

# MIIRA

A CAF GROUP COMPANY



## LRV-TRAMS SOLUTIONS

[www.cafmiira.com](http://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**



CAF GROUP

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

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 ECOonomy

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.





## LRV-TRAMS Solutions

### RESILIENT WHEELS

As part of a leading train manufacturer, CAF MIIRA holds a prominent position in the LRV-TRAMS market, boasting extensive experience and advanced technology. Our resilient wheels have been a reliable choice for numerous projects, backed by accreditations and approvals that surpass the capabilities of competing products.

With over 17,000 resilient wheels supplied to the market and a focus on technological innovation, CAF MIIRA remains the preferred choice for OEMs in the LRV-TRAMS sector.



**Tram Wheel**  
Birmingham



**LRV/Metro Wheel**  
Honolulu



**LRV/Special Interface**  
Cagliari

### VERSATILE DESIGN

Our resilient wheel solution is engineered to meet the most demanding specifications and seamlessly adapts to all tram and LRV solutions in the market. Its adaptable design allows for usage across various interfaces and required diameters.

### SIMPLIFIED TIRE REPLACEMENT

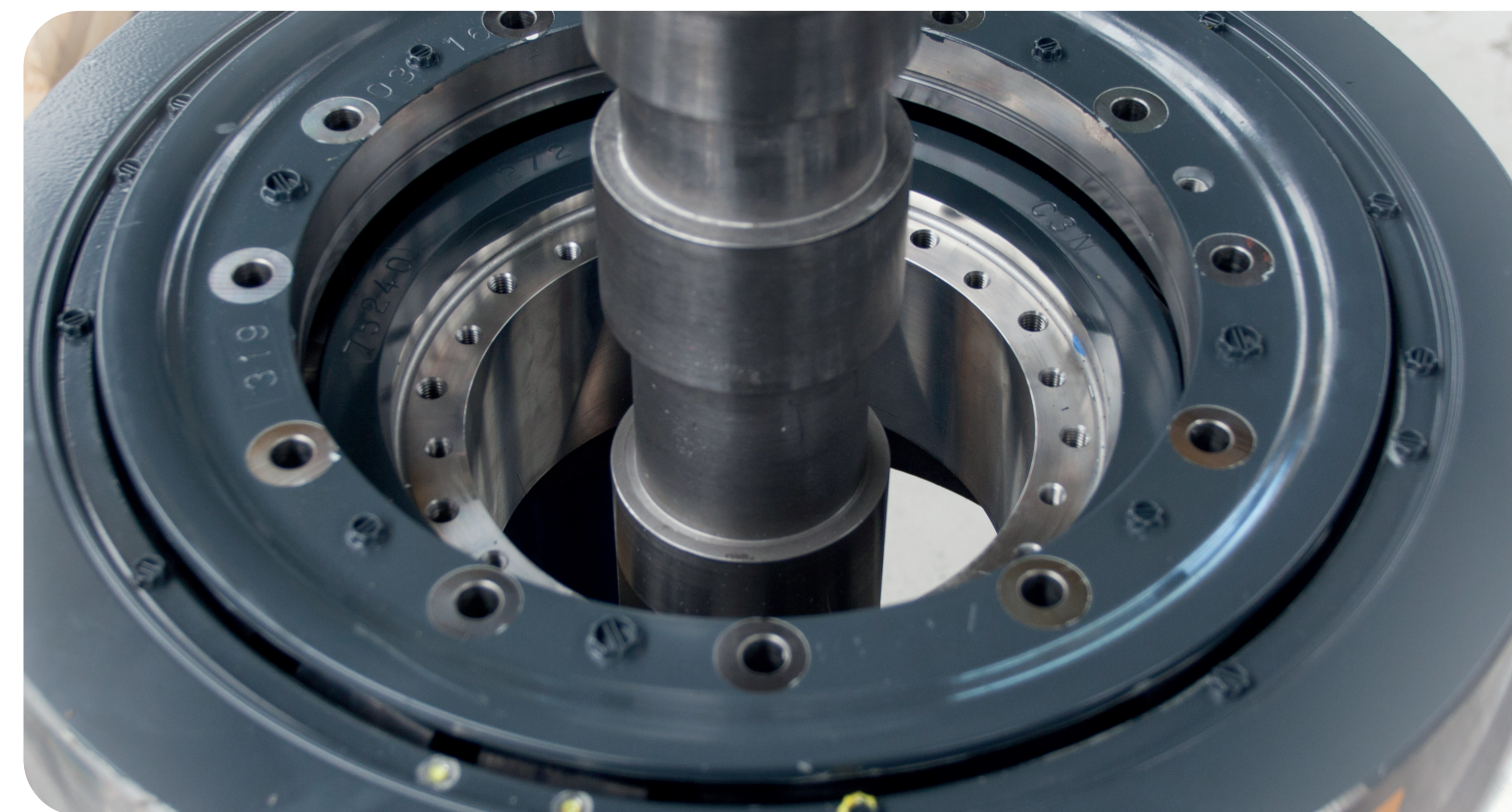
Our design streamlines tire replacement, reducing downtime and associated maintenance costs.

### V-SHAPED RUBBER BLOCKS

CAF MIIRA's resilient wheels feature V-shaped rubber blocks that provide enhanced flexibility and durability, ensuring optimal performance even in challenging conditions.

### HIGH AXIAL STIFFNESS

CAF MIIRA's resilient wheels offer high axial stiffness, ensuring a smooth and stable ride even on uneven terrain.



### NOISE ABSORPTION SYSTEM:

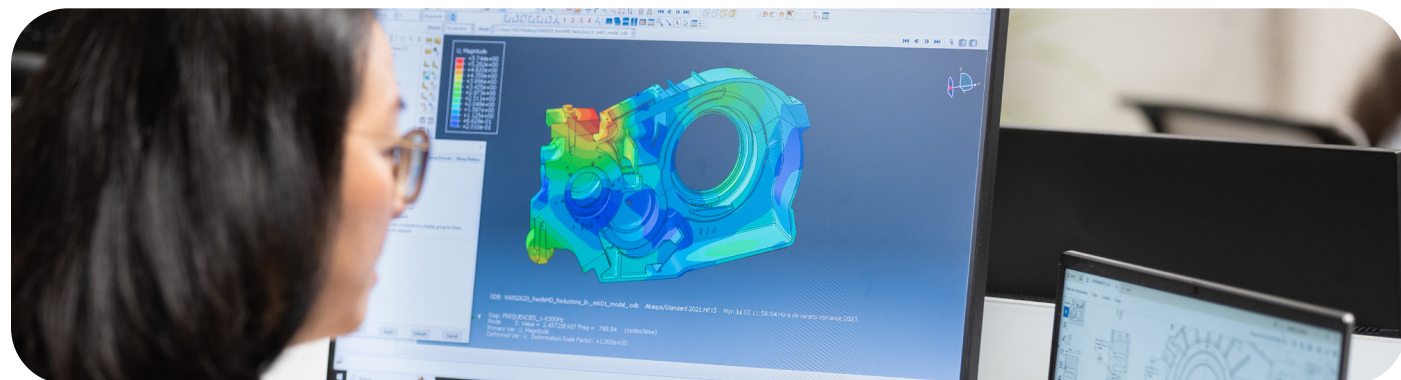
Our resilient wheel solutions can include an interface that will allow assembling damping plates on it. These damping plates are noise absorption systems that are mounted on the resilient wheels to mitigate, especially, the squeal noise (axial modes).

They are composed by metallic and rubber layers and designed by FEM calculations to damp the critical wheel modes. According to field test performed with these type of systems, 25 dB reduction values has been reached at the frequency of interest (around 800 Hz), eliminating at all the squeal noise. The reductions obtained on the rolling noise (radial modes) are in a lower level.



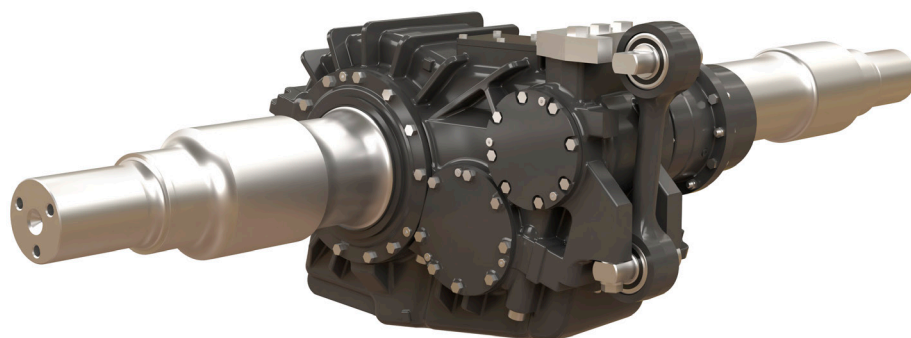
## GEARBOXES

With over 50 years of expertise in gearbox design, manufacturing, and supply, CAF MIIRA is at the forefront of addressing the evolving challenges in the rolling stock industry. Our customer-centric approach, coupled with an extensive portfolio of successful projects, positions us as a trusted partner for OEMs worldwide.



## TAILOR-MADE SOLUTIONS

At CAF MIIRA, we understand that each project comes with unique requirements. Leveraging our decades of experience, we offer tailor-made gearbox solutions to meet the specific needs of our clients, ensuring optimal performance and reliability.



## LIFECYCLE COST OPTIMIZATION

CAF MIIRA's gearboxes are designed to optimize lifecycle costs by prioritizing lightweight construction, reliability, and low noise levels. This approach not only enhances operational efficiency but also minimizes maintenance requirements, resulting in significant cost savings over the lifespan of the equipment.

## ADVANCED DESIGN AND TESTING

Our gearboxes are engineered using state-of-the-art design and testing methodologies, guaranteeing superior quality, durability, and efficiency. By incorporating the latest technologies and materials, we deliver gearboxes that exceed industry standards.

## WIDE RANGE OF APPLICATIONS

Our gearbox solutions cater to a diverse range of applications, including locomotives, metros, high-speed trains, regional trains, and trams. Whether it's a standalone gearbox or part of an integral wheelset solution, CAF MIIRA ensures compatibility and performance across various platforms.

## PORTAL AXLES AND WHEELSETS

As a leader in the tram and LRV segments, the CAF Group has empowered CAF MIIRA to pioneer advanced solutions for these applications. With a focus on innovation and sustainability, we specialize in designing, manufacturing, and maintaining state-of-the-art portal axles and wheelsets that exceed industry standards.

## EXTENSIVE EXPERIENCE

CAF MIIRA boasts extensive experience in the tram and LRV sector, having developed bespoke solutions for various tram and LRV applications. Our solutions are meticulously designed and rigorously tested to meet the most stringent specifications, ensuring unmatched performance and reliability.

## INTEGRATED DESIGN AND MAINTENANCE

Our holistic approach to portal axle and wheelset solutions includes design, supply, and maintenance, offering OEMs a comprehensive solution that streamlines operations and reduces total cost of ownership. By consolidating responsibility under one source, we enhance efficiency, reduce lead times, and minimize risks for our customers.



## ADAPTABILITY AND VERSATILITY

Our tram solutions are highly adaptable and can be seamlessly integrated into any tram or LRV platform. Whether it's a standard gauge or a specialized application, CAF MIIRA's portal axles and wheelsets are designed to excel in diverse operating environments.

## ENVIRONMENTAL BENEFITS

CAF MIIRA's solutions are engineered to minimize environmental impact, with a focus on reducing weight, carbon footprint, and maintenance requirements. By opting for our integrated solutions, OEMs can contribute to a greener, more sustainable future for urban transportation.

## TECHNOLOGICAL INNOVATION

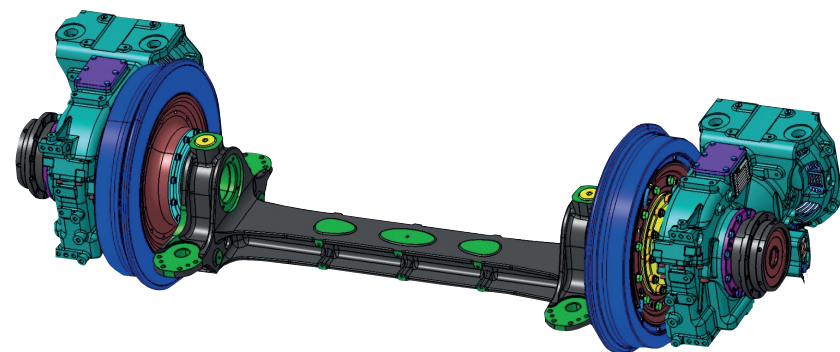
At CAF MIIRA, we embrace innovation and continuously invest in cutting-edge technologies to develop smarter and more sustainable solutions. From lightweight portal axles to advanced gearbox solutions, we are committed to shaping the future of tram and LRV transportation.





## OFF THE SHELF SOLUTIONS

### URBOS 100 PLATFORM



#### PRODUCT MAIN CHARACTERISTICS

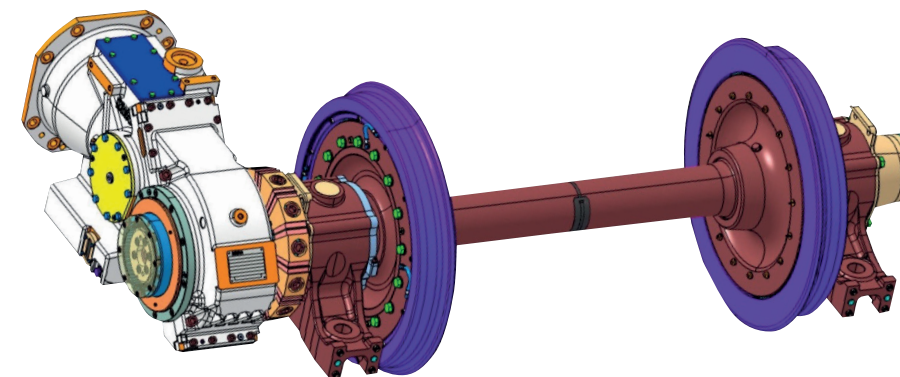
- 100% low floor platform
- Independent wheel traction
- Fully suspended 1 stage drive
- Modular wheelset:
  - Metric & International gauge, including grounding, braking equipment, and speed sensors

#### MAIN TECHNICAL DATA

- 80km/h design speed
- Wheel  $\varnothing$  = 630/510mm
- Up to 14,4Tn/axle load
- 650Nm tractive torque,  $i=5,44$
- Service proven design

## OFF THE SHELF SOLUTIONS

### URBOS 100X PLATFORM



#### PRODUCT MAIN CHARACTERISTICS

- 100% low floor platform
- Traction per wheelset
- Fully suspended 2 stage drive
- Modular wheelset:
  - Metric & International gauge.
  - Different gear ratios to optimize traction equipment efficiency.

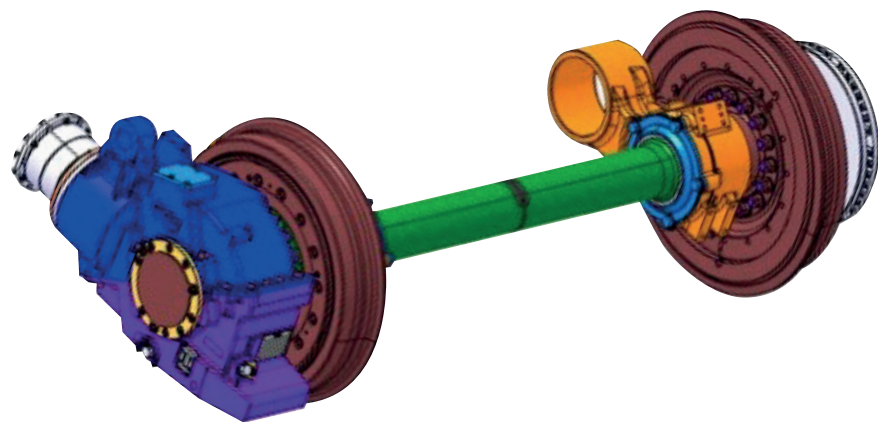
#### MAIN TECHNICAL DATA

- 90km/h design speed
- Wheel  $\varnothing$  = 640/510mm
- Up to 12,5Tn/axle load
- 1185Nm tractive torque,  $i= 6,25$



## OFF THE SHELF SOLUTIONS

### URBOS AXL



#### PRODUCT MAIN CHARACTERISTICS

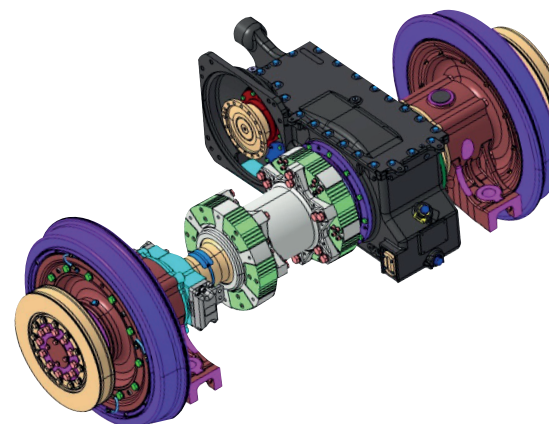
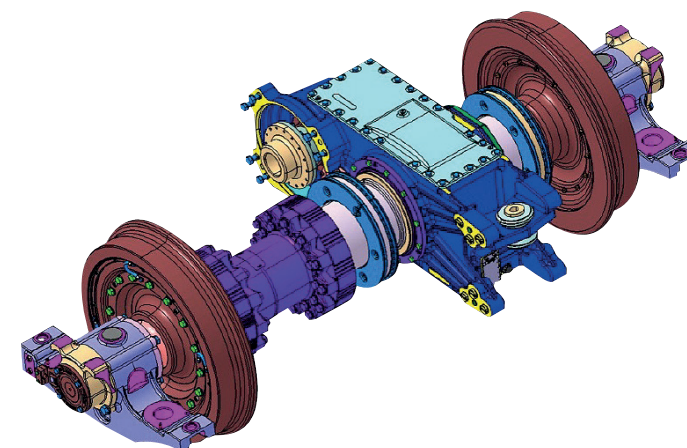
- 70% low floor platform
- Traction per wheelset
- Non suspended 1 stage drive
- Direct power transmission:
  - Gearbox wheel
- Inboard bearing

#### MAIN TECHNICAL DATA

- 110km/h design speed
- Wheel  $\varnothing$  = 680/550mm
- Up to 10Tn/axle load
- 789Nm tractive torque,  $i$  = 5,44

## OFF THE SHELF SOLUTIONS

### LIGHT RAIL VEHICLES



#### PRODUCT MAIN CHARACTERISTICS

- 70% low floor solution
- Traction per wheelset
- Very common in USA
- High level of standardization using proven designs increasing the reliability
- Modular designs for cost reduction and short delivery times
- Long maintenance intervals for oil change and overhaul
- Possibility to implement predictive maintenance instrumentation.



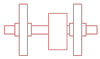


REFERENCES

LRV



MARYLAND - USA



WHEELSETS

TRAMS



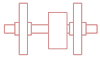
ESKIŞEHİR - TURKEY



WHEELS



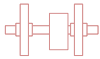
SYDNEY - AUSTRALIA



WHEELSETS



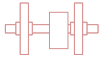
CINCINNATI - USA



WHEELSETS



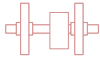
FREIBURG - GERMANY



WHEELSETS



STOCKHOLM - SWEDEN



WHEELSETS



BOSTON - USA



WHEELSETS



HONOLULU - HAWAII



RESILIENT WHEELS



DE LIJN - BELGIUM



WHEELSETS

EUROPE

- Vitoria
- Seville
- Bilbao
- Zaragoza
- Saint Etienne
- Amsterdam
- Utrecht
- Luxembourg
- Freiburg
- Tallin
- Budapest
- Debrecen
- Cagliari
- Lund
- Oslo
- Lieja
- Delijn
- Brussels
- Brimingham
- Edinburgh
- London

AFRICA

- Mauritius

USA

- Houston
- Cincinnati
- Kansas
- San Francisco
- Honolulu
- Boston
- Maryland
- Seattle (Brookville)

CANADA

- Edmonton

ASIA PACIFIC

- Beijing Metro
- Kaohsiung
- Manila
- Sidney
- Canberra
- Newcastle
- Parramata (Australia)

MIDDLE EAST

- Eskisehir
- Jerusalem

LATAM

- Cuiaba





# 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



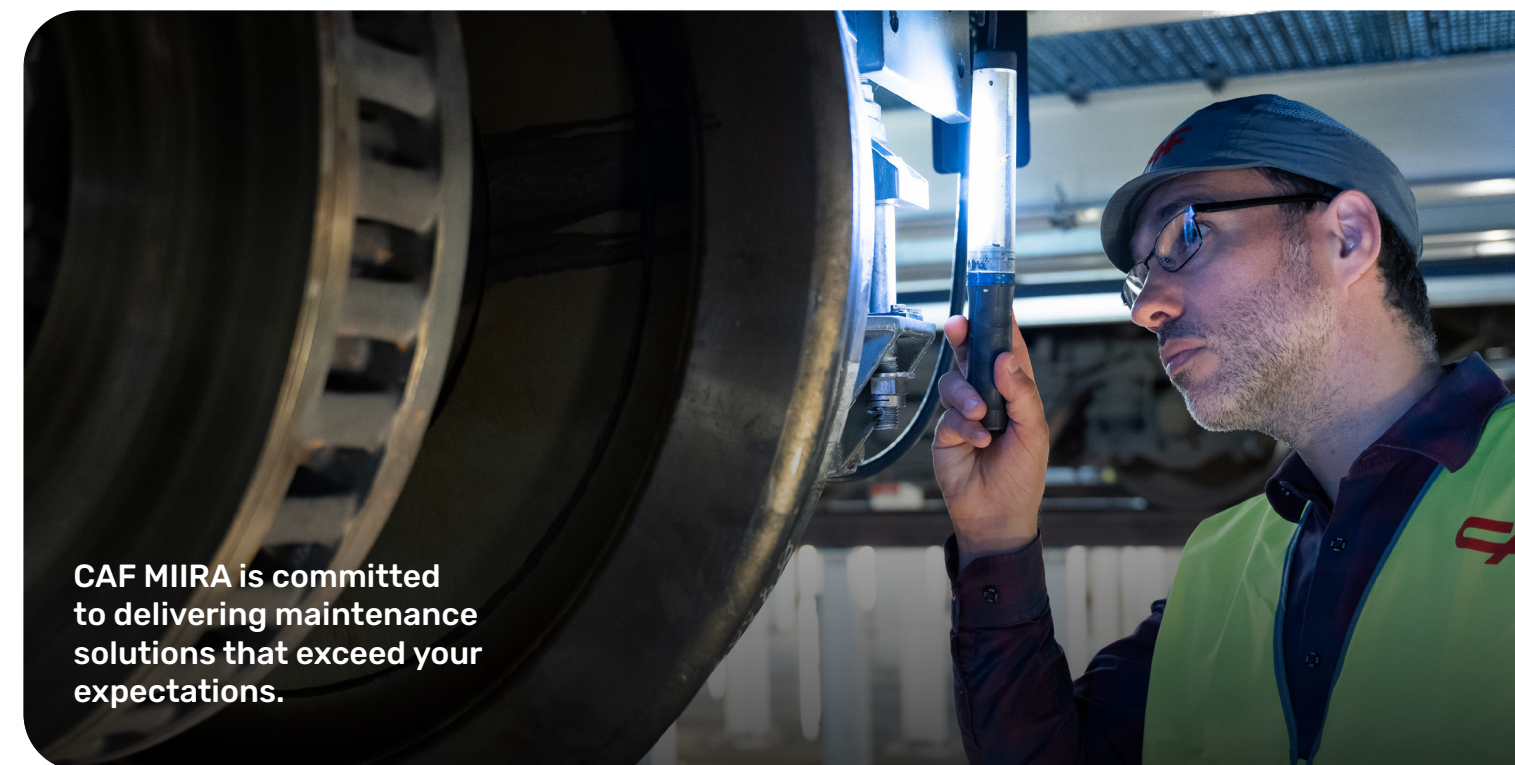
#### Routine Inspections

Maintaining high standards of quality and safety



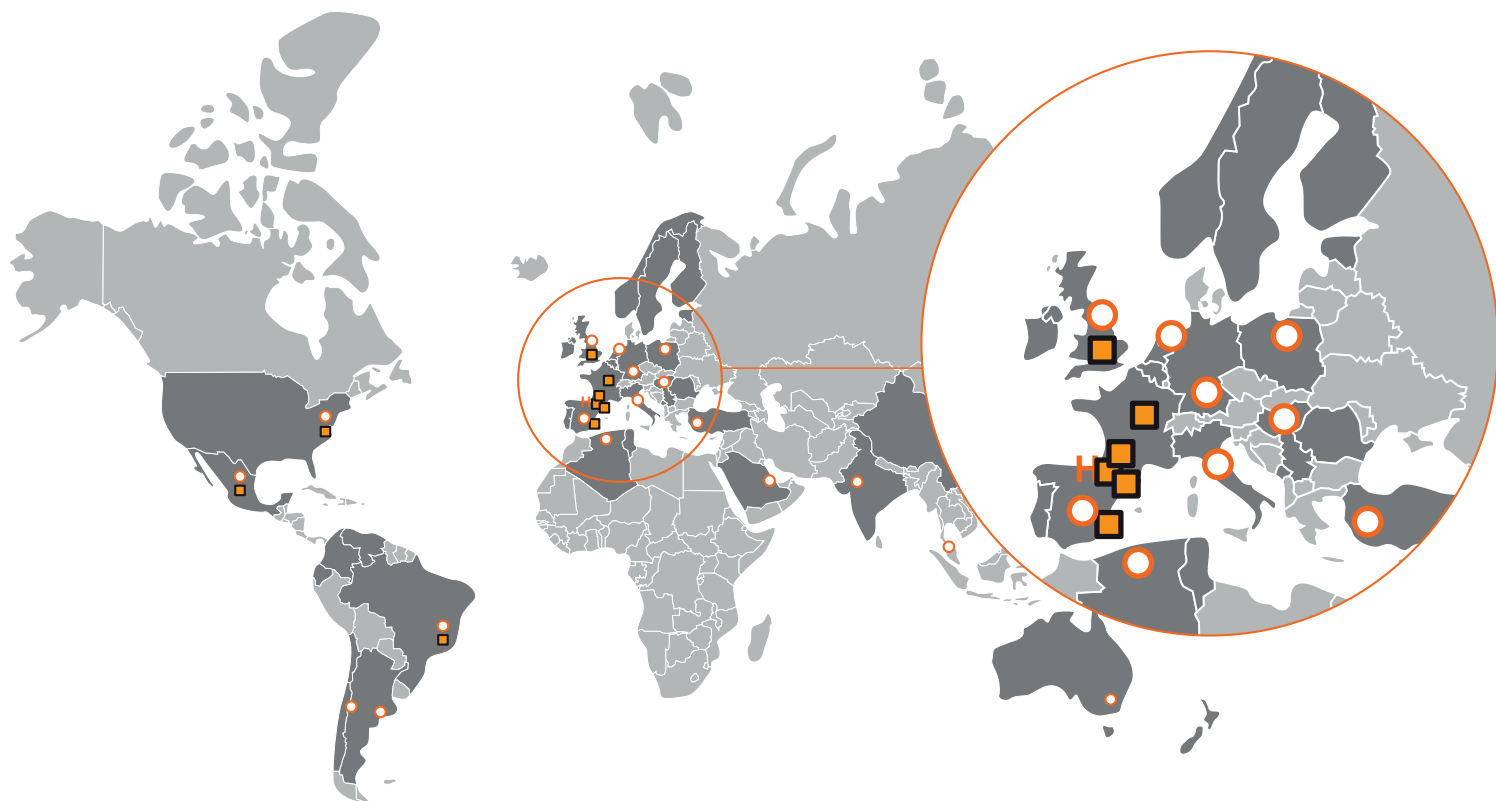
#### Corrective Maintenance Services

Swift solutions for equipment issues or failures



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





- 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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