RAILWAY SYSTEMS
by voestalpine

zentrak SCM

Diagnostic and monitoring technologies for turnout systems

voestalpine Signaling
www.voestalpine.com/railway-systems

voestalpine
ONE STEP AHEAD.

DIGITAL PERFORMANCE ON TRACK®

DIAGNOSTIC AND MONITORING TECHNOLOGIES FOR INFRASTRUCTURE

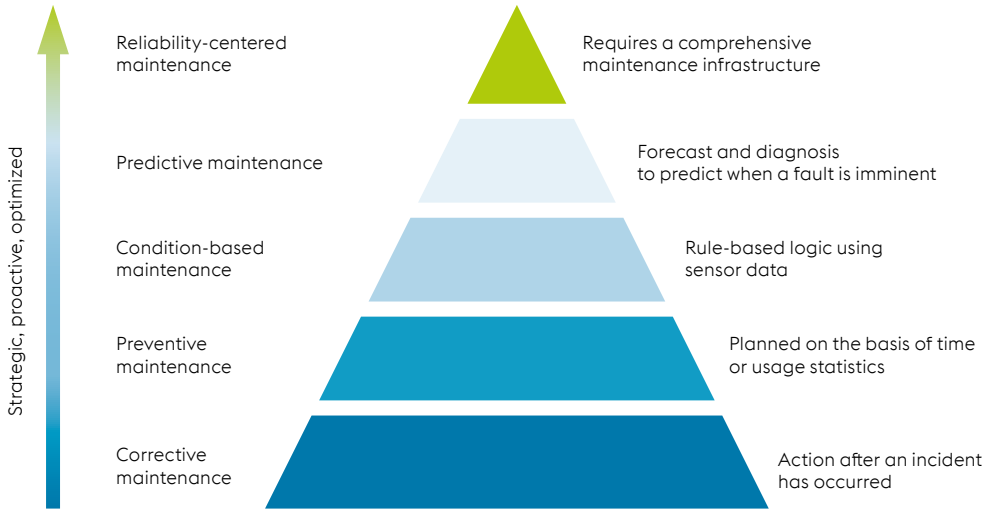
We use our intelligent zentrak diagnostic and monitoring system to record the asset condition of your infrastructure continuously and comprehensively. With the category switch condition monitoring – zentrak SCM module – we enable you to prevent switch failures and optimize maintenance processes. This is important because a large percentage of infrastructure-related delays and unplanned servicing are caused by failure of switches and their components. With zentrak SCM, we are offering you an option for proactive condition-based maintenance. For the highest levels of availability. With the lowest lifecycle costs.

That's what we stand for. For Digital Performance on Track®.

WHY USE DIAGNOSTIC AND MONITORING SYSTEMS FOR YOUR TURNOUT SYSTEM?

- **24/7 availability** is absolutely necessary due to expanding urbanization
- **Increased demands on the infrastructure** caused by a higher clock rate, increasing speeds and axle loads
- **Challenging environmental influences** such as dirt, snow and sand affect the performance of turnouts
- **Restricted access** and **minimum times** for carrying out maintenance work
- **Reliability-centered maintenance** necessitates the use of diagnostic and monitoring technologies

zentrak SCM, the intelligent switch condition monitoring system, is the answer to the changed basic conditions in global rail transport. Impending failures are detected at an early stage, even before rail operations are negatively impacted. As a result, you reduce switch failures, increase availability of railroad lines and simultaneously optimize the life-cycle costs.



Our recommendation

A reliability-centered approach ensures a customized, successful maintenance strategy for each individual asset. The ability to plan maintenance and repair work guarantees you optimized costs over the entire life cycle of your railroad network – and your turnout systems.

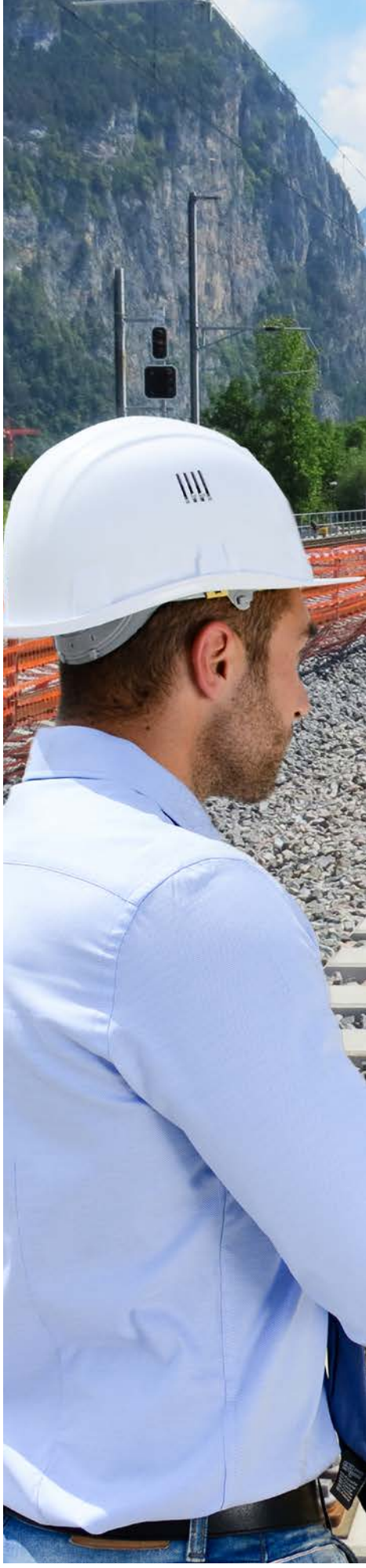
Switch condition monitoring with zentrak SCM

Switch failures can be the result of mechanical, environmental or electrical problems and often require multiple departments or experts to find a solution. Use intelligent switch condition monitoring systems such as zentrak SCM to detect impending failures at an early stage. Maintenance can be prioritized based on the asset condition, and the additional information provided by zentrak SCM enables targeted troubleshooting. Measuring points for this can be custom-defined to meet your requirements and more points can be added at any time. That guarantees maximum flexibility and planning security. As a result, you can introduce required measures promptly, prevent failures and ensure maximum availability.

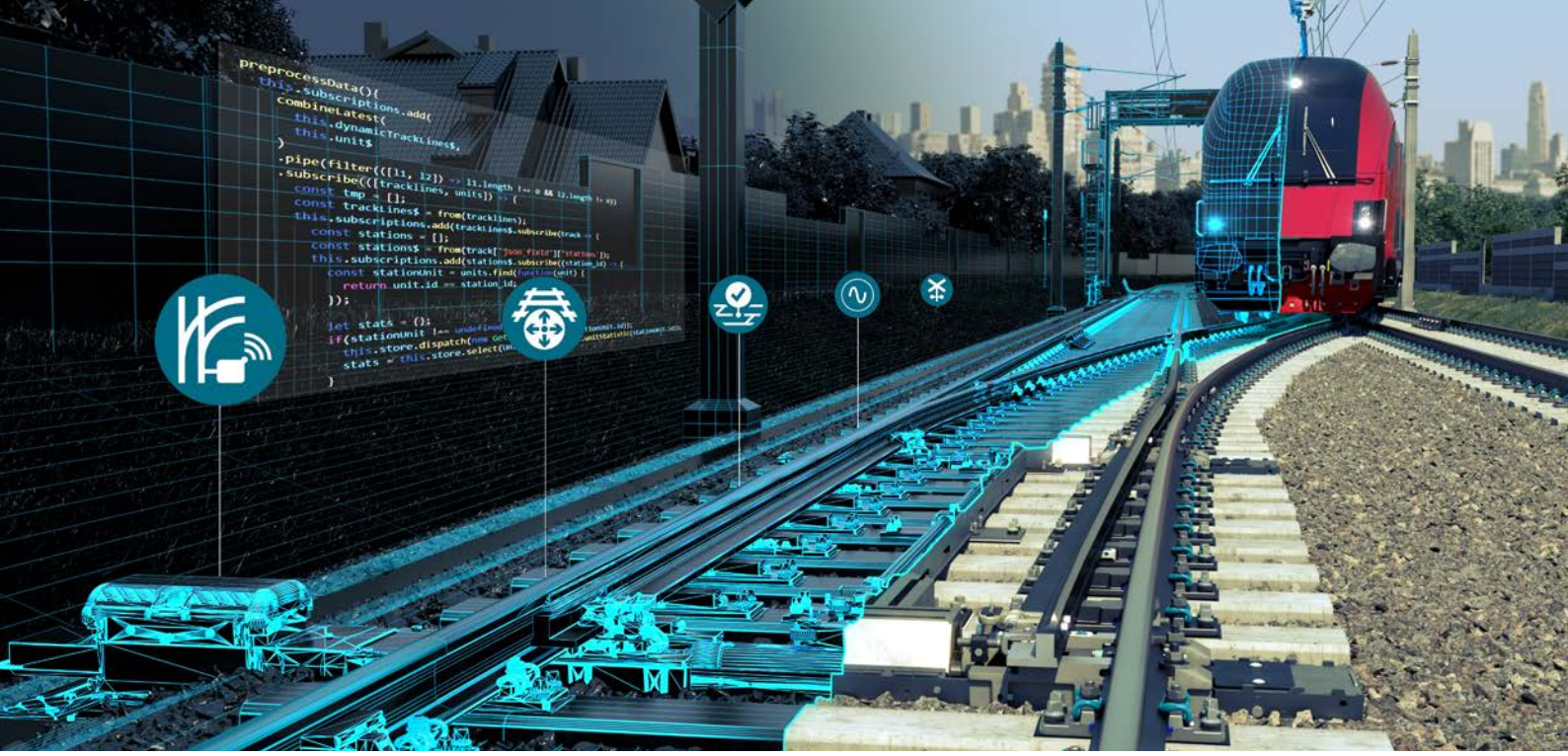
zentrak SCM features the following advantages:

- Independent of drive and interlocking technology as well as IT environment
- Modular design
- Easy to retrofit measuring points
- Flexible monitoring solution: Data is acquired centrally in the interlocking or directly at the turnout
- Seamless monitoring of the operating state
- Wide variety of national and international approvals exist

For more information please follow the QR code:




ACTION / REMEDY
FORECAST
INFORMATION
COLLECT DATA

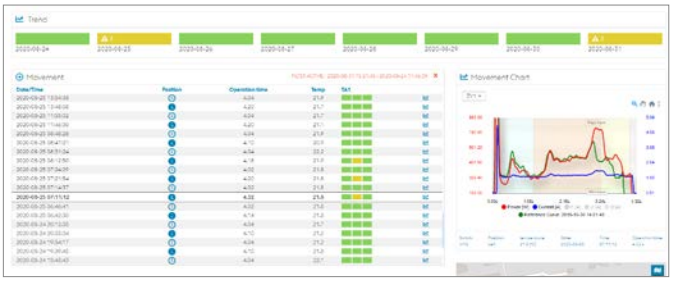


HOW DOES SWITCH CONDITION MONITORING WORK?

Without switch condition monitoring, failures occur unexpectedly and only two operating states can be determined. The asset is either available or it is out of order. As a result, the entire operation comes to a standstill, causing unnecessary delays.

Switch condition monitoring prevents failures and increases availability of railroad lines

When assets are equipped with switch condition monitoring, then there is one more measurable state. Determination of this additional asset condition enables **impending failures** (limit violations) to be identified and measured. The recorded data is analyzed, which enables **maintenance planning** and corrective measures to be initiated in a timely manner. In addition, zentrak SCM is a valuable tool for **eliminating** irregularities because it helps accelerate the tedious process of troubleshooting. Accordingly, an irregularity can be remedied quickly and with little effort.



zentrak SCM provides for up to 40 % fewer turnout failures

INTELLIGENT SWITCH MACHINE

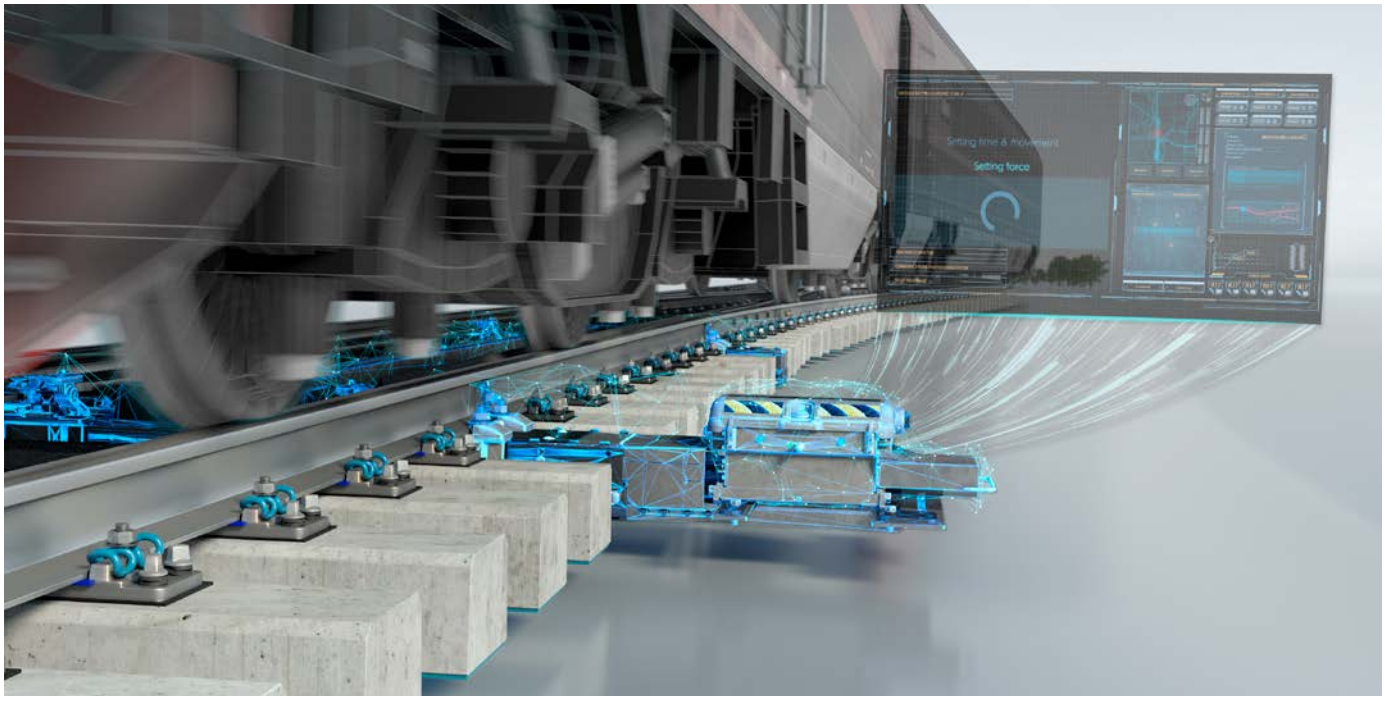
In combination with our zentrak diagnostic system, our intelligent switch machine is an extremely effective tool for your maintenance team. Your railway system becomes better, more efficient and more profitable. The sensors required for this are mounted directly on the switch machine and/or on the hydraulic force transmission system. These are either pre-installed as an integrated solution or can be modularly retrofitted. The measured data acquired by them is evaluated directly on the data logger, meaning that irregularities can be detected based on assessment criteria. If the measured data is OK, it is temporarily stored and transmitted to the diagnostic platform at an interval that can be freely selected. In the event of irregularities, the data is immediately transmitted to the platform for further analysis via a data link. As a result, the regional supervisors receive a meaningful display of the performance and a precise analysis system for management.

SYSTEM

- Battery-operated or wired
- Data generation and acquisition of information
- Data transmission by means of SIM/modem or wired connection
- Visualization on the intelligent zentrak diagnostic platform
- Access via terminals or mobile end devices

Possible measured variables

- Setting force, time, duration and position
- Current curve
- System pressure / setting pressure
- Oil level
- Water ingress
- Temperature, etc.



zentrak SCM – YOUR PARTNER FOR ALL TRACK SYSTEMS

We cover the turnout portfolio of the whole world with zentrak SCM. No matter what type of rail transport, application area, turnout geometry or manufacturer, the diagnostic system can be used by all railways. Furthermore, it is adapted to your requirements depending on the local conditions.

This is true for both vignol rail and grooved rail turnout systems. For example, with compact sensors combined in blocks, using existing piping for cable routing or housing the data logger in existing control cabinets, the requirements for grooved rail turnout systems in particular are met.

Possible measured variables for flat-bottom and grooved rail turnout systems:

measured variables	Acquisition	Causes / effects on the turnout system																
		Turnout components				Setting system			Sign-aling		Switch machine						Locking device	
		Defective roller system	Poor lubrication	Increased wear	Tongue retensioning	Losses in the hydraulic system	Loose components	Force transmission system poorly adjusted	Insulation defect	Electrical failures	Losses in the hydraulic system	End position detection	Defective motor	Manual operation	Poor power supply	Defective coupling	Resistance to motion	Insufficient adjustment
Setting force																		
	Hydraulic pressure	●	●	●	●	●		●			●	●					●	●
	Switching current	●	●	●		●		●			●	●	●		●	●	●	●
	Setting force measuring bolt	●	●	●	●	●		●			●	●				●	●	●
	Power	●	●	●		●		●			●	●	●		●	●	●	●
Vibration																		
	Acceleration sensors	●	●	●			●	●					●			●	●	
Setting time						●					●	●	●		●	●		
Setting movements		●	●	●		●	●	●	●	●	●	●	●		●	●	●	●
Noise emissions																		
	Solid-borne sound sensors	●	●	●			●	●					●			●	●	
Temperature																		
	Centrally in the interlocking area	●	●	●	●	●	●	●			●	●		●	●	●	●	●
	Directly at the installation site											●	●				●	●
Water level									●	●	●	●	●	●	●			
Manual switching												●	●	●	●			
Hydraulic fluid level indicator						●					●							
Position of the tongue rails					●							●					●	●

VIGNOL RAIL TURNOUT SYSTEMS

POSSIBLE MEASURING POINTS

1 Intelligent switch machine:
   a. Setting force
   b. Setting time
   c. Setting movement
2 Vibration
3 Noise emissions
4 Temperature (rail and environment)
5 Position of the tongue rail

GROOVED RAIL TURNOUT SYSTEMS

POSSIBLE MEASURING POINTS

1 Intelligent switch machine:
   a. Setting force
   b. Setting time
   c. Setting movement
2 Vibration
3 Noise emissions
4 Temperature (environment and earth box)
5 Position of the tongue rail
6 Manual switching
7 Water level

HARDWARE & SOFTWARE FROM A SINGLE SOURCE

zentrak SCM provides all components, from hardware to software, as a system and complete solution. This means that you save on interfaces and get everything – from data acquisition to data analysis – from a single source. The system versions can be configured to meet your requirements.

OVERVIEW OF SYSTEM ELEMENTS

Sensors detect a plethora of quantitative measured variables for determining the performance and condition of the monitored turnout. The use of noninvasive technology means the measurements do not cause reactions and therefore are completely risk-free.

Data recording by means of customer-specific hardware (with flexible options), which has been developed specifically for railway applications. The information gained by the sensors is processed and ensures comprehensive data retrieval.

Software modules on a central server analyze the acquired data to provide the user with information about the asset condition as well as performance statistics using integrated visualization software.

Integration of zentrak

zentrak SCM can be integrated into external software platforms by system interfaces or visualized by means of our zentrak diagnostic and monitoring platform (can be expanded with all zentrak categories).

Interfaces include:

- OPC-UA (e.g. DB DIANA)
- Web services
- Interface development in coordination with the customer is possible

Our visualization software enables easy and intuitive operation via a multilingual user interface. Seamless monitoring of the operating state is possible on any PC, tablet or common smartphone, regardless of platform, by means of web-based software. As a result, the state of the track or of fixed assets is continuously available and is comprehensively analyzed and displayed. A clearly displayed overview of the asset conditions saves time and guarantees that you can focus on the essentials.

- Visualization of the asset condition
- Forecast
- Alarms
- KPIs and reporting

MEASURABLE LCC OPTIMIZATION OF THE RAILWAY INFRASTRUCTURE

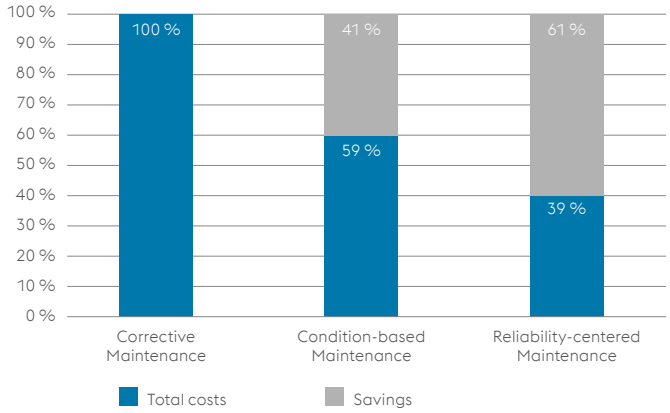
Availability increases, costs go down – proven life-cycle cost optimizations

"*Railway operators need an efficient and competitive infrastructure to be able to compete with other carriers. All too often public procurement follows the principle of the least expensive provider. However, it is already possible to evaluate ecological criteria and factors such as availability, performance and costs over the entire life cycle.*"

Dr. **Jochen Holzfeind**,
Chief Technology Officer voestalpine Railway Systems

By relying on decades of experience and data, we can use the LCC software tool to demonstrate the economic effects and benefits of using zentrak SCM and thereby reinforce the trust of our customers.

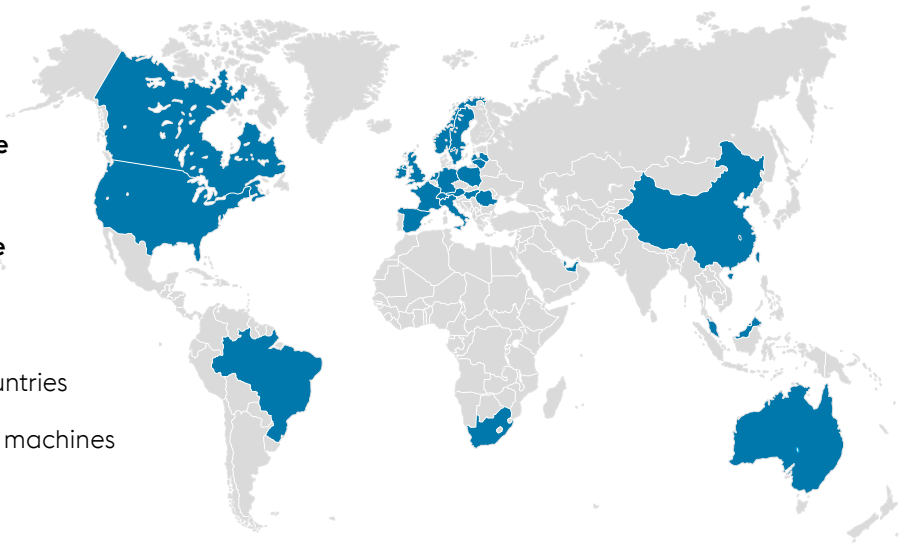
Total costs



WHY CHOOSE US?

Domain expertise, competency and more than 160 years of experience in the international turnout business guarantee your "digital" Performance on Track®.

- Reference projects in more than 20 countries
- Monitoring of more than 10,000 switch machines
- Up to 40 % fewer turnout failures
- Higher availability of railroad lines



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