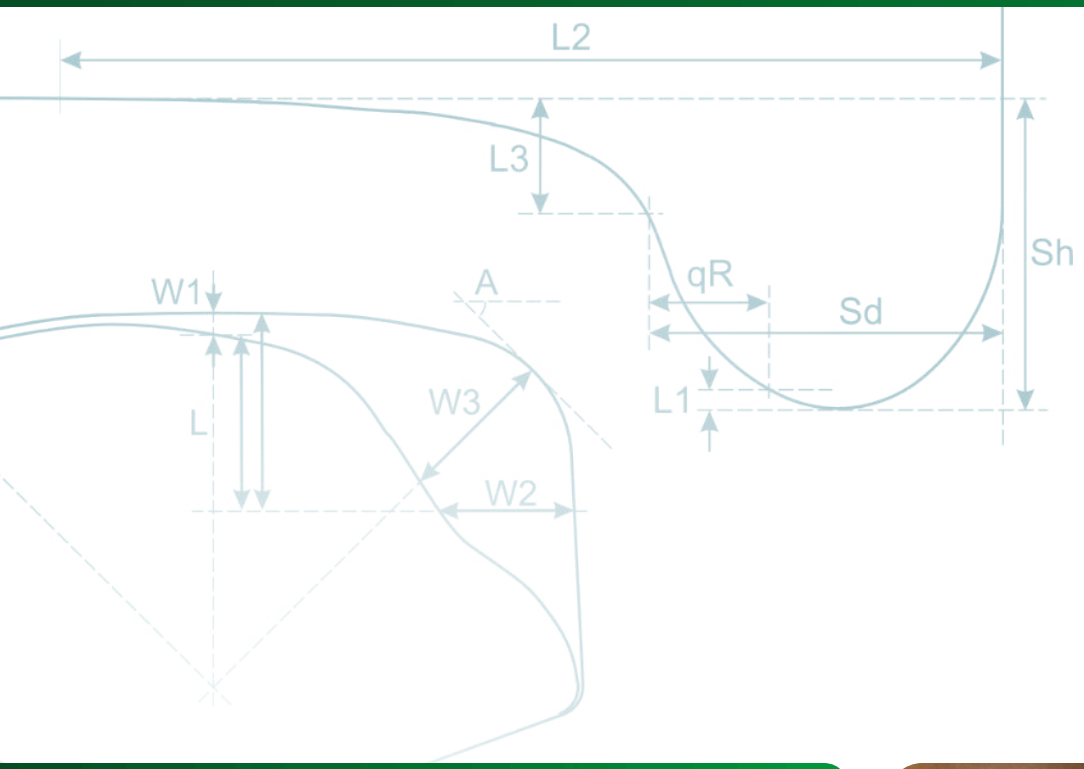
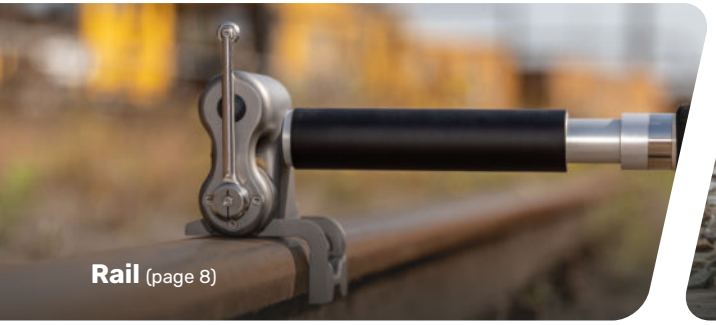


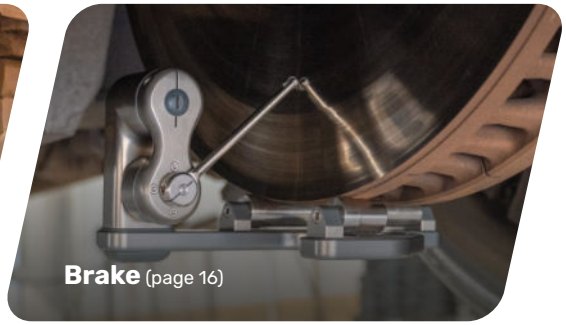
MiniProf

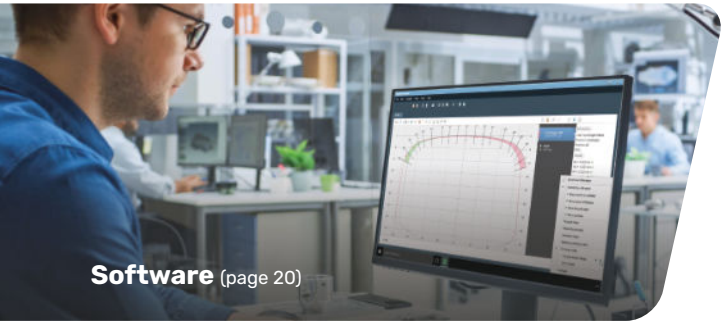
***Much more** than a measurement*

FULL CONTACT
PROFILE MEASURING SYSTEMS
FOR THE RAILWAY INDUSTRY

GREENWOOD ENGINEERING



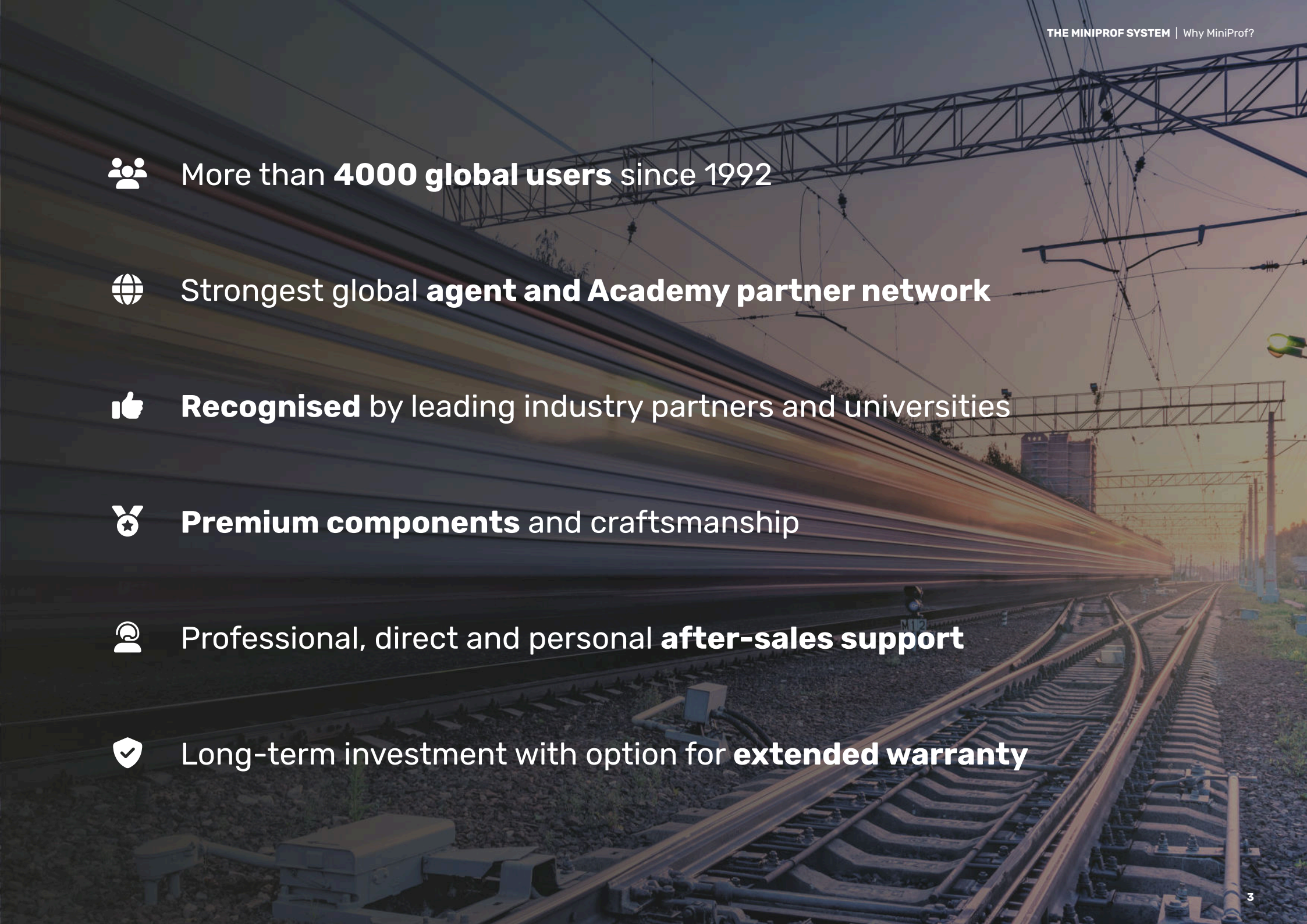




MiniProf - Accurate and reliable profile data

The MiniProf systems are first-class, full contact profile measuring tools for monitoring and analysing cross-sectional profiles of railway tracks, wheels, brakes, switches and crossings. Globally renowned for their exceptional high accuracy, high-quality materials and cutting-edge technology, the easy-to-use handheld devices provide reliable profile data for maintaining and optimising infrastructure and rolling stock in global rail operations.

Each MiniProf system is delivered with the user-friendly and flexible Envision software package for basic to in-depth profile analysis. More than 60 calculations and alignments are available as well as a variety of visualisation options for a deep and reliable understanding of wear patterns and profile conditions. The lighter Criterion app is also available to ease the data collection in the field.



- More than **4000 global users** since 1992
- Strongest global **agent and Academy partner network**
- **Recognised** by leading industry partners and universities
- **Premium components** and craftsmanship
- Professional, direct and personal **after-sales support**
- Long-term investment with option for **extended warranty**


MiniProf
Optimise and improve:
safety
quality
capacity
frequency
punctuality
travelling comfort
maintenance costs

Global **area of use**

The MiniProf systems are recognised globally by industry-leading companies and universities and are used by more than 4,000 users across various sectors of the rail industry for preventative maintenance of infrastructure and rolling stock, optimising operational efficiency, reliability, comfort, safety, and much more.

Research & universities
WRI studies, verification of research and principles
Reduce noise and wear-rates to extend asset lifetime
Improve safety, speed, load and travel comfort

Product design & development
Material and life cycle test
Lubrication/friction effect
Design of wheel, rail, brake disk, boogie

Safety regulation
Inspection check if assets are within regulation
Accident and derailment investigation
Analysis and documentation of work

MiniProf

Manufacturing
Production quality control
Factory acceptance inspection before shipment
Verification of production equipment

Quality control
Verify accuracy of on-site/build-in laser-based gauges
Verify accuracy of wheel lathes and rail grinding machines
Verify accuracy of handheld laser-based gauges

Procurement
On-site field/workshop incoming inspection
Lifetime/performance monitoring – forecast planning
Compare quality from different suppliers

Management
Life cycle wear monitoring
Trend forecast, planning of on-time maintenance intervals
Life expectancy / improvements / replacements

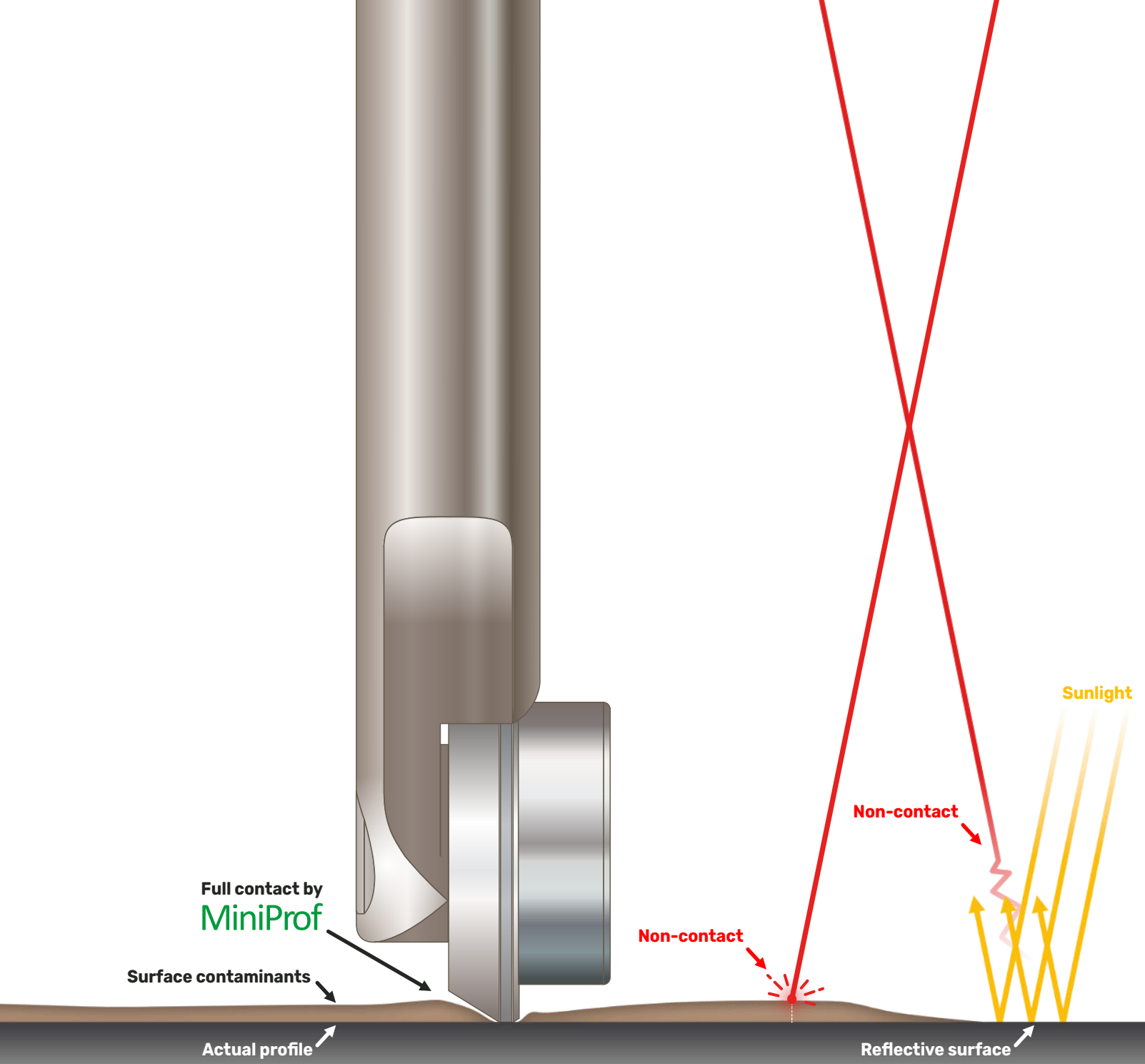
Maintenance
On-site field/workshop conformity, limit inspection and documentation
Rail grinding, profile check before/after
Wheel re-profiling, profile check before/after milling

Measure the actual profile
- not just the accumulated surface

The MiniProf systems are based on secure, full-contact measurements, where a knife-shaped, magnetic measuring wheel interfaces directly with the profile surface throughout the entire measuring process. This effectively eliminates concerns about oil, dirt, grease, and other contaminants, as the wheel cuts through these layers to measure the true profile. The tactile sensing advantage ensures precise measurements by maintaining both physical and visual contact with the surface, providing real-time feedback.

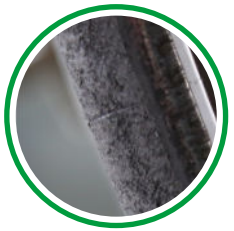
The MiniProf systems deliver highly accurate and reliable profile data, thanks to its unique full-contact measuring principle. This principle incorporates two rotating optical high-resolution encoders that ensure measurements are taken perpendicular to the surface across the entire profile. By capturing 20,000 to 30,000 individual points in a single profile measurement, the MiniProf systems provide exceptional raw data and ensure outstanding profile accuracy and consistency you can depend on.

Learn more by scanning the code



Examples of **surface contaminants** and **obstructions**


Sand


Dirt


Lubrication


Leaves


White frost


Raindrops


Snow

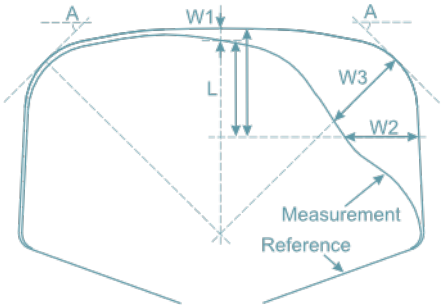

Reflecting light

Learn more by scanning the code

MiniProf BT Rail

The MiniProf Rail system is attached magnetically to the top of the rail head, using the opposite rail as a reference through a telescopic rod. It measures the cross-sectional profile of railway tracks via Bluetooth or cable in less than 5 seconds, minimising user exposure on the track, enhancing safety and efficiency. It is suitable for most track types including grooved rails and supports multiple track gauges.

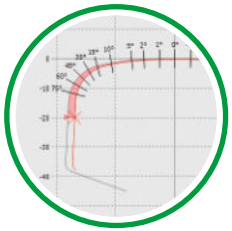
Vertical, horizontal and angled wear is calculated instantly. The versatile and flexible Envision software package offers numerous additional calculations and alignments, allowing for optimal customised configuration.



Gauge
A telescopic rod uses the opposite rail as a reference to ensure correct and stable positioning for measuring the rail profile and track gauge simultaneously in one single measurement.

Perpendicular device
A small built-in perpendicular device provides correct alignment with the rail, preventing faulty diagonal measurements and further reducing exposure time.

Grinding
Envision visualises and calculates residuals and areas automatically, providing instant information of metal removal and grinding stone tilt. Measurements can be compared in multiple ways and easily exported to various formats.



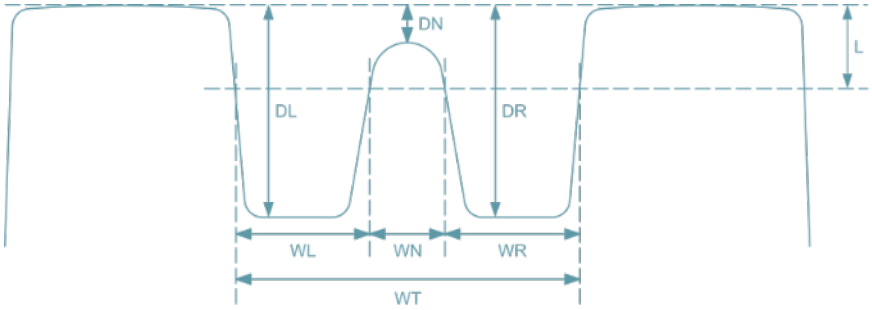
PROFILE ACCURACY | Better than ±11 µm | Repeatability: ±2.5 µm **MEASURING SPEED** | < 5 seconds **IP RATING** | IPX4 **WEIGHT** | MP-260: 0.8 kg | MP-261: 0.7 kg | MP-262: 1.2 kg | Telescopic rod: 0.6 kg

Learn more by scanning the code

MiniProf BT

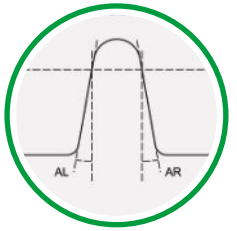
Switch & Crossings

The MiniProf Switch system measures multiple cross-sectional profiles of switches and crossings quickly and easily via Bluetooth or cable. It can be easily adjusted to match various switch measuring scenarios by modifying the horizontal movement.
Magnetically attached to the top of the rail head, it extends to the opposite rail through a fixed rod, providing stability and enabling gauge and track-relative switch measurements. It can also measure the rail profile and track gauge with multirod support.

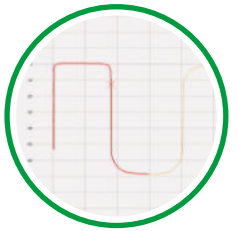


Physical placement
Each measurement provides precise information on the physical placement of the multiple profiles while minimising user exposure on the track.

Frogs and guardrails
Frog clearance and nose angles are calculated instantly. The versatile and flexible Envision software package offers additional calculations, allowing for optimal customised configuration.



Independent profiles
Each profile is saved as an independent measurement which can be used with all standard rail calculations. Single rails and grooved rails can also be measured.



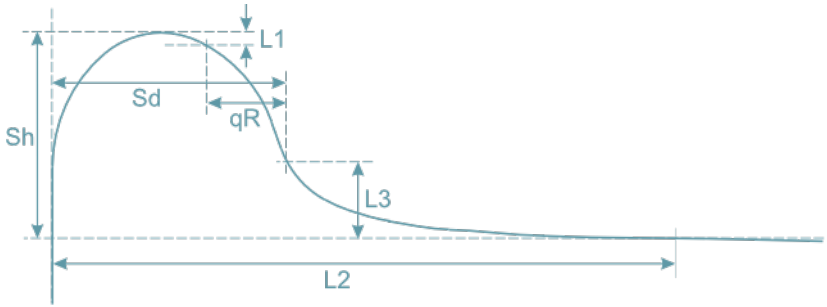
PROFILE ACCURACY | Better than ±11 µm | Repeatability: ±2.5 µm | Gauge: ≤200 µm **HORIZONTAL MOVEMENT** | Range: 300 mm (100 mm towards gauge side, 200 mm towards field side) | Displacement: ≤100 µm
MEASURING SPEED | < 5 seconds per profile **WEIGHT** | Unit: 7 kg

Learn more by scanning the code

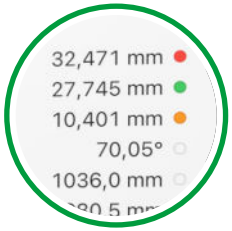
MiniProf BT Wheel Mini

The MiniProf Wheel Mini system is attached magnetically to the backside of the wheel and provides fast and easy cross-sectional profile measurements of railroad wheels via Bluetooth or cable. Due to the small size back plate of the instrument, it can be mounted on even very small wheels, including tram wheels where only limited space is available.

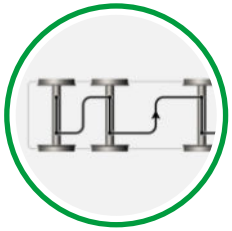
Parameters such as Sd, Sh and qR values are calculated instantly and numerous additional calculations and alignments for wheels are available in the versatile and flexible Envision software package, allowing for optimal customised configuration.



Easy data collection & instant results
A measurement can easily be performed with just a few taps on a smartphone using the Criterion app. It offers real-time feedback with instant go/no go results and clear visualisation of the measurement results.



Measuring schemes
When measuring multiple profiles, the MiniProf measuring scheme is a very strong tool for clear identification of each profile in advance and for simplifying and reducing the measuring process even further.



Reprofiling
Ideal for use before and after wheel reprofiling to determine when to reprofile and how much material to remove. Thanks to its unmatched accuracy, this ensures precise reprofiling and extends the lifespan of rolling stock.

PROFILE ACCURACY | Better than ±9 µm | Repeatability: ±2.5 µm **MEASURING SPEED** | < 5 seconds **WEIGHT** | Unit: 0.7 kg

Learn more by scanning the code

MiniProf BT Wheel 400

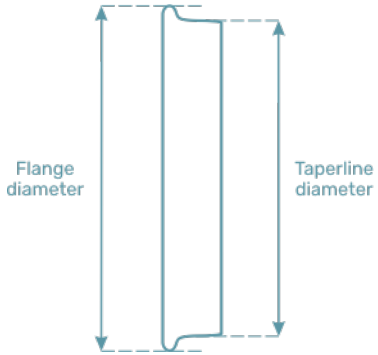
The MiniProf BT Wheel 400 system is attached magnetically to the backside of the wheel and provides fast and easy cross-sectional profile measurements of railroad wheels via Bluetooth or cable. It measures the wheel profile, flange- and taperline diameter in a single measurement.

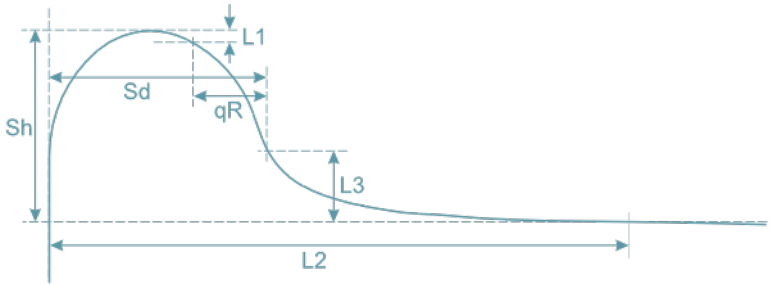
Parameters such as Sd, Sh, qR and diameter are calculated instantly and numerous additional calculations and alignments are available in the versatile and flexible Envision software package allowing for optimal customised configuration.

DIAMETER AND THE VERSINE PRINCIPLE

The diameter measurement of the MiniProf Wheel 400, like most other handheld measuring devices, uses the versine measuring principle, assuming an ideal wheel with no deformations and perfect surface conditions. However, minor wheel defects or surface irregularities can lead to significant inaccuracies. For example, a small 0.1 mm dent on the flange of a 1,000 mm wheel could result in a diameter deviation of up to 2.2 mm.

Learn more about the versine principle by scanning the code





PROFILE ACCURACY | Better than ±9 µm | Repeatability: ±2.5 µm **DIAMETER ACCURACY** | 800 mm: 30 µm | 1000 mm: 50 µm | 1200 mm: 80 µm **MEASURING SPEED** | < 5 seconds **WEIGHT** | Unit: 1.4 kg

Learn more by scanning the code

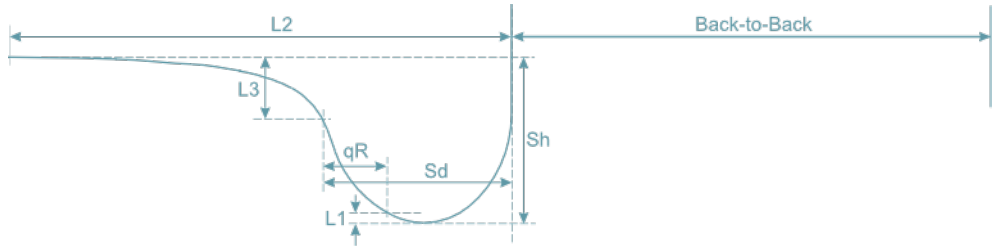
MiniProf BT

Wheel Back-to-Back

The MiniProf Wheel Back-to-Back system is designed to measure the wheel profile as well as the back-to-back distance of the wheelset in one fast, single measurement. Magnetically attached between the backsides of the wheels and connected through a solid rod, it can be applied directly under the rolling stock or on standalone wheelsets depending on the type of work.

Combined with the profile measurement, it gives a valuable set of wear parameters useful to evaluate the condition of the wheelset and identify where maintenance work is required.

Parameters such as Sd, Sh and qR values and the back-to-back distance are calculated instantly and numerous additional calculations and alignments for wheels are available in the versatile and flexible Envision software package, allowing for optimal customised configuration.



PROFILE ACCURACY | Better than ±9 µm | Repeatability: ±2.5 µm **BACK-TO-BACK ACCURACY** | 200 µm **MEASURING SPEED** | < 5 seconds **WEIGHT** | Unit: 2 kg

Learn more by scanning the code

MiniProf BT Brake

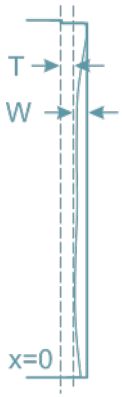
MiniProf BT Brake is an excellent tool for measuring the important wear parameters of brake discs and for calculating the brake hollowing and brake thickness.

MiniProf BT Brake provides instant calculations of the brake hollowing and brake thickness. The MiniProf Envision software can visualise and calculate residuals and areas automatically. Measurements can be compared in multiple ways and easily exported to various formats. MiniProf Envision offers you a powerful brake analysis tool as well as user-friendly measuring software.

PROFILE ACCURACY | Better than ±11 µm | Repeatability: ±2.5 µm
MEASURING SPEED | < 5 seconds **WEIGHT** | Wheel mounted: 0.9 kg | Axle mounted: 1.2 kg

Wheel mounted
The wheel mounted MiniProf BT Brake instrument is attached magnetically to the vertical part of the wheel, either on the backside of the flange or on the outer side of the rim. This part of the wheel is used as a reference for the measurement.

Axle mounted
The axle mounted MiniProf BT Brake instrument is mounted on the outer diameter of the brake disc and is attached using magnetic rollers. These also align with the wear marker on the disc which act as reference points for the measurement.



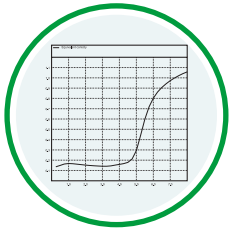
Learn more by scanning the code

MiniProf BT TwinHead

With the full contact MiniProf TwinHead instruments for wheels and rails, the left and right profiles are measured consecutively one by one obtaining an extremely accurate relationship between the two profiles, including a precise knowledge of the rotation of the profiles relative to each other. This is a crucial part of any wheel/rail interaction study and is especially important when analysing running characteristics for rolling stock using e.g. equivalent conicity studies.

Equivalent conicity

The dynamic interaction between railway vehicle and the track is fundamental to ensure a safe and efficient operation and maintenance of the railway and can be described by using equivalent conicity. A high equivalent conicity increases instability/hunting, infrastructural damages and the risk of derailment and it is therefore a vital parameter when analysing the wheel/rail interface.



Contact studies

When you know the exact profiles and geometric interaction between the wheels and rails you can:

- Optimise your reprofiling maintenance schedule
- Identify critical speed limits
- Reduce the risk of derailment
- Improve vehicle stability & driving comfort
- Reduce maintenance costs

PROFILE ACCURACY | Better than ±11 µm | Repeatability: ±2.5 µm | Gauge: ≤100 µm **MEASURING SPEED** | < 5 seconds per profile **WEIGHT** | TwinHead Rail: 1.9 kg | TwinHead Wheel: 2.7 kg

Easy **data collection**

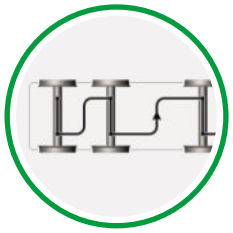
MiniProf Criterion is the iOS/Android app for performing profile measurements with a MiniProf BT instrument. The app is available for free download and currently supports profile measuring with the MiniProf single head Wheel, Rail and Brake systems. In addition to profile measurements, Criterion includes selected calculations and alignments from the complete Envision software package.

Download on the App Store

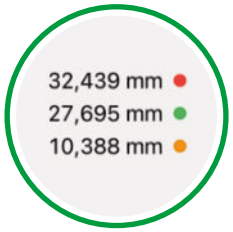
GET IT ON Google Play

MiniProf Criterion

Intuitive user interface
MiniProf Criterion is designed for use on smartphones and provides an intuitive measuring process, which works just like MiniProf Envision. The app supports numerous languages for a personalised user experience.

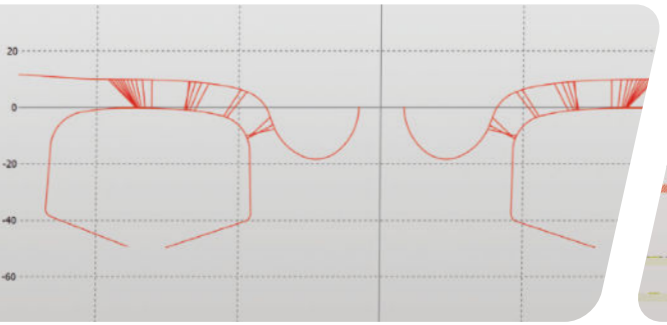


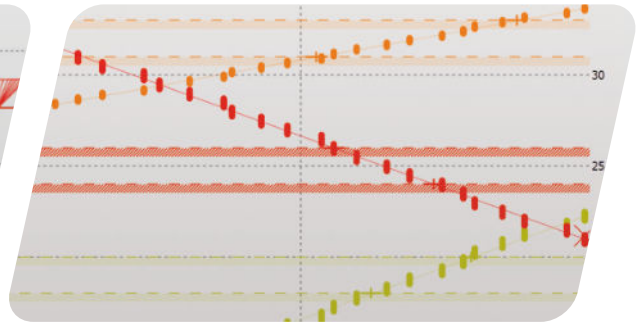
Measuring schemes
Measurement schemes enable easy data collection of user-defined patterns of measuring locations resulting in efficient and reliable measurements. In addition, the GPS location can be attached to the individual measurement.

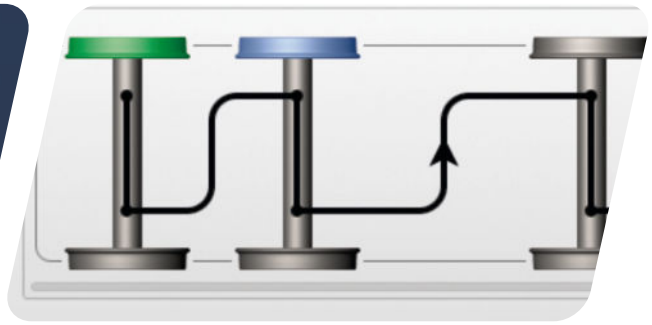


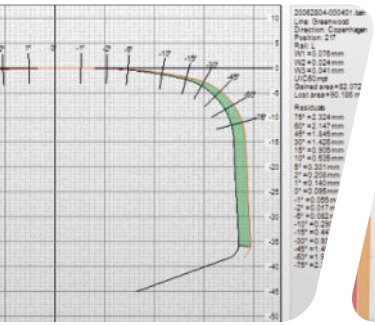
Instant results and limits
Instant results are shown upon completion of a measurement, along with optional alarms using limits configured with the selected reference profile. Profiles and result values can be viewed later and easily transferred to MiniProf Envision for detailed analysis

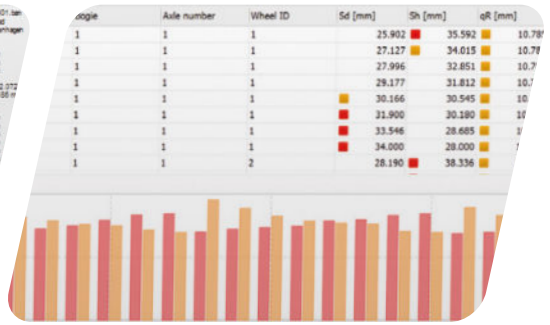
Learn more by scanning the code

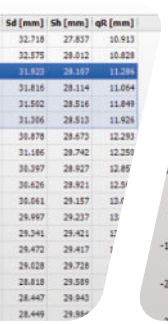


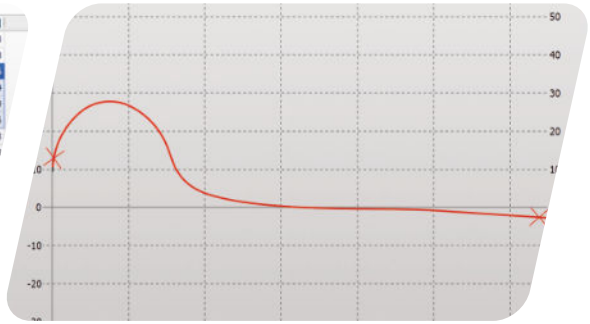












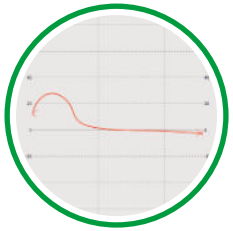
Complete **data analysis** toolbox

The MiniProf systems come equipped with the comprehensive Envision software package, which is usable with all variations of the MiniProf systems. It is highly flexible, user-friendly and customisable to meet individual customer requirements. The software can be used for performing measurements as well as in-depth post measurement analysis.

It offers over 60 calculations and alignments, along with various visualisation options for the measured profiles, including measurement schemes, database evaluation, trending, equivalent conicity and many other analysis capabilities. These features provide a deeper understanding of wear patterns and profile conditions and provide users with the tools needed to maintain high performance, safety and cost-effectiveness in their railway operations.

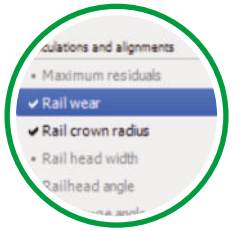
Learn more by scanning the code

MiniProf Envision



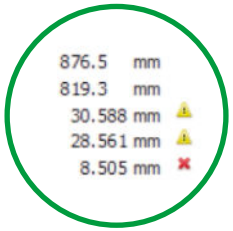
Visual analysis

MiniProf Envision features strong tools for visual analysis of individual profiles, comparison of multiple measurements and overview of large amount of data. With more than 60 calculations and alignments, this offers the most comprehensive software available.



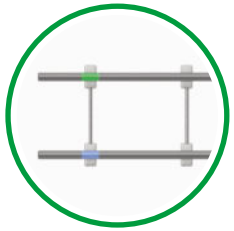
Automated processing

Given a few measurements or large series, analysis can easily be automated using the advanced batch and scripting functionality included in the software.



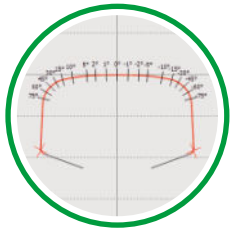
Measuring

Measurements are more than a profile. Customisable information about the subject, instantly calculated wear values and evaluation against alarms values are all a part of the MiniProf measuring experience.



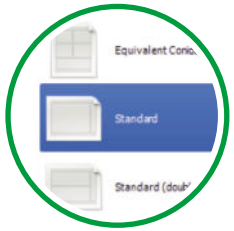
Measurement scheme

MiniProf Envision features a measuring scheme system to perform large sequences of wheel, rail and brake profiles efficiently. An intelligent scheme wizard, enables the user to make customised solutions.



Grinding overlays

Being a vital view in rail maintenance, grinding overlays are available during measuring and for the later analysis. This allows for simple residuals as well as finding areas along the profile.

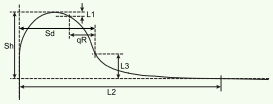


Presentation and portability

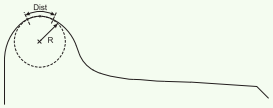
Data and results can be extracted and easily used in third-party applications. Customisable templates allow attention to details when creating reports, which can be saved in PDF format or printed.

Wheel

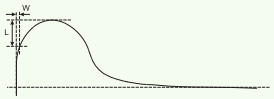
Wheel wear
Calculates the flange thickness (Sd), flange height (Sh) and the flange gradient (qR) for a wheel profile.



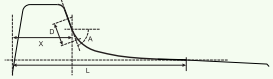
Wheel flange radius
Calculates the radius of the wheel flange (R) for a wheel profile.



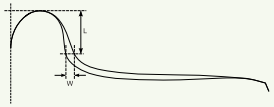
Wheel flange back wear
Calculates the flange back wear (W) for the selected profile.



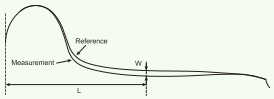
Wheel flange angle maximum
Calculates the maximum flange angle (A) and the position (X) for a wheel profile.



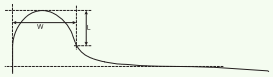
Wheel flange root wear
Calculates the flange root wear (W) for a wheel profile at a specific distance (L) from the top of the flange.



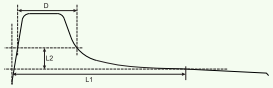
Wheel thread wear
Calculates the thread wear (w) as the distance between the measurement and the reference at a given point (L) defined from the backside of the flange.



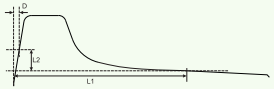
Wheel flange width
Calculates the width of the flange (W) for a wheel profile at a specific distance (L) from the top of the flange.



Wheel flange width (Tram)
Calculates the width of the flange (D) for a wheel profile.

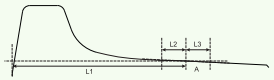


Wheel flange back wear (Tram)
Calculates the flange back wear (D) for the selected profile.

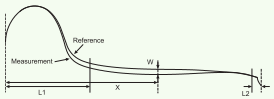


Wheel flange root radius
Calculates the wheel flange root radius (R) at a given point defined from the taperline (L1). The radius is determined from the curvature of a 2nd order polynomial fitted to a specified area (D).

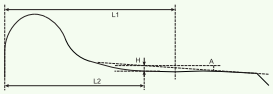
Wheel taperline angle
Calculates the taperline angle (A) using the average for a distance (L2, L3) around the taperline (L1) for a wheel profile.



Wheel thread wear maximum
Calculates the maximum thread wear (W) and position (X) between the measurement and the reference in an area set from the flange backside (L1) to the outer thread (L2).

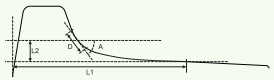


Wheel hollowing
Calculates the maximum wheel hollowing (H) and position (X) for a wheel profile.

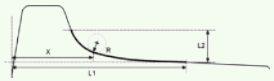


Wheel flange crown thickness
Calculates the thickness of the flange crown (D) for the selected profile.

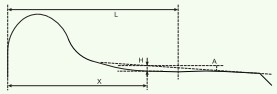
Wheel flange angle
Calculates the angle of the flange (A) for a wheel profile.



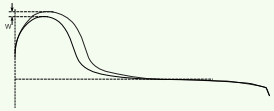
Wheel flange root radius minimum
Calculates the minimum flange root radius (R) and position (X) for the selected profile. The calculation determines the radius using the precalculated curvature values.



Wheel hollowing maximum
Calculates the highest wheel hollowing (H) and position (X) for the selected profile.

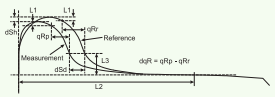


Wheel tip wear
Calculates the tip wear (W) for the selected profile.

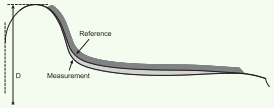


Brake

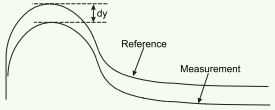
Wheel wear difference
Calculates the difference between the wheel wear on a measured profile and a reference profile.



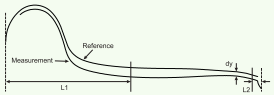
Wheel volume loss
Calculates the volume between the measurement and a reference. This is done using either the measured diameter (if available) or the diameter entered as a parameter for the calculation.



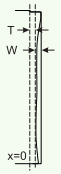
Align wheel on flange top
Aligns a measured wheel profile to the reference profile at the top of the flange. This alignment only moves the profile in the vertical direction. No rotation is performed.



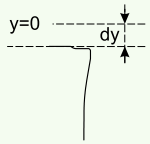
Align wheel on outer thread
Aligns a measured wheel profile to the reference profile on the outer thread. This alignment only moves the profile. No rotation is performed.



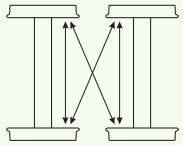
Brake wear
Calculates the brake-disc hollowing (W) and the remaining thickness (T).



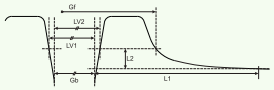
Align brake on top edge
Aligns a measured brake profile on the top edge so this edge overlays the horizontal axis.



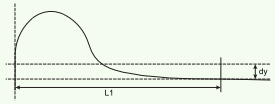
Wheel diameter difference
Calculates the difference between the diameters on wheels in a bogie.



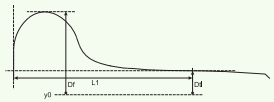
Wheel gauge flange
Calculates a number of wheel dimensions and gauge values given two measured wheel profiles.



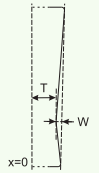
Align wheel on taperline
Aligns a measured wheel profile on a given taperline. This alignment only moves the profile in the vertical direction (dy). No rotation is performed.



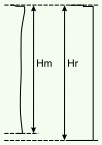
Align wheel on diameter
Aligns a measured wheel profile using the diameter information stored with the profile.



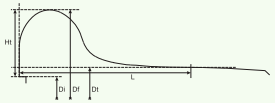
Brake wear (No reference)
Calculates the brake-disc wear (W) and the remaining thickness (T).



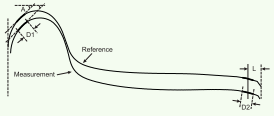
Align brake on scale
Aligns a measured brake profile against the reference by stretching the measured profile vertically so the height of the measurement (Hm) matches the height of the reference (Hr).



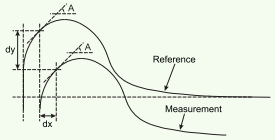
Wheel diameter from tyre
Determines the wheel diameter using the inner diameter and a field containing the tyre height, measured separately.



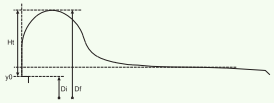
Align wheel
Aligns a measured wheel profile to the reference profile at the top of the flange. This alignment only moves the profile in the vertical direction (dy). No rotation is performed.



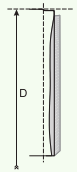
Align wheel on flange back
Aligns a measured wheel profile to the reference profile at the flange back. No rotation is performed.



Align wheel on tyre
Aligns a measured wheel profile using the tyre height information if present.

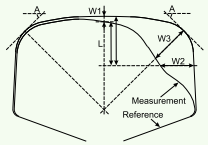


Brake volume loss
Calculates the volume between the measurement and a reference. This is done using either the measured diameter (if available) or the diameter entered as a parameter for the calculation.

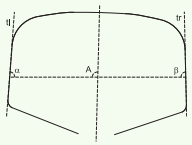


Rail

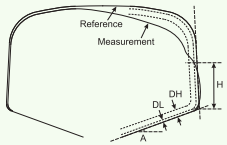
Rail wear
This function will calculate the vertical (W1), horizontal (W2) and 45° (W3) wear. The wear is calculated as the difference between a measured profile and a reference profile.



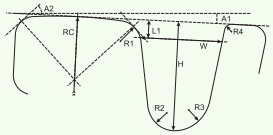
Rail head angle
Calculates the angle of the rail head (A) for the selected profile.



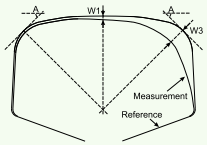
Rail height
Calculates the remaining height of the rail head (H) for the selected profile.



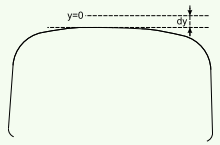
Grooved rail geometry
This function calculates a number of geometrical features for a grooved rail profile: Groove width (W), groove height (H), crown radius (RC) and radiuses for the different parts of the groove (R1, R2, R3 and R4).



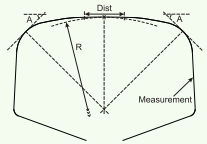
Align rail on wear
Aligns a measured rail profile against a reference by minimising the wear parameters W1 and W3. No rotation is performed on the measured profile.



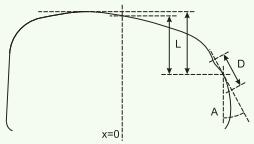
Align rail on top
Aligns a measured rail profile so the profile intersects the horizontal axis at the top point. This alignment only moves the profile in the vertical direction. No rotation is performed.



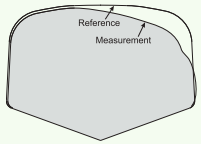
Rail crown radius
The rail crown radius (R) is calculated as the radius of the circle that gives the best fit at the top of the rail head in an area determined by the distance parameter (Dist).



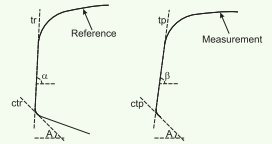
Rail gauge angle
Calculates the gauge angle (A) at a given point defined from the top of the rail head (L). The angle is determined either from the tangent in the point, the angle between two points on each side or as the average of the tangent angels in a certain area (D).



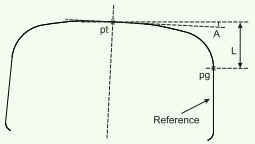
Rail head area
Calculates the rail head area for the selected profile and reference. This also calculates the area ration between profile and reference.



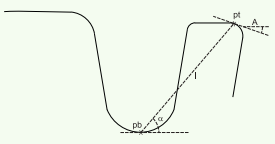
Align rail
Aligns a measured rail profile against a reference by using the field side face and the lower corner. The alignment can optionally use the gauge side face if desired.



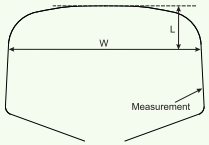
Align rail for grinding (Low/ Tangent)
Aligns a measured rail profile against a reference according to the CEN grinding standard for tangent track and the low rail in curves. No rotation is performed on the measured profile.



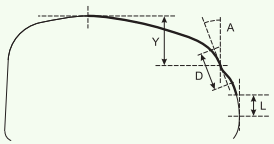
Align grooved rail
Aligns a measured grooved rail profile against a reference using a point on the inner side of the check part and the bottom of the groove.



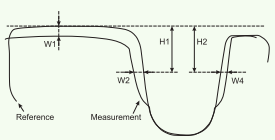
Rail head width
The rail head width (W) is the distance from the field side of the rail head to the gauge side measured at L millimetres from the highest point of the rail profile. Setting the L parameter to 0 makes the calculation return the largest width.



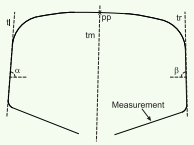
Rail gauge angle maximum
Calculates the maximum gauge angle (A) and position (Y) for the selected profile. The calculation determines the angles either as the tangent angle in each point, as the angle between two points on each side or as the average of the tangent angles in a certain area (D).



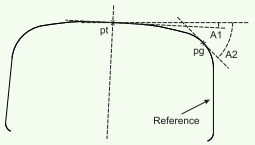
Grooved rail wear
This function will calculate the vertical (W1) and horizontal (W2, W4) wear for a grooved rail. The wear is found as the distance between the measurement and the reference.



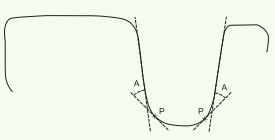
Align rail centered
Aligns a measured rail profile against a reference by using both sides of the profiles and the top point. This alignment is particularly useful for aligning measurements of new rails for quality control.



Align rail for grinding (High)
Aligns a measured rail profile against a reference according to the CEN grinding standard for the high rail in curves. No rotation is performed on the measured profile.



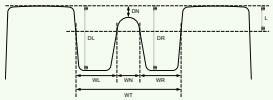
Align grooved rail (Flat)
Aligns a grooved rail measurement using the bottom parts of the groove, either gauge part or check part.



Switch & Crossings

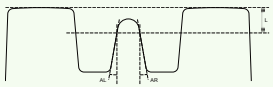
Switch frog clearance

Calculates width values of total width (WT), left width (WL), nose width (WN) and right width (WR). Depth values of left depth (DL) and right depth (DR). Nose depth values of nose depth left (DNL) and nose depth right (DNR).



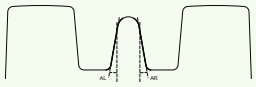
Switch nose angles

Calculates nose angle values of left angle (AL) and right angle (AR) at a given point defined by the parameter (L). The angles are determined either from the tangent in the point, the angle between two points on each side or as the average of the tangent angles in a certain area (D).



Switch nose angles maximum

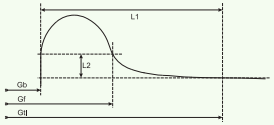
Calculates the maximum nose angle values of left angle max (AL) and right angle max (AR) for the selected profiles. The angles are determined either from the tangent in the point, the angle between two points on each side or as the average of the tangent angles in a certain area (D).



TwinHead

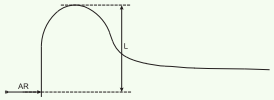
TwinHead wheel gauge

Calculates the wheel gauge values (Gb, Gtl and Gf) for a set of TwinHead wheel profiles. Gb is the gauge found at the backside of the wheels, Gtl is the gauge found at the taperline on the wheels and Gf is the gauge found on the flange.



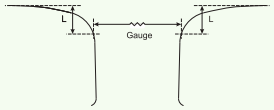
TwinHead wheel gauge (AR)

Calculates the wheel gauge value (AR) for a set of TwinHead wheel profiles. AR is the gauge found at the backside of the wheels at a point relative to the flange top.



TwinHead rail gauge

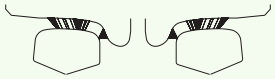
Calculates the gauge between two rail profiles made with a TwinHead rail unit. The two profiles must be linked together for the calculation to succeed.



Contact studies

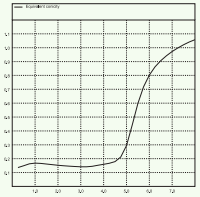
Contact points

The contact points is a graph showing where all the contact between the wheel and rail profiles were found.



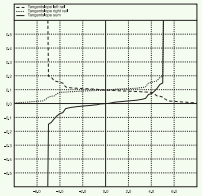
Equivalent Conicity

The equivalent conicity shows a graph with the conicity plotted relative to the wheelset displacement.



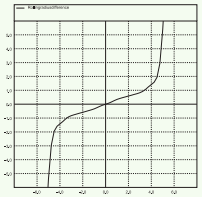
Contact angles

The contact angles shows a graph of the left and right contact angle and the difference between the left and right angle relative to the wheelset displacement.



Rolling radius difference

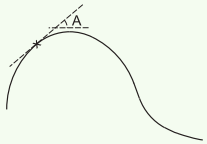
The rolling radius difference shows a graph of the difference rolling radius relative to the wheelset displacement.



Common

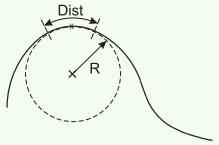
Angles

Calculates the tangent angle, measured in degrees, at each point of the selected profile. The angles for a reference profile are calculated and displayed along with the angles of the measured profile if a reference is selected.



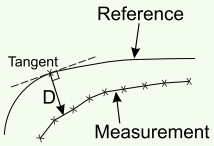
Curvature

Calculates the curvature in every point of a profile by fitting a 2nd degree polynomial to a small part around each point. If a reference profile is available, the curvature will also be calculated for this and the result displayed as a reference for the curvature of the measurement.



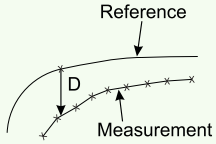
Residuals

Calculates the distance (D) to a measured profile perpendicular to a reference profile at each point of the reference profile. The calculation assumes that the points in the measured profile can be connected with straight lines.



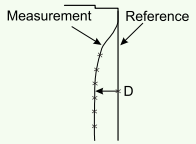
Vertical residuals

Calculates the vertical distance (D) to a measured profile at each point of the reference profile. The calculation assumes that the points in the measured profile can be connected with straight lines.



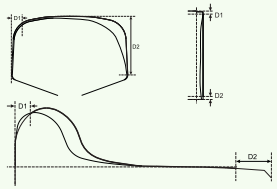
Horizontal residuals

Calculates the horizontal distance (D) to a measured profile at each point of the reference profile. The calculation assumes that the points in the measured profile can be connected with straight lines.



Maximum residuals

Calculates the maximum, minimum and average residual between the reference profile and the measured profile in a given area. This area is defined independently for wheel, rail and brake profiles as illustrated below.



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Antong Borui Company
Anyang Dali Company
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Germu Shenhua Company
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Qiqihaer Locomotive Depot
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Shangqiu High Speed Train
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Shanxi Aozhengtongda Co.Ltd
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Shaoxing Metro
Shenyang High Speed Train Track
Shenyang Metro
Shenyang Metro Line 1
Shenyang Track Depot
Shijiazhuang Subway Line 1, 2, 3
Shijiazhuang Track Depot
Sichuan Jinrongzhike Company
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Siemens
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SWK Mobil GmbH
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MÁV-START
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BSP
Central Railway
Delhi Metro Rail Cooperation
Eastern RLY
Electric Loco Shed, Howrah
HYT Engineering Co.
Indian Railways
Jindal Steels & Power Ltd.
Northern Railway
Old Kolkata Metro
R.D.S.O. Ministry of Railways
SCRLY
South Central Railway
Southern Railway

Ireland

Alstom Transport Ireland Ltd.
GPX Rail
Irish Rail (Iarnrod Eireann)
Transdev Light Rail

Israel

Alstom Israel (Citadis Jerusalem)
CRTG-EEB Red Line Systems
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Alstom
AMT Genova
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BTW
CoFren
COMMEL Srl.
Ferrotramviaria SpA
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Lucchini
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Japan

Akebono Brake Industry.
Asa Seaside Railway
Bureau of Trans. Tokyo Metro
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Sagami Railway, Japan
Shikoku Railway Company
Speno NIPPON
Sumitomo Metal Industries LTD
Tetsudu kiki
Tobu Railway
Tokyo Electric Railway
Tokyo Metro Co.
Tokyo Metropolitan Bureau
Tokyo Metropolitan Government
Tokyo Railways
Toshiba Transport Engineering
Totetsu Kogyo
Transportation Bureau
Transportation Bureau, Senda
Ueda Brake Ltd.
Yamato Trackwork System co.
Yokohama Municipal Transp. B

Malaysia

KTMB - Malaysian National Railway
LRT Kelana Jaya Line
MRT Kuala Lumpur
MRT1 SBK Line
MRT2 sg Buloh Line
Rapid KL
Sistem Transit Aliran Ringan

Mauritania

SNIM

Mexico

Ferrocarril Mexicano Sa de CV

Morocco

Alstom Morocco

Netherlands

Arriva Nederland
BAM Rail
Connexxion
De Wilde Spoorwegbouw
DEKRA Rail – NL
Esveld Consulting Services BV
GVB-Amsterdam
HTM Infra
HTM Personenevervoer N.V.
Mecno Service B.V.
Movares Nederland BV
NS Technisch Onderzoek
ProRail
RET N.V.
Ricardo Nederland B.V.
Stadler Rail
Strukton Rail
TU Delft

New Zealand

Kiwi Rail

Norway

Bane NOR SF
Bilfinger Industrial Services AS.
Mantena AS
Norwegian University of Science
Oslo Sporveier
TM Togdrift

Peru

Metro de Lima
OHD
Tren Urbano De LIMA

Poland

Firma Dany
Karya Sp. z.o.o.
PKP Polskie Linie Kolejowe S.A.
SPAW-TOR

Portugal

Caminfos de Ferro Portugueses
Metro Lisboa
REFER

Puerto Rico

ACI Puerto Rico

Qatar

Doha Metro
Siemens Mobility

Romania

AFER-Romanian Railway Authoroty
Alstom

Saudi Arabia

Copasa Arabia Comp. Ltd, CR 40302
Etihad Rail DB
Haramain High Speed Railway
Riyadh Metro

Serbia

GSP

Singapore

SBS Transit
Singapore MRT Ltd

Slovakia

Dopravný Podnik Bratislava, a.s.
University of Zilina

South Africa

Bombardier Transporation
Gibela Rail
Impala
LRS Lennings Rail Services
Lucchini South Africa
Metrorail
Orex
PRASA
Rovos Rail
Sasol
Spoornet
Surtees Engineering
Transnet Engineering

South Korea

ARA Bridge
AsiaTech
Aviation & Railway Accident Investig.
Chunwun Railroad
Dawonsis
Dongmyung
E&O Services
Hanmac
Hong-ik
Hyundai Rotem Company
Korail (GwangJu Depot)
Korail/Samsung
Korea High Speed Rail Construction
KRRI
KRTC
Rotem
Saman
SamPyo-Pantrack
Seohyun
SeoulMetro
Sherpa Cooperation

Spain

ADIF
Alstom Spain
Arcelormittal
AVE- Dir. de Infraestructura
Bombardier Transportation Spain
BTREN Taller Mant. Renfe
CAF
CETEST
Euskotren
Ferrovial
ICER RAIL
Knorr-Bremse
Metro Ligero Oeste
Nertus Mant. Ferroviario
Talgo
Talleres de Metro Bilbao
TMB
Uni. Politecnica de Valencia
University of Vasc Country
Visiona Control Industrial
Vossloh España (Valencia)

Sweden

AB Stockholms Spårvägar
Banverket
Bombardier Transportation
Göteborg Spårvägar
Inexa
Infranord AB Mätenheten
Lameco Equipment AB
Latronix AB
LKAB Malmtrafik AB
Luleå University of Technology
Norrköpings kommun
SJ AB
SJ Maskindivision
SL Bansystem AB
Spark Trade AB
SweMaint AB
Trafikverket
Vossloh Rail Services Scandinavia

Switzerland

ALSTOM Schienenfahrzeuge AG
BLS AG
Bombardier Transpotation CH
East Metals AG
Furka-Oberalp-Bahn
Matisa Materiel Industriel SA
Matterhorn Gotthard Bahn
Metro Lausanne
Regionalverkehr Mittelland AG
SBB CFF FFS
Speno International S.A.
Travys Transports Vallée de Joux
Verkehrsbetriebe Zürich

Taiwan

Chan Chun Construction Company
Groundwood Enterprise Co., Ltd.
Kaohsiung Rapid Transit Corp.
Metro Taipei
Ming-Yu Machinery Co., Ltd.
San Lien Tech
THSRC

Turkey

Burulas Ulasim
Istanbul Ulasim
Körfez Ulastima
Rayvag Vagon Sanayi ve Ticaret
TCDD
Voestalpine Kardemir Demiryolu

United Arab Emirates

Saudi Railways Company
Serco Dubai Metro

United Kingdom

4-Rail Services Ltd.
Alstom
Balfour Beatty Rail Ltd.
Becorit GmbH
Blackpool Council
Bombardier Transportation UK
British Steel
Colas Rail
DEKRA Rail
DeltaRail UK
Docklands Light Railway Ltd.
DRS – Direct Rail Services
East Midlands Railway
Edmundson Electrical LTD
ESG
Euro Tunnel
Federal Mogul Friction Products
Freightliner Maritime Terminal
Greater Anglia
GTRM
Harsco Rail (UK)
Hitachi Rail Europe Ltd.
Infraco BCV Limited
Instronix
Keolis Nottingham Tram
Knorr-Bremse Rail Systems (UK)
L.B. Foster Rail Technologies
LNER
London Underground
Loram
Lucchini UK
LUL
MerseyRail
Metronet Rail BVC
MRX TECHNOLOGIES
Network Rail
Newcastle University
Nottingham Tram Consortium
RAIB
RFL (Infrastructure) Ltd.
Schweerbau (UK) Ltd.
Serco Docklands Limited
Serco Railtest Limited
Siemens
Siemens (Heathrow Express)
Siemens Rail Systems
SNC-Lavalin Rail & Transit
South Eastern Trains
South West Trains
South Western Railway
SPT – Strathclyde
Transeng Ltd/Heathrow Express
Transport for London (TFL)
Trescal Ltd.
Tube Line
University of Birmingham
University of Huddersfield
VOESTALPINE VAE UK Ltd.
West Midlands Metro
West Midlands Trains

United States of America

Alstom Transportation Inv.
American Steel Foundries
Amsted Rail Company Inc
Amtrak
Anchor Brake Shoe
Arcelomittal
ARM
BART
BNSF Railway
Bombardier Transportation US
Booz
City of Charlotte
City of Oklahoma City
CSX Railroad
Dart
Delta Manufacturing
Engineering Systems Inc.
ENSCO
Evraz NA
FRA
GE Transportation Systems
General Motors Corp.
Hampton Roads
Harsco Rail
Harsco Track Tech.
Herzog Transit Services
King County DOT Transit
Long Island Railroad (LIRR)
Loram
MARTA
Maryland Transit Administration
Massachusetts Bay Com. Railroad
Massachusetts Bay Transportation
MBTA
Memphis Area Transit Authority
Metro North Railroad
Miner Enterprises
MTA Baltimore Heavy Rail
MTA Houston
MxV Rail
National Transportation Safety Board
New Jersey Transit
New York City Transit
Norfolk Southern Corp.
North Shore Mining
NYCTA-MOW
Orgo-Thermit Inc.
PATH
Penn Machine Company
Plasser
Port Authority of Allegheny County
Purple Line Transit Operators
Railroad Friction Products Corp.
RTD-Denver
Saint-Gobain Abrasives
Simmons Machine Tools Corp.
Sound Transit
Sperry Rail
Standard Car Truck Co.
Steel Dynamics Inc.
Strato Inc.
The Modern Continental Construction
TTC Inc.
TTI
TTX Co.
Union Pacific Railroad Company
VAE Nortrak North America
Valley Metro Rail
Valley Transportation Authority
Voestalpine US
Wabtec Inc.
Whitmore
WMATA
Woojin IS America

Venezuela

Metro de Caracas

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With more than 30 years of international experience, a representative office in China and local agents covering over 50 countries, Greenwood Engineering is the leading manufacturer of innovative and highly specialised measuring equipment for optimal asset management and maintenance planning in the global road and railway industry.

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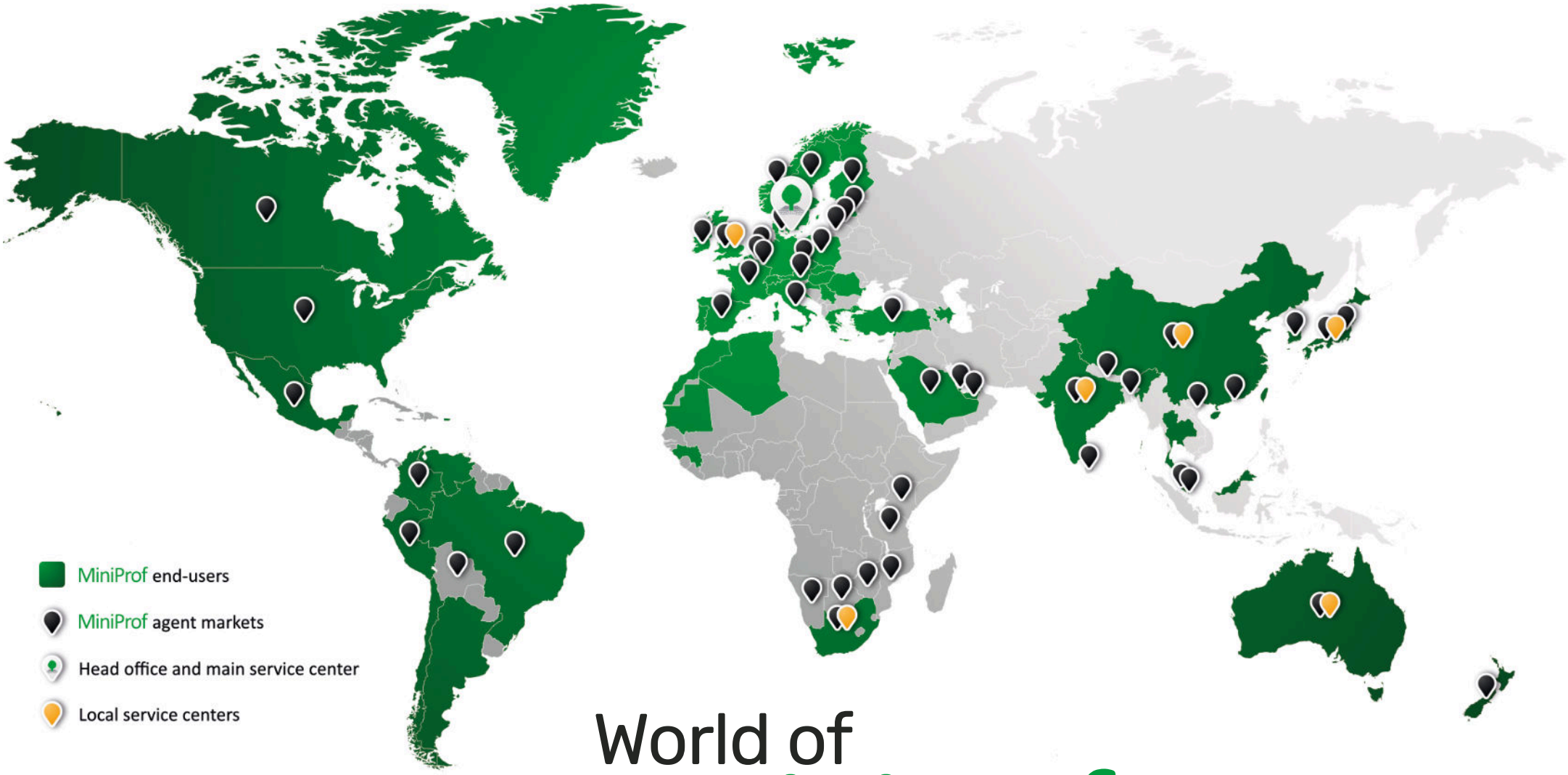

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