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NEWSLETTER

HEGGEL® Fix 830

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Navigating Abrasion Corrosion In Mining Industry

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The Mining industry, which deals with the extraction and processing of ores, is characterized by its heavy-duty machinery and harsh operational environments. These conditions involve the handling of heavy, abrasive, and often corrosive materials. In such a setting, understanding the causes and effects of abrasion, wear, and corrosion, as well as their interactions, is crucial. This knowledge is vital for maintaining operational efficiency, ensuring workers safety, and optimizing the lifespan of mining equipment.

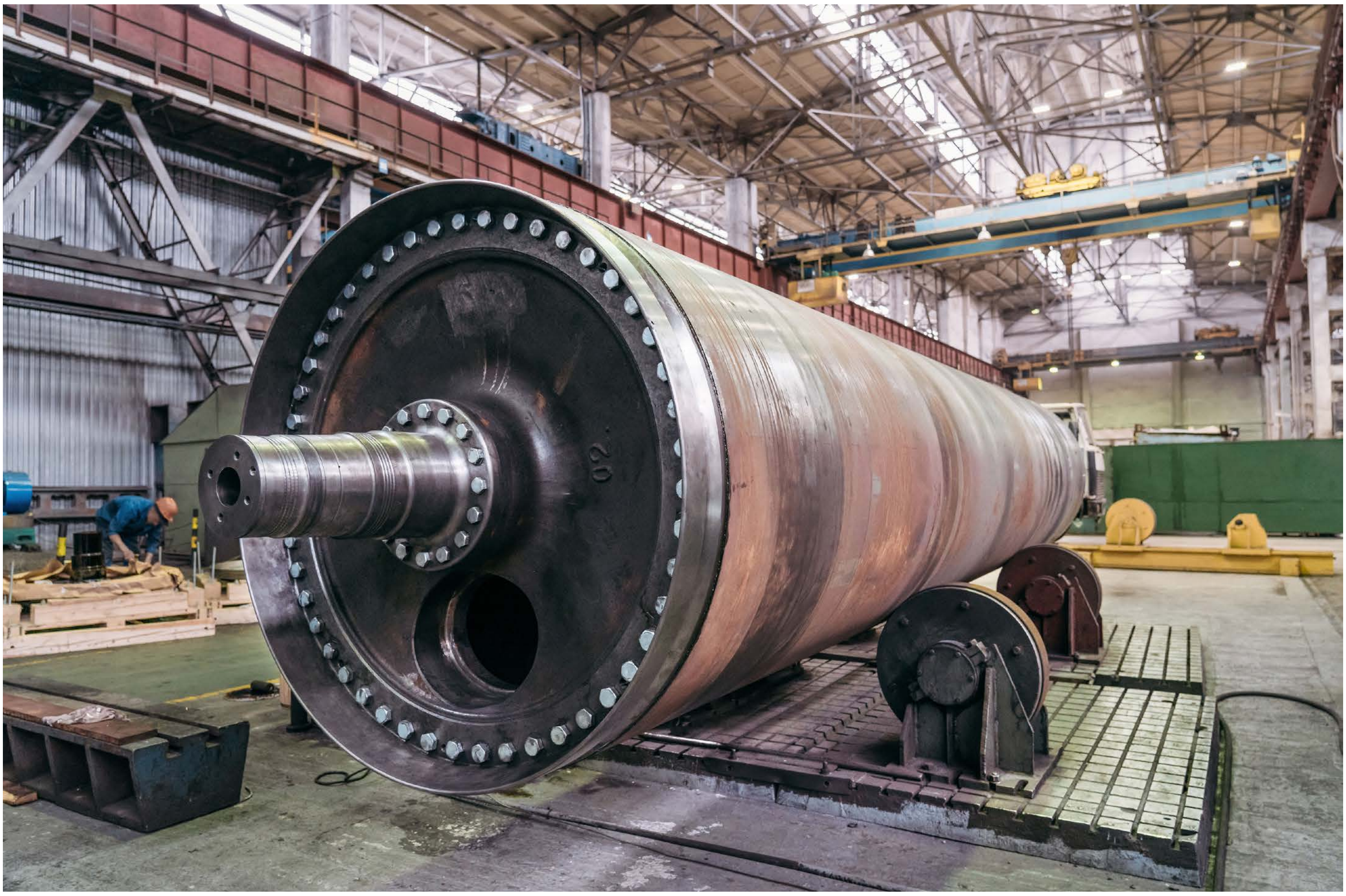
Abrasion, caused by the continuous handling of rough and hard materials, leads to the scraping and wearing of equipment surfaces. The primary cause of abrasion in the mining industry is the persistent contact with these harsh materials. The hardness, shape, and velocity of the abrasive particles significantly influence the extent of abrasion.

Wear, resulting from a combination of abrasive action, repeated stress cycles, and friction-induced material transfer, further contributes to the degradation of machinery. In the mining industry, wear is caused by a multitude of factors. Abrasion, as previously mentioned, is a major one. However, other types of wear can also occur, such as impact wear (caused by collisions between equipment and hard materials), fatigue wear (caused by repeated stress cycles), and adhesive wear (where material is transferred from one surface to another due to friction).

Corrosion, triggered by exposure to various substances, is another major issue. Many mining processes involve the use of water, often mixed with other substances like acids, bases, or salts, which can be corrosive and add to the overall deterioration of the equipment. Moreover, the natural environment where mining takes place can also contribute to corrosion. For instance, mining equipment exposed to seawater or salt air can experience accelerated corrosion due to the high salt content.

Corrosion abrasion, also known as abrasive corrosion, corrosive wear, or slurry erosion, is a significant problem in the mining industry. It‘s a combined process where both corrosion and abrasion occur simultaneously, often leading to more severe damage than either process alone. This typically happens when equipment is exposed to slurries (mixtures of corrosive liquids like acidic or alkaline water and solid particles) that are both abrasive and corrosive. The solid particles cause mechanical wear on the material, while the liquid induces chemical corrosion. Together, these processes can significantly degrade the material.

The extent of abrasion, wear, and corrosion can be influenced by factors such as the material properties of the equipment (hardness, toughness, chemical composition), operating conditions (load, speed, temperature), and the nature of the materials being handled (hardness, particle size, corrosiveness).



Involved Equipment

The specific equipment used in the mining industry can vary greatly depending on the type of mining operation. For example, surface vs. underground mining, and the specific mineral being mined, etc., all determine the tools and machines used. Each of these pieces of equipment is subjected to high levels of abrasion, wear, and corrosion. Therefore, proper maintenance is crucial to ensure their longevity and effectiveness in mining operations.

Leaching Tanks, used in the process of leaching where valuable minerals are extracted from ores, often contain abrasive slurry. This, along with any corrosive chemical reactions that may occur inside, can cause wear and tear on the tank walls and agitator blades.

Ball Mills, which are utilized to grind or blend materials into very fine particles, also undergo significant wear. Both the balls themselves and the inner lining of the mill are subject to heavy abrasion due to the grinding of hard ore particles.

Cyclones and Hydrocyclones, used for the separation, classification, and thickening of mining materials, often deal with abrasive materials, causing significant wear and tear.

SAG Mills, which are similar to ball mills and used to grind larger pieces of ore into smaller ones suitable for further processing, are exposed to high impact and attrition. These conditions result in considerable wear on the inner lining of the mill.

Pumps, including Slurry pumps and centrifugal pumps, are used in the mining industry and are regularly damaged by abrasive slurries and high pressure. This causes substantial wear.

Moreover, Thickeners, Clarifiers, Drilling Equipment, Excavation Equipment, Crushing and Grinding Equipment, Conveyor Systems, Chutes, Hoppers, Screening Equipment, Loaders, Blasting Tools, and more, are among the inseparable facilities in mining applications. All of these are subjected to severe abrasive conditions.

Deteriorating Effects of Abrasion, Wear, Corrosion

The demanding nature of the mining industry presents considerable challenges for machinery and equipment due to abrasion, wear, and corrosion. These three main types of material degradation can lead to significant consequences, including:

Increased Material Loss:

The combined effects of corrosion and abrasion can cause materials to degrade faster than they would from either process alone.

Decreased Operational Efficiency and Structural Integrity

As equipment degrades and its structural integrity is compromised, it can become less efficient at performing its tasks.

Safety Risks:

In severe cases, corrosive abrasion could lead to equipment failure, potentially creating hazardous situations.

Reduced Equipment Lifespan:

Corrosive abrasion can significantly shorten the lifespan of mining equipment, necessitating more frequent repairs or replacements.

Increased Maintenance Costs and Unexpected Downtime:

Frequent replacements or repairs of worn-out parts can increase maintenance costs. Abrasion can also cause sudden equipment failure, leading to unexpected downtime and lost productivity. Furthermore, increased wear results in more frequent replacement of components, which can increase operating costs.

Mitigating Abrasion, Wear, Corrosion

All pieces of equipment mentioned above require proper maintenance and occasional replacement of parts to ensure their ability to handle harsh, abrasive operating environments. Implementing measures to prevent and minimize abrasion, wear, and corrosion in the mining industry is essential for maintaining operational efficiency, prolonging equipment lifespan, and reducing costs.

Material selection and equipment design are fundamental pillars in mitigating abrasion, wear, and corrosion. The use of high-strength alloys, ceramics, and corrosion-resistant substances like stainless steel helps to prolong equipment lifespan. Simultaneously, equipment designs tailored to withstand wear and corrosion ensure longevity.

Lubrication, particularly with products offering corrosion protection, reduces friction and wear. Cathodic protection adds another layer of security against metal corrosion by utilizing sacrificial metals. Moreover, where feasible, adjusting the operating environment can minimize wear and corrosion. The use of corrosion inhibitors serves to slow the corrosion rate. Other techniques such as thermal spraying and surface treatments enhance the hardness and wear resistance of metal parts, promoting their durability.

Protective coatings and linings offer unique advantages in the mitigation of abrasion, wear, and corrosion for mining equipment. Their primary strength lies in providing a physical barrier between the substrate material and the environment, effectively preventing any direct contact with abrasive materials or corrosive substances.

The ultra-protective, abrasion-resistant **HEGGEL Fix 830** is an excellent solution for significantly extending equipment lifespan. It not only protects substrates against corrosion, but also impedes wear expansion, even at high abrasion rates, thereby optimizing operational efficiency.

HEGGEL® Fix 830

Super Abrasion Resistant Composite

Specifically engineered for hand application, **HEGGEL Fix 830** delivers superior abrasion resistance to areas prone to erosion and wear damage, whether from dry particle impacts or those within fluids. **HEGGEL Fix 830** exhibits outstanding resilience, particularly against fine particle abrasion.

In addition to its outstanding abrasion resistance, **HEGGEL Fix 830** possesses unique chemical resistance. It effectively withstands acids, alkaline solutions and harsh solvents.
Offering a robust barrier against abrasive damage, **HEGGEL Fix 830** can be built up to a Dry Film Thickness (DFT) of up to 15 mm. It is exclusively designed to repair and rebuild machinery and equipment affected by intense wear and erosion damage.

With a rough and semi-gloss surface finish, **HEGGEL Fix 830** serves as an ultimate wear-resistant repair grade composite. Its extended pot life and service time facilitate easy application.

HEGGEL Fix 830 is also a self-priming two-component product with a solvent-free chemical composition. It achieves tenacious bonding with various substrates, including steel, stainless steel, cast iron, copper, bronze, aluminum, alloys, and concrete.

HEGGEL® Fix 830

Application Areas

- Corrosion-erosion damaged pipes, valves, etc.
- Substrates prone to erosion & wear
- Steelwork exposed to mineral acids
- Leaching tanks
- Pulverized fuel lines
- Ash handling systems
- Mineral storage
- Clinker silos
- Coal bunkers
- Mining equipment: ball mills, SAG mills, etc.

Technical Data	
Abrasion Resistance **ASTM D4060** (Taber CS-17/1kg/1000 cycles)	4 mg weight loss
Barcol Hardness ASTM D2583	52
Adhesives Strength ASTM D4541	23 MPa (cohesive failure)
Compressive Strength BS6319 Part 2 1983	80 MPa
Impact Resistance ASTM G14	Forward: 12 Joules Reverse: 6 Joules
Temperature Resistance NACE TM0174	+90°C Immersed +150°C Non-Immersed

Typical Chemical Resistance (Full immersion)

- Crude Oil (Sweet or Sour)
- Kerosene
- Sulfuric Acid 50%
- Hydrochloric Acid 35%
- Nitric Acid 15%
- Sour Gas
- Sodium Hydroxide 50%
- Sodium Hypochlorite 15%
- Methanol
- Acetic Acid 30%
- Demineralized Water
- Acetone
- Diethanolamine
- Diglycolamine