Switch Monitoring and Diagnostic Systems

Switches (turnouts/points) and crossings are vulnerable nerve centres of railway infrastructure and are main cost-drivers. Their maintenance is highly costly for the infrastructure management. Switch-defects, -failures and train-derailments, on account of defective switches, disturb the traffic flow in a high extend. Switch and turnout machine failures account for a large proportion of infrastructure related delays and unplanned maintenances.
Fixed Infrastructure Asset Monitoring enables tracing defects in turnouts. This will be done by means of intelligent software. Thanks to the comparison of actual and reference values the software can detect imminent failures even before a malfunction occurs. Depending of these values/data maintenance messages will be generated and send to the competent authorities automatically. Thus failures can be avoided by means of PREVENTIVE MAINTENANCE.

One of such Switch Condition Monitoring (SCM) System is ROADMASTER® from Voest Alpine, Austria. It enables operators to reduce switch failures and optimize maintenance processes. SCM alerts allow maintenance work to be scheduled to restore performance before service is disrupted. Performance of switch machines and turnouts is measured at every movement, and specialist algorithms are used to warn when normal operating characteristics are exceeded. Solutions are non-invasive and fully configurable to cover all combinations of switch machine, turnout and control scheme. ROADMASTER® - intelligent data acquisition for vignol rail turnouts as well as grooved rail turnouts.

ROADMASTER® (or PHOENIXSCM) used on PHOENIXMDS platform offers infrastructure operators and maintainers valuable information on the condition and performance of turnouts, switch machines and associated assets. The data and automated alerts provided create a vital time-frame in which maintenance work can be scheduled to restore performance before failure. Maintenance can be prioritized according to asset condition, and additional information provided by the function enables a targeted approach to fault finding.
"Setting the switch" - that's what the German Railway (DB) has taken literally and uses a new technology for monitoring the points in the rail network with its system DIANA. With these "intelligent switches" train traffic should become even more reliable in the future.

The new technology is similar to an electrocardiogram, ECG for short, which measures the electrical impulses of our heart muscle. The ECG gives the doctor diagnostic information about how fit and healthy the patient is. The same goes for the virtual diagnosis and analysis platform DIANA:
One or more drive motors are attached to the switch. When they set the switch in motion, electricity flows. In the signal box, sensors record the power consumption and transmit the data to DIANA. The computer program compares the results with the set-point. If the switch is missing nothing, then the curve corresponds to the reference current curve. If the program detects any deviations, DIANA will sound alarm.

This platform detects on an early stage malfunctions, debris in the switch or wear. And the repair team can take preventative measures; either repair or maintain the switch or replace it if it is defective. The relevant maintenance team will be informed about the relevant workings steps over an app on a tablet or mobile.

German Railway (DB) has already mounted this diagnostic system on 10 000 switches. In 2018 another 15 000 switches will come under this diagnostic system. It is envisaged to cover 30 000 switches until 2020.