

Risk Based Maintenance Planning for Loading Equipment in Underground Hard Rock Mine: Case Study

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Abstract : Mining industry is known for its appetite to spend sizeable capital on mine equipment. However, in the current scenario, the mining industry is challenged by daunting factors of non-uniform geological conditions, uneven ore grade, uncontrollable and volatile mineral commodity prices and the ever increasing quest to optimize the capital and operational costs. Thus, the role of equipment reliability and maintenance planning inherits a significant role in augmenting the equipment availability for the operation and in turn boosting the mine productivity. This paper presents the Risk Based Maintenance (RBM) planning conducted on mine loading equipment namely Load Haul Dumpers (LHDs) at Vedanta Resources Ltd subsidiary Hindustan Zinc Limited operated Sindesar Khurd Mines, an underground zinc and lead mine situated in Dariba, Rajasthan, India. The mining equipment at the location is maintained by the Original Equipment Manufacturers (OEMs) namely Sandvik and Atlas Copco, who carry out the maintenance and inspection operations for the equipment. Based on the downtime data extracted for the equipment fleet over the period of 6 months spanning from 1st January 2017 until 30th June 2017, it was revealed that significant contribution of three downtime issues related to namely Engine, Hydraulics, and Transmission to be common among all the loading equipment fleet and substantiated by Pareto Analysis. Further scrutiny through Bubble Matrix Analysis of the given factors revealed the major influence of selective factors namely Overheating, No Load Taken (NTL) issues, Gear Changing issues and Hose Puncture and leakage issues. Utilizing the equipment wise analysis of all the downtime factors obtained, spares consumed, and the alarm logs extracted from the machines, technical design changes in the equipment and pre shift critical alarms checklist were proposed for the equipment maintenance. The given analysis is beneficial to allow OEMs or mine management to focus on the critical issues hampering the reliability of mine equipment and design necessary maintenance strategies to mitigate them.

Keywords : bubble matrix analysis, LHDs, OEMs, Pareto chart analysis, spares consumption matrix, critical alarms checklist

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