

State-of-the-Art Wheel Detection and Axle Counting Systems

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Agenda

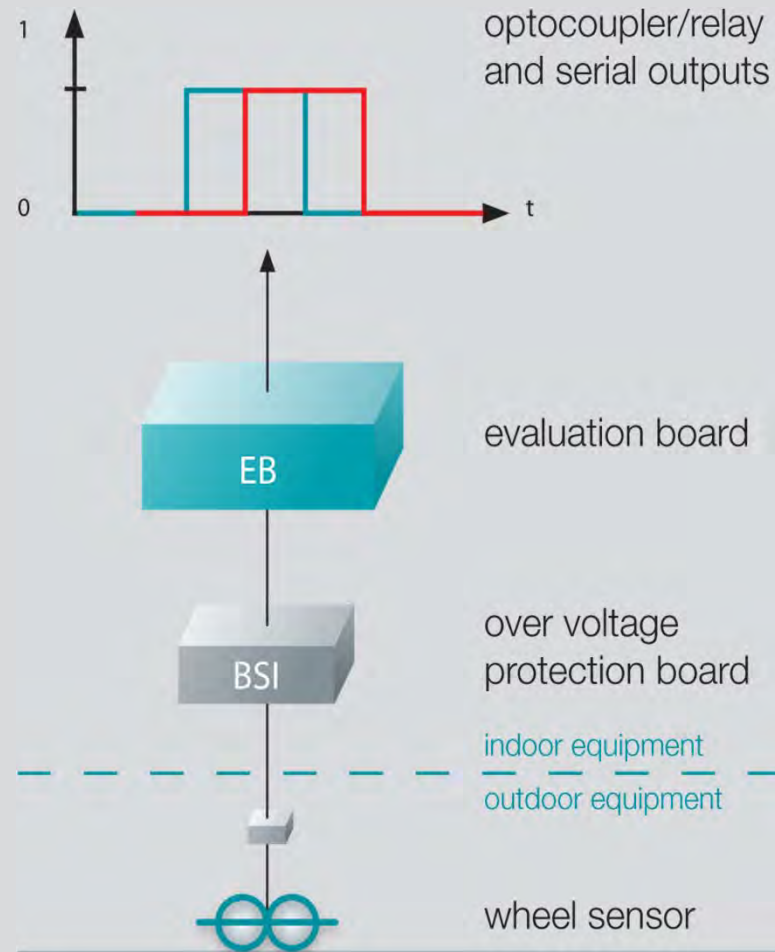
- 1. Innovative Wheel Detection and Axle Counting Systems**
2. Company overview
3. Case Studies | References
4. Conclusion



Wheel Detection

Field of applications

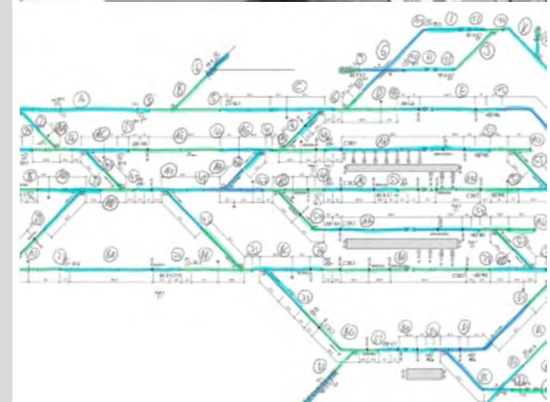
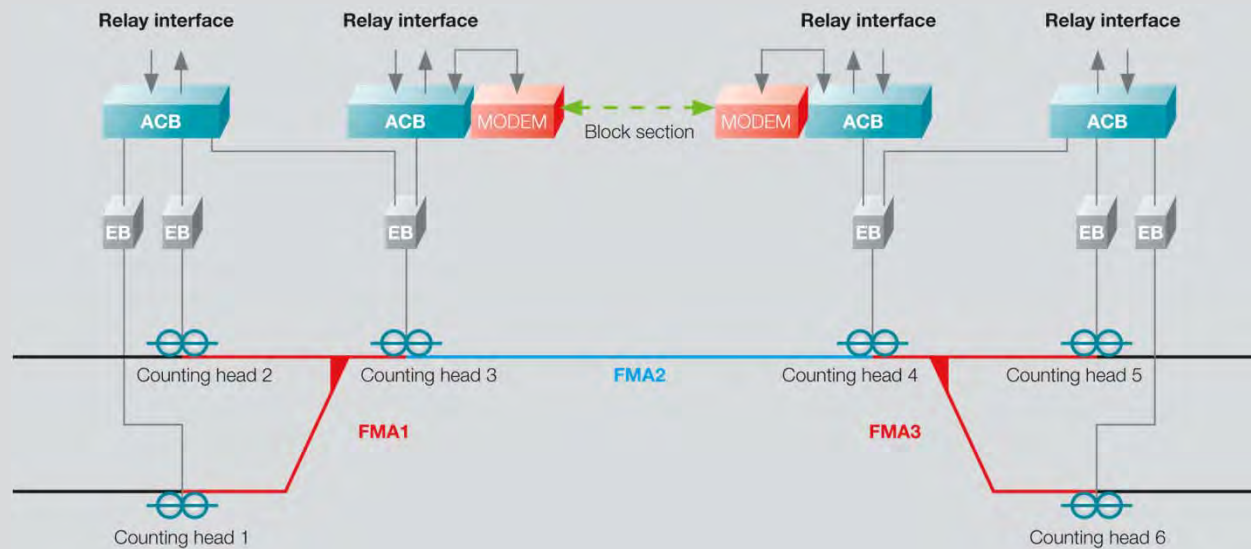
- axle counting systems
- level crossings
- switching tasks
- measuring systems
- diameter & speed measurement
- customer-specific applications



Axle Counting Systems

Axle counting system ACS2000 (relay interface) for

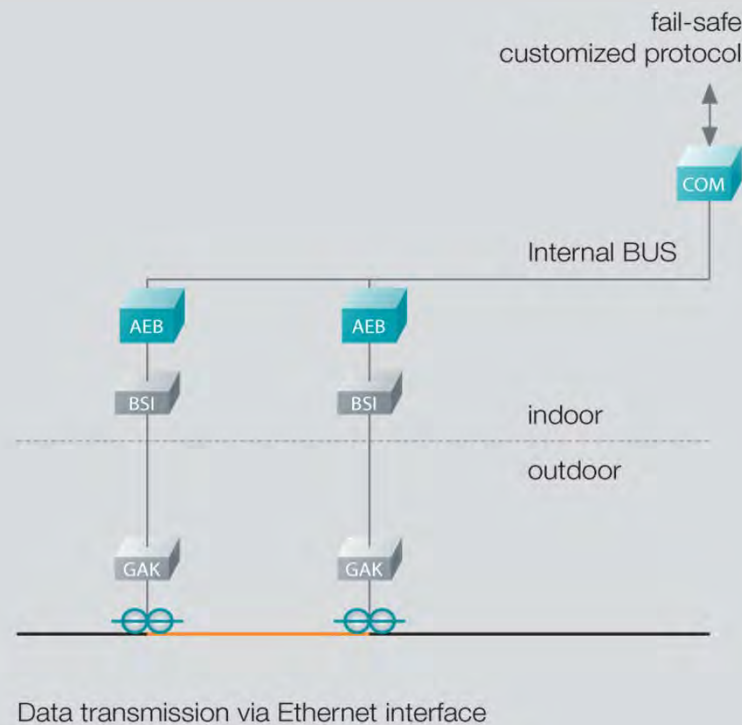
- Main lines
- Metro / trams
- Regional lines
- Industrial lines



Axle Counting Systems

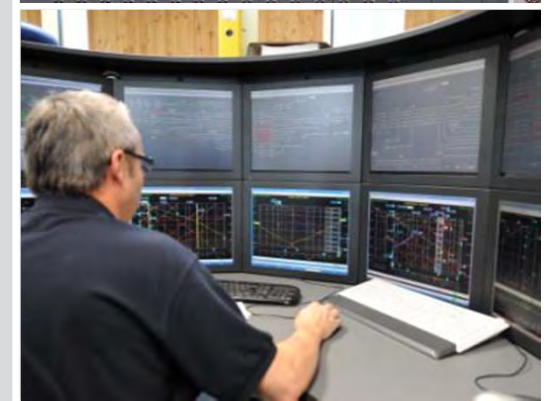
Axle counting system FAdC (serial interface) for

- Main lines
- Metro / trams
- Regional lines
- Industrial lines



Axle Counting Systems

- Permanent innovation leads to different axle counting systems
 - **ACS2000:** **fail-safe relay interface**
 - **FAdC:** **fail-safe serial interface**
(or fail safe relay interface as an option)
 - **FAdCi:** **fail-safe serial interface**
- Every axle counting platform consists of variable components
- Based on proven FWD systems (Frauscher Wheel Detection)
- Safe determination of clear/occupied (track vacancy)
- Exhaustive diagnostic information



Axle Counting Systems

- Easy replacement of existing track circuit
- Reliable counting of axles and fail-safe generation of Clear/Occupied message
- Customized reset-function
- Simple integration into any type of interlocking system
- Serial interface affords compact interlocking systems with customer-specific and economic track vacancy detection (FAdC)
- Modular and scalable design
- Additional functionalities configurable (e.g. counting head control, driving direction, etc.)
- Central and distributed architecture



Axle Counting vs. Track Circuits

	Track Circuit	Axle Counting Technology
Track superstructure requirements	Electrically insulating	None
Measures with reference to track return current	Special measures required (meshing)	None
Sensitivity to external influences (e.g. over voltages, track currents, etc.)	High	With high-quality wheel detection, can be compensated to the greatest possible extent
Sensitivity to climatic influences (e.g. heat, cold, dirt, etc.)	High, particularly with reference to ballast resistance (leaves, wetness, etc.)	With high-quality wheel detection, can be compensated to the greatest possible extent
Section length	Less than 2000 m	No restriction
Recognition of rail breaks	Possible under certain circumstances	Not possible
Reset	Not required	Required - various variants available
Functional scope	Track vacancy detection	Track vacancy detection, direction information Number of axles, number of wagons, speed, etc.

Axle Counting vs. Track Circuits

	Track Circuit	Axle Counting Technology
Monitoring of complex point structures, etc.	Can be carried out under certain circumstances	Can be carried out without restriction
Can be modified	Only with great outlay (superstructure adaptations; rail joints)	Simple (by mounting wheel sensor using rail claw)
Installation	Installation of rail joints Drilling of connection cable	Rapid assembly through the use of rail claws
Availability	TF – Gsk high NF – Gs average	Very high
Required travel cycles	24 hours	Up to 2 years
Maintenance outlay	High	Low
Installation costs	High	Low
Investment costs (components)	Comparable	Comparable
Can be modified	Only with great outlay (superstructure adaptations; rail joints)	Simple (by mounting wheel sensor using rail claw)

Highest Safety – Maximum Reliability

- Fail safe and reliable operation even under extreme conditions
 - temperatures
 - huge vibrations
 - electromagnetic interferences
 - floodings
- 3 wheel sensor families for different applications
- No electronic components near the track (track side connection box)



Easy and Fast Setup with Rail Claws

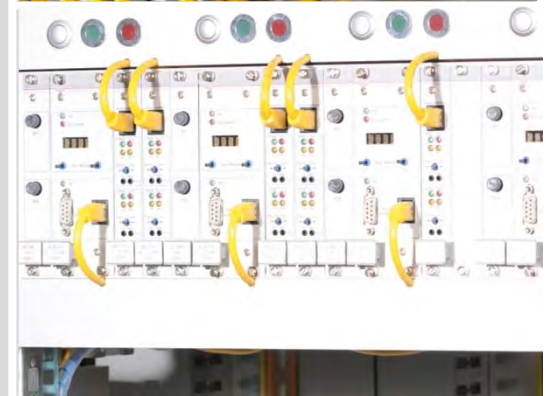
- No drilling of rail
- Flexible positioning
- Easy and quick mounting or dismounting
- Proven and efficient solution for every possible requirement



Reduced Maintenance Costs

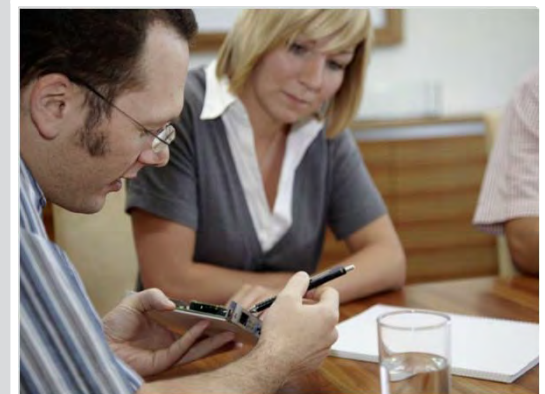
Diagnostic system FDS allowing

- Preventive maintenance
- Fast and efficient fault clearance
- Reduction of maintenance work
- Remote access
- Statistic evaluation
(quantity of axles, train, reset operations...)



Services for Minimum LCC

- **Consulting for correct system architecture**
Support in concept phase in case of system structure, technologies and functions choice
- **Operator can handle all Frauscher products**
Standard and individual adapted training session on-site or at the facilities of Frauscher
- **Effective and smooth project management**
Support during installation & commissioning periods on-site, via phone / email
- **Short down times and high availability**
Quick response times in finding of error causes and repairing of faulty components



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Product Portfolio



WHEEL DETECTION



AXLE COUNTING SYSTEMS



DIAGNOSTICS



MEASURING SYSTEMS



SPECIAL SENSORS



SERVICES

Mission of Frauscher



Being the most reliable and cost effective supplier with outstanding products and services for wheel detection and axle counting systems.



Independent Technology Leader

- Founded by Josef Frauscher in 1987
- Frauscher Sensor Technology, Austria
100% focus on development, manufacture and supply of wheel detection and axle counting systems
- More than 100 employees
- Foundation parent group guarantees long term stability
- Subsidiaries for Sales and Services
 - UK
 - Poland
 - China (Beijing)
 - local agents
- Independent supplier



Company Structure



- **Foundation:**
guarantees long term stability
- **Holding:**
managing of company shares, IPR's, real estate, capital and company ownership
- **Frauscher Sensortechnik GmbH:**
development, manufacture and supply of inductive sensor technology and rail safety components
- **Frauscher Polska, UK, Asia:**
sales and service subsidiaries
- **Frauscher Energietechnik GmbH:**
Development Stirling engine
- **Flight Charter:**
charter company for business flights / airplanes

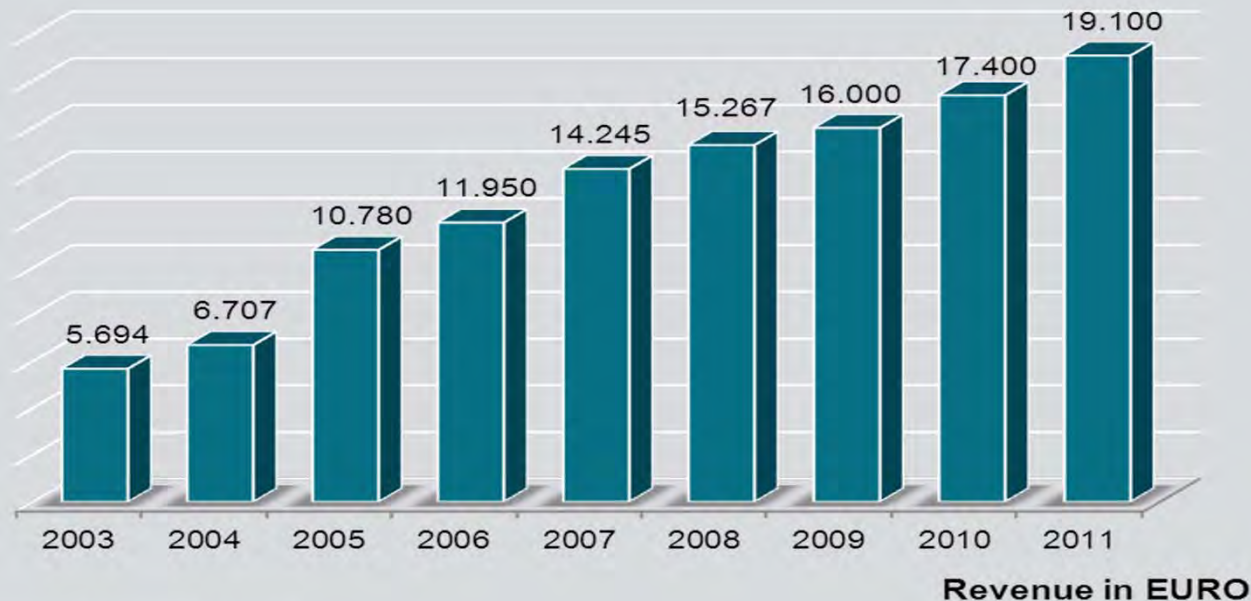
Business Philosophy

- Proven safety and reliability is applied at minimum life cycle costs
- Signalling supplier can offer the best and innovative solutions to their customers
- Operator can handle our products by themselves
- Independent supplier
- Dedicated service and local support to the market

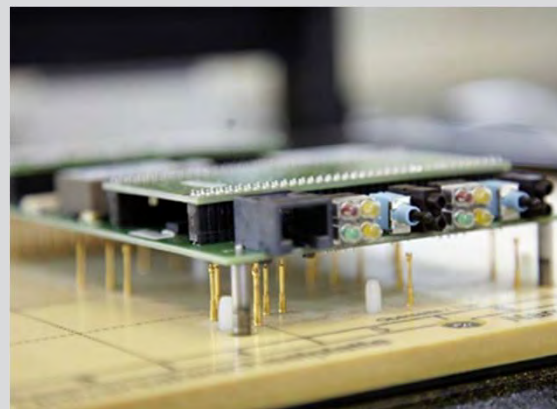
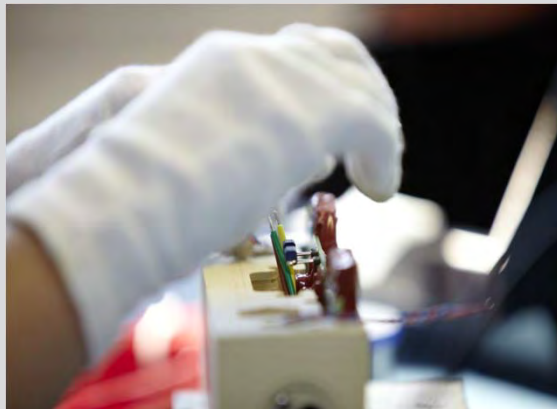


Financial Performance

- Organic growth by ownership capital only
- EBIT of company has been continuously positive for 20 years
- Profit has been growing continuously
- Cash flow is positive in all years



Inhouse Production

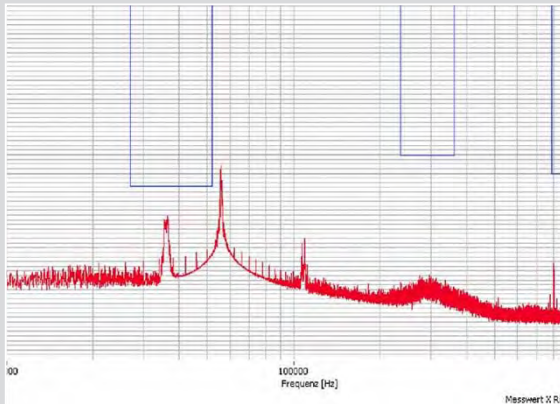


- Frauscher is the leading producer of inductive sensor technology for the railway industry worldwide
- 100% ownership of all IPR; leading to full control of all development and critical manufacturing processes
- High tech manufacturing facilities capable of producing more than 15.000 sensors per year

Inhouse Development



- Permanent innovations and numerous patents
- Analyzing customer needs (trials, measuring tools, test equipment)
- Development according to CENELEC standards complying with SIL 4 requirements
- Independent „product safety“ division
- R&D expenses 15% turnover



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Segments



MAIN LINE



REGIONAL LINE



INDUSTRIAL LINE



METRO | TRAM



LEVEL CROSSING



OTHER APPLICATIONS

Customers (excerpt)

System Integrators / Signalling System supplier

- Alstom
- Ansaldo
- Bombardier
- CRSC
- Invensys rail
- Siemens

Signalling Companies

- Atkins Rail
- AZD Praha
- Balfour Beatty Rail Signal
- BBR
- Kombud
- SST Signal und Systemtechnik

Railway operators

- Austrian Federal Railways (OeBB)
- Beijing Metro
- German Railway (DB)
- MTR Hong Kong
- Network Rail
- SRT Thailand
- Vietnam Railways

invensys

BOMBARDIER
TRANSPORTATION

 **AnsaldoSTS**

ALSTOM

SIEMENS

 **SIGNAL & SYSTEM TECHNIK**

 **ZAKŁADY AUTOMATYZACJI**
KOMBUD SA

Balfour Beatty
Rail



BBR

OBB

 Slovenske železnice

 **SBB CFF FFS**

DB BAHN



 **ČESKÉ DRÁHY, a.s.**

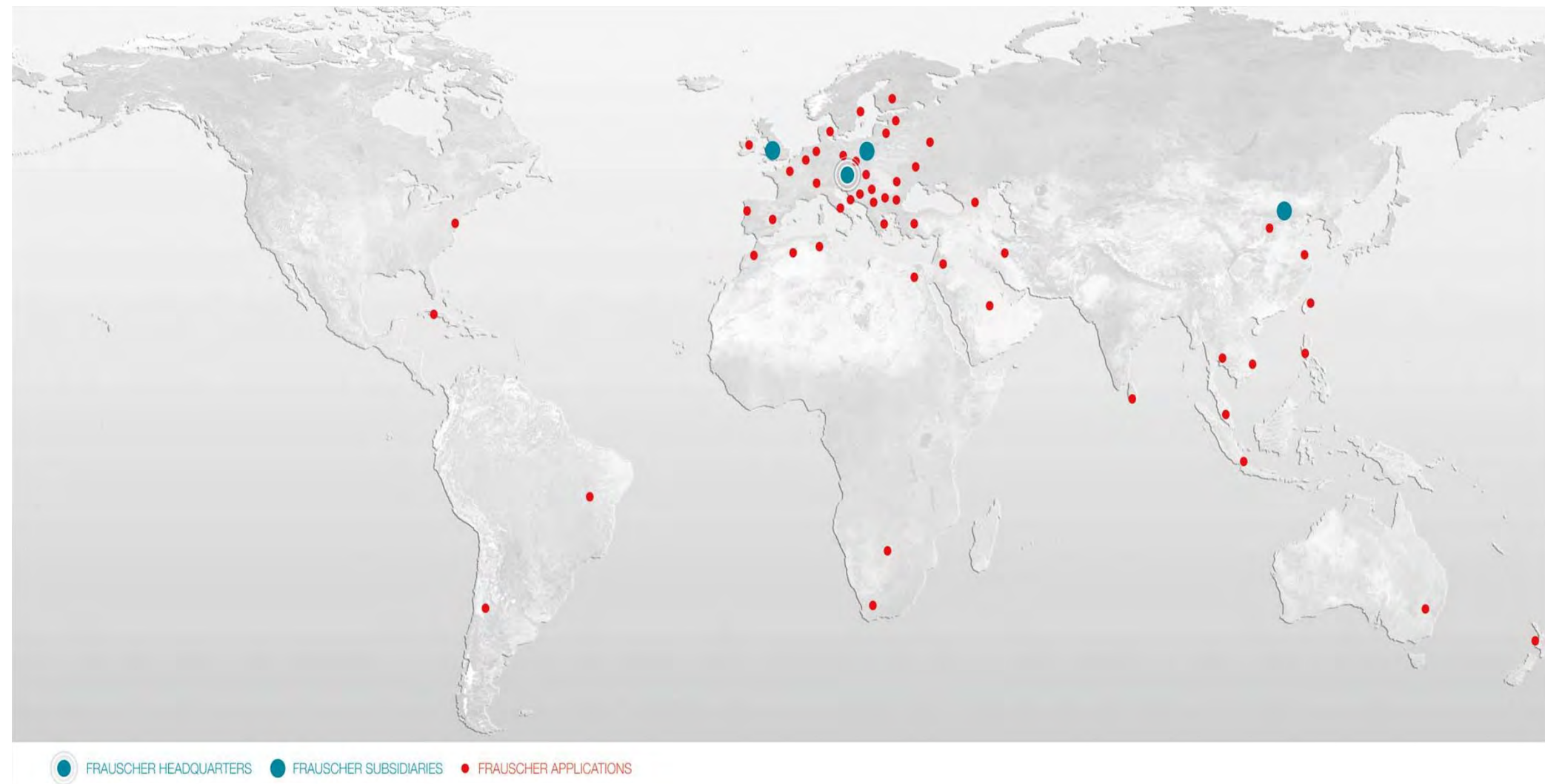
Frauscher Worldwide

- **32.000** wheel sensors and **21.000** axle counter systems in operation in Railways
- **3.300** wheel sensors and **2.200** axle counter systems in operation in Light rail / Metro
- **3.200** wheel sensors and **3.100** axle counter systems in operation in Industrial Railways
- **30.000** wheel detection points in operation in position detection, switching and level crossings

Frauscher products can be found on all continents and in more than **50 countries** of the world.



Frauscher Worldwide



Bursa

Country Turkey

Operator BursaRay

Partner BBR

Date February until
October 2010

Frauscher components

- Wheel sensor RSR180
- Evaluation board IMC
- Axle counting system ACS2000

Volume

- 100 counting heads
- 50 counting sections

Features

- Rapid transit
- Integration in existing systems
- Extension already scheduled
- Trial installation at the beginning



London Underground

Country UK
Operator London Underground
Partner Invensys
Date December 2008

Frauscher components

- Wheel sensor RSR123
- Evaluation board EIB-R

Volume

- 100 counting heads

Features / Challenges

- 90 seconds head way
- Check rail
- Quick installation during short line shut down
- 750 V DC



Hamburger Hochbahn City Ost

Country Germany
Operator Hamburger
Hochbahn
Partner Siemens
Date December
2007

Frauscher components

- Wheel sensor RSR180
- Evaluation board IMC

Volume

- 190 counting heads
- 188 evaluation boards

Features / Challenges

- High density of different signalling equipment in the track
- High EMI
- 750 V DC



Beijing Subway

Country China

Operator Beijing MTR

Partner CRSC/CASCO

Date 2010

Frauscher components

- Wheel sensor RSR180
- Evaluation board IMC
- Axle counting system ACS2000

Volume

- 287 counting heads
- 237 counting sections

Features / Challenges

- Axle counting system used to back up track circuits
- 750 V DC
- Three rail system



Hanoi – Vinh Phase II

Country Vietnam
Operator Vietnam
Railways
Partner Alstom
Date 2010

Frauscher components

- Wheel sensor RSR180
- Evaluation board IMC
- Axle counting system ACS2000

Volume

- 534 counting heads
- 432 counting sections

Features / Challenges

- Heavy rail
- Non electrified line
- Narrow gauge



Blue Scope Steel

Country Australia

Operator BlueScope
Steel

Partner Selectrix

Date January 2008

Frauscher components

- Wheel sensor RSR180
- Evaluation board AMC
- Axle counting system ACS2000

Volume

- 50 counting heads
- 10 counting sections

Features / Challenges

- Rough environmental conditions
- Floodings
- Heavy haul train (steel plant)



Kuala Lumpur

Country Malaysia
Operator ERL Kuala Lumpur
Partner Siemens
Date January 2001

Frauscher components

- Wheel sensor RSR180
- Evaluation board ASB
- Axle counting system AZF

Volume

- 326 counting heads
- 200 counting sections

Features / Challenges

- Tropical thunder storms
- 25 kV AC



State Railway of Thailand

Country Thailand
Operator SRT
Partner Siem Huad
Date January 2005

Frauscher components

- Wheel sensor RSR180
- Evaluation board AMC
- Axle counting system ACS2000

Volume

- 320 counting heads
- 80 counting sections

Features / Challenges

- Non electrified line
- Remote level crossing system



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Frauscher – The Best Solution

- Technology leader for wheel detection and axle counting system
- Highest safety and maximum reliability
- Easy and fast setup
- Low maintenance
- Customized solutions
- Global experience – successful operation of Frauscher products in more than 50 countries
- Independent component supplier



Frauscher Contacts



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Thank you for your Attention

