

# Slashing Costs in the Mining Industry with Predictive Maintenance

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**Mining companies are faced with several challenges including high turnover, limited accessibility to machines, and harsh environments, making it an uphill battle to maintain and grow profit. Furthermore, one hour of downtime can cost as much as \$100,000 at some sites, and it's rare for machine failure to be resolved quickly when predictive maintenance practices aren't being implemented. If mining sites want to significantly reduce costs, they must rethink the technology and practices they're using to keep machines running safely and reliably.**

## **What is Downtime Really Costing You?**

In any industry, the cost of downtime is made up of more than lost productivity—you also have to account for additional overhead, overtime hours, and potential customer loss. When it comes to mining companies, many of those costs are amplified due to one factor: location.

Remote locations and hazardous environments commonly associated with mines mean it can take more time and staff to access the failed equipment and resolve the issue—think in-house maintenance, overtime hours, and even outside contractors who may have to travel across the state or country to access the site. Furthermore, if new parts need to be ordered, shipping costs and delivery time are typically doubled or even tripled compared to a plant near a large city. Let's say you have a critical failure costing you \$10,000 per hour of downtime and it will take two weeks for the new part to be delivered to your remote site. That's \$3,360,000 down the drain, assuming the part gets replaced as soon as it's delivered.

Several factors contribute to machine failure including misalignment, miscalculating regrease intervals, and even using the wrong lubricant. Predictive maintenance not only serves to monitor the condition of the machine and determine when maintenance must be performed, but it can help you identify the root cause of poor and degrading machine performance.

## Avoiding Excess Costs with Ultrasound

With an array of condition monitoring technologies available, it can be difficult to know what to use and when. One form of technology that identifies a wide range of machine conditions from bearing friction to compressed air leaks is ultrasound. Because ultrasound is versatile in its capabilities and requires minimal training, it can slash costs in the following ways:

- **Reduced machine failure** – The insights gathered from ultrasonic monitoring can be used to stop failure in its tracks, reducing unplanned downtime. With unplanned downtime often comes the need to replace parts, which adds up tremendously when high shipping costs and lengthy delivery times for remote mines are considered.
- **Energy Savings** – Early detection of compressed air leaks or faulty steam traps and better regreasing practices prevent machines from working harder than they need to.
- **Less overtime** – When failure occurs, maintenance staff may need to work overtime to determine where things went wrong and how to resolve the issue. This can become costly in cases where the investigation happens over a period of weeks.

With that said, investing in ultrasound tools is an investment, not just in the cost of the equipment itself, but in time spent training staff on using the tools. To determine if the ROI is significant enough, we must first determine what types of ultrasound equipment are available and how they apply to mining equipment.

## Ultrasonic Tools for Mining Equipment

### Automatic Regreasing

Fifty percent of critical equipment failures can be traced back to improper lubrication. With ultrasonic monitoring using the [OnTrak](#), you can measure the amount of friction being produced in your bearings, taking the guesswork out of lubricating critical equipment, such as chilled water pumps, air handler units, and purified water pumps. Once a need for grease is detected, the system notifies the operator through UE Insights, a cloud-based platform. From there, with a push of a button, the operator can grease the bearing remotely by giving the system permission.

#### SINGLE POINT LUBRICATOR

Dispense lubricant with precision only when needed from up to 16 single point lubrication devices

#### COMMUNICATION

(Ethernet, wifi or cellular)

#### MODULAR SYSTEM

Each OnTrak is capable of 16 sensors, Easily scale OnTrak systems to thousands of sensors to one central dashboard

#### MOBILE VIEW

Viewable on any network connected device; pc, laptop, tablet, phone using a standard browser



#### ALARM NOTIFICATION

Built-in events system, which is configurable, and has the ability to display, email and text any alerts the system has



The OnTrak system also has an automatic mode where no human interaction is needed to grease bearings. Regardless of which mode you use, monitoring bearing data from the OnTrak helps to reveal underlying issues that aren't always directly related to lubrication. For example, you may grease the bearing remotely only for the data to show that the friction has come back. This could be an indication of another issue such as misalignment or bearing fatigue.

## Compressed Air Leak Detection

When it comes to critical machines, any undetected leaks can cause extensive damage to your equipment and break the bank to fix. With ultrasound leak detection using an Ultraprobe, you can instantly pinpoint the source of any leak, whether it's air or gas.



The important thing to remember is that leaks can occur in nearly any machine. The main cause of leaks can be linked to a specific occurrence – when fluids move from a high-pressure area to a low-pressure area. When the fluid enters the low-pressure point, turbulent flow is created. Turbulence produces white noise by disturbing the air molecules, which contain low and high frequencies. The Ultraprobe can tune in by looking for high-frequency areas. By ignoring the lower frequencies, ultrasound technology can accurately locate and identify a leak, even in a noisy environment.

## Partial Discharge Detection

In the early days of mining, there were dangers related to using temporary power in mines. Back then, the hazards included:

- Shocks from contact with trolley wires, bare conductors, and ungrounded equipment.
- Fires from electricity igniting coal, the ashing of motors, and short circuits.
- Explosions resulting from arcing and sparking that ignited methane or dust accumulations.

Today, the Office of Mine Safety and Health Research continues to provide guidance to protect mine workers from shocks, fires, explosions, and other things that can cause injuries, illnesses, and death. One thing to monitor today is partial discharge.

In plain terms, a partial discharge is the result of an electrical breakdown that—over time—degrades an asset’s insulation or conductive components, leading to failure. Partial discharge can affect transformers, bushings, arrestors, switchgear, cables, and many other substation components over 1000V.

While a corona discharge (CD) is usually revealed by a relatively steady glow or brush discharge (BD) in air, partial discharges within solid insulation system are not visible, meaning you’ll need to listen for it instead. Ultrasound is the perfect tool for this because it can detect noise at high frequencies that are inaudible to the human ear.

## Using Ultrasound to Predict Equipment Failure on Common Mining Equipment

Coupled with a user-friendly interface, maintenance staff can use ultrasound to quickly spot an imminent failure and work to repair the damage before it’s too late. Let’s look at a few common types of equipment in the mining industry and how ultrasound works to combat associated failure.

### Ventilation Fans

Mining ventilation is defined as a combined system of shafting, ducting and a well-designed combination of fans. Mining ventilation fans are used to supply adequate oxygen for the workforce and dilute and exhaust dangerous gases in an underground mine. Improper underground ventilation creates health problems in staff, decreasing production and increasing the frequency of on-site accidents. Due to the criticality of these fans, there isn’t much room for error in maintenance, making it essential to regrease its components properly. Unfortunately, these fans are difficult to access and if they’re not running, temperatures can reach dangerous heights, making it a dangerous point to access.

The [OnTrak](#) automatic regreasing system can mitigate risk by allowing maintenance to regrease the motor remotely. Once friction is detected, the user gets an alert via UE Insights, a cloud-based system. From there, the user can give the single-point lubricator permission to dispense a calculated amount of grease to reduce bearing friction.



## Transformers and Junction Boxes

To protect workers from potential electrical hazards, you must monitor partial discharge. Partial discharge (PD) testing is a failure mode detection method that trained technicians can perform on energized equipment. Arcing, tracking, and corona discharge produce ultrasound at the site of emission. These electrical discharges can be located quickly by scanning an area with the Ultraprobe or Ultraview camera. The signal is heard as a frying or buzzing sound in the headset. As with pressure or vacuum leak detection, the closer the instrument is to the discharge, the more intense the signal.

## Jaw Crushers

Jaw crushers are widely used to crush materials into medium size in the first crushing process of ore rocks, so your rocks would be ready for secondary crushing. It can handle a wide range of suitable materials, such as granite, marble, basalt, limestone, quartz, pebble, iron ore, copper ore and more.

Unlike gyratory crushers, the main lubrication used in jaw crushers is grease rather than oil. Although the main crushing process is complemented by jaw plates, the crucial parts that give motion to the moveable jaw plate are the toggle plate, pitman bearing and flywheel. The pitman drives the moveable jaw dies to push stone material toward stationary jaws, which create strong pressing forces to both jaw dies. Therefore, if the pitman bearing is not lubricated in time, it will be broken under the high pressure of material and interrupt the entire operation.

Because crushing is such a vital part of material processing, an automated lubricator with ultrasound capabilities is an ideal investment because it can detect friction and supply grease as soon as it's needed. This mitigates human error that accompanies traditional greasing methods while saving costs in the form of less grease waste and less unplanned downtime.

## Bottom Line

As mining evolves, predictive maintenance practices will be encouraged to improve productivity and workplace safety. If your site is seeking a way to optimize regreasing frequency or stop electrical failures in their tracks, installing ultrasonic tools provides a quick return on investment. The [OnTrak](#) is an easy solution to get started with automation and predictive maintenance because there is minimal training needed and the user-friendly platform provides an easy way to lubricate bearings remotely and view bearing data. The Ultraview camera can create accurate partial discharge reports by safely diagnosing corona, arcing, and tracking and determining the type and severity of partial discharge. These tools combined are proficient in helping mining companies improve machine reliability and overcome challenges that affect efficiency and profitability.

## About UE Systems & the OnTrak

UE Systems is the world leader in ultrasonic instruments & training solutions for predictive maintenance, reliability, condition monitoring and energy saving program. The OnTrak by UE Systems uses the power of remote prescriptive monitoring to give lubrication experts a powerful, accurate and easy-to-use software application to monitor bearing friction and remotely lubricate from anywhere, anytime or any supported device. To learn more about UE Systems and OnTrak, please visit [UESystems.com/product/ontrak/](https://UESystems.com/product/ontrak/) or [UESystems.com](https://UESystems.com).

