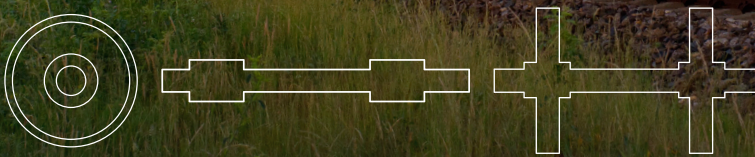


MIIRA

A CAF GROUP COMPANY



WHEELS & AXLES SOLUTIONS

www.cafmiira.com

Beyond
wheelset
solutions

Your partner for wheelset solutions



INTEGRAL WHEELSET SOLUTIONS

At CAF MIIRA, we are dedicated to being your global leader in providing cutting-edge Integral Wheelset Solutions. Our commitment extends from the heart of the rail industry, offering innovative engineering, manufacturing, and maintenance solutions for complete wheelsets and portal axles, for all type of trains.

Our solutions are designed to streamline supply chain management and reduce the carbon footprint, contributing to a greener and more sustainable future.

By designing and manufacturing the main elements of the wheelset internally, we ensure full traceability throughout the assembly process.

A committed and highly qualified team, with strong leadership capabilities, focuses on customer satisfaction, continuously driving innovation and excellence in every project. Together, we strive to exceed expectations and achieve shared success.

Forward together.

WHY CHOOSE CAF?

- **Reduced lead times and improved logistics efficiency**
- **Reliability, efficiency, and cost-effectiveness**
- **Decreased total weight of the complete solution**
- **Minimized carbon footprint**

The CAF Group is a multinational group with over 100 years’ experience offering integrated transport systems at the forefront of technology that provide high value-added sustainable mobility for our customers.

We are international leaders in the implementation of comprehensive rail and bus mobility solutions, with extensive experience addressing projects throughout the entire project life cycle in a multi-tude of geographies.



CERTIFICATIONS

Our quality systems are rigorously tested and currently comply with major international standards and regulations.

PRODUCT & MANAGEMENT SYSTEM

<p>QUALITY</p> <ul style="list-style-type: none">• ARR• ISO 9000• IRIS• ISO 1725• RISAS• VPI	<p>ESG</p> <p><i>Sustainability & Environment</i></p> <ul style="list-style-type: none">• CDP• EPD• ISO14001• ISO26000• RAILSPONSIBLE• ECOVADIS PLATINUM <p><i>Labour health & safety</i></p> <ul style="list-style-type: none">• 45001
<p>SAFETY</p> <ul style="list-style-type: none">• UNE	<p>SCIENCE BASED TARGETS</p> <p>RACE TO ZERO</p> <p>EPD®</p> <p>2023 ecovadis Sustainability Rating</p>
<p>TSI</p> <ul style="list-style-type: none">• TSI	

CAF continues towards the challenge of decar-bonisation as the main axis of its strategy, with a commitment to sustainable growth focused on the environment, and leading the transition towards net zero emissions mobility.

Our strategic commitment to decarbonisation and the energy transition is reflected in the 2021 accession to SBTi (Science Based Targets Initiative) and Race to Zero, international alignment initiatives in the fight against climate change and Paris Agreement.

Lead the way with CAF
MIIRA’s Eco-Approved
solutions



Green e-Energy

100% renewable certified e-Energy, produced by wind turbines.

Sustainable. Infinite.

ECO design

More efficient designs that are lighter, require less maintenance and offer longer lifetimes.

Complete wheelset and gearbox designs that eliminate compatibility related problems, maximizing the reduction of total weight.

Efficient. Lightweight.

ECOmmited

Part of SBTi (Science based targets initiative) and Race to Zero initiatives against climate change aligned with the Paris Agreement.

Focus on continuous improvement to reduce carbon footprint throughout the entire life cycle of our products.

Endless improvement.

ECOnsumption

Lightweight designs that require less material and generate less waste.

Production and supply of complete wheelsets generate less carbon footprint: we avoid unnecessary operations and transports.

Integral. Clean.

Circular ECOnomy

100% of the scrap generated by our products is used to produce the steel we use. No additional external resources needed.

Reusable packaging system.

Recyclable.

Green Steel

Green Steel wheels and axles. Our steel is below Standards in terms of generated GHG intensity and below industry average.

Responsible. Green.

ENGINEERING DESIGN, TECHNOLOGICAL ASSESSMENT & TESTING

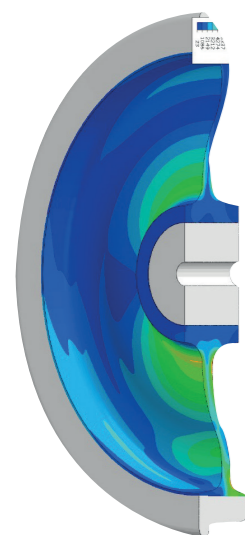
Design, validation and testing

CAF MIIRA has vast expertise in the design of wheels, axles and wheelsets. CAF MIIRA's products have been operating in main operators and OEMs since 1929.

Heritage in Steel production for decades provides us superior expertise in wheels and axles metallurgy.

Modelling cutting edge tools enable product designs to be validated to ensure their safety, reliability and enduring operational performance.

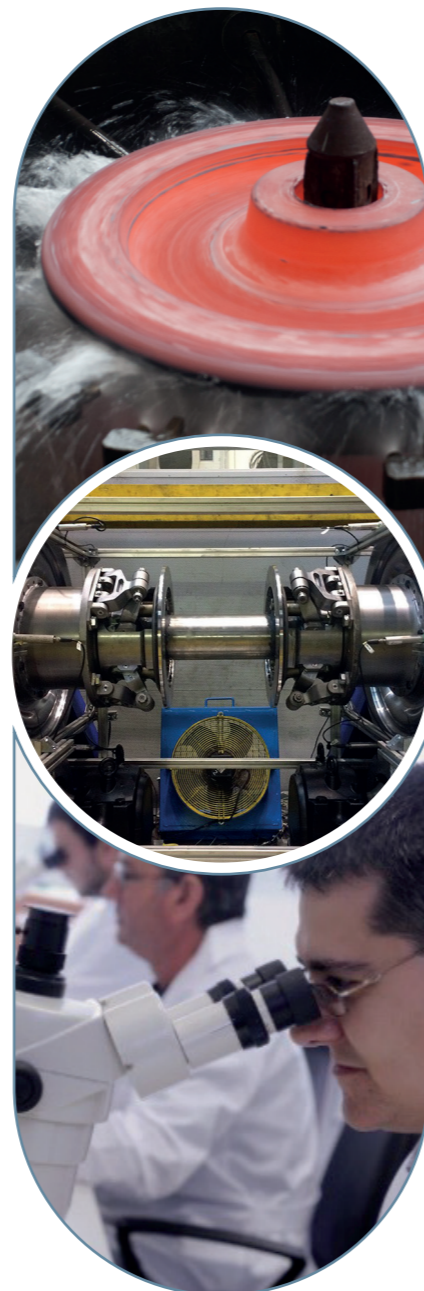
Further to our modelling and metallurgy expertise, designs are validated and proven by physical testing which is done in CETEST, our ISO-IEC-17025 certified laboratoty.



Modelling
cutting-edge
tools

In house
Type testing
equipment for
wheels, axles
and wheelsets

Laboratory for
charaterization
of steel



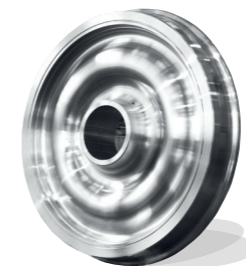
- Analysis of requirements and identification of customized solutions.
- Assistance in the definition and/or improvement of existing designs.
- Definition of specific materials and processes for each specific application.
- Engineering services for the analysis and improvement of the performance of the material in service.
- Definition of maintenance operations, including the development of NDT and inspection procedures.



WHEELS

ALL TYPES / MATERIALS / NOISE REDUCTION SOLUTIONS

- All type of **forged wheels** (from 550mm to 1.350mm).
- Produced in our **state-of-the-art facilities**.
- Comply with all Railways Standards: **EN, AAR, RISAS, GOST, CR, JIS,...**
- For **all application** in railway industry.



LOW STRESS WHEELS

- Low stress ultra light monoblock wheels for high demanding freight applications developed by our top engineering team.



PASSENGER MONOBLOCK WHEEL

- Worldwide reference for highly demanding passenger wheels in terms of safety and performance.
- Supplier for main OEMs such as CAF, TALGO, CRRC, STADLER, ALSTOM, SIEMENS,...
- Operating in most challenging railroads all over the world for operators like RENFE, DB, OBB, SNCF, Trenitalia, CR, PR, MTA, RATP,...
- Successful experience collaborating and partnering with customers.



AUXILIARY WHEEL

- Worldwide reference in auxiliary wheels for pneumatic metro cars.
- Large experience in Mexico DF metro lines, RATP metro, Marseille Metro, Montreal Metro...



LOCOMOTIVE WHEEL

- Worldwide reference in Locomotive monobloc wheels.
- Supplier for most demanding customers (operators and OEMs).
- Solutions for most demanding environments such as desert.
- Deliveries to most demanding countries like US, China, Germany, Austria, Spain...



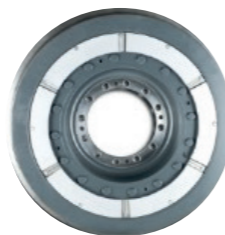
NOISE REDUCTION RING

- Cost-noise reduction high efficient ring solution
- Not welded
- Proven up to <250km/h EMU
- Own developed simulation program and own testing laboratory operating with great success in numerous fleets.



WHEEL CENTERS

- Own design and production.
- Vast experience in the market.



NOISE REDUCTION PLATES

- Sandwich type solution for noise reduction applications.
- Oriented to >250km/h.
- Tested on own testing laboratory.
- Service proven under CAF and CRRC fleets.



RESILIENT WHEELS

- Service proven thanks to the years of service in the most successful tram producers worldwide such as CAF, CRRC, Hitachi, Skoda, ...



ROLLING STOCK STEEL GRADE SOLUTIONS

XTRA LONG LASTING Maximum hardness – extra life

An optimum combination of mechanical properties, maintaining high hardness levels even at the end of wheel operating life. Improved average service life accompanied by a reduction of maintenance operations such as the re-profiling. Life extensions under the most demanding operational conditions.

XTRA LOW FATIGUE Maximum fatigue resistance (RCF)

Significant reduction of the damaged caused by rolling contact fatigue (RCF). Delays the nucleation of fatigue cracks, obtaining important wheel life extensions.

ULTRA LOAD Heavy haul

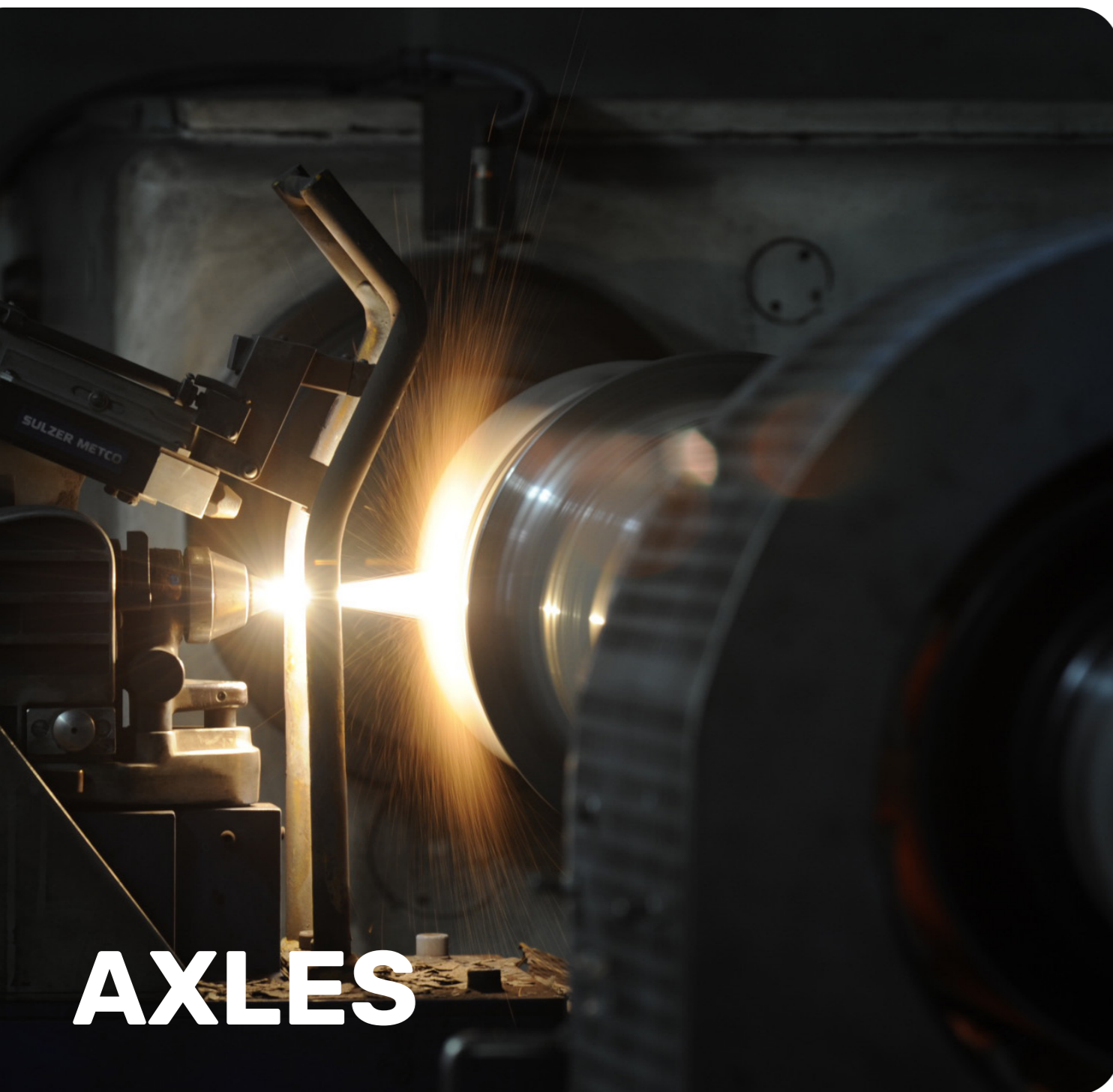
Applications with extreme axle loads (over 35 tons). Preferred wheels for TTCI (AAR) laboratories in the USA (after analysis of 14 different manufacturer). Ultra load steel grade increases wheel life and improves overall maintenance costs.

DESERT PROVEN Optimised for desert zones - abrasion

Steel solution that under extreme service conditions on both freight and passenger, has shown an average wheel life increase exceeding 30%. Reduces severe wear of the wheel due to the presence of sand in the wheel-rail contact.

COMPOPAD PROVEN Optimised for tread braking

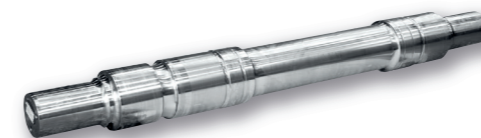
Specific ER7 grade (the main grade for wheels used for freight applications) which improves wear resistance and wheel performance under severe thermal cycles. Evidence of improved performance and increased durability.



AXLES

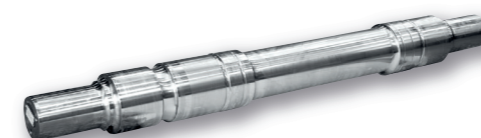
ALL TYPES / COLD-ROLLING / SHOT BLASTING

- **All kinds** of driven and trailer **axles**



FINISHED AXLES

- Completely finished axles for EMU, Metro, LRV and Locomotive fleets.



COLD ROLLED AXLES

- Cold rolled axle, performed by our CNC line, can withstand much higher service loads without cracking.



HOLLOW AXLES

- Hollow axles allow much easier in-service inspections, cutting down the maintenance costs.



MOLIBDENUM COATED AXLES

- Molibdenum coating increases the lifetime of the axle, avoiding damages during wheels changing operations.



COMPLETELY AUTOMATED COLD-ROLLING LINE

We can treat the seats, the grooves or all the surface of the axle to:

- Increase the hardness on the surface and deep below.
- Introduce strong compressive residual stresses deep under the surface.
- Reduce the surface roughness.



HOMOLOGATED SHOT BLASTING CNC MACHINE

Our shot blasting process has been approved by main European operators. Using our shot blasting process we get several benefits:

- Clean the surfaces in depth.
- Increase the effective contact area between substrate and coating, drastically improving the adhesion.
- Increase the fatigue life, through the hardening and introduction of compressive residual stresses.



CLASS 1 COATINGS TESTED ACCORDING TO THE EN 13261:

We have the capacity of applying in-house different types of class 1 coatings:

- We have service proven consolidated solutions that have shown an appropriate performance in the most demanding applications, also at subzero temperatures.
- Our references for class1 coated axles, include some of the most demanding customers such as DB and SNCF.



COMPLETE LIFE CYCLE

Complete wheelset design of all components including wheels, axles, gearboxes and axle boxes.

In house production and testing of all the components.

Integral Maintenance of Complete Wheelsets for wagons (IS1, IS2 or IS3) and passenger cars.

- Design of specific maintenance plans together with the final customer.
- Execution of the maintenance services.
- Supply of spare components.



→ Facilities in **Beasain, (Spain)** and **Milan, (Italy)**



MAINTENANCE & SPARE PARTS Solutions

COMPREHENSIVE SOLUTIONS FOR RAILWAY MAINTENANCE AND SPARE PARTS

CAF MIIRA is at the forefront of delivering comprehensive maintenance and spare parts solutions tailored to meet the dynamic needs of the railway industry. Our commitment to excellence, innovation, and reliability ensures that your fleet remains operational, efficient, and safe.

We offer a wide range of services designed to minimize downtime and maximize performance, including:

- Maintenance Services
- Technical Assistance
- Spare-Parts Supply Services
- Spare-Parts Engineering Services

With a focus on quality and customer satisfaction, CAF MIIRA is your trusted partner in railway maintenance and spare parts solutions.

MAINTENANCE SERVICES

Keeping Your Fleet Running Smoothly

Our maintenance services are designed to ensure your equipment operates at peak performance, day in and day out. We provide comprehensive support through:



All-in Guarantee

Ensuring top-quality care and attention for optimal performance and longevity



Preventive Maintenance Services

Proactive maintenance to maximize uptime and reliability



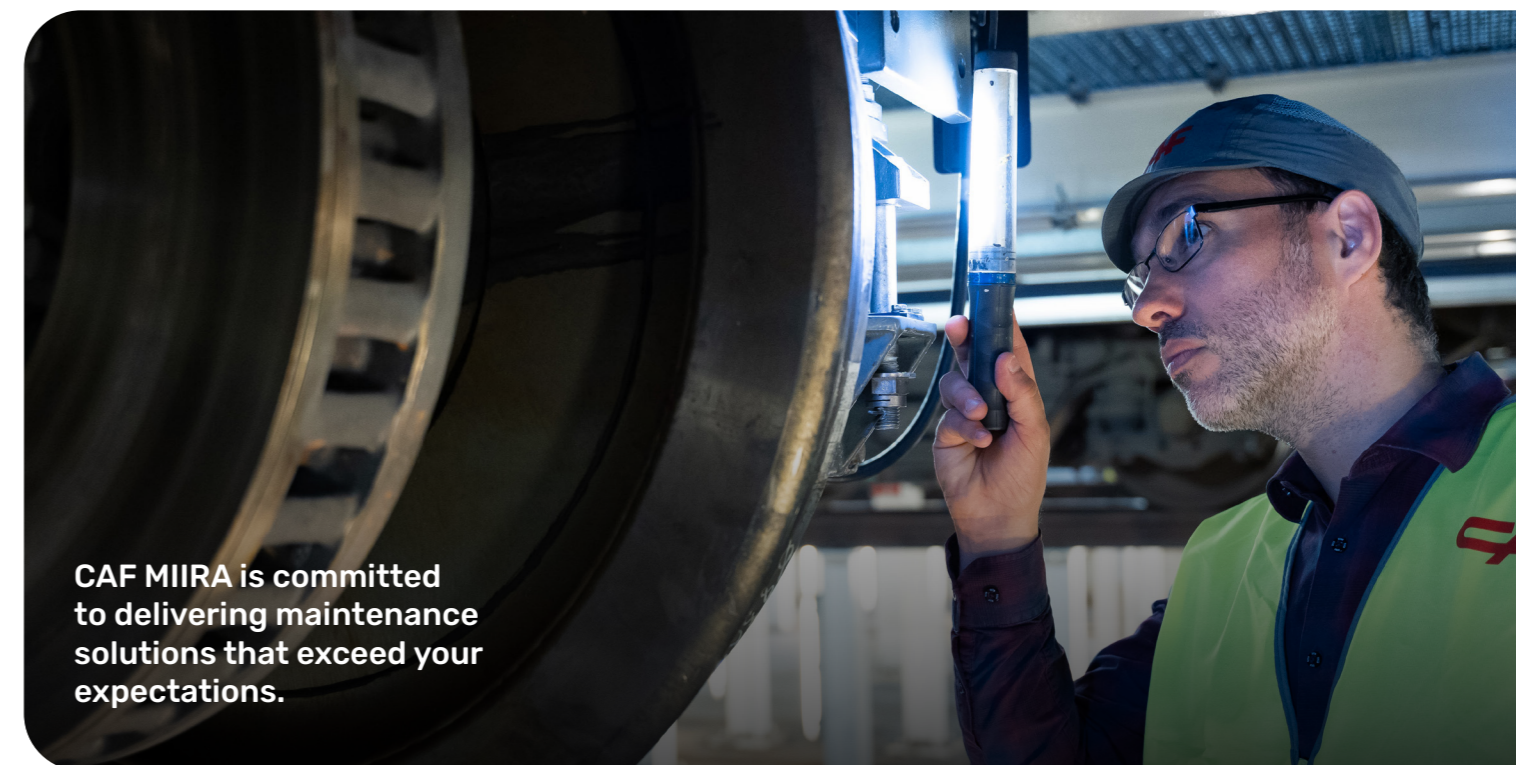
Routine Inspections

Maintaining high standards of quality and safety



Corrective Maintenance Services

Swift solutions for equipment issues or failures



CAF MIIRA is committed to delivering maintenance solutions that exceed your expectations.

REFERENCES

FREIGHT LOCO OPERATOR



EMD DESSERT - SAUDI ARABIA



WHEELS



PROGRESS RAIL - USA



WHEELS



DB - GERMANY



WHEELS - AXLES

FREIGHT WAGON OPERATOR



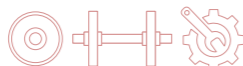
TRANSFESA - SPAIN



WHEELS - AXLES - WHEELSETS - MAINTENANCE



HUPAC - ITALY



WHEELS - WHEELSETS - MAINTENANCE



SAR - SAUDI ARABIA



WHEELS - WHEELSETS

FREIGHT LOCO OEM



BITRAC - SPAIN



WHEELS - AXLES - WHEELSETS



HXD2 - CHINA



WHEELS



EKZ - KAZAKHSTAN



WHEELS - AXLES

PASSENGER LOCO OEM



PUSH-PULL - SAUDI ARABIA



WHEELS - AXLES - GEARBOXES
WHEELSETS



HXD1D - CHINA



WHEELS



TRAXX - GERMANY



WHEELS - AXLES

HIGH SPEED AND INTERCITY



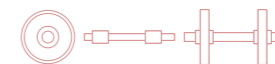
OARIS FLYTOGET - NORWAY



WHEELS - AXLES - GEARBOXES
WHEELSETS



CHANGCHUNG - CHINA



WHEELS - AXLES - WHEELSETS



AVRIL II - SPAIN



WHEELS - AXLES

COMMUTER AND REGIONAL TRAINS



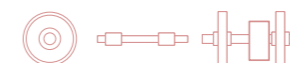
PHD - SNCF - FRANCE



WHEELS - AXLES - WHEELSETS



CIVITY NS - NETHERLAND



WHEELS - AXLES - GEARBOXES
WHEELSETS



OBB RAILJET - AUSTRIA



WHEELS - AXLES



METRO



MTR - HONGKONG



WHEELS



STC - MEXICO



WHEELS - GEARBOXES



MTA - NEW YORK - USA



WHEELS - AXLES

TRAMS



ESKIŞEHİR - TURKEY



RESILIENT WHEELS



FREIBURG - GERMANY



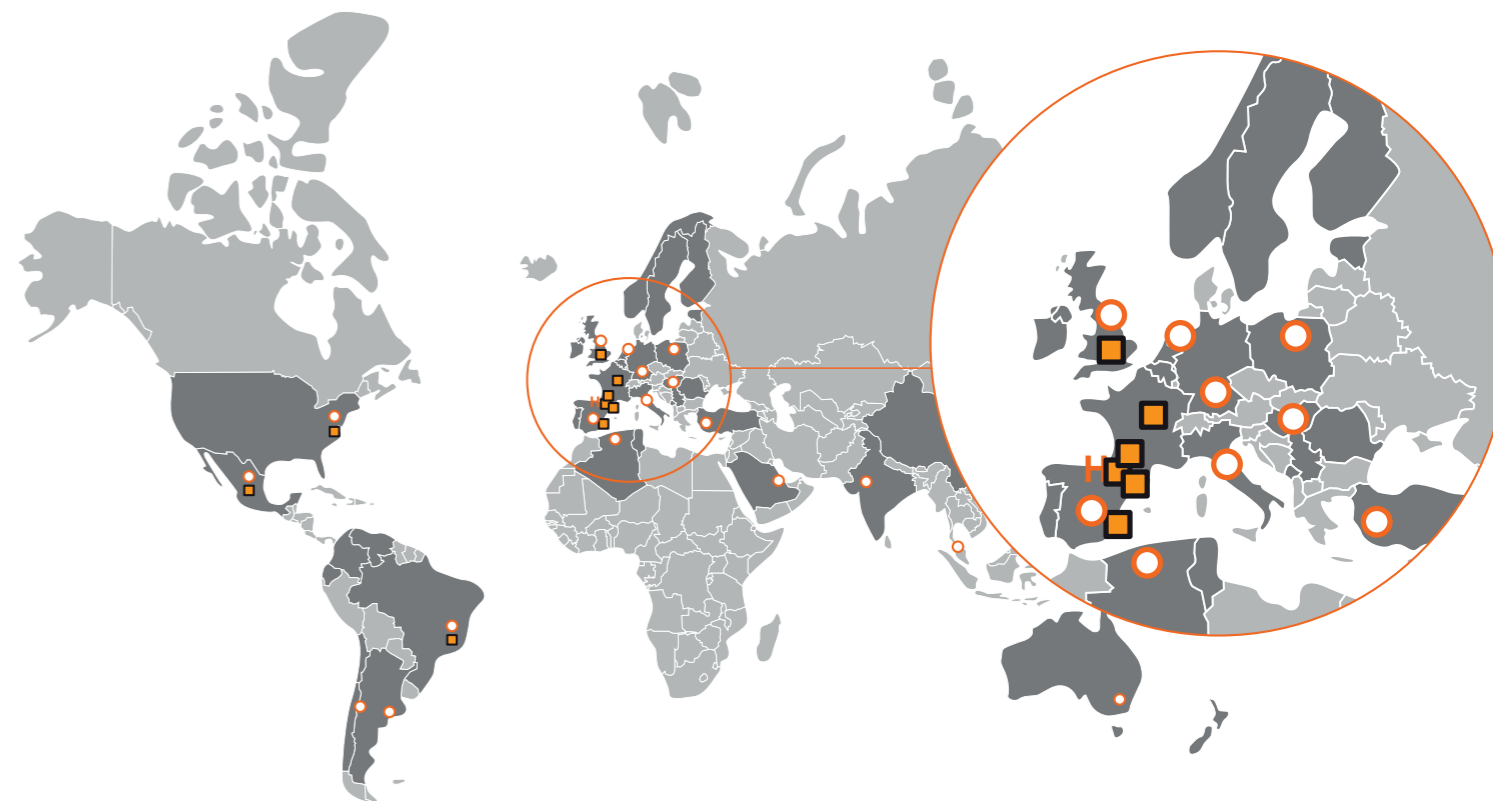
WHEELSETS



HONOLULU - HAWAII



RESILIENT WHEELS



- H** Headquarters
- Production Plants
- Offices
- Countries with ongoing projects

Headquarters:

- SPAIN

Production Sites:

- SPAIN • FRANCE
- USA • BRAZIL
- MEXICO • UK

Subsidiaries:

- MADRID • PARIS • LONDON
- MUNICH • WASHINGTON D.C.
- NEW DELHI • MEXICO D.F.
- ROME • SYDNEY • WARSAW
- SAO PAULO • BUENOS AIRES
- ISTANBUL • ROTTERDAM
- DOHA • KUALA LUMPUR
- SANTIAGO DE CHILE
- BUDAPEST



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