



User report

# DB Netz AG

Digitalised maintenance vehicles



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*"optiMEAS has been our digitalisation partner for years. It works really well and, above all, is always solution-orientated. As a result, we have exactly the performance data we need for our vehicles. need optimisation."*

## Fit for the job

As an infrastructure company of Deutsche Bahn, the DB Netz AG is responsible for the safe operation and maintenance of the railway network and its facilities. It operates a fleet of different maintenance vehicles for this purpose. The **maintenance vehicles for overhead lines (IFO)** specialise in the maintenance and repair of overhead lines.

Together with **optiMEAS**, DB Netz is realising a digital vehicle monitoring system that improves the operation of the IFOs and increases their availability.

# How smart technology Improved availability

The **maintenance vehicles for overhead lines (IFO)** of **DB Netz AG** are indispensable - for the ongoing maintenance of the approx. 20,000 kilometre-long electrified network and as a "fire brigade" in emergency situations. The **optiMEAS** solution, consisting of IoT hardware and software as well as interfaces, enables the precise determination of locations and the automated determination of operating days and kilometres driven.

## THE CHALLENGE: MAINTENANCE VEHICLES MUST BE READY FOR ACTION

An exceptionally strong storm that causes trees to topple onto overhead lines can suddenly paralyse rail operations over a wide area. Especially in the event of major disruptions, restoring the power supply is a huge challenge and the availability of **IFOs** is essential. Several vehicles from different regions have to be dispatched to an area in order to be able to quickly resume operations on the lines even in such a critical situation. This requires the control centre needs to know where the vehicles equipped with special technology are and whether they are ready for use. Another problem is that the vehicles do not start after long periods of standstill because the battery voltage is insufficient. **DB Netz** also needs a solution for this.

In addition to acute defects, vehicle availability is limited by regular maintenance, which is carried out at set intervals. The aim is to optimise maintenance intervals based on the actual kilometres driven and operating times and to reduce visits to the workshop.

**DB Netz** is relying on **optiMEAS'** digitalisation and rail expertise to develop a future-proof solution. The company has already **worked** successfully with **DB Systemtechnik**. IIII

## THE SOLUTION: THE OPTIMEAS SYSTEM CONTINUOUSLY SUPPLIES OPERATING DATA

The smart solution from **optiMEAS** is being developed in several stages for the **IFO** construction lines and logistics locomotives. On the vehicle side

an IoT device always receives the data, processes it intelligently and transmits it to the "landside". Two rail-certified device types are in play: The **smartRAIL** is installed in the **IFOs** and the particularly compact **smartMINI** in the logistics series. With their **smartCORE** firmware, the systems offer GPS, various interfaces, intelligent functions for data acquisition and processing as well as cloud connectivity.

Using a GPS signal, each system records the position data at short intervals and records the battery voltage. The device sends the data to the **optiCLOUD** via mobile radio.

The position values flow automatically into **DB Netz's** digital map. The kilometres travelled and operating day data are calculated using an algorithm and are available for the IT system in which the maintenance strategies are implemented.

Tracking, odometer and battery monitoring are basic functions of the overall solution. In some test vehicles, so-called sample conversions, operating hours counters are also realised. **CAN bus adapters** are used to connect the control units of the main engine, auxiliary engines and power units of the working machines to **smartRAIL**, which taps the data.

The system records analogue signals via optionally installed sensors in combination with the specially developed **smart I/O MIO1** and **smart I/O 8U12** measuring modules. Depending on the model series, these include the temperatures of oil and coolant, the fill level of fuel tanks



Installation of a smartRail in the control cabinet of a maintenance vehicle.

and the pressure in the soot particle filter of diesel engines. The open system architecture makes it possible to integrate additional data sources, sensors and measurement modules without having to change the basic system. The **smartCORE** firmware only requires an additional software module for a new measurement task.

The **smartI/O** BATMON measuring module is set to play a key role in the future. It continuously records the battery voltage and also serves as an "intelligent power supply unit": if **IFOs** are on standby on the siding, **smart RAIL** or **smartMINI** is set to battery-saving mode. From then on, the smart measuring module records the battery voltage independently and only wakes up the IoT device at definable intervals to transfer the data to the **optiCLOUD**.

The cloud is both a data server and an interface to the devices. No technician needs to travel to the locomotive to update software or change device configurations - this can be done remotely via the cloud.

**smartRAIL** is fully railway-certified and fail-safe thanks to integrated watchdogs. ■■■

#### THE BENEFIT:

#### TRANSPARENCY, GREATER AVAILABILITY AND DATA-BASED MAINTENANCE

Almost 80 vehicle systems are now travelling with an **optiMEAS system** on board, via which they continuously transmit position and vehicle data to the shore side. The control centre can digitally locate each vehicle on the map and see via a traffic light whether it is ready for use. This is particularly valuable for major incident management, as **IFOs** from different network areas can be coordinated quickly.

**DB Netz** uses the GPS-based odometer to derive the actual wear and tear and maintenance requirements of components such as wheelsets and brakes and to adjust replacement intervals in future based on usage. The aim is to save maintenance costs, consume fewer resources and increase the availability of the **IFOs** in the machine pool.



Permanent monitoring of the starter battery ensures the operational readiness of the fleet. In future, battery failures will be predicted and automatic alarms triggered with the help of historical diagnostic data.

Thanks to additional intelligent measurement technology, **DB Netz** will have the main engine and the work machines - including the important but failure-prone aerial work platforms - under control in future. Recorded and calculated running time data should make it possible to maintain engines and units in good time depending on their use.

Following successful trials, the **IFO 708** series is to be equipped with this technology across the board.

The scalability of **smartRAIL** ensures that unlimited additional measurement technology can be integrated to monitor the "state of health" of the vehicle

of components. One current topic is the monitoring of soot particle filters in diesel engines.

One highlight of the solution is that it continuously feeds the IT system with performance data on the vehicle systems. The intelligent use of the constantly growing database makes it possible to optimise maintenance times and implement condition-based maintenance. **DB Netz's** aim is to provide high-quality railway infrastructure with the greatest possible efficiency.

The digitalisation of the **IFO** fleet with **smartRAIL** makes an important contribution to this. ■■■

#### ADVANTAGES AT A GLANCE:

- " Precise vehicle tracking
- " Running kilometre counter based on GPS
- " Battery monitoring
- " Continuous operating data
- " Remote control
- " Condition-orientated maintenance

#### COMPONENTS USED BY OPTIMEAS:

- " IoT device **smartRAIL** / **smartMINI** with **smartCORE** software
- " Battery monitoring system **smartI/O** **BATMON**
- " Measuring modules **smart I/O** **MIO1** and **smartI/O 8U12**
- " **optiCLOUD**

#### FURTHER INFORMATION:

[www.optimeas.de](http://www.optimeas.de)  
[www.dbnetze.com](http://www.dbnetze.com)

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