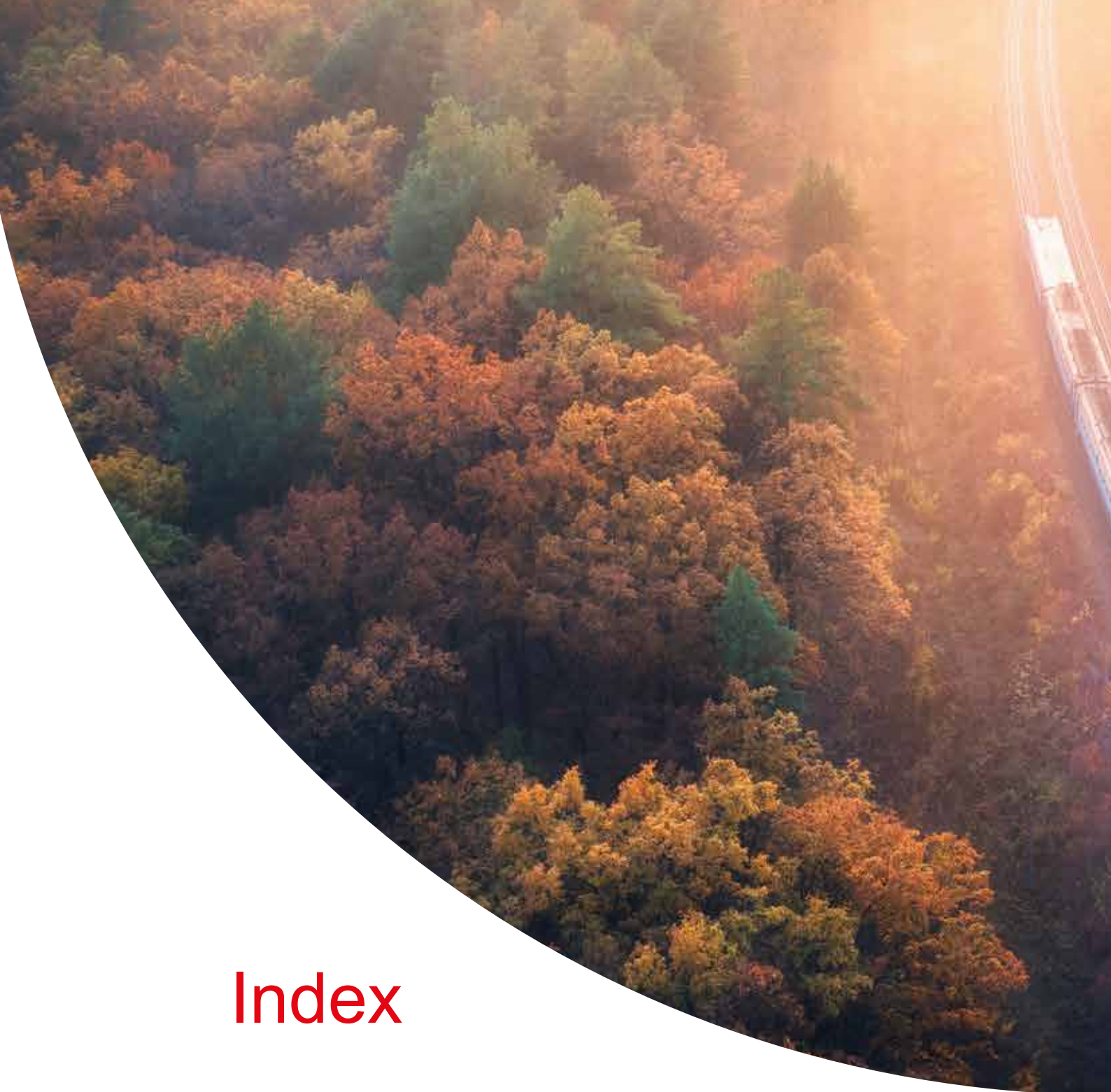


MiiRA | CAF  
MOTION & INTELLIGENCE IN RAILWAYS

# wheelsets

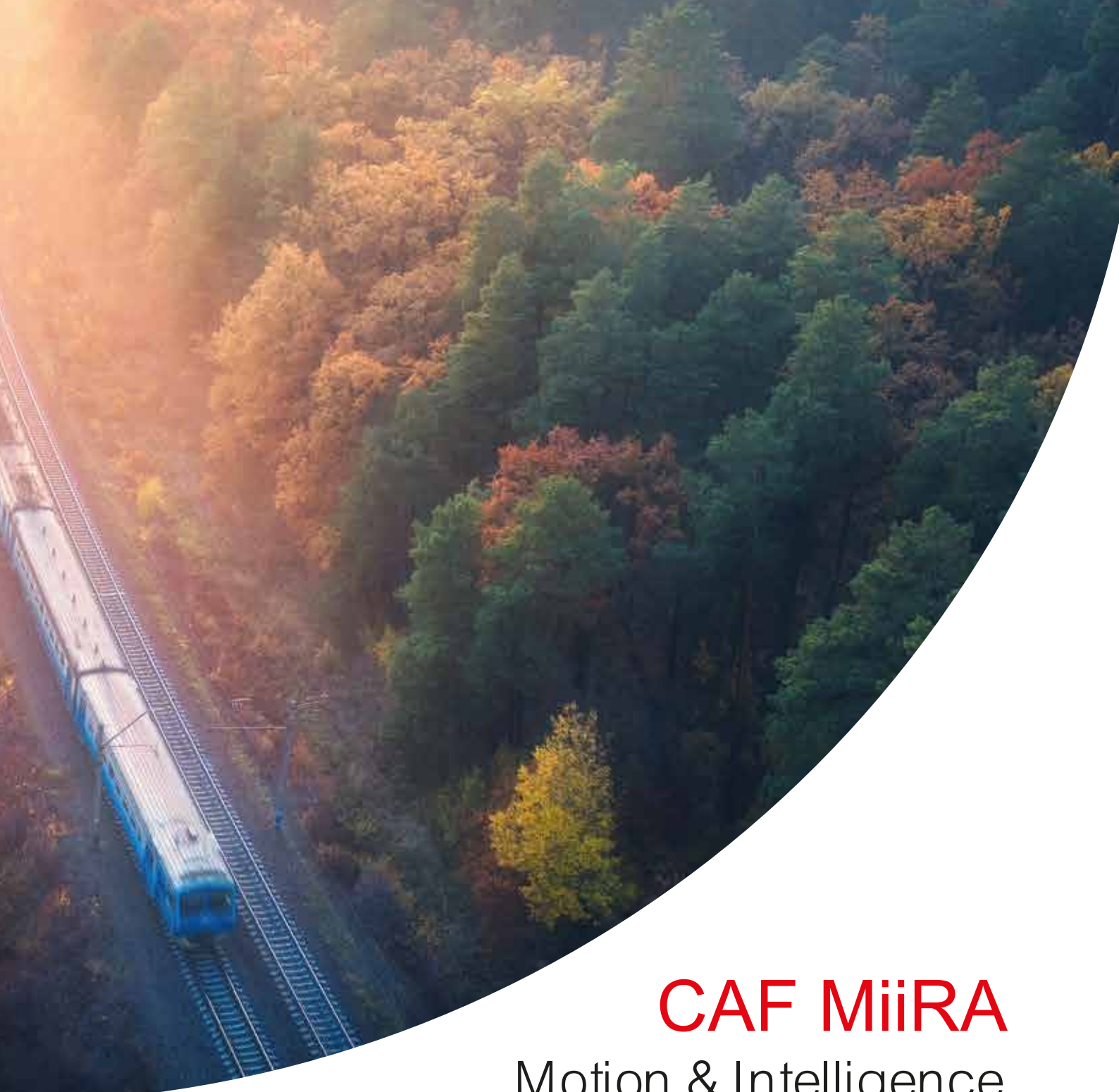




# Index

• Solutions	<b>8</b>
• Green Future	<b>10</b>
• Certificates	<b>12</b>
• Complete Wheelset Solutions	<b>14</b>
• Integral maintenance services	<b>20</b>
• Wheelset components	<b>21</b>
• References	<b>22</b>





# CAF MiIRA

## Motion & Intelligence in Railways

Almost a century of experience and state-of-the-art technology have made us world leaders in manufacturing railway wheels, axles, gearboxes, resilient wheels and complete wheelsets.





32/10t





Multinational group with over 100 years of experience in the supply of comprehensive transit solutions positioned at the forefront of technology for high value added sustainable mobility.

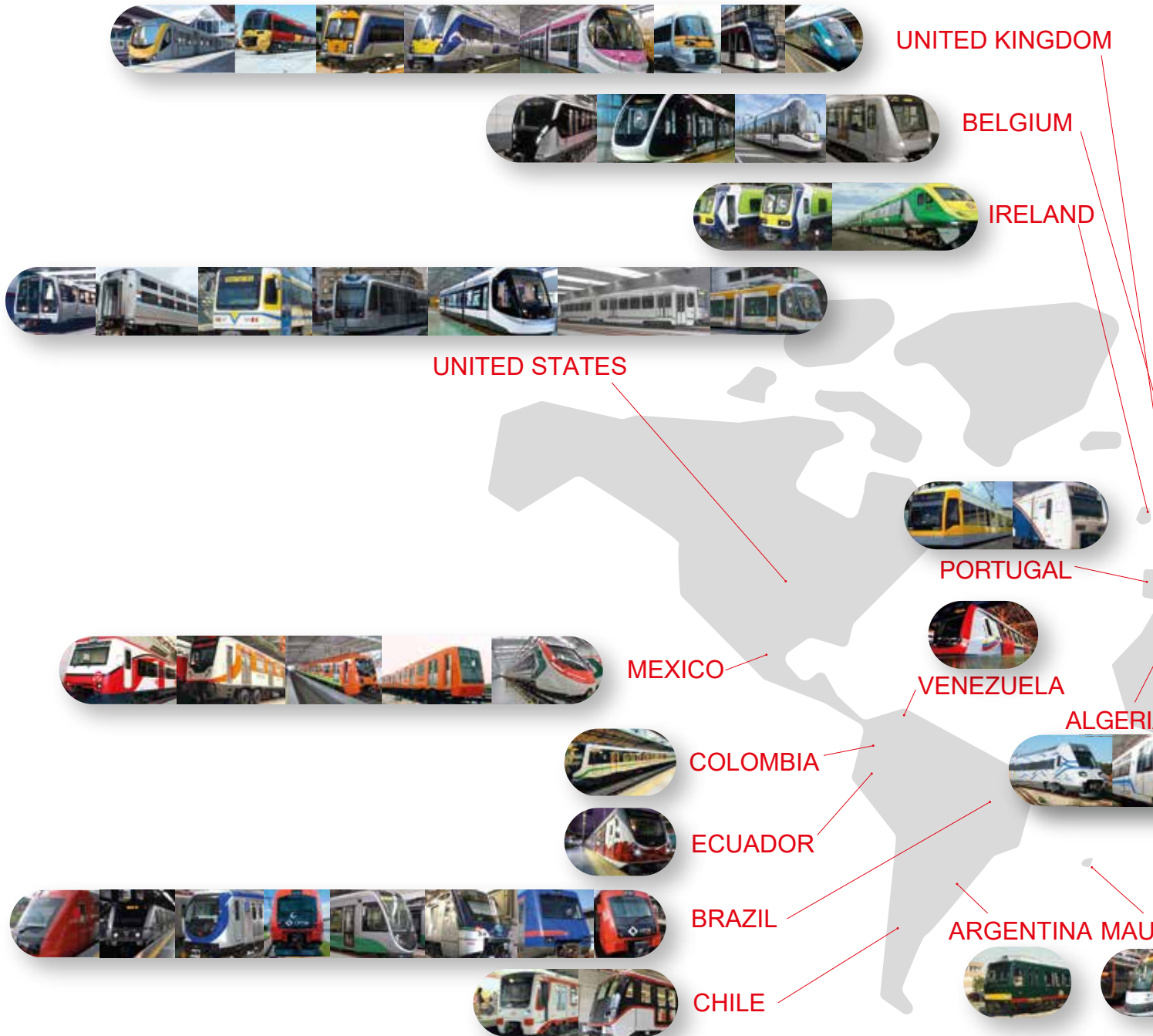


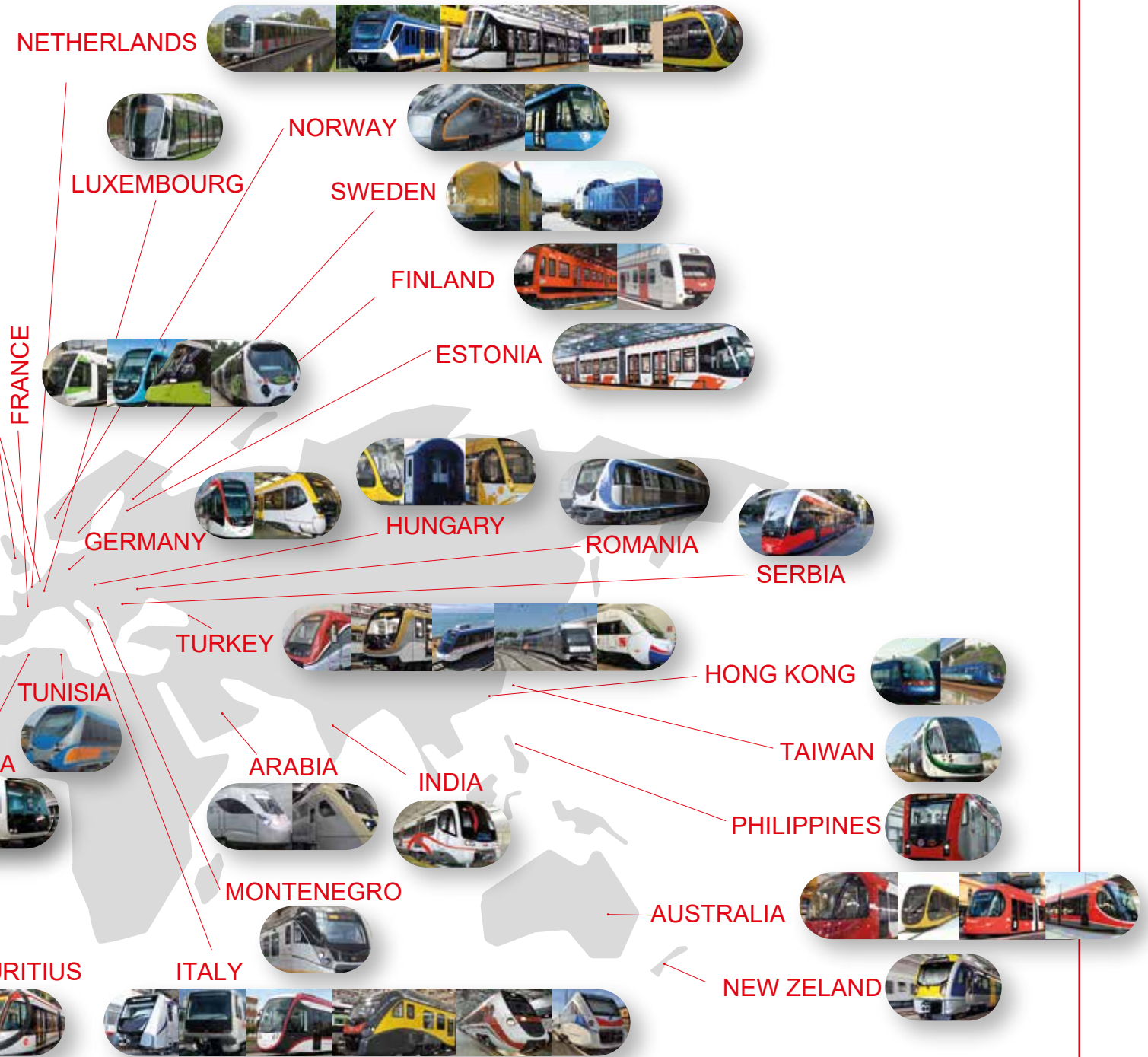
Over 70 subsidiaries





# Worldwide projects



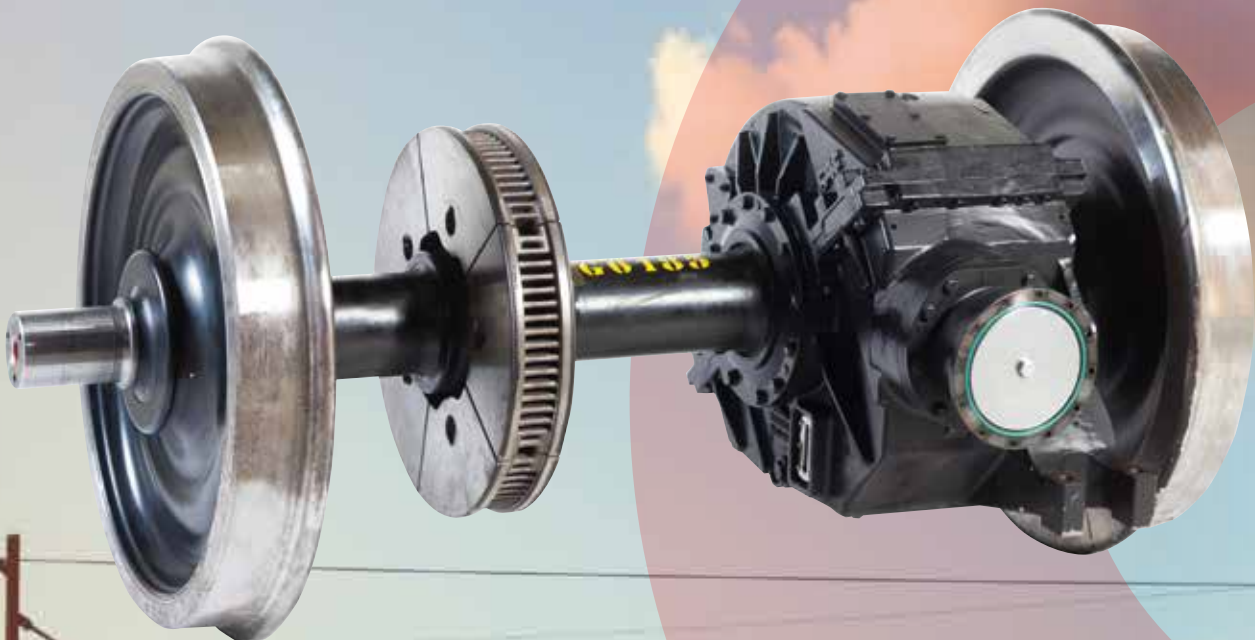


Industrial establishment in USA, France, UK, Mexico and Brazil

50 maintenance centers in the world

45-year concession to operate a system of suburban trains in Mexico City

# Portfolio Solutions





# ENGINEERING

Products' & materials' design

Modernizations

 ECO Design

# SUPPLY

Products |  
Wheels  
Axles  
Wheelsets  
Resilient wheels  
Gearboxes

 Green Steel  
 Green e-Energy

Value added elements |  
Protection systems  
Noise reduction solutions

Integration on supply chain

 ECOsumption


# SERVICE

 ECOmitted

Technological assessment |  
Maintenance plans' optimization  
Failure analysis  
Service inspections

Integral maintenance management

Life cycle optimization

 Circular ECOmy



# Green future

Time for action





### Green e-Energy

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

*Sustainable. Infinite.*

### Green Steel

Green Steel wheels and axles.

Our steel is below European Standards in terms of generated GHG intensity and below industry average.

*Responsible. Green.*

### 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.*

### ECOconsumption

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 ECOconomy

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.*

### ECOmmited

Part of SBTI ((Science based targets initiative) and Race to Zero, European 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.*



# Certificates

## Railways and Standard homologations

### CAF MiiRA Certifications

- ISO 14001
- ISO 9001
- OSHAS 18001
- ISO-IEC-17025 certified metallurgical Laboratory
- ISO / IEC 27001

### Railways Certifications

- IRIS
- AAR
- RISAS
- GOST
- VPI
- RENFE (Spain)
- SNCF (France)
- DB (Germany)
- OBB (Austria)
- TRENITALIA (Italy)
- SNCB (Belgium)
- SBB (Switzerland)
- CR (PRC)
- NS (Netherlands)
- Korail (South Korea)
- MTR (Hong Kong)
- MTA (USA)





# Complete Wheelsets solutions

We are the only supplier in the market that can design, manufacture and assemble complete wheelset.

Manufacturing the main elements of the wheelset internally allows us to ensure traceability of each of the parts throughout the assembly process, subsequently allowing the customer to perform a more versatile service monitoring of its parts.

The integral design, supply and maintenance of wheelsets and the gearbox reduces the final total cost to our customers by:

- **Reducing lead times and increase the efficiency on planning and logistics**
- **Reducing total weight of the complete solution in a higher amount than doing it separately to each component**
- **Reducing carbon footprint generated in the complete wheelsets**

We have the most modern facilities to control critical processes for safety such as the application of torque, which ensures and records the values obtained in 100% of the assemblies made.

Being part of CAF Group is an advantage due to the access we have to the knowledge and return on experience of all Group companies that can design and manufacture different train components such as traction, communication, simulation, etc. We can get the required support from them to improve our own solutions.

We design, manufacture and maintain wheelsets for all train applications (passenger and freight) including portal axles for 100% low floor trams or complete wheelsets for refurbished locomotives.

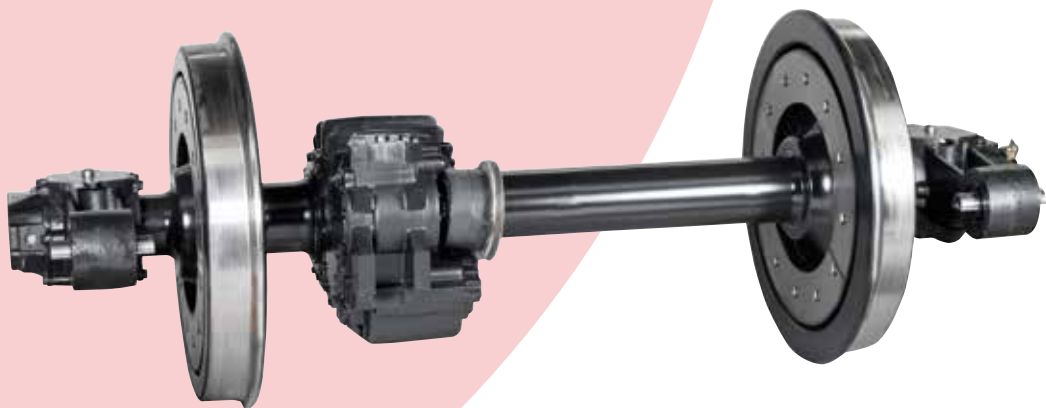




# Wheelsets for High Speed, EMU's, Locomotives and Metros:

We can provide the following type of wheelsets:

- Wheelsets for engines and trailers
- Wheelsets for shrink fitting
- Wheelsets with cylindrical and conical bores
- Wheelsets of variable gauge
- Wheelsets with internal bearings
- Wheelsets with brake disc pressed into the axle
- Wheelsets with brake disc assembled on the wheel
- Wheelsets with brake disc tied to the axle
- Wheelsets with complete fully suspended gearbox
- Wheelsets with semi-suspended gearbox
- Wheelsets with canon box suspended gearbox



# Wheelsets & portal axles for Trams & LRV

The CAF Group is a leader in the tram and LRV segments, which has allowed CAF MiiRA to accumulate extensive experience in this field, having developed its own solutions for all types of trams and LRV's.

CAF MiiRA designs, manufactures and maintains state-of-the-art axle-bridge sets 100% tested by CAF that meet the most demanding specifications.

Our trams solutions are easily adaptable to all tram and LRV solutions in the market. CAF stands out among its competitors thanks to its experience in such demanding application that require large investments and new technological developments. A look at the future with smart advanced solutions that develop more sustainable environments.



Discover our complete portfolio of LRV & Trams solutions



# Wheelsets for Freight

CAF MiRA's experience in this field enables us to offer the most appropriate solution to each customer while being well aware that this is a key sector in the development of railways, communications and business in the 21st century

CAF MiRA is in the forefront of innovation in Freight applications, with different projects in the pipeline with the following objectives:

- Weight reduction.
- Increased load capacity.
- Reduction of noise emission\*
- Reduction of operational costs.
- Digitalization.
- Safety.

We are part of Shift2Rail who has established the following objectives, fostering a modal shift in the EU transport network:

- Reduction of Green House Gases
- Improved services and customer quality until 2030.
- Market growth and modal shift.
- Cost reduction.

CAF MiRA has developed new designs that meet the objectives above:

- Light and Thermostable wheel (LiTheS).
- Ultra Load Wheel (uLLoW).
- Silent Wheelset (SiSet).



Discover our solutions in freight.  
Complete portfolio of solutions,  
including engineering, supply and  
service capacities.

# CAF MiiRA, your partner along the entire life-cycle

## Complete wheelset engineering:

CAF MiiRA has its own engineering department dedicated to developing different products to comply with specific needs and requirements of each customer. In addition to the latest development and simulation programs, CAF MiiRA has its own design tools, which enable it to offer the most complete service possible.

A highly qualified team works focused on improving and optimizing not only the projects but also the design and calculation methods used for them.

Belonging to CAF Group provides us with the required knowledge about in service performance of our products as well as the knowledge needed of the complete bogie system.

## Customer supply chain integration

The "Lean Manufacturing" strategy allows us to continually optimize eliminating waste with our skilled people and leveraging in our state-of-the-art facilities. Thus, we offer a high-value, competitive service with reduced lead times.

We respond to requests with the desired amounts and conditions, in the right place at the right time.

- Adaptation according to demand
- Minimum stock at the customer
- Small delivery batches
- Minimum lead time
- Fewer emergencies, with immediate attention and resolution
- Integration into the management system for customer traceability

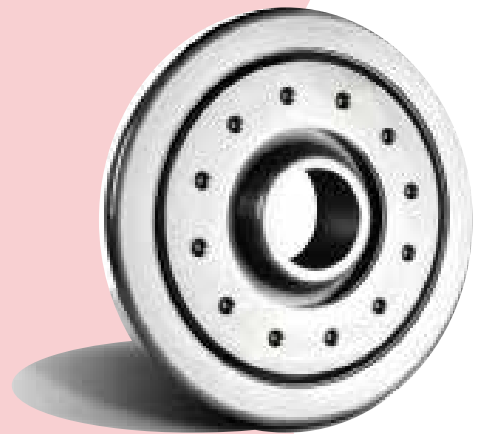


## Technological Assessment

CAF MiiRA is a world reference in the supply of critical and integrated solutions highlighted by a highly experienced engineering team and the provision of technology support adapted to each project.

We supply the following solutions:

- Analysis of requirements and identification of customized solutions.
- Assistance in the definition and/or improvement of existing designs.
- Definition of specific material 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.





# Integral maintenance services



**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)

# Wheelsets components

**CAF MiRA creates solutions that are sustainable, rapid, clear ad-hoc responses for each customer and each project.**

## Wheels & Axles

CAF MiRA has vast expertise in the design of wheels, axles and wheelsets. CAF MiRA'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.

## Gearboxes

With more than 50 years experience in gearbox design, manufacture and supply, CAF MiRA faces rolling stock upcoming challenges with a tailor-made customer approach, supported by a vast list of proven references.

Supported by unrivalled design, test and manufacturing capabilities, and our knowledge in complete wheelset systems, CAF MiRA gearboxes optimize life cycle cost, by means of light, reliable and low noise solutions.

Backed by strong Rolling Stock Group, a worldwide service net gets us closer from customers.



Discover our wheels and axles solutions.



Discover our gearbox solutions.



# References

Satisfied clients

- Locomotives



**CAF**  
Sar Push-Pull

Supply of complete wheelsets with CAF MiiRA's wheels, axles and gearboxes

A technical diagram showing a cross-section of a wheelset and its axle. It includes a circular wheel on the left, a central axle, and a gear assembly on the right. The diagram is overlaid on a semi-transparent red circle.

**CAF**  
BITRAC Platform

Supply of complete wheelsets with CAF MiiRA's wheels and axles

A technical diagram showing a cross-section of a wheelset and its axle, similar to the one above. It is overlaid on a semi-transparent red circle.

**DASH 9**

Supply of complete wheelset with CAF MiiRA's Wheels, axles and gearboxes.

A technical diagram showing a cross-section of a wheelset and its axle, similar to the others. It is overlaid on a semi-transparent red circle.

◦ Freight wagon operator



Transfesa  
wagon fleet

Supply of complete wheelsets including  
maintenances services for different  
Wagon's of their fleet



HUPAC  
wagon fleet

Supply of wheels including  
maintenances services for different  
Wagon's of their fleet



SAR  
dessert wagon

Supply of wheelsets with  
CAF MiiRA's wheels





• High speed



**CAF**  
OARIS Platform Flytoget  
Supply of complete wheelsets with  
CAF MiiRA's wheels, axles and gearboxes

A technical diagram showing a wheelset and axle assembly. It includes a circular wheel with a central hub, a horizontal axle, and a cross-section of a gear or axle component.

**CRRC**  
Changchung  
Supply of wheelsets with  
CAF MiiRA's wheels and axles

A technical diagram showing a wheelset and axle assembly, similar to the one in the first block, but with a red background.

**Talgo**  
AVRIL II Platform - Renfe  
Supply of CAF MiiRA's wheels and axles

A technical diagram showing a wheelset and axle assembly, similar to the others, with a red background.

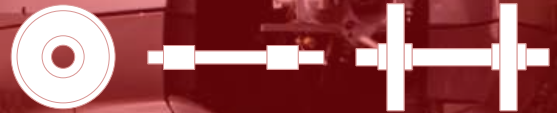


◦ Commuter and regional trains



Bombardier-  
Alstom PhD - SNCF

Supply of wheelsets with  
CAF MiiRA's wheels and axles



CAF  
CIVITY Platform - NS

Supply of complete wheelsets with  
CAF MiiRA's wheels,  
axles and gearboxes



SNCF  
Regiolis





## ◦ Metro



CAF  
WMATA

Supply of CAF MiiRA's wheels



CAF  
Metro Helsinki

Supply of CAF MiiRA's  
auxiliary wheels and gearboxes



CAF  
Metro Madrid

Supply of CAF MiiRA's wheels and axles



## Trams



### CAF Freiburg

Supply of complete motor wheelsets  
with CAF MiiRA's resilient  
wheels and gearboxes



### CAF Houston

Supply of CAF MiiRA's  
auxiliary wheels and gearboxes

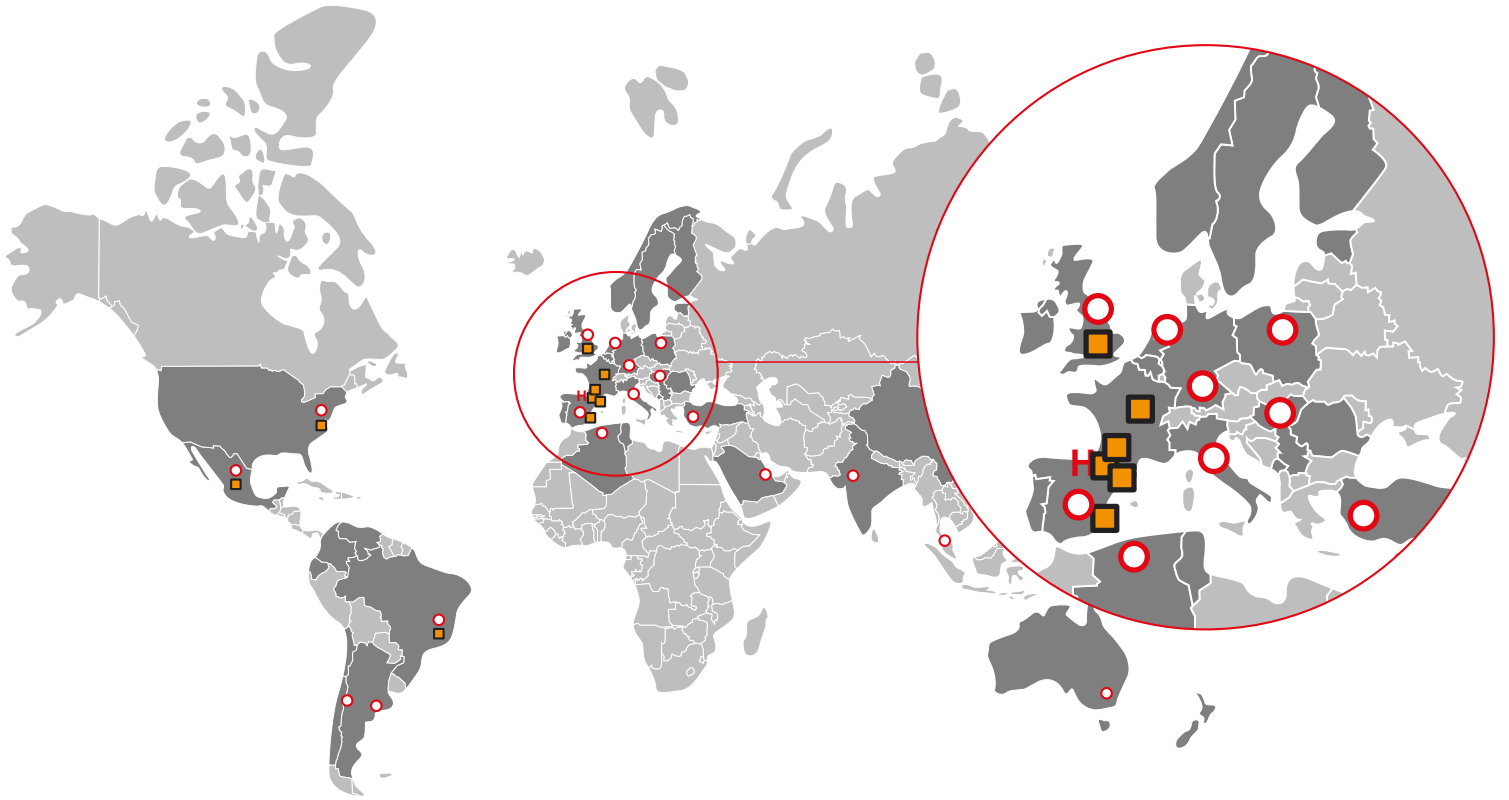


### CAF Budapest

Supply of CAF MiiRA's 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



J.M. Iturrioz, 26  
 20200 Beasain  
 Gipuzkoa - Spain  
 T: +34 943 028 660  
 F: +34 943 189 120

miira@caf.net  
[www.cafmiira.com](http://www.cafmiira.com)