OSIsoft

SUMMARY

Société Nationale des Chemins de Fer Français

Industry

Transportation – Rail

Business Value

- Predictive Maintenance
- Asset Health

PI System™ Components

- PI Server™
  - Data Archive
  - Asset Framework (AF)
  - Notifications
  - Event Frames
- PI Integrator for Business Analytics™

Data Drives Maintenance for SNCF

The French National Railway Corporation – the Société Nationale des Chemins de Fer Français, or SNCF – is a state-owned company that operates France's world class railway system. SNCF Réseau oversees the management and maintenance of 30,000 kilometers of railway line with 15,000 trains running daily. With ridership increasing 50% in the last 10 years, SNCF Réseau faces daunting logistical challenges that have made it critical to optimize maintenance of railway lines and equipment.

In 2014, SNCF began a partnership with OSIsoft. At the 2017 OSIsoft Users Conference in London, SNCF Réseau Chief Data Officer, Stéphane de Paris, spoke about the role of the PI System™ in giving workers more digital tools in the field, enabling machine learning, and ultimately, allowing operators and maintenance personnel to catch equipment failure before it occurs.

Fixing Assets Before They Break

More than a decade ago, SNCF Réseau invested in remote sensors and monitoring systems to deliver data on track equipment, motors and other assets in the field. The company built a system that fed this sensor data into a supervision system capable of generating telephone alerts for maintenance personnel.

The system worked, but not perfectly. Sensors were not always accurate. As a result, the system generated a tremendous amount of data and alerts on equipment performance and incidents, but railway operators did not always trust the alerts they received. The system was capturing data, but it was not creating insight that the company fully trusted and acted on in order to anticipate and avoid equipment failures. As a result, operators often waited until there was a problem to go into the field and fix it or they performed maintenance on equipment according to a schedule.

"We need to anticipate and reduce the maintenance footprint. We need to act at the right time at the right place, before the incident," de Paris said.

With better data and analytics, SNCF Réseau has made the shift to condition-based maintenance. Maintenance staff use sensor data to determine which equipment performance is degrading and most likely to fail and then prioritize maintenance accordingly.

According to de Paris, one of the key reasons for the project's success is that it was not a top-down initiative. Maintenance staff drove the initiative using tools designed by and configured for maintenance operators. Today, SNCF Réseau operators and maintenance crews have digital tools and hand-held devices that can give them trusted data and insights almost anywhere in real time.

Harnessing Sensor Data for Machine Learning

Ultimately, SNCF Réseau is moving toward predictive maintenance, in which analytics allow operators to know the real-time condition of equipment in the field and predict when it will need to be maintained, even before it begins to degrade.

To do this, SNCF Réseau is investing in machine learning. They already have a treasure trove of legacy data: more than a decade's worth of field observations collected from remote sensors, weather stations, equipment, and personnel. Recently, the company partnered with Datapred, a French company that specializes in machine learning. Using SNCF Réseau data collected and organized by the PI System, Datapred algorithms comb time-series curves for statistical anomalies that might indicate and predict equipment failure.

The Datapred algorithms are capable of sequential machine learning, meaning that data need not be entered in a batch and analyzed all at once, but can be analyzed continuously in real time as it arrives in the system. Datapred's modeling engine draws data directly from the PI System via the PI Integrator for Azure and feeds results back into the PI System so that machine-learning insights are available to operators and asset managers in a single location.

"The beauty of the system is that it can be used for any type of time series: vibration, temperature, pressure, etc… Potentially speaking, there's no limit to the type of field time series data that can be incorporated within the system," said Thomas Oriol, co-founder of Datapred, who gave a presentation alongside de Paris at the 2017 OSIsoft User Conference.

When high-quality data gets fed to powerful algorithms, such as Datapred's, SNCF Réseau can use machine learning to discover patterns and insights into "unknown unknowns." In other words, they'll start to see not just problems they are looking for, but be alerted to problems they never even knew existed.

To learn more about SNCF and the PI System, watch the full presentation here.

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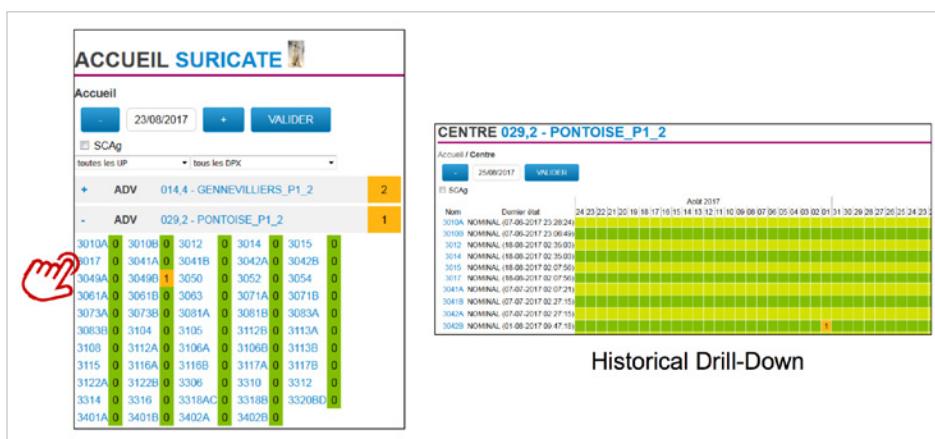
SNCF's maintenance dashboard shows the condition of assets at-a-glance.

de Paris, Stéphane / Oriol, Thomas. Using Operational Data for the Future Maintenance of the French Rail Infrastructure. OSIsoft.com. 17 October 2017. <https://www.osisoft.com/Presentations/Using-Operational-Data-for-the-Future-Maintenance-of-the-French-Rail-Infrastructure/>