

# The Importance of Safety in the Mining Industry

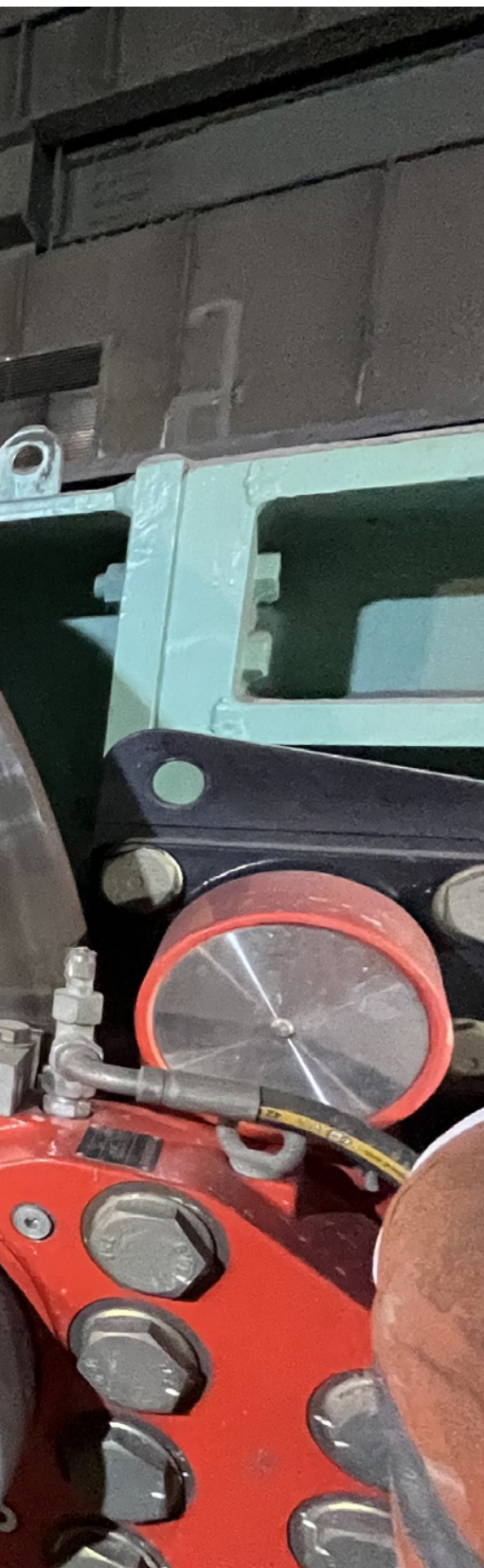
**Regal Rexnord examines operational efficiency of braking systems**

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*Innovative braking solutions incorporate features like hydraulic releases and soft braking, significantly reducing wear and tear while ensuring precise control.*





The rugged, high-stakes environment of the mining industry requires safety to be non-optional. Every piece of equipment, every process, and every decision must come together to ensure the livelihood of the workforce is preserved and operational excellence is achieved.

From conveyor systems to hoists and grinding mills, these critical components play a large part in providing essential raw materials to the global economy. One crucial element that plays a vital role in all these sectors, however, is the braking systems of these heavy applications.

### The Critical Role of Brakes in Mine Safety

Brakes are a fundamental component in various mining applications, playing a crucial role in ensuring the safety of operations. Some key examples of how brakes are properly utilized within the industry include:

- 1. Conveyors:** Conveyor systems are used to transport materials over long distances within a mine. Brakes are essential for controlling the speed of conveyor belts, preventing overloading and mechanical failures that could lead to accidents. Effective braking systems ensure that conveyors can be stopped quickly in emergencies, reducing the risk of injury to workers.
- 2. Hoists:** Hoists are used to lift and lower materials and personnel in mines. Reliable braking systems are critical for hoists to prevent uncontrolled descent, which could result in severe accidents. Advanced braking technologies, such as fail-safe braking systems, ensure that hoists can stop safely even in the event of a power failure.
- 3. Grinding Mills:** Grinding mills are used to crush and grind ore into smaller particles. Brakes are vital for controlling the rotational speed of the mills, ensuring safe operation. In case of an emergency, brakes can quickly stop the mills, preventing potential hazards such as mechanical failures.



*Braking requires accurate speed modulation and contingencies for power loss, speed signal errors, or mechanical failures. All photos courtesy of Regal Rexnord.*

## The Future of Mining Safety

Deloitte released the report “Technological Advancements Elevating Health and Safety in Mining Operations” to address AI and IoT opportunities to help enhance health and safety practices—and, in some cases, even remove employees from working in hazardous conditions.

AI-driven predictive maintenance constitutes a pivotal facet of mining safety, leveraging data from equipment sensors and historical maintenance records to preemptively detect machinery health deterioration. Current maintenance practices vary by mining company, from planned maintenance to “as needed” maintenance when problems arise. Unplanned maintenance may increase the risk of incidents due to the higher potential lack of planning and confirmation that critical controls are in place. Predictive maintenance utilizing AI can predict specialized maintenance needs for each piece of equipment using an array of data from historical maintenance records, mine operations data, equipment telemetry and computer readings, and overall trends for a given piece of equipment. This predictive maintenance reduces unplanned downtime and unplanned failures that often result in increased injury rates.

### Robotics for hazardous operations

The mining industry has long been an early adopter of robotics, particularly in underground environments where the application can increase workers’ ease of travel underground and potentially remove them from harmful environments. Technological advancements in robotics and the application of both IoT sensors and artificial intelligence processing is effectively changing what’s possible with robotics.

One useful application of robotics is exploration or mapping of subterranean spaces that may have been considered a confined space or have other known hazards that prevent human interaction. Confined spaces, for example, present several challenges; sending robots into confined spaces, which may contain poor air quality, flooding, collapsing areas, poor visibility, and chemical/gas exposure, for exploration or mapping purposes could be very effective.

Additionally, robots could be used for first response in rescue operations for which part of the risk is unknown hazards or conditions. Robots can assess structural conditions, mapping hazards, and delivering critical supplies including medical and oxygen. Rescue robots can be used rapidly after an incident, while response operations are planned, and can be equipped to perform rescue or triage operations and save lives with basic medical supplies and oxygen, thermal cameras, and environmental sensors.

### Underground Drones

Drones have emerged as powerful instruments for mining with a variety of applications, many of which can improve health and safety outcomes. In underground environments, drones can be used to map areas that are difficult or impossible for humans to access. In recent years, the reliability and efficiency of drones has dramatically increased with IoT and will further accelerate with AI applications. IoT sensor applications on drones have allowed for real-time data and improved obstacle avoidance, real-time flight path adjustment, and various other critical improvements to enable smart and connected environments not possible a few years ago. One example is emergency response drones (ERDs). A drone can provide first responders with critical information to assess hazards and risks in a very timely way. In underground environments at Newmont, response drones are equipped with thermal imaging to aid recovery times. Other sensors such as methane or other gases identify hazards in real time and share them with rescue teams. Newmont’s emergency response specialist noted of ERDs, “They provided critical and practical operational information to our responders to ensure they can perform their activities without having to place themselves in harm’s way.” Providing real-time data to rescue teams, drones enable informed decision-making and significantly augment the safety of search and rescue operations.

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## Application Considerations and Technological Advancements

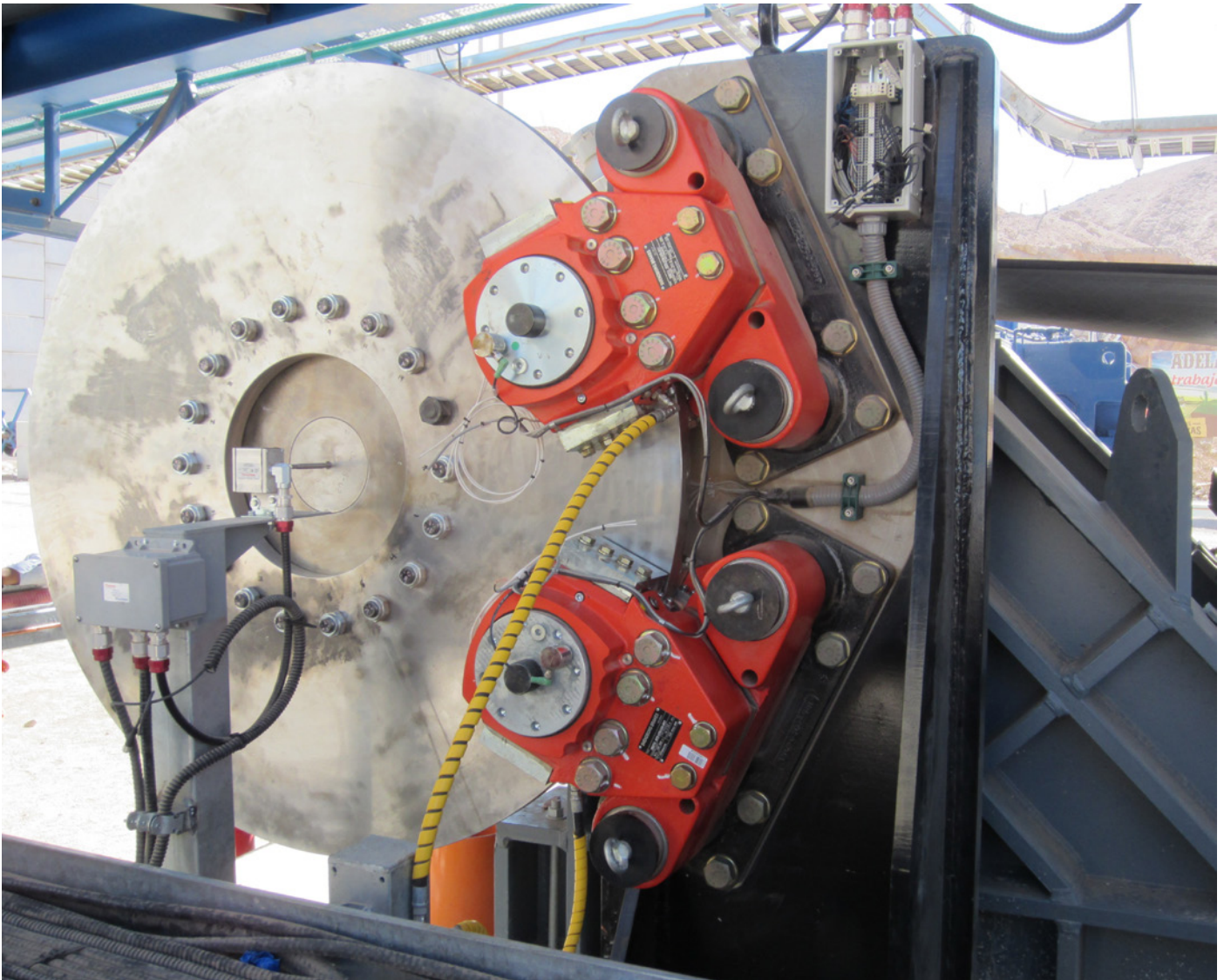
There are many factors reviewed when designing and selecting a braking system—the torque applied when braking, location and orientation of the equipment, and operating conditions to name a few. However, braking is not as simple and on or off; often it requires accurate

speed modulation and contingencies for power loss, speed signal errors, or mechanical failures.

Innovations in smart braking technologies have aided significantly in managing increased demands, detecting and monitoring equipment wear and status, and responding to changes in system resource availability.

A good example of these safety features being considered can be seen in Regal Rexnord’s emphasis in advanced braking solutions





*Safety improvements on components can protect the workforce from operational hazards.*

from one of its brands, Svendborg Brakes. Innovative braking solutions incorporate features like hydraulic releases and soft braking, significantly reducing wear and tear while ensuring precise control. Having these systems installed and in mind ensure proactive steps are being taken to significantly reduce the chance of injury on the work site.

SOBO (SOft Braking Option) iQ's deployment by Svendborg Brakes has continued to show immense improvements towards the safety of conveyor systems. Integrating advanced braking algorithms with state-of-the-art hydraulic technology is a great step towards ensuring the safety of those on the jobsite.

Designed to mitigate uncontrolled loads and prevent catastrophic failures, SOBO iQ's braking protocols ensure smooth and controlled deceleration and the intelligent feedback mechanisms optimize braking force dynamically enable safe and reliable operation under various load conditions.

### **Pursuing Safety in a Mine**

Incorporating a design partner with a focus on powertrain solutions into a new project or existing refurbishment can aid in identifying the variables needed for consideration and resources available to combat risk. This inclusion can pay dividends in both upfront design efforts and long-term risk prevention. The cost of downtime

due to poor system selection can be immense, and a preventable injury or fatality would be catastrophic.

While the mining industry has made progress in improving safety standards, the journey towards a completely safe working environment is ongoing. Continuous innovation and adherence to safety protocols are imperative.

Brakes, as a critical safety component, exemplify how targeted improvements in equipment can significantly enhance the safety of mining operations, and by prioritizing safety, the mining industry can protect its most valuable asset—its workforce.

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