HEXAGON

Brochure

Smart solutions for railway inspection

Meet the widest range of metrology solutions for makers in the railway industry

Unmatched expertise across rail applications

Across the rail industry, metrology is an increasingly used tool for ensuring production productivity and quality is improved and wastage is minimised without compromising passenger comfort and safety.

Across manufacturing and maintenance, the integration of advanced inspection technology is a necessity. Every area of the railway production process has high potential for productivity gains by introducing improved inspection methods.

Hexagon has the ground-breaking metrology and automation expertise needed to understand and deliver solutions to these challenges.

Interior components

Wagon and coach

Major railway components

Railway infrastructure

Chassis and bogie

Applications overview

We've identified the following key railway applications that can be revolutionised by Hexagon inspection technologies.

1. **Railway infrastructure**
   Rail profile and alignment
   E-clip railway fastening system
   Gauges for rail dimensional checks

2. **Chassis and bogie**
   Chassis and bogie inspection (guided manual)
   Chassis and bogie inspection (automated)

3. **Wagon and coach**
   Locomotive frame alignment
   Welding and assembly fixture adjustment
   Clearance profile
   Structural component validation
   Drill position marking/setting out

4. **Railways major components**
   Axle box inspection and reverse engineering
   Axle maintenance and inspection
   Wheelset and track profiles
   Windscreen geometry and fitting
   Liquid carrying tubes
   Casting components

5. **Interior components**
   Seat inspection
   Interior plastic parts
   Tubes for interior components

1. Railway infrastructure

Rail infrastructure presents a range of challenges when it comes to inspection for design, production and maintenance, whether on the factory shop floor or out in the world wherever tracks are laid.

Rail profile and alignment

E-clip railway fastening system

Rail dimensional checks

1.1
Rail profile and alignment

With railway line construction projects being incredibly capital intensive, it's difficult to change the alignment of a rail line once it's in place. That means that alignment and profile checks are absolutely key during track installation, and must be regularly checked throughout the rail line lifecycle to ensure any maintenance is plannable and as minor as possible.

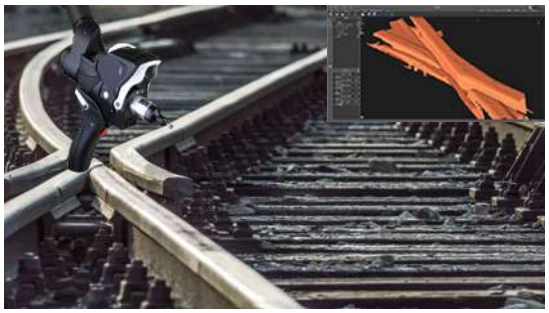
Key solution requirements

- Horizontal alignment in the plan including the straight path and curve
- Vertical alignment including track level, gradient and vertical curves
- Portable measurement equipment operational directly on railway track

Hexagon smart solutions

Handheld 2D laser scanner

Precise measurement and contact-free wear evaluation of switches/turnouts. Immediate display of exceeded limits allows for quick decisions.



Portable measuring arm

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.

Laser tracker with direct scanning or external 3D laser scanner

Efficient inspection of the surface geometry of rails. Deformation analysis over time, during the alignment process.

1.2 E-clip railway fastening system

E-clips on railway tracks limit corrugation and vibration problems caused by the major dynamic forces generated by passing trains. In general, a complete E-clip railway fastening system is composed of two elastic rail clips, two rail shoulders, one rail pad and two rail insulators.

Key solution requirements

- Environmentally protected system for use in forging environment
- Portability to enable direct on-site measurement
- High-volume inspection capabilities
- Direct connection to bending machine for corrections

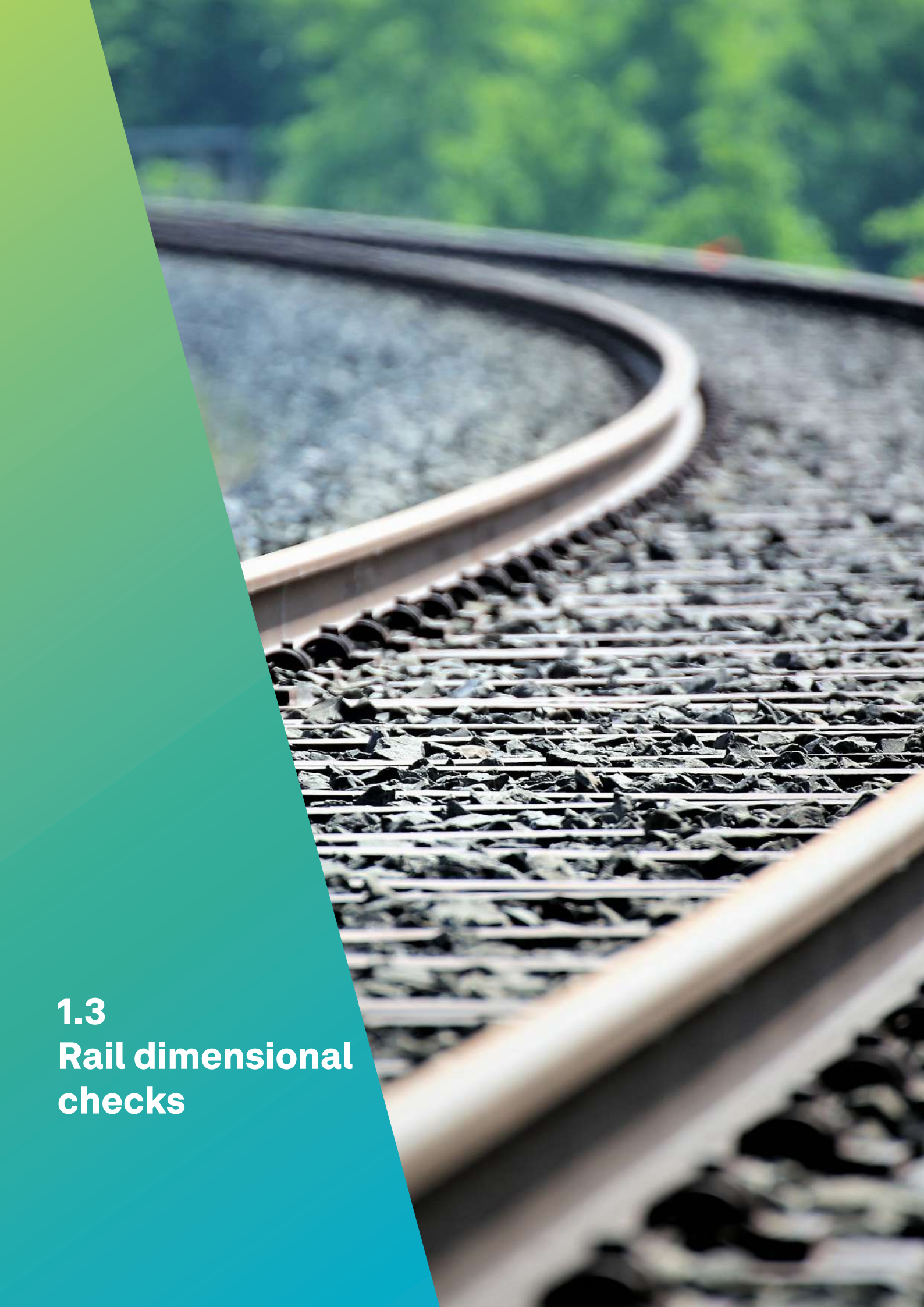
Hexagon smart solutions

Portable measuring arm

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.

Tube inspection cell

Dedicated cell for instant inspection of tube geometries using multi-camera photogrammetry.



1.3 Rail dimensional checks

Railway transportation requires rails to strictly conform to requirements specified in various standards. One key requirement is conformance of the dimensions of the rail wear.

Key solution requirements

- High accuracy to certify the components of the gauges
- Flexibility to measure different types of tools and features
- Fast measurement, to keep up with the high number of certifications required
- Portable device for in-situ measurement

Hexagon smart solution

Gauge track geometry and rail wear profile measuring devices

Fast and precise evaluation of track gauge, superelevation and rail track.

Direct calculation of the twist in order to detect irregularities on site and to initiate necessary maintenance tasks immediately.

Accurate measurement of the entire rail head cross section and calculation of the most important non-dimensional quantities and wear parameters in a matter of seconds.

2.
Chassis and bogie

The chassis and bogies are the foundations of the train car. These vital parts demand a range of high-detail inspection applications that can have measurable consquences with regards to costs, safety and comfort.

Chassis and bogie (guided manual)

Chassis and bogie (automated)

2.1 Chassis and bogie (guided manual)

Overall geometrical analysis and adjustment of the wheel loads and bogie geometry optimise travel comfort and minimise the wear and operating costs of rail and rolling stock. Frame inspection takes place after manufacturing and prior to assembly or after maintenance for geometrical validation.

Key solution requirements

- Large measurement volume for complete chassis
- Flexibility to reach hidden features with probing devices
- Measurement ideally possible on the shop floor
- Portable system to move between different measurement tasks
- Immediately available results for on-the-spot corrections

Hexagon smart solutions

Laser tracker with touch probe

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.

Large-volume portable arm with touch probe

Fast and accurate measurement is needed for production and inspection. The portability and flexibility of a wireless system makes the job much easier.

Single-camera photogrammetry system

Macro-based evaluations allow the execution of predefined test plans with just a few clicks.

2.2 Chassis and bogie (automated)

Chassis and bogie inspection, including geometrical analysis and optimisation and adjustment of wheel loads, are prime applications for improving efficiency through the implementation of an automated inspection system.

Key solution requirements

- Large measurement volume for complete chassis
- Flexibility to carry out multi-sensor inspection within a single program
- Immediately available results for on-the-spot corrections
- Productivity enabled by preprogammable inspection routines

Hexagon smart solutions

Laser tracker with 3D laser scanner on robot and rail combined with rotary device

Designed for the full coverage of a bogie, automated inspection with offline programming and a high-productivity scanner offers fast geometrical inspection of key components through flexible and accurate measurement.

Large-volume CMM

A design with an open structure offers excellent access and illumination of the working area, which increases loading and programming flexibility and drives time savings in inspection and overall production cycles.

3. Wagon and coach

Wagon and coach design and production come with unique challenges for inspection and quality control, from alignment and fixturing adjustments to car profiles and component validation.

Locomotive frame alignment

Welding and assembly fixture adjustment

Clearance profile

Structural component validation

Drill position marking

3.1 Locomotive frame alignment

Requires dimensional inspection and profile gauge analysis according to CAD or inspection plan. Overall geometrical validation and completeness check of features prior to the final assembly process.

Key solution requirements

- Immediately available results for on-the-spot corrections
- Manual operation for fast inspection at low production volumes
- Measurement within challenging shop-floor environments
- Quick checks at various stages of production
- Support building processes and measuring of a base frame after an accident

Hexagon smart solutions

Laser tracker with direct scanner

Medium-to-large-volume measurements with build and inspect functionality.

Portable arm with touch probe

Accurate measurement that can be taken to the heart of production for quick checks with build and inspect functionality.

Single-camera photogrammetry system

Simple and fast measurement even in tight spaces.

3.2 Welding and assembly fixture adjustment

Fixtures are used to securely locate (position in a specific location or orientation) and support components, ensuring that all parts produced using the fixture will maintain conformity and interchangeability. Manufacturing tools are initially checked and adjusted according to CAD and are usually periodically inspected at defined time intervals.

Key solution requirements

- Shop-floor measurement and immediate results for on-the-spot corrections/adjustments
- Real-time coordinates for fixture adjustments
- Large-volume scanning for part inspection on the fixture
- High-speed single-point measurements for minimum downtime of the production line

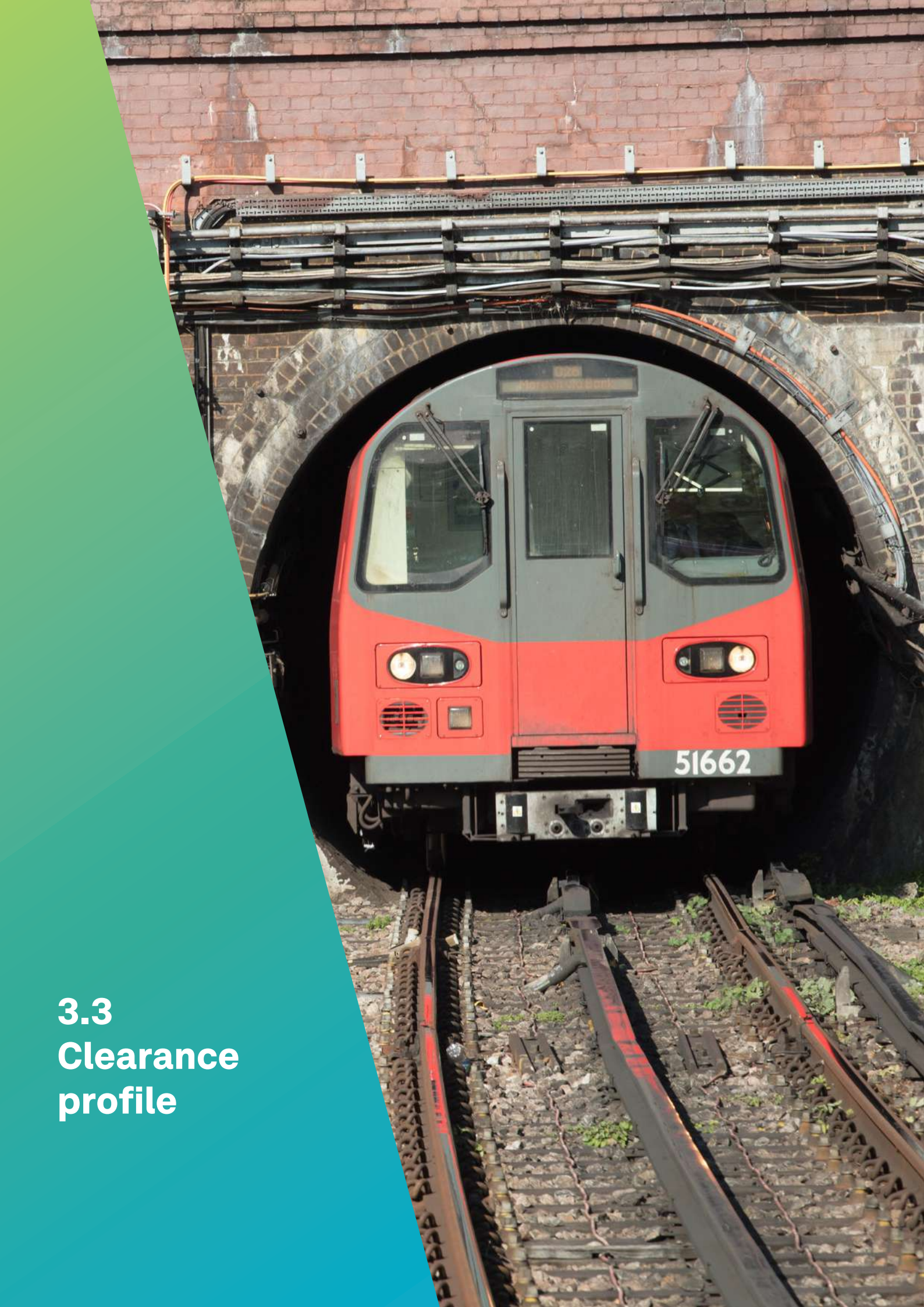
Hexagon smart solutions

Laser tracker with touch probe

Flexible probing device with interchangeable tips for efficient hidden-point measurement capability for medium-to-large fixtures.

Portable arm with touch probe

Accurate measurement that can be taken to the heart of production for quick checks with build and inspect functionality.



3.3 Clearance profile

A loading gauge defines the maximum height and width for railway vehicles and their loads to ensure that they can pass safely through tunnels and under bridges and keep clear of trackside buildings and structures.

Key solution requirements

- Shop-floor measurement with high level of portability
- Manual or semi-automatic operation for fast inspection and highest possible flexibility
- Fast results giving the option to perform on-the-spot descriptions
- High measuring volume range to cover the whole range of the profile
- Flexible measurement gauges to increase efficiency of the measurement task
- Versatile measurement equipment to adapt to the shop-floor conditions

Hexagon smart solutions

Laser tracker with direct scanning

Accurate and semi-automatic non-contact scanning capability for cross-section or profile analysis of entire object.

Laser tracker with reflector and touch probe

Accurate measurement with build and inspect functionality and excellent hidden-point marking capability. Operator guided inspections according to the defined inspection plan.

3.4 Structural component validation

The standard conformity of components can already be monitored during the assembly process, and in case of a defect, the respective part can be discharged for rework. Missing details or features can be detected with a CAD comparison or based on a guided inspection plan.

Key solution requirements

- Large measurement volume to cover a whole wagon
- Quick measurements with a high degree of automation
- Easy operation without extensive training
- Measurement within challenging shop-floor environments
- Guided measurement processes (inspection plan)
- Completeness checks with automatic scanning solutions for part validation

Hexagon smart solutions

Laser tracker with large-scale 3D laser scanner

Fast, flexible and accurate measurement with extended standoff and line width.

Laser tracker with direct scanning

High degree of automated measurement sequences for surface and profile scanning.

Portable arm with touch probe

Fast and accurate measurement for part alignment and inspection.

3.5
Drill position marking

Setting-out or ‘Build Mode’ of geometrical features such as bore hole centres, lines or contour lines with real-time coordinates and a corresponding punch marker device.

Key solution requirements

- Durable and easy to operate marking technology
- Integrated laser pointer for fast identification of the required position on the object surface
- Build and inspect processes with real-time coordinates
- Compact and portable systems for interior coach measurements
- Large-volume coverage to allow the highest possible efficiency and minimise station relocation errors

Hexagon smart solutions

Laser tracker with entry-level probe including punch tool tip

Standard measurement with real-time coordinate display and hidden-point marking capability.

Laser tracker with high-end probe with a punch tool marker

Higher-accuracy measurements with build and inspect functionality and hidden-point marking functionality.

4.
Major railway components

A huge number of other components are important within the rail industry, and each has its own challenges when it comes to inspection for design, quality control and maintenance.

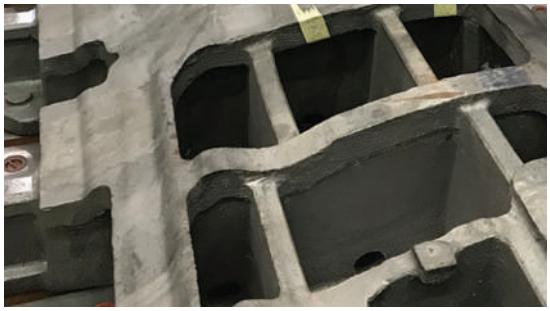
Axle box inspection and reverse eng.

Windscreen geometry and fitting

Axle maintenance and inspection

Liquid carrying tubes

Wheelset and track profiles



Casting components

4.1 Axle box inspection and reverse engineering

Axle boxes are one of the more critical components of the railway vehicle. The axle box is the housing of the bearings, which support the axle load of the vehicle and have a direct impact on passenger comfort.

Key solution requirements

- Quick and easy measurement on the shop floor
- High-resolution and accuracy for exact feature detection
- Good depth capture for measurement inside of joints and gaps
- High-speed analysis to avoid delaying high-volume production
- Fast reporting to make a go/no-go decision with traceability of results

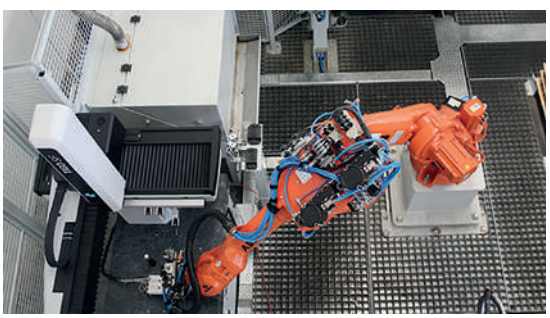
Hexagon smart solutions

Portable arm with 3D laser scanner

Accurate surface scans are the key to reverse engineering projects and easy inspection.

Structured light scanner

Semi-automated system with highest resolution and accuracy for reverse engineering.



Shop-floor CMM

High accuracy fully automated system with highest accuracy for inspection.

4.2 Axle maintenance and inspection

Integrity of train axles is of great importance to the rail industry. This requires the wheels and other auxiliary axle components to be removed from wagons and locomotives in order to facilitate access to the inspection area. Therefore, and with the aim of minimising the interruption of train services and maintaining safety, train operators require frequent and regular inspection methods that allow rapid inspection with the least number of dismantling operations.

Key solution requirements

- Measurement on the shop floor during the maintenance process
- High-speed analysis to reduce maintenance downtime
- Quick and easy measurement
- Immediately available results for on-the-spot corrections

Hexagon smart solutions

Portable arm with touch probe

Portable, fast and accurate geometrical inspection during maintenance operations.

Laser tracker with handheld touch probe

Extreme portability, for alignment and general geometry checks during maintenance inspection processes.

4.3 Wheelset and track profiles

Train wheelsets and rail infrastructure are typical high-wear parts that have a significant influence on passenger comfort and safety as well as noise and ride. Profiles of wheels, brake discs, rails and switches are therefore regulated by recurring measurement and maintenance operations under demanding operating conditions.

Key solution requirements

- Measurement in the workshop during the maintenance process
- Quick and easy measurement
- High-speed analysis to avoid delaying high-volume production and excessive downtimes
- Immediately available results for on-the-spot corrections
- Fast measurement solutions as every unit passes through inspection
- Capacity to report the status of high-wear parts
- Fast reporting to make a go/no-go decision

Hexagon smart solutions

Portable arm with 3D laser scanner

Accurate measurement that can be taken to the heart of production for inspection for expert analysis.

2D laser profiler

Fast handheld wear measurement during regular maintenance ensures safety for passengers and goods.

Automated on-track wheelset measurement

An installed on-track wheelset measurement system can automatically identify out-of-tolerance parts as stock passes across it and deliver accurate and precise results in seconds.

4.4 Windscreen geometry and fitting

Scanning and modelling of windshield frames and windscreen prior to assembly ensures the required aerodynamic design. Clearance analysis of windscreen fit avoids mechanical deflection or collision of windshield glass with the frame.

Key solution requirements

- Probing and scanning functionality in one system
- Manual operation for fast inspection and to allow highest possible flexibility and portability
- Fast analysis to allow the option to make on-the-spot decisions and corrections
- Medium-volume range to cover the entire size of the window
- Fast edge measurement

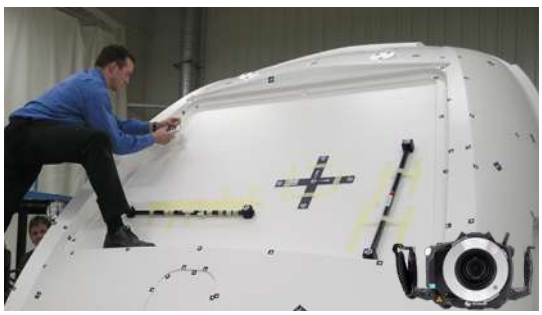
Hexagon smart solutions

Laser tracker with touch probe and scanner

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.

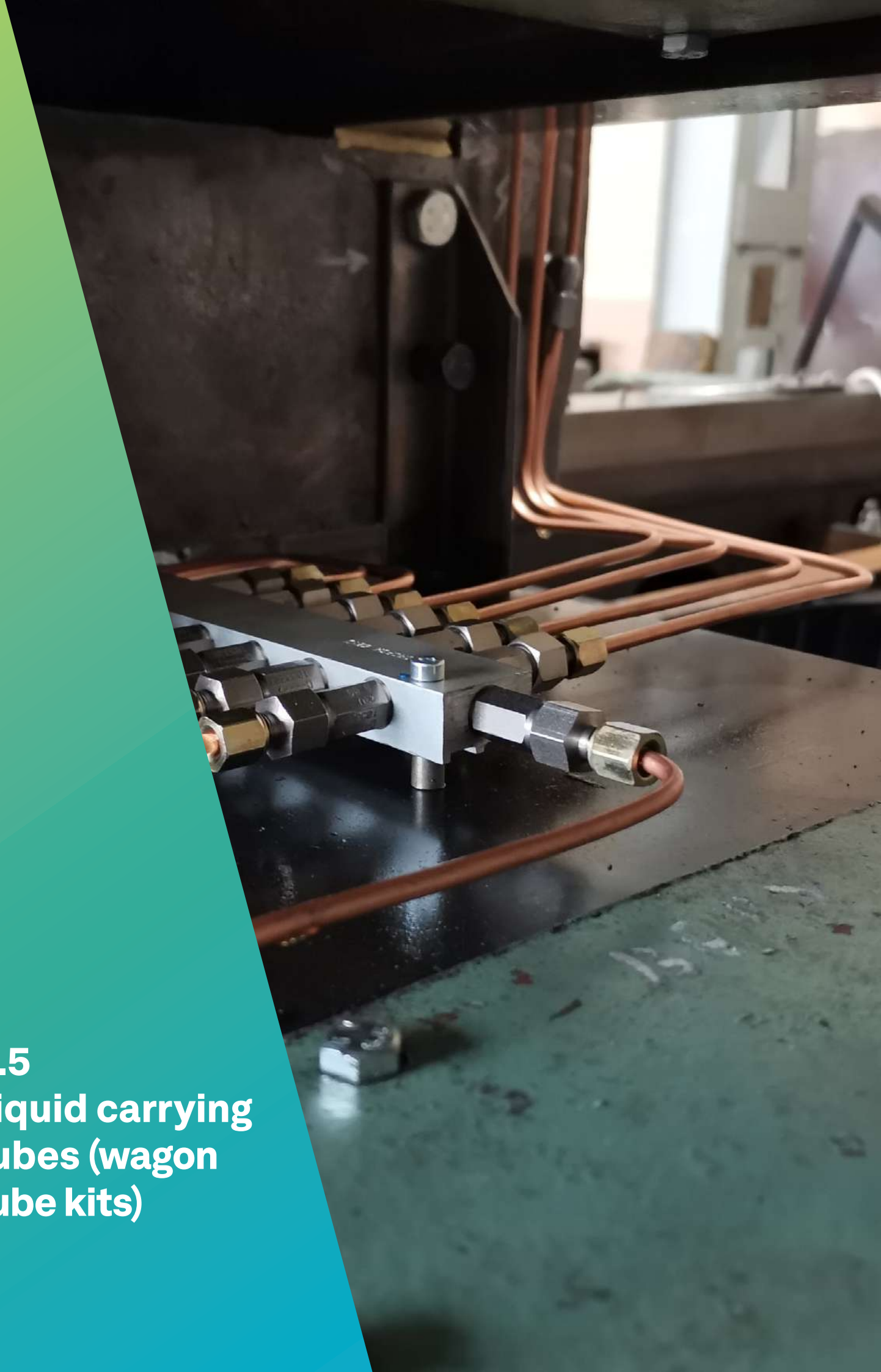
Portable arm with large-scale scanner

Fast scanning solution with maximum coverage for fast part inspection. Portability and flexibility of a wireless system makes the job much easier.



Single-camera photogrammetry system

Highly portable solution and data acquisition within minutes in cases where a reduced number of inspection points are sufficient.



4.5
Liquid carrying tubes (wagon tube kits)

Whether in the roof, passenger cabin, bogie or engine room: mostly invisible to the passengers but indispensable for operation, tubes can be found everywhere in modern trains, both gas-carrying as air supply lines or liquid-conducting, for instance in the control or brake line systems. Production is characterised by a large variety of bent tubes and small batch sizes. In addition, suppliers are increasingly expected to deliver complete kits for a wagon consisting of many individual tubes.

Key solution requirements

- Shop-floor users must be able to operate the system after only brief training
- One system for all tubes needed in the rail industry
- System should be able to replace mechanical gauges
- Feedback to CNC benders is mandatory to transfer correction data automatically
- Capacity to increase production efficiency through time savings

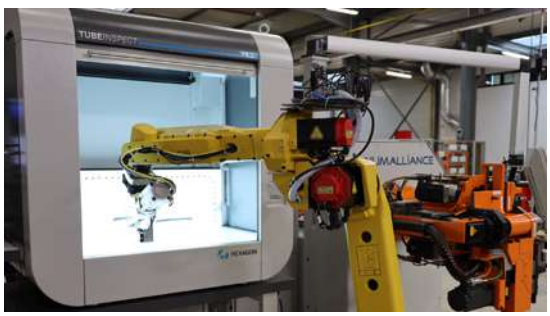
Hexagon smart solutions

Portable arm with tube probe and 3D laser scanner

An arm with different accessories delivers unmatched speed and flexibility to the tube and wire production industry.

Tube inspection cell

All-in-one turnkey measurement cell specially developed for the efficient quality control of bent tubes and wires during the manufacturing process.



Automated tube inspection cell

High-resolution models ready for complete integration as the quality assurance step within a larger robotic tube production cell.

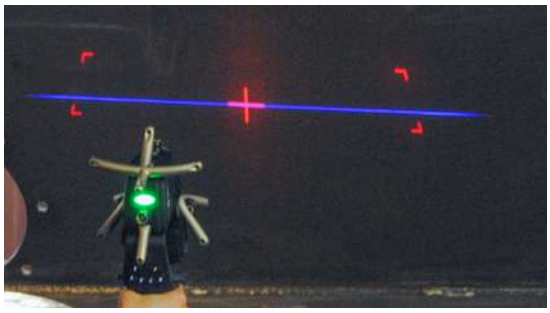
4.6 Casting components

In the rail industry some key components come from castings and forging manufacturing processes with specific industrial requirements.

Key solution requirements

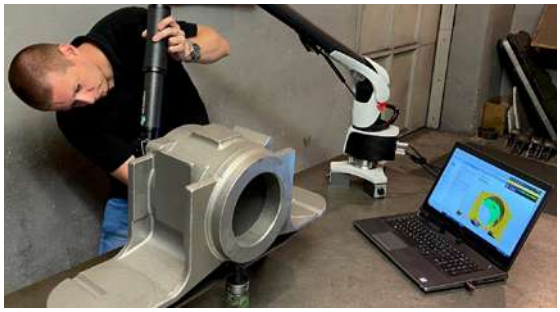
- Adding scan data to the same coordinate system of the initial part
- Complete data coverage to minimise or remove post-processing steps
- Marking to enable fast positioning on a CNC machine
- Good depth capture for recessed pocket scanning
- Reverse engineering to ensure virtual fit (e.g. wheel and bogie)
- Easy and fast scanning with an automation possibility

Hexagon smart solutions



Laser tracker with touch probe and 3D laser scanner

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.



Portable arm with touch probe and 3D laser scanner

Accurate measurement that can be taken to the heart of production for quick checks with build and inspect functionality.

Structured light scanner automated cell

Turnkey solution for high-accuracy measurement using a robot-mounted structured light scanner.

5. Interior components

Within the passenger cabins of trains there are several types of components for which systematic inspection and quality control is just as important to comfort and safety as any other aspect of coach production.

Seat inspection

Interior plastic parts

Tubes for interior components

5.1
Seat inspection

The passenger seat is an important system in any train. Seat design, covering comfort, safety, health and ergonomics are key in railways, along with the proper installation of any seats, tables and overhead luggage compartments.

Key solution requirements

- Light and portable for measurement inside the coach
- Easy operation without extensive training
- Medium-to-large measurement volume
- Wide range of small features to be checked, from studs and pins to slots and threaded holes
- Scanning with a large standoff for fast data collection

Hexagon smart solutions

Laser tracker with probe and 3D laser scanner

Fast, flexible and accurate measurement with build and inspect functionality and excellent hidden-point measurement capability.

Portable arm with 3D laser scanner

Fast scanning solution for quick part inspection, with high degree of portability for moving within the cabin.

5.2 Interior plastic parts

The interior components of railcars are a significant factor in keeping passengers and crew safe and comfortable. Portable metrology solutions can provide a significant advantage in inspecting the wide range of plastic parts required for the fast and proper installation of seats, tables and overhead luggage compartments.

Key solution requirements

- Light and portable for measurement inside the coach, or high-speed contactless measurement during production
- Easy operation without extensive training
- Medium-to-large measurement volume
- Wide range of small features to be checked, from studs and pins to slots and threaded holes
- Scanning with a big standoff for fast data collection

Hexagon smart solutions

Structured light scanner

High-resolution and high-accuracy scanning with automation options for quick and reliable inspection.

Portable arm with 3D laser scanner

Fast accurate scanning solution helps design, manufacturing and quality control.

CMM with chromatic white light sensor

Automated data capture with non-contact sensor for surface analysis, profile inspection and feature evaluation. Used for sample testing.

5.3 Tubes for interior components

Curved tubes are installed in many places in the wagon: as handrails, brackets or supports for other components. Often, the necessary holes are drilled by laser cutting during the production process before the tubes are bent. Bending machines must therefore be able to accommodate the tubes in an oriented manner. During measurement, both bending curves and the bores must be checked.

Key solution requirements

- Shop-floor users must be able to operate the system after only brief training
- A single system must inspect both tube geometry and additional features
- System should be able to replace mechanical gauges
- Feedback to CNC benders is mandatory to transfer correction data automatically

Hexagon smart solutions

Portable arm with tube probe and 3D laser scanner

Arm with different accessories delivers unmatched speed and flexibility to the tube and wire production industry.

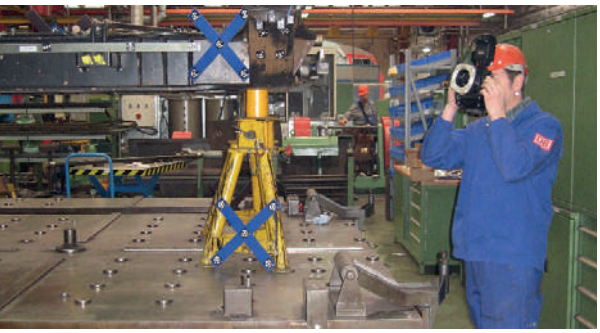
Tube inspection cell

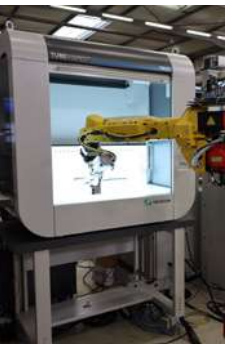
All-in-one turnkey measurement cell specially developed for the efficient quality control of bent tubes and wires during the manufacturing process.

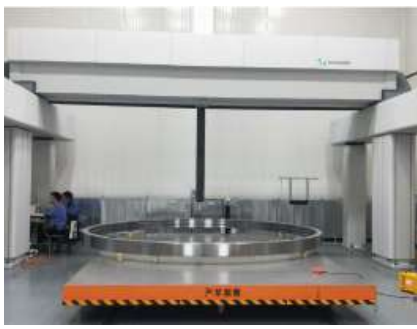
Automated tube inspection cell

High-resolution models ready for complete integration as the quality assurance step within a larger robotic tube production cell.



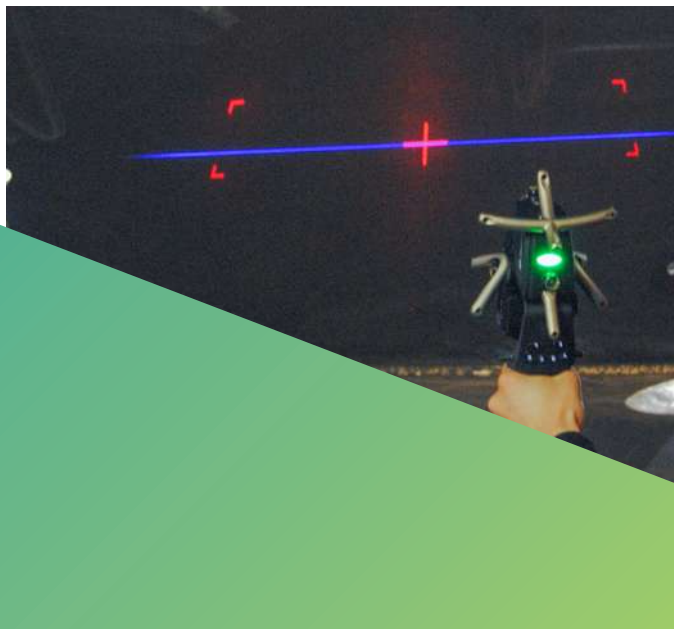







Metrology and inspection

Hexagon offers a complete metrology and inspection solutions range, from CMMs to portable measuring arms, laser trackers to structured light scanners, hand tools to automated solutions, all supported by the best dimensional metrology and CT software. They capture real-world data for positioning and inspection, providing actionable information that continuously improves efficiency, quality and productivity.

Capabilities

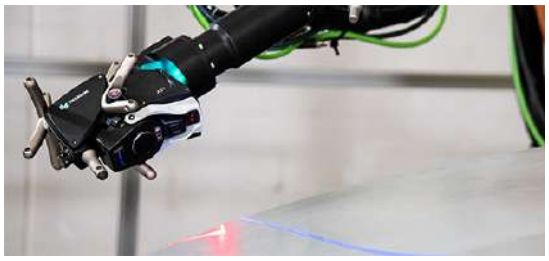
- Dimensional inspection and analysis
- Statistical process control and analysis
- CT analysis
- Automated inspection
- Robot calibration and simulation

Automated solutions

Automation is the future of manufacturing. While already widespread in the various sectors, metrology-grade automation that allows for sufficiently accurate quality control has wide opportunities for growth.

Whether inline, at-the-line or near-the-line, automated systems have the potential to revolutionise quality processes and deliver massive productivity and reliability benefits.

Automated laser tracker systems



The Leica Absolute Tracker AT960 is capable of six degrees of freedom (6DoF) measurement as standard, allowing the use of a scanner, camera or probe from up to 30 metres away. With the Absolute Scanner AS1, AS1-XL and Leica T-MAC sensors, this process can be automated, with each easily mountable on any standard industrial robot arm.

With the unique direct scanning functionality of the Leica Absolute Tracker ATS600, automated inspection is simpler than ever before. There's no need for a sensor or an operator at the point of measurement, so components can just be brought into the tracker's field of view and automatically inspected with just a few software clicks. No need to move the tracker, no need to manually scan. With its unique selective scanning functionality, just tell the ATS600 the area it should measure and how much detail is needed, and start.

Structured light scanning automation

Turnkey automated inspection powered by structured light scanner technology, PartInspect L is a modular robotic inspection cell concept designed to make high-speed, high-accuracy measurement on the shop floor easier than ever.

Automated CMM metrology system

Enhance coordinate measuring machine (CMM) workflows with an off-the-shelf automatic part loading system like TEMPO, which increases the throughput of your CMM and maximises operational capacity. TEMPO enables autonomous measurement free from interruption. Whether operating with overnight production requirements or accomodating the needs of staff to switch their focus to other important tasks, TEMPO allows manufacturers to maintain output even when CMM operators are unavailable.

Automated tube inspection

TubeInspect is an all-in-one turnkey measurement cell specially developed for the efficient quality control of bent tubes and wires. The TubeInspect platform delivers full automation capability, with high-resolution models ready for complete integration as the quality assurance step within a larger robotic tube production cell.

Laser trackers

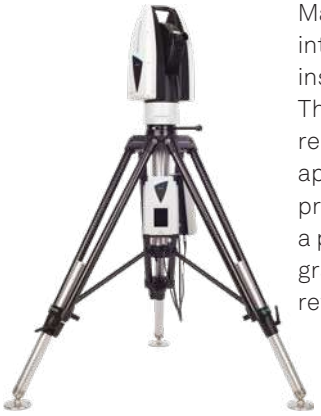
A long-term standard in industrial metrology, laser tracker systems lead the field of portable coordinate measuring machines in terms of accuracy, reliability and durability.

Absolute Tracker systems

Absolute Tracker AT960

A robust, all-in-one laser tracker with high-speed dynamic measurement as standard, the AT960 is a complete solution for six degrees of freedom (6DoF) probing, scanning and automated inspection as well as reflector measurement.

Absolute Tracker ATS600



Manufacturers are increasingly interested in digitally pinpointing and inspecting large parts and surfaces. The Leica Absolute Tracker ATS600 is ready to meet the challenges of these applications with a unique working principle that can accurately locate a point in 3D space with metrology-grade accuracy without the need for a reflector at the point of measurement.

Absolute Tracker AT500

The Leica Absolute Tracker AT500 makes measurement simple without compromising on portability, productivity and resilience. IP54-rated protection and an extended operating temperature range keep the AT500 working under even the most challenging conditions.

Scanning solutions

Absolute Scanner AS1

Built on unique SHINE technology, the Absolute Scanner AS1 always delivers full scanning performance, even on the most challenging parts. Whether faced with glossy black plastic automotive body parts or moulded carbon-fibre components, this innovative exposure mode allows the AS1 to scan with no reduction in quality or productivity.

Absolute Scanner AS1-XL

The Absolute Scanner AS1-XL is a large-scale 3D laser scanner compatible with Leica Absolute Tracker AT960 and Absolute Arm 7-Axis systems. An extra-wide 600-millimetre scanline and standoff distance of 700 millimetres allow for fast capture of large surfaces as well as inspeciton of deep cavities.

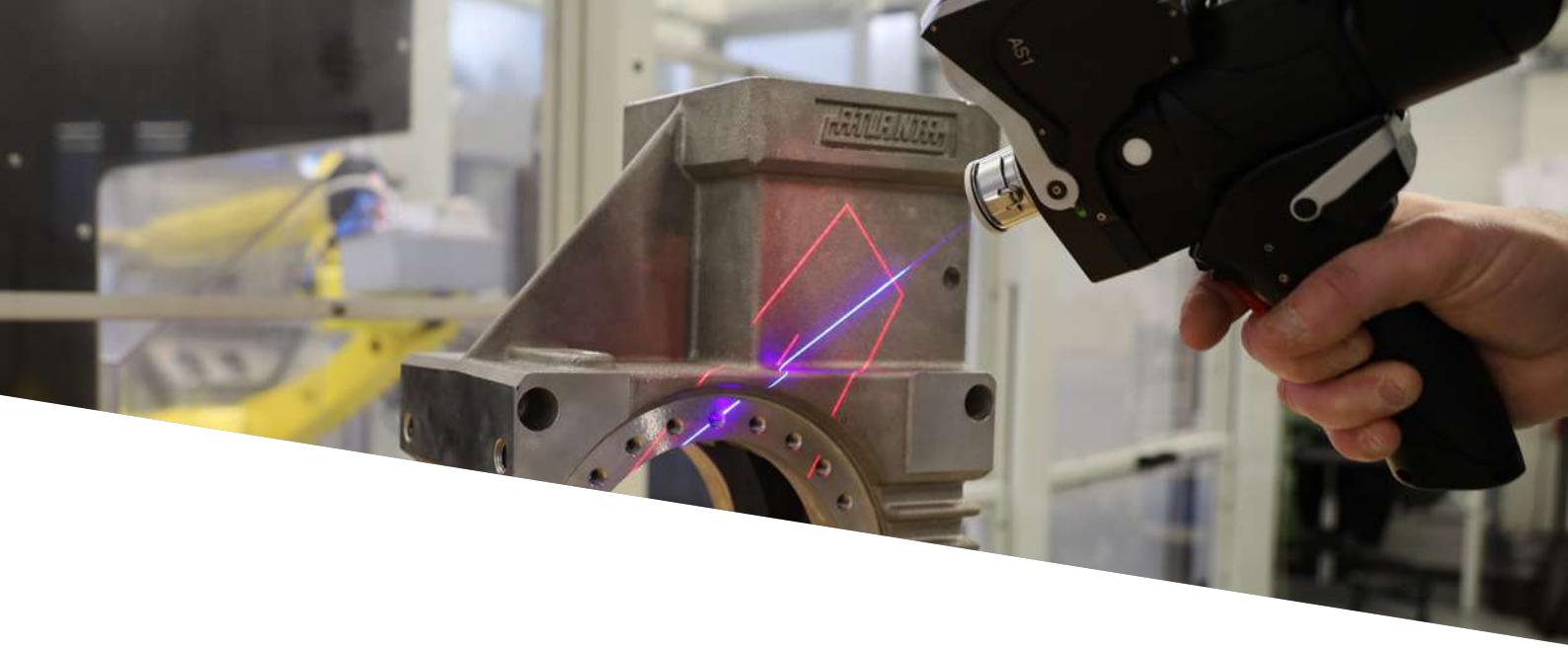
Probing solutions

Leica T-Probe

High-accuracy handheld touch probing, allowing for fast and easy measurement of parts, including hidden areas without the need for time-wasting station changes. Compatible with AT960 models.

Leica B-Probe^{plus}

Able to gather hidden 3D points across a large measurement volume, the B-Probe^{plus} is a completely wireless solution that makes probing measurement easy to perform and affordable. Compatible with AT500.



Portable measuring arms

Portable measuring arms are the easiest way to take metrology into the heart of production. High-accuracy measurement is truly portable and reliable thanks to robust yet lightweight construction and full system accuracy certification.

Absolute Arm systems

The world's leading portable measuring arm, designed for high measurement productivity, unrivalled usability and practicality, and the flexibility to meet the demands of any metrology challenge.

Scanning solutions

Absolute Arm 7-Axis

The flagship Absolute Arm 7-Axis system is compatible with a selection of easily interchangeable scanners designed for higher-productivity measurement.

Tube measurement

The well-established tube probe technology makes tube geometry measurements quickly and easily using any Absolute Arm system. The non-contact infrared tube probes can be used to measure tube length and bend angles, while standard touch probes allow for measurement of end forms such as bevel-cut ends or ends with expansions as well as large-diameter tubes.

Absolute Scanner AS1

The Absolute Scanner AS1 is the flagship 3D scanning sensor for Absolute Arm 7-Axis systems. Using cutting-edge blue-laser technology and advanced programming, it combines 'always-on' maximum performance with simple usability to deliver high-productivity non-contact 3D measurement.

Absolute Scanner AS1-XL

The Absolute Scanner AS1-XL is the large-scale 3D laser scanner for Absolute Arm 7-Axis systems. An extra-wide 600-millimetre scanline and standoff distance of 700 millimetres allow for fast capture of large surfaces as well as inspeciton of deep cavities.

Probing solution

Absolute Arm 6-Axis

Every Absolute Arm is compatible with almost 100 types of probe. With tips in various sizes and in variations including touch trigger, angled and infrared, all are quickly removable and remountable.

Dedicated probing models take single point measurement to a new level of accuracy, with the dedicated Absolute Arm 6-axis model offering improved higher accuracy for touch probe measurements while still retaining the wide range of usability features of the flagship 7-axis model.

2D laser profilers

Hexagon's laser profilers offer a precise 2D profile measurement solution based on laser light section technology. The technology captures profile curves with a laser and camera and is available across a range of hardware and software options that offer advanced handheld and automated measurement solutions to the rail industry.

CALIPRI systems

The unique CALIPRI range of profile measurement devices is based on the patented CALIPRI Principle, which uses 2D laser light section technology to precisely determine part profiles.

Scanning solutions

CALIPRI C42

Designed to measure all common train wheel, brake and track profiles, the wireless CALIPRI C42 handheld rail measurement device provides quick and correct evaluations with high repeatability.

For measurements of heavy rail equipment and metro train vehicles, the CALIPRI C42 covers the complete application range, including high-speed trains, and regional and cargo stock. The C42 stands for multifunctionality across the board for the complete wheel-rail system. Different software measurement modules for wheels, break discs, rails and switches allow customised use across the rolling stock domain.

CALIPRI Prime

CALIPRI Prime is a fully-integrated optical inspection system for precisely measuring critical railway wheel flange dimensions in seconds. It's a compelling replacement for mechanical gauges and fixtures across several wheel measurement applications with its capacity to reduce overall costs and improve accuracy.

Automated on-track measurement of wheelsets

CALIPRI X

CALIPRI X is an automated, permanently installed on-track wheelset measurement system for the rail industry. It eliminates time-consuming and costly manual measurement, delivering precise results in seconds by immediately identifying out-of-tolerance areas. In combination with the cloud storage and analysis tool CALIPRI Predictor, measurements are automatically and instantly stored in the cloud, saving the time and effort of the maintenance team.

Photogrammetry and structured light scanners

Photogrammetry solutions offer speed and flexibility across a wide range of measurement-related applications in industrial production. From testing, inspection and positioning tasks to deformation analysis and tracking applications, our camera-based 3D optical metrology systems deliver unmatched high-speed geometric data collection.

Structured light scanner systems are comprehensive optical 3D measurement solutions that deliver high-speed, high-accuracy data capture for small-to-medium sized parts.

Photogrammetry solution

DPA Industrial

Built around the robust industrial-grade casing of the custom-designed C1 Camera, DPA Industrial is a high-end photogrammetry system that has been specifically created for both resilience and simplicity.

The C1 Camera is a 50-megapixel digital camera contained within an IP51-rated housing that makes it ideal for use on the shop floor, in the workshop or in outdoor environments. As well as its tough casing, it boasts a simplified control schema that reduces user interaction to targeting and image capture, aided by a laser targeting grid that is projected onto the measurement object.

Structured light scanner solution

PrimeScan

The PrimeScan optical 3D scanner line is an attractive entry-level solution for highly precise 3D digitisation of industrial components. Like other Hexagon structured light scanner models, the PrimeScan is based on advanced fringe projection technology that provides the strongest luminous power and highest projection quality.

Coordinate measuring machines

Bridge coordinate measuring machines (CMMs) from Hexagon combine decades of metrology expertise with the latest advances in CMM technology, establishing them among the most capable and versatile metrology devices for quality control and monitoring production.

Hexagon's gantry range of CMMs brings accurate and efficient measurement to diverse inspection applications on large-sized components across many industries. They come in a variety of sizes, from cost-effective entry models to ultra-high accuracy machines, all strengthened by versatile sensor options.

Gantry CMMs

The gantry CMM range features quality design, robust materials, a highly stable mechanical structure and innovative technologies to ensure high accuracy, fast measurement and high throughput in production cells, on the production floor or in the measuring room.

Leitz PMM-G

The Leitz PMM-G provides the highest accuracy and enhanced throughput for extra-large-sized workpieces.

ALPHA 2.0

ALPHA 2.0 is an all-purpose gantry CMM suited to the dimensional inspection of large workpieces such as castings and machined parts. When equipped with optical scanning sensors, the system can rapidly digitise millions of data points on freeform components. This makes it an ideal reverse engineering and inspection system for the die and mould manufacturing process.

Bridge CMMs

For applications that require extreme precision, ultra-high accuracy CMMs offer the accuracy needed to handle complex geometries.

Leitz PMM-C Line

Whether calibrating master parts and gauges or inspecting complex geometries and high-value sensitive parts with the tightest tolerances at sub-micron levels, there is a machine for almost every application – even in precision production environments.

The PMM-C range offers targeted metrology capabilities to fulfil the specific requirements of two broad application classes. Two base models – **Precision** and **Flexibility** – address high precision applications with very tight form tolerances and applications that also require a high degree of sensor flexibility.

Metrology software

Driving the tools of high-end inspection

Hexagon is the largest software developer in the metrology industry and offers a wide range of individually customisable software packages. Hardware solutions from Hexagon support this with a foundation of cross-platform compatibility, designed for perfect functionality with both the many advanced platforms developed in-house and the best third-party programs on the market.

SpatialAnalyzer	**Inspire**	**PC-DMIS**	**VISI Reverse**	**TRAC-CHECK**
PolyWorks®	**Metrolog X4**	**Verisurf**	**BendingStudio**	**REcreate**
DM Works	**Silma / X4-iRobot**	**HxGN Robotic Automation**	**RoboDyn**	

Hexagon

Third-party

Nexus

Centralised manufacturing within an open and integrated digital reality platform

Nexus is Hexagon's new digital reality platform for manufacturers. It connects people, technologies and data to accelerate innovation and bring ideas to life faster than ever before.

Break silos and put data to work

By connecting data across functions, Nexus enables collaboration and breaks down barriers between different engineering disciplines.

Build on Hexagon's manufacturing expertise

Nexus simplifies access to world-leading manufacturing expertise from Hexagon and its partner ecosystem.

Experience the freedom of an open platform

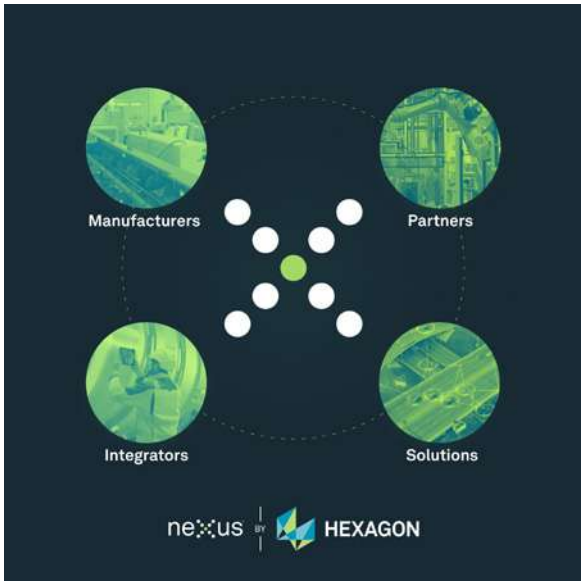
Reimagine operations with an open platform that meets users where they are – starting with the technology they already own and integrating innovation at their own pace.

Nexus delivers

- Speed: faster time to market through fluid collaboration and automated data sharing
- Efficiency: time and cost savings due to increased visibility and faster decision making across disciplines
- Productivity: unlock further improvements in productivity through faster feedback loops across the entire product lifecycle
- Optimal data sharing: only share the data needed to solve a particular problem

nexus®

| Learn more at **nexus.hexagon.com**



Metrology Asset Manager

Smart manufacturing in your hands, anytime, anywhere

Data is the starting point for any optimisation strategy. Digital data solutions have the potential to offer new ways to operate and manage metrology devices more efficiently.

Metrology Asset Manager is a modern and secure cloud-based application powered by Nexus that is available for both stationary and portable metrology devices from Hexagon. It delivers real-time performance data in a centralised, user-friendly dashboard, providing a simple, accurate and reliable way to monitor and analyse the performance of key metrology assets, whether on a single site or distributed across multiple locations around the world.

Key benefits of Metrology Asset Manager

- One common platform to monitor and manage various Hexagon metrology devices
- Easy access to all devices for real-time monitoring of operating conditions, health status and utilisation factor
- Location tracking of all portable devices in real-time
- Real time visibility and management of certification status
- Monitoring of ongoing part programs and access to historical data, including all programs executed and related results
- Real-time notifications regarding critical events
- Easier remote support and service directly from Hexagon local service team to maximise device availability
- Service team to maximise device availability

Every compatible Hexagon device comes bundled with a one-year Advanced subscription for Metrology Asset Manager. Contact your local Hexagon representative for more details.

Metrology Asset Manager

Service and support

World-class support delivered locally

The international presence of Hexagon guarantees comprehensive aftersales support and services across the globe. With the largest dedicated service team of any metrology equipment manufacturer and an emphasis on locally delivered solutions, Hexagon is unmatched from service, repair, certification and calibration through operator training and software maintenance and upgrades.

World-class service made simple

Hexagon offers a wide range of support services extending well beyond the point of purchase. Delivered by experienced and skilled engineers at ISO-certified laboratories, local Hexagon Precision Centres or even on-site to minimise downtime, our after-sales portfolio is the most complete on the market.

- Maintenance and warranty plans that ensure equipment availability
- Trouble-free usage and minimal downtime
- Preferred hotline access at no additional cost
- Access to professional advice whenever needed

● Customer and demo centre ○ Production facility

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us @HexagonAB.