



Intelligent Solutions for Rail Transport



■ Company Information



PROGRESS RAIL SERVICES

has been a subsidiary of Caterpillar Inc. since 2006 and is a major partner for the rail industry worldwide. The company was founded in 1982 and has more than 150 sites in North America, Mexico, Brazil, the United Kingdom, Germany and Italy. Progress Rail employs approximately 5,500 employees.

The sites in Bad Dürkheim and Berlin [Germany] as well as Florence [Italy] specialise in the development and production of hot box detectors. Progress Rail is one of the leading providers in this segment. More than 1,200 hot box systems from the experts in rail safety are in operation worldwide.

You can find more information at www.progressrail.com

CATERPILLAR INC.

Caterpillar Inc. has been facilitating progress and positive, sustainable change on all continents for more than 85 years. With turnover of USD 60,138 billion in 2011, Caterpillar is the world's leading manufacturer of construction and mining machines, diesel and natural gas engines, industrial gas turbines and diesel-electric locomotives. The company is also a leading service provider thanks to subsidiaries Caterpillar Financial Services, Caterpillar Remanufacturing Services and Progress Rail Services. In total, Caterpillar employs more than 100,000 employees on 278 sites in 40 countries.

You can find more information at www.caterpillar.com

A FUES-EPOS installation from Progress Rail in Pueblo, Colorado, USA

■ Greater Safety for Rail Transport – FUES-EPOS



In rail operations, hot-running bearings and brakes represent a major safety risk. This can lead to axle journal fractures, derailments or fires. Brakes that are inadvertently not released can lead to overheating and this can cause damage to wheel treads, braking equipment and to the track infrastructure. A hot box detection system provides effective protection that can prevent damage to trains and rail tracks.

HIGH-TECH FOR GREATER SAFETY

With the FUES-EPOS [easy pull out system] hot box detection system from Progress Rail, external and internal bearings, wheels and brakes can be reliably monitored and checked from the tracks. Thanks to very modern infra-red technology, heat can be measured in real-time in the relevant areas and dangerous excess temperatures can be determined. FUES-EPOS is based

on the tried-and-tested predecessor models FUES 1 and FUES 2 yet it provides greater flexibility thanks to the modular design.

PROVEN SOLUTION WITH MANY ADVANTAGES

More than 1,200 installed systems prove themselves every day throughout the whole of Europe and guarantee safe railway services. The FUES-EPOS guarantees reliable operation at speeds from 3 km/h to 500 km/h. The FUES-EPOS is also compatible with all established trains, axles and brakes and can be adapted in a user-friendly way to meet the individual requirements of the operator. High quality, longevity and easy maintenance are further advantages of the intelligent solution from Progress Rail. Comprehensive service and supplementary offers complete the FUES-EPOS offer.



ADVANTAGES OF FUES-EPOS

- Easy installation and maintenance
- Modular construction and high compatibility with established rail vehicles
- Continuous and high measurement accuracy thanks to a 12-bit resolution
- High availability combined with a long life-cycle
- Intelligent software to prevent false alarms
- Future safety thanks to expandability
- Attractive cost price, low life-cycle costs
- The reduction of easy-pull-out components shortens track times
- Remote diagnosis and configuration of equipment is possible

INTEGRATED SOLUTIONS FROM PROGRESS RAIL

Progress Rail provides customised complete solutions related to FUES-EPOS. The offer comprises:

- Ready-to-use measurement modules – calibration data is saved in the system
- User-friendly interfaces
- Installation of the systems
- User training
- User support / hotline
- Technical support
- Replacement parts
- Optional reporting system [supervisory control and data acquisition, SCADA]

■ Greater Safety for Rail Transport – FUES-EPOS

PERFECT FOR SLAB TRACKS

The new FUES-EPOS is also suitable for slab tracks. Progress Rail has developed special modifications to adapt the hot box detection equipment perfectly to the respective track profile. The fixture has been completely re-engineered and complies with the utmost requirements of railway operations. This means that the FUES-EPOS can be integrated into slab tracks from various superstructure manufacturers without any great expense.

EXCEPTIONALLY SAFE, EVEN UNDER EXTREME CONDITIONS

The FUES-EPOS always functions reliably even under extreme weather conditions. Progress

Rail has developed a special solution for desert areas that also detects hot box alarms even in extreme heat. The influences of the desert sand must be taken into consideration as well as the high temperatures. The FUES-EPOS therefore has a special hood to protect the infra-red sensors from the effects of the weather.

The FUES-EPOS is reliable not only in the desert but also in snowy and icy conditions. One version of the tried-and-tested hot box detection system has heated measurement modules to guarantee safe rail operation even in the event of snowfall and permanent frost.



FUES-EPOS for slab tracks



FUES-EPOS installation with snow covers in Switzerland



TEMPERATURE RECOGNITION

- Up to 180°C in hot box detection
- Up to 600°C in brake detection
- Accuracy of +/- 3°C with 12-bit resolution

CALIBRATION AND MAINTENANCE

- Pre-calibrated modules
- Auto-calibration
- Self-diagnosis and status report, including remote diagnosis
- Automatic pollution correction

INSTALLATION

- Railway sleeper: 24 VDC per sleeper
- TCP/IP or X3/X25 connection
- Power supply: Standard 220 – 240 option of 110 VAC 50 – 60 Hz, a cable length of up to 100 metres between railway sleeper is standard and evaluation unit is supported

SUPPORTED TRAIN SPEEDS

From 3 km/h to 500 km/h [1.86 mph to 310 mph]

SOFTWARE

- Scientific Linux
- Web-based user interface

OPTIONS

- Automatic radio transmission [audio response module]
- Vehicle identification [VID]
- Snow covers with electrical heating
- TAS [target area split] modules
- Two braking detection devices [BDD] or two BDD with target area split [TAS]
- Software-based sun filters
- Train monitoring system [remote announcement display, RAD]
- Eight element detector
- Target area 1 & 2 equipment
- Supports all current gauges [1435 and 1520 mm]

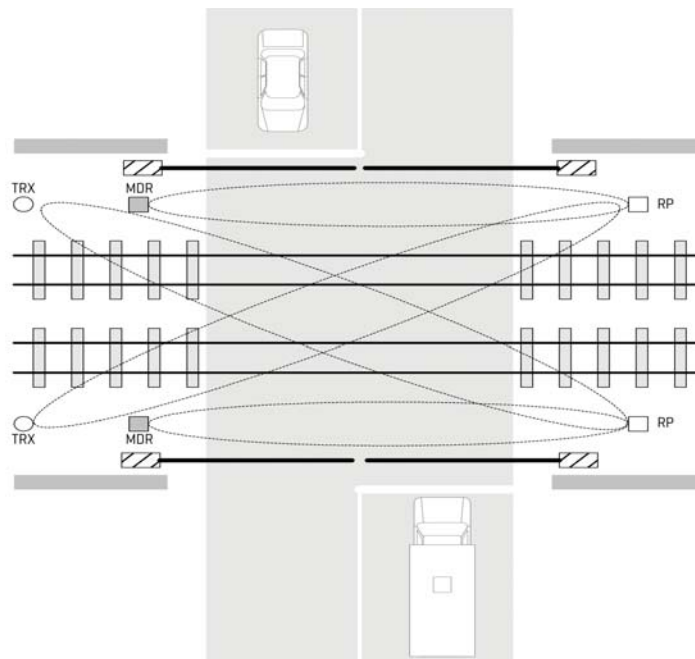


■ Level Crossing Protection: MIRA

In the level crossing areas there is the risk that cars and trucks might not respect the installed signals: the terrible accidents that could follow could affect not only the railroad traffic, but also lead to serious injury.

MIRA, Multi Inspection Radar Appliance is the new generation of the CrossGuard products that had been installed across Europe. MIRA is based on microwave radar technology, and guarantees the maximum level of integrity for safety, being SIL-4 in accordance to the CENELEC standards. In addition Progress Rail did improve the product capability to be easy to install and easy to maintain.

Progress Rail is able to directly address various local customer requirements, while maintaining flexibility to include even additional functions.





■ All Information from a Single Source – RAD

The remote announcement display (RAD) is a SCADA (supervisory control and data acquisition) office system that is used to support rail operation. The RAD system has been proving itself throughout Europe for more than 15 years. The core function of the RAD is gathering and displaying different information on the incorporated TIS (train inspection system) platforms, such as chassis monitoring thresholds (FUES), wheel diagnosis systems, RAD terminals and various other components. All gathered, displayed and processed information is recorded in the central RAD database.

The system also provides useful additional functions: train alarms and system events are handled using pop-up windows that can be acknowledged and event lists for the search and analysis of event history. Each RAD system accesses a unique common database, the content of which can be displayed using the RAD application on the RAD terminal. The RAD system contains its own configuration tool. The

RAD server application is responsible for secure data storage, communication with the RAD terminal as well as monitoring of and communication with the associated TIS platforms (for example availability status). The RAD system uses the current Microsoft operating systems' environment.

SUPER RAD

Super RAD is a central, web-based analysis system that can also be connected to different RAD control centres (RAD-CTC). It provides the following core functions:

- Trend analysis of trains that enable the customer to carry out preventative maintenance
- Combined analyses (of different RADs)
- Direct access to train data (temperature profiles)

■ Four Elements, Combined Control – Integrated Checkpoint

The integrated checkpoint developed by Progress Rail consists of four elements for securing rail transport and the track infrastructure. All functions can be controlled with one unique control unit:

- Dragging equipment detector (DED)
- Hot box detection FUES-EPOS (hot box detection, HBD)
- Clearance space profile monitoring (high-wide load, HWL)
- Track temperature detector

DRAGGING EQUIPMENT DETECTOR (DED)

The dragging equipment detector identifies low hanging objects under travelling trains. These are recognised with sensors that process the signals from an electronic evaluation system and transmits this to the control centre. The alarm thresholds can be set individually. The system is therefore best suited to recognise damages to thresholds, Eurobalises, vehicles and rail components and to prevent this safely.



HOT BOX DETECTION FUES-EPOS (HBD)

In rail operations, hot-running bearings and brakes represent a major safety risk. This can lead to axle journal fractures, derailments or fires. Brakes that are inadvertently not released can lead to overheating and this can cause damage to wheel treads, braking equipment and to the track infrastructure. A hot box detection system provides effective protection that can prevent damage to trains and rail tracks,



CHECKPOINT LAYOUT

Should a train drive over an integrated checkpoint with hot axles or brakes, incorrectly loaded wagons or with objects hanging down under the train, the system triggers an alarm that is transferred to a remote monitoring system, such as RAD. This means that counter-measures can be taken promptly to prevent negative consequences.

CONTROL UNIT

The control unit contains the evaluation electronics for the measurement data collected as well as the power supply for the whole measurement unit. Communication between the equipment and the control room is guaranteed by the control unit. The control unit is usually positioned right beside the checkpoint in an air-conditioned control house.



A telegraph flow only takes place if it contains all information, so that no further concentrators are required. It is also fully compatible with our remote announcement display RAD.

CLEARANCE SPACE PROFILE MONITORING (HWL)

The clearance space profile monitoring measures the external diameter of the trains using infra-red sensors. In the event that the light barriers are broken, an alarm is triggered to prevent damages to trains, freight and infrastructure. The clearance space profile monitoring can also be used before tunnels and bridges and can be adapted for different profiles.



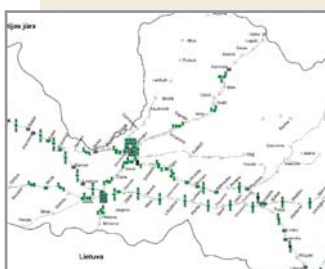
TRACK TEMPERATURE DETECTOR

Even in very hot regions, the track temperature can have a significant influence on the measurement of hot boxes. The system is controlled by Progress Rail and therefore takes the track temperatures into account so as to be able to measure reliably even in extreme heat.



REMOTE ANNOUNCEMENT DISPLAY RAD

The remote announcement display [RAD] is a SCADA [supervisory control and data acquisition] office system that is used to support rail operation. The core function of the RAD is gathering and displaying different information on the incorporated TIS [train inspection system] platforms.





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MOVING SAFELY INTO THE FUTURE WITH SYSTEM SOLUTIONS FROM PROGRESS RAIL

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