Rail Services

- Independent assurance
- Technical consulting
- Performance engineering
Every journey safe, reliable and sustainable

We are a global consultancy providing technical expertise and specialist engineering services to help clients navigate the rail industry’s operational, commercial and regulatory demands.

With extensive experience across all key disciplines, from rolling stock, signalling and telecommunications, to energy efficiency, safety management and operational planning, we support a client portfolio that ranges from some of the world’s largest rail administrations to niche component suppliers.

And whether providing strategic counsel in the boardroom or implementing new safety-critical technologies with frontline teams, our commitment is the same: expertise that is informed and impartial; responses that are as pragmatic as they are impactful; and innovations that enhance rail’s reputation as a safe, reliable and sustainable mode of transport.
The cornerstone of our business is the quality and diversity of professional backgrounds, disciplines and outlooks that our people offer. Within our teams are rail experts who are regarded as among the best in the world within their field. They are specialists who understand the industry’s structures and idiosyncrasies every bit as much as the standards and practices that underpin it. Alongside them are those we have attracted to the sector from other walks of life – government, academia and science – as well as colleagues who offer insight from Ricardo’s work in areas such as motorsport, environmental regulation and clean energy generation. Binding us together is a shared value of being free to offer trusted expertise. Write a natural home for professionals who want to see things done properly; who believe it is their responsibility to anticipate problems and deliver tangible results.

We offer a unique mix of operational, technical and strategic expertise, coupled with access to world-leading engineering facilities.

**Independent assurance**
- Independent verification and validation
- System verification engineering
- Independent safety assessment
- Assessment Party (UK)
- Product certification
- Software assurance
- Asset management
- Auditing
- Notified Body and Designated Body
- Assessment Body
- Plant Assessment Body

**Technical consulting**
- Safety case development
- CSM risk management
- Human factors
- Technology migration
- Procurement support
- Project management
- Energy efficiency
- Incident investigation
- Fleet performance
- RAMS
- Condition monitoring
- Corporate strategy
- Environmental Impact Assessment
- Future trend modeling

**Performance engineering**
- Complete system optimisation
- Niche manufacture and assembly
- Engines
- Driveline and transmission systems
- Hybrid and electric systems
- Vehicle engineering
- Noise, vibration and harshness (NVH)
- Electromagnetic compatibility
- Vehicle and infrastructure testing
- Wheel-rail interface
Our clients include:

Alstom Transport
Angel Trains
Banedanmark
Beijing Metro Construction Company
Bombardier
CAF
Canadian National Railway
CRCC
CRSC
CRRC
Crossrail Limited
Deutsche Bahn
Danske Statbaner (DSB)
Eshad Rail
Go-Ahead
GVB (Amsterdam)
Hitachi
HTM (The Hague)
Hyundai Rotem
Infrabel
Inversys
Insignia Rail
KORAIL
Korea Railroad Research Institute (KRRIR)
London Underground
LSG
Metro de Madrid
Mitsui
MTR
MTU
Nacco SAS
Network Rail
NS Group
POSCO Engineering and Construction
ProRail
Qatar Railways Company
RailCorp
RET (Rotterdam)
Roads and Transport Authority, Dubai
Riyadh Metro
Scomi Engineering
Siemens
Taiwan High Speed Rail Corporation
Thales Group
Virgin West Coast
Voith

Who we help

Riyadh Metro
ISA for 175 km driverless system

As the Independent Safety Assessor (ISA), Ricardo will deliver the necessary assessments to provide Riyadh’s government agency with confidence that the new Riyadh Metro system will operate safely upon its opening in 2018.

Scomi monorail transmission
Driveline design and manufacture

Scomi Rail required an integrated upgrade of their monorail driveline to increase performance and durability. Working from a blank sheet, we provided the design, development and manufacture of the first prototypes in just six months. Our solution delivered significant performance improvements in terms of weight reduction by 25% and endurance/reliability, which allowed for an upgrade from 170kW to 260kW.

KORAIL
Safety management system review

On behalf of South Korea’s national operator, KORAIL, we provided an international team of experts to manage an extensive review of the Safety Management System for its high speed routes, establishing the extent to which the current SMS was understood and implemented. We also provided recommendations on specific SMS documentation for rolling stock, infrastructure and power supply.

PanMon
Condition monitoring

Our pantograph monitoring technology, PanMon, has been approved for use across the UK by the national infrastructure manager, Network Rail. The product approval was the result of a successful two-year trial where the system proved itself capable of providing continuous measurements of pantograph defects and uplift forces from trains passing at speeds of up to 125mph.

NS Dutch Railways
Rolling stock procurement support

In 2015, Ricardo’s design review team provided procurement support for the new fleet of Stadler’s FLIRT FastForward vehicles – an EMU designed for suburban and regional operations – ensuring that requirements set by NS Dutch Railways were met, and enabling handover of the first sets to take place on schedule, one year later.
Independent assurance

Like many safety-critical sectors, railways have important stakeholders – governments, regulators, investors and passengers – who expect a degree of expert oversight on issues related to safety and quality.

Whether certifying new technologies or assessing entire rail systems during construction, 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)

Through Ricardo Certification, which operates as a separate and entirely independent business within the Ricardo group, we also provide an extensive range of accredited services, including:

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

For more information about our independent certification services, see certification.ricardo.com

Cooperation not instruction

We never compromise on safety. But neither do we try to catch projects out or demand excessive documentation.

Our expertise of the regulatory environment enables us to identify relevant legislation, both upcoming and new, and interpret it for application to projects. This helps us to work with project managers to ensure an efficient assessment process.

Example projects:

Al Sufouh Tram
Beijing Subway Line 8 Signalling
Crossrail
Danish Signalling Programme
Etihad Rail
European Rail Freight Corridor C
Dubai Metro
HSL – Zuid
Korean Radio-Based Train Control System (KRTCS)
Masdar City Personal Rapid Transit
Mecca Metro
Qatar Rail
RandstadRail
Riyadh Metro
Shinbundang Line (Seoul)
Shenzhen Metro Line 3 Signalling system
Taiwan Airport Link
Taiwan High Speed Rail Corporation

Independent Safety Assessment
Independent Safety Assessment
Notified Body and Designated Body
Independent Safety Assessment and Notified Body
Independent Safety Assessment
Notified Body
Independent Safety Assessment
Independent Safety Assessment
Independent Safety Assessment
Independent Safety Assessment
Safety Verification Engineer Certification
Independent Safety Assessment
Independent Safety Assessment
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Rolling stock

A range of technical services, including design and engineering, aimed squarely at helping rail businesses maximize the performance of their fleet.

Engine and driveline production
Ricardo is a world leader in engine and driveline design and development, with few others able to match our skills, experience and application of the very latest technological innovations.

We have over 50 years’ experience of delivering cleaner, more efficient engines for rail clients and today we offer a complete range of bespoke engine solutions across the full product life cycle, including market-driven specification, modernisation and upgrade of equipment, niche manufacture and in-field support.

Using in-house facilities, we can design, test and manufacture complete rail drivelines and transmissions under one roof, with a proven record of producing drivelines that are at once lighter, quieter and more efficient, yet also more powerful and durable.

Design and engineering
Our award-winning design and engineering team has a proven record of delivering innovative, cost-effective solutions across all forms of rolling stock. Previous assignments have included multiple units, locomotives, coaches and freight vehicles, ranging from full bodyshell design to interior refurbishments.

We also design bespoke components and sub-systems such as bogies and under-frame equipment, and have experience of engineering complete turnkey projects, ranging from powerpacks for DMUs through to large locomotive engines.

Quality assurance
We provide various audit and inspection services to ensure quality standards are maintained throughout the design and build of new rolling stock or fleet refurbishments, as well as during ongoing life cycle maintenance programmes.

Noise, vibration and harshness
As experts in noise and vibration within the rail environment, our knowledge of standards and regulations (TSI, ISO standards, codes for environmental impact) ensures compliance with requirements under all circumstances.

Services include design advice, measurement, prediction modelling and troubleshooting.

Inspection and certification
Separate to our design capabilities, we also independently certify new build, upgrades and renewals of rolling stock against a range of legal requirements and technical specifications.

Ricardo Certification, which operates as a separate and entirely independent business within the Ricardo group, provides a range of accredited assurance services for the rail market, including:

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

For more information about our accredited certification services, see certification.ricardo.com
Signalling and train control

Advice and assurance services for safety-critical technology.

We provide a range of specialist advice and assurance services for the signalling and communications realm.

In Asia, we support the introduction of new signalling technologies through our product certification services and provide technical support and independent assessment for projects ranging from urban metros to high speed lines.

In Europe, we assist infrastructure managers during the introduction of ETCS and GSM-R and are at the leading edge of ERTMS knowledge.

We are also a leading independent safety assessor of signalling systems and sub-systems, having certified over 20 different metro systems around the world, the majority of which involve CBTC technology.

Independent assurance
We help infrastructure owners and train operators ensure and demonstrate that their systems meet relevant regulatory and contractual requirements.

We operate schemes that validates compliance with standards such as EN50129 (safety case), EN50126 (RAMS), EN50128 (software), EIRENE (GSM-R) and the European Railways (Interoperability) Directive. We ensure that all projects, where judged as ‘significant’, comply with the Common Safety Method risk management regulations referenced by the EN Railway Safety Directive, or alternatively follow recognized guidance on Engineering Safety Management, such as iESM.

We can also provide confirmation that the design and construction of signalling and telecommunications systems meet required codes and technical specifications and, where mandated by regulation, issue certification of the operational suitability of assets.

Technical support
Our experts also provide a wide range of technical guidance and project management support including:

- Advice on migrating legacy systems to ETCS and CBTC
- Development of technical safety arguments and Safety Cases for modified technology
- Business planning support and review
- Feasibility analyses, tender preparation and contracting
- Advice on relay-based and solid state interlocking applications
- Application engineering for novel systems and equipment
- Project engineering support for resignalling schemes
- Human factors
- Signalling infrastructure condition assessment
- Asset management
- GSM-R communications
Operations

From small local operators to global manufacturers, we provide technical and strategic support across every aspect of their organisations.

Human factors
We undertake a range of specialist human factors work tailored for the rail sector. This includes workplace design assessments, evaluation of working methods and determining the psychological and physiological impact of new procedures.

Safety management
We help design and implement organisation-wide safety management systems, carrying out the necessary safety and risk analyses. We also advise on the implications of the European Common Safety Method on Risk Assessment and Evaluation (CSM-RM).

Safety engineering, risk management and RAM
We develop risk assessments, safety management systems and RAM studies covering anything from single products to entire railways.

Electromagnetic compatibility
Electromagnetic compatibility (EMC) is an area of significant interest as it can lead to system breakdowns, reduced reliability and degraded safety standards. Our EMC specialists work alongside safety engineers to ensure issues are appropriately addressed.

Track consultancy
Our infrastructure team specializes in track-related issues – including switches and crossings – and provides assurance, advice and condition-monitoring services for heavy and light rail systems all over the world.

Fleet maintenance
Intelligence-led maintenance can significantly improve fleet availability. We work with clients to help improve existing processes through a mix of good practice and by making the best use of diagnostic readings provided by fault detection and asset monitoring systems, amongst others.

Asset management
We offer a wide range of asset management services, from those of an overarching strategic nature to detailed advice for specific assets.

Energy efficiency and environmental impact
Ricardo’s internationally renowned environmental practice provides advice and analysis for governments, operators and vehicle manufacturers across the world, helping the transport sector to reduce emissions and adopt cleaner working practices and technologies.

Available support covers the full corporate sustainability agenda, from implementing organisation-wide energy efficiency programmes to supply chain analysis, economic modelling, environmental impact, corporate behavioural change and stakeholder engagement.
Strategic consulting

Senior executive support for a complex and changing world.

Ricardo’s strategic consultancy practice offers an extensive portfolio of corporate advisory services to help senior executive teams address high-impact issues and resolve operational problems at every stage of the value chain.

The majority of our consultants are qualified engineers with executive-level experience within the transport sector, whilst our environmental and energy advisers are at the forefront of policy creation and programme delivery for a range of governments and multinational organisations.

Unlike ‘pure’ management consultancy brands, this enables us to offer advice and analysis informed by direct industry and regulatory experiences.

Clients include transport operators, manufacturers and financial and government institutions, and our assignments range from acquisitions and post-merger integration support, through to designing business turnaround programmes, modelling of future transport trends and resource scarcity impact assessments.

In the rail sector specifically, we have helped clients undertake local market audits, challenge supplier costs structures, reform procurement programmes and review internal safety processes.

Services include:
- Business strategy
- Market entry
- Corporate sustainability programmes
- Economic impact assessments
- Commercial due diligence
- Regulation and policy
- Quality and High Value Problem Resolution (HVPR)
- Integrated cost reduction and operations improvement
- Mergers and acquisitions
- Low carbon technology assessments
- Regulatory compliance, planning and risk management
- Sale of non-core business units
- Modelling of future transport trends
- Resource scarcity impact assessments
Intelligent Rail

Our Intelligent Rail concept is about helping clients extract tangible benefits from real-time data monitoring.

Intelligent Rail is a ‘one-stop shop’ that extends from the design and provision of measurement technologies to the analytical expertise needed to extract maximum value from your data.

Our experts collate and prioritize the diagnostic readings, and turn them into meaningful intelligence reports that can provide an evidence base for introducing change across an organisation, whether for operational (e.g. advising drivers and mechanics), tactical (e.g. performance analyses) or strategic (e.g. KPI management) purposes.

Whatever obtaining a quick snapshot of individual asset performance, or instigating longer-term efficiency drives across an organization, Intelligent Rail is about connecting real-time monitoring data to the delivery of tangible operational improvements.

What can be measured?

- Wheel defects
- Noise
- Vehicle maintenance
- Incident prevention
- Track quality
- Automatic vehicle identification
- Access charging
- Pantograph condition
- Axle bearing monitoring
- Ride comfort
- Overhead voltage
- Weighing in motion

SmartFleet

SmartFleet uses data captured from operational rolling stock to help improve the efficiency and availability of the fleet. The SmartFleet Operate dashboard, for example, provides up-to-date overviews of current faults and alerts, whilst the Analytics dashboard delivers important performance trend information and assists in detecting anomalies in train systems.

PanMon

Our pantograph monitoring module can examine both uplift forces and pan head condition. Using a combination of radar, laser, optical and flash technology to capture high-definition images of pantographs on passing trains, we can provide real-time measurement of the condition and wear of the carbon strip, and the status of end horns and aerofoils.

InfraMonitoring

InfraMonitoring uses sensors and data-loggers installed onboard routine passenger trains to monitor track quality. By using regular traffic to collect measurements, we can gather track data under realistic conditions, providing access to richer, more frequent data to continuously monitor track conditions rather than merely detecting faults that have already occurred. This approach is also proven to be more cost-effective per kilometre than deploying specialist measurement vehicles.
The Ricardo group

Maximise efficiency. Eliminate waste.

A global engineering, consulting and performance products business that specialises in the transportation, energy and scarce resource sectors.

Our work extends across a range of market sectors – such as passenger cars, commercial vehicles, rail, defence, motorsport, power generation and government – and we are proud to possess a client list that includes transport operators, manufacturers, energy companies, financial institutions and government agencies.

Through our multi-industry knowledge and deep technical expertise, we are uniquely positioned to handle our clients’ toughest strategic and operational challenges, with assignments that have included strategy development, cost reduction, safety management, regulatory compliance and environmental impact assessments.

Meanwhile our in-house engineering capabilities enable us to provide high-quality prototypes and low-volume manufacturing of complex products and assemblies, including engines, transmissions, electric motors and generators, battery packs and fuel cell systems.

Yet across everything we do, in every assignment we undertake, we remain committed to the ethos of our founder, Sir Harry Ricardo, one of the most innovative mechanical engineers of his time, who in 1915 set out on a mission to maximise efficiency and eliminate waste.