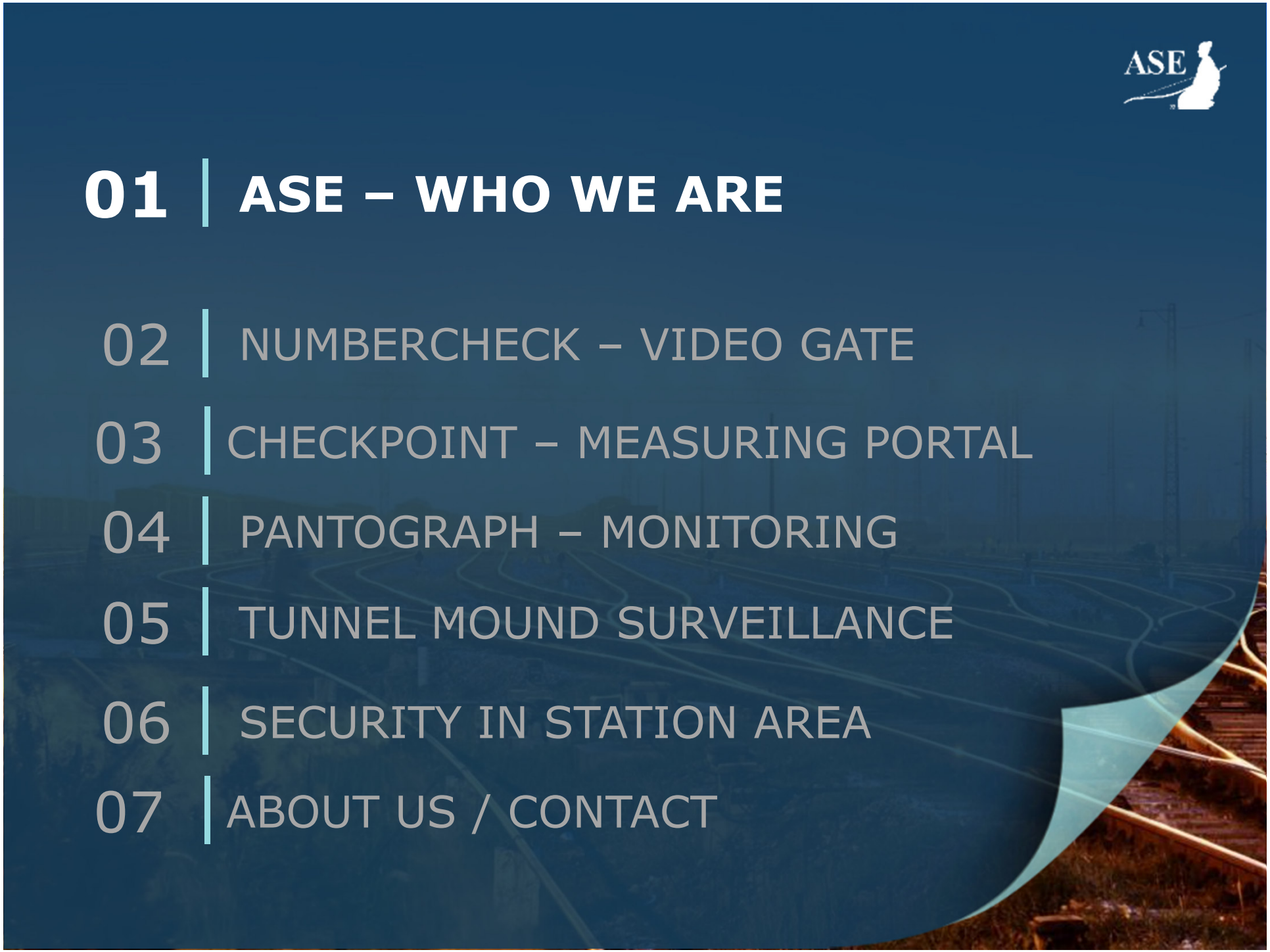
ASE GMBH

SECURITY IN RAILWAY TRAFFIC

WAYSIDE TRAIN MONITORING SYSTEMS

Eric Steck, February 2018



01 | ASE – WHO WE ARE

02 | NUMBERCHECK – VIDEO GATE

03 | CHECKPOINT – MEASURING PORTAL

04 | PANTOGRAPH – MONITORING

05 | TUNNEL MOUND SURVEILLANCE

06 | SECURITY IN STATION AREA

07 | ABOUT US / CONTACT

ASE GMBH– WHO WE ARE

- Foundation 2002
- Customer specified video surveillance systems
- OCR development since 2009
- Over 100 customer

OUR RANGE OF SERVICES

Process surveillance and perimeter protection (Power plants etc.)

Biometric facial recognition

Checkpoint-measuring portal for wayside train monitoring

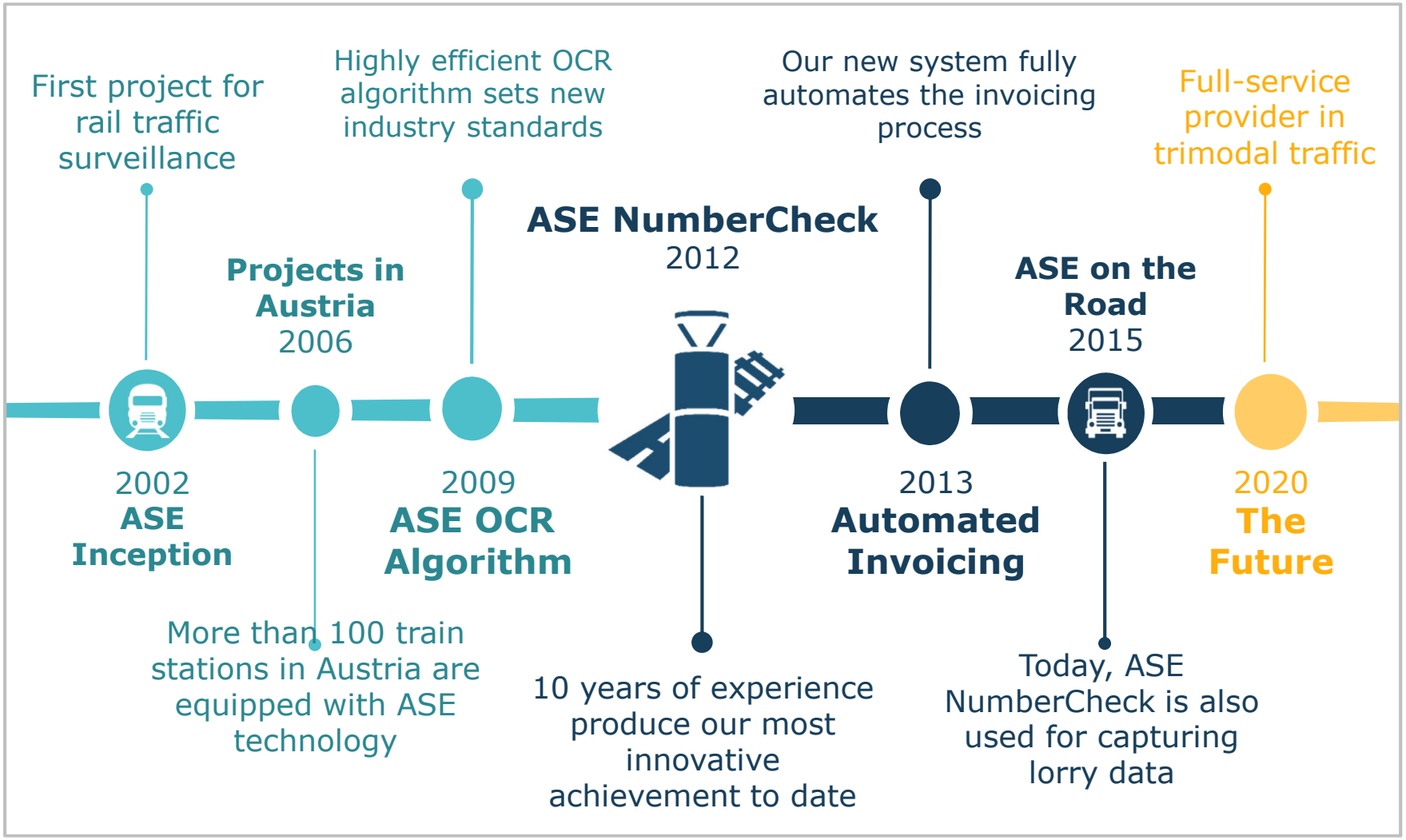
Surveillance in station area

UIC-wagon number recognition

Process optimization for combined transport / goods traffic

R&D MILESTONES

01 OUR DEVELOPMENTS IN RAILWAY SECTOR



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Our solution

02 OCR-GATE „NUMBERCHECK“ DETECTION AND DIGITIZATION OF VEHICLE DATAS

NYKU 2938412 22G1 **31 81 665 0 286-0**

91 80 612015106 D-DB **K-BE 5818**

OCR-GATE FOR RAIL

7 MODULES FOR CUSTOMER SPECIFIED SOLUTIONS

M1 ASE NUMBER*Check*

M2 Container number identification

M3 Hazardous goods identification (numbers and signs)

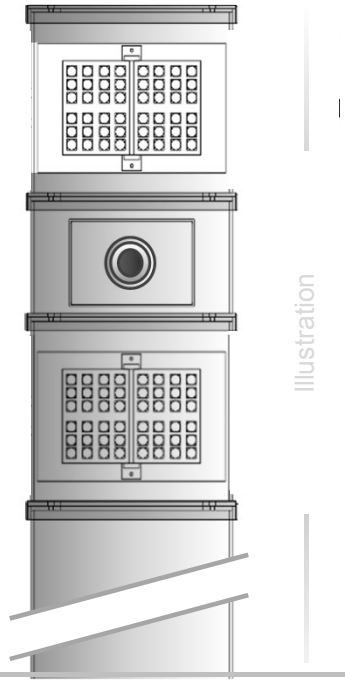
M4 As-is documentation and archiving

M5 Axle sensors

M6 Automated TOC matching

M7 Automated invoicing

ASE NUMBER*Check* pillar



Illustration

SUBSTANTIAL INCREASE IN REVENUE

EXTENSIVE COST SAVINGS

SMALL INVESTMENT

FUTURE-PROOF TECHNOLOGY

THE FUTURE OF TRIMODAL TRAFFIC SURVEILLANCE HAS ALREADY ARRIVED

02 ASE NUMBERCHECK AND WHEEL AXLES SENSORIC

Reliable identification, image processing and plausibility check of UIC wagon numbers, Russian wagon numbers, locomotive types, and more.

Wheel sensors capture wheel shelf marks and number of axles and automatically report the affected wagon

ASE NUMBER*Check*

Vandal resistant housing

Wheel sensors for capturing:

Direction of traffic

Speed

Number of axles

Number of wagons

- ✓ **Identification rate >95 %**
- ✓ **Fast installation** Without closing tracks
- ✓ **Modular design** flexible adjustment
- ✓ **Easy integration**

M1 **M2** M3 M4 M5 M6 M7

ASE Technology- Modul description

02 DETECTION OF CONTAINTER NUMBERS AND DANGEROUS GOODS

Reliable identification, image processing and plausibility check of CNT BIC container numbers

Detection of dangerous good signs/numbers and vehicle numbers

Identifies CNT BIC container codes (BIC/ILU)

Automates data matching

Interfaces with parent logistics systems

Identifies ADR warning signs

Identifies hazardous goods signs

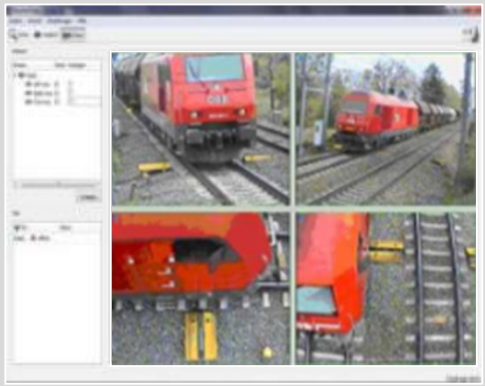
Matches data

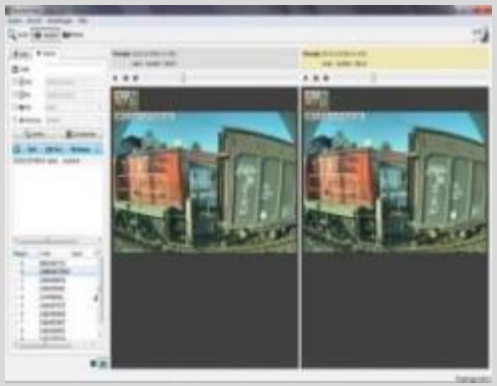
- ✓ **Higher throughput**
- ✓ **Registration, steering of trucks and trains**
- ✓ **AS-is documentaiton**
- ✓ **Process optimization**

M1 | M2 | **M3** | **M4** | M5 | M6 | M7

02 AS-IS DOCUMENTAITON AND ARCHIVING

enables searching for wagons and complete trains by day, time, arrival, departure, and UIC numbers



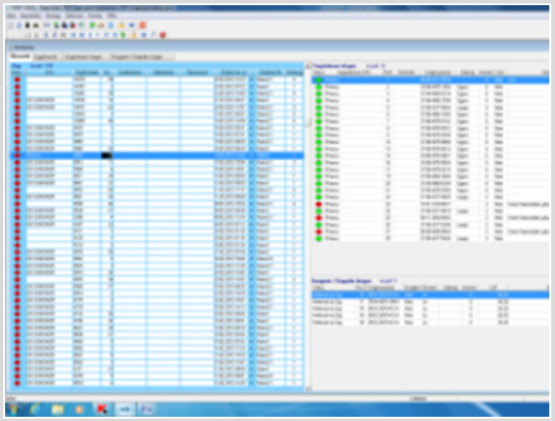


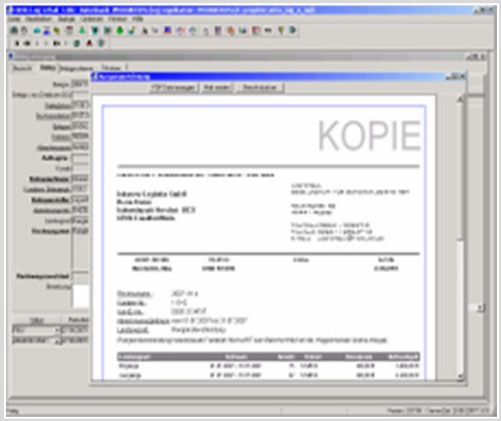
Archives 360° views of passing trains & wagons

- ✓ **Visual inspection**
- ✓ **Easy evidence**
  Using archived data
- ✓ **Cost savings**
  Claims for damages

02 AUTOMATED TOC MATCHING

Automated electronic matching of transits captured by ASE NumberCheck with TOC reservations and automated billing system





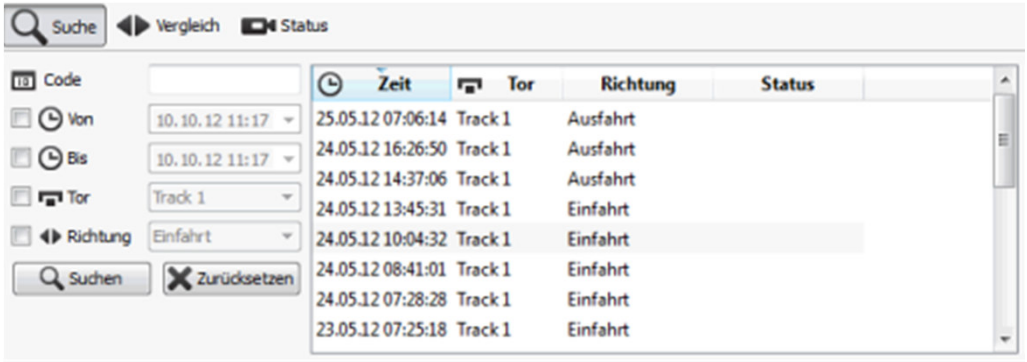
GUI – Trabsy user interface

- Matches reported TOC data
- Mobile end devices for determining down times

M1	M2	M3	M4	M5	**M6**	**M7**

- ✓ **Efficiency gains**
- ✓ **Fully automated**
- ✓ **Sales increas**
- ✓ **Cost reduction**

NUMBERCHECK – SOFTWARE FEATURES



- **Video-based recording of train or truck passes with one or more IP video cameras**
- **Transits are recorded and archived**
- **Parallel automatic recognition of character types**
- **Stored data (videos and recognized characters) can be viewed via a comfortable user interface**
- **Search functions for characters**
- **Complete video sequences available**
- **Damage detection**

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07 | ABOUT US / CONTACT

03 CHECKPOINT: TRAIN DATA MEASURING PORTAL

- Recognition/capturing train data
- Measuring train characteristics
- Axles detection
- Clearance profile
- Video recording
- Thermal profile
- RFID Transponder
- interior surveying

03 HIGHLIGHTS AND FUNCTIONS

- Measuring portal in light frame construction
- Various assembling possibilities (also under bridges)
- State-of-the-art sensor components, long service life
- Reliable detection at all weather conditions
- Search for pictures by train number, date, time, alarm, event
- Image archiving and verification in case of incident or damage
- Data transfer to control consoles and mobile devices
- Integration / Combination with other systems

03 MEASURING AND DETECTION MISCONDITIONS

Measuring Train characteristics:

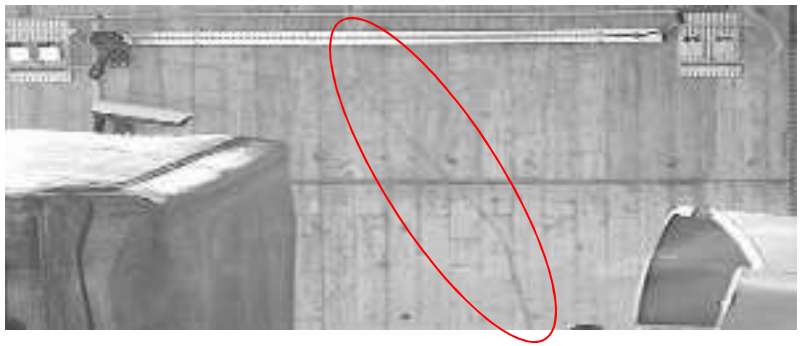
- Speed
- Direction
- Axles detection
- Wagon detection (position, type, train formation)
- Load detection

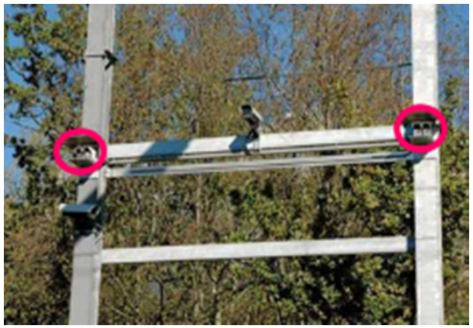
Detection misconditions:

- Clearance profile (antenna, loose covers, tension belts, oversized cargo, etc.)
- Thermal profile
- Tracking of hot-running, fixed-brake and flat wheel detection
- Wheel load, overriding of buffers
- and more

Measuring force on contact wire

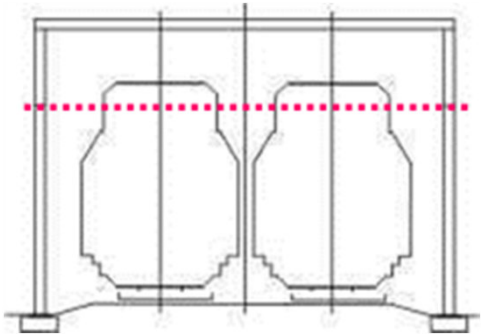
- Wear / breakage of the abrasive strip
- Integration of known sensors



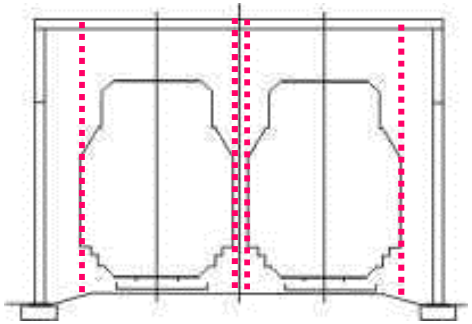


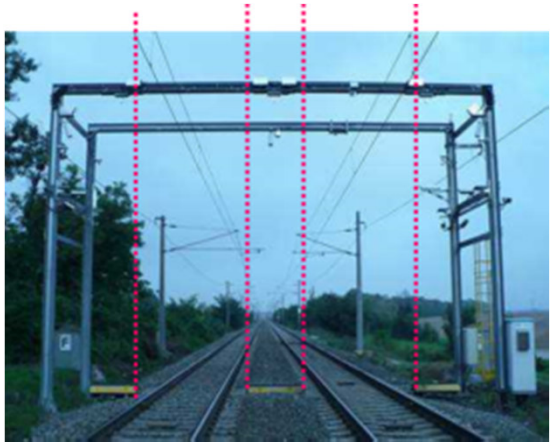
Example: Detection of a high standing antenna

03 MEASURING CLEARANCE GAUGE - COMPONENTS



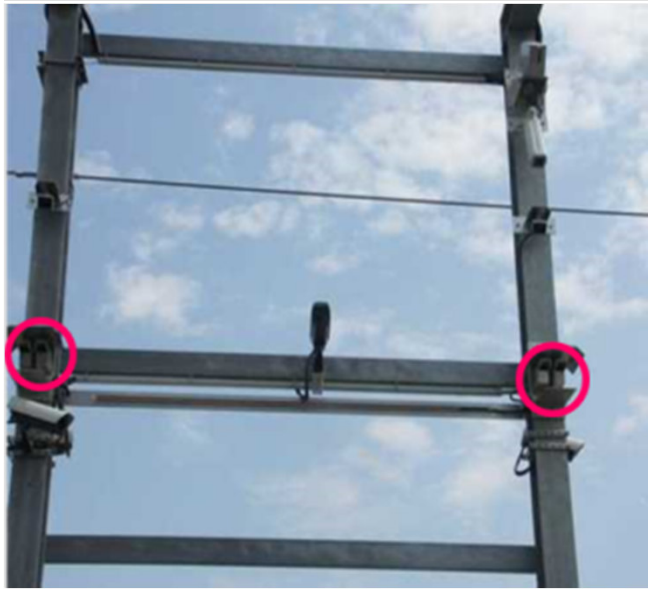
Detection clearance profile violation in width and height:
min. width of 40 mm.
Speed up to 60 m/sec.





Damage protection
for bridges, tunnels and infrastructure

Optical high-end sensors



Reliable measuring
- intelligent image and laser analizes
- Outdoor suitability / sun protection redundant detection

03 AUTOMATIC AS-IS DETECTION

Flange closed

Brake lever position: Wagon loaded/empty

Damage label available?

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07 | ABOUT US / CONTACT

DETECTION CONTACT STRIPE

- Optical detection
- Position of pantograph
- Wear of contact stripe
- Defects of contact stripe

At day V = 205 km/h

At night V = 165 km/h

PICTURES OF DEFECT PANTOGRAPHS / REASONS

Damage by:

- Wear
- Accident
- Storms / bad weather

04 ANALYSIS FOR CONTACT STRIPES

Avoidance of damage caused by worn or broken out carbon layers with the contact wire

Measurement of force on contact wire

Optimization the pressure of the contact strip against the contact wire -> wear avoidance

FEATURES

The measuring system provides all the parameters required for evaluation:
Detection train data (Length and speed up to 220 km/h)
Detection pantograph types
Position of the grinding bar relative to the longitudinal and transverse axis
Missing or deformed contact stripes
Thickness of the coal layer over the entire width (degree of wear)
Differentiation of carbon or copper abrasive strip
Differences in position and width (outbreaks)
Contact wire increase / increase in contact pressure
Automatic damage analysis
High speed image recording

UPLIFT OF CONTACT WIRE

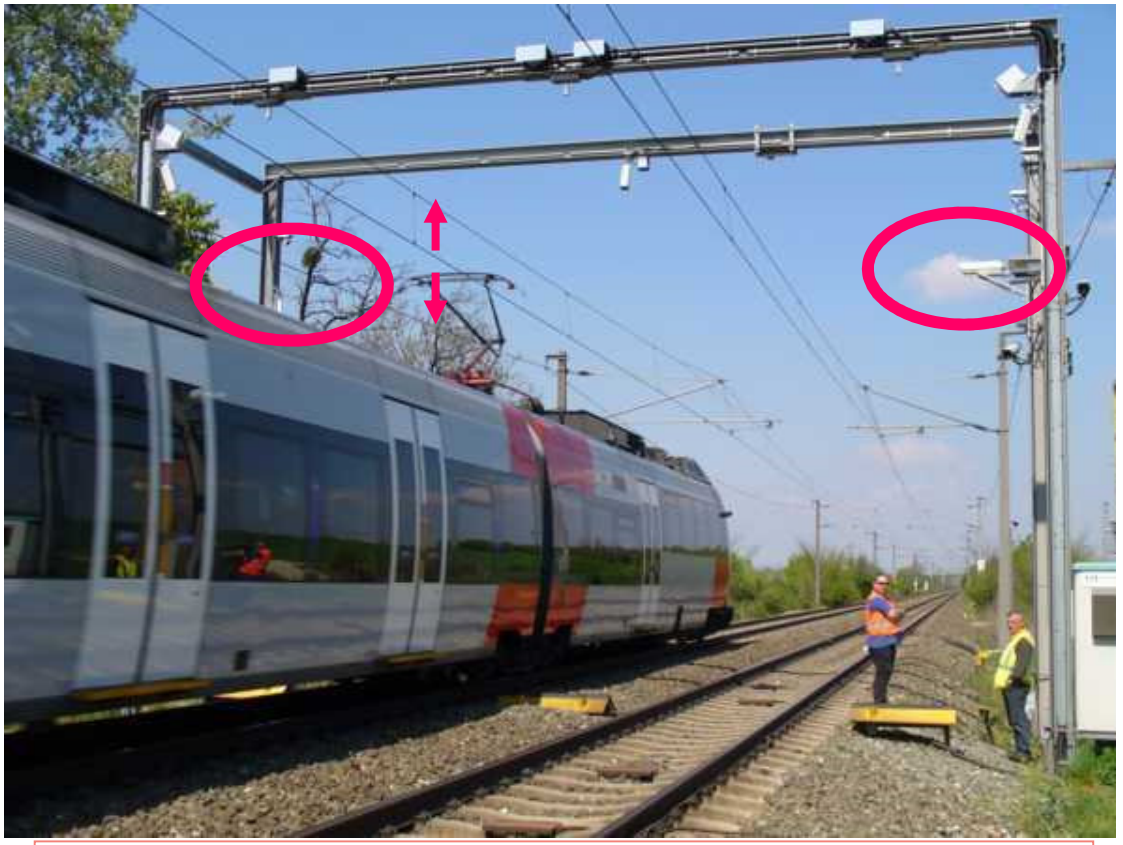
Measuring of:

- Uplift of contact wire
- Speed of wind
- Ambient temperature

Calculation of deviation

= f

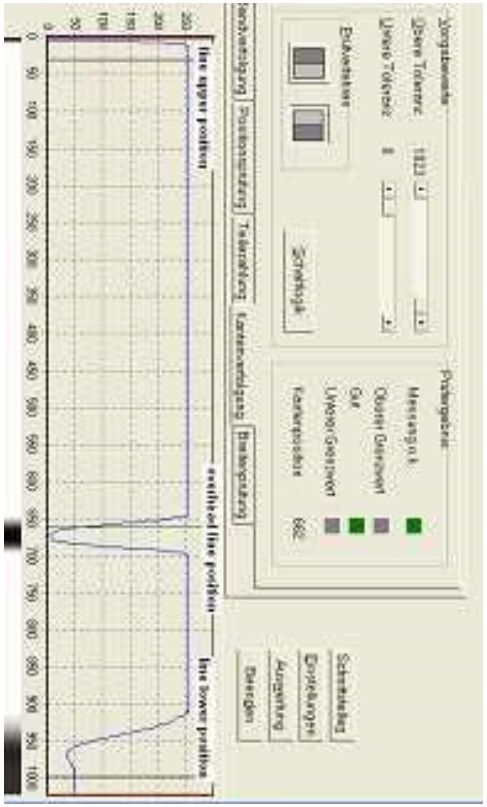
(Uplift, wind, pantograph type, etc …)



Reference at Network Rail in Great Britain

04 UPLIFT OF CONTACT WIRE

Backlight for optical contrast



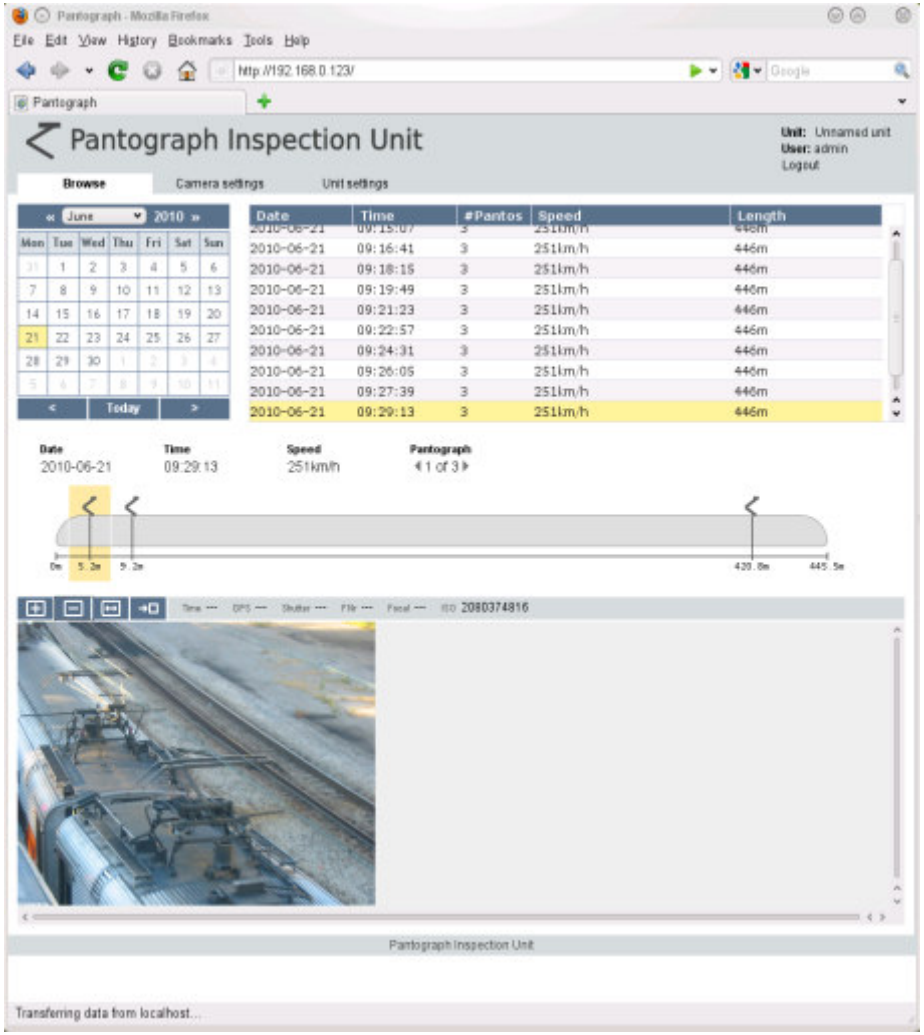
Movement and position of th contact wire.

The Uplift sensor is mounted on a portal.

Detects damage to the pantograph

PANTOSPECT – SOFTWARE FUNCTIONS

- Manage multiple units via the web interface
- Status display of all connected units (standby, error states)
- Central storage and browsing of all images (date, time, train...)
- Graphical representation pantograph position
- GPS informationen available
- Interface (SNMP) for automatic signal / alert



PANTOSPECT – BENEFITS AND ADVANTAGES

Detection damage and wear

↓

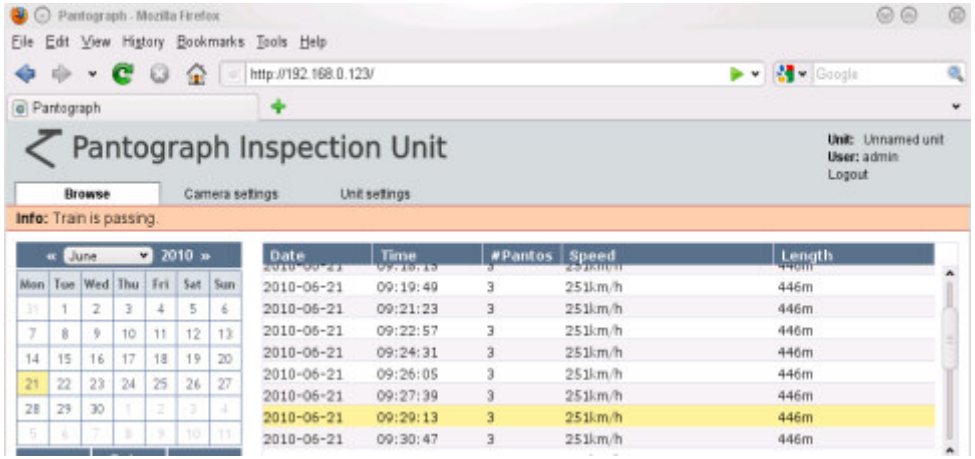
Identification of pantographs in the database

↓

Automatic alerting

↓

Quick search



Data transmission:

All measured data and limit value exceedances are available for the operator's network.

Connection via TCP/IP, PSTN, ISDN, GSM, UMTS, etc. can be realized flexibly

The measurement parameters to be transmitted are flexibly adapted to the available data rates.

Pantograph-Monitoring

04 REFERENCE: INFRABEL, BELGIEN

- Detection of speed by wheel sensors
- Activation of optical sensors
- Detection of beginning and end of train and pantograph positions
- Real-time information processing
- Calculation of trigger time for camera
- Combination of measurement and image data in the database
- Storage of pantograph image, date and time, train speed, train length and pantograph position
- Recording of complete train as M-JPEG compressed video stream (relevant JPEG images can be extracted)

Detection components:
Power supply
Timing Controller
Camera
Mini PC
Wheel sensors
GPS modul

Installation space for additional network components
Metal housing with heater and filter ventilators
Headlights right and left for:
Flexible and optimal lighting
Avoidance of shadowing of the overhead line suspension system

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07 | ABOUT US / CONTACT

TUNNEL MOUTH SURVEILLANCE

- Detection persons and objects
- Direction detection
- Detection of camera manipulation
- Detection of loss of video signal
- People counting / loitering
- Object tracking and classification
- Virtual fence

HIGHLIGHTS AND FUNCTIONS

PTZ Pan/Tilt/Zoom

- Manual or network control
- Preset on event
- Automatic PTZ tracking
- Zoom to marked area

Alerting

- Alert E/A, mobile devices
- E-Mail notification
- FTP, TCP

Integration

- Server API / SDK
- Events via TCP/IP
- Support OPC data access

Area of surveillance

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06 | SECURITY IN STATION AREA

07 | ABOUT US / CONTACT

Security in station area

06

VIDEO SYSTEMS FROM ASE ENSURE MORE SECURITY IN PUBLIC PLACES

- Recording/Image data storage
- Real time analysis of video data
- Event controlled recording
- Classification of objects and people
- Fully automatic tracking of persons and vehicles
- Vehicle detection
- Alerting
- Definable motion detection
- Change reports (e. g. parked objects, changed surfaces, graffiti)
- Panic detection
- Data access via Internet

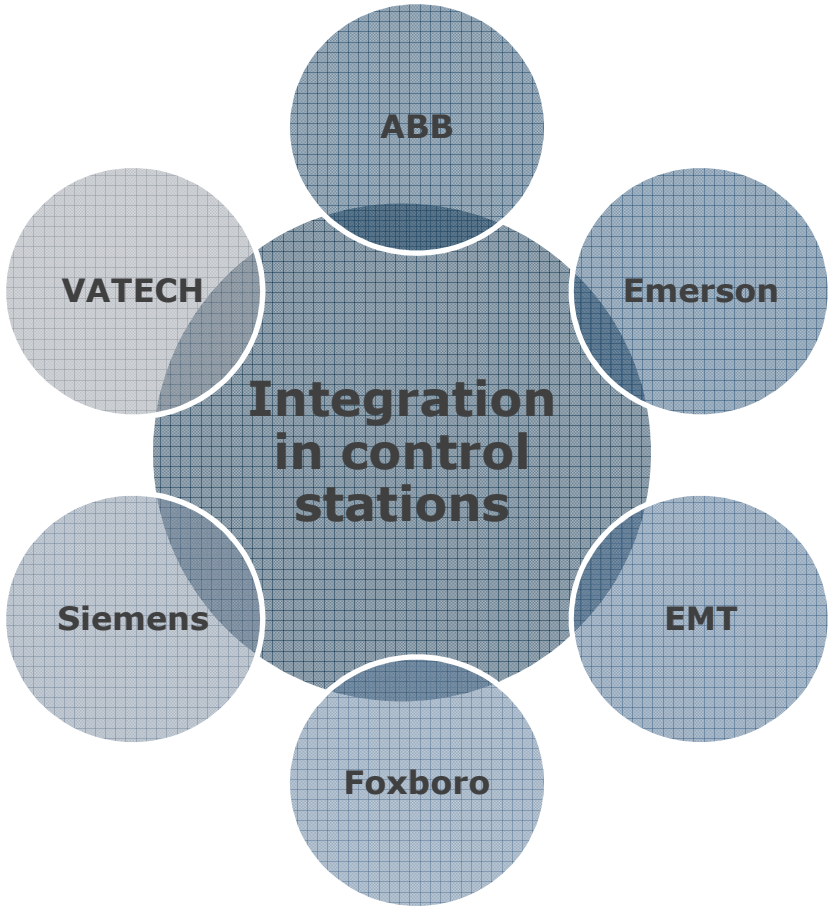
STATION VIEW - FEATURES

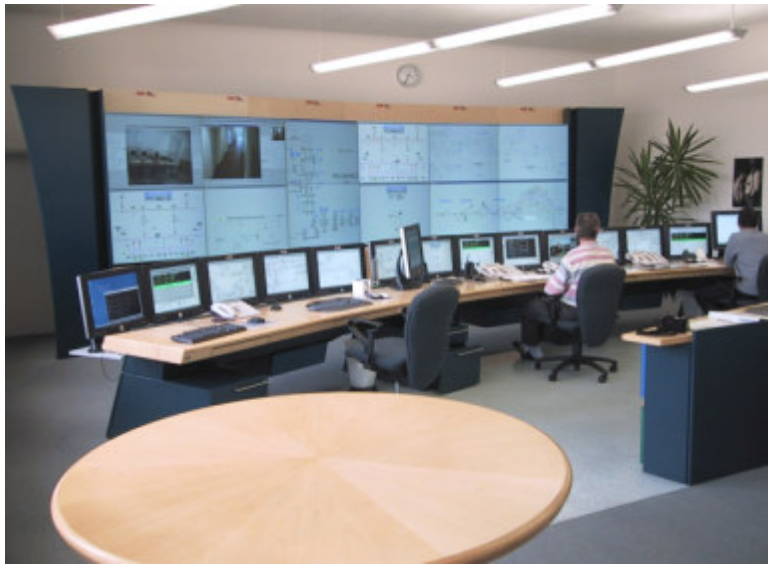
- platform surveillance
- train crossings
- suicide suspects
- panic detection

Railway station Baden (AT)

- Real-time analysis of video data
- Detection of abnormal activities and safety-relevant situations
- Automatic dome camera control
- Mobile data available via Internet
- History pictures and live recordings are available to external emergency personnel via the Internet
- Connection to VMS (Video Management Server)

06 INTERFACES FOR INTEGRATION IN CONTROL STATIONS





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07

Benefits & Advantages

OUR SYSTEMS CREATE MEASURABLE SUCCESS

Smart image processing
Highly efficient OCR algorithm, matching captured information with database

Archiving & remote access
Accessing information by wagon number, date, time, etc., using remote interfaces from anywhere

Universal interfaces
Standardised communication using any logistics or operating system via WiFi, UMTS, GPS, etc.

Tailored software
Visual inspection of captured arrivals using Stitching module

Comprehensive process automation
Captures down times

Extensive shunting support
Checks shunting order / advance information on shunting; follows wagon movements across the rail network

Enormous contributions to success with low investment volume
Large profit and savings potential

Our systems shine through fastest operational readiness
The fastest solution on the market - without a track closing

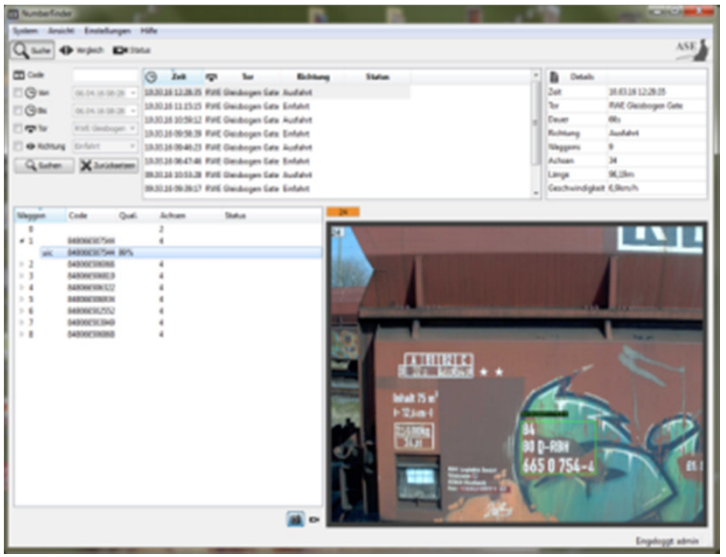
Flexibility of a special design
We offer tailor-made solutions for every project and every customer

Many years of experience & comprehensive engineering knowledge
Our solutions are well thought-out, innovative and highly efficient

We have strong partners in industry and research
Our network is an essential part of our success

Software-Updates regularly
Stay up to date with us at all times

PRACTICAL EXAMPLES



REFERENCES

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SBB Cargo

HGM Mannheim

Railway / NumberCheck - references

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basell
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bayernhafen Regensburg
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E.I.M.G
duisport Duisburger Hafen AG
DUSS
HE WÄGETECHNIK
HGM
HKM
infraserv höchst
INFRABEL Right On Track
MARCON FILLING TECHNOLOGIES
PCK
OMV
ÖBB
SBB Cargo
SWH Stadtwerke Heilbronn GmbH
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