NUMBER*Check* by ASE helps Infrabel getting more detailed train information using their infrastructure

As the infrastructure operator and owner, Infrabel is responsible for the Belgian railroad network. The main objective is the development of a secure and high-quality railway network for today's and future trains.

Up to 1100 trains pass Brussels central station

The Brussels North and Brussels South railway stations are linked via the busiest railway tunnel in the world: Up to 1100 trains pass the tunnel each day on one of its six tracks. Most of Belgian circling passenger trains pass this connection, including the ICE, Thalys, TGV and Eurostar.

Inside the tunnel is also the Brussels Central station, with three island platforms which is the location of the ASE number recognition system.

Picture: Station Brussels-Midi; © Infrabel

Why NUMBER*Check* by ASE?

Apart from safety relevant information, the Belgian train traffic control system contains very little information on the train properties and its composition. Due to its strategic central position, the new train number recognition system from ASE is able to provide Infrabel with true wagon order and movement in real time. Additionally, the information provided by the traffic control system is linked to the detected trains.

In the future, further properties of trains will be recorded by appropriate measurement techniques. These include loading gauge checking, hot box detection, dragging equipment detection, wheel flat detection, integrity checks of pantographs, Graffiti and more.

Latest technology meets intelligent engineering

The number recognition system consists of three camera pillars with a height of about 1.8 meters. The pillars are located in the track between the adjacent tracks at the northern end of the three island platforms.

Each pillar monitors its two surrounding tracks in parallel. Each pillar houses the cameras, axle detection, illumination and computer network components.

Picture: camera pillar; © ASE AG

The database and evaluation computers are located at the end of platform 1. Their task is to analyse process, check and save the captured data. The information of the traffic control system is queried over Ethernet. With the exception of the power supply line, only a one fibre optics cable is needed to connect all components in a ring topology. These unique qualities allow installation and initial operation within several hours.

Special challenges and high precision

The installation inside the tunnel paired with ambitious requirements where challenging: The maximum velocity of 60 km/h requires highly light sensitive cameras and short exposure times while using high frame rates and low image compression. The short exposure times require strong illumination which must never blind the conductor and passengers. These problems are only aggravated by the low distance between camera and train of about 80 cm, requiring wide angles of aperture for both the cameras as well as the illumination. These tasks were successfully solved with a new illumination and camera systems developed by ASE AG.

The detection system is designed to continuously record and analyse passing UIC and material numbers from different point of views. This method achieves high levels of accuracy. In this project, more than 98% of all numbers are read correctly! Even ICE trains with their grey and low contrast are read reliably. Great care has been taken to optimize the processing time: There is no queuing of train data even during Brussels' rush hour.

High flexibility with modular software tools

The complete software stack is modular and connected communicating via TCP/IP interfaces. This allows splitting the software modules to several different servers or locations inside the network according to the costumer requirements and optimized for the specific application.

Additionally, the fault-free operation, and hardware parameters such as temperature, fan speed, axle sensors and further parameters are continuously check by a higher-level system. For example, the maintenance personal will be automatically notified in case of a slowly increasing detection error rate. Their first action will be to check and clean the camera windows. Multiple remote maintenance options and debugging functionality complete the effective maintenance down to the lowest signal level.

Further NUMBER*Check* systems in Belgium are planned

Based on the outstanding experience with this system, Infabel is planning to install more of these systems at Belgian harbours, allowing Infrabel to record most of the Belgian freight wagon stock.

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