics. In each of these areas, new algorithms will be developed and tested, based on existing big data technologies, that allow for integrating and analyzing real data from diverse sources, developing transport patterns and exploiting these in a way that is most suitable for decision-making.

Indra leads, furthermore, four Transforming Transport pilot projects. Among these, we are going to launch, in collaboration with Adif and Ferrovial Agroman, a rail pilot project for the high-speed section between Cordoba and Malaga, in Spain. Big data technologies will be used to improve the management of the line's maintenance works, optimize available resources and reduce maintenance costs based on integrating, processing and modeling different data sources: maintenance, information on assets, traffic data, topology, superstructure data and meteorological information. Real-time predictions will also be made on the impact of maintenance on certain events for rail traffic management.

Tangible benefits

The three main advantages that big data may contribute to the transport sector, and which the Transforming Transport project will address, are the improvement of efficiency, services rendered to clients and the possibility of generating new revenues or business models.

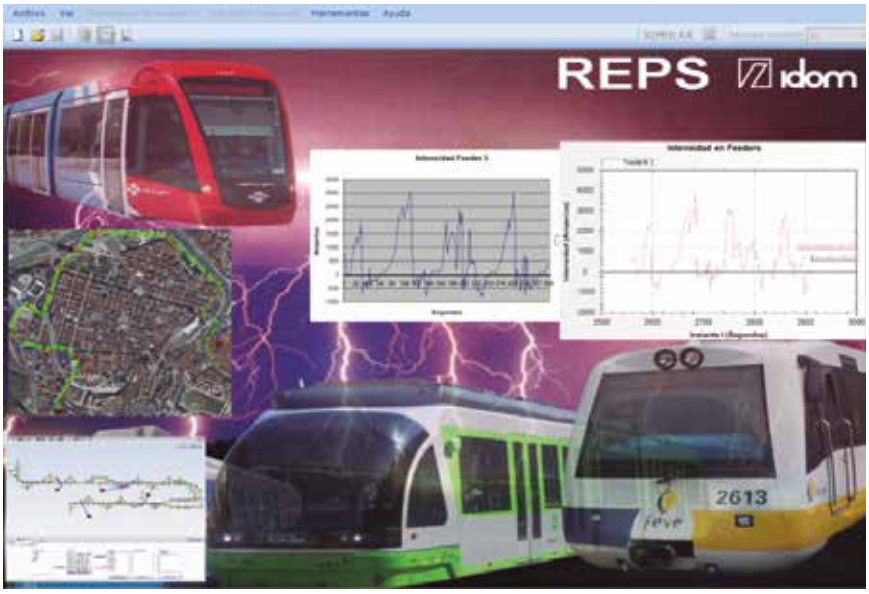
It is calculated that the use of big data may improve operational efficiency of processes and services linked with transport by, at least, 15%, optimizing the use of resources and reducing maintenance costs, fuel consumption or incidents, among others.

Likewise, these technologies make it possible to offer a more personalized service adapted to the clients' needs, while also contributing to the optimization of passenger flows, reducing waiting times and goods delivery, and avoiding failed connections between different modes of transport, among other benefits. All of this will improve user satisfaction and will generate repeat business.

The use and exploitation of data may also lead to new sources of income and, even, new business models, based on a better knowledge of travelers' preferences or travel patterns, for fields like tourism or advertising.

Optimizing the calculation of energy consumption for Tramway Networks

IDOM IS WORKING ON OPTIMIZING THE CALCULATIONS OF THE ELECTRICAL INSTALLATIONS OF TRAMWAY NETWORKS USING THE REPS (RAILWAY ELECTRICAL POWER SIMULATOR) TOOL.



REPS is a specialized software tool, developed entirely by the IDOM R+D+I team, for the simulation and analysis of railway electrical networks, together with the analysis of the planned operating grids. This software has been used in the design of the Tramways of Bilbao, Murcia and Zaragoza (Spain), Lund (Sweden), and Ring 3 Copenaghe (Denmark).

The design of electrical installations for a tram network, especially substations requires a great deal of adjustment, to minimize the size and insertion of the substations in the city. Also factors such as EMC (electromagnetic fields) and energy regeneration are key aspects to be considered when designing in an urban environment.

The REPS simulator developed by IDOM has a powerful Graphical Interface to visualize / interact all the elements, creating different scenarios on the tram network and on the electrical system and analysing an endless number of operations situations, even in degraded mode. The entire tramway network is simulated at once, both electrically and with different variants of the grid operations.

The electric model is adjusted to real values measured during existing operations and can be calibrated with real measurements for each client in the case of in-service trains.

The main innovations that have been incorporated into the software for the analysis of the tram networks with respect to other conventional models of energy analysis are:

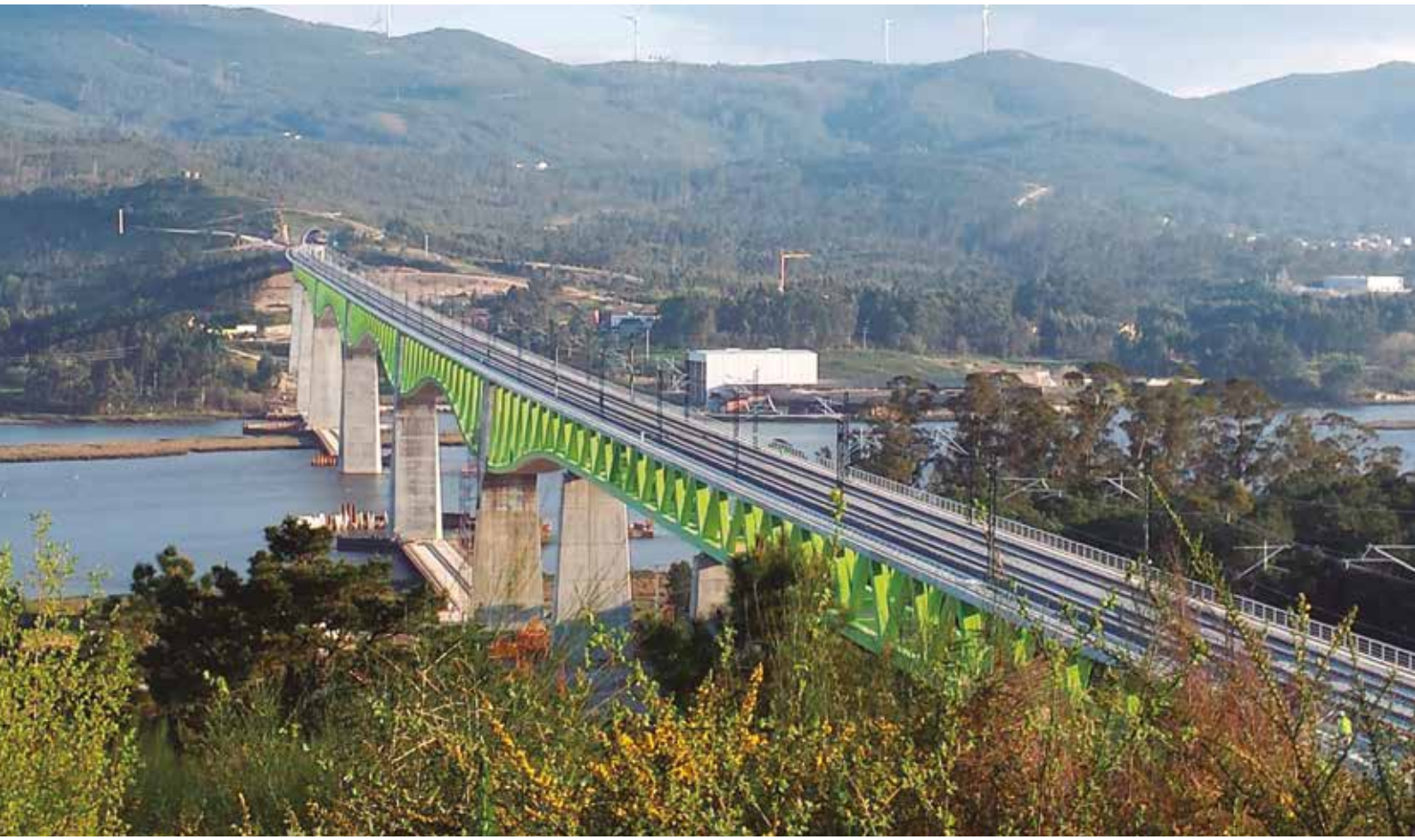
1. Bi-directional substations can be set up, in order to achieve a preliminary analysis of the recovery of braking energy systems, determining the return to the electric network. With this feature, the installations can be designed taking into account the energy recovery and the power of the equipment of return of energy to the network, thereby reducing the installed power.

2. The tool also integrates a module to calculate the currents in the overhead contact line, with continuous recording serving as input data for the calculation of electromagnetic fields. This allows electromagnetic compatibility (EMC) analysis in frequency ranges outside the regulatory analysis (between 0 and 9 kHz), which could affect sensitive equipment, typically located in hospitals, universities or scientific centres, which may be located close to tram networks.

3. The capacity of stored energy can be evaluated for the units required to circulate in "Free Catenary" sections or without contact line (system with batteries in the rolling stock).

4. The energy quality of a line can be analyzed, calculating the losses by the Joule effect in conductors as well as the percentage of energy burned in them, in relation to all the energy supplied.

The implementation in the IDOM calculation algorithms tool, highly optimized, reduces the analysis times, allowing the entire alignment to be evaluated, in reduced periods of time and obtaining a more global and detailed analysis of everything related to the energy supply of tramway infrastructure projects.



Lateral Wind Prevention System

SICE, IN COLLABORATION WITH THE SPANISH RAILWAYS INFRASTRUCTURE ADMINISTRATOR (ADIF), HAS DEVELOPED AN ALGORITHM TO PREDICT THE DIRECTION AND FORCE OF THE WIND AT THE EXIT OF A TUNNEL FOR A HIGH-SPEED LINE. IT HAS BEEN IMPLEMENTED IN THE ULLA VIADUCT ALONG THE ATLANTIC AXIS BETWEEN SANTIAGO AND VIGO IN GALICIA.

SICE, in collaboration with the Spanish Railways Infrastructure Administrator (Adif), has developed an algorithm to predict the direction and force of the wind at the exit of a tunnel for a high-speed line. It has been implemented in the Ulla viaduct along the Atlantic Axis between Santiago and Vigo in Galicia.

With the Aquilón application in the Ourense Control Centre, operators receive in real time the lateral wind prediction alarms on the viaduct and can take speed reduction measures and communicate them to the train. Solution uses information from three weather stations that measure wind direction and speed, but also barometric pressure, temperature, relative humidity, and dew point.

The algorithm makes a 10-minute prediction and provides information with current alarm levels and for the next 10 minutes, historical data and trend graphs.

For this purpose, a wind characterization study was carried out on the viaduct of Ulla and its surroundings. It used data from the stations installed in the viaduct and also historical data of the stations of the Spanish Meteorological Agency.

It has been shown that the 10-minute prediction against real values has a sufficient and reliable precision.

In the implementation carried out in the Ulla viaduct, alarm thresholds have been settled and temporal speed restrictions (TSR) have been assigned by train typology. This was based on the ADIF documentation (MPGI sheet 3 "Actions against windstorms" and experimental consignment C Number 15 "Requirements for the circulation of trains with very strong winds").

Interoperable ATO over ETCS: Towards the automation of mainline

INTEROPERABLE ATO OVER ETCS IS THE KEY CONCEPT FOR FUTURE EUROPEAN-WIDE AUTOMATION OF MAINLINE RAILWAY OPERATIONS. AN EARLY IMPLEMENTATION PROJECT IN THE MEXICO-TOLUCA LINE IS ALREADY RUNNING UNDER THIS CONCEPT. VALUABLE EXPERIENCE AND FEEDBACK IS EXPECTED FROM THIS PROJECT, LED BY CAF SIGNALLING.

The application of Automatic Train Operation in conjunction with ETCS Level 2 is being pioneered on a new line project in Mexico. This very early implementation, coordinated and developed by CAF Signalling, is the Mexico-Toluca commuter line. This is a new line of 58 kilometres of double track, electrified at 25kV AC, with five new stations that will give service to more than 800.000 people.

This high-density commuter line has been designed according to usual "distance to go" principles applied to metropolitan railways, with Grade of Automation GoA2 for train operation.

Driving between stations will be automatic, and drivers will be required to close doors and operate the train during periods of disruption.

The implementation of ETCS is according to the SRS 2.3.0d (Baseline 2). Although the works for developing the ATO over ETCS specifications have been made in the context of Baseline 3 ETCS, this early implementation is demonstrating that it works also with Baseline 2.

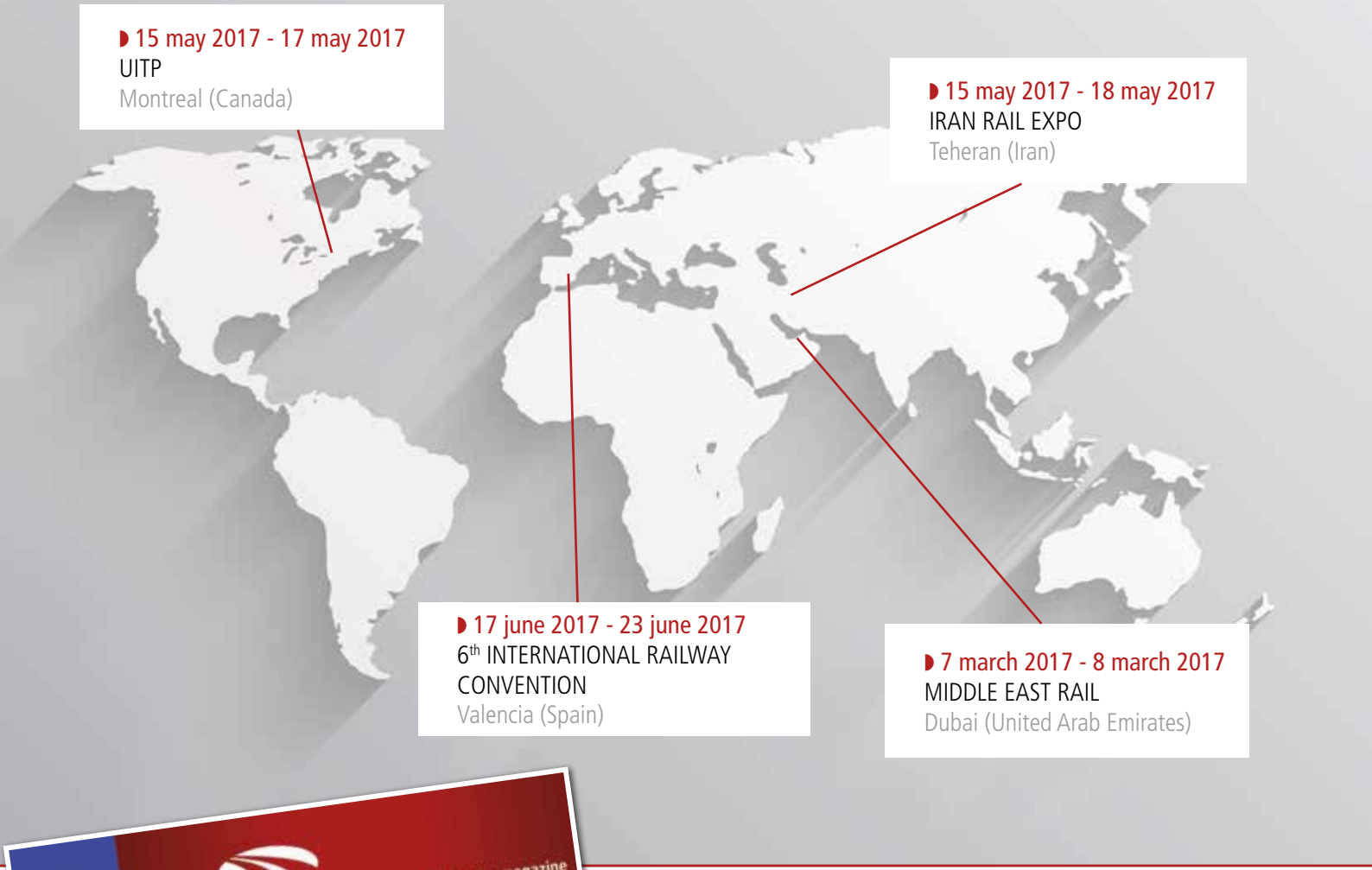
Conclusions

The more significant conclusion is that a standard and interoperable approach to Automation at GoA2 is feasible, applying ETCS as the standard ATP to guarantee Safety and an ATO implementation according to the draft specs of the ATO over ETCS concept.ATO and ETCS have been put together with a high degree on functional independency between them.

ATO over ETCS is a powerful concept stressing interoperability and standardization. It can be applied to a specific line such as Mexico-Toluca with a project-oriented approach. But the concept itself is oriented to the wide, open railway system.

The key advantage is that an equipped train will be able to run with automatic driving in any equipped section of the network. This will simplify the deployment and the migration, decreasing the needed investments and providing higher benefits to the railway system operation.

PRESENCE OF MAFEX IN INTERNATIONAL EVENTS IN 2017



- 15 may 2017 - 17 may 2017
  UITP
  Montreal (Canada)
- 15 may 2017 - 18 may 2017
  IRAN RAIL EXPO
  Teheran (Iran)
- 17 june 2017 - 23 june 2017
  6th INTERNATIONAL RAILWAY CONVENTION
  Valencia (Spain)
- 7 march 2017 - 8 march 2017
  MIDDLE EAST RAIL
  Dubai (United Arab Emirates)

INFRASTRUCTURE

Engineering and consultancy

- Aquafrisch, S.L.
- Ardanuy Ingeniería, S.A.
- CAF Power & Automation
- CAF Turnkey & Engineering
- Colway Ferroviaria, S.L.
- Gantrex
- Getinsa-Payma, S.L.
- Idom
- Instalaciones Inabensa
- Ineco
- MB Sistemas, S.Coop.
- NEM Solutions, S.L.
- Newtek Sólidos
- Sener Ingeniería y Sistemas, S.A.
- Tecnivial Infraestructuras
- Typsa

Civil engineering construction

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

Electrification

- Alstom Transporte, S.A.
- Ardanuy Ingeniería, S.A.
- Arteche
- Getinsa-Payma, S.L.
- Idom
- Ineco
- Ingeteam Power Technology, S.A.
- Instalaciones Inabensa, S.A.
- La Farga Lacambra, S.A.U.
- Luznor
- Parrós Obras, S.L.
- SEMI, S.A.
- Telice
- Typsa

Fixed material: components and equipment

- Alstom Transporte, S.A.
- Amurrio Ferrocarriles y Equipos, S.A.
- Aquafrisch, S.L.
- Arteche
- Duro Felguera Rail, S.A.U.
- Elektra - Grupo Elektra, S.A.
- Faiveley
- HICASA - Hierros y Carbones, S.A.
- Idom
- Ikusi
- Instalaciones Inabensa
- Ineco
- ITK Ingeniería, S.A.
- JEZ Sistemas Ferroviarios, S.L.
- Parrós Obras, S.L.
- Redalsa, S.A.
- Siemens Rail Automation, S.A.U.
- Talleres Alegría, S.A.
- Thales España GRP, S.A.U.
- Valdepinto, S.L.

Security

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

Signaling and traffic control

- Alstom Transporte, S.A.
- Ardanuy Ingeniería, S.A.
- Bombardier España
- Cables y Comunicaciones Zaragoza S.A.
- CAF Signalling
- DSAF. Dinámicas de Seguridad
- Getinsa-Payma, S.L.
- GMV Sistemas S.A.U.
- Idom
- Ikusi
- Implaser 99, S.L.L.
- Indra Sistemas, S.A.
- Ineco
- Luznor
- P4Q Electronics, S.L.
- SEMI, S.A.
- SICE
- Siemens Rail Automation, S.A.U.
- Telice
- Tecnivial Infraestructuras
- Thales España GRP, S.A.U.
- Typsa

Maintenance

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

Stations

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

INFORMATION AND DATA SYSTEMS

Systems and equipment for collection and ticketing

- Alstom Transporte, S.A.
- Ardanuy Ingeniería, S.A.
- Calmell Group
- Ecocomputer

- Idom
- Ikusi
- Indra Sistemas, S.A.
- Manusa Door Systems
- SICE
- Thales España GRP, S.A.U.

Communications, Information systems and passenger information equipment

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

ROLLING STOCK

Passenger car manufacturers

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

Manufacturers of freight wagons

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

Fabricantes de locomotoras

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

EQUIPMENT AND COMPONENTS ROLLING STOCK

Traction and control systems

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

Components

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

Equipment and machinery for the manufacture of rolling stock

- Aquafrisch, S.L.
- Cetest
- Danobat
- ITK Ingeniería, S.A.
- MB Sistemas, S.Coop.

Interior

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

Security

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

Maintenance

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

Quality control, inspection and certification

- Tecnatom

ALBATROS, S.L.

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- www.albatros-sl.es

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

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

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

AL-KO

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  48220 Abadiano (BIZKAIA)
- P: +34 94 621 57 40
- F: +34 94 681 37 04
- erik.geluk@al-ko.es
- www.al-ko.com

AL-KO, a pioneer in the manufacture of shock absorbers in Spain, offers wide range of shock absorbers and suspension elements, backed by its engineering versatility that provides innovative technical solutions to meet the needs of its customers.

This fact has lead AL-KO, to carry out -in all its plants- major investments in research and testing facilities, as well as in expansions and refurbishments with the objective of implementing a flexible, efficient and profitable production, also in small series.

All this serves to make AL-KO a competent party in developing effective solutions in the field of suspension.

ALSTOM TRANSPORTE, S.A.

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  28027 Madrid (MADRID)
- P: +34 91 334 58 00
- F: +34 91 334 58 01
- german.ruiz@transport.alstom.com
- www.alstom.com

As a promoter of sustainable mobility, Alstom Transport is the only railway manufacturer present in the full spectrum of transport systems, equipment and services. The company offers a complete range of high performance products: rolling stock, signalling, maintenance and modernisation, infrastructure and integrated solutions. In Spain, Alstom Transport employs around 2000 people in 19 working sites, has a manufacturing site in Barcelona and develops R&D programmes both for rolling stock and railway signalling and safety projects.

The technological laboratory located in Madrid has become a benchmark for signalling projects throughout the world.

AMURRIO FERROCARRIL Y EQUIPOS, S.A.

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  01471 Amurrio (ARABA)
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- F: +34 945 89 24 80
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- www.amufer.es

Amurrio Ferrocarril y Equipos, S.A. is one of the international market leaders in the design, production and installation of railway materials. Our rolling stock interchanges and crossings are installed in high-speed rail lines, underground lines, tram lines, and conventional railways throughout Europe, Asia, America and Africa. In the area of metal foundry, we have the experience, the knowledge and the people to produce, process and mechanize machine tool parts and sets of great technical complexity in carbon steel manganese steel and other steel alloys.

AQUAFRISCH, S.L.

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

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

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

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

ARCELORMITTAL ESPAÑA, S.A.

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

ArcelorMittal is the world's leading steel and mining company and it is part of a small group of rail manufactures whose production has developed notably in the specialized high-speed, heavy- haul, metro, conventional lines and other applications are light rail and tram in the different qualities of normal carbon steel, micro alloyed and head hardened rails.

ArcelorMittal quality has been recognized by customers around the world, from Europe through Asia to Oceania, America and Africa.

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

ARDANUY INGENIERÍA, S.A.

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

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

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

In Spain, Ardanuy carries out work from offices in Madrid, Barcelona, Valencia, Seville and Tenerife. It also has offices in Lithuania, Poland, India, Colombia, Algeria and USA. Ardanuy has always had a marked international vocation. Currently over 90% of new contracts are won on the international market, in Western Europe: United Kingdom, Ireland and France; Central and Eastern Europe: Poland, Bulgaria, Latvia, Lithuania; America: Bolivia, Chile, Colombia, Mexico, Peru, USA; Africa: Morocco, Mozambique, Algeria, Egypt, South Africa; and Asia: India, Vietnam, Kazakhstan.

ARTECHE (ELECTROTÉCNICA ARTECHE SMARTGRID, S.L.)

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  48100 Mungia (BIZKAIA)
- **P: +34 94 601 12 00**
- **F: +34 94 615 56 28**
- **nac@arteche.es**
- **www.arteche.com**

Arteche Group's business is focused on providing equipment, applications and solutions for the electricity and railway sector worldwide. In power generation, transmission, distribution, industry, and railway technologies, the group has become a key player in the search for answers to new challenges. A position maintained by a deep knowledge of the different international electricity systems, efficient client-oriented organization and remarkable investment in research and development.

This is shown by over 50% increase in the brand references in the past five years. Arteche's decisions over the years made our group a symbol of reliability, quality and trust, both in solutions and in corporate relations. Corporate alliances have taken a key role in Arteches's history, becoming and asset which has contributed to our international growth and to the development of innovative solutions.

ASSIGNIA INFRAESTRUCTURAS, S.A.

- **Avd. Quitapesares 11**
  Pol. Emp. Villapark
  28670 Villaviciosa de Odón,
  (MADRID)
- **P: +34 91 567 28 70**
- **F: +34 91 571 96 28**
- **info@assignia.com**
- **www.assignia.com**

Assignia Infrastructures is a company that is part of the Essentium Group, which is based in Spain.

It has international experience in the development, execution, management and operations of large infrastructure projects of all kinds, including concessions and services.

Assignia has participated in all high-speed railway projects in Spain. Its experience is reflected in the various projects developed including infrastructures, superstructures, stations, new lines or renovations of lines in circulation that include: high-speed, conventional and sub-urban lines, trams and metros, the expertise in the sector is complemented by performing maintenance works thereof.

The in-house machinery park (available for widths 1,435 and 1,668 mm), the flexibility and international presence of the company in countries like Mexico, Venezuela, Turkey, Morocco, India, Algeria and Chile, gives Assignia an unquestionable distinction in the railway sector.

AZVI

- **C/ Almendralejo, 5**
  41019 SEVILLA
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- **ww.azvi.es**

Azvi is a hundred-year-old Company specialised in Civil Works whose origins are in railways, forming part of the history and evolution of the railways and its infrastructures in Spain and abroad.Throughout these years, Azvi has participated in numerous construction, rehabilitation, conservation and maintenance projects over more than 1,000 kilometres of track, of which almost 450 km have been High-Speed Rail built within the last 25 years.Azvi also has a large and modern machinery park which allows the company to carry out works with its own machines and a Logistics Centre equipped with modern facilities and state of the art resources in order to centralize a variety of support services to railway activity, such as MachineryPark, materials, maintenance, checking and repairing shops. Research and Development is also an important issue for Azvi. Through its own R&D department, Azvi invests in railway research and development, in collaboration with various public and private entities and investigation groups.

BOMBARDIER ESPAÑA

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  Complejo Triada-Torre A
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- **F: +34 91 383 61 98**
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- **www.bombardier.com**

Bombardier Transportation, a global leader in rail technology, offers the broadest portfolio in the rail industry. Bombardier Transportation Spain is one of the leading exporters of the Spanish

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

CABLES DE COMUNICACIONES ZARAGOZA

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

Founded in 1971, Cables de Comunicaciones has been steadily building its reputation as a respected business in the field of communications cables. Cables de Comunicaciones has cemented its position and its products are now used in over 50 countries around the world.
The company has a wide range of products that are certified according to the standards of the leading telecomm and railway operators in the majority of countries in Europe. It is dedicated to designing and developing excellent telecommunications, signalling, instrumentation, data and fibre optic cables.

CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A.

- **Padilla, 71 - 6 28006 Madrid (MADRID)**
- **P: +34 91 436 60 00**
- **F: +34 91 436 60 11**
- **caf@caf.net**
- **www.caf.net**

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

CAF POWER & AUTOMATION

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

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

CAF SIGNALLING

- **Avenida de la Industria, 50 28108 Alcobendas (MADRID)**
- **P: +34 91 798 27 50**
- **F: +34 91 661 37 51**
- **cafsignalling@cafsignalling.com**
- **www.cafsignalling.com**

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

CAF TURNKEY & ENGINEERING

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

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

CALMELL GROUP

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

- **calmell@calmell.net**
- **www.calmell.com**

The first company of the group, Calmell, S.A. was founded in 1970, focusing its activity on the manufacture or graphic products. Currently, the Calmell Group is the leader in access control and identification, through its companies Calmell S.A., Affix S.L., Idoneum S.A., which are respectively engaged in producing the supports (tickets, cards,…), developing specific software and hardware, personalization and security.

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

CETEST

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

Test and analysis services for:

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

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

Test services cover the following areas:

- Structural components.
- Running gear.
- Suspension systems.
- Vehicle dynamics.
- Noise and vibrations.
- Aerodynamics.
- EMC and energy consumption.
- Mechatronics.
- Special instrumentation (Instrumented wheelsets, instrumented pantograph).

COLWAY FERROVIARIA, S.L.

- **C/Botánica, 149-151**
  08908 L'Hospitalet (BARCELONA)
- **P: +34 93 414 65 12**
- **F: +34 936 39 8 610**
- **acolomerf@colway-08.com**
- **www.colway-08.com**

Colway Ferroviaria,S.L., company belonging to the COLWAY Group, specializes in the design, engineering, manufacture, supply, installation and commissioning of turnkey railway vehicle interiors. Through the integrated management of modular supplies, based on experience, knowledge, research and innovation, the company achieves the satisfaction of the needs and expectations of its customers: railway manufacturers and public administrations.

Colway capabilities include Modular System solutions for Rail Interiors as Toilet Modules, Front hoods, saloons, walls, Buffet, Restaurant areas, vestibules.

COMSA CORPORACIÓN

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- **www.comsa.com**

COMSA is the company of COMSA Corporación specialised in the construction of railway infrastructures. Founded in 1891, the company provides a comprehensive service in the field of railway construction and maintenance, electrification, and control and communication systems of high speed rails, conventional rails, metros and tramways.

In this business activity, it is leader in Spain, where has been involved in the construction of all high speed lines, and has permanent operations in Argentina, Brazil, Lithuania, Mexico, Poland, Portugal and Turkey. It has also taken part in a large number of projects in other markets such as Italy, the Philippines, Taiwan, Malaysia, India, etc. This extensive experience has been the key for its consolidation in the railway sector and has enabled it to become the leader in the railway construction industry.

DANOBAT

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- **www.danobat.com**

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

It gathers extensive experience and qualification in the rendering of services such as engineering services, equipment integration, complex project management, and collaboration with the customer all along the life of the project.

Danobat has a strong international presence and references in the most relevant customers.

DSAF – DINÁMICAS DE SEGURIDAD, S.L.

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  01170 Legutiano
  (ARABA)
- **P: +34 945 466 314**
- **F: +34 945 466 314**
- **info@dsaf.es**
- **www.dsaf.es**

DSAF is a company structure devoted to People's Movement Safety. It is committed to providing new technologies applied to design and project implementation, as well as initiatives that guarantee an approved evacuation safety level in this generalized risk society.

Emergency signalling is DSAF's main application area; it develops photoluminescent, electroluminescent and LED signalling systems for people evacuation in risk situations and environments: tunnel evacuation safety, vessel evacuation safety, building evacuation safety…

DSAF safety applications are developed in three big areas: tunnel safety (road / railway), safety in vessels, and buildings.

DURO FELGUERA RAIL, S.A.U.

- **Pol. Ind. Fábrica de Mieres s/n**
  33600 Mieres
  (ASTURIAS)
- **P: +34 985 45 63 31**
- **F: +34 985 45 61 64**
- **dfrail@durofelguera.com**
- **www.durofelguera.com**

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

ECOCOMPUTER S.L.

- **C/ María Zambrano 5 - Bajo ·**
  33401 Avilés
  (ASTURIAS)
- **P: +34 985 52 50 46**
- **F: 34 985 56 83 17**
- **sales@ecocomputer.com**
- **www.ecocomputer.com**

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

ELEKTRA-GRUPO ELEKTRA, S.A.

- **C/ Apostolado, 34**
  20014 San Sebastián
  (GIPUZKOA)
- **P: +34 607 94 29 73**
- **railway@elektra-sa.es**
- **www.grupoelektra.es**

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

Being the leading company in the railway sector in the supply of electrical equipment. Your solution provider in electrical products for railway, with specific tecnical support.

Elektra Group is composed of an extensive Spanish national network and has companies in Romania, India and USA.

FAIVELEY TRANSPORT IBERICA, S.A

- **Pol. Ind La Drecera – C/ Mecánica, 23 – 43470 La Selva del Camp (TARRAGONA)**
  C/Antonio Cabezón s/n (complejo Renfe) – 28034 Madrid (MADRID)
- **P: +34 917282159**
- **F: +34 917282157**
- **patricia.gil@wabtec.com**
- **www.faiveleytransport.com**

Faiveley Transport Ibérica, S.A. is a firm focused on design, production, and maintenance of auxiliary equipments for railway industry (locomotives, rolling stocks, trams and metros). Our product range include also the design, production, installation and maintenance of Platform Screen Doors (PSD). FT Ibérica is the branch for Spain, Portugal and Mexico market of International Group Faiveley Transport. Our main facilities are in La Selva del Camp (Tarragona –Spain) and Commercial offices in Madrid.

FUNDICIONES GARBI, S.A.

- **Bº Munsaratz, 33**
  48220 Abadiano
  (BIZKAIA)
- **P: +34 94 621 54 80**
- **F: +34 94 681 73 86**
- **garbi@fundicionesgarbi.es**
- **www.fundicionesgarbi.es**

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

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

FUNOR, S.A.

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

Castings in carbon steel, alloy steel and stainles steel.

Our products:

- Steel casting.
- Raw castings or fully machined.

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

GAMARRA, S.A.

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

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

Products: brake discs, brake block shoe holders, buffers, spigots and essential steel castings for bogies.

GANTRES, S.A.

- **Pol. Ind. Izarza 4N –**
  48115 Sondika – Vizcaya
- **P: +34 944 53 50 84**
- **info.bilbao@gantrex.com**
- **www.gantrex.com**

Gantrex Spain, S.A. is the global market leader in specialty rail tracks fixation including design, production, supply of goods and installation of turnkey contracts.

Rail fixation at train workshops, embedded rails accesses for Ports or logistic terminals and private rail installations together with other Subway´s and Tram´s required installations are some of Gantrex Spain´s main activities.

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

GETINSA-EUROESTUDIOS, S.L.

- **C/ Ramón de Aguinaga, 8**
  28028 Madrid (MADRID)
- **P: +34 91 456 09 82**
- **F: +34 91 456 09 83**
- **internacional@getinsa.es**
- **www.getinsa.es**

With more than 40 years of experience in Transport Infrastructure Projects in Spain and all around the world, Getinsa-Payma, S.L. has grown into a top engineering firm in Spain and an international benchmark in the sector. In Spain, Getinsa-Payma has played a leading role both in the modernization of the conventional railway and in the development of the new high speed railway network. Our services include project management and engineering & consultancy services, involving all phases of the project, from feasibility studies up to commissioning and technical assistance for the operation and maintenance of railway infrastructure. Our experience covers civil works, track and platform, signaling and telecommunication systems, as well as electrification (electric substations, overhead lines, etc.). We are currently working on railway projects in Europe, Middle East, Africa, Asia, South America and USA.

GMV SISTEMAS, S.A.U.

- **Juan de Herrera, 17 - P.T.B. Boecillo**
  47151 Valladolid (VALLADOLID)
- **P: +34 983 54 65 54**
- **F: +34 983 54 65 53**
- **ahernandez@gmv.com**
- **aags@gmv.com**
- **www.gmv.com**

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

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

HICASA - HIERROS Y CARBONES, S.A.

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

HICASA specialises in the storage, transformation, distribution and commercialisation of railway materials, rails and railway accessories of all types in accordance with both European (UNE EN), as well as American (ASTM) Standards, not to mention others such as AREMA, etc. HICASA belongs to a private group of companies, GEVIR, which is made up of four enterprises in Spain, and is special in the sense that it combines its role of distributor with that of manufacturer, given that it possesses its own specialist light rail factory, a fact which endows it with a unique market profile.

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

ICON SISTEMAS DE INFORMACIÓN Y DATOS

- **Avd. Santiago Amón, 3-52-**
  34005 (Palencia)

- **P: +34 979 70 29 06**
- **F: +34 979 70 20 21**
- **ehornos@iconmm.com**
- **www.iconmm.com**
- **www.denevads.com**

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

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

IDOM

- **Zarandoa 23**
  48015 Bilbao (VIZCAYA)
- **P: +34 944 79 76 00**
- **F: +34 944 75 93 64**
- **cortega@idom.com**
- **oscar.rico@idom.com**
- **www.idom.es**

IDOM is one of the european leading companies in the field of professional services in engineering, architecture and consultancy. It is an independent company established in 1957 and it has participated in over 30.000 projects in five continents. In 20 countries with 39 offices throughout regions (America: Argentina, Brazil, Canada, Chile, Colombia, USA, Mexico, Perú), Asia (India), Africa (Argelia,Lybia, Morocco), Middle East (Saudi Arabia, UAE), Europe (Belgium, Slovenian, Spain, Poland, Portugal, United Kingdom).More than 3.000 staff posseses the expertise and experience to cover all the phases of a railway project (high speed, conventional, freight, metro, light rail, tramway, stations, depot and workshops), from conception to commissioning and beyond. IDOM will accompany the client by providing the correct technical assistance required for the decision-making process: technical specifications for design, alternatives studies, demand and traffic studies, financial and socioeconomical analysis,basic and detailed design, operational and maintenance plans,works supervision, testing and commissioning.

IKUSI

- **Paseo Miramón, 170**
  20014 San Sebastián
  (GIPUZKOA)
- **P: +34 943 44 88 00**
- **F: +34 943 44 88 20**
- **movilidad@ikusi.com**
- **www.ikusi.com**

Ikusi offers integral solutions for exploiting the diverse means of urban public transport (Bus/BRT/Tramway/Light Rail/Metro/Suburban), as well as in intermodal transport hubs. One proposal, backed up with a track record reaching back more than 20 years in the sector, has the main goal of improving passenger experience, guaranteeing safety, increasing revenue from secondary sources independent from the main activity, and streamlining operational efficiency.

IK4 RESEARCH ALLIANCE

- **Pol. Azitain 3K, 2ºG**
  20600 Eibar (GIPUZKOA)
- **P: +34 94 382 03 50**
- **otegi@ik4.es**
- **www.ik4.es**

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

The IK4 Research Alliance sets out to generate, capture and transfer scientific and technological knowledge mainly to the business framework. This way it contributes towards improving the competitiveness of companies and the progress of society.

Nowadays it gathers a staff of 1275 and an income of 102M€ in 2014.

IMPLASER 99, S.L.L.

- **Pol. Ind. Borao Norte, Nave 5A**
  50172 Alfajarín (ZARAGOZA)
- **P: +34 902 18 20 22**
- **F: +34 902 18 20 22**
- **international@implaser.com**
- **www.implaser.com**

Implaser is a Spanish company focused in developing innovative security signs for railway projects. Innovation and quality are our mainstays, as we were the first SME being certified in R+D+I in Spain. Implaser has all the range of products certified by AENOR with photoluminescent values of 150, 300, 580 and 720 mcd/m^2. We are also specialized in the manufacturing of informative, security and accessibility stickers for coaches, to be used both indoor and outdoor.

Hard work and great concern for innovation has allowed us to develop new products, such as photoluminescent systems combined with electroluminescent and guiding systems by LEDs.

INDRA

- **Avda. de Bruselas, 35**
  28108 Alcobendas (MADRID)
- **P: +34 91 626 88 58**
- **F: +34 91 626 88 68**
- **dmeza@indra.es**
- **www.indra.es**

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

operative options. Indra has managed to open a competitive market for the first time based on technological and economical competitiveness.

INECO

- **Paseo de la Habana, 138**
  28036 Madrid (MADRID)
- **P: + 34 91 452 12 00**
- **nacional@ineco.com**
- **international@ineco.com**
- **www.ineco.com**
- **www.ineco.com**

Global leader in transport engineering and consultancy, it has contributed to the development of transport infrastructures for over 45 years in more than 45 countries. Its high level technical specialisation allows its activity to diversify into new markets and reinforce its presence in those where it is already established. Its participation in the whole railway system in Spain has led the company to develop important international projects like the Makkah-Madinah high speed in Saudi Arabia, the Ankara-Istanbul line in Turkey and the HS2 project in the United Kingdom.

INGETEAM POWER TECHNOLOGY, S.A.

- **Edificio 702.**
  Parque Tecnológico de Bizkaia
  48160 Derio (BIZKAIA)
- **T: +34 94 655 90 00**
- **F: +34 94 403 98 37**
- **traction@ingeteam.com**
- **www.ingeteam.com**

Ingeteam is an expert leader in the development of electrotechnical and power electronics systems providing involving energy exchanges at large.

Our capacities and the experience on the railways sector allow us to offer technological solutions that significantly contribute to reach our customers´ strategic objectives, leading to maximize operational efficiency.

We strive towards on offering in-house/ state-of-the-art developments for.

INSTALACIONES INABENSA, S.A.

- **Energía Solar, 1 -**
  Palmas Altas
  41014 (SEVILLA)
- **P: +34 95 493 60 00**
- **F: +34 95 493 60 05**
- **inabensa@abengoa.com**
- **www.inabensa.com**

In the railway sector, Inabensa is an international reference for overhead lines, traction substations, communications and ancillary installations: high voltage, low voltage, lighting and ventilation. Inabensa undertakes turn-key projects, ranging from designing, supplying and installing to maintaining electrification system for both conventional and high-speed railways, freight, subways, trams and monorails.

It also holds one of the most advanced pools of rail plants in the sector, highly sophisticated with the utmost functionality and approved for use in the EU. Inabensa has its own overhead line equipment technology, CAVE overhead line and TkMx overhead line, and it also has an R&D department focusing on energy storage systems, bidirectional substations, detection of broken rail and software development.

INTERNACIONAL HISPACOLD, S.A

- **Avda. Hacienda San Antonio,1**
  Pol. Ind. El Pino
  41016 Sevilla
  (SEVILLA)
- **P: +34 954 677 480**
- **F: +34 954 999 728**
- **hispacold@hispacold.es**
- **www.hispacold.es**

Hispacold is a World leader company for climate systems specialized in comfort for people with more than 30 years' experience.Hispacold designs and manufactures HVAC solutions for all rail vehicles: trams, metros, EMUs, DMUs, LRVs… with proven and reliable technology solutions.In Hispacold each activity is based on a solid quality culture and on a real commitment with the environment. Quality certifications ISO 9001, ISO 14001, OSHAS 18001 are only the smallest part of this working way.

Hispacold is a company of Irizar Group SC, which employees more than 3.000 people in the five continents and has a global turnover of more than 550 Million €. This gives Hispacold the benefits from a multinational organization while maintaining an individual company spirit. Hispacold's presence in the five continents guarantees the best technical assistance at any place of the world.

JEZ SISTEMAS FERROVIARIOS, S.L.

- **Arantzar, s/n**
  01400 Llodio
  (ARABA)
- **P: +34 94 672 12 00**
- **F: +34 94 672 00 92**
- **infor@jez.es**
- **www.jez.es**

JEZ Sistemas Ferroviarios, S.L. is committed to designing, manufacturing, supplying and maintenance of all types of manganese steel switches and railway track systems, in addition to moulded cast steel parts for the general industry.

Our Technical Department (Department of R&D) ensures we have the capability of designing and producing points and crossings (turnouts, crossovers, scissor crossovers and diamond crossings) or parts for them, such as hard steel manganese crossings or spare tongues.

At JEZ Sistemas Ferroviarios, S.L. we fit our developments to meet clients needs.

KELOX, S.A.

- **Isla de Jamaica, 8**
  28034 Madrid
  (MADRID)

- **P: +34 91 334 15 90**
- **F: +34 91 358 05 64**
- **marketing@kelox.es**
- **www.kelox.es**

Kelox launched its railway activity in 1977, manufacturing catering equipment for dining cars on longdistance lines. The experience and knowledge acquired over the years have become Kelox specialist in the design and full supply of galleys and catering equipment for high-speed, shuttle and regional trains.

Our style of design is characterised by harmony; it is beautiful, ergonomic and functional, always according to the customer specifications.

LA FARGA LACAMBRA, S.A.U.

- **Ctra. C-17z - Km. 73,5 08508 Les Masies de Voltregà (BARCELONA)**
- **P: +34 93 850 41 00**
- **F: +34 93 859 55 30**
- **gustau.castellana@lafarga.es jordi.valaro@lafarga.es**
- **www.lafarga.es**

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

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

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

LUZNOR

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

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

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

MANUSA DOOR SYSTEMS

- **Avda. Via Augusta, 85-87 - 6ª planta. 08174 Sant Cugat del Vallès (BARCELONA)**
- **P: + 34 902 321 400**
- **T: +34 935 915 700**
- **F: +34 902 321 450**
- **F: +34 932 185 610**
- **manusa@manusa.com**
- **www.manusa.com**

Manusa is the Spanish market leader in design, production, installation and maintenance of automatic door systems. Established in 1966, it has 12 delegations in Spain, branches in Portugal, Brazil, Singapore and India and international presence in more than 70 countries around the world.

Manusa develops specific products for public transport, such as platform screen doors (PSD) and ticket gates for access control, as well as one-way corridors, onboard doors and tunnel partitioning doors, always with the Manusa technology support.

MB SISTEMAS, S. COOP.

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

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

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

METALOCAUCHO, S.L.

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

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

The Company was established in 1982 and currently has three manufacturing sites, located in Spain (HQ), China and India. In 2009 the company was awarded IRIS Certification. MTC, being among the leading companies in its sector, supplies to the main Rolling stock Constructors worldwide, including Alstom, Bombardier, CAF, CSR, CNR, Hyundai Rotem, Siemens, Talgo, Vossloh). We also collaborate with Operators for the supply of spare components for their overhaul projects. Our main products are rubber-metal primary and secondary suspensions, focusing on primary springs (conical or chevron type), guiding bushes, guiding links, secondary air springs and emergency springs, traction rods, elastic bushings, buffers, layer springs as well as a diverse range of associated rubber-metal solutions.

MGN TRANSFORMACIONES DEL CAUCHO, S.A.

- **C/ Candelaria, 9 - Pol. Ind. Camino del Calvario 28864 Ajalvir (MADRID)**

- **P: +34 91 887 40 35**
- **F: +34 91 884 45 84**
- **enp@mgncaucho.com**
- **www.mgncaucho.com**

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

MGN invests in research and innovation as a basis for the development of elements to be adapted in the new understanding of passenger and fright trains, taking the lastest technological advances of the rubber world, vibration control and damping systems.

NEWTEK SOLIDOS S.L

- **Pol. Abendaño. Urdaneta bidea, 3B. Zarautz - (GIPUZKOA)**
- **P: +34 943 835942**
- **F: +34 943 894441**
- **comercial@newteksolidos.com**
- **www.newteksolidos.com**

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

NEM. NUEVAS ESTRATEGIAS DE MANTENIMIENTO, S.L.

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

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

P4Q ELECTRONICS, S.L.

- **Ctra. Bilbao-Balmaseda, Km. 9 48810 Alonsotegi (BIZKAIA)**
- **P: +34 94 498 20 28**
- **ialberdi@p4q.com**
- **www.p4q.com**

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

PARRÓS OBRAS, S.L.

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

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

PRETENSADOS DEL NORTE S.L.

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

PRETENSADOS DEL NORTE produces the best prestressed wire for railway sleepers in the world. More than 30 years' experience, PRETENORTE only uses the best raw materials and we can supply any need required by the client.

We have supplied prestressed steel for several projects around the world and our material is considered the one with the best quality in prestressed WIRE world. We have the best and most modern machinery and a highly qualified team of experts and engineers. We also produce prestressed steel used in precast concrete parts and structures.

PATENTES TALGO, S.L.

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

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

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

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

- **C/ Espronceda, 38, local 3 28003 Madrid (MADRID)**
- **P: +34 91 343 03 48**
- **F: +34 91 359 12 46**

fsanchez@precon.cemolins.es
ferroviario@precon.cemolins.es
www.cemolins.es

PRECON is the Spanish leader in design and supply of precast concrete products for railway tracks, either ballasted and ballastless tracks.

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

REDALSA, S.A.

General Solchaga, s/n
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47008 Valladolid
(VALLADOLID)
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F: +34 983 27 37 68
redalsa@redalsa.com
www.redalsa.com

- Rail electrical welding LBS are arranged to form 288 meters for high-speed train strecht and convencional rail network.
- Engeneering services and integral management for electrical welding factories and management of rail stockpiles.
- Regeneration of used rails to make LBS.
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- Rail ultrasonic inspection, using hand-held equipment and self-propelled movil equipment until 90 Km/h.
- Maintenance and repair work of train coaches in our factory. Our facilities are equipped with 3 Km of railway and 3 railway access to RFIG. We have all the necessary traction resources of 1668 track width.
- Thermal aluminium welding kits distribution.

SEMI, S.A. (GRUPO ACS)

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

A society in international expansion. With the adaptability of a small business, the infrastructure of a big company and the financial backing of a large group. SEMI is encompassed in the major companies of Industrial Services sector of the ACS group.

Focused in the industrial field, SEMI build infrastructures for energy, transport, communication, environment and non-residential building. Activity in the railway area: Electrification and Traction Substations for AC and DC, Auxiliary Electrical Equipment, Engineering and Consulting, Maintenance of Catenary and Substations, Infrastructure for Railway Signaling and Communications.

SENER INGENIERÍA Y SISTEMAS, S.A.

Severo Ochoa, 4 (PTM)
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(MADRID)
P: +34 91 807 70 68 / 71 74
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dep.infra@sener.es
www.sener.es

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

In the field of railway engineering, Sener count on an extensive experience in metros, light rail trains systems and tramways, conventional railway line, freight transport and High Speed Lines. Sener's activities range from preliminary, conceptual and feasibility studies, basic and detailed engineering to project management services, supervision of works, value engineering or ICE services.

SICE TECNOLOGÍA Y SISTEMAS

C/ Sepúlveda, 6 -
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www.sice.com

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

SICE TyS's transport activities are focused on meeting the needs of users, operators and transport operation concessionaires in the transport sector. As a systems integrators and systems suppliers, they offer unique technological solutions tailored to all kind of installations.

Design of the Centralized management of all services that complement any form of public or private transport and integrates different solutions and systems:

- Security&Safety Systems for Metros and Railways
- Telecommunications Systems for Metros and Railways
- Signaling: (Interlocking, Level Crossing, CTC)
- Electric BRTs
- Ticketing
- Public transport prioritization

■ Consulting Engineering (OFITECO): Railways lines, Tunnels, Load test (railways bridges).

SIEMENS RAIL AUTOMATION S.A.U.

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

Siemens Rail Automation is the resulting Company after the acquisition of the Invensys Rail Dimetronic group by Siemens. The new division offers integrated mobility solutions through the most advanced technologies for railway signalling and train control.

Our main purpose is the supply of "turn-key" projects, including all the phases of design, development, supply, manufacturing, installing, testing, commissioning and maintenance of railway signalling systems and automatic train control systems for either mass transit applications as main line and high speed lines.

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

STADLER RAIL VALENCIA S.A.U.

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

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

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

TALLERES ALEGRÍA, S.A.

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

Talleres Alegría with more than 100 years at the service of railway´s networks, offers to its customers a wide range of fixed track equipment with the best quality and service conditions. Following its own technical design or its customer's, Talleres Alegría manufactures among other turnouts for High Speed Lines, conventional Lines, subway and Tramway lines, as well as End Forged Switch Points and Track Vehicles.

Being aware of the relevance of comfort within the railway sector, Talleres Alegría has collaborated with leading companies developing and applying technical solutions for mitigating noise and vibrations during the crossing over the turnouts.

TECTATOM

- **Avda. Montes de Oca, 1 San Sebastián de los Reyes**
  28703 Madrid
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- **P: +34 91 659 8600**
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- **correo@tecnatom.es**
- **www.tecnatom.es**

Tecnatom has more than 50 years of experience in the application of Non Destructive Testing (NDT) to the inspection of components. It also offers its high technological level in the development and application of inspection systems and techniques to the railway market, where security and quality control are increasing required. Tecnatom can provide its depth knowledge on materials currently used or tested in the railway sector (metals or new materials carbon-fiber based), taken advantage of its activities in the nuclear and aerospace sectors.

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

■ Inspection services for infrastructures and rolling stock

■ Development of inspection techniques and procedures

■ Development of inspection equipment and systems (ultrasonics, eddy currents) for rail transport components (track, axles, bogies, wheels)

■ Training of operators on Non-Destructive Testing (NDT) techniques

■ Development of training simulators for train drivers.

TECNIVIAL

- **C/ Livorno nº59**
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- **F:+34 949 25 20 80**

- **export@tecnivial.es**
- **www.tecnivial.es**

Created in 1973, Tecnivial is the Spanish reference in traffic safety. It contributes giving solutions regarding Airport, Railways, and Road Signaling and marking. The challenge for a permanent evolution, technological innovation, and customer´s satisfaction are our identity signs. In Tecnivial we specialize in all types of fixed signalling for roads, both conventional and high speed lines; in this last section are one of the companies approved by the Railway Infrastructure Administrator (ADIF).

We have extensive experience in railway stations signalling, carefully following the specifications of the corporate identity manuals. We develop comprehensive and customised signage projects, from project design to final installation and maintenance service. Tecnivial has always been committed to the I+D+i, which has allowed it to be a reference in the fixed railway signaling, high-speed and conventional network, while being present in the most relevant projects at the national level; this is the case of the Madrid-Figueras or Olmedo-Orense sections, and internationally, Ave Medina-La Meca.

TEKNORAIL SYSTEMS, S.A.

- **Paseo de la Castellana, 91**
  28046 Madrid (MADRID)
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- **F:+ 34 91 564 72 86**
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- **www.teknorail.com**

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

TELICE

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- **telice@telice.es**
- **www.telice.es**

Telice is a Spanish company with 39 years of experience in several fields of technology installation, especially for the railway sector.

Our activities cover design, installation and maintenance for Railway Electrification Systems, Railways Safety and Signalling, Optical Fiber, Industrial Automation and Electrical Installations Our extensive experience has made Telice a preferred partner for carrying out work and providing services for important railroad administrations and major construction and technology companies in the railroad industry.

THALES ESPAÑA GRP, S.A.U.

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- **www.thalesgroup.com**

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

TYPSA

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

VALDEPINTO, S.L.

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- **F: +34 91 691 57 03**
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- **www.valdepinto.com**

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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