TagMaster
North America, Inc.

baas R&D

Lloyd's Register
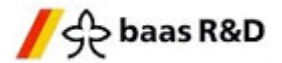
Wheel Flat Detection and Axle Load Measurement

TagMaster, NedTrain and Baas present GOTCHA, a joint system solution for wheel flat detection and axle load measurement for rail bound transportation. GOTCHA provides significant cost savings, increases safety-levels and reduces damage to the infrastructure.

GOTCHA - Wheel flat detection and axle load measurement system

The GOTCHA system

GOTCHA is a total solution for measuring of wheel defects and axle load of trains in operation, at high-speed. The system uses fibre optical sensors, which are placed in robust metal housings mounted under the rail. The sensor detects vertical deflections of the rail due to the passage of trains. The optical signal from the sensor is converted to an electrical signal that represents the characteristics of a certain wheel defect or axle load. To ensure correct weight data, automatic calibration is performed as locomotives with pre-defined weights are identified.

The GOTCHA system is easy to implement in existing processes and provides an objective quality measurement system, which is important for improving maintenance strategies. The system is totally resistant to electromagnetic interference and is highly reliable. It requires only one service check period per year.
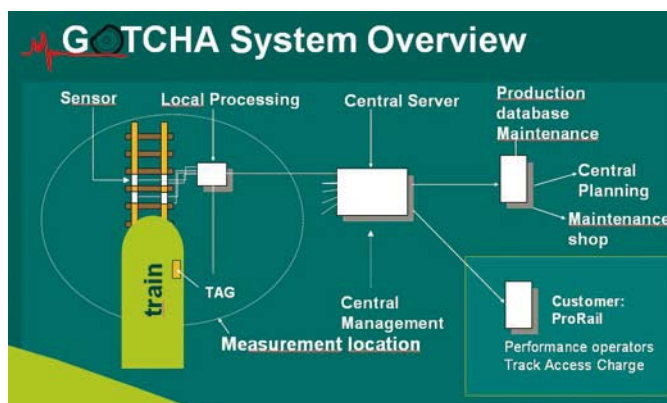
TagMaster RFID - for automatic identification

TagMaster's RFID system is a central part of the GOTCHA system. The RFID system ensures that the measured data is accurately attributed to each wagon as it passes the measurement station. Each wagon is equipped with an ID-tag on each side, which is automatically identified by TagMaster long-range readers mounted alongside the track.
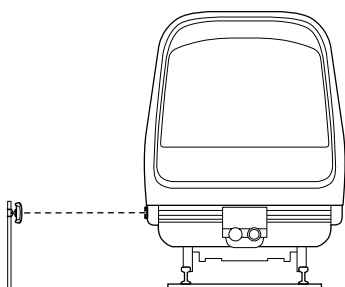
Improvement in maintenance operations

The measurement system forms an integrated part of the wheel re-profiling process in the maintenance workshops. Wheel quality and type of defects can be detected as the train is moving at normal speed. The system distinguishes between different types of defects, which results in increased maintenance efficiency. Each workshop has the capability to check the database for registered defects such as eccentricity, squaring, flats etc. Based on the data retrieved from the measurements, accurate rejection criteria can be implemented.

Reduced wear and improved safety

The measurements of axle load and wheel quality ensures that defect vehicles are in operation for a shorter period of time after detection. Through condition-based maintenance the reaction time for wheel re-profiling is made shorter and the wear on railroad tracks is dramatically reduced. This results in an improved safety level of the rail network.

Rail road infrastructure charges

Rail road operators argue that the cost of operation is correlated to kilometres tonnes; train kilometres, axle load and the wheel quality. As a method to derive the future charge per train, the GOTCHA system provides positive identification of each wagon along with an accurate method of measuring defects as well as static and dynamic loads.

Easy to install

The sensors are mounted under the rail and need no decommissioning of the track. As a result of using fibre optical technology there is no electrical connection to the rail and the system is insensitive to electro-magnetic interference. The identification part of the system, provided by TagMaster, consists of a heavy-duty ID-tag, which is easily mounted on the wagon-side. The readers are easily installed at the side of the track.

Automatic identification by TagMaster

TagMaster's RFID (Radio Frequency Identification) system operates at 2.45 GHz. TagMaster has developed a range of readers and ID-tags that fulfils the tough requirements of the rail industry. These products are used worldwide in railway applications that require identification and positioning at high-speed, with high precision in demanding environments.

1 Heavy Duty ID-tag

The heavy-duty ID-tags are mounted on the front, side, top or underneath each individual vehicle or on the sleepers in special tag fixings. The ID-tag is an extremely resistant, totally encapsulated and maintenance free. It has a predictable life of 6, 8 or 10 years, depending on model.

2 LR-6^{HD} reader

The LR-6^{HD} is a reader used for track-side applications. These readers can be installed at key locations such as stations, terminal entrances or maintenance centres. The reader identifies ID-tags at a range of up to 6 metres and at passage speed of up to 400 km/h.

3 S1510 Handheld reader

The S1510 Handheld a 2.45 GHz RFID reader with an integrated industrial PDA. The versatility of the PDA together with the flexibility of RFID technology makes the Handheld reader an ideal supplement to stationary readers in applications such as train maintenance. The S1510 allows for quick and reliable on-the-spot identification and verification of objects such as wagons.

GOTCHA system
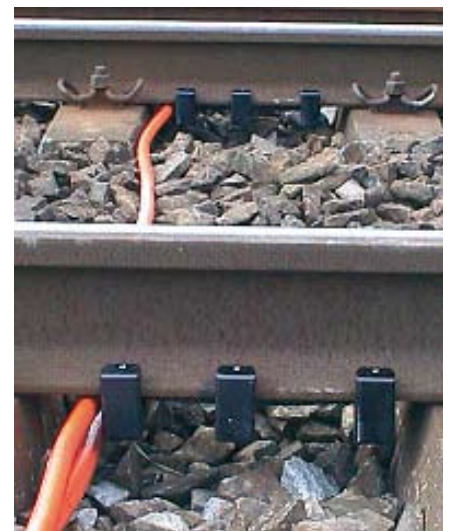
Fiber optical sensors

GOTCHA installation - Dutch Railway

Maintenance and quality control

Dutch Railway - To improve the wheel quality and reduce the maintenance and infrastructure costs due to wheel defects, NedTrain Consulting and Baas R&D have installed the GOTCHA system on tracks across Holland. Both wheel quality and axle load are measured at high-speed at 17 locations. Another 24 stations has been equipped to measure axle load. The integrated TagMaster RFID system ensures that the actual measurements are matched with the correct wheel pairs. Thanks to the TagMaster system the workshop maintenance schedule of a specific wagon is automatically updated by the GOTCHA system.

System benefits

Maintenance costs reduction

The system has shown a 90 % reduction of hot boxes and a decrease of consequential damage defects such as broken springs. The implementation on the Dutch railway has increased the efficiency in the re-profiling process. The condition-based service has led to a 10% increased bogie life span and 25-50% longer service life of the wheels. Due to the substantially reduced time of defect wheels in traffic a 5-10 % reduction in maintenance cost of the infrastructure has been reached.

Long-range & long life

TagMaster's long-range RFID readers are available for track-side installation where there is need for identifying ID-tags at high speed. The heavy-duty ID-tags have a long life span and are easy to mount on the train.

Passenger convenience and safety

As wheel defects are identified at an early stage, less trains need to be taken out for regular service. Trains in operation hold a higher quality level, avoiding service problems due to wheel or axle quality problems. This leads to improved passenger convenience such as reduced noise and vibration levels.

Future add-on functionality

As parts of the continued development of this system, additional add-on functionality is possible. By adding infrared sensors for the measurement of axle temperature, "hot boxes" is possible. In addition, measuring horizontal vibrations rather than vertical vibrations, advanced software interpretation algorithms can identify unstable bogies. These additional features can be integrated into the same database using the same interfaces to the overall maintenance system.

Company overview

TagMaster is a leading supplier of long-range identification systems based on a technique known as RFID (radio frequency identification), TagMaster's system automatically identifies vehicles accurately at long-range. TagMaster has pioneered the development of long-range RFID and has introduced the technology into a wide range of areas, including the rail industry.

TagMaster is represented worldwide through a large network of distributors, system integrators and OEM partners.

For more information on TagMaster, please visit our website at www.tagmasterna.com or e-mail us at sales@tagmasterna.com