

8 AUG 26

Read Time: 10 Mins.

Case Study

AI-Optimized Comminution Circuit



Overview

Drawing from engineering insights and more than 640 historian files, the solution identified failure patterns. Using the FMECA-based root cause framework, the machine learning models not only predicted failures but also identified the underlying cause for the same. The solution, based on the previously reported failures, **delivered more than 85% probability of failure detection six months before failure**, component-level rest-of-useful-life estimates, and a system health index map. Thus, turning reactive maintenance into foresight-driven asset management.





Client Background and Challenges

A leading producer of gold and the by-products of copper, lead, zinc, and silver, operating across the mining value chain, including exploration, mining, mineral processing, and metal extraction, experienced unplanned shutdowns at its mineral processing plants, beginning with the grinding mill circuits. This directly affects the comminution circuit, which is the backbone to the mineral processing plant that defines throughput, productivity, mineral recovery, and cost per ton of metal for respective concentrators.

Known for its advanced analytics and predictive maintenance initiatives, the company continued to face challenges:

Criticality of processing technique:

A leading gold producer with large-scale comminution circuits where grinding mills act as a defining force for the processing plant and concentrator's availability.

Invisible mechanical failures:

The breakage incidents of gearboxes, pinions, and bearings were difficult to predict due to periodic and standard maintenance

Million-dollar loss per day:

Every unplanned shutdown of a grinding mill costs USD 1.5-1.8 million per day due to production losses and emergency repair expenses.

Poor visibility:

640+ historian data sets are siloed with no analytical tool integration, leading to poor or no visibility of component degradation.

Our Approach and Solution

To overcome the challenges, Tech Mahindra delivered an AI-infused predictive maintenance solution that was built on data ingestion, processing, modeling, and validation. With over **640 data historian files** embedded in the '**Kepware**', an industrial connectivity software, a reliable sequence of data points for the grinding circuits and their critical components was created. Taking the solution a step further, engineering insights, failure logs, and operational insights are used to establish a clear relationship between behavioral patterns and failure modes.

Tech Mahindra trained ML models to predict failure statistics for gearboxes, pinions, and bearings, and to estimate their remaining service life, commonly known as the rest of useful life and the probability of failure within a defined period. In addition, the model closely evaluated the root causes of the predicted failures and mapped scenarios against the failure mode, effects, and criticality analysis (FMECA) framework. As a result, a system health index map was generated to prioritize proactive maintenance measures.

Business and Community Impact

The engagement provided insight into the mill circuit, enabling benefits such as

-  Improved plant availability and throughput
-  Reduced unplanned shutdown
-  Low emergency maintenance events
-  Asset health outlook
-  Optimized MRO inventory
-  Improved worker safety

About Tech Mahindra

Tech Mahindra (NSE: TECHM, BSE: 532755) offers technology consulting and digital solutions to global enterprises across industries, enabling transformative scale at unparalleled speed. With 146,000+ professionals across 90 countries, Tech Mahindra provides a full spectrum of services including consulting, information technology, enterprise applications, business process services, engineering services, network services, customer experience & design, AI & analytics, and cloud & infrastructure services. It is the first Indian company in the world to have been awarded the Sustainable Markets Initiative's Terra Carta Seal, which recognizes global companies that are actively leading the charge to create a climate and nature-positive future. Tech Mahindra is part of the Mahindra Group, founded in 1945, one of the largest and most admired multinational federation of companies.



www.techmahindra.com
www.twitter.com/tech_mahindra
www.linkedin.com/company/tech-mahindra

Copyright © Tech Mahindra Ltd 2026. All Rights Reserved.

Disclaimer: Brand names, logos, taglines, service marks, tradenames and trademarks used herein remain the property of their respective owners. Any unauthorized use or distribution of this content is strictly prohibited. The information in this document is provided on "as is" basis and Tech Mahindra Ltd. makes no representations or warranties, express or implied, as to the accuracy, completeness or reliability of the information provided in this document. This document is for general informational purposes only and is not intended to be a substitute for detailed research or professional advice and does not constitute an offer, solicitation, or recommendation to buy or sell any product, service or solution. Tech Mahindra Ltd. shall not be responsible for any loss whatsoever sustained by any person or entity by reason of access to, use of or reliance on, this material. Information in this document is subject to change without notice.