YOUR QUESTIONS ANSWERED

WHY IMPLEMENT ROLLING STOCK CONDITION BASED & PREDICTIVE MAINTENANCE?

Summarize the benefits of a condition based and predictive rolling stock maintenance strategy?

For any railway, safety is fundamental before other metrics become relevant.

To understand how safely a train is operating—and to predict when it will not be—it is important to monitor train components and operational conditions. Knowing when components are likely to fail, when driver behaviors do not meet expectations, or when train operations are causing safety incidents, are all key safety related insights that condition monitoring data enables.

Combining condition monitoring data streams together with sensor, operational, and legacy railway data allows a model of the railway and rolling stock to be built. Using remote diagnostic and automated wayside monitoring solutions this model is constantly updated—at a high frequency in near real time. By assessing and interrogating this model operators gain insights to help improve safety and can access other key metrics to define the efficiency and profitability of the railway.

Some of the benefits of implementing condition based maintenance are as follows.

Improved Reliability. Predict the failure of components and systems, and possible impact on services, to avoid issues and to better manage reliability issues.

Greater Availability. Gain visibility and understanding of condition to facilitate conversion of un-scheduled to scheduled maintenance, to reduce the frequency and scope of scheduled maintenance, and to undertake more maintenance on "opportunity" whilst trains are stopped for provisioning or otherwise.

Reduced Costs. Costs are reduced and productivity is maximized by maintaining or replacing components when required and by predicting when full life is reached. By performing maintenance less often, workshop capacity and the labor required for maintenance is minimized.

Describe the approach you recommend taking to implement a condition based maintenance strategy?

The following key initiatives based around data collection, a strategy to maximize data use, and process change to support this, form the basis of an effective condition based and predictive rolling stock maintenance strategy.

Critical Component Condition Monitoring

By utilizing innovative sensors installed at the wayside, operators can capture detailed measurement data and images from rolling stock locomotives and wagons/cars. Once processed with machine vision and other algorithms this data is transformed into condition and predictive information. These wayside monitoring sensor systems can be deploy as a single system to monitor one particular component or as multiple systems 'super site' to inspect and measure many different components. Using such solutions delivers major reductions in inspection frequency and labor costs, as well as improvements in measurement accuracy, length of component life, and facilitates safe operations.
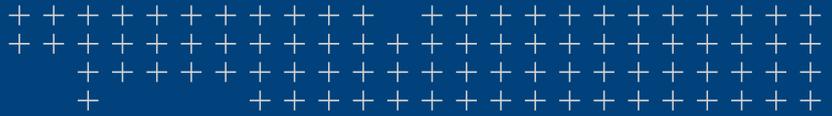
Locomotive & Operational Data Acquisition & Management

Harvesting locomotive sensor and other operational data, gives operators insight into locomotive condition. This enables the prediction of faults and helps to establish the optimum time to maintain the locomotive.

Using data analytics software to analyze this data allows operators to the identify patterns and trends that are significant for their business. In turn, these patterns or trends can be used to generate events prompting corrective actions through workflow and maintenance notifications or control room activities. So that key information is in the hands of the right people at the right times the software can also generate reports on whole fleet condition.

Data Analytics Strategy

A key element to developing a condition based and predictive rolling stock and operations strategy is to plan for data consistency. Every organization should plan for the inclusion of condition and related data into organizational data stores and data analytics environments to maximize data value. It is imperative that data is not siloed. Analysis of rich datasets across condition monitoring, locomotive and operational data, ERP and other data repositories, leads to the definition of leading indicators of adverse operational and mechanical events.

Through the creation of a comprehensive data model of rolling stock and operations in real time, operators can transform their business. Leveraging the model allows them to understand asset conditions, to gain insight into locomotive maintenance and revenue operations, and to find ways to manage the lifecycle of assets effectively.

Process Reform

It is critical to get the "plumbing" or process infrastructure that integrates condition and other data into the rail operation and its supporting business processes right. By putting in place the business processes and tools that allow condition based and predictive rolling stock maintenance to operate, an organization enables better planning, streamlined provisioning (supply chain), and the efficient execution of maintenance activities. Furthermore, automating where possible the collection of data, and sending transactions through mobile technology—to link maintenance crews and back end systems—streamlines maintenance work.

How can Trimble Nexala and Beena Vision solutions support a condition based and predictive maintenance strategy?

Trimble's rail asset lifecycle management products manage the lifecycle of rail transport assets from operations through to maintenance and repair.

Trimble Beena Vision is the leader in vision based automatic wayside inspection systems for the rail industry. Its technology enables detailed condition assessment of train components—from wheel surface condition to full train inspection.

Trimble Nexala software solutions utilize on-train equipment and cloud-based software to deliver real-time fleet-wide remote diagnostic information. The software processes vast quantities of raw data in real time, providing a comprehensive view of overall fleet status and location.

Trimble rail solutions are relied on by rail operators worldwide to deliver actionable insight from data and to transform their business via improvements in operational efficiencies and performance.

Contact us at **rail@trimble.com** to discuss your condition monitoring and predictive maintenance needs.