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Splunk® at New York Air Brake

Optimized Operations and Billions in Savings for Top Railroads

NEW YORK AIR BRAKE
TRAIN DYNAMIC SYSTEMS DIVISION

"Railroads used to rely solely on industry standards and engineer experience. Thanks to Splunk, our systems allow our customers to provide engineers with real-time feedback and use operational insight to achieve optimal runs every time."

Director of Engineering
Train Dynamic Systems
(a division of NYAB)

OVERVIEW

INDUSTRY
• Freight railroad brakes and control systems

SPLUNK USE CASES
• Operational intelligence
• The Internet of Things
• Business analytics
• Monitoring, alerting and reporting
• Enhanced visualization

BUSINESS IMPACT
• Improved customer operations by mining large volumes of unstructured data
• Moved from monthly batch analysis to flexible real-time reporting
• Delivered value-added services
• Minimized in-train forces
• Optimized operational efficiency
• Extracted and leveraged new insight from multiple train simulations

DATA SOURCES
• Onboard sensors on couplers, brakes and other components
• GPS location and track topology
• Onboard Positive Train Control (PTC) platform
• Computer-controlled braking systems
• Consist database (train characteristics)

SPLUNKBASE APPLICATIONS
• DataFlare™

The Business

New York Air Brake (NYAB), a Knorr-Bremse company, is a leading supplier to the railroad industry of braking systems and components, training simulators and train control systems. Train Dynamic Systems (TDS), a unit of New York Air Brake, is considered the worldwide leading industry expert in train dynamics, train control and training simulators.

Challenges

The $60 billion U.S. freight rail industry railroads moved more than 1.7 trillion ton-miles of freight in 2012 using 3.6 billion gallons of fuel at a cost of approximately $11.5 billion. While railroads are considered the most efficient form of freight transport—it takes just one gallon of fuel to move a ton of freight nearly 500 miles—reduced fuel consumption is still a primary objective for the industry.

Based in Irving, Texas, NYAB division Train Dynamic Systems (TDS) is helping many of the world's top railroads achieve substantial improvements in fuel efficiency and other operational metrics with its LEADER (Locomotive Engineer Assist/Display & Event Recorder) train management system. The LEADER system uses data captured from onboard train systems to help railroads achieve 'golden runs' where fuel economy, in-train forces and schedule compliance are optimized.

The LEADER system has provided tens of millions in gallons of fuel savings to railroads in North America, Australia, Mexico and Brazil. Most customers report average fuel savings in the range of 5% to 12%. TDS engineering staff continues to work to provide LEADER customers with even greater value and tighter integration with the onboard and back office systems.

Each railroad worldwide uses a custom combination of hardware and software—not only on their locomotives, but also their back office systems. The TDS LEADER system must be able to make sense of a growing stream of mostly unstructured data coming from train sensors, onboard computers and other systems. Train engineers need real-time information and railroad managers need snapshots as well as long-term analysis capabilities.

Enter Splunk

While the LEADER system was already providing customers with tremendous savings— billions in some cases—TDS knew there was more it could do, and its customers were demanding it. In search of a solution that could handle multiple formats of machine-generated data, the TDS engineering team evaluated a number of different analytical platforms before deploying Splunk Enterprise. According to the TDS director of engineering, "With Splunk, we have the ability to add additional data—any type of data—without having to redesign our systems. Customers frequently send us new types of information and with Splunk we don't need to rebuild anything. We just start piping data in and consuming it in any way we need."

Breakthroughs

Timely reports help customers justify continued investments
Prior to deploying Splunk software, the TDS support team spent many hours using Excel spreadsheets to prepare monthly reports for railroad customers on

system performance and resource utilization. For example, a report might show a customer's fuel savings when they were 55% or 70% compliant with optimal driving recommendations. However, if the customer requested another type of report, it would take another four or five hours to prepare it, according to the TDS spokesperson. TDS was running most analyses in batch mode, with almost no online or dynamic interactivity.

Instead of monthly reports, the TDS engineering team now uses Splunk Enterprise 6 and the DataFlare Splunk App to provide customers with dashboards displaying real-time information on train performance. The dashboards report on fuel efficiency, impacts on time-to-destination, in-train force reduction, driver compliance and other factors, then correlate that to overall savings and other business objectives. Thanks to Splunk software, this new LEADER capability has become a mission-critical system for NYAB customers.

The advanced visualization made possible with Splunk Enterprise and DataFlare has also led to value-added services and a source of additional revenue for TDS/NYAB. According to the director of engineering, there are an infinite number of variables and operational adjustments that railroads have to consider when making decisions. For instance, what would be the impact on fuel consumption if a coal train arrived a half hour later than expected? "If it saves two percent on fuel, they might be willing to make that trade-off. We are using Splunk Enterprise to help customers sort out the many 'what ifs' and they are willing to pay for that service," he says.

Real-time operational insight helps achieve 'golden runs'

Driving a freight train is like guiding a 20,000 ton Slinky. With freight trains as long as one and half miles, there can be up to 400 feet of slack due to the play in couplers and other elements. If precise control is not maintained, particularly over hilly terrain, this free movement can lead to severe in-train forces that can lead to inefficient operation, premature wear, and even de-coupling (i.e., parting).

The TDS LEADER system is tightly integrated with the locomotive's on-board electronics and uses data acquisition to determine locomotive status, location, speed, in-train forces and many other metrics. LEADER provides engineers with real-time information and coaching via an in-cab display. The system maintains two-way communications with railroad control centers and off-board systems via radio.

TDS engineers use Splunk Enterprise to index unstructured train data collected by the LEADER systems and turn it into meaningful operational intelligence for real-time alerting, analysis and long-term trending. Today, LEADER is installed in more than 4,000 locomotives and TDS is receiving about 20 megabytes of data per locomotive per month. Data flow is expected to rise dramatically with the government-mandated installation of Positive Train Control systems. "Splunk plays an important role in helping us and our customers extract critical intelligence from a growing range of data sources," notes the TDS director of engineering.

The track ahead for TDS and Splunk

TDS has big plans to use Splunk to extend LEADER capabilities in the near future. The TDS engineering team is already using Splunk software to incorporate new types of sensors being deployed on locomotives and train cars. "Right now, there's an average of 10-12 different types of remote sensors on a typical train," the director of engineering notes. "We expect that number to grow ten-fold in the coming years as railroads work to achieve ever greater efficiency. Splunk Enterprise gives us the flexibility to handle any data our customers may send us, and the confidence to know we'll be able to provide them with meaningful insight from it."

TDS also plans to use Splunk analytics and dashboards to gain new insight from data generated during train simulator runs. The engineering group is developing rule sets in Splunk to identify positive and negative driver behaviors, and using Splunk software's time series indexing to generate DVR style playback of individual runs.

Free Download

Download Splunk for free. You'll get a Splunk Enterprise 6 license for 60 days and you can index up to 500 megabytes of data per day. After 60 days, or anytime before then, you can convert to a perpetual Free license or purchase an Enterprise license by contacting sales@splunk.com.