



RAIL SERVICES

Global capability.
Local expertise.



01

TÜV Rheinland

This is us.





We ensure quality & safety

INDUSTRIAL SERVICE & CYBERSECURITY

- Pressure Equipment
- Elevators & Lifting Equipment
- Electrical Engineering & Building Technology
- Industrial Inspection & Materials Testing
- Infrastructure & Project Supervision
- Energy & Environment
- Cybersecurity & Functional Safety

MOBILITY

- Periodical Technical Inspection
- Driver's License
- Car Services & Appraisal
- Engineering & Type Approval
- **Rail**

5 BUSINESS STREAMS

PRODUCTS

- Softlines
- Hardlines
- Electrical
- Solar & Commercial Products
- Medical

24 BUSINESS FIELDS

ACADEMY & LIFE CARE

- Occupational Health & Safety
- Training & HR Development
- Labour Market Services
- Digital Transformation

SYSTEMS

- Certification of Management Systems
- Customized Services
- Government Inspections & International Trade



OUR SERVICES IN A SNAPSHOT...

TÜV Rheinland Group

5

business streams

2,1

EUR billion annual
sales

21.400

employees
worldwide

TÜV Rheinland Rail

20

countries with rail
engineering offices

40

rail engineering
offices

400

rail experts –
number increasing

02

Service

This is what we offer.



Expertise in Rail and Transportation Technology

Assessment & Certification Integrated Systems

Market Leader in Assessing Integrated Systems (Driverless)

ISA – Independent Safety Assessment of systems

- Trams, LRVs, people mover, monorails, metros
- Safety concepts such as evacuation & rescue, tunnel safety concept and fire protection concept, operation and maintenance, commissioning and testing
- Sub-systems, e.g. Platform Screen Doors, signaling, train control CBTC, rolling stock
- Automated / driverless operations

IVV (Independent Verification & Validation)

ICE (Independent Checking Expert)

Assessment of RAMS, functional safety, hardware and software

Assessment and auditing of development processes and management systems

Test-witnessing (type test program, functional tests)

Inspection, assessment and certification according to specifications

Assessment of IT safety in rail applications

Bases are ISO 9001, IRIS, CENELEC EN 5012x and other regulations, e.g. BOStrab, specific national standards

Expertise in Rail and Transportation Technology

Assessment & Certification ERTMS and Signalling

Supporting the Evolution in Signalling

Assessment of ERTMS-components according to TSI CCS

- Inspection of documents
- Auditing of quality management systems
- Inspection
- Test-witnessing

ISA – Independent Safety Assessment of products

- Safety components, control systems, level crossings
- Signalling, train control systems
- Generic and Specific Applications

Assessment of notified national technical rules (NNTR) of train control systems (rail and trackside)

Safety Assessment of ERTMS components (rail and trackside) according to CENELEC (e.g. EN 50126)

Evaluation and assessment of ERTMS components according to CSM-RA

Assessment (EBA) of Software (e.g. EN 50128) in the process of approval of rolling stock

Expertise in Rail and Transportation Technology

Assessment & Certification Rolling Stock

Rolling Stock on Fast Track: Ready for Certification!

EC testing of products and systems according to the TSI: LOC & PAS, WAG, NOI, PRM and SRT

- Wheels, wheelsets, brake components, couplings, toilets
- Traction units, locomotives, passenger vehicles, freight wagons, special vehicles

Verification of the national requirements for commissioning of vehicles

- DeBo in D, DeBo in F, UK, NL, A, CH, PL, CH

ISA – Safety assessment of subsystems according to CENELEC and BOStrab

Independent evaluation of the risk management procedure according to the common safety method (CSM-RA)

Verification and evaluation for functional safety and RAMS

Evaluation and monitoring of management systems (ISO 9001 / IRIS)

Audits for safety authorities (EBA / TAB)

Monitoring and realization of tests (type tests and functional tests) as well as noise measurements and tests (ISO / IEC 17025)

Expertise in Rail and Transportation Technology

Consulting Asset Management & Evaluation

Quality Assurance and Value Protection for your Assets

Evaluation of accidents as well as determination of the causes and supervision of repair

Technical Controlling for Rolling Stock Leasing Companies and Financiers

- Techno-commercial contract design
- Structured reviews of asset condition and maintenance adequacy over the life cycle
- Hand back condition assessments

Warranty management and claim arbitration

Process optimization, contract controlling, requirements management

Asset Assessment and Valuation

- Condition, residual value and outlook
- Vehicle inspections and accident appraisals
- Residual value appraisals

Quality Assurance

- Supervision of manufacturing & maintenance
- Commissioning
- Asset Management

Expertise in Rail and Transportation Technology

Consulting Procurement Support & Sourcing Strategies

Global Sourcing for Local Excellence

Asset Procurement , PPP, Franchising & Concessioneing support

- Market research and industry dialogue
- Vendor Due Diligence
- Preparation of process and documents
- Techno-commercial contract design
- Requirements Management
- Management of Q&A process
- Negotiation support / award recommendation

Procurement strategies

- Fleet & asset strategies incl. LCC and RAMS aspects
- Global sourcing strategies, supply chain and supplier analysis
- Make-or-buy analysis
- Portfolio analysis and strategy (i.e. despecification, bundling, substitution etc.)
- Re-engineering of tender or general procurement procedures

Supplier management and audits

Expertise in Rail and Transportation Technology

Consulting Operation and Maintenance

Maintain your Future Potential

Depot & workshop strategy

- Distribution of maintenance services to the workshop sites
- Make-or-buy analysis
- Benchmarking of processes, organisation, costs, methods

Lean management

- Optimisation of operational and organisational structure , controlling and transparency
- Analysis and optimisation of maintenance IT systems
- Holistic implementation of LEAN and change management

Maintenance optimization

- Development and optimisation of maintenance concepts
- Fleet strategy „new procurement vs. refurbishment“
- Analyses of reliability and cost drivers

Spare parts management

- Concepts for Spare Parts Management and storage organisation
- Material flow analysis and realisation of JIT concepts
- Definition of spare parts packages for maintenance cycles, repairs...

Management systems

- Analysis and implementation of SMS (RL 2004/49/EG)
- Support with ECM implementation (VO 445/2011)

Expertise in Rail and Transportation Technology

Consulting Safety in Rail

Safety first! Supported by Proven Experts Worldwide

Safety Management

- Process definition
- Planning of safety activities, e.g.:
 - safety plan
 - safety assurance concept
 - safety analyses
 - safety case production
 - certification process
- Monitoring of safety process
- Definition of methods and tools and documentation of results
- Implementation of safety management process and/or provision of personnel / safety manager role
- Safety standards training

Safety Engineering

- Safety case compilation
- Performing and documenting safety analyses, e.g.:
 - hazard analysis
 - risk analyses
 - FMEA / FMECA
 - FMEDA
 - FRACAS
 - OSHA
 - SAC
 - Hazard Log
 - FTA
- Development of a “safe” system architecture or hardware design
- Planning and implementation of standard conformant processes (system, hardware, software)
- Provision of personnel

RAM Engineering

- Planning of RAM activities within the lifecycle model
- Performing and documenting RAM activities, e.g.:
 - reliability prognosis and modelling (RBD)
 - RCM
 - maintainability
 - LCC analysis
 - identification and interpretation of field data
 - design of LCC
 - design to cost analysis

Requirement Management

- Requirement specification process
- Requirement traceability

Expertise in Rail and Transportation Technology

Consulting Infrastructure

Infrastructure

Technical and economic studies for high-speed railways, conventional and light rail systems

High experienced support of approval and procurement procedures

Feasibility studies for rehabilitation of railway lines

Maintenance and operation concepts, manuals and planning as well as asset management

Track Inspection, Condition Assessment & Supervision

Inventory and evaluation of rail infrastructure

Determination and evaluation of investment, maintenance and operating costs, life-cycle cost and RAMS analysis for infrastructure

Serving as ICE (Independent Checking Engineer), IVV (Independent Verification Engineer) or Lenders Engineer

Definition of quality requirements (specifications) and monitoring the quality process

Design check / verification and design management

Scheduling and cost control

PMC: Interface Management, Project Coordination

Our Range of Services

Design Support

- Concept to detailed design
- Bespoke design solutions
- Vehicle modifications
- On-site support
- System Integration
- Close relationship with manufacturing partners
- Trusted associates

Engineering Support

- Full vehicle bodyshell structural analysis
- Components & subsystems
- Linear
- Non-Linear
- Transient & Thermal
- Dynamic
- Risk Assessment
- Modification instructions
- Engineering change documentation

Maintenance Support

- Optimisation
- Accident/failure analysis and root cause investigation
- On-site installation support
- Audit
- Incident support
- Failure analysis
- Corrosion analysis
- Condition Monitoring / Condition Based Maintenance Introduction

Risk Engineering

- Hazard identification
- Physical effects consequence modelling
- Qualitative risk assessment
- Bowtie risk management
- Quantitative risk assessment
- Functional safety
- ALARP assessment
- Reliability, availability & maintainability modelling

Risk Management

- Asset integrity management
- Process safety management
- HSSE management systems
- HSSE/ Safety cases
- Independent review & auditing
- Incident investigation
- Emergency planning & crisis management
- Business continuity management
- Security risk management
- Supply chain risk management

Our Range of Services

Culture and behaviour

- Safety leadership
- Culture & behavioural safety
- Human factors
- Competence management
- Workplace safety
- Training & education
- Game based learning

Procurement support

- Market research and industry dialogue
- Vendor Due Diligence
- Preparation of process and documents
- Techno-commercial contract design
- Requirements Management
- Management of Q&A process
- Negotiation support / award recommendation

Asset management

- Asset Assessment and Valuation
- Condition, residual value and outlook
- Vehicle inspections and accident appraisals
- Residual value appraisals
- Quality Assurance
- Supervision of manufacturing & maintenance
- Commissioning
- Asset Management

Integrity management

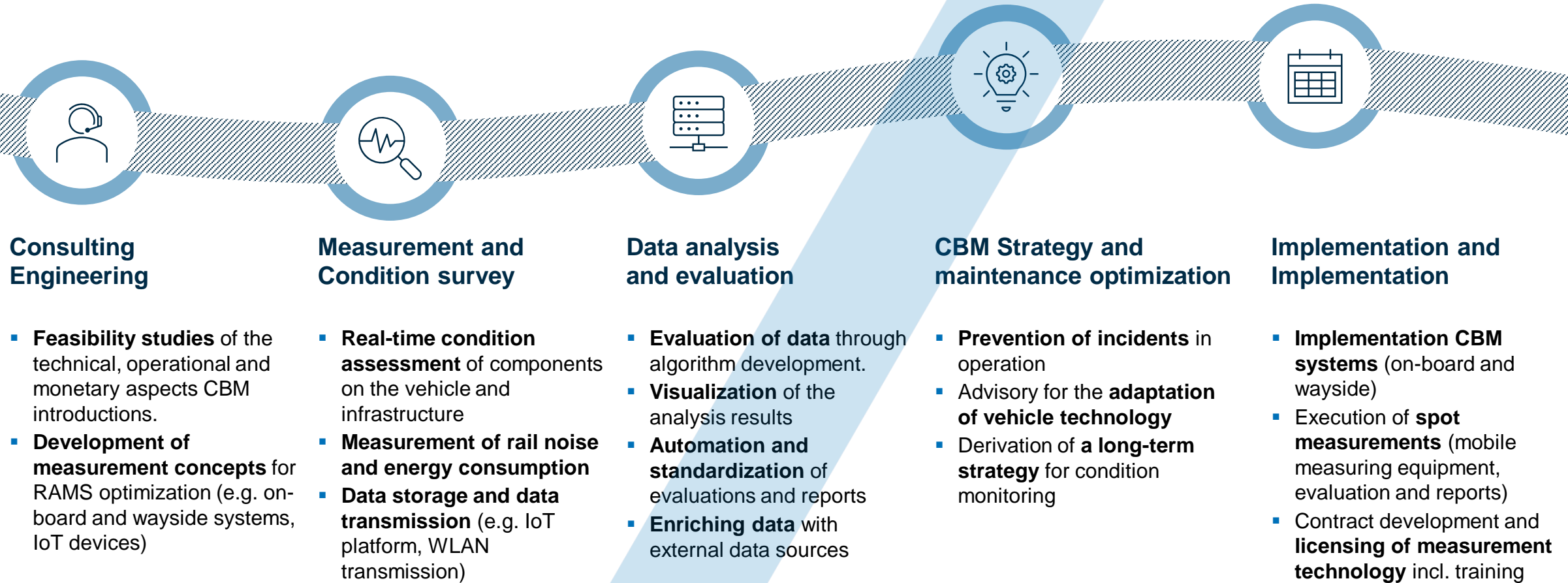
- Impartial, independent advice
- Identify and manage process safety risks
- Improve plant integrity, reliability and availability
- Inform outage planning and component life management decisions
- Plan outage and component replacement costs

Providing a risk-based programme to focus inspections where they are most needed, to mitigate project, safety, environment, production and regulatory risks

Asset & Vendor inspection

- Coordination of inspections to ensure planned downtime is optimised
- Industry-specific NDT techniques to detect and characterise defects
- Quality assurance / quality control
- Vendor capability assessments
- Factory acceptance tests
- Pre-shipment and loading/unloading inspections

State-of-the-art Condition Based Maintenance improves reliability, availability, as well as security and lowers costs



D/Gauge – our UK based consulting and software provider for gauging and clearance solutions

D/GAUGE

Joined the TÜV Rheinland Group in Jan23'

Team of 30 Engineers and Software Developers based in the UK

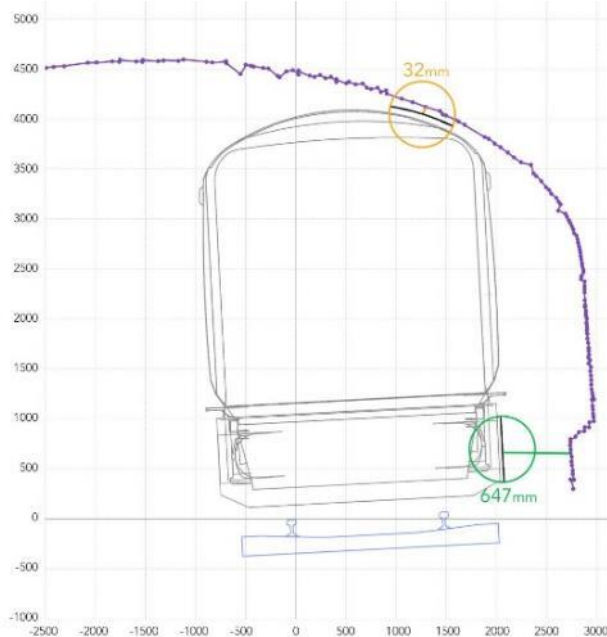
Formed 15 years ago by gauging experts

Delivered over 180 UK projects in 2022

Projects in Network Rail (UK), Amtrak (US), Australia and Europe

Advisers to British (UK) , American (AAR) and European (UIC) standards panels

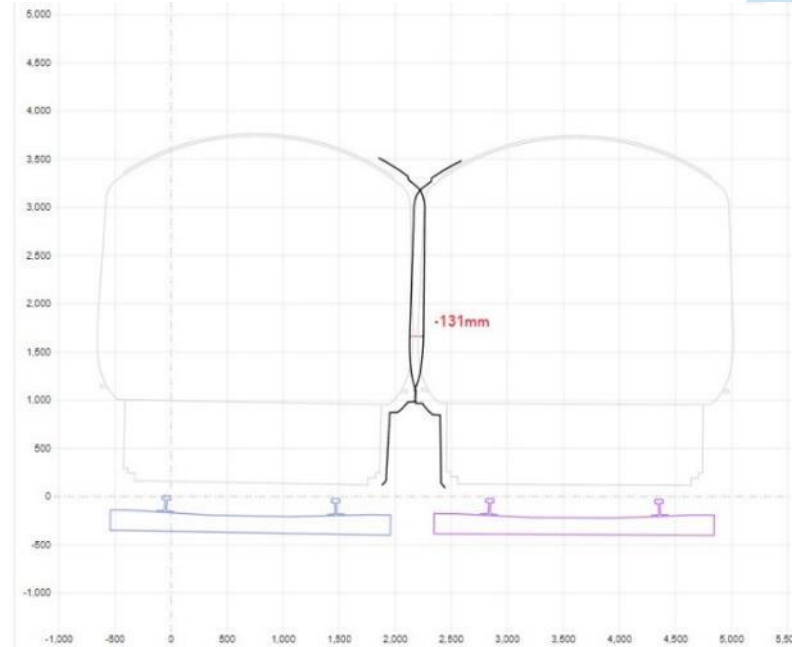
D/Gauge – our UK based consulting and software provider for gauging and clearance solutions



Structure Assessment

(Vehicle to Structure)

- Monitoring of clearances to standard Vehicles, Plates and Gauges
- Investigations into non-standard vehicles and exceptional loads



Passing Assessment

(Vehicle to Vehicle)

- Clearances between mainlines, other networks and sidings.
- Assessments of passing turnouts / switches



Pantograph Assessment

(Electrical Clearances)

- Clearances between pantographs and infrastructure
- Clearances between pantograph and Overhead Line Equipment
- Pantograph De-wirement risks

It's up to you to decide where we can help you to be **Precisely Right .**

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