



Brockmann & Büchner

How Actionable Information Accelerates Rail Maintenance

- Condition-Based Monitoring

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Revolutionizing Rail Maintenance

Since the industrial revolution, significant transformations have occurred. Machines and assets now face higher expectations, necessitating enhanced performance, increased flexibility and reduced failure rates. Owners and operators of fleets and infrastructure alike demand not only improved durability but also access to more comprehensive information. The process involves gathering operational data, generating alarms in the event of malfunctions, and delivering actionable insights:

- Where is the problem?
- How severe is it?
- Where and how do I need to intervene first to solve the most urgent problem in the most efficient way?
- What if I want to achieve the best possible outcome, but with the lowest possible investment?

Real-time data is matched and compared with historical data, empirical values, and manufacturer instruction. Oftentimes operators set their own reference values and categorize deviations and anomalies according to their frequency and severity. However, the data processing step is not done manually, but with the help of various technologies and methods. While most of the technologies used for data collection have been around for decades, those used for data transmission, storage and analysis are rather new. In fact, these technologies often hold untapped potential that exceeds current user exploitation.

Emerging Technologies in CBM and Predictive Maintenance

The Internet of Things (IoT), telematics, big data, blockchain, cloud, or edge computing and artificial intelligence are all terms that CBM professionals will come across. These concepts and techniques will enable, improve, and accelerate data processing regardless of context or industry. Like the others, artificial intelligence has only recently started to become more explored for the purposes of CBM and predictive maintenance.

Machine vision, for example, describes methods that integrate hardware and software to enable machines to perceive and recognize objects. Cameras are used to record visual material of track sections and sides of passing trains. The material is directly processed to identify deformations, dirt, overgrowing vegetations and obstacles. Through machine learning, algorithms analyzing data to predict output values optimize their operations when fed with new data. The algorithms discern which values fall within acceptable ranges and continuously enhance performance and output. Consequently, the system's accuracy in identifying deformations, damages, or abnormalities improves, making it more reliable.

Ci4Rail

Ci4Rail is a dynamic German startup company with extensive experience in the railroad market and in embedded electronics and software. Their mission is to help customers digitize, increase transparency, and improve the value of their solutions. They provide customized computing and service solutions tailored to the needs of mobility operators, vehicle, and subsystem manufacturers. Their "Know Your Train" solution combines cloud-based machine learning analytics with flexible edge computing for condition-based and predictive maintenance. By continuously analyzing data and optimizing performance, Ci4Rail helps operators monitor and improve the condition of on-board systems. Ci4Rail also offers retrofit solutions and integration options for system suppliers. With a vision of a world where public transport is faster, more affordable, and more environmentally friendly, Ci4Rail is dedicated to the digitization of rail and public transport through innovative technologies such as machine learning and artificial intelligence.



<https://www.ci4rail.com/company/>

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Rail Alliance – Shaping the Future

The concept of a Rail Alliance is a general success factor to exploit the full potential of the rail industry and solve the individual challenges of the market participants.

Triggered by possibilities of digitalization and recent trends, the rail sector is more and more taking on a new shape. The combination of numerous market participants and stakeholders is further increasing complexity.

If this sounds interesting to you - visit us on <https://rail-alliance.network/>