

Creating a world
fit for the future



Introduction to Ricardo Rail

Helping you build railways fit for the future

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The Ricardo group

- We are a global, multi-discipline consultancy and niche manufacturer of high-performance products.
- Our work extends across a range of market sectors, including commercial vehicles, rail, defence, motorsport, power generation and government.
- Everything we do remains committed to the ethos of our founder, Sir Harry Ricardo, who set out in 1915 on a mission to '*maximise efficiency and eliminate waste*'.

Over 3,000 engineers
consultants and scientists
across 20 countries



Our service portfolio



Assurance and certification



Energy consulting



Engines



Environmental consulting



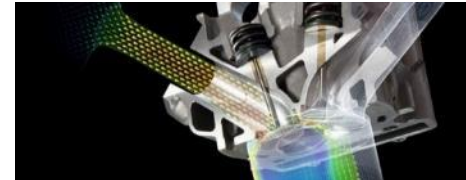
Hybrid and electrical vehicles



Knowledge and training



Niche manufacturing



Software



Strategic consulting



Testing



Transmissions and drivelines



Vehicle engineering

Our clients and market sectors

 <p>Automotive</p>	 <p>Rail</p>	 <p>Energy & Environment</p>	 <p>High Performance & Motorsport</p>
 <p>Commercial Vehicles</p>	 <p>Motorcycle</p>	 <p>Defence</p>	 <p>Off-Highway Vehicles</p>

Global locations

North America

250+

UK

1800+

Germany,
Netherlands
and rest of the EU

600+

Asia
and rest of the World

300+



Ricardo in the rail sector

We are rail industry specialists within the Ricardo group working to ensure that communities around the world are served by safe, resilient, high-performance railways.

Our expertise lies in understanding the complex and critical systems that underpin an efficient rail service, providing clients with all the technical skills and insight necessary to navigate the sector's operational, commercial and regulatory demands.



Experts in critical and complex railway systems

By combining a deep understanding of the rail environment with specialist knowledge of its most critical technologies, we provide responses that deliver tangible outcomes for our clients and their stakeholders.

Systems engineering

Multi-disciplinary expertise that cuts across traditional industry silos.

Design and analysis

Expertise in producing cost-efficient responses to complex engineering challenges.

Asset management and optimisation

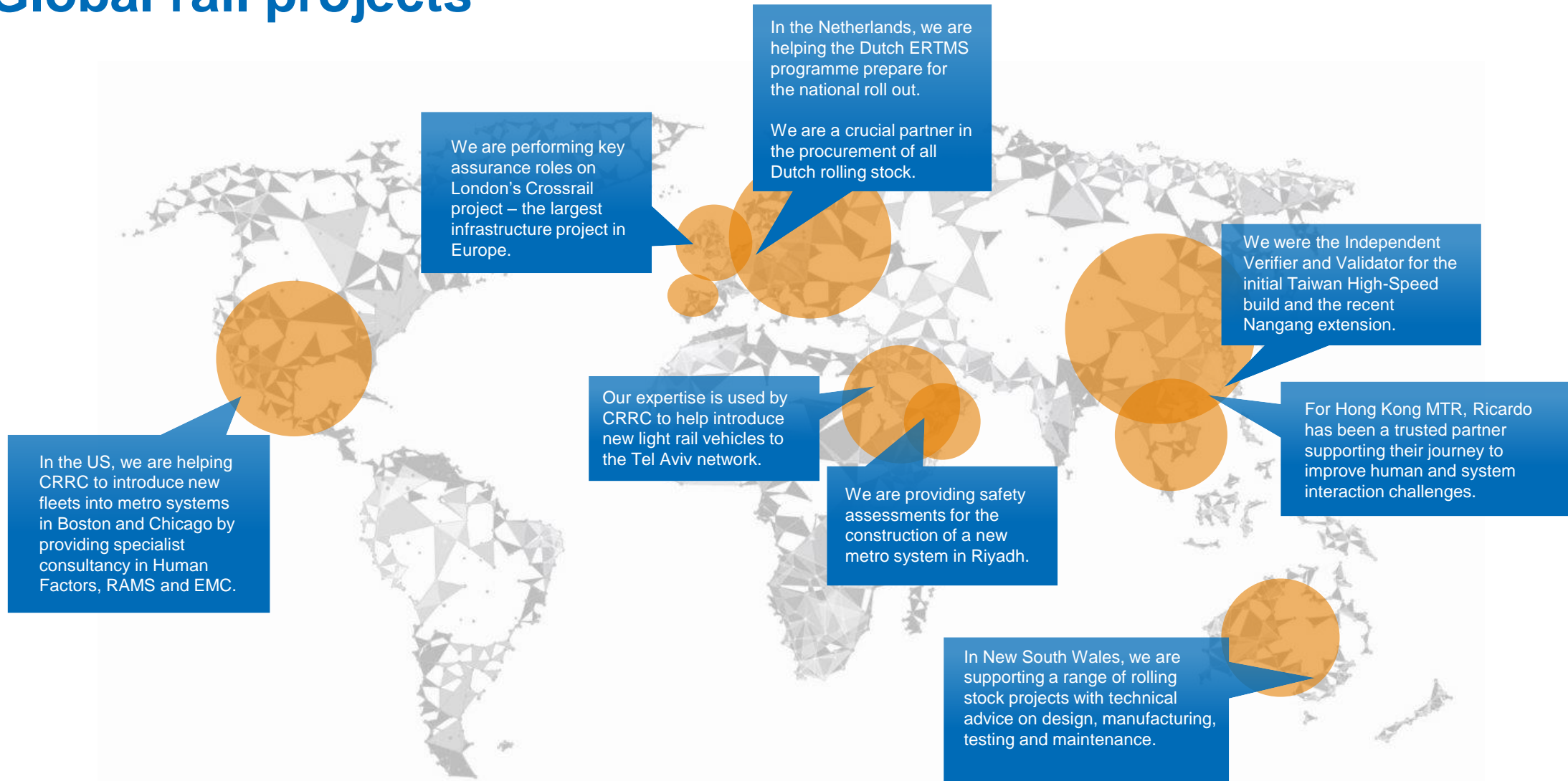
Specialist processes and technologies to improve efficiency across rail operations.

Independent assurance

Timely approvals for rail components, products and entire systems.

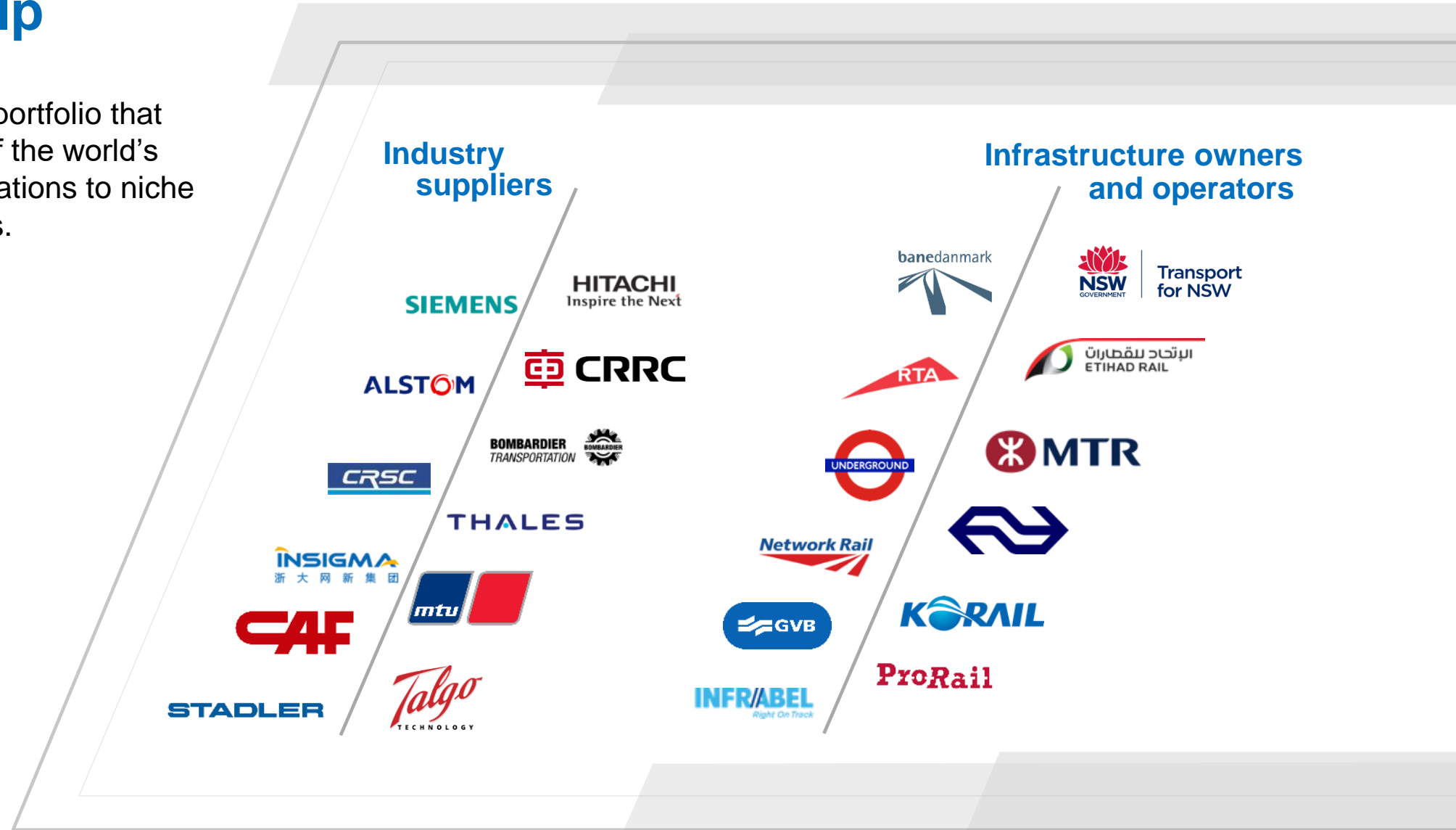


Global rail projects



Who we help

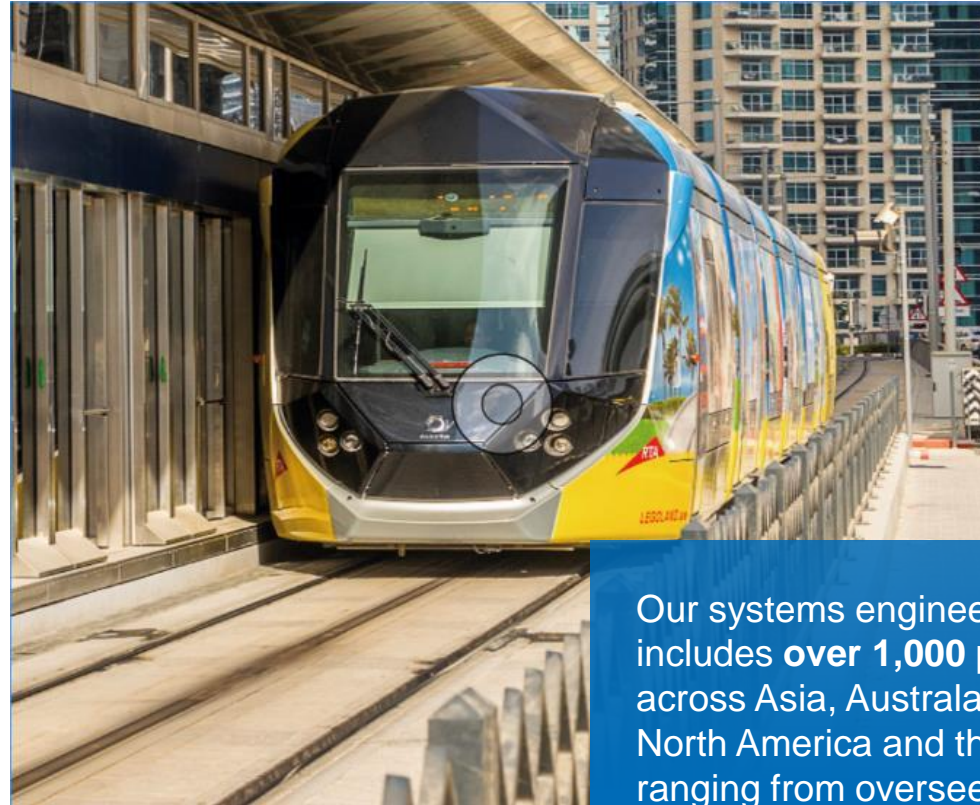
We support a client portfolio that ranges from some of the world's largest rail administrations to niche component suppliers.



Systems engineering

Multi-disciplinary expertise that cuts across traditional industry silos.

- Project management
- Procurement and tender support
- Requirements management
- Configuration management
- Digital resilience
- Supplier quality assurance
- Functional safety
- Reliability, Availability and Maintainability (RAM)
- Human factors
- Software assurance
- Noise and vibration
- Electromagnetic compatibility
- Fire engineering
- Investigative testing



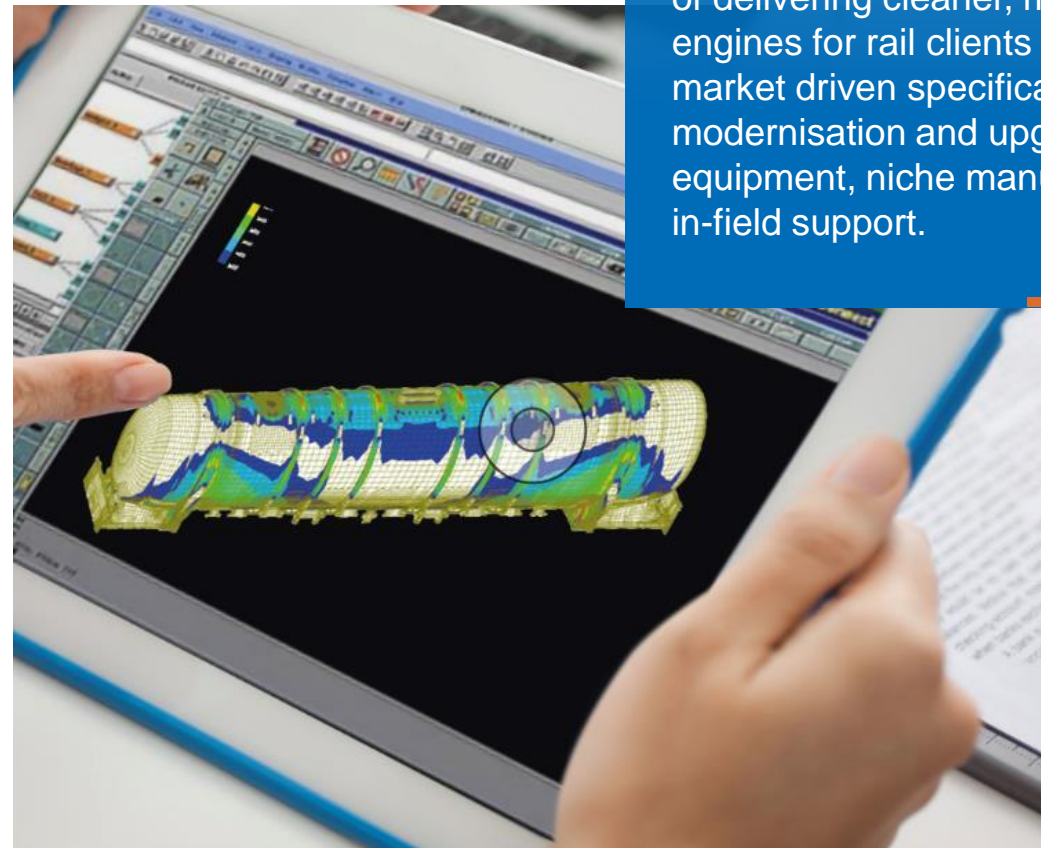
Our systems engineering portfolio includes **over 1,000 projects** across Asia, Australasia, Europe, North America and the Middle East, ranging from overseeing the introduction of new rolling stock into service through to the construction of entire rail systems.

Design and analysis

Our award-winning design and engineering teams provide a range of services aimed squarely at helping clients to improve operational efficiencies.

- Project engineering
- Mechanical engineering
- Structural analysis
- Electrical engineering
- Signalling product development
- Technology market review
- Mechanical design
- Weight analysis
- Electrical design
- Train control and automation
- Gauging and dynamic analysis
- Control centre systems
- Design verification and validation

We have **over 50 years** experience of delivering cleaner, more efficient engines for rail clients including market driven specification, modernisation and upgrade of equipment, niche manufacture and in-field support.

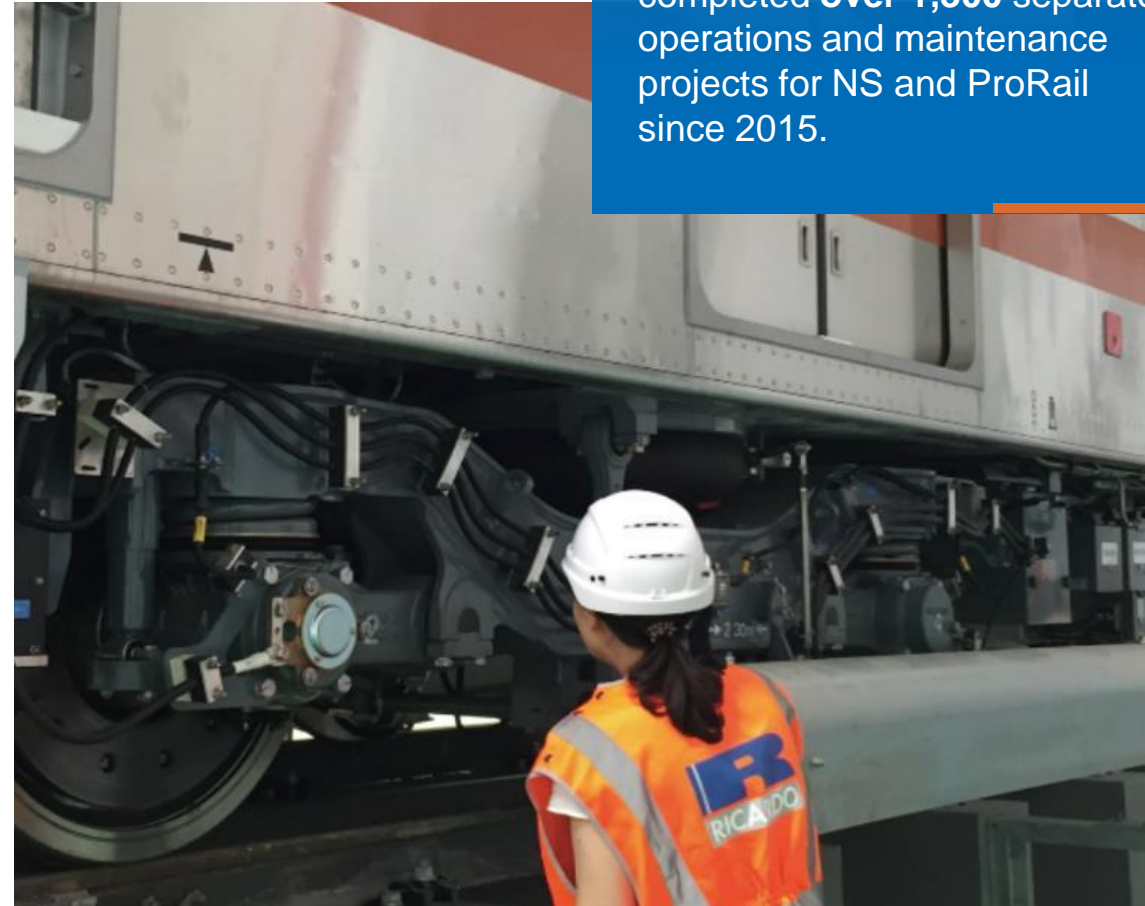


Asset management and optimisation

Specialist processes and technologies to improve efficiency within rail organisations.

- Management systems
- Energy management
- Low-carbon technology assessments
- Operations scheduling
- Lifecycle cost management
- Maintenance support
- Restructuring and reorganisation
- Asset condition and performance
- Risk management
- Vehicle-track interfaces
- Complexity management
- Asset renewals
- Change management
- Rail data consultancy

In the Netherlands, we have completed **over 1,300** separate operations and maintenance projects for NS and ProRail since 2015.



Assurance

Whether certifying new technologies or assessing entire rail systems, we offer an extensive portfolio of independent assurance services.

- Independent Verification and Validation
- System verification engineering
- Software assurance
- Asset management
- Auditing
- Assessment Party (UK, non-accredited)
- Independent Safety Assessment(non-accredited)
- Independent Competent Person

Accredited assurance

- Notified Body
- Designated Body
- Assessment Body
- Assessment Party (UK, accredited)
- Railway Product Certification
- Plant Assessment Body
- Independent Safety Assessment (accredited)



In Asia, we have certified **over 200** signalling and rolling stock products and **50** new metro, urban and high-speed lines throughout the region.



Hitachi Rail Europe

Intercity Express Train 2012-2018

Ricardo provided technical support throughout the development of the bi-mode Intercity Express Train serving the west of England, including safety case and risk assessments, infrastructure compatibility, RAM assessment, EMC consultancy, Human Factors and Fire Safety. Our expertise enabled the new vehicles to enter into service from autumn 2017, with adapted sets for coastal regions following later.

평창 Pyeongchang 平昌

Gangneung high-speed line *Safety Assessments 2016-17*

Ricardo performed the required safety assessments of the Automatic Train Protection system installed on a 60km section of a new high-speed rail line from Seoul to the 2018 Winter Olympic venues around Pyeongchang. Through on-site audits and detailed document reviews the team worked to ensure the technology was fully compliant with technical standards.





WEpod

Safety management 2016

We supported the public demonstration of this six-seater automated vehicle by helping to prepare the Safety Case necessary to obtain authorisation from the Dutch national vehicle authority, enabling the WEpod to operate alongside regular traffic.

Budapest-Belgrade high-speed *Notified Body 2018-2022*

Ricardo Certification is the appointed Notified Body for the 184km section of the high-speed route between Belgrade and the border with Hungary. Our experts will act as an independent third-party, conducting verification activities throughout the project's planning, construction and testing.





Beijing Maglev *Safety Assessments 2016-17*

As the appointed Independent Safety Assessor of the signalling technology for Beijing's first ever maglev line, our team undertook a series of expert assessments and audits to ensure it was ready for operation.