



## Business/IT & Equipment Management

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# Optimizing onboard data-driven systems to mitigate downtime

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Onboard intelligence gives fleet managers all the details needed to manage maintenance effectively when vehicles are on the road or in the shop. Everything you need to know, and then some, is available as a reference for service and troubleshooting.

## **Predictive maintenance practices**

Minneapolis-based Koch Trucking is an over-the-road carrier with 900 power units, mostly servicing the Midwest, Northeast and Southeast regions of the U.S. The company

has been operating for more than 30 years and has received numerous industry awards. The fleet has been using Eaton's IntelliConnect remote diagnostics system for three months. Todd Wright is the company's director of maintenance and favors one of the program's functionality features that allow him to implement [predictive maintenance](#) practices. "When we see a code, the Eaton solution will show us a picture of the problem, tell us what parts are bad, and will tell us if it's a shutdown situation or a condition that can wait and the vehicle is drivable," Wright said. "So now we can schedule any service well in advance. We can safely predict, for example, if the vehicle can make it from Indianapolis to Pittsburgh where we can identify a dealer location for servicing. That's what the technology is doing right now.

"That same function is also allowing us to eliminate most of our costly and time-consuming transmission inspections. If we don't see a code pop up telling us a specific transmission needs attention, we pretty much leave the units alone because we know how reliable the Eaton transmissions are."

Bobby Robinette, project team lead for connected solutions with the Eaton Vehicle Group, added that this is a software system that utilizes a fleet's existing telematics service provider to get information from the truck back to Eaton for analysis.

"IntelliConnect gives the fleet advanced notice that their vehicle may be having an issue, at which point they can turn a future truck-down scenario into a preventative maintenance operation—saving them from down time, repeat warranty claims and mystery service lights," Robinette explained. "As for access to the right information, every fleet that utilizes IntelliConnect will have the option at sign-up to have their information delivered to additional monitoring systems they already use. We also provide a means for the users to choose how they want to receive their notifications, whether it is in email or live in the user portal."

# Making better choices



For Mark Gibson, president of Ashland, Oregon-based Siskiyou Transportation, it's all about making better choices. "At the end of the day, the ability to analyze service histories and costs leads to an understanding of what maintenance practices work best in our operation," he said. "That also leads to more effective decisions about what we need to change."

The value in a predictive approach to vehicle maintenance for Siskiyou Transportation, according to Gibson, is magnified by the varied services the company offers. The company began in 1983 as a log-hauling contractor serving southern Oregon and northern California. Since then, it has grown into a diversified operation providing log hauling, transfer and end-dump trucking services for aggregates and hazardous waste and specialized transportation project consulting.

For the Siskiyou Transportation fleet of 12 Class 8 logging and chip trucks, the company's in-house maintenance team relies on the EROAD Service and Vehicle Maintenance module. "The software greatly simplifies maintenance with its automated service scheduling based on any time, distance or other parameter we set," Gibson explained. "It also allows us to customize inspections to meet regulatory or operating requirements as well as preventive maintenance items and intervals."

“The comprehensive Service and Vehicle Maintenance module allows us to proactively manage the maintenance and repair of our fleet,” Gibson continued. “It helps eliminate defects that can cause delays from breakdowns or being placed out-of-service from failing a roadside inspection.

“Maintenance and repairs are a significant component of our operating expenses,” he added. “The ability we have in the EROAD platform to plan for the future by having accountability and transparency around our vehicle maintenance is an essential part of eliminating costly downtime and predictably operating successfully.”

## **A range of solutions**

“Both PeopleNet and TMW Systems have a wide range of solutions aimed at improving fleet health to decrease maintenance costs and eliminate vehicle downtime,” said Thomas Fansler, president of Trimble Transportation Mobility Analytics (the parent company of both TMW and PeopleNet). “The PeopleNet Mobile Gateway (PMG) is an intelligent vehicle-bridging unit that is available factory-fit or installed as an aftermarket solution. The PMG provides a deep integration into a vehicle’s engine to give a constant view of the vehicle’s health. PeopleNet’s vehicle health monitoring technology provides automatic notification of issues and recommends immediate actions that can prevent a breakdown or unscheduled service event.”

The PMG comes factory-fit in all new Kenworth and Peterbilt trucks, and PeopleNet also has partnerships with several other OEMs to offer a pre-wire option on new trucks.

“TMW Systems and the TMT Fleet Maintenance solutions team are now leveraging the insight provided through PMG to help fleets identify and prioritize trucks that require service before they break down,” added Renaldo Adler, principal of asset maintenance for fleets and service centers with TMW Systems. Using the Predictive Maintenance solution in conjunction with their TMT Fleet Maintenance application, maintenance departments can do more than react to historical trends; they can anticipate events before they happen and schedule the work.

“The PMG isolates and communicates vehicle performance data elements representing more than 80 engine and emissions aftertreatment variables to provide an accurate view of vehicle health,” Adler continued. “Advanced data science is used to identify patterns that point to a probability of failure. This information is communicated to the fleet maintenance professional via a user dashboard in the TMT Fleet Maintenance platform. These alerts also can be communicated to fleet operations through their TMW transportation management software so they can plan for the necessary vehicle downtime.”

The new TMW predictive maintenance solution, TMT Predict.Fault Codes, was announced this month and will be part of a new series of applications falling under the TMT Predict brand.

“The data inputs for predictive maintenance are specific to each condition that a fleet is trying to predict and prevent,” Fansler said. “For example, if a fleet is trying to detect an elevated risk of an oil pressure issue on a vehicle engine, several data inputs may be relevant including rail pressure, engine demand torque and airflow rate. The data science team typically transforms these inputs to create the actual predictors. Additionally, the success of the predictive analytics effort will also be influenced by the granularity of the data inputs (the frequency with which the vehicle provides updates) and latency (the time lag between data generation, data processing, and risk scoring).”

## **Service supply chains enable predictive maintenance**

The benefits of predictive maintenance are obvious. Being able to repair or replace components just before they fail would eliminate breakdowns, reduce high costs associated with unscheduled repairs and improve service lifecycles for fleets.

“The challenge has been pinpointing with a high degree of certainty when failures will occur,” said Michael Riemer, vice president of product and channel marketing at Decisiv. “Increasingly, we have access to a vast amount of data that allows for not only predicting failures, but also facilitating improvement across the entire service process.”

The right data will accelerate the move toward both predictive maintenance and proactive service, Riemer noted. “By using detailed, reliable and quality data from internal and external service events, along with the data captured by telematics devices, we can analyze vehicle, system and component reliability to improve predictive maintenance effectiveness,” he said.

Truck and component manufacturers are already doing their part by incorporating remote diagnostic capabilities on their vehicles. Riemer adds that there are solutions that fleet maintenance and outside service provider operations can use as well.

Decisiv’s Service Relationship Management (SRM) platform is designed to enable the use of actionable data to support predictive maintenance. The platform integrates with OEM and third-party diagnostic vendors to capture performance data. It also leverages VMRS—the Vehicle Maintenance Reporting Standards, managed and licensed by the American Trucking Associations—to capture the right kinds of accurate data that can be used to prescribe predictive service needs.

“Service delays have a profoundly negative impact on downtime, operational efficiency, costs and, ultimately, profitability,” Riemer said. “While a true predictive maintenance capability is still evolving, capturing reliable, quality data will enhance your decision-making and provide a foundation to fuel predictive analytics.”

## Adding diagnostics



“Typically, fleet operators look at maintenance in three ways: time-based, distance-based, or engine-hour-based,” said Dean Croke, vice president of data products at Spireon. “By adding diagnostics into the mix, we can diagnose vehicle operating conditions that typically lead to breakdowns resulting in lost productivity. This includes analysis of engine oil, fuel consumption, fluid level variation, operating temperatures, tire pressures and fault codes that indicate when a vehicle should be brought in for maintenance.”

Scheduling maintenance based on actual vehicle health, rather than by an arbitrary schedule, helps to improve operational efficiency and keep working capital on the roads.

“Our FleetLocate solution includes a variety of devices that can detect both engine diagnostics and driver behaviors, such as harsh acceleration or braking, which can affect vehicle health and performance,” Croke explained. “Our solution also integrates with GM’s OnStar system, which increases the data available for GM vehicles and also reduces the need to install an aftermarket device. Using the NSpire platform, which tracks data from millions of vehicles on the road, we can apply data analytics to generate usage, health and benchmark reports across a customer’s fleet, as well as similar fleets.”

Today, this information is provided as ad hoc reports, but in the future, it will be incorporated into maintenance modules and dashboards, accessible via mobile, to provide an at-a-glance view of vehicle health and the most pressing issues that could cause vehicle breakdowns, Croke said.

“The modeling aspect of scoring vehicle data is based on probability of component failure, which drives the timing of when vehicles need preventative maintenance,” he added. Using the modeling data sets to allow the operator to understand aspects such as total cost of operation, how long to keep vehicles, when to trade or sell, and which vehicles in the fleet are underperforming.

## Valuable access



“We needed a solution where I could get my hands on the truck without actually flying to the truck,” began DJ Harrison, national fleet manager for Interstate Batteries.

“Geotab provided that. I could look at the engine and the transmission and never leave my office. Before Geotab, everything was reactionary, instead of predictive. So, you’d have to wait until something bad happened to the truck.”

“Within the software, you are able to create rules based on this data to alert fleet managers of potential issues,” explained Stephanie Voelker, vice president of enterprise sales solutions at Geotab. “You are also able to configure maintenance reminders based on distance and time driven.” Voelkner singled out GPS and engine data as some of the most important data collected, noting that the Geotab GO device is able to collect GPS, accelerometer and engine data such as odometer, RPM, faults, and so forth.

## Pulling fault data



Mark Alsbrook, Omnitrac's senior product manager, outlined data access: "Omnitrac's extended fault monitoring product pulls the fault data from the CAN BUS on five major ECUs and sends that data to OnCommand (OCC). OCC then provides analytics such as how severe is the fault and the recommendation action plan. They also provide history of the faults with severity so the fleet can determine if the truck is maintained properly or needs maintenance work. They also provide additional info such as Vehicle Reports and location of nearest repair facility."

Some key data that can be accessed, according to Omnitrac, includes:

- Vehicle information—automatic vs. manual, year, model, make;
- Driver demographics—tenure, location, driving patterns (day vs. night), driving style (aggressive vs. passive);
- Load/trip information—terrain/elevation, length of haul, commodity hauled, empty vs. loaded, number of stops, rural vs. urban.

## Optimizing maintenance schedules

"Noregon offers a variety of products and services that help fleets optimize maintenance schedules and reduce costly repairs due to lack of insight into issues on vehicles," said Dave Covington, Noregon's chief technology officer. "For example, TripVision will alert

users to issues on the vehicle, in real time, and delineate the impact on the vehicle if it continues to operate. This information is extremely beneficial to prevent unexpected breakdowns or costly malfunctions, but coupled with JPRO, it helps technicians ensure that vehicles run longer between maintenance events. When that same vehicle arrives at the service center, a JPRO connection will access the information provided by TripVision to empower technicians to find the root cause and perform longer lasting repairs on all components on the vehicle.”

According to Covington, JPRO also provides users with a list of pending and inactive faults. A pending fault is essentially an active fault that is unconfirmed by the time or mileage needed to register it as an active fault. A pending fault gives technicians a high level of certainty that the issue will fester and become a problem if not repaired. JPRO also displays the number of times a fault has become active and then inactive.

This count can be a good predictor of future issues with the subsystem having the problem. For example, coolant level problems can oscillate between active and inactive for days before they become permanently active and cause a vehicle derate. By looking at the count associated with the coolant faults using real-time data from TripVision, the technician can take action when the vehicle arrives by adding coolant or verifying the coolant sensor’s operation to prevent an over-the-road breakdown, Covington said.

Fleets seeking increased insight into their vehicles can also take advantage of Noregon’s data analytics services. The company monitors and analyze data to detect trends about the particular make/model buildup of their fleet to help find cost saving opportunities and relay information about common issues found across those particular vehicles.

“Noregon provides all fleets and service centers with many self-paced training options to ensure their technicians understand how to use all the features and functions of JPRO that help them diagnose the entire vehicle and uncover predictable issues,” Covington said. “The company ties together historical connections with all of their products to discover trends from that particular vehicle.

“For example, if a vehicle outputs an active fault in TripVision while in transit, that vehicle will have the same information stored in JPRO during its next connection,” he added. “Noregon encourages fleets to connect JPRO to a vehicle when it initially arrives

for triage, as well as using the tool to verify the vehicle received all necessary repairs. JPRO allows for diagnosis on every module to uncover all issues on the vehicle. Nearly 60% of heavy-duty vehicles still have an active fault when they leave the service center, highlighting the need to ensure completion of all repairs before the truck leaves the bay.”

## **Tracking and E-logs**

Ryan Driscoll, marketing director for GPS Insight, talked about the software/hardware support systems the company provides and how that helps fleets develop predictive maintenance programs for their vehicles.

“GPS Insight is a tailored GPS tracking and E-Log solutions provider and within those solutions is a maintenance program,” he explained. “The maintenance program allows maintenance managers to enter in their service schedules, which can be anything from PMs to tag expiration dates. They can also track maintenance completed and costs associated with them and receive automated reminders in the form of text messages, emails or alerts on the GPS Insight dashboard when services are due on trucks. Maintenance managers and drivers can also receive diagnostic trouble codes when an engine issue arises and can easily schedule the truck to come in if necessary.

“This helps fleets reduce the costs associated with poor maintenance and reduces downtime, Driscoll continued. “GPS Insight’s solution is customizable so that each user receives the information she needs, the way she wants to see it and when she needs to see it. That way they are not overwhelmed with information that doesn’t pertain to their job. GPS Insight account managers can help set this up for customers to ensure that they get the most from the data coming from their fleet.”

## **Predictive maintenance for telematics**

To date, predictive maintenance has focused heavily on critical vehicle systems—engines, transmissions and components—with system data that is monitored by the vehicle’s electronic control monitor (ECM).

“Temperature and other key factors are monitored by the ECM, which is then reported on through telematics devices to look for variations that could indicate eminent failure,” said Deryk Powell, president of Velociti. “Addressing potential issues before they become catastrophic is vital for the safety of the drivers, and will minimize vehicle downtime to maximize operational revenue.”

Telematics data is used not just for relaying vehicle data, but also to log hours of service (HOS) and manage routes. Through programs like Velociti’s VelociCare, fleets are realizing the importance of monitoring the equipment responsible for monitoring the vehicles, according to Powell.

“These programs tag key parameters to look for breakdowns in communication, either between the vehicle to the device or the device to the fleet manager, or other personnel responsible for overseeing the health of the vehicles on the road,” he explained. “By monitoring these key parameters, it’s possible to catch data transmission gaps that would lead to the loss of HOS log data, or vehicle breakdowns from late or lost warnings.”

In today’s technology-rich environment, fleets not only need predictive maintenance, they need system health monitoring to endure the programs tasked with predicting failure haven’t themselves started to fail.

“They also need a process in place to address needed repairs quickly,” Powell added. “Proactive system health monitoring avoids costly downtime due to system failure, ensures systems are operating optimally and allows them to do the job you expect of them. Technology providers have brought incredible solutions to our industry, and by proactively monitoring them, fleet owners can keep those solutions, and their fleets, happy and healthy with reliable and accurate predictive maintenance.”

[For more on advanced fleet management and predictive maintenance, read our article here.](#)

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