WHEN EQUIPMENT MONITORING MAKES MORE THAN JUST CENTS

by David Fisk
A MINE IS A VERY ROUGH NEIGHBORHOOD FOR MOBILE EQUIPMENT TO LIVE IN.

Not only are they expected to haul huge loads of ore (up to 400 tons in the ultra-class trucks) over rough mine roads and up and down steep grades, but the dust and grit are everywhere, grinding into bearings and destroying fans. The often-extreme environment – think 125°F (52°C) in the desert, or -55°F (-48°C) in the arctic – only adds to the stress on the mechanical and electronic components, inducing failures and reducing service life.
The haul trucks and shovels in a mine are the company's production line, so when a unit breaks down, it gets immediate attention. Production and profitability can be seriously impacted and repair costs can be significant. Maintaining these $7 million trucks and $20 million shovels consumes a large proportion of a mine's staffing and operating budget. Reducing downtime by even a small percentage can quickly create returns of hundreds of thousands of dollars. For example, many mines utilize three or four large shovels to load the hauling fleet. Unplanned downtime of just one of those shovels can impact production volumes by 25% to 35% for as long as the shovel is down. Intervening before a catastrophic failure not only shortens equipment downtime but saves money on equipment repair. Recognizing a problem early on can mean the difference between a truck being able to drive to the shop for repairs and a truck having to be towed in with far more extensive damage and requiring major work.

So how can your operation take the next big step in optimizing mobile production equipment? Consider implementing an equipment monitoring program that will provide near real-time insight into the performance of your equipment and support your condition maintenance program by:

- collecting all of the available operating data and alarms from the equipment - haul truck, shovel, loader, or fixed plant equipment like a mill, conveyor, or crusher
- wirelessly transmitting the data to the mine's central maintenance or monitoring centre
- providing visualization and analysis tools to monitor equipment health in real time
- identifying critical faults as they develop to support maintenance decisions and action.

In many cases, developing failures can be identified well before the operator is aware of a problem and can be corrected during routine maintenance, which will:

- prevent downtime
- significantly reduce maintenance and operating costs
- extend the service life of the equipment

The benefits of monitoring your mobile equipment extend into the realm of safety and operator actions. Preventing a haul truck from breaking down, for example, allows your operation to avoid dangerous situations such as a haul truck with a full load on a steep grade losing power with several other haul trucks right behind it. Monitoring equipment data can also provide insight into operator actions that could have a potentially negative impact on the equipment or jeopardize their own safety. Operators can receive coaching in real time to encourage best practices.
At a large U.S. copper mine, a critical engine oil filter alarm from a haul truck was received. The fleet monitor responded by using mobile equipment monitoring to investigate the operating conditions of the truck. Maintenance kept the unit in service, but under close observation. When a second alarm was triggered 14 hours later, it was an indication that the engine was beginning to seriously degrade and the decision was made to remove the truck from service.

The operator was instructed to immediately shut down. Maintenance was sent to inspect the truck and found the engine’s oil filters were clogged with metal. The haul truck’s engine had already been scheduled for replacement, but the alarms and the metal found in the oil filters resulted in the decision to replace the engine immediately, rather than waiting for the scheduled engine swap. The truck was driven to the shop, and the engine replaced.

By identifying the problem early and taking corrective action, a catastrophic engine failure that would have destroyed the engine block was avoided. As a result, the maintenance team was able to replace the engine and save the old engine core while it was still intact and able to be rebuilt, saving the site over $200,000.

The mine also saved considerable downtime costs because other truck components weren’t damaged, since the engine had not yet completely failed.

By providing continuous collection and storage of all of the data from the assets, mobile equipment monitoring has changed the copper mine’s approach to maintenance. The near-real-time access to alarms and operating data allows maintenance to react and investigate immediately, dramatically increasing the likelihood that they will be able to intervene before the equipment fails.

RETURN ON INVESTMENT: MOBILE EQUIPMENT MONITORING IN ACTION

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The ability to view and analyze historical data provides enormous opportunities for maintenance teams. Using mobile equipment monitoring programs, they can:

- use data to make informed decisions
- identify warning signs of developing failures
- find developing problems much earlier
- improve equipment or processes to prevent the same failure from happening in the future
- identify unsafe or potentially damaging operator behavior

Access to this data enables your mine to act quickly when equipment begins to develop problems, allowing you to focus your resources on keeping equipment running rather than on fixing equipment that has already failed. With mobile equipment monitoring, you can significantly shift maintenance approaches from reactive to proactive.