WHITEPAPER

Intelligent Maintenance Systems with SAP & Predictive Analytics

The Challenge

To be profitable in increasingly competitive markets, companies must find ways to reduce costs while maximising the utilisation and longevity of plant, equipment, and other high-value assets. These two competing demands create a significant challenge for maintenance teams to design the best maintenance strategy while dealing with the uncertainty of real-world operational conditions.

The Solution

Through its market-leading expertise in predictive analytics and SAP enterprise technologies, Soltius New Zealand is uniquely placed to deliver world-class Intelligent Maintenance solutions. These systems go beyond traditional maintenance strategies by incorporating mathematical optimisation and predictive analytics that help companies balance competing demands and identify equipment problems before they affect business operations. Maintenance costs, equipment down-time, and unscheduled repairs are reduced while asset utilisation and longevity are maximised.

Why Predictive Analytics?

The modern enterprise is a complex network of people, processes, and equipment. To stay competitive in national and global markets, the enterprise minimise costs while maximising production and ROI for assets, as well as simultaneously planning for future uncertainty in market and operational conditions. Predictive analytics is the key to making sense of complexity so the right decisions can be made at the right time and then implemented quickly to maximise positive business outcomes.

Predictive analytics covers a wide range of advanced mathematical and statistical methods that are used to solve complex problems involving many sources of information. With the speed, frequency, and complexity of routine business decisions often exceeding people's abilities to manage them effectively, predictive analytics can be used to make data-driven decisions automatically, or to provide the right people with the necessary insight to quickly make the best decisions.

The Role of Predictive Analytics in Traditional Maintenance Programmes

Predictive analytics plays an important role in traditional maintenance programmes such as Reliability Centred Maintenance by helping managers and schedulers identify optimal maintenance schedules. These optimised schedules are based on a variety of different information including:

- Historical data on actual maintenance and failure patterns

- The expected risk and cost of different asset failures

- Manufacturer recommendations

- Projected loads and equipment demand

- Costs for personnel and replacement parts

- Other direct and indirect costs.

The outcome is a schedule that provides the best balance across all these important inputs that reduces the long-term costs of maintenance while maximising asset utilisation and longevity.

Intelligent Maintenance Systems

The foundation of intelligent maintenance systems is the integration of predictive analytics into new or existing SCADA (supervisory control and data acquisition) systems that monitor a variety of equipment variables, such as vibrations, temperature, current, speed and load. Historical data from the SCADA system is used to train sophisticated statistical models that learn to identify the operational state of equipment in near real-time. Traditional approaches to equipment monitoring frequently use control charts with control limits to identify when equipment is operating within a predetermined range that is deemed "normal". In contrast, the equipment states identified with predictive analytics are based on complex interactions among many different sources of information and provide a level of insight into how equipment is performing that simply cannot be derived from traditional approaches.

Once the statistical models have been trained, they are used to continuously monitor the state of equipment and to compare the current state to known periods where the equipment was operating effectively. If an anomaly or change in the state of the equipment is detected, the intelligent system can notify relevant personnel to investigate in more detail or the system can begin implementing corrective actions automatically if it's appropriate to do so.

The principal benefit of intelligent maintenance systems is that they can identify problems well in advance of an actual failure, and much more quickly and reliably than other inspection or monitoring programmes. The end result is reductions in unplanned down-time and the opportunity to reduce planned maintenance without compromising asset reliability.

Integration with Existing Plant and Enterprise Information Systems

A compelling feature of intelligent maintenance systems based on SAP enterprise technologies is the ease of integration with existing SCADA and PLC technologies. SAP Manufacturing Integration & Intelligence (MII) and the bundled Plant Connectivity (PCo) solution are designed specifically to bring SCADA-type operations data and traditional ERP data together in real time to form the data-based infrastructure needed to build, train, and deploy predictive models. The combined data is fully compatible with existing database systems and with SAP HANA, the revolutionary in-memory database appliance.

Operations that depend on high-frequency sensors that produce large amounts of high velocity streaming data will benefit from SAP Event Stream Processor. This innovative solution performs real-time analysis of high-velocity data streams and integrates directly with SAP HANA for storage and further analysis.

Predictive Analytics Solutions

SAP provides a number of different solutions for building, testing, and deploying predictive models – all of which are tightly integrated into SAP enterprise technologies. SAP InfiniteInsight is a unique solution that makes building and deploying accurate predictive models simple for suitably experienced analysts. Predictive models developed using SAP InfiniteInsight can be deployed as stored procedures

in most leading enterprise database systems, making integration of model output into existing decision and control systems straightforward.

If computation speed is of utmost importance, for example when the output of complex models is required in milliseconds as opposed to seconds, then models can be built and deployed natively in SAP HANA using the SAP Predictive Analysis Library. Models built and deployed using these revolutionary SAP technologies can run thousands of times faster, making real-time analytics, decision support, and process control a reality.

When the modelling requirements are particularly complex, or the latest cutting-edge machine learning methods are required, then the power of R can be utilised through its tight integration with SAP solutions – including SAP HANA. R is the world's leading programming language for predictive analytics. It is open source, used in most universities around the world for research in advanced statistics and machine learning, and was designed for one purpose only – advanced analytics.

Mobility

Even the best decision support systems are next to useless if the right information is not passed to the right people at the right time. Achieving this in the fast-paced business environment of today means going mobile. SAP offers embody a number of powerful mobility solutions that make disseminating mission-critical information across all types of mobile devices quick, simple, and intuitive. Through the combination of functionality available in modern mobile devices, SAP mobile technologies can help ensure that the best possible decisions are made, communicated, and acted on at the right time.

Our Services

As SAP's only Gold Partner in New Zealand, Soltius is the county's leading SAP reseller and solution provider. In addition to our highly experienced SAP technical and deployment experts, Soltius is the only SAP partner in New Zealand to employ world-class data scientists who can help customers on their journey to truly maximise the value of their proprietary data through the use of advanced analytics and predictive modelling.

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