



ADVANCE ASSET MAINTENANCE STRATEGIES WITH PREDICTIVE ANALYTICS

The costs of scheduled or unscheduled downtime in manufacturing environments can be significant. To minimize this risk, manufacturing operations have developed standard equipment maintenance calendars and manual asset monitoring processes. Unfortunately, this approach is expensive, resource-intensive, error-prone, and forces companies to remain reactive.

Predictive maintenance provides a proactive solution to monitor equipment health and predict failures. It enables organizations to avoid machine failures and unplanned downtime, increase equipment and production line productivity, reduce maintenance costs (including hard component replacement costs and associated personnel time), and improve output quality.

First, Get the Data Right

The effectiveness of a predictive maintenance strategy is dependent on the data quality and accuracy of transformation, analysis, and generated insights. Manufacturing data may be generated by and stored in a variety of systems, very few of which will produce data in the same formats. Successful predictive maintenance processes must gather data from disparate repositories including ERP (Enterprise Resource Planning), MES (Manufacturing Execution System), and SCADA (Supervisory Control and Data Acquisition) systems, as well as data generated by PLCs (Programmable Logic Controllers) incorporated into production equipment and sensors.

Additionally, real-time sensor data, typically transmitted over message buses like MQTT, requires a specific transformation process. Stream processing enables real-time transformations to be applied prior to storage in a time series database.

Once all the data is accessible, the analytics team must ensure that it is cleansed of errors, duplicates, and incomplete records. It must be structured consistently in order for machine learning and visualization tools to use it effectively.

Detect Anomalies

Identifying unusual behaviors or patterns in machine components using sensor data can prevent small glitches from creating major operational problems. In cases where large numbers of sensor feeds are involved, challenges emerge due to the sheer volume and velocity of data streaming off the equipment. In addition, meaningful analysis from the data is a nontrivial task, since slowing or shutting down production in order to examine a machine carefully should only be done when truly necessary. For these reasons, simple threshold-based alerting is normally unsuitable; it will generate too many false positives. More advanced methods can, however, easily be implemented and will flag potentially serious issues without reducing Overall Equipment Effectiveness (OEE).

PREDICT OPTIMAL
TIMES FOR EQUIPMENT
MAINTENANCE

CLEAN, CONSISTENT
SOURCE DATA
IS CRITICAL

IMPROVE QUALITY
AND REDUCE COSTS

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altair.com/data-analytics

Predict Machine Failures

Machine learning (ML) technology leveraging historical and real-time data from sensors mounted to production equipment as well as PLCs, SCADA, and other sources. It can accurately flag potential failures of whole machines and/or critical components before they can cause downtime. Failures may be binary in nature; that is, either a failure occurred or not. Failures can also be multi-class and fall into several different categories, including reduced speed, throughput, or quality. Obviously, the more complex the machine (or system), the more ML models can help prevent failures that can impact productivity.

Predict Remaining Useful Life (RUL) for Components and Systems

ML and stream processing technology are the most effective solution for RUL analysis. The large amounts of data produced by sensors combined with human inspections of finished pieces can be used to train machine learning algorithms to identify that “sweet spot” and proactively alert operators when a tool is approaching time for replacement. Stream processing algorithms can also process all the sensor data being generated by any number of production machines, make on-the-fly comparisons with historical data, and amplify the accuracy of the ML algorithms.

Predictive Maintenance with Altair Data Analytics

Leveraging 30+ years experience in manufacturing and machine learning, Altair Data Analytics provides an automated, repeatable, and sustainable solution that is easy to deploy and supports the complete data lifecycle.

Altair enables manufacturing operations to develop, manage, and deploy accurate predictive maintenance systems to reduce costs, keep downtime under control, improve productivity and quality, and increase the profitability of operations.

Data Preparation: Access, cleanse, and format warranty and service utilization data from CRM, ERP, and systems managed by channel partners, as well as PDF and Excel reports and big data sources without any manual data entry or coding.

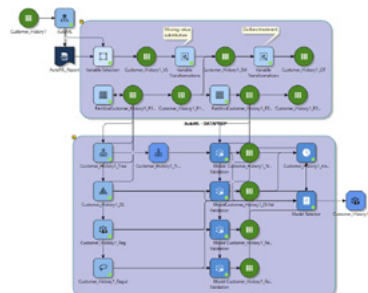
Machine Learning: Altair’s industry-leading visual approach to data analytics enables businesses to build and deploy machine learning models in almost any analytic infrastructure. Altair’s automated ML and explainable AI functions eliminate repetitive tasks, makes data scientists and business analysts more productive, and enables managers to create profitable, attractive service packs.

Streaming Analytics: Build stream processing applications and sophisticated analytical dashboards without writing any code. Solve difficult problems quickly, understand complex relationships in seconds, and identify issues requiring further investigation with just a few clicks.



Good data analytics tools do not require a degree in data science in order to use them effectively. A self-service approach fosters utilization of the technology, reduces the time-to-market for analytics-based business processes, and helps ensure that analytics projects are adding real business value.”

Sam Mahalingham, CTO, Altair



LEFT: Altair’s patented decision tree technology leads the market with its flexibility and easy-to-understand results. **RIGHT:** Automated data preparation, modeling building and comparison means insight is found in minutes, not hours or days.

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