


Electronic Equipment Maintenance



A new telematics standard will help producers track usage of mixed fleets.

Gathering accurate equipment information improves preventive maintenance.

Equipment monitors can track hours of equipment use.

When electronics are introduced into a rugged environment, they should be wind protected, tested, and tested again.

AGGREGATES MANAGER

Your guide
to profitable
production

Data-Driven Analysis Improves Equipment Efficiency

When it comes to protecting the capital investments **made in your equipment**, knowledge is power. The more an operator knows about each piece of equipment the easier it is to make wise equipment decisions. As operators keep their equipment longer, this information is particularly vital.

“Preventive maintenance is so important because, if you do it properly, it can reduce your potential downtime, improve utilization of your equipment, and actually extend the useful life of equipment,” says Brad Mathews, vice president of marketing for Dexter + Chaney, a Seattle-based company specializing in software for the construction market.

While many operators understand the impact of a good preventive maintenance program, it can be difficult to collect and track the key information necessary to ensure timely maintenance. A variety of methodologies are available.

For example, some producers ask equipment operators to perform manual readings on equipment monitors to capture hours or miles of use. Those readings can then be logged into manual meters that need to be reviewed for service intervals or into a software program that sends automatic notification of when regular maintenance.

A second option includes the installation of electronics onto the equipment. The electronics are tied into the engine to indicate when a machine is idle versus operating at a load. Both of those factors can be re-

corded and tied into maintenance task alerts. “The hours are gathered electronically and entered into software for you so each piece of equipment is reporting on itself,” Mathews says.

Telematics also offer a method to collect information on machine data, and a new standard developed by the Association of Equipment Management Professionals (AEMP) creates commonality in the delivery of basic telematics data to end users. “In the trucking industry, it’s been around for a long time,” says Steve Rasmussen, chief information officer of Philips & Jordan, Inc., a Knoxville, Tenn.-based heavy civil construction company. “In the heavy equipment industry, manufacturers had been very proprietary of that information.”

According to AEMP, the new standard will allow retrieval of machine data for input into the end-user’s database and will simplify implementation of telematics in mixed fleets. It provides basic machine data such as cumulative operating hours, cumulative miles traveled, cumulative fuel consumption, and current location. The standard is designed to supplement, rather than replace, existing reports used to manage equipment.

“It was very hard for us to integrate data from multiple manufacturers or vendors,” Rasmussen says, noting that manufacturers have now agreed to transmit data using a standard format. “I think the new standard is going to make some pretty significant improvements in how organizations like ours are going to collect some of this data.”

OPERATION

1 Collect equipment data



Determine a method for collecting equipment information such as hours of use, fuel consumption, and service intervals. To the extent feasible, implement technology to aid in scheduling preventive maintenance and capturing equipment cost information.

4 Review equipment data

A screenshot of a software interface for reviewing equipment data. The interface is titled "H001 - 2008 VOLVO A25C". It displays several key metrics: Serial Number 15545, Previous Meter 1972, and Current Meter 1989. A large digital display shows "56.5". Below this, there are several icons for different functions like "Fuel", "Oil", "Water", and "Air". A table at the bottom shows a list of data points for "66.5 Gal" with columns for "Hours", "Center Diff...", "Sample Oil", "1932", ".57", and "SP".

Hours	Center Diff...	Sample Oil	1932	.57	SP
190	Front Differs...	Sample Oil	1932	.57	SP
190	Left Center ...	Sample Oil	1932	.57	SP
190	Left Front PL...	Sample Oil	1932	.57	SP

Service technicians can review data for each piece of equipment as they approach it. Using a screen like this one, the tech can view the service intervals for each machine and click on the service once it has been performed.

TIONS ILLUSTRATED

Electronic Equipment Maintenance

OUR EXPERTS

2 Install equipment monitors



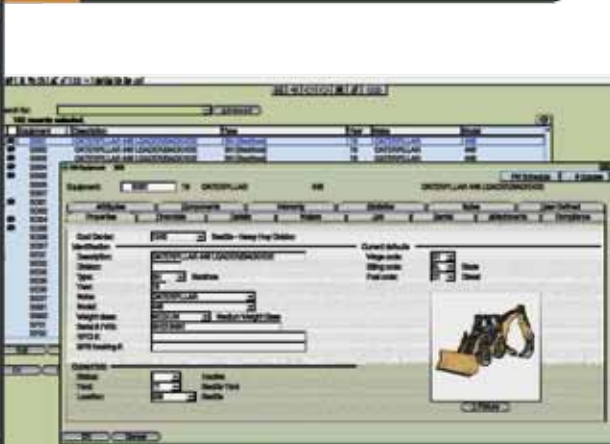
Equipment monitors can be mounted on each piece of operating equipment to track actual operating hours and can differentiate between idle time and operating under a load. Readings from these monitors can be used to plan and schedule regular preventive maintenance.

3 Track data during service



A service technician who performs regular fueling and oiling can collect data from machine monitors and input it into the software system, or the readings can be collected electronically. A touch-screen computer allows for streamlined data collection.

5 Capture life-cycle information



By electronically capturing and storing information on each piece of equipment, an operator can trace when it was purchased, what regular maintenance it received, and when it underwent a substantial overhaul.

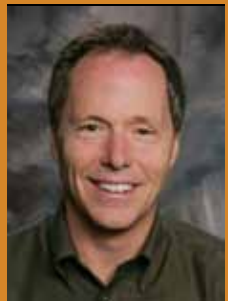
6 Determine profitability



Equipment usage analysis can provide insights into its utilization, down time, and idle time. By examining trends across regions, fleets, or brands, operators can use data to identify top-performing equipment and make wise capital investments.



Steve Rasmussen is the vice president of information and technology (IT) for Phillips & Jordan, Inc. (P&J). He provides analysis and evaluates information and business process requirements and helps fulfill corporate business needs relating to IT. Rasmussen has been on the forefront of developing construction specific applications for equipment management and maintenance, among other systems.



Brad Mathews is the vice president of marketing for Dexter + Chaney. He has been with the company for 19 years, after previously working in sales and marketing with other technology companies. He has a bachelor's degree in business as well as his MBA.

OPERATIONS ILLUSTRATED

Voices of Experience

Steve Rasmussen

Creating a smooth flow of equipment information from the site to the central office has been the focus at Knoxville, Tenn.-based Phillips & Jordan, Inc., says Chief Information Officer Steve Rasmussen.

“We started down the path about four years ago. We were trying to get better integration between our accounting and equipment systems and developing methodologies to collect information in the field to share information back with the quarry managers, as well as the people who are servicing the equipment from a preventive maintenance perspective,” he explains. At that time, there were not a lot of solutions designed for the heavy construction market.

Phillips & Jordan focused on collecting information for its type of heavy equipment fleet with the goal of integrating that information into its corporate accounting system. After evaluating various GPS black box systems and RFID technologies, the company opted for RF technology. It designed a system that allows the service tech who delivers fuel and oil to the equipment on a daily basis to serve as the point person. “We felt that those were the people who were out touching the equipment every day,” Rasmussen says. By tying the system to the service tech, the company can not only collect the information on the equipment, but also collect information on the preventive maintenance services he performs.

“That was one of the problems with the black box technology,” he explains. “They were good at collecting the hours and certain information, but they lacked the ability to collect data on what was being done to the equipment from a service tech standpoint.”

The service tech has a tablet computer that shows each piece of equipment. A custom-developed, touch-screen application allows the tech to select a piece of equipment as he approaches it and see which service intervals are approaching. Radio-based hour meters are installed on the equipment, and they transmit information to the fuel truck which, in turn, feeds that data to the accounting systems in the corporate offices. “We knew there were going to be a lot of changes in the black box market during the next 10 years, so we didn’t want to build anything proprietary,” Rasmussen says of the company’s choice between off-the-shelf and custom solutions. “We just wanted to collect data from whatever black box comes out. In the quarry environment, it’s a pretty good system.

“I think the biggest benefit we’ve gained so far is the visibility into the equipment. The guys know what’s being used. They can schedule more efficiently,” he adds. “They also can see when the equipment is going to be taken out of service and can make better decisions about how to approach it.”

Dan Ruppert

Software systems can aid in equipment management by laying out a preventive maintenance schedule and tracking it as a living document, says Brad Mathews, vice president of marketing at Seattle-based Dexter + Chaney. “If you’re recording your hours, and they can be captured electronically, it updates your preventive maintenance schedule automatically,” he says.

Each day, hours of machine operation are recorded through equipment monitors, and maintenance tasks are triggered based on those hours. Operators can choose to input equipment data manually or obtain it electronically. While most operators step into electronic equipment management in a phased approach, full automation can offer additional advantages. First, it saves time because miners don’t have to climb onto the equipment to take monitor readings and then enter them into a system. Second, it improves accuracy because manual readings are often done in a periodic manner rather than daily. Gaps in measurements decrease accuracy and can interfere with timely maintenance.

It’s also important to note that software systems that collect data from heavy equipment are not the same as telematic systems that report back to the manufacturer. “The monitoring is quite a bit different,” Mathews explains. “Most of the telematics are very helpful with the dealer in providing detailed information on diagnosing the issues for repair and capture very detailed information specific to the equipment.” They don’t, however, he says, capture some of the information that is helpful to the end user such as details on specific maintenance services performed by company mechanics.

“This system is designed for the owner of the equipment who is managing the equipment on a daily basis,” Mathews says. “We’re going to electronically gather information and bring it to a centralized unit that the mechanic can access in the field.”

Software also can be used to determine a piece of equipment’s cost throughout its life cycle. “The system is not something that stands alone in the field,” he notes. “If you’re paying invoices for repairs to the equipment or buying parts for it, you’re tracking the time of the mechanics who work on it and the operators who run it. All of that data is relevant to the management of the equipment. You’re collecting a complete cost history throughout its life.”

These costs can be viewed on an operational, regional, or corporate level. “You can look and see that a particular brand of equipment has, over its life, proven to be effective for your company in your types of operation,” Mathews says. “It can also show if a piece of equipment is profitable. At the end of the day, that’s what you really need to know.”



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