

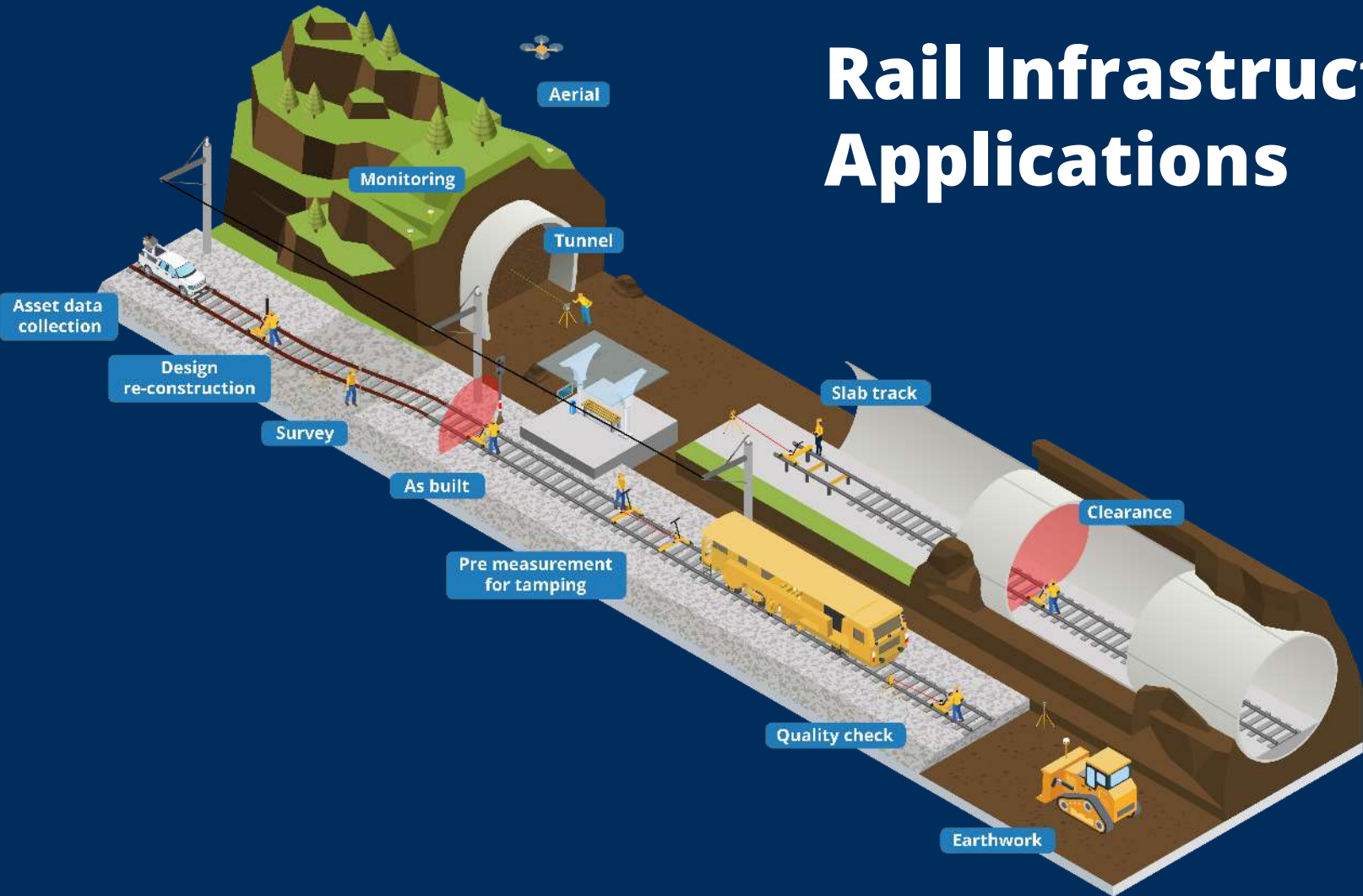
Presented By:  
Andreas Sinning

# **GEDO Applications Overview**

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Using GEDO for various track survey and construction applications

# Rail Infrastructure Applications



# GEDO Hardware

Modular system that grows with your tasks and requirements

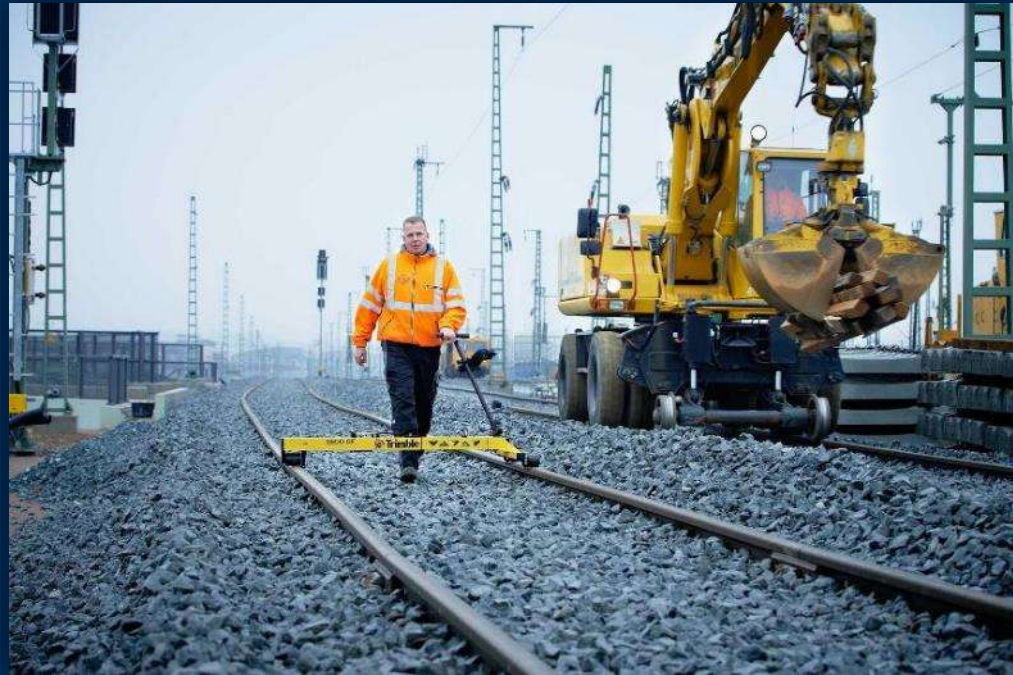
- GEDO CE 2.0 base unit
  - Precise cant and gauge sensor
  - Odometer
  - Communication
  - Illumination
- Gauge adapter
- IMU, Total Station, GNSS Receiver
- Scanner
- Profiler
- Compatible with Trimble instruments



# Track Quality Check - GEDO Doc

Easy way to check the key quality parameters

- Chainage
- Cant
- Gauge
- Twist
  
- No curvature measured!
  
- Camera support



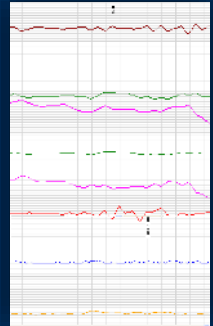
# Track Geometry – GEDO IMS

Enhanced track geometry recording and analysis

- Chainage
- Cant
- Gauge
- Twist
- Horizontal Curvature
- Vertical Curvature



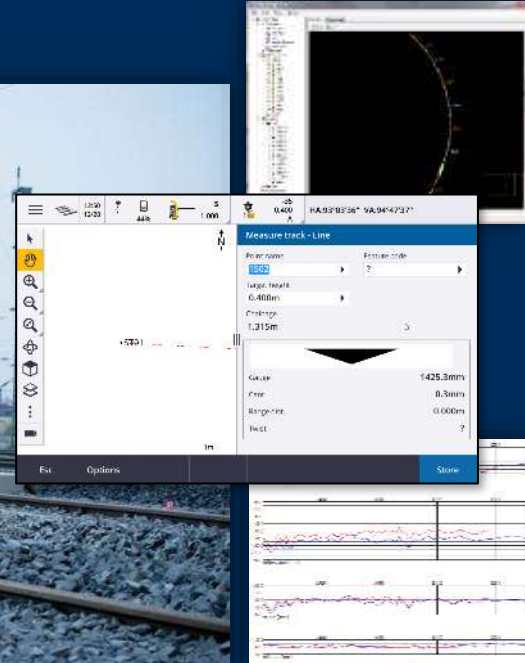
- Compliant with EN 13848-4



# Geodetic Track Survey – GEDO Rec

With total station for precise track survey

- Coordinates
  - Center line (axis)
  - Left rail
  - Right rail
- Cant
- Gauge
- Twist
- Curvature calculated
  
- Re-design
- As-built
- Quality check
- Monitoring



# Geodetic Track Survey – GEDO Rec

With GNSS for fast and draft track survey

- Coordinates
  - Center line (axis)
  - Left rail
  - Right rail
- Cant
- Gauge
- Twist
  
- As-built



# Enhanced Track Survey – GEDO IMS

High productivity track survey

- Coordinates
  - Center line (axis)
  - Left rail
  - Right rail
- Cant
- Gauge
- Twist
- Curvature
  
- Re-design
- As-built
- Quality check
- Monitoring

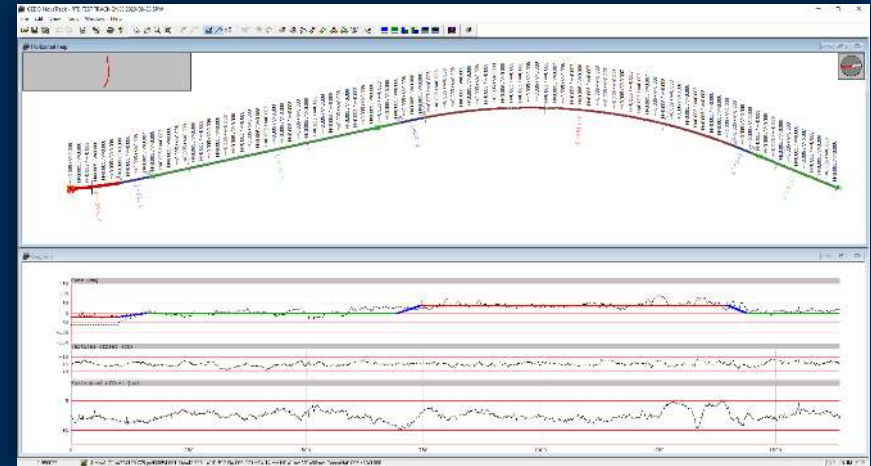




# Track Design – GEDO NovaTrack

## Alignment calculation for track optimization

- Alignment data do not exist
- As-built track far off from initial design
- Initial geometry information missing
- Automatic or semi-automatic reverse calculation of alignments in absolute
- Advanced measurement analysis using regression methods
- Alignment element calculation with Best-fit-to-Limitations option
- Support of user defined rules for geometry, speed and cant limitations

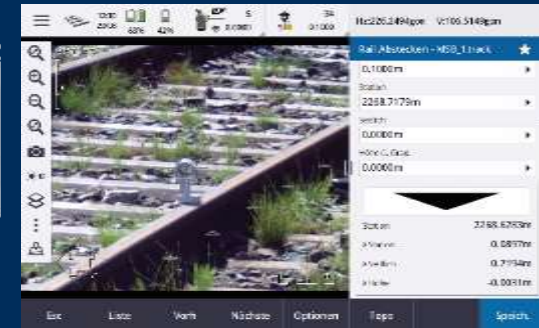


# Track Stakeout – Trimble Access Rail

Software for track survey and stakeout survey tasks



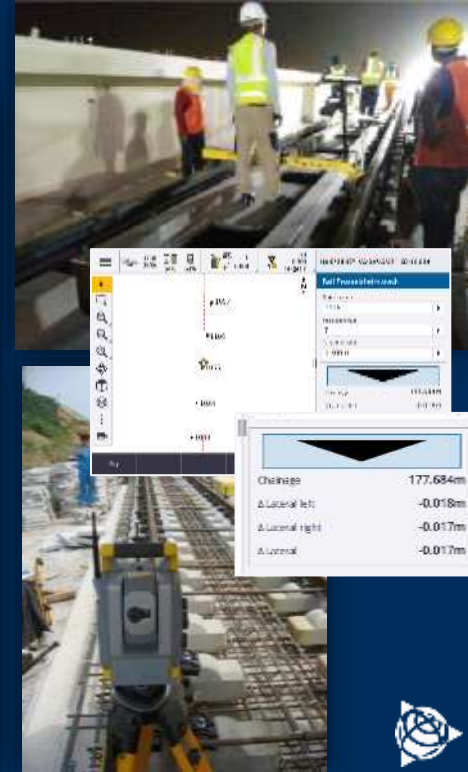
- Real-time transformation
- Total station and GNSS
- Supports rail specific transition bands and chainage line
- Stakeout
- Track adjustment
- Control



# Slab Track Construction – GEDO Track

Proven technology to support track installation

- Live information on site for track adjustment
- As-built survey
- Final quality check
- Quality report
- Precise and productive
- Increasing quality and productivity for track installation
- For direct fix and other slab track systems (i.e. Porr, Rheda 2000)



# Slab Track Construction – GEDO SPS

Customized systems to support rail less slab installation



- Live information on site for slab adjustment



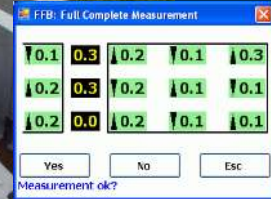
- Automated measurement
- Precise and productive



- Increasing quality and productivity for slab installation



- For rail less slab systems (i.e. Porr, Bögl, Wegh, Sampyo)



# Slab Track Control – GEDO IMS

High productivity final control for slab track

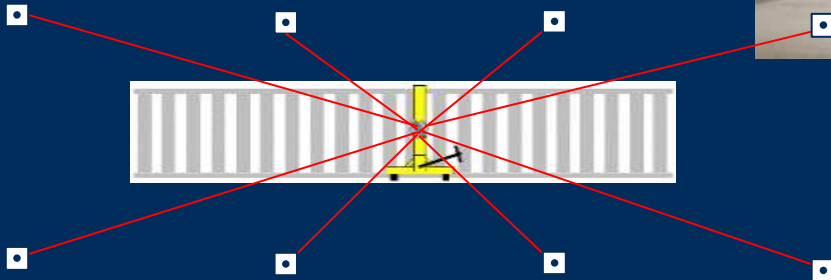
- Integration of total station
- Automated resection
- As-built survey
- Final quality check
- Quality reports
- Precise and highly productive
- Independent from construction method



# GEDO IMS with Total Station

High productive final control for slab track with automated resection

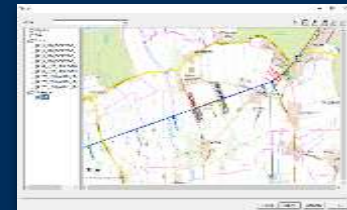
- Best point constellation
- Highest accuracy
- Highest reliability



# Pre-Measurement for Tamping

For all survey tasks around ballast track construction and maintenance

- Pre-measurement for tamping during construction, re-construction and maintenance
- Full integrated survey workflow for re-design and re-construction projects
- As-built check according to design and local tolerances
- Quality check for all relevant track parameters
- Platform survey and as-built control
- Integration with profiler or scanner for clearance check possible
- Full digital data flow from survey in the field to design in the office to pre-measurement in the field and to construction



# Pre-Measurement for Tamping

Improve tamping quality and productivity

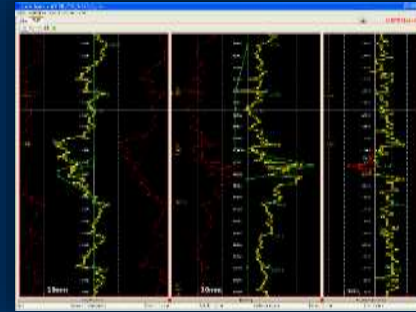


Post-processing

- Ability to change alignment
- Introduce new reference point coordinates

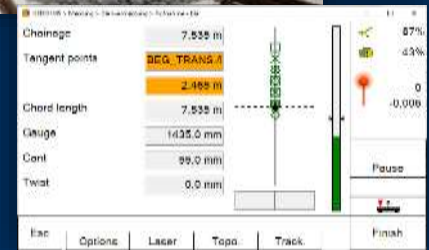
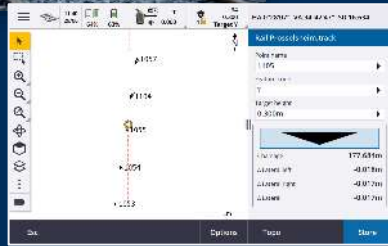
Analysis

- Tamping data preparation
- Ramp definition
- Export for all relevant tamping machine manufacturers and guidance systems (Plasser, Matisa, Harsco, etc.)





# Pre-Measurement for Tamping



## GEDO Track

- Geodetic setup
- Digital alignment data
- Live results

## GEDO Vorsys

- High productivity and flexibility
- Long chord method
- Paper plan and digital data
- Live results

## GEDO IMS

- Highest productivity
- Paper plan and digital data
- Inertial measurement technology



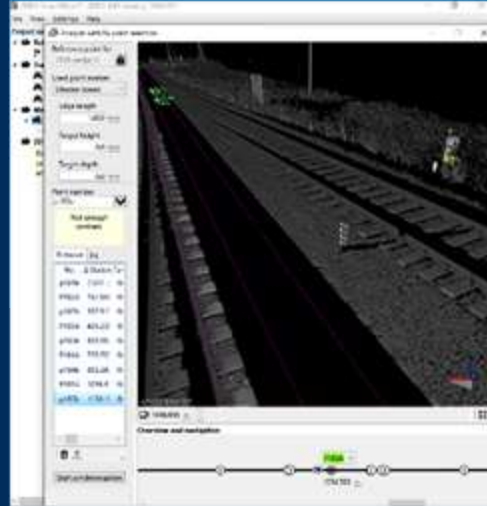
# Trimble GEDO Laser Scanning System for Clearance and Asset Data Collection



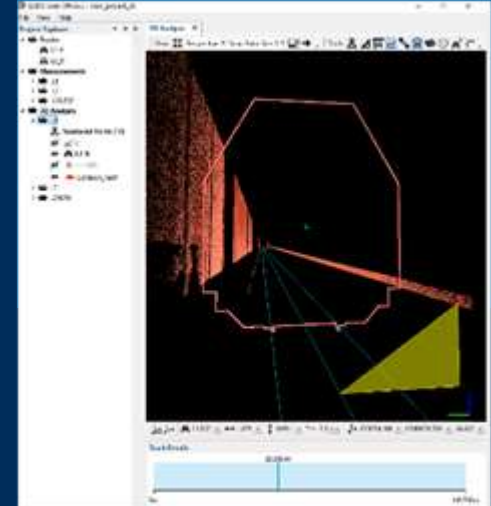
Scan



Process



Analyze & Deliver



# Clearance and Asset Data Collection

Get detailed information by using kinematic laser scanning



## GEDO Rec-Scan

- Relative
- Geodetic in combination with Total Station or GNSS



## GEDO IMS-Scan

- Combination with IMS
- Geodetic referencing based on targets



## GEDO IMS-GNSS-Scan

- Full integration



# Trimble GEDO GX50 Laser Scanner

Laser Scanning System for Kinematic Clearance Analysis and Asset Data Collection



# Trimble GEDO GX50 Laser Scanner

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## Railway Specific

- Utilizes universal multi gauge and multi sensor Trimble GEDO CE 2.0 track measurement trolley system
- Full 360° kinematic scan of track and railway corridor

## Highly Flexible

- Entry level single scan head system
- Field upgradeable to dual scan head configuration
- Adjustable scan head configurations

## Easy to Handle

- Quick and simple trolley and scan system assembly
- Powerful, easy to use and dedicated field software

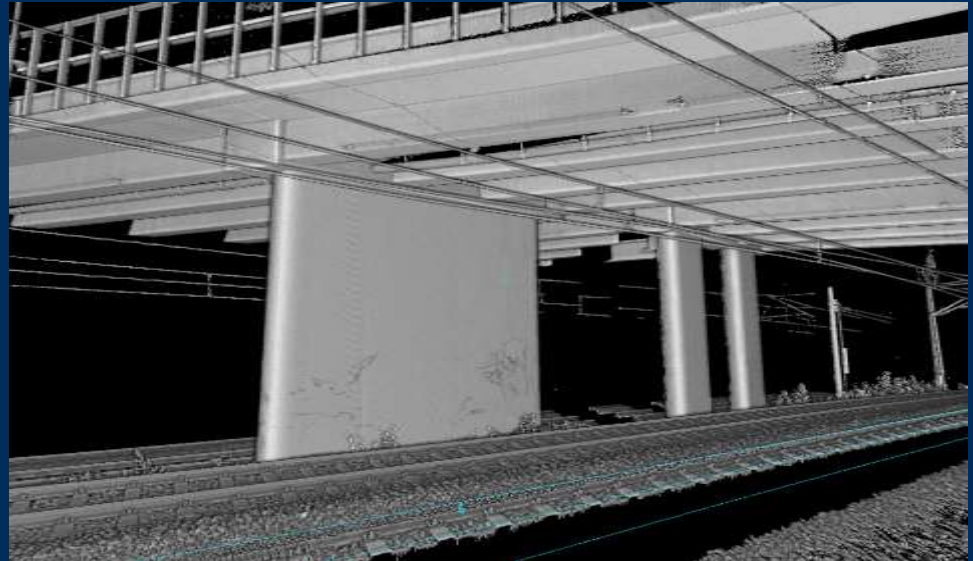


# As-built and Asset Data Collection

Get all details out of your point cloud data by using GEDO Scan Office



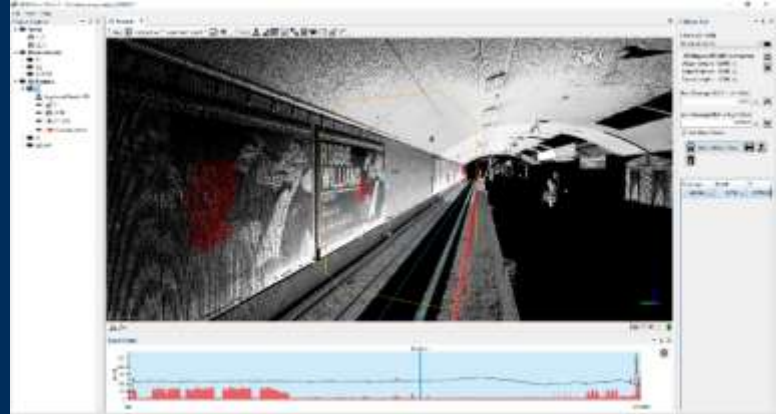
- Enhanced 3D point cloud analysis
- GEDO Scan, Mobile Mapping (i.e. MX50, MX9) and terrestrial scan data (i.e. X7, TX6/8, X12, SX10/12)
- Alignment evaluation
- Capture object information
- Linear object recognition
  - Platform
  - Railway tracks
  - Overhead lines
- Data to support BIM Modelling
  - As-Built check
- As-built survey



# Clearance

## Precise analysis for track safety

- Relative check for as-built
- Absolute check for as-built and design alignment
- Check for new rolling stock
- Profile defined by
  - Envelope (DXF)
  - 3D Wagon model
  - Authority specific rules
- Measurements with track reference
- Cross section export





**GEDO Scan**  
Scan2BIM for a railway station





# GEDO Scan – Mobile Mapping MX9

Two solutions that complement each other perfectly

## GEDO Scan System

- Highest precision for track position, gauge, cant and surrounding objects
- Flexible setup for pure relative, geodetic and full integrated solution
- Ideal for short section up to a few km, tunnels and platforms
- Real time clearance check possible
- Focus on railway specific engineering tasks

## Mobile Mapping MX9

- High productive data collection with medium accuracy
- Integrated cameras
- Ideal for long distances
- Focus on asset data collection and pre-studies



GEDO Scan Office  
Railway specific data analysis





# GEDO Applications

## Relative Measurement

Simple track quality check

## Track Survey

Collect data for design and control

## Track Stakeout

Stakeout track position

## Slab Track Construction

Track installation and control

## Pre-Measurement for Tamping and Re-construction

Data for the tamping machine

## Clearance and as-built

Check clearance for safety and final as-built

## Asset Data collection

Collecting object information



# GEDO around the world

Surveyors and construction companies rely on GEDO solutions

>1.500

Trolleys sold

28

Years

>50

Countries

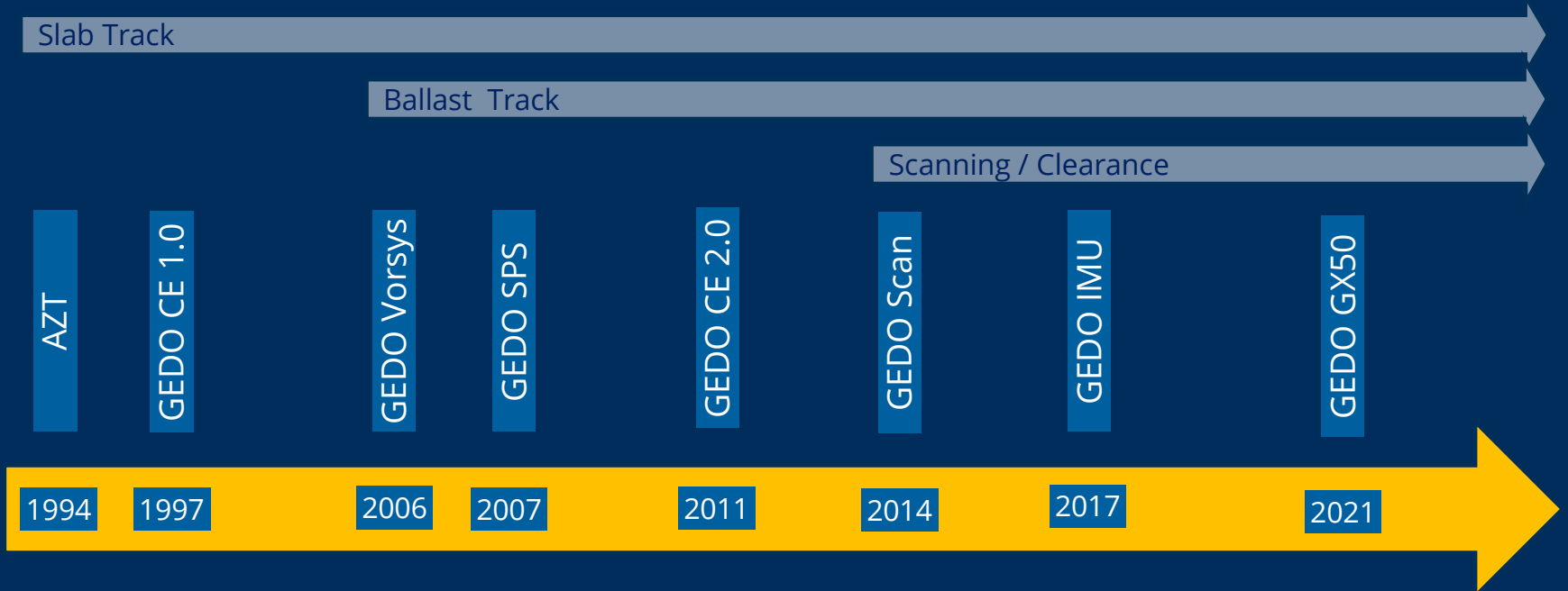


Kiewit

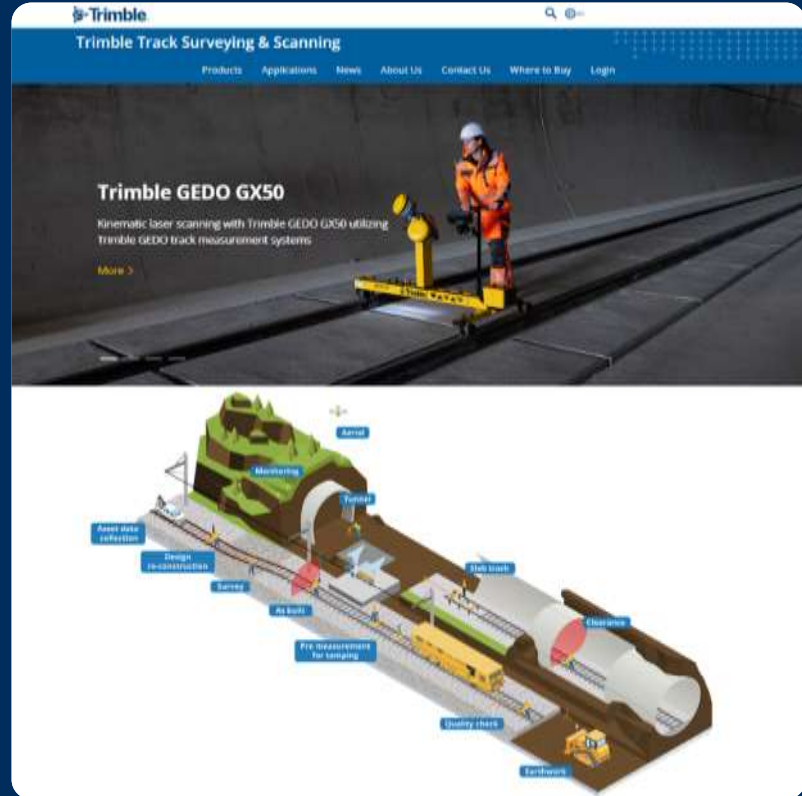
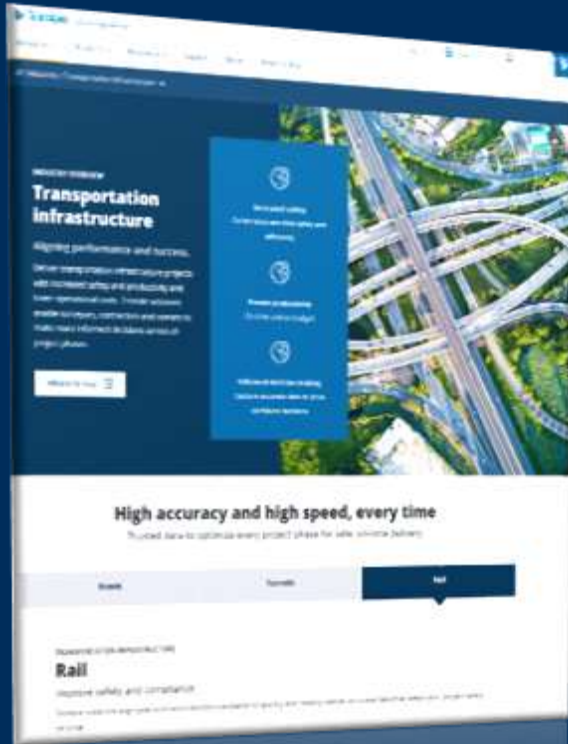


# GEDO History

Experience in railway survey since 1994



# gedo.trimble.com



# Thank You

Trimble Track Survey & Scanning

[info@trimble-railway.com](mailto:info@trimble-railway.com)

감사합니다  
GRAZIE VINAKA  
ERIMA KASIH  
THANK YOU  
TAKK  
merci  
謝謝  
ありがとう