

# 2

## Talگو's business

- **2.1** Profile, identity and commitments
- **2.2** Strategy and business model
- **2.3** Industrial activity and services
- **2.4** Talگو's future



# 2.1 Profile, identity and commitments

While celebrating the 80th anniversary of its founding in 1942, Talgo pursued three lines of business in 2022:

- 1 The design and manufacture of high-speed and very high-speed, long-distance and regional trains.
- 2 Manufacture of maintenance equipment.
- 3 Provision of maintenance services to railway operators worldwide.

It has its own technology and an innovative character that allow it to achieve the highest levels of quality, availability, reliability, safety and respect for the environment in all its products, while always remaining at the forefront of railway technology.

### Corporate details

**Name**  
Talgo, S.A.

**Address**  
Paseo del tren Talgo, 2 28290 Las Matas – Madrid, Spain

**Telephone**  
(+34) 91 631 38 00

**Website**  
<https://www.talgo.com/>

**Share capital**  
37,156,169.93 euros

**Number of shares**  
123,442,425

**Activity**  
Manufacture of rail vehicles, components and equipment, as well as light maintenance and refurbishment services.

**Markets**  
Talgo is present in eight countries: Spain, Germany, Denmark, Saudi Arabia, Egypt, the US, Kazakhstan and Uzbekistan; and it is listed on the Madrid, Barcelona, Valencia and Bilbao stock exchanges.

### Centres of activity

**Head office** Las Matas, Madrid.

**Factories** Las Matas II and Rivabellosa (Spain).

**Maintenance bases in Spain** Las Matas I, Fuencarral, San Andrés, Can Tunis, Málaga, Santa Catalina, Valladolid and La Sagra

**Maintenance bases abroad** Germany, the US, Kazakhstan, Uzbekistan and Saudi Arabia.

### Activity

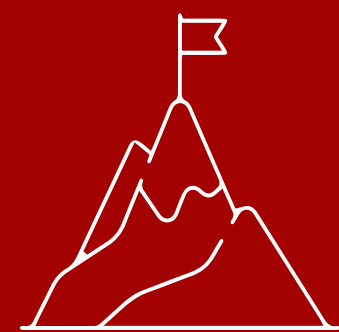
**Manufacturing**

- Trains, locomotives and coaches, bogies and wheelsets.
- Refurbishment of own and third party vehicles.
- Maintenance equipment: pit lathes, equipment for measuring wheel parameters, gauges and trolleys.

**Maintenance**

- Integral and personalised maintenance activities, including, among others, the care, overhaul, repair and complete overhaul of own and third-party trains.

# 2.1 Profile, identity and commitments



### Mission

To be the leading company in the Spanish railway sector, with an international industrial presence, recognised worldwide for its capacity for innovation, technology, quality, reliability and the added value of its products and services.



### Vision

To be a supplier of products and services capable of implementing comprehensive and innovative solutions in new segments and markets.

### Technological innovation

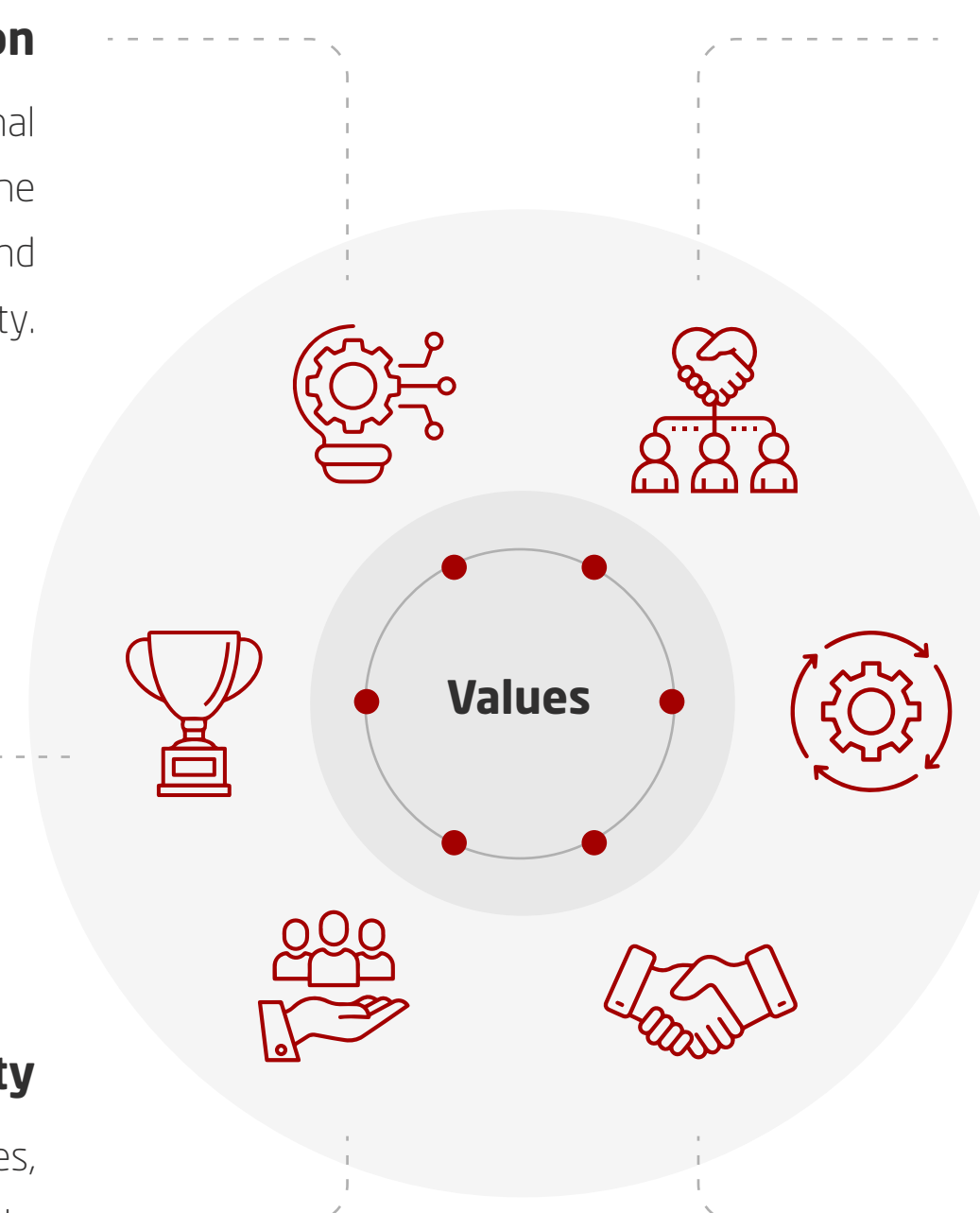
We foster an open work environment that promotes personal initiative and creativity. Technological development and the contribution of originality and added value to our products and services are the essential features of our corporate personality.

### Identification and commitment

We are proud to belong to Talgo as a company of worldwide prestige. We share its contributions and achievements to which we all contribute with our dedication and personal commitment.

### Integrity

We combine our economic, social and environmental objectives, reconciling the goals pursued by the company with those of society and the family. We fulfil our commitments to society by conducting our business activities within a framework of the utmost honesty. Our employees act with integrity and loyalty that promotes mutual trust and personal esteem.



### Staff health and safety

We look after the well-being and health of our workers by integrating safety, prevention and occupational health aspects into the overall management of the company. Our commitment is focused on ensuring that all workers carry out their activities under safe conditions and in healthy work environments.

### Professional Development

We are constantly concerned about the development and improvement of our professionals, a job well done and ongoing improvement.

### Customer service

We strive to provide our customers with innovative, high-quality products and services that meet their needs and expectations. We establish long-lasting cooperative relationships with our customers to support their business success. We take on the customer's objectives as our own, meeting their needs immediately and efficiently.

# 2.1 Profile, identity and commitments

Talgo worldwide

**Europe**

- Austria
- Belgium
- Denmark
- Germany
- Ireland
- Luxembourg
- Norway
- Portugal
- Switzerland
- Ukraine
- Belarus
- Bosnia and Herzegovina
- France
- Hungary
- Italy
- Netherlands
- Poland
- Spain
- Turkey
- United Kingdom

**Asia**

- China
- Indonesia
- Kazakhstan
- South Korea
- Uzbekistan
- India
- Japan
- Qatar
- Saudi Arabia
- Thailand

**North America**

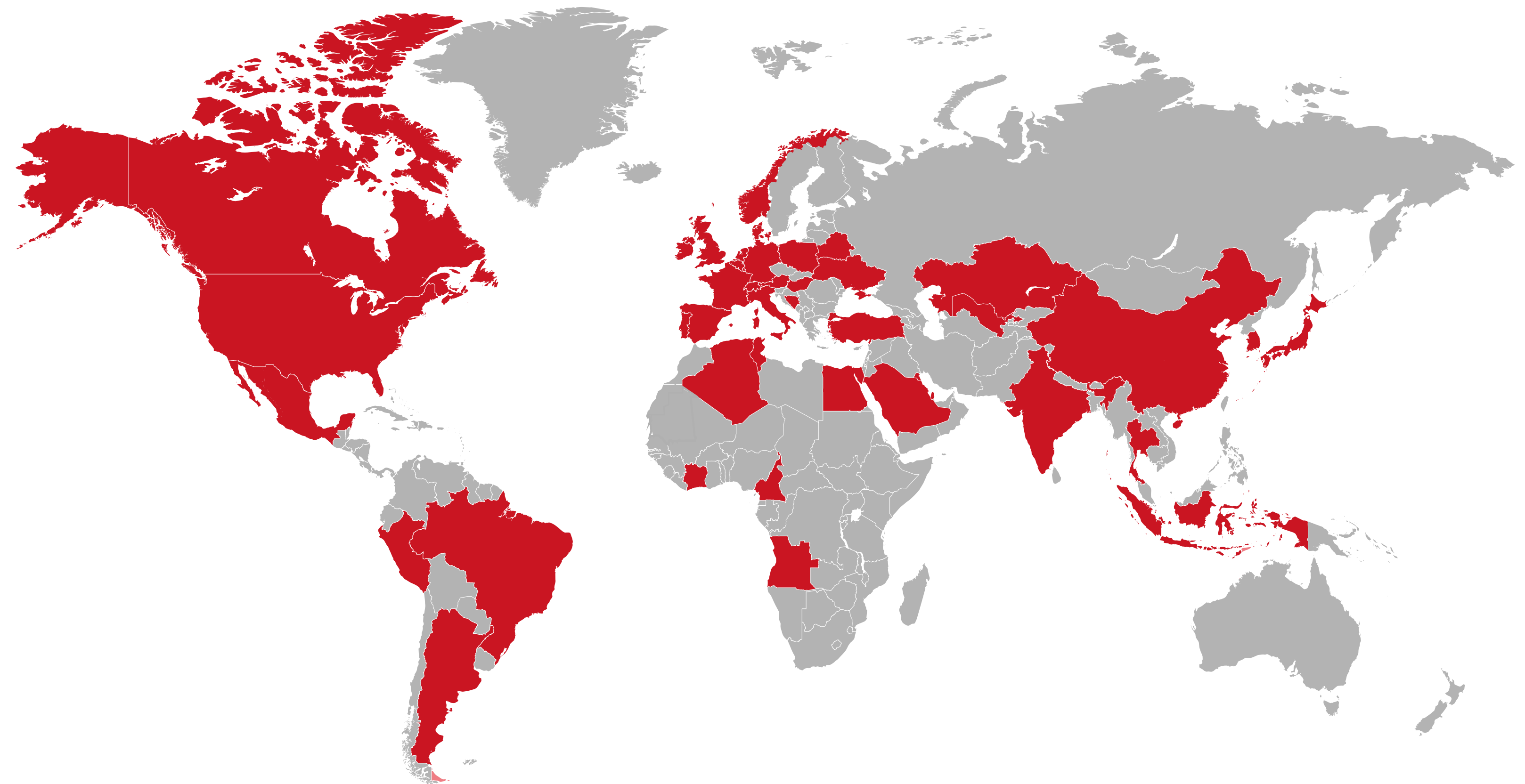
- Canada
- United States
- Mexico

**South America**

- Argentina
- Peru
- Brazil

**Africa**

- Algeria
- Cameroon
- Ivory Coast
- Egypt
- Tunisia



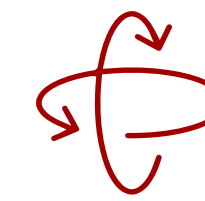
## 2.2 Business model

Talgo's activity is focused on the **design and manufacture of top quality trains, as well as the supply and provision of equipment and maintenance services** for railway operators all over the world.

The Group's business model aims to deliver long-term value to its stakeholders. It is underpinned by a solid financial model focused on steadily increasing turnover and maintaining attractive returns for shareholders; and by a sustainable model that maximises efficiency and social commitment while reducing the environmental impact of its activities.

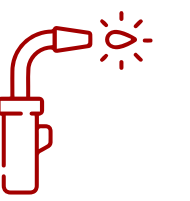
### Talgo's business model: hallmarks of its identity

#### Industrial flexibility



Low capital-intensive model (low investment in fixed assets, high flexibility and outsourcing) and focuses its resources on design, engineering, selective manufacturing of high value-added components, assembly, delivery process and after-sales service.

#### Efficient light structure: outsourcing



Talgo outsources most of the supply chain, manufacturing only the essential components related to Talgo specifications and particularities (welding of critical steel and aluminium structure and rolling elements).

#### Ongoing learning



The company's engineers receive all the necessary feedback to improve the technology and design of the components, so that they can incorporate these advances continuously into all trains, both in the maintenance and manufacturing phases.

#### Commercial selectivity



Selection of potential commercial opportunities, through an exhaustive analysis based on three pillars: attractive margin, contractual scope that provides the necessary guarantees and security and a reasonable cash profile in line with the project's risk profile.

#### Commitment to motivated and engaged staff



Nurturing talent and promoting training as a means to improve productivity, to add value to both the employee and the company, to generate a competitive advantage in the market and to create a motivated, responsible staff committed to Talgo's values.

#### Committed to sustainability



Decarbonisation, business ethics, safety, reliability and quality define our industrial activity and our management systems. We are committed to sustainability and social responsibility as travelling companions and value drivers of our activity. We conceive and apply them in an increasingly consolidated way.

## 2.2 Business model

As a supplement to this model, Talgo uses a specific process to analyse and specify its sustainability context, which is described both in the [Corporate Sustainability Report / Annual ESG Report](#) available in its 2022 edition through the [investor portal](#) as well as the document "Business model, fundamental analysis and sustainability context of the Talgo Group".

Talgo has a broad portfolio of products that are adaptable to customer needs and linked to medium and long distance segments with high and very high speed trains, state-of-the-art passenger coaches and regional and commuter trains to continue boosting its growth in the sector.

In recent years the group has strengthened its strategic position by investing in the development of new products to meet the needs of the market, with a particular focus on the manufacture of more efficient trains with higher capacity.

### Proprietary products and technologies

#### Very high speed (from 250 km/h)

Talgo Avril includes a range of technologies and shows that the Group's skills are available to only a few manufacturers worldwide. Innovation aimed at maximising capacity and minimising operating costs ahead of competitors, with the particularity of including proprietary technology such as the equipment of the change of track gauge.

#### High speed (up to 250 km/h)

The Talgo 250 range trains have proven to be the most reliable and cost-effective option for operators looking for equipment designed for accelerated rotation both on networks that have been partially adapted to high-speed and on conventional lines that have not been adapted.

#### Intercity - passenger coaches

Leading manufacturer of complete train sets for long-distance services on mainly conventional infrastructure. The Talgo 230 (DB and DSB in Germany and Denmark) has established itself as a flexible and efficient benchmark product in the European market. Talgo technology offers very low operating and maintenance costs and is also fully adaptable with its own technological solutions, such as natural tilting or Talgo bogies.

#### Regional and commuter rail

Talgo has developed the Vittal platform in-house, which is designed for high-frequency commuter and regional services around major cities. The excellent power-to-weight ratio improves acceleration and braking coefficients, while its unbeatable accessibility helps to cut the time spent on loading and unloading operations at each station.



## 2.2 Business model

### Proprietary and differential technology

Talgo's objective is to offer operators a product that allows them to cover more needs, and with a better cost-effectiveness ratio than other manufacturers, based on a technological paradigm built on six main principles.

#### Continuous low floor

Talgo trains reduce loading and unloading times by 20% and provide maximum autonomy for people with reduced mobility.

#### Independent and guided rolling

The only manufacturer with a system in which each of the two wheels on the axle can rotate at a different speed.

#### Lighter and wider coaches

The use of aluminium alloys and the reduced length of each coach maximises capacity with wider vehicles.

#### Natural tilting

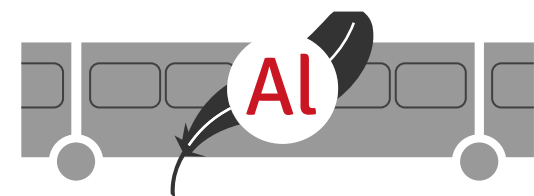
Talgo's pendular technology allows for a 25% increase in speed on curves without additional investment.

#### Change of gauge

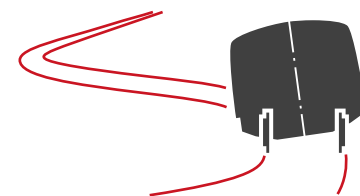
A distinguishing feature that makes the company's trains the only solution capable of adapting to any railway network and of transparently crossing all borders.

#### Fully articulated trains

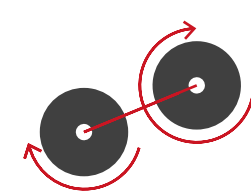
It reduces the cost of rolling stock maintenance, improves reliability and allows for more frequent interventions on the train, but it also increases safety.



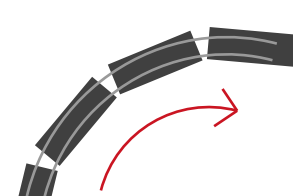
Lightweight aluminium construction



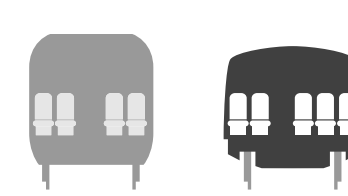
Natural tilting



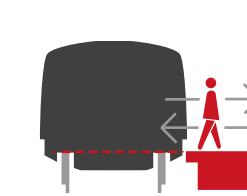
Mono-axle articulations and wheelsets



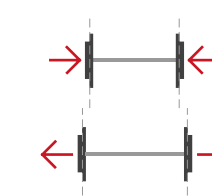
Shorter cars to better suit the headroom profiles



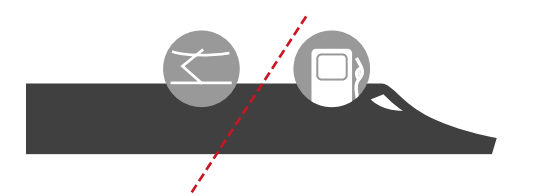
Wide-bodied cars offering increased capacity on a single floor



Platform level access



Automatic variable gauge system and independent guided



Hybrid traction technology

## 2.3 Industrial activity and services

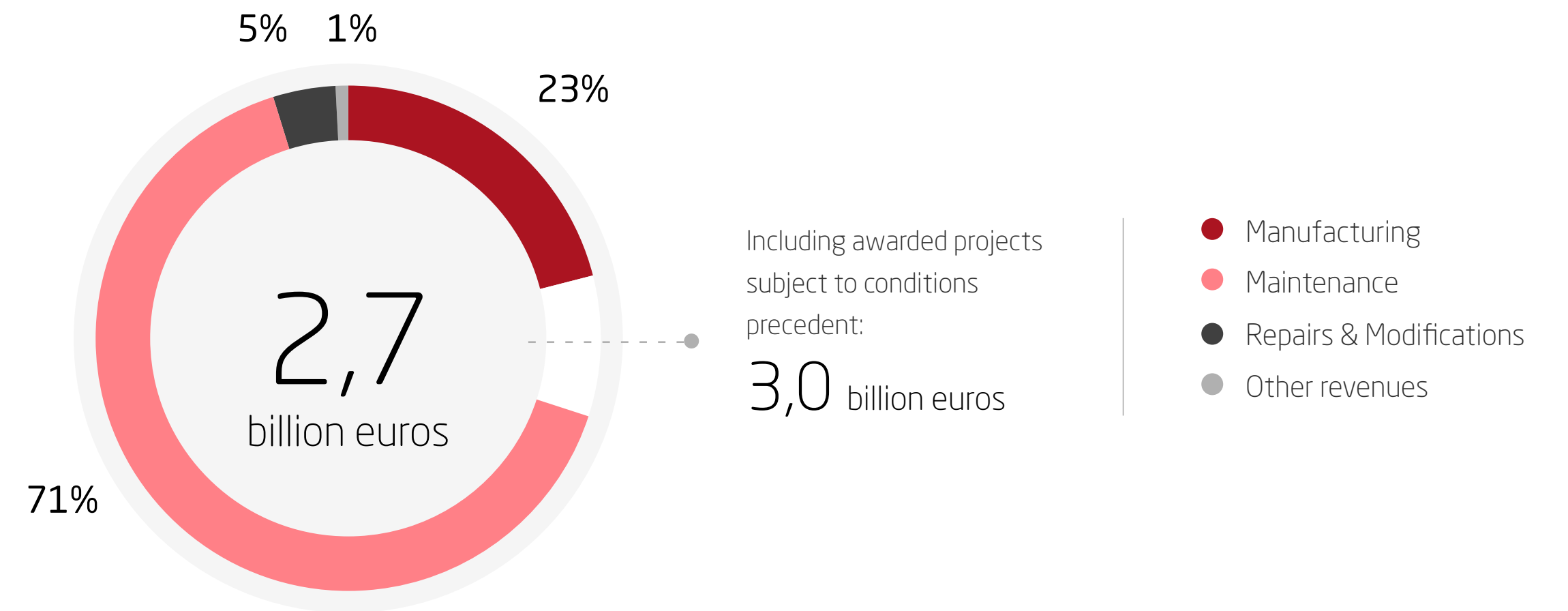
### Composition of order book

The order book stood at 2.7 billion euros in 2022, reaching 3 billion euros if we include already awarded contracts subject to conditions precedent.

No significant new project contracting was recorded in 2022. However, the outlook for the sector is positive, driven by the process of decarbonisation of transport in the coming years and reflected in the expectations of the latest industry surveys.

Still, the current order book offers potential improvements in the company's two main business lines. Europe, the Middle East and North Africa are the main potential markets for Talgo with additional tenders worth over 5.0 billion euros, mainly in MAV and long distance; 2.0 billion euros in extensions in projects in Germany, Denmark and Saudi Arabia; and an increase in maintenance services activity with the incorporation of new fleets in production over the last few years.

*Positive business outlook for 2023 due to decarbonisation of transport in the coming years.*



Millions of euros	2022	2021	Variación
Total order book	2,748	3,249	-15.4%
Order book size: manufacturing	639	976	-34.5%
Order book volume: maintenance services	1,962	2,241	-12.4%
Order book volume: equipment and other	147	32	359.4%



## 2.3.1 Manufacturing

Industrial area

**63,000** m<sup>2</sup>

Production capacity:

**400-500** pcs/year

Centres:

**Las Matas, Madrid (Spain)**

Manufacture of high speed train (HS) powerheads and maintenance equipment.

**Rivabellosa, Álava (Spain)**

Manufacture of passenger coaches.

**Milwaukee, United States (\*)**

Assembly and heavy maintenance projects.

Manufacturing accounted for 61% of Talgo's revenues in 2022, calculated on a backbone average, representing 23% of the order book worth 0.6 billion euros.

The main generators of manufacturing revenues were the projects for DB Talgo 230 (Germany), Renfe MAV powerheads (Spain) and DSB Talgo 230 passenger coach compositions (Denmark).

Although it was a year in which the pace of project implementation slowed down compared to 2021, mainly due to supply chain disruptions. Manufacturing revenue, as a proportion of total Group revenues, remain high due to the impact of Covid-19 on the maintenance business during 2020-2022.

The manufacturing order book is mainly composed of international projects (Germany, Denmark and Egypt) which are scheduled to be executed in the next 24-36 months.

### 2023 targets

- Increase in production capacity at the Rivabellosa factory:
  - Improvement of the wheelset welding process.
  - Improvements to the mobility of materials in the factory (overhead cranes).
  - Improvement of the painting process (priming).
- Continuation of previous ongoing projects.



(\*) Provided by public bodies.

## 2.3.1 Manufacturing

### Status of manufacturing projects

#### HIGH SPEED

##### Renfe Avril MAV (Spain)

Scope - €900 million

Status

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Manufacture of 30 MAV "Avril" trains</li> <li>• Maintenance for a period of 30 years 1</li> </ul> | <ul style="list-style-type: none"> <li>• In dynamic testing.</li> <li>• Significant test milestones recently achieved that ensure deliveries will commence in 2023.</li> <li>• Significant charges are expected as trains are delivered.</li> <li>• Delays caused by COVID-19 and supply chain have been communicated to the customer.</li> </ul> |
|--|---|

##### Renfe MAV locomotives (Spain)

Scope - 161 million

Status

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Manufacture of 23 locomotives and maintenance services for 13 trains.</li> <li>• Option for 12 additional locomotives.</li> </ul> | <ul style="list-style-type: none"> <li>• In progress</li> </ul> |
|--|---|

#### LONG DISTANCE/PASSENGER COACHES

##### DB Talgo 230 km/h (Germany)

Scope - €550 million (€2.3 B)<sup>(1)</sup>

Status

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Framework agreement for the manufacture of up to 100 Talgo 230 trains.</li> <li>• Initial order for the production of 23 trains.</li> <li>• Second order under negotiation.</li> <li>• Scope for maintenance under negotiation.</li> </ul> | <ul style="list-style-type: none"> <li>• In production phase.</li> <li>• AAD<sup>(2)</sup> structure during the life of the project.</li> </ul> |
|---|---|

##### DSB Talgo 230 (Denmark)

Scope - €152 million (€500 M)<sup>(1)</sup>

Status

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Initial order for the manufacture of eight trains, together with technical assistance and materials.</li> <li>• Second order under negotiation.</li> </ul> | <ul style="list-style-type: none"> <li>• In production phase.</li> </ul> |
|---|--|

##### ENR Talgo 160 km/h (Egypt)

Scope - 157 million

Status

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Manufacture of 6 trains and their maintenance for a period of 8 years.</li> </ul> | <ul style="list-style-type: none"> <li>• In local testing and delivery phases.</li> </ul> |
|--|---|

(1) Maximum scope of the framework agreement.

(2) Abstract Acknowledgement of Debt, with access to up to 60% of the total value of the contract, which allows for advance payment of the contract.

## 2.3.2 Maintenance

The maintenance business remained strong in 2022, thanks in part to a strategy based on the use of pioneering technologies that continue to set the industry benchmark. It represented 71% of the 2022 order book and includes services provided to customers in 6 countries with a total amount of 2.0 billion euros. They provide long-term revenue visibility backed by a consolidated and growing maintenance order book.

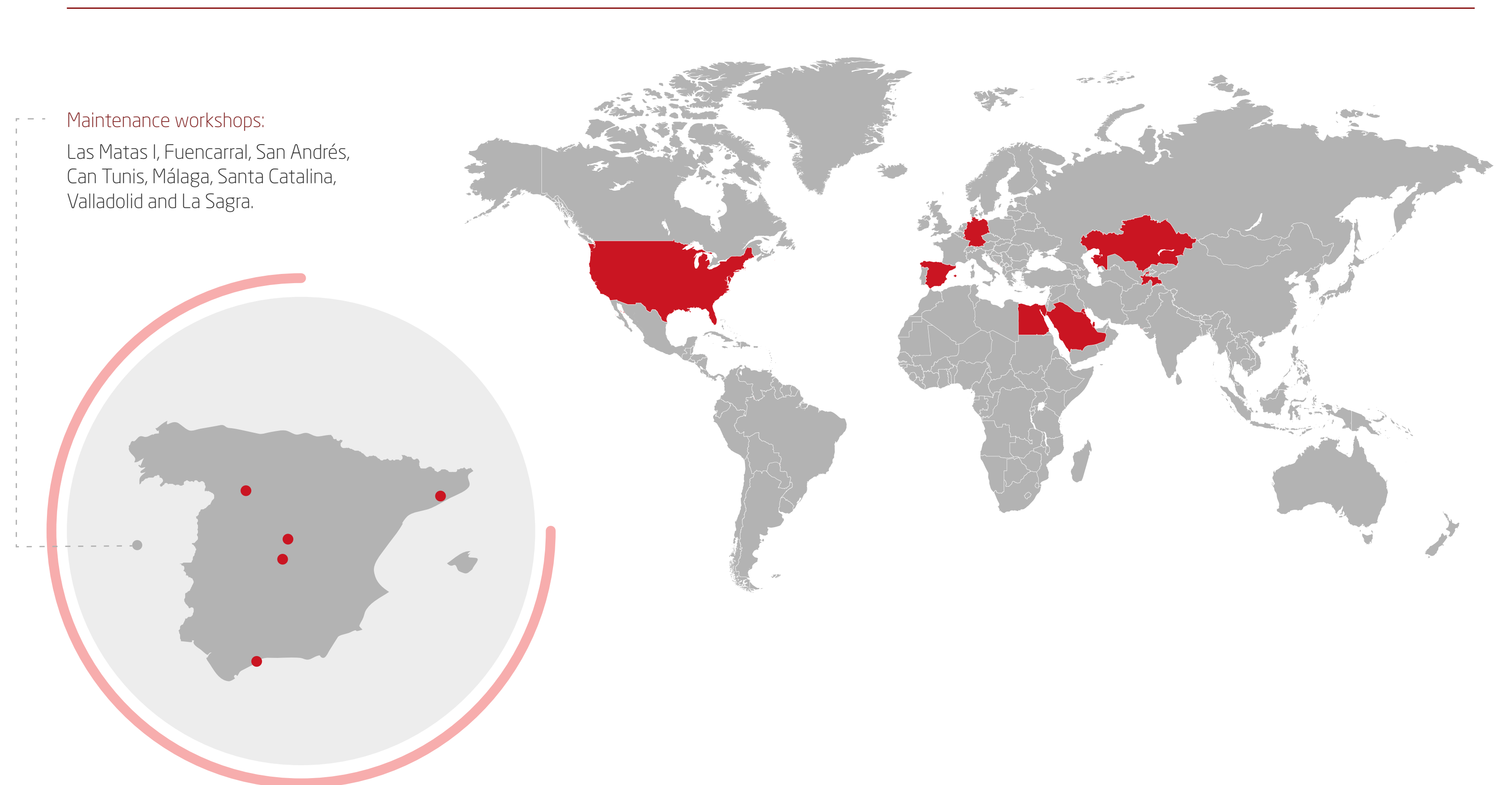
Commercial services have continued to recover during 2022 reaching pre-Covid levels in all markets with one milestone being the launch of new maintenance services (Egypt), where new Talgo trains are being delivered.

The Group maintains a strong maintenance order book characterised by:

- Contracts indexed to inflation and therefore protected against price volatility.
- Recurrent cash flow and low capital requirements.
- A fleet under maintenance that will continue to grow in the coming years.

The maintenance activity in Russia was cancelled in March 2022 and the outstanding contract amount has been removed from the order book. Revenues represented 1% of the Group's total annual revenues in 2021.

Location of maintained fleet



## 2.3.3 Refurbishment and other

In 2022, the heavy maintenance and refurbishment business accounted for 5% of the total order book with a total order intake of 0.1 billion euros. It is a business that continues to offer growth potential and is the gateway to new markets characterised by customer demand for aspects such as upgrading, remodelling and technical improvement of existing equipment rather than the acquisition of new products.

### 2023 targets

Immersed in the achievement of a major programme of digitalisation of the entire maintenance process (zero paper) so that we can have a single, consolidated and secure data that provides traceability to all maintenance operations carried out on the trains maintained according to their maintenance plan.

These processes also include the development of predictive activities, based on train-to-ground communications in real time in order to be able to predict any service incidents that may occur. The aim is to improve the availability and reliability of the equipment maintained to enable operators to operate trains more safely.

### HEAVY MAINTENANCE AND REFURBISHMENT

#### Metrolink redevelopment (USA)

Scope - 35 million

Status

- Refurbishment of up to 121 vehicles with an initial order of 50 vehicles.
- In production phase.

#### Conversion of night trains to MAV (Spain)

Scope - 107 million

Status

- Conversion of Talgo S7 compositions (Talga "night coaches").
- The initial project includes 156 cars (13 compositions) with an option for an additional 72 cars (6 compositions).
- In production phase.

#### Remodelling of AV compositions (Spain)

Scope - 35 million

Status

- Activities to refurbish 44 AV train sets.
- New scopes of negotiation.
- In production phase.

#### LACMTA redevelopment (USA)

Scope - 73 million

Status

- Activities to refurbish 74 coaches of the Red Line.
- Project completed in accordance with the communication received from the client in H1-2022, pending further resolution.
- Currently in litigation with client.



## 2.4 Talگو's future

The 2022 results show the resilience of the business with satisfactory performance even in adverse conditions, while the 2023 forecasts point to expected growth in activity and therefore in revenues with a recovery in margins. The Group maintains a favourable commercial position, especially in the long-distance and high-speed segments in European countries and in the Middle East and North Africa, where Talگو has already demonstrated the benefits of its technology for the operator and the visible trend for the coming years is very positive.

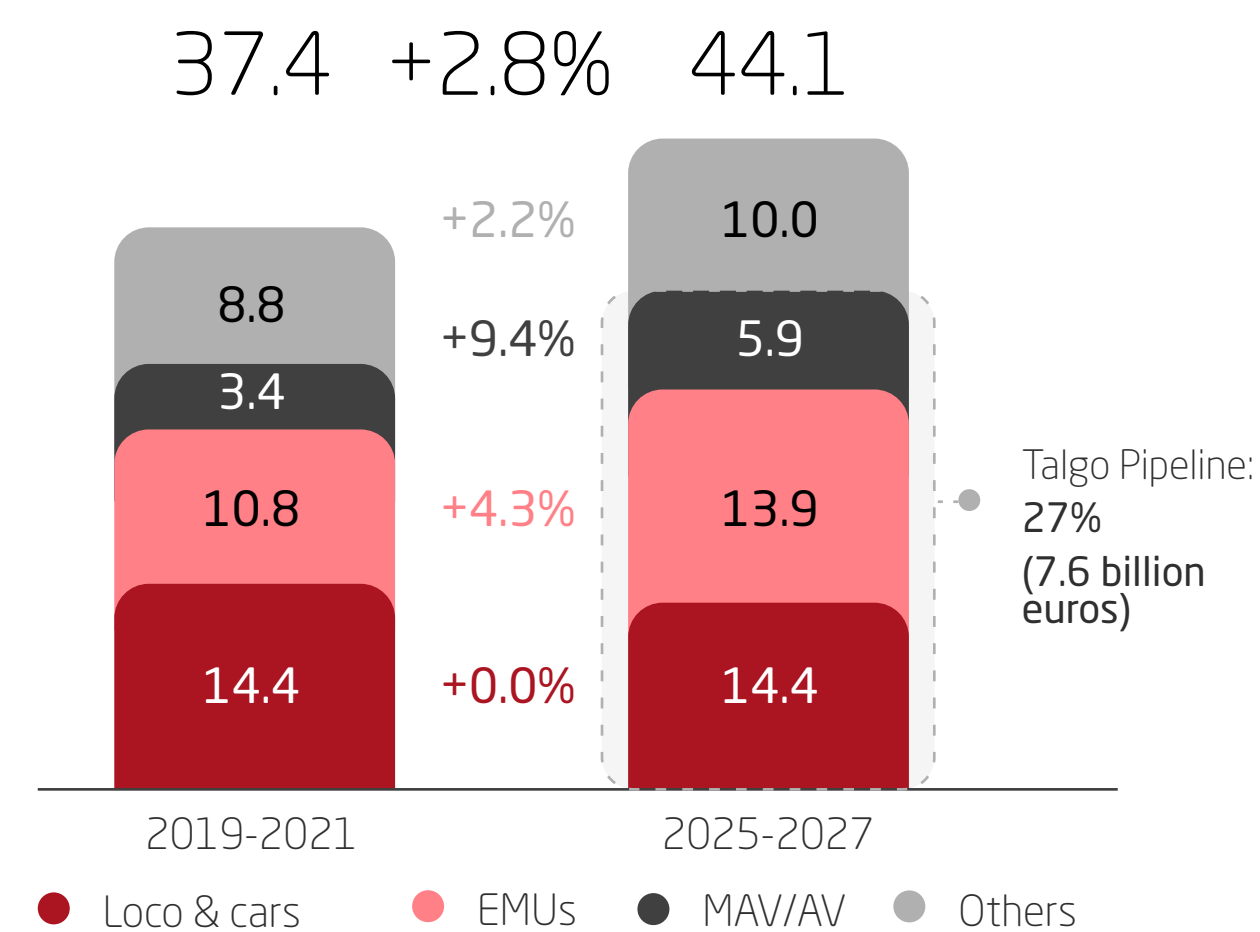
Against this backdrop, Talگو's strategy has the following strengths:

- Proven industrial and commercial operation track record.
- Unique technology with proven customer and end-user benefits.
- Best industry ratios in terms of operational efficiency for commercial operators.
- Framework agreements in place that provide significant growth potential for the coming years.
- Contractual conditions in projects aimed at protecting economic risk (price indexation clauses) and legal risk (in case of penalties or termination of contract).

The rail passenger transport sector is a key element in successfully addressing the decarbonisation objectives and processes of the proposed global transport system for 2030-2035. This, together with the process of liberalisation of the railway map, means that trade prospects are positive for the coming years.

These expectations support Talگو's stated business target for 2023 (2.0x Book-to-Bill).

### Rolling stock and Talگو Pipeline market



Source: UNIFE

	2022 Results	2023 targets
<b>Business performance</b>	<ul style="list-style-type: none"> <li>• Execution of order book: <b>Target: 32%   Result: 32%</b></li> <li>• Ratio Book to Bill: <b>Target: 1.0x   Result: 0.1x</b></li> </ul>	<ul style="list-style-type: none"> <li>• 40% order book execution for 2023-2024. <sup>(2)</sup></li> <li>• Average book-to-bill c. 2.0x.</li> </ul>
<b>Profitability</b>	<ul style="list-style-type: none"> <li>• Adjusted EBITDA: <b>Target: 11%   Result: 11%</b></li> </ul>	<ul style="list-style-type: none"> <li>• Adjusted EBITDA increase to c.12%.</li> </ul>
<b>Capital structure</b>	<ul style="list-style-type: none"> <li>• NOF: <b>Target: Cash consumption   Result: +51 mill. €.</b></li> <li>• Net debt: <b>Target: c. 2.5x Adjusted EBITDA.   Result: 1.9x</b></li> <li>• Capex in 2022: <b>Target: 25 mill. €   Result: 21 mill. €</b></li> </ul>	<ul style="list-style-type: none"> <li>• Maintain stable NOF in 2023 with a financial leverage level of c. 2.0x Adjusted EBITDA.</li> <li>• Capex of 30 million €. <sup>(1)</sup></li> </ul>
<b>Shareholder remuneration</b>	<ul style="list-style-type: none"> <li>• Shareholder Remuneration Programme <b>Target: €10 million   Result: €12 million</b></li> </ul>	<ul style="list-style-type: none"> <li>• 12 mill. €<sup>(3)</sup> in shareholder remuneration in 2023.</li> </ul>

(1) Does not include R&D projects.

(2) On the order book for the year 2022.

(3) Subject to approval by the AGM. Preliminarily, it will be implemented through a Scrip Dividend and a share buy-back programme.

## 2.4 Talگو's future

### Results achieved: indicators

The main metrics for the assessment and results of quality management are:

Data and indicators	2022	2021	Change
<b>Quality management: strategies and system deployment</b>			
Cumulative achievement of annual targets of the three-year plan	54%	40%	35%
Fulfilment of annual quality objectives	100%	96%	4.2%
Costs of the quality function (thousands €)	4,943	4,491	10.1%
Expenditure and investments (thousands €)	601	1,241	-51.6%
Scope of quality management system (%)	100%	100%	0%
Rate of implemented corrective and preventive actions	80%	76%	5.3%
<b>Process management</b>			
Process management system scope (no activity)	100%	100%	0%
Process improvement projects: completed	44%	53%	-17%

### Quality

Quality management at Talگو mainly covers process management, improvement management, product quality management and quality management itself, which includes certifications, complaints management and internal failure management.

During the year, key activity and development began with the expansion of the quality and certification function within the project structure, from the tender phase to the final acceptance by the customer, as activators and guarantors of the good practice to be carried out.

This was implemented through the ambitious "Become Lean Project", which aims at a holistic review of the company's core processes, as well as their simplification and dissemination. Different actions have been implemented in this respect:

- Implementation of the training and dissemination project for the main focal points governing the processes, with a view to simplifying the documentation of the Management System.
- Acquisition of a tool that helps to improve the transparency of processes and their content, as well as a more intuitive search for the information required by the organisation.
- Preparation of the matrix for improving knowledge of the company's main processes and procedures and their application in the different departments/centres.

- Launch of Green Belt training programme, within the Lean Six Sigma methodology, with the aim of training experts in continuous improvement in all areas of the organisation. As a result, improvement projects will be implemented that will contribute to savings and streamlining processes.

Also in 2022, the effectiveness of inspections has been improved by means of tools such as Failure Mode Analysis and Potential Effects (FMEA) of the process and control plans based on critical characteristics; the return of experience or statistical analysis in material reception inspections.

This has led to the implementation of new improvements or innovations such as:

- Conduct of self-assessment audits of the standards of the company's main processes to determine the degree of improvement of the standards in each process and to determine the focus of improvement.
- Revision of the assurance sheets, generating a model and structure that improves the definition of the necessary inspections (both Talگو's and those of our suppliers) for each of the purchasing families.
- Improved management of survey sending.
- Creation of the laboratory for quality control activities in Rivabellosa.

## 2.4 Talgo's future

### Innovation

Talgo, as a leading national and international group of companies in research and development, assigns the highest priority and resources to this essential driver of business value to ensure its continuity and sustained growth over time. It

*Despite the decline in results, Talgo invested 18.3% more in R&D projects in 2022 as a factor for future growth.*

was not for nothing that a disruptive innovation in the railway sector was the origin of the company 80 years ago.

One of the proofs of the priority given to innovation is the initiative launched by Talgo to stimulate innovation through the Talgo Award for Technological Innovation in its two categories: railway technology and mobility; the 19th edition of the award was held in 2022.

This commitment is also shown by the fact that, despite the results, 18.3% more has been invested in innovation projects over the course of 2022, totalling 16.1 million euros (13.6 million euros in 2021), with R&D expenditure rising to 1.6 million euros, 14.3% more than in 2021. This represents an investment of 3.8% of the company's revenues.

Data and indicators	2022	2021	Change
<b>Innovation</b>			
R&D investments (capex) (M €)	16.1	13.6	18.3%
R&D expenditure (GID.IDI+OT) (M €)	1.6	1.4	14.3%
<b>Investments vs Sales</b>	<b>3.8%</b>	<b>2.7%</b>	<b>40.7%</b>
Nº of innovations with an environmental scope	6	N/A	N/A
Nº of innovations with a social scope	2	N/A	N/A



## 2.4 Talgo's future

### INNOVATION PROJECTS 2022

#### ENERGY EFFICIENCY AND SUSTAINABILITY

##### Vittal One Hydrogen train

- Clean hydrogen drive.
- Flexible operation (hydrogen-electric).
- Replacement of fossil fuels (diesel).
- Reduction of CO<sub>2</sub> emissions into the atmosphere.

##### Light wheelset

- Use of new sustainable materials.
- Weight reduction.
- Less environmental impact.

##### Metamaterials for interior noise reduction

- Lightweight acoustic insulation.
- Materials with improved qualities.
- Reduction of noise levels.
- Higher level of passenger comfort.

##### Box/light structure

- Use of new sustainable materials.
- Weight reduction.
- Less environmental impact.

##### Viscoelastic panels for structural cushioning

- Use of new sustainable materials.
- Higher level of passenger comfort.

##### Carbon fibre recycling

- Full product life cycle.
- New recycled materials.
- Sustainable consumption of raw materials.

#### AVAILABILITY AND VERSATILITY

##### Motorised wheelset

- Motorisation system compatible with Talgo's independent wheel concept and Talgo's wheelset.
- Distributed traction.
- Increased speed.

#### INTELLIGENT TRAINS

##### Box hoist/structure

- Train body lifting system allowing variation of carriage access height for different platform heights.
- Improving accessibility at the entrance to the train.
- Integration of Persons with Reduced Mobility (PRM).

##### Maintenance 5G

- Digitisation of maintenance tasks.
- Remote assistance and technical support via augmented reality devices.
- 5G coverage in maintenance workshops.

#### PASSENGER EXPERIENCE

##### Improved acoustic experience

- Indoor noise reduction through state-of-the-art noise cancellation systems.
- Creation of independent acoustic zones through the use of directional loudspeakers.
- Increasing the intelligibility of the messages broadcast over the train's public address system.

##### Blackout windows

- Improved comfort by allowing adjustment of light through the passenger window.
- Noise and vibration reduction.

##### Indoor guidance using ultrasonic beacons

- High-precision positioning system inside the train.
- Increasing the autonomy of blind people.
- Improving universal accessibility.

##### Variable frequency dampers

- Improved comfort by adjusting the damping conditions during train movement.
- Ensuring stability and safety parameters.



## 2.4 Talgo's future

### Improvements, innovations, studies and strategic partnerships

The following activities were carried out within the strategic circle of improvements, innovations, studies and strategic partnerships:

- Collaboration with Repsol to promote the creation of renewable hydrogen trains, thus promoting emission-free rail transport on the Iberian Peninsula
- Collaboration with the Basque Hydrogen Corridor, an association whose aim is to create a hydrogen ecosystem based in the Basque Country, that will enable progress to be made in the decarbonisation of the energy, industrial, residential and mobility sectors.
- Collaboration with SOIH2 ALEX, a European public-private economic interest grouping whose aim is the interregional socio-economic, industrial, energy, environmental and technological development of the ALEX territory (Alentejo and Extremadura) through green hydrogen.



### Analysis, transparency and strengthening of management

