

Irizar Group magazine



**COACH
OF THE YEAR
2018**

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N° 1

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towards the future***

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“And now comes the good news of the recognition of our coach Irizar i8 as the best coach of the year in Europe”

We are continuing to develop our strategy of seeking synergies among all group companies. Every day there are closer relationships between all the companies and, in addition to developing the products and markets in the business areas of each company, we are achieving great technological advances in our entire range of coaches and electric buses with their main systems.

We continue to move forward with a focus on the development and strengthening of the brand based on our own products. The manufacture of Irizar brand coaches at our parent plant already accounts for a third of our output and we are convinced that this trend will continue and we will generate new growth in the coming years.

Of course, we continue our unshakeable commitment to the sustainability and well-being of our customers and citizens. After the technological breakthrough of the launch of the new Irizar product range in the last two years, with its two star products, the Irizar i8 and the Irizar i6S, in addition to the new range of hybrid products, the time has come to complete the range of electric buses.

At this year's Busworld fair we are presenting our articulated 18 metre Irizar ie tram which extends the current supply of electric vehicles to articulated vehicles with opportunity charging; next to it will be the well-known, tried and tested sector benchmark, the Irizar ie bus.

The new Irizar ie tram is fully fitted with the Group's technology in electronics and communications as well as in its main systems: power train, batteries and charging systems.

We have already started manufacturing our electric buses in the Group's new electric mobility plant, Irizar e-mobility, in Aduna, Gipuzkoa, Spain.

Because of our good position in the market and the good performance of our 100% zero emissions electric buses, we are already confident that customers will place new orders with us, as is currently the case for Le Havre, Bilbao, Valencia, Madrid, Barcelona, Luxembourg and Bayonne.

We are still involved in important R & D programs in electric mobility, as we are convinced that this activity is key to the Group's growth.

Our parent plant in Ormaiztegui has again surpassed 1300 production coaches and the manufacture of integral buses has grown 30%.

The plant in Mexico continues to manufacture more than 900 coaches a year, all for the Mexican market, and our efforts to increase exports from the Brazilian plant are bearing fruit.

And now comes the good news of the recognition of our coach Irizar i8 as the best Coach of the Year in Europe.

Now we are starting to feel that we are already important in Europe; that our efforts of recent years in technology, sustainability and customer proximity, in short in strengthening our brand, are now starting to produce results.

We first want to thank our customers for having brought us to our current position and we want to thank the journalists on the jury of this award, for having judged us as the best and voting for us.

Thank you very much to everyone - we will do our best, we will do the impossible, not to disappoint you in the future.

We are therefore continuing along our path of solid growth with a commitment to our customers and to society, which we demonstrate by trying to offer more value added in key areas in the world today such as safety, comfort and sustainability.

Many thanks to all of you,

José Manuel Orcasitas
Irizar Group CEO



Irizar Group

Irizar is a business group with an international presence, a leader in the passenger transportation sector and a benchmark in electric mobility, energy, electronics, connectivity and rotating machinery.


The Irizar Group is comprised of seven brands (Irizar, Irizar e-mobility, Alconza, Datik, Hispacold, Masats and Jema) that have production operations in 13 production plants in Spain, Morocco, Brazil, Mexico and South Africa in addition to their own R&D centre whose purpose is applied research and technological development of products and systems for the Group.

It is a well established group made up of more than 3000 people with a commercial presence in more than 90 countries on 5 continents and billing in excess of 580 million euros.

Irizar, S. Coop is the parent company of the Group and its central headquarters is located in Ormaiztegi (Gipuzkoa, Spain) where Creatio, the Group's Research and Development Centre, is also located.

Established in 1889, today Irizar is a solid Group that is geographically and industrially diversified and in continuous growth. In the Group we are wholeheartedly committed to the brand, technology and sustainability.


 **Founded in 1.889**
(128 years of history)

 **7 companies**
leaders in their activity sectors

 **13 production plants**
worldwide

 **R+D center**

 **Presence in 5 continents**
in more than 90 countries

 **24 hours, 365 days**
service network

 **More than 3.000 people**

 **580 M euros**
turnover in 2016

 **Financial strength**

Irizar Group

Bussiness areas

The Irizar Group is currently present in:

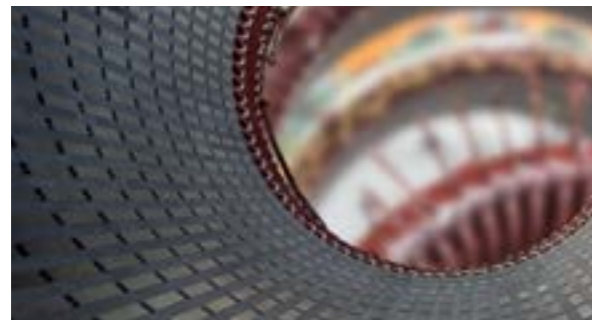
Passenger transport



Electromobility



Electric motors



Electronics



Connectivity



Energy



Coaches and buses ranging from integral coaches to hybrid technology in Class I and II vehicles for urban and intercity services, as well as conventional coaches.



Electric vehicles and electromobility components and systems for cities.



Electrical and pneumatic door components and systems, P.M.R. elevators for the road and rail transport sector.



Production of climate control system for the road and rail transport sector.



Electric generators and engines. Offshore marine, hydraulic and industrial generators for special applications.



Power electronics, smart grids, centrales fotovoltaicas, solares, multiplexado, proyectos electrónicos de I&D y HMI.



ITS solutions for fleet management in connected vehicles



Irizar Group's Research and Development Centre which was created in order to enhance the Group's applied research and technological development capabilities both for its own-brand products as well as for the main coachwork components.

Passenger transport



Buses and coaches

Irizar offers a wide range of coaches and buses ranging from integral coaches and 100% electric buses, to hybrid technology in Class I and II vehicles for urban and intercity services, as well as conventional coaches.

Components and Systems

Components and systems are also being developed within the Group for road and rail passenger transport.

Masats, a specialist in accessibility and infrastructures, is a manufacturer of pneumatic systems for doors, ramps, steps and lifts along with other items associated with platform doors and railway station safety.

Hispacold develops climate technology, air purifiers and defrosters.

Datik, in the connectivity field, develops devices that capture and manage the information generated by vehicles that assists driving, diagnostics and preventative maintenance.

Jema looks after the 100% multiplexed electronic architecture that equips every system with intelligence in order to offer new functions, reduce the amount of wiring and facilitate vehicle diagnostics.

Irizar, a brand you can trust

Giant steps towards a great future

The brand is our greatest asset and an undisputed icon of our strategy to maximise the value of our customers, providing them with the best products and services tailored to their needs and offering them the guarantee of a solid project in which to trust. All this forms part of a strategy based on customer relations and building a direct relationship in order to gain their loyalty and trust which we support with an optimal communication strategy.

Irizar brand integral coaches and buses are the ultimate representation of our brand. At present, the entire range of integral coaches is available to all our worldwide customers.

The development of Irizar's brand strategy based on technology, sustainability and customer focus, which has been developed in recent years, is proving very fruitful.

Our parent plant in Ormaiztegui has again surpassed 1300 production coaches and the manufacture of integral buses has grown 30%. New growth is expected for the coming year.

The service network is still in the process of expansion and it is currently possible to locate an approved Irizar warranty workshop in all places where its coaches operate.

Moreover, R & M services are increasingly being offered so that the customer has Irizar as its sole contact.

Total sales of coaches for Europe are DAF motorized. Note the evolution of the Spanish, French and English markets where Irizar is growing and obtains

greater brand recognition thanks to the customers appreciating the reliability, design and service provided by the brand. Irizar has become a benchmark for both long distance operators or discretionary service with the Irizar i6S and for tour operators and VIP cars with the Irizar i8.

In Italy, where Irizar has been a benchmark for many years, the range of coaches offered with integral models has been expanded. This year, 20% of total sales in Italy will be Irizar coach brands. The expansion of the sales and after-sales network, customer proximity and the supply of R & M contracts will continue in order to achieve higher market shares.

Note also that this year we have been awarded several local prizes, both Spanish and European. Most recently, the Coach of the Year 2018 award, for the best vehicle of the year in Europe and the Best Constructor of Europe Award in Busworld. These awards show that we are recognized as a leading brand, among the best in Europe.





Our hybrid coaches offer a 20% reduction in fuel consumption compared to a conventional diesel coach.

A very competitive TCO, below-average CO2 emissions and an after-sales service which is a benchmark in the sector.

The best range of products ever seen

We have a new generation of high tech coaches for the Premium sector, class I and II intercity buses with hybrid technology or biodiesel and class I zero emissions electric buses.

A catalogue of products which aims to provide competitive advantage in safety, reliability, sustainability, technology and profitability for our customers.

Our hybrid coaches offer a 20% reduction in fuel consumption compared to a conventional diesel coach.

Only Euro 6 C engines are available that can operate with state-of-the-art diesel (10 ppm sulphur content) or HVO (hydrogenated vegetable fuels).

The whole range of buses and coaches has the most advanced active and passive safety systems and technologies on the market.

Designed to meet the most demanding parameters, Irizar coaches are robust, light, quiet and reliable.

All of this enables us to cover all sectors of public passenger transport, from occasional services to regular public commuter services, encompassing urban, intercity and long distance routes and to position ourselves at the head of the mobility market.

Pioneering spirit: Cutting edge technology and innovation

At Irizar we provide customers and society with high added value, state-of-the-art products and services that incorporate multiple pioneering technological solutions produced by the knowledge of the entire Irizar Group. Technologies designed to solve the great challenges of the present and the future.

As a result of this strategy and this knowledge, this year we are unveiling the new generation of Irizar engines, the new Irizar virtual clock box, the 18-metre articulated electric bus, Irizar electric tram (ie tram), which integrates a new electric motor, new batteries and new pantograph charging systems.

We are involved in important and ambitious projects at European level to outline future directions

in mobility and other business areas where we operate. Many of them are being carried out with the knowledge and contribution of our own technology from Group companies and supported by the Cidetec Technological Centre.

These projects relate to driverless vehicles, electric mobility, energy storage systems, energy efficiency, standardization of charging systems, connectivity, big data, which are basic in the new generation of clean, efficient, fast, standardized and smart transportation.



All round support, maximum efficiency

In addition to its wide range of reliable and sustainable products, the Irizar service offers custom solutions, designed and created to offer you the best: (financing, repair and maintenance contracts plus collection of your used vehicle). The availability of a fully guaranteed comprehensive repair, tune-up and maintenance service 24 hours a day, 365 days a year remains a feature that sets us apart.

At Irizar we know that fuel is the major cost component for operators, so Irizar makes every effort to reduce consumption. The new generation of coaches offers the minimum TCO (total cost of ownership), with the following basic elements: minimum fuel consumption, long oil and filter change intervals (up to 150,000 km), particle filter with automatic regeneration and without maintenance up to 700,000 km, very competitive spare parts price and a large number of service points throughout Europe.

We have a help desk in each European country and a central help desk with 24h support, 365 days of the year. As a consequence, the residual value of

our vehicles is very high which also reduces their financing cost.

In summary, a very competitive TCO, below-average CO2 emissions and an after-sales service which is a benchmark in the sector.

Moreover, we can equip coaches with the most advanced technology for comprehensive monitoring and control of costs and efficiency, which helps transport companies to optimise the performance and profitability of each fleet.

Irizar offers customers close follow-up and advice that translate into optimization of vehicle reliability and availability. It includes integrated electronic management, Irizar connectivity, as well as fleet management solutions and remote diagnosis that result in a considerable reduction of consumption and emissions.

All in all, Irizar is ready to respond to the current and future service and sustainable mobility needs of passenger transport.

The Irizar Group is ready to respond to the current and future service and sustainable mobility needs of passenger transport.

Leaders in design and customization

This spectacular design, at the service of aerodynamics that optimizes consumption and confers prestige on its owners, is one of the strengths of Irizar. At the same time, it offers exceptional comfort for driver, guides and passengers, thus guaranteeing an unforgettable and exhilarating experience.

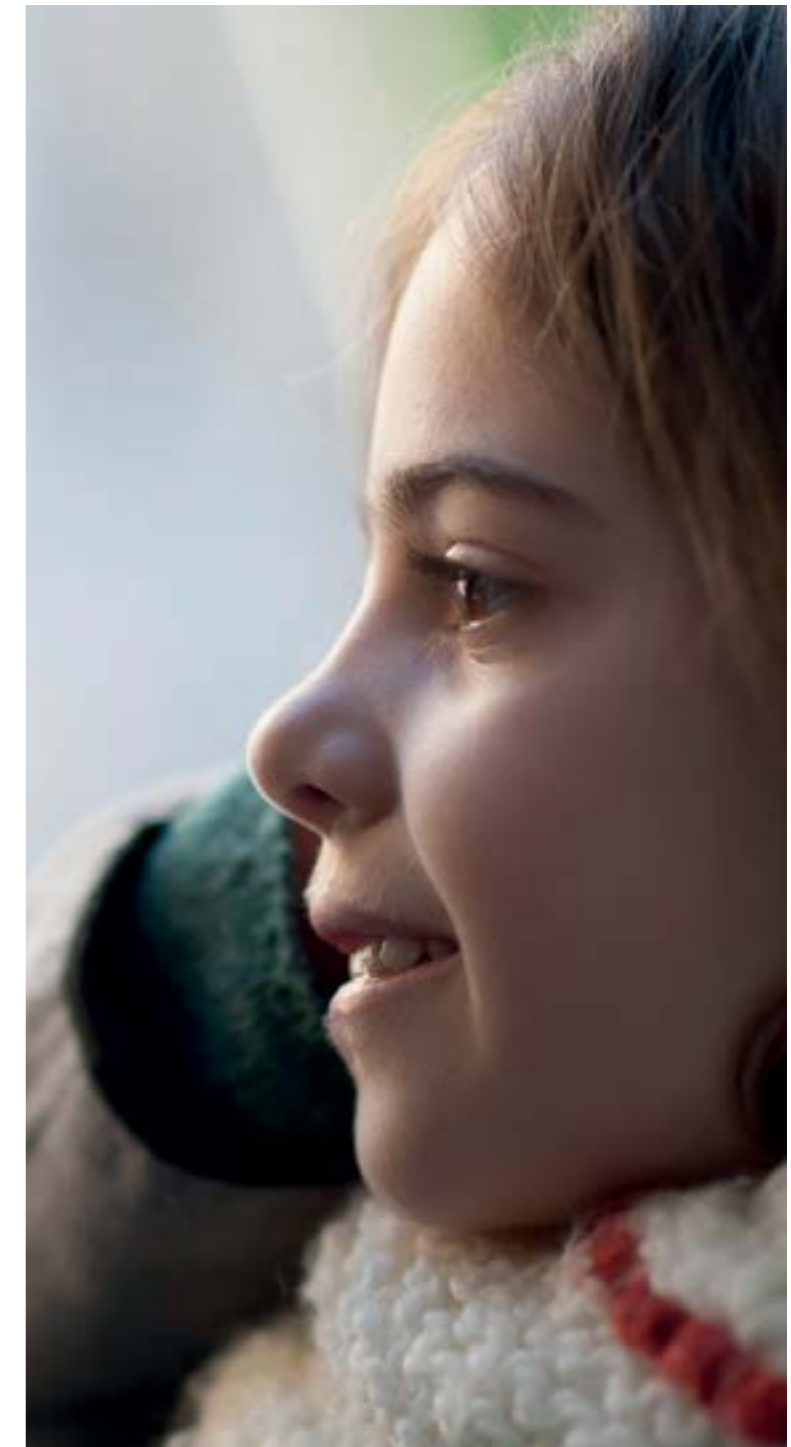
Consequently, all Irizar vehicles stand out for their large and distinctive personality and overwhelming visual impact.

Another Irizar maxim is the unlimited customization option that it offers to the market and to operators, which is undoubtedly a competitive advantage.

Sustainability in capital letters

Our commitment to the sustainability and well-being of our customers and citizens leads us to go much further.

At this year's Kortrijk fair we presented our articulated 18 metre Irizar ie Tram which extends the current supply of electric vehicles to articulated vehicles with opportunity charging; next to it will be the well-known, tried and tested sector benchmark, the Irizar ie bus.



“The future is already here”



LATEST NEWS

Irizar has been nominated Bus Builder of the Year by the Busworld Academy Awards.

Latest innovations

New hybrid variant

Work is currently taking place on a parallel hybrid package for three-axle vehicles with a higher power kinematic chain and battery life based on a Cummins Euro 6C engine (diesel and HVO approved) of 8.9 L, 370 hp and 1600 Nm, 110 kW Irizar electric motor and 15 kW/h Ion-Lithium batteries.

New generation engines - Model Year 2017

With the launch of new Euro6 MDY 2017 engines by Paccar-DAF and the new range of ZF transmissions, Irizar is presenting the new solutions that will represent a major leap forward in terms of efficiency and improvements in consumption.

The new DAF engines, based on the current MX11 and MX13, following a complete redesign of both, seek minimum the fuel consumption possible to achieve maximum emissions reductions. Likewise, the new ZF-Traxon transmission, which replaces the current ZF-AsTronic, goes beyond efficiency in consumption, with advanced functions offering more economic, easier driving. The new features

include PreVision GPS, the transmission/GPS system interface that enables a predictive driving strategy that adapts the gear-shifting sequence to the route topography. The option for the drive shaft is the same as the current solution, although there will also be a new generation of "direct drive" shafts available from the end of 2018 that will reduce noise and consumption.

In light of these innovations, Irizar focuses on the concept of "power on demand", by going further with systems that consume power only when demanded by the service. The optimization of the behaviour of the engine cooling system, the new steering pump or the compressed air system are the initial solutions where work is taking to place in search of real fuel consumption savings.

This new generation of engines will set new standards in efficiency, with improvements in consumption in excess of 5% compared to current kinetic chains and consequently reducing CO2 emissions.

Irizar virtual cockpit

The new Irizar virtual cockpit is a virtual clock box that offers innovative technological and quality functions. The high resolution 12.32" colour display has a dynamic and intuitive design and displays comprehensive information in flexible form that can be adapted to any needs arising at any time.

This new Irizar technological commitment means that the driver can interact with the vehicle and constantly obtain, quickly, all the information needed for safe and comfortable driving.

The Irizar virtual cockpit offers all the necessary information in an attractive colour design, with fixed elements on the screen combined with dynamic elements that are shown in the central window, depending on the information requested by the driver at the time. It is controlled using the multifunction steering wheel plus - the steering wheel switches are used to navigate the system menus.





Irizar i8



**COACH
OF THE YEAR
2018**

The **Irizar i8**, the best of the best

For the first time in its history, the Irizar brand has won one of the most prestigious European awards

The Irizar i8 bus has been nominated as the BEST COACH OF THE YEAR 2018 in Europe

A jury of specialist journalists from the most prestigious magazines in the sector in 22 European countries has decided to award the prize to Irizar i8 for its countless attributes and the high added value it offers.

The award recognises the great strategic leap taken by Irizar in recent years, to position itself among the best independent European manufacturers (OEM).

The Irizar i8 is a thoughtful combination of design, technology and sustainability that offers exceptional comfort to the driver, guide and passengers and confers prestige on its owners. It is also the maximum expression of quality, safety, profitability, robustness and reliability in a sector in which its strong personality and visual impact stand out.

The Irizar i8, together with the other coaches of its range, is the pillar on which this brand is building its future prospects in the long-distance and occasional service sector. It can be affirmed therefore, that Irizar currently has the best range of coaches in Europe as affirmed by the numerous customers who have new generation Irizar vehicles.

The exceptional performance and response of the vehicle during the Euro Coach braking and acceleration tests and the open road driving tests on a mixed 30 km route between dual carriageway and secondary road have given Irizar i8 a victory. It should be mentioned that this first position is even more meritorious given that the vehicle submitted was a 3-axle, 14-metre version and was competing with three other 12 m, 2 axle vehicles - which are significantly lighter.

The comments of the jury and of the specialized press refer to an exterior and interior design that is "powerful, with great scope for customization, ergonomic armchairs, comfortable, spacious interior ..." and performance - "unbeatable in braking, radius of rotation ..." Environmental considerations are very positive in relation to the "maximum capacity of the vehicle, its reduced energy consumption, minimum vibration levels and noise, even in very tight corners". Regarding technology, "the dashboard is a benchmark, multiplexing keys and adding a HMI for the first time as standard. Safety: Full LED headlights, pioneering systems such as AEBS, LDW, TPTMS, ACC and DFT as options. In addition it meets R/66.02." In the section on total vehicle costs the evaluation is: "the purchase price, depreciation and residual value, consumption and repair and maintenance costs make the i8 a benchmark".

Euro Coach Test 2017

The Coach of The Year prize for the best coach of the year was established more than five years ago and this was the first time in history that Sweden has hosted the Coach Euro Test. Specifically, the city of Linköping, 240 kilometres south of Stockholm, hosted the test, where six maximum world-class competitors all gathered with their coaches: Irizar's integral i8, the Iveco Bus Evadys, the Mercedes-Benz Tourismo, the Neoplan Tourliner, the Scania Interlink HD and the VDL Futura FDD2-141 double decker.

The meeting brought together more than 60 professionals as members of the Jury of the Coach of the Year Award and managers of the manufacturing brands.

Both the presentations and the start and finish point of the road tests took place at Mantorp Park, a circuit built in 1968 and used for Formula 2 races in the 1980s. Currently, its facilities host different events such as exhibitions, driving tests and speed competitions.

The road route test, in which all drivers participated at the wheel of each participant coach at least once, was 30.6 kilometres long and took about 40 minutes to complete.



Number one also for customers

The Irizar i8 has quickly become Europe's number one choice for football, rugby and high specification corporate coaches.

In the UK, companies such as Ellison's Travel of St. Helens, Stewarts Coaches of Reading, The Kings Ferry Travel Group, Clarkes of London, Lockett's Travel and Howard Snaith Coaches offer services to various sports teams including Liverpool Football Club.

Ellisons is the VIP client with the highest number of i8s in the UK. All these units carry premier league players. Ellisons is so satisfied with the vehicles that it is renewing its fleet with the i8. In the words of Andy Magowan, "The Irizar i8 is a big coach with an aisle height of more than 2.1 metres and a flat floor making it the perfect mode of transport for a front-line football team and Irizar's support from the moment of purchase until the end of the vehicle's life, makes it the perfect choice.

Student is the European operator with the highest number of i8s in Europe. Its total fleet is nearly 220 units, practically all of which are Irizar.

Bus4You in Scandinavia, FunClub in Poland, Bilman Bus and Bastian Bus in Spain can be added to the long list of operators.



The Irizar i6S – The best seller

The new generation of Irizar coaches is reaping a harvest of new successes. Major operators worldwide remain loyal to the Irizar brand given the attractiveness of Irizar vehicles for implementing their different service strategies. Because it is very easy to find the vehicle that best suits their needs at Irizar.

The Irizar i6S, released to the market last year, follows in the footsteps of the Irizar i8, with successes wherever it goes.

Like the Irizar i8, the Irizar i6S has been named "Coach of the Year in Spain 2017". The new Irizar i6S replaces the emblematic Irizar pb and is similar in its aesthetic features to the Irizar i8 with which it shares the new incorporated technology.

The Irizar i6S is a coach designed for medium and long distance and discretionary lines and is the best-selling coach in the Irizar range. In just ten months more than one thousand units have been sold.

New operators and operators loyal to the Irizar brand have chosen this coach model for incorporation into their fleet.

The main reason why this new coach model is selected by our customers is because they wish to be at the cutting edge of technology, to be benchmarks in their image and offer passengers a service that is unique, safe, modern, personalized and comfortable.

The Irizar i6S in the UK

The right-hand version of the Irizar i6S, adapted to the needs of the UK market, has just been presented at the Coach & Bus 2017 in Birmingham 4 - 5 October.

The Irizar i6S is heading for Peru

Peru will also have this model of coach from November of this year.

In european operators

LUX EXPRESS de Estonia. It operates from Estonia to the rest of the Baltic republics and Russia. Its fleet has more than 50 Irizar units.

OUIBUS-SNCF in France. It is a newly created public company that operates on major routes due to the liberalization of bus lines. Has more than 60 units.

FLIXBUS a new company with the same Uber philosophy but focused on long journeys. It is an online platform that sells tickets and loads on numerous domestic and especially international lines.

CITY CIRCLE. Has just signed a contract to purchase 60 new Irizar i6S to be manufactured in three years. It is a benchmark customer in the U.K.

TRANSVIA, MOVENTIS. Is joining the customer base with the renewal of its fleet with this model of coach in the complete version.

KOBENHAVNS BUSTRAFIK in Denmark.



The Irizar hybrid - exceptional consumption

In 2016 Irizar launched its hybrid class II vehicle in its i4 (only high floor vehicle in the world market) and i3LE models. This is the parallel hybrid technology made up of Cummins Euro 6C gasoil engine and 6.7l HVO 6 cylinders, 320 hp and 1200 Nm and Eaton - e drive hybrid package with 6 V robotised box, 65 kW electric motor and 5.5 kW/h lo-Li batteries

After more than a year of operation and more than a million km, the reliability of the vehicles as well as their low consumption have been confirmed, reducing consumption by more than 20% compared to exactly the same vehicle with a 100% combustion engine in short-distance intercity travel, as as the high reliability of the hybrid group.

Such is the satisfaction of the major operators of the Madrid Consortium who put their trust in Irizar, that they are repeating and even expanding their purchases this year. Highlights - Grupo Avanza

through its companies Larrea, Etasa, Alacuber and the Julián de Castro Group, through its companies Julián de Castro, Beltran, Cevesa, Argabus, El Gato.

These variants have also been presented in the UK during August with great interest from operators and Irizar will present these hybrid variants at the Kortrijk fair this year, offering it in all European markets.

Note that work is currently taking place on a hybrid variant for three-axle vehicles with a higher power kinematic chain and battery life based on a Cummins Euro 6C engine of 8.9 L, 370 hp and 1600 Nm and 110 kW Irizar electric motor and 15 kW/h Ion-Lithium batteries.

Irizar Mexico still the leader

With the success of the i8 model in the Mexican market and the perfect positioning in the market of the other two models, i6 and i5, the most profitable product range for meeting passenger transport needs in Mexico is consolidating itself. These models are consistent with the values of the Irizar brand, such as safety, comfort, reliability and profitability for its customers.

Irizar Mexico's leadership is merely a reflection of its proximity to its customers and the quality, competitiveness and profitability of its products.

Sales during the first half of the year indicate that Irizar Mexico will continue to lead the market with production of around 900 units, similar to 2016, thus maintaining its market share above 50% and confirming the Mexican market's preference for the Irizar brand.

Investments that improve productive facilities

Problems often give rise to opportunities and this is what has happened after tragic painting booths fire in the plant in summer 2016.

The investment in the new painting facilities will provide Irizar Mexico with state-of-the-art paint booths which will undoubtedly bring about an improvement in the quality and service of the coaches.

Likewise, the process will be more sustainable, with greater energy efficiency and emissions that meet the most demanding standards in Europe.

A new 3,500 m² warehouse is also being built. This will include an exclusive space for the unit finishing process and quality reviews, which will include a new tunnel for seal tests, 2 paint booths and spaces for cleaning and final tuning of the buses before delivery to the customer.

All these strong investments seek to improve the quality of the units and service to our customers. Investments that demonstrate the importance of Mexico for Irizar, thus upholding the Group's key strategy, proximity and directly relationships with customers to win their trust and confidence.





Irizar Brazil

The Irizar Group's Export hub

Business people have long understood that crises are good for renewing strategies and forcing companies to reinvent their approach and change their products to survive in a competitive environment.

Irizar Brazil has experienced one of the most intense economic and political crises of the last 20 years. Uncertainty has cast a shadow over the future of the country, recognized as the eighth world economic power, but which has recorded four consecutive years of negative growth. The increase in public debt and cuts in federal budgets have led to shrinking investment in transportation and local industry since 2014.

As the Brazilian scenario has shown no visible signs of improvement, Irizar Brazil has changed its strategy towards export markets, investing heavily in its commercial presence, by strengthening after-

sales and innovating in every aspect of the transport sector.

In **Chile**, following two years of crisis in commodity prices, Irizar has consolidated its involvement in the tourism and long-haul sectors. The change in legislation, authorizing 15m vehicles, was a major turnaround for the single-floor coach market. As a result, the sector gained market share over double-deck sales, which increased Irizar's sales in Chile. Irizar's market share grew to 20% in 2017, from 10% in 2016.

After almost a decade of poor figures for Irizar, **Peru** was consolidated among the three main export markets of Irizar Brazil. As a result of a business and after-sales and customer proximity strategy, Irizar's share has grown from less than 5% to 30% in 2017. Innovative solutions such as the first

Business class seat with electric reclining were key to conquering new territory and consolidating Irizar as the preferred supplier for the Tourism Sector. The safety and comfort features of the Irizar i6 are key factors for increasing Irizar's presence in mining transportation, the fastest growing transportation sector in Peru. The high costs associated with double-decker operations have helped Irizar to win new customers with the i6S, which is designed for freight transport.

In **Australia**, **Irizar Asia Pacific** has established strong communication links with Irizar Brazil, focusing on improving reliability and new local customization options.

This, coupled with a new after-sales strategy, has resulted in the fact that for the first time in 10 years (May 2017), Irizar had second largest number of registrations, beating Volgren, the leading local manufacturer. Irizar's share in Australia is expected to grow from 11 % to 16 % by the end of 2017.

South Africa and **West Africa** have involved major effort and many triumphs for the Irizar team. Burkina

Faso confirmed the first order of 10 coaches in a project in which Irizar Brazil has offered its advice for a new operator to start its business. Cameroon and Ghana have confirmed their first orders and Irizar is being considered to be the official vehicle for the African Cup of Nations in Ghana, as it was 4 years ago. Changes in South Africa's regulations consolidate 15m single-decker coaches, so operators have decided to abandon costly double-decker operations and are adopting the Irizar i6 as an innovative solution for fleet renewal. The strong commercial presence in South Africa has led Irizar to become market leader in 2017. All this means that African markets in 2017 represent more than twice the volume of 2016.

In difficult times and in competitive environments, the Irizar Group has shown that it is able to find opportunities and maintain growth, confirming that a strong commercial presence and after-sales service are the keys to keeping current customers and conquering new fleets.

Hispacold, 40 years' constant innovation

Roberto Recuerda, General Manager of Hispacold, reviews the 40-year history of the Company.

Forty years ago the founding partners decided to launch a business project to market air conditioning systems in buses and coaches. "From the outset, they were clear that the internationalization of the company was key to its future and its viability, so they did not hesitate to work with perseverance, spending long days away from home, away from their families, to put Hispacold on the map, and they achieved it", Recuerda said.

In Recuerda's opinion, the reason that Hispacold remains a living business forty years later is the result of the work of all those that have been and are involved in the project. But not only the people who make up the company's workforce - also its customers, suppliers, shareholders and agencies and institutions that work with it directly or indirectly.

He also underlined the company's ability to adapt to a dynamic environment, which has enabled Hispacold to evolve as a collective and to reinvent itself

continuously, whilst always maintaining excitement at work. For example, in 2009 in the midst of one of the biggest world crises of recent years, Hispacold decided to embark on a new adventure related to air conditioning systems for rail applications - which today is one of the lines of business with the greatest growth and future potential.

Electric mobility is another project on which the company is focusing. Currently it presents new advances in air conditioning systems for hybrid and electric vehicles that can be adapted to all types of vehicles (trolleybuses, hybrid and 100% electric buses) of different lengths (up to 24 metres) and to very different climatic conditions (hot, cold and extreme climates).

Hispacold launches a new corporate visual identity



In the year of its 40th anniversary, Hispacold is completely overhauling its brand, making an occasion for a new perspective on the future and adaptation to new times.

The new image is fundamentally based on an evocation of pure air, balance and sustainability. From this starting point, the symbol tries to reflect a rotation, a blue stream of clean air that closes in on itself, giving a nod to renewed air and mobility.

The typography is forceful, because it is imperative for the brand to enjoy optimum visibility and legibility. However, the lower case letters and the grey tone soften this forcefulness and also offer the best formal correspondence with the symbol; both form a harmonious visual whole.

Hispacold is a company with a long history and major experience in which innovation is one of its main assets. The new image tries to highlight this capacity to renew itself and continue moving forward on the path of air conditioning; a current, fresh, friendly and versatile image.



Masats, 50 years of history

Masats is celebrating its 50th anniversary in 2017 by sharing its journey with the people who make up the company, its customers, suppliers and employees.

In order to celebrate its half-century and face the major challenges of the future, the company has presented the new corporate image that will now represent a people-based model, internationalization, improvement teams and continuous innovation, values to make the Masats project more alive and give it greater projection over time. The new corporate concept is designed to convey the spirit that marks the daily task of manufacturing products to make people's everyday lives easier, which is the most important value for the company.

The company is continuing to redefine its internal organization and its challenges to ensure sustained growth with its eyes on the long term. All in order to design a structure that is closer to customers and which always knows how to interpret the needs of coach builders, big brands, manufacturers, companies and public transport operators.

Masats is convinced that the future will mean the production of more technological, better tested and more reliable products, and it is therefore focusing on modernizing product certification systems and creating more added value, by offering maximum rigour and professionalism in projects. To generate quality products that meet the needs of coach builders, operators and users.

Masats was founded half a century ago to operate exclusively in the transportation of travellers and today it has high expectations in the railways due to a strategic decision taken nine years ago to develop a specific product range for this sector, which is supported by the current exciting decision to focus on the development of platform doors. Hard work, dedication and permanent change and innovation have made the company a benchmark in the road and rail equipment sector.

Masats was founded in 1967 by Salvador Alapont and is celebrating its first 50 years with pride at having forged its own model and a very distinct personality based on the long-term responsibility of all those who make up the company, continuous training, recognition of achievement and a courageous focus on further strengthening future commitment to the project. These traits are recognized by the company's customers, who have encouraged a change of image projecting the human values of the company and its commitment to people.

Its headquarters are in Barcelona and its primary business is manufacturing systems and components for hydraulic and electric doors, train and underground platform doors and elevators for persons with reduced mobility for the road and rail transport sector.



The company is continuing to redefine its internal organization and its challenges to ensure sustained growth with its eyes on the long term.

Currently Masats is the leading company in Spain and a benchmark company worldwide in the road and rail equipment sector.

The company is a global supplier of coach builders and big brands and it exports 47% of its output to more than 30 countries, with a major presence in Singapore and significant penetration in the Hong Kong and Kuala Lumpur markets. In addition

to a growing presence in Asia, operations in the United States are increasingly significant with the implementation of a plant in Atlanta to reinforce the strategic commitment to the North American market. This greater global projection of the set of products of high technological qualification gives the Masats brand international recognition.

Electromobility

With **Irizar e-mobility**, the Group is capable of providing complete mobility systems to cities and citizens, including both 100% electric buses and the main infrastructure systems needed for charging, drive systems and energy storage. All of which are designed and manufactured using 100% Group technology and that carry the Irizar quality and service guarantee. There is also the added benefit of being able to rely upon one contact person at all stages of the project.

www.irizar-emobility.com

for a better life





Ready for the electrification of cities with our own reliable and proven technology

Three years after the delivery of the first 100% zero emissions electric buses to the cities of San Sebastian and Barcelona, we can now proudly say that we are fully prepared for the electrification of the public transport services of European cities with a wide range of comprehensive mobility solutions tailored to the needs of each customer, with products and services made by the group with state-of-the-art technology developed entirely in the Irizar Group.

The first 25 units are running at full capacity in a dozen European cities with proven battery range, efficiency and reliability.

The current order backlog and the high demand for zero emissions products that will soon materialize have led the Irizar Group to start serial production at the new Aduna plant - exclusively for the development and manufacture of electric mobility solutions for cities.

The first hundred direct and indirect jobs have already been created to begin our journey in this area, by producing and offering advanced technology products that mean that we can be competitive from Europe.



The **Cote Basque-Adour conurbation, France** has chosen Irizar for a major avant-garde transport project. It has purchased 18 18.73-metre long zero emissions Irizar ie tram articulated buses, charging stations at the end of each line through rapid charging infrastructures, or slower charging stations in depots.

In this way, the Cote Basque-Adour Conurbation will be the first to have two complete lines with a 100% electric BRT system in France.

The Irizar ie tram under this contract has a bespoke, innovative and avant-garde tram-type design.

TMB (Transportes Metropolitanos de Barcelona) has just awarded Irizar e-mobility a contract for four 18.73 metre Irizar ie articulated buses. These buses, Irizar's first 18-metre articulated buses in Spain, will enter into service in June 2018. The new units will join the two 12-metre buses which have

been operating in the city since 18 August 2014 and which are part of the European Commission's ZeEus project.

With this purchase, the Barcelona municipal transport company is tackling the first phase of transforming the H16 line to a 100% electric, zero emissions route.

The **Municipal Transport Company (Empresa Municipal de Transportes - EMT)** and Madrid City Council have purchased 15 buses which will be the first 100% electric buses to join the municipal company's fleet. In addition to the units, 15 chargers will be supplied for night charging in depots. This trust in the Irizar brand is due to the satisfactory results in tests carried out on Irizar vehicles.

Valencia will also have its first Irizar 12 metre electric bus (ie bus) by the end of this year and Bilbao will add another two 12 metre buses to its fleet, to be delivered by the end of this year.

Le Havre joining other French cities in electrifying its public transport system with three Irizar ie electric buses. These are the first electric buses that acquired by La Communauté d'agglomération Havraise through the CATP purchasing office and they will be put into regular service later this year.

- In 2014, Irizar became the first European manufacturer in the sector to deliver two 100% electric vehicles to Barcelona and delivered the first unit to San Sebastian.
 - In 2015, the first units were delivered to London, Marseille and the Barcelona metropolitan area (Mohn, SA) and tests were carried out in various European cities.
 - In 2016, 6 units were delivered to Marseille for France's first fully electric line along with other units to San Sebastián and Bilbao. In the same year, the first articulated bus unit was manufactured after spending six months undergoing durability testing at Idiada (Tarragona).
 - In 2017, 26 new 12-metre long buses will be delivered.
- Also at the end of this year, the construction of 22 articulated buses will begin. These are the four newly acquired by Barcelona (TMB), the 18 acquired by the Cote Basque-Adour conurbation, plus the three acquired through the CATP Purchasing Office for the Communauté d'agglomération Havraise.



We are expanding our range World premiere of the new Irizar ie tram

The Irizar ie tram - A tram on wheels

The Irizar e-mobility range of buses is being expanded. The existing 12 metre models are now complemented by 10.8 metre buses, presented at the Coach & Bus fair in Birmingham on 4 and 5 October and the two new 18 metre articulated bus versions, the Irizar ie bus and the Irizar ie tram.

We are the Irizar ie tram and its technology and the new pantograph charging system at a world premiere.

The articulated 18 metre ie bus will be put into circulation later this year in the city of San Sebastian.

Both are a new solution for urban mobility for transporting larger numbers of passengers. 18 metre vehicles, 100% electric motorization, zero emissions. They provide a transport solution offering major capacity, speed and connection with the pantograph charging system. They include all the main infrastructures systems necessary for charging, traction and storage of energy developed within the Irizar Group.

The Irizar ie tram is an articulated 18-metre bus. A bus with the aesthetic attributes of a tram, developed based on the idea that the design is part of the attractiveness of the service and contributes to the development of comfort for the citizen.

The combination of large capacity, ease of access and the interior spatial organization of a tram, with zero emissions, define the DNA of this new vehicle. The Irizar ie tram offers a design that starts from a minimalist aesthetic language, without ornaments, with all of its features responding to specific functional aspects, creating an identity and an image that are easily recognizable by users.

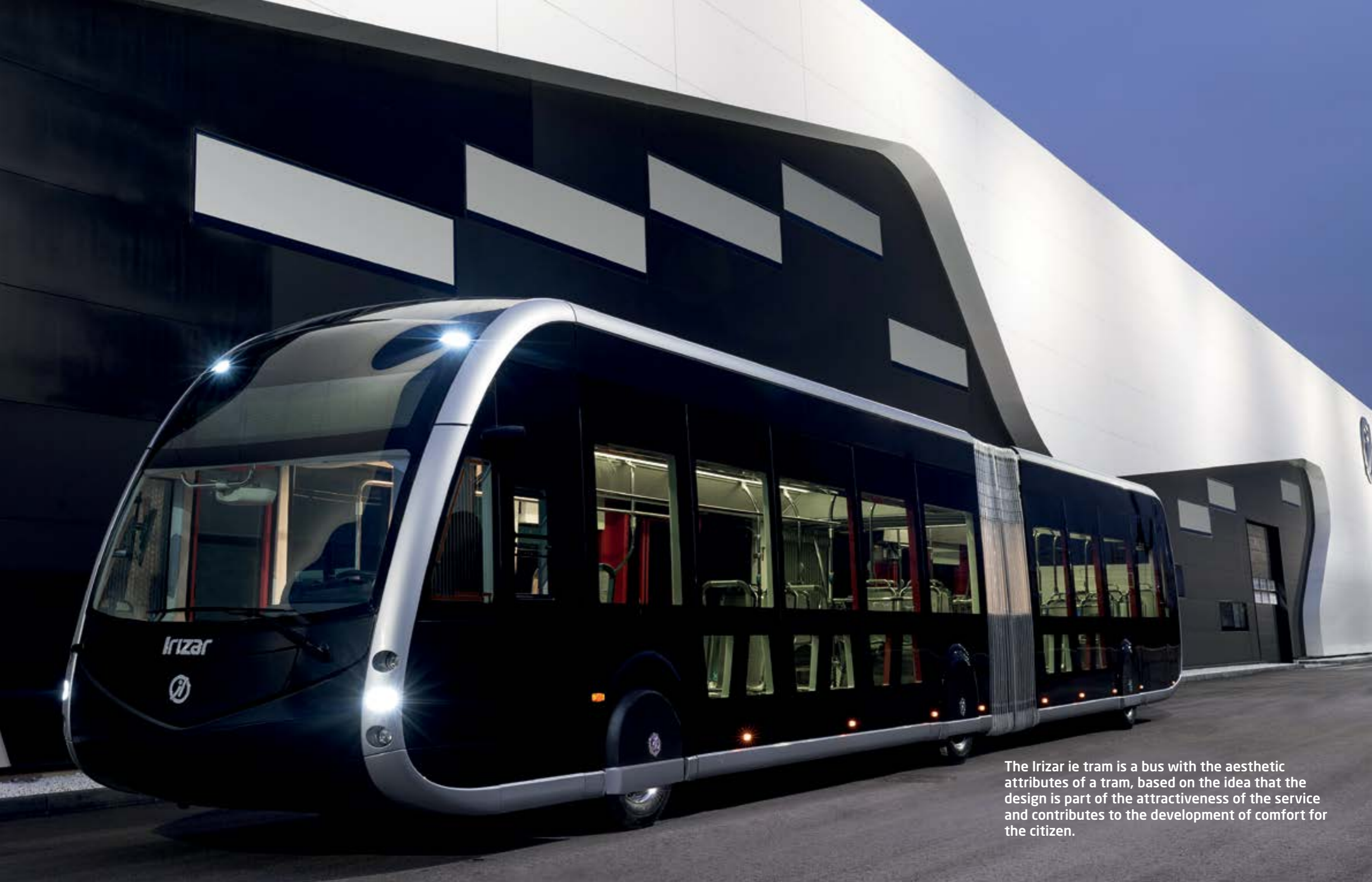
One of the most significant features is the chrome edging that flows around the body of the vehicle. It makes for immediate identification and creates a appearance that is different to other similar vehicles. This edging, like an icon, is an identifying feature associated with the brand.

The chrome edging runs around the large glass surface of the sides, which becomes a canvas on which the environment through which the vehicle travels is reflected.

The front reflects fluidity and elegance, with a large glazed surface that evokes the heritage of the tram, which together with the full led optics integrated in the edging rings, creates a composite appearance that is avant-garde but technological and rational at the same time. The rear, which breaks with the cubic form of the bus, is another of our major aesthetic advances.

The innovative, inspiring design of the Irizar ie tram breaks with the classic transport codes and enhances the charm of the city by reflecting urban cultural diversity.

Every last detail has been considered in the aesthetics of the tram, for example the hubcaps and the rear-view mirrors, which have been replaced by cameras that display their images on two screens inside the vehicle on each side of the driver.



Irizar



The Irizar ie tram is a bus with the aesthetic attributes of a tram, based on the idea that the design is part of the attractiveness of the service and contributes to the development of comfort for the citizen.



The interior: The search for a unique space

Irizar e-mobility has designed the passenger interior with consideration for traveller behaviour and interaction with the urban vehicle and based on different lifestyles and future trends, so the proposed arrangement of the seats creates social cohesion. Very comfortable seats and integration of essential comfort and safety features are proposed.

Accessibility, safety, movement flow and passenger comfort inspire the interior design architecture. The arrangement of the interior spaces enables the adaptation of the different types of users, offering them all a comfortable solution. Thus, the spaces offered are bright and pleasant, designed for students because it has been observed that on all public transport networks, they prefer to sit at the back.

The interior design seeks to offer the user a feeling of openness and light, where the transition between inside and outside is minimized through

the transparency of the windows, so the passenger becomes observer of what happens outside the vehicle. The large side windows, together with the LED interior lighting and its central "open air" vault, provide brightness that transfers the user to a spacious, pleasant and safe environment.

In the inter circulation area, a system with very low lateral inclinations has been designed to provide an open space towards the rear trailer. The system avoids the separation of the two passenger areas, is translucent and is equipped with LED lighting.

These 18-metre vehicles have capacity for 155 people, making them unique among electric buses. They allow the installation of up to eight sliding doors to facilitate the exchange of passengers with a reduction of time in the station, which is indispensable for reducing journey times and increasing punctuality on high-level service lines.

The integral low floor and arrangement of the seats inside the vehicle ensure that passenger entrances and exits in stations and movement inside the vehicle proceed smoothly.

We think of everything and everyone

Furthermore, our arrangement of the seating is based on a mass transit configuration, which is ideal for improving the flow of passengers in the rear compartment of the vehicle, allowing for improved access to the articulation.

The vehicle can accommodate two areas for wheelchairs and pushchair and four seats for people with reduced mobility. The fitting of these areas consists of a stop request button in Braille, signs for the reserved seats (size and colour of the seats), a buzzer indicating the stop request and approved signs in the wheelchair space. In summary, a vehicle that is accessible to all.

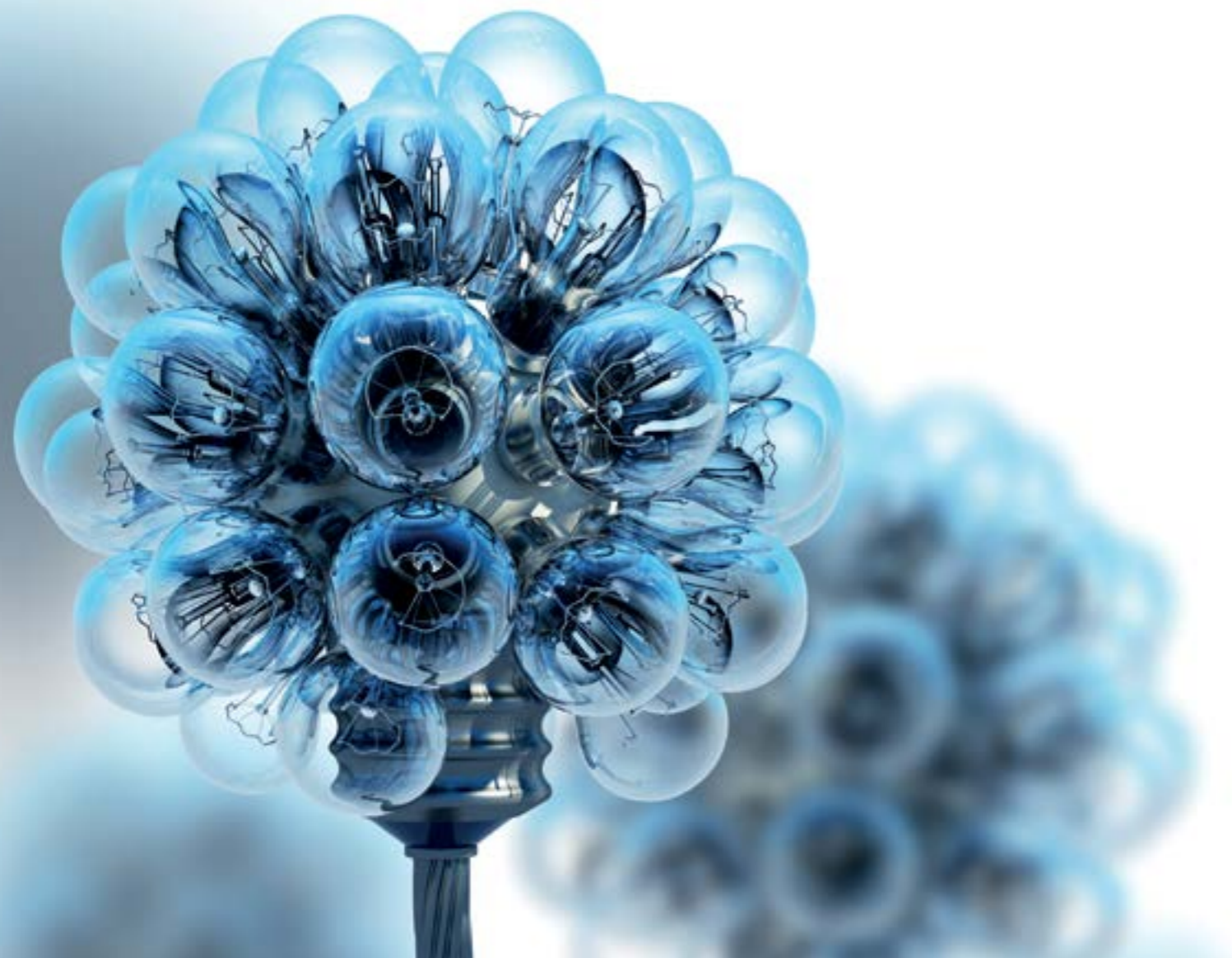
Accessibility is further enhanced by the installation of ticket validation devices near all doors, the design of the driving position, the interior layout with large internal movement aisles and improved manoeuvrability of people in wheelchairs and others with reduced mobility.

Accessibility, safety, movement flow and passenger comfort inspire the interior design architecture.

These Irizar vehicles offer the same degree of thermal comfort as the rest of the Irizar range, and they contribute to the creation of a noise-free atmosphere.

The "kneeling" function, with heights of between 250-270 mm, enables comfortable and effortless access to the bus.

For your entertainment, Irizar enables the installation of a wide range of solutions: USB chargers, WiFi, Braille buttons, luggage racks, passenger information, interior vinyls, etc.



Irizar seal: Cutting edge technology

The technology developed and applied by the Irizar Group is based on the experience and vast knowledge of each of the areas involved in each installation and in collaboration with the most prestigious research and development centres in Europe.

It is a technology that has also been tested in Irizar's laboratories and test benches and in the vehicle itself. Technology that optimizes the flow of energy between the different systems involved in electrification, such as the drive chain, battery storage, Wabco EBS and auxiliary equipment.

Batteries

The high power density and long life batteries are lithium ion of the LTO family (Lithium Titanate Oxide).

The Irizar battery system responds to a modular concept, designed to meet the needs of any operator. It also allows easy isolation and rapid replacement in the event of an error in one of the modules, without affecting the operation of the rest.

The estimated useful life of the batteries depends to a large extent on the operating and consumption conditions, especially mileage, operating hours, recharge cycles, bus occupancy and weather. Irizar offers the optimized solution for maximum durability.

Safety in use

Battery temperature is stabilized independently and the battery management system is integrated into the vehicle's circuits, so there is no fire or explosion risk. Moreover, they do not need preventive maintenance.

The system is as solid and safe as required by the latest European regulations: R100, R10 and UN38.3.

Recyclability

Once the battery reaches 80% of its service life charge capacity, Irizar will change it and give it a second life by using it in static up to 50% of its service life charge capacity. The recycling process can then take place.

Irizar electric motor:

Unlike other projects, conditioned by more standardized engines, the motorization of the Irizar ie tram also responds to technologies designed and developed exclusively by the Irizar Group, which is fully adapted to the requirements of the vehicles.

The engine, manufactured by Alconza, a Group company, a permanent magnet synchronous motor with capacity of 230 kW, sufficient to respond to the required operations.

Air conditioning system

The Hispacold air conditioning system, designed specifically for zero emissions electric vehicles, offers a perfect balance between the thermal comfort of passengers and energy optimization, developed by Irizar for its electric vehicle.

Electric doors

The doors installed in the Irizar ie tram are electric doors developed by Masats; the single front door, swinging with a safety sensor and the others, also double doors, are metre with sensor. They include a management control system with manual, automatic and shuttle modes.

The electric and manual ramp is a Masats RT1 1300 model.



Proven and tested reliability

A safe and totally reliable vehicle

The 18 metre Irizar ie articulated bus, has just completed testing at the Institute of Applied Automobile Research, IDIADA, with excellent results.

We simulate the intensive use of the coach to check its durability under the most severe conditions. The test is extensively monitored. Daily, technicians from independent institutions inspect the buses to detect any anomalies due to accelerated fatigue.

Running on the accelerated fatigue track

On an accelerated fatigue track we simulate the accumulation of kilometres equivalent to the entire service life of the vehicle as far as structural components are concerned as well as elements of the bus. The tests combine the running on various surfaces at different speeds and a series of manoeuvres to stress the structure of the vehicle.

Buses are also subjected loading conditions to simulate actual usage; often the most critical load

condition to test the durability of the entire vehicle under the most severe conditions.

A wide variety of surfaces and elements are used during testing which simulate the behaviour of the unit during its life in an accelerated and amplified manner.

Cobblestones, for example, cause a high frequency of large vertical forces that affect the vehicle's suspension systems and structure. One of the most demanding stretches is the waterway with different sized boreholes that cause a series of strong impacts that are transmitted to the structure in the form of high longitudinal and vertical loads.

Other areas of the circuit, such as the flat pavement with bumps, enable the driver to detect internal noise in the passenger compartment of the coach and evaluate the comfort of both driver and passengers.

The undulations of the track (symmetrical and asymmetrical on the left and right wheels) test the suspension systems and help in assessing the level of comfort inside the vehicle.

Areas of gravel make it possible to see the intrusion of dust into the various compartments as well as projecting gravel, dirt and dust onto the underside of the bus causing wear and corrosion.

These tests consist of the accumulation of test kilometres and the completion of figure of eight manoeuvres, following guidelines established by IDIADA on the accelerated fatigue track.

These tests are complemented by ramp starts. The buses undergo stop, door open / close manoeuvres and wheelchair ramp unfolding / folding on a 15% ramp.

The test results and the daily inspection of the buses are used to analyse the behaviour and indicate any details that can be improved.

The testing is ultimately intended to simulate the vehicle's entire useful life, ensuring good durability in the harshest conditions. That is why, at this stage of testing, it is so important to detect incidents from the moment they appear and to properly implement corrective measures.

Cobblestones, for example, cause a high frequency of large vertical forces that affect the vehicle's suspension systems and structure.

In-house testing technology

The new Irizar e-mobility factory has been designed to host its own test tracks and test benches in order to guarantee the reliability and efficiency of the equipment and to compare the technology incorporated into the vehicles, as well as their components and systems.

Irizar has devised a progressive validation programme in each of the design stages of the vehicle, its traction, charging and battery systems, applying latest-generation technologies and methodologies to obtain the most accurate and reliable results. And it has highly qualified staff with knowledge of the most demanding local and international standards and guidelines.

INTERVIEW WITH:

Cedric Saulnier, Director of Transport Marseille Municipal Services

Marseille, the second most populated city in France, is home to the first 100% electric bus line in the country. In its commitment to sustainable development, Marseille Municipal Transport Services (RTM) has placed its trust in Irizar due to its ability to offer personalised solutions equipped with cutting-edge technology, whilst also taking into consideration the demanding characteristics of the Marseille climate.



Marseille has become the first city in France to launch into operation a complete line of six Irizar zero emissions, 100% electric coaches. Does this make Marseille a green city of the future? What are the objectives sought and what steps are being taken in this respect?

➤ It is clear that this is the RTM's objective, particularly in the centre of the city. We are also preparing for the new law which, from 2020, will enforce that public transport companies must acquire one coach recognised as being "green" (100% electric or NGV) for every two vehicles purchased.

From 2025, all coaches purchased must have the "green" feature.

The objective therefore announced by the RTM is the purchasing of more than 15 100% electric vehicles per year from 2020, and more than 30 from 2025.



How many passengers use public means of transport in Marseille each year? And what percentage of them is using this zero emissions line?

➤ Marseille public transport serves one hundred and seventy million users per year. Of these, one and a half million use the zero emissions line. That is less than 1% of the overall.

More than half of customers these days opt for "clean" transport (Metro and tram).

What services do the coaches that run in Marseille offer? Are they specially configured coaches? What features do they have?

➤ The fleet is comprised of six hundred coaches with an average age of seven years. The coaches are fully accessible (electric ramps, etc.), they are fully air-conditioned and all are equipped with video surveillance.

Marseille in itself has some very demanding climatic characteristics during the summer. Is Irizar satisfying the arising demands? What data or results can be provided to us on an operational, range and technological level?

➤ When we purchased the six Irizar coaches, they were the only ones on the market that were able to offer a full day's range, when taking into consideration the use of air conditioning.

The RTM's decision to acquire these six vehicles provided no cause to modify the type or level of service, nor to lower our level of demand.

Now, with almost a year and a half of them being in operation and more than two hundred thousand kilometres covered, we can confirm that these prototypes, comprising six vehicles, are pretty much ready for regular use.



One of the big concerns on the part of the operators is the after sales service for electric coaches. What can be said in this regard?

➤ Of course, this is an important concern.

On this matter, we are fully aware of the risks associated with the procurement of prototypes and the after sales service is developing and gaining structure. Irizar is compensating for this “weakness” with a commitment in situ so that the RTM is able fulfil its level of service.

Before moving forward on a larger scale, the after sales service needs to be structured in France.

What are considered to be the most significant features or values that Irizar has brought to this project?

➤ The level of commitment and the willingness to progress.

Are the public aware of the environmental contribution of these coaches? How do they perceive it?

➤ Very well. We have carried out regular surveys which show that 99% of customers and users are satisfied with the electric coaches.

What lessons have been learned?

➤ There are numerous lessons, but I would like to highlight three that I consider the most relevant; learning about management of the service, the influence of external parameters such as climate control, the driver... and all those elements that are related to maintenance (infrastructure, technical knowledge, organisation, etc.)

Furthermore, I would like to add that the experience acquired from starting up this fully electric line shows us that this type of commitment is totally feasible, even though there are two matters which need to be looked at in more depth; the price, the economic reality and the full development of infrastructures.

The coaches are fully accessible (electric ramps, etc.), they are fully air-conditioned and all are equipped with video surveillance.

INTERVIEW WITH:

Alfonso Gil,
 Mobility and Sustainability Councillor
 Bilbao city hall

Bilbao has transformed itself into one of the pioneering cities in Spain in commitment to electric mobility. It currently has Irizar zero emissions buses and will soon acquire another two units.



Does this make Bilbao a green city for the future? What are the objectives pursued and what steps are you taking to achieve them

➤ It makes us a city that has realized that electric mobility is not the future, but the present. The future is here, it is now. Because we are convinced that all we can do now is the present that we are supporting up for future generations. A commitment to electric mobility is a commitment to sustainability in capital letters, to health, to well-being ...

Our commitment is unstoppable, in addition to the 2 new Irizar electric buses that will join the Bilbobus fleet before the end of the year, Bilbao will soon have new rapid recharge stations for electric vehicles to charge their batteries in little more than twenty minutes. Because we believe that extending this type of charging point will be what gives us the qualitative and quantitative leap that electro mobility needs in the city.

Bilbao City Council, in the Mobility and Sustainability Area, is clear that every euro that we devote to not polluting is an investment in health

Do you think that public transport can play a leading role in protecting the environment?

➤ Without a doubt. Government agencies must play this essential role. They need to be at

the forefront and prove it by example. We must implement measures to care for and improve the environment and, therefore, the health and quality of life of people.

As with the purchase of electric buses or the total renewal of OTA surveillance vehicles, which in Bilbao are all one hundred percent electric. Indeed, we are considering the possibility that electric vehicles will be exempt from paying the OTA.

Also, by putting resources in place, as we have done, to encourage the use of non-polluting vehicles in the city. Like the financial aid we have offered to all those taxi drivers who have decided to change their conventional vehicle for an electric vehicle, with great success.

Or committing, as we have done, to providing more than 400 electric bicycles next year for the Bilbon Biziservice. This is something that we believe to be essential for spreading their use in city with a complicated topography.

What characteristics and challenges need address for specifying buses for Bilbao?

➤ Bilbao is a city with very specific and complicated topographical feature - that is the main challenge we were facing. We needed a bus that could offer a perfect combination of zero emissions with enough power to climb and descend the city's high districts whilst also being able to withstand uninterrupted working days of 15 to 18 hours.

A technological challenge faced by bus builders to which Irizar has given a positive response.

How many passengers a year use this means of public transport? What is the total percentage of passenger transport in the city?

➤ Last year nearly 26 million people used the municipal bus service, Bilbobus. We also normally add the more than 20 million users recorded using the free public in the city plus the total of 345,015 loans in the Bilbon Bizi service.

These are very important figures in a city where most trips are made on foot, and where private vehicles are relegated to third place, after public transport. This is something that makes us the example to be followed by the cities around us.

All these figures, far from making us complacent, force us to face the difficult challenge of going beyond our comfort zone and, for example, making good on the commitment we signed with Greenpeace to reduce emissions caused by urban and metropolitan mobility by 50% in 2030, compared to 2012 levels.

An exciting challenge that we are confident of meeting.

At the level of operations, autonomy and technology, what data or results can you offer us? Is Irizar complying with the requirements? What do you consider to be the most important characteristics or values that Irizar has contributed to this project?

➤ We have always proceeded hand in hand. The public-private partnership has worked perfectly and has been able to meet our needs perfectly.



In our case, because of the particular topography of our city, we practically needed a tailored suit, and that is what they have given us. We knew that we were working with experts, with proven and guaranteed results and that reassured us. Once we knew that Irizar was going to be behind our first electric buses, we were certain that our commitment to public transport electrification would cease to be risky and would be a winner.

And what better way to take stock of these first months of partnership work and to evaluate the results, than by announcing that the next two electric buses that will move through the streets of Bilbao will once again be Irizar buses.

Are citizens aware of the environmental contribution of these buses? What is their assessment?

➤ The evaluation has been completely positive. The presence of electric buses in the city has become - and this is no exaggeration - a new source of pride for Bilbao. All in all, a sign and seal of the modern city that we like to aim to be.

In fact, a recent Spain-wide survey placed us first in citizen evaluations of public transport in Bilbao. When added to the remarkably high user evaluation of the Bilbobus service, this encourages us to continue along the route that we have decided to take and not to be diverted.

Clearly, everyone has understood that our commitment to electric is unshakeable. And that applies to citizens above all. And the Area of Mobility and Sustainability together with them.

Irizar pantograph

This charger is a system for conversion of energy from a three-phase power network - rated power of 600 kW.

The system allows automatic or manual connection of the charger to bus batteries. It is an articulated mechanism installed in the roof of the vehicle and a vault connected to the charger and located in a structure or adapted pole. When the bus needs its batteries charging, the pantograph arm extends and establishes timely connections.

The operator can choose from different protocols related to the opportunity charging procedure (automatic mode or manual mode).

The new Irizar pantograph allows the vehicle to be charged in just a few minutes. Its modern and minimalist design offers easy integration into the urban landscape.

It also offers the possibility of complete automation of the slow load in garages through the commissioning of structures with contact vaults installed above the parking spaces, replacing the outlet solution that needs a manual connection by part of an operator.

The automation of the contact between the vault and the pantograph of the parked bus allows instant charging. This alternative solution reduces the presence of cables on the floor and, therefore, improves the safety of the operators.

The Smart Charging system integrates a remote diagnosis system to remotely monitor all systems and anticipate possible preventive needs.



Profiling the future of mobility

The various companies that form part of the Irizar Group actively participate, hand-in-hand with major European brands, in key European projects for the future of electrification of cities and public passenger transport.

These projects relate to driverless vehicles, improvements in energy storage systems, energy efficiency, standardization of charging systems, connectivity or big data, which are basic in the new generation of clean, efficient, fast, standardized and smart transportation.

Driverless vehicles

The goal of the AUTOMOST "Dual Transport System Automatic Guidance" is to develop technologies that make it possible to automate vehicles for urban and industrial transport applications in order to significantly increase efficiency, safety and sustainability. It is financed by the CDTI (Centre for Industrial Technological Development) of the Ministry of Economy of Spain.

The demonstrator of a dual-mode bus will function as a commercial shuttle at the cruise terminal in the port of Malaga. Testing will take place during a number of months in real traffic conditions.

AUTODRIVE is a programme funded by the European Commission involving a consortium of more than 40 companies in the automotive world (Mercedes, Bosch, Infineon, VDL, Irizar, AVL, Murata, ZF, Tecalia...)

AutoDrive brings together leading companies, suppliers, manufacturers and research centres from the European semiconductor industry to create a pan-

European ecosystem with the critical mass needed to create standards and provide components and sub-systems for driverless vehicles.

The results of AutoDrive will significantly contribute to safer and more efficient mobility.

Energy efficiency

EBSF2 (European Bus System Of The Future 2)

The European Bus System of the future 2 project, funded by the European Commission's H2020 program, involves the development and validation of different solutions combining the efficiency of bus systems in an organized way with the lower energy consumption of electric buses.

Currently work is taking place to demonstrate advanced energy efficiency techniques in electric vehicles (A / C system, eco-assistant and smart management of auxiliary elements). This great

Fast and intelligent vehicle charging infrastructure

ASSURED: Fast and intelligent vehicle charging infrastructure for large vehicles

The ASSURED project proposal addresses "The integration of electric commercial vehicles into the fast-charging infrastructure" of the Green Vehicle work programme. A consortium of 40 participants from 12 EU member countries will carry out the work.

The overall objective of ASSURED is to analyse the needs of cities, operators and end users to capture the characteristics and requirements of the new generation of heavy electric vehicles (such as buses), medium-load trucks and light vehicles for operation in urban environments. This leads to cost improvements and the development of the new generation of HV charging system for electric vehicles and new innovative strategies for managing charging.

European demonstrator is being used to test, among other technologies, those developed by Irizar in the area of assistance for efficient driving.

Power storage

SADE: Safe Storage Systems

This project has been co-financed by the Ministry of Energy, Tourism and Digital Agenda as part of the National Plan for Scientific Research, Development and Technological Innovation.

The project aims to research and develop a battery-pack solution designed for the urban mobility opportunity charging strategy. The development will have a working prototype, to be validated and tested on a laboratory scale.

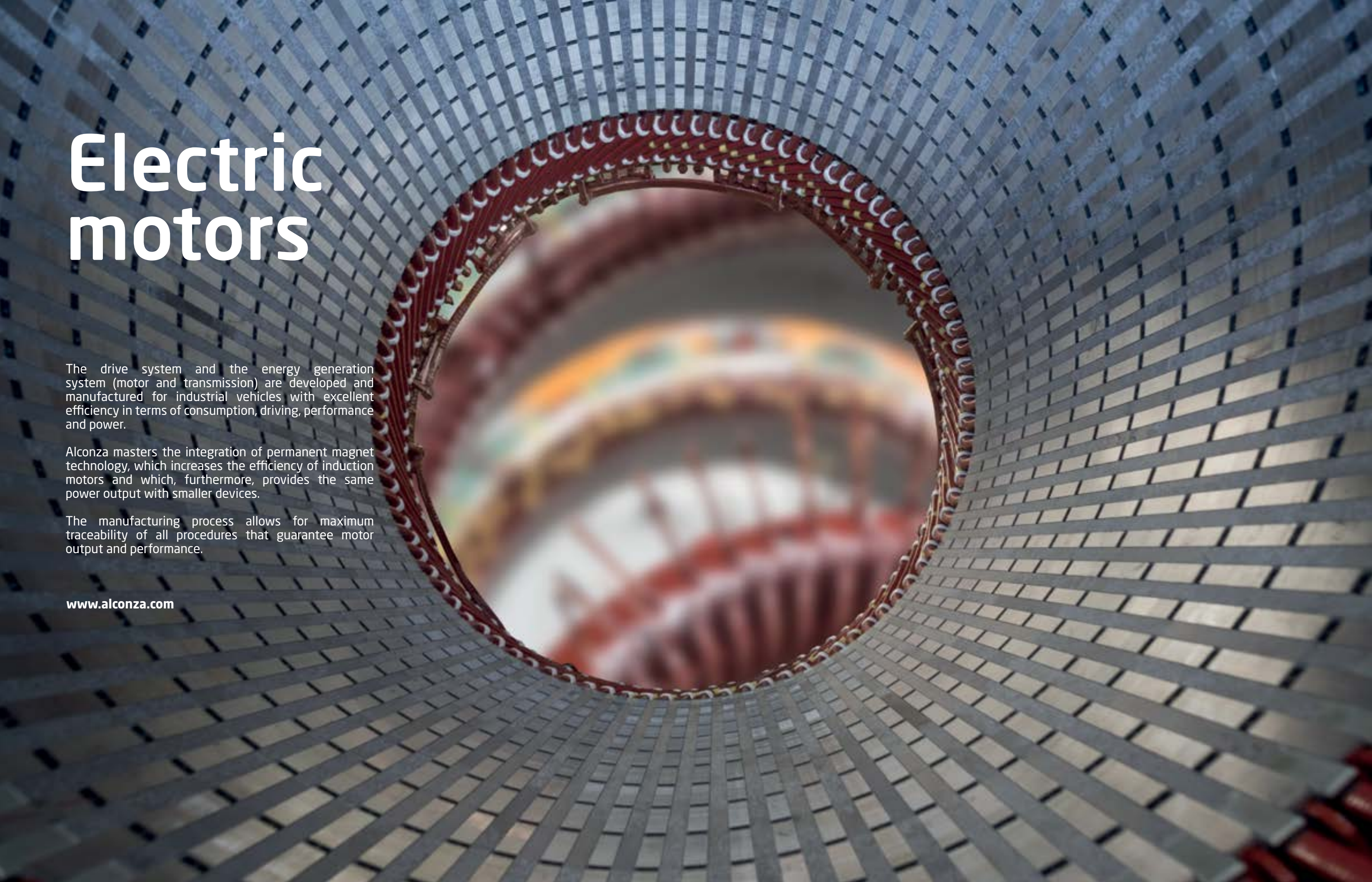
Connectivity - Big Data

eFleet

Based on the premise that the electrification objectives of urban bus transport are not achievable with current technology, the Irizar Group is proposing the eFLEET project to develop technologies and strategies to create eMobility solutions (100% electric buses for public transport) that are modular, flexible and scalable to make feasible the mass deployment of medium / large fleets of electric buses, while minimizing the impact on the electricity grid and reducing initial and operating costs.

eFLEET is an important strategic challenge as it seeks to unlock the limitations of a booming market in which the Irizar Group has been positioning itself since 2011.

Electric motors



The drive system and the energy generation system (motor and transmission) are developed and manufactured for industrial vehicles with excellent efficiency in terms of consumption, driving, performance and power.

Alconza masters the integration of permanent magnet technology, which increases the efficiency of induction motors and which, furthermore, provides the same power output with smaller devices.

The manufacturing process allows for maximum traceability of all procedures that guarantee motor output and performance.

www.alconza.com

Propulsion engines for research



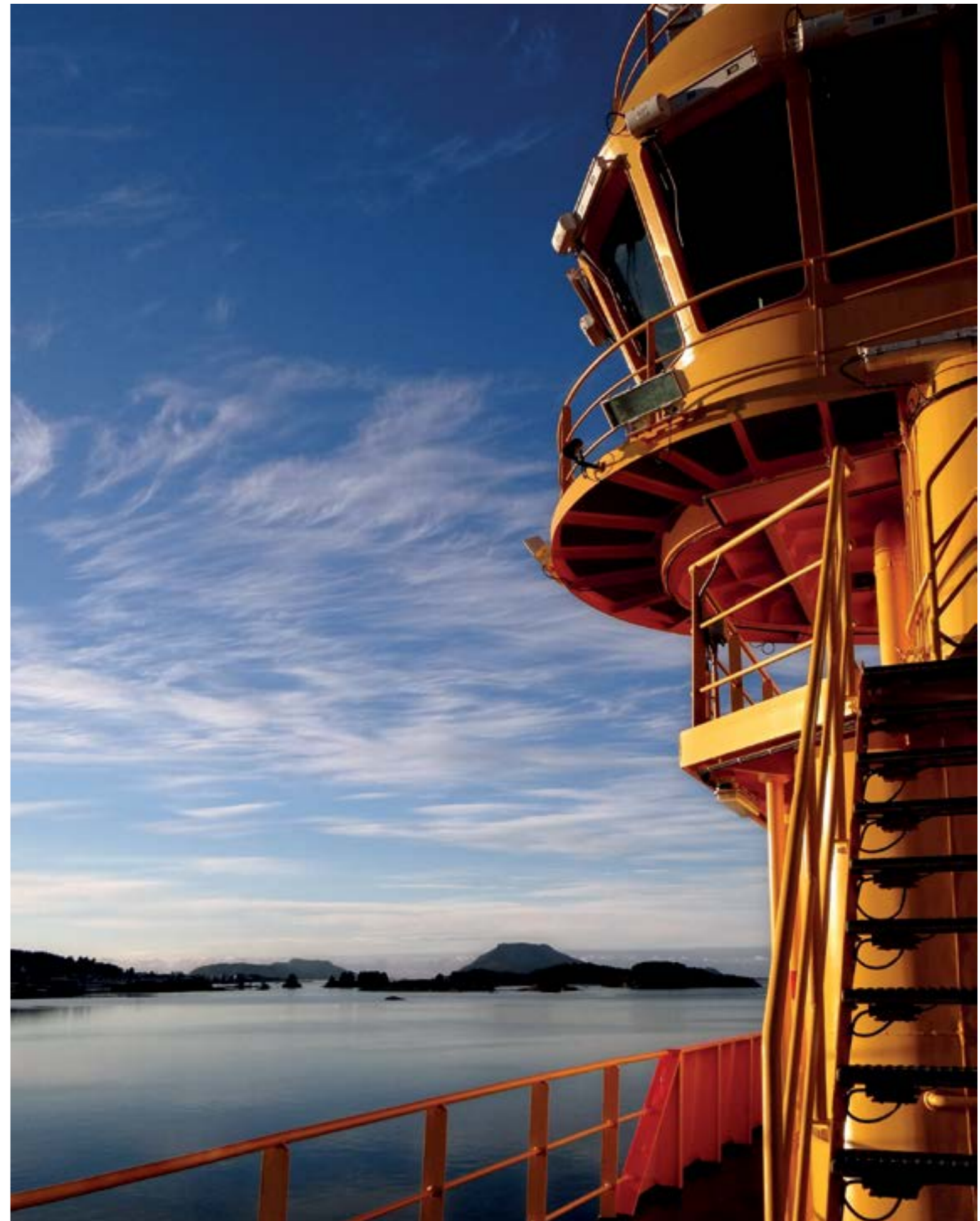
Alconza has again been chosen by Rolls & Royce Marine AS to design and manufacture the propulsion engines of the RRS Sir David Attenborough oceanographic research vessel for the NERC which is being built at the Cammell Laird Shipyard in Liverpool.

This vessel will operate in the Antarctic and the Arctic and will be able to work for 60 consecutive days in icy waters where scientists will carry out their tasks. In terms of design, it is the only polar research vessel built in the UK with a heliport and is equipped with state-of-the-art laboratory equipment.

This vessel has two propulsion lines, each of which is driven by twin 2,750 kW engines, each at 140 rpm, designed and manufactured by Alconza in accordance with very restrictive noise emission and vibration requirements including compliance with

the SILENT-R class of DNV-GL, due to the special characteristics of this research vessel. Meeting these requirements in the propulsion engines demanded extensive and detailed design work subsequently validated on the test bench.

These motors have been satisfactorily tested at the Alconza plant and delivered to the customer, therefore adding a further notable reference to the Alconza portfolio, as a manufacturer of custom rotary electric machinery.



Electronics



Multiplexed architecture and the CAN communication protocol which co-ordinates all the electronics of the coach, enables diagnosis and data collection services by way of the OBD connector, and equips the systems with a certain degree of intelligence.

Also of note, are the AEB-LDW driving assistance systems that are integrated into the touch screen and the HMI controller and console, from which the entertainment and comfort systems are administered.

www.jemaenergy.com



The Irizar HMI, with Irizar Group Technology

The Irizar HMI is an on-board information and entertainment device that is incorporated into Irizar i8 and Irizar i6S coaches and was developed by Jema, a company within the Irizar Group.

It currently supplies more than 700 units per year to be fitted into i8 and i6S coaches, for both the Ormaiztegui and Mexico plants.

In both models, the HMI comprises a carrier card where a QA3 COM module (Computer On Module) with INTEL® ATOM™ microprocessor is installed. The operating system used is Windows Embedded 7. The hardware design of the card was developed in conjunction with Ulma Embedded, whilst the development of applications was done internally in Jema. The result was a product that is fully customised for Irizar.

In the Irizar i8, the device relies upon a 10.1" integrated touch screen, whilst in the i6S the 7" screen connects remotely through a HDMI connection.

The new HMI offers the passenger detailed route information via GPS as well as improved monitor displays. The new innovations in electronic systems provide the passenger with quality information with precise and up-to-date data at every point in the journey.

Auxiliary HMI Keyboard - Joystick

The HMI is a device which interacts with the user by way of a resistive touch screen. Furthermore, it can be operated through a keyboard that has a navigation wheel in the centre of it and direct access buttons. The HMI will respond to direct access buttons being pressed from any screen. Communication between the HMI and the keyboard joystick happens through a standard USB cable.

Functionality

Multimedia

The HMI connects with the Bosch or Actia audio/video equipment through a proprietary protocol to operate in both the driver area and the passenger area. The audio source can be selected, playback can be fast forwarded and rewind and the volume can be adjusted.

Climate control

The HMI interacts with the HC climate control equipment that is connected to the vehicle's CAN bus. The driver or passenger area can be selected, the temperature of both areas can be controlled, air flow can be controlled, air recirculation flaps and dehumidification can be managed, etc.

GPS Navigation

The HMI enables GPS navigation with maps of the whole of Europe.

Telephone

The HMI allows interaction with a mobile phone connected by Bluetooth to the hands-free system included in its own HMI. Functions included are: direct dialling, phonebook management and recent numbers.

Camera display

The HMI provides automatic display from up to three cameras located at different points: rear view, footboard, etc.

WIFI access point

The HMI enables connections to the Internet via WiFi.

Settings

The diagnostics screen offers detailed On-Board information about the condition of the electronic devices in the bodywork. Access to this screen is reserved for authorised personnel and is password restricted.

The HMI allows the language, date and time, electronic device diagnostics etc. to be adjusted.

Radio option

The HMI offers the possibility of tapping into power stages through audio output to play back music in mp3 or radio format (a radio chip is incorporated into its carrier).

Connectivity

A person in profile, wearing a dark blue long-sleeved shirt, is holding a tablet computer. The person is looking at the screen, which is held in their left hand, while their right hand is touching the screen. The background is a blurred cityscape with many buildings, suggesting a high vantage point. The lighting is soft and natural, likely from a window or outdoor light source.

Irizar connectivity unites intelligent driver assistance systems with a range of optional equipment to offer the driver and passengers an optimal form of mobility.

The wealth of experience in artificial vision and deep-learning allows for precise interpretation of the information which the various sensors distributed throughout the vehicle capture at short time intervals. Data analysis predicts scenarios that may impair driving, taking 'high expertise' decisions and applying corrective functions to prevent such scenarios, by way of virtual validation within the vehicle's own software.

www.datik.es



Datik: towards the driverless bus

Datik, an Irizar Group company, is leading several R & D projects to try to introduce different levels of automatism in Irizar coaches and buses in the coming years.

The goal of the **Automost** "Dual Transport System Automatic Guidance" is to develop technologies that make it possible to automate vehicles for urban and industrial transport applications in order to significantly increase efficiency, safety and sustainability. It is financed by the CDTI (Centre for Industrial Technological Development) of the Ministry of Economy of Spain.

In this case, Datik will design a demonstrator electric urban vehicle, the Irizar ie bus with dual driving modes - manual and automatic (autopilot for urban environments) - that will function as a commercial shuttle at the cruise terminal of the port of Malaga. Testing will take place during a number of months in real traffic conditions.



Datik has accumulated a wealth of experience in the development of artificial vision-based sensors for the detection of hazards in the vicinity of the vehicle.

The **HiAdvice project**, funded by the SPRI, aims to design a prototype intercity hybrid vehicle with autopilot for highways and express ways.

The vehicles equipped with autopilots will still require the attention of the driver, but it is hoped that the experience accumulated will lead to the development of specific automation functions in which the driver can move away from his position, for cleaning purposes, or for parking and manoeuvres in depots.

Since launching its first involuntary lane change detector in 2012, Datik has accumulated a wealth of experience in the development of artificial vision-based sensors for the detection of hazards in the vicinity of the vehicle. The ongoing R & D projects have taken the knowledge accumulated in all these years as their starting point.

Both projects will come to light in 2020, and will position Datik as a world-class technology supplier.

Assistance systems for Operation, Driving and Maintenance

Assistance systems for operation, passenger information, ticket dispensing, passenger counting, video protection and eco-driving extensively contribute to improving the operational performance, safety and quality of the service.

Remote Diagnostics

Datik offers a back-office remote diagnostic system to manage all the procedures of the bus line. It enables centralized monitoring and reception of different alarms in real time, historical studies, etc.

The system provided is able to monitor the vehicle (doors, batteries, air conditioning and heating, pantograph, traction chain, etc...) and the in-line and in-depot charging infrastructures.

This solution provides statistics on any incidents involving the different vehicles, consumption on the different operating lines and, practically, all information on the overall operation of the fleet of electric vehicles.

The system is more valuable than others that are being marketed due to the fact that all the critical components (vehicle, batteries, propulsion, climate

control, chargers, etc.) have been developed internally. This means that complete monitoring is possible, which results in very precise preventive maintenance.

Remote diagnosis tools provide statistics on the availability and reliability of the tram, optimize maintenance times and monitor the system in real time. These are complemented by the specific functions of EcoAssist, which is a system that indicates if braking and instantaneous accelerations are not efficient, thus contributing to reducing the consumption of traction linked to sudden accelerations; and the functions of the I-panel - Fleet management system to analyse CAN bus information linked to geolocation.



Datik Autodock

Datik Autodock assists the driver in approach manoeuvres, stops and exits. It is a system that can take control of steering and pedals and can guide the vehicle to a stop, with a precise, safe and very efficient approach manoeuvre.

Datik Autodock can be disconnected at any time from the approach manoeuvre. Furthermore, the inner camera detects the degree of attention of the driver and if he is distracted or absent, it can abort the approach manoeuvre by completing the DA task.

Datik Autodock also contributes to performance optimization, given that the braking and starting intervals offer the greatest consumption variability based on the drivers and given that their driving style, their stress level or rushing to finish the service may lead to increased consumption at stops. It also improves safety and comfort, and levels of punctuality.

Energy



The presence of the Irizar Group in the energy field is underpinned by the depth of knowledge and expertise of its affiliates, in particular Jema, with regard to different energy generating systems.

Jema principally dedicates itself to the design and manufacture of equipment with Smart Grid solutions for the conversion of renewable, solar, wind and hydroelectric power (Alconza), into energy that is suitable for storage and subsequent injection into the grid.

Likewise, it is involved in the design and manufacture of static power systems for various plants that generate renewable energy. The most prominent of these being solar photovoltaic energy, which transforms endless, clean energy from the sun into electric energy.

www.jemaenergy.com



A photovoltaic plant in the Atacama desert

Jema has supplied 50 2MW turnkey solutions for the photovoltaic plant in the Atacama desert in Chile. These systems consist of a set of high performance, robust IFX3 type solar inverters.

Jema Energy has launched the start-up operations of the 100 MW plant using specialized technicians. The start of the actual activity of the photovoltaic plant and the injection of energy into the grid are expected to materialize this summer.

The integral solutions are a plug & play system consisting of inverters, transformers and other auxiliaries housed in marine containers.

Turnkey solutions have been adapted for the desert environment, providing rated power at 50 ° C. They meet the Chilean seismic requirements and have an

additional reactive power injection capacity that meets the demanding regulations of the Chilean grid code. With all these characteristics, we make it possible for the customer to extract the maximum power in any adverse conditions.

This new plant is an addition to the renewable energy facilities that Jema already has in Chile, in conventional power plants, and demonstrates its performance capacity in large solar power plants and its international presence.

Jema is part of the FLEXITRANSTORE European project

Jema recently joined the European FLEXITRANSTORE project under Horizon 2020 for the research and development of new technologies in the field of energy.

FLEXITRANSTORE is an integrated platform to increase flexibility in smart transmission networks with storage entities and significant inclusion of renewable energy sources (LCE-04-2017).

This ambitious project involves 35 entities, including private companies, universities and research centres.

The facility consists of a wind farm to be built in northern Greece. This will function as a demonstration and real testing platform. Jema will develop a BESS system for energy storage and a customized controller. Accordingly, relevant information will be obtained that will enable specific

services to be provided for improving the share of renewable energy injected into the grid, while maintaining a high level of reliability and stability.

The aim of the project is to develop and demonstrate a platform with extensive tools to supply the network with flexibility. This requires special attention to modularity, interoperability and the standardization of systems. It will function as a large-scale demonstrator where Jema will integrate storage systems with real-time monitoring of energy demand.



Corporate Social Responsibility

For a more sustainable world

At Irizar we are committed to economically, socially and environmentally sustainable competitiveness and we are continuing to pursue initiatives with the people that make up Irizar, its customers, passengers, external partners, society and the environment.

For the third consecutive year, we have renewed our firm commitment to the ten principles set out by the United Nations Global Compact on Human Rights, Labour Rights, the Environment and the fight against Corruption.

In 2016 we undertook a thorough review with a high level of participation by Irizar S.Coop employees and made it clear that sustainability is increasingly one of the main aspects to strengthen in the future. A future understood in terms of the brand, technology and sustainability.

Creating new sustainable products with Irizar technology

We have also continued to enhance our business area dedicated to electric mobility and the manufacture of 100% electric buses and we have started production of hybrid buses. We are ready to be part of this transformation of transport systems in cities where current levels of air and noise pollution make it difficult for citizens to have an adequate quality of life.

The jury of the Spanish Section of the European Environmental Awards, coordinated by the Ministry of Agriculture, Food and Environment, via the Biodiversity Foundation, awarded Irizar the National Business Award for the Environment for 2016, in the product-service category.



Job creation and recruitment of talent

In the last two years, Irizar S. Coop. has steadily hired 200 people, a third of whom are highly qualified graduates, in order to increase our technological and R&D capability. We already have almost 800 people in the parent company and more than 3,000 in the Irizar Group. We continue to hire highly qualified individuals in order to carry out our R&D programmes, both for our integral coaches and for the new electric mobility line of business.

Below we highlight some social activities to which we contribute in different areas:

- Activities in the sector with actions to promote and position bus and coach transport as a necessary means of transport in the future and to improve knowledge about coaches among public service professionals and emergencies when intervening in accidents involving coaches through sponsorships with associations,
- Collaboration with local training centres and universities through different approaches of the educational field, such as the sponsorship of different courses and collaboration with different educational centres for training and technical, economic and social development.
- Support for educational, cultural and traditional activities in our immediate environment.
- Support for sport as a good way to convey values such as dedication, motivation, effort and teamwork.
- National and international cooperation: Charities, Food Bank, Red Cross, Vicente Ferrer Foundation, Médecins Sans Frontières and Unicef.

It also participates in incubators to support and promote the emergence of new business initiatives.

The Company's awareness of sustainability will continue to increase exponentially, as a result of unstoppable globalization and climate change, which will require organizations that are increasingly exemplary in Sustainable Competitiveness (economic, social and environmental). In order to respond to this, our sustainability strategy is part of the company's global strategy and therefore we will continue working to be recognized as a SOCIALLY RESPONSIBLE BRAND.



Irizar Group

Leading sustainability
and technology



Irizar Group

Zumarraga bidea, 8

Ormaiztegi (Gipuzkoa) SPAIN

Tel.: + 34 943 80 91 00

Fax: + 34 943 88 91 01

irizar@irizar.com

www.irizar.com