

### **ABSTARCT**

*In the limestone mining industry, operational efficiency heavily relies on the reliability of heavy equipment, particularly excavators equipped with hydraulic breaker attachments. This study reveals significant challenges faced by PT. Indocement Tunggal Prakarsa Tbk in achieving a productivity target of 36,000 tons per month for breaking boulders, which is hindered by component failures. The objectives of this research are to analyze the impact of these failures on productivity using the Failure Mode and Effect Analysis (FMEA) approach, identify the root causes of failures through Fault Tree Analysis (FTA), and formulate effective preventive maintenance strategies. Through the analysis of performance data from January to October 2024, it was found that failures in the seal component were the primary cause of downtime, with a Risk Priority Number (RPN) reaching 168. The implementation of a structured preventive maintenance strategy successfully increased productivity by 50.16%, from 19,387.2 tons per month to 29,114 tons per month, while also reducing the Mean Time to Repair (MTTR) from 99.176 hours to just 29 hours. This research provides strategic solutions for optimizing the maintenance of heavy equipment in the mining sector.*

*Keywords: Hydraulic breaker, productivity, Failure Mode and Effect Analysis (FMEA), Fault Tree Analysis (FTA), preventive maintenance*

## INTISARI

Dalam industri pertambangan batu kapur, efisiensi operasional sangat bergantung pada keandalan alat berat, khususnya pada *excavator* dengan *attachment hydraulic breaker*. Penelitian ini mengungkap tantangan signifikan yang dihadapi PT. Indocement Tunggal Prakarsa Tbk dalam mencapai target produktivitas *breaking boulder* sebesar 36.000 ton per bulan, yang terhambat oleh kerusakan komponen. Penelitian ini bertujuan untuk menganalisis dampak kerusakan terhadap produktivitas dengan pendekatan *Failure Mode and Effect Analysis*, mengidentifikasi akar penyebab kerusakan dengan metode *Fault Tree Analysis*, dan merumuskan *strategi preventive maintenance* yang efektif. Melalui analisis data kinerja dari Januari hingga Oktober 2024, ditemukan bahwa kerusakan pada komponen *seal* adalah penyebab utama *downtime*, dengan *Risk Priority Number* (RPN) mencapai 168. Penerapan strategi *preventive maintenance* yang terstruktur berhasil meningkatkan produktivitas sebesar 50,16%, dari 19.387,2 ton per bulan menjadi 29.114 ton per bulan, serta menurunkan *Mean Time to Repair* (MTTR) dari 99,176 jam menjadi hanya 29 jam. Penelitian ini memberikan solusi strategis dalam optimasi pemeliharaan alat berat di sektor pertambangan.

Kata kunci: *Hydraulic breaker*, produktivitas, *Failure Mode and Effect Analysis* (FMEA), *Fault Tree Analysis* (FTA), *preventive maintenance*