

ABSTRAK

ANALISIS PENGARUH KONDISI JALAN ANGKUT TERHADAP *FAILURE RATE* DAN *FUEL CONSUMPTION* HAULER PT BUMA *JOBSITE* LMO

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Kondisi jalan angkut yang rusak serta tidak sesuai standar dapat mempercepat kerusakan komponen alat angkut, yang berdampak pada meningkatnya laju kegagalan (*failure rate*) serta konsumsi bahan bakar. Penelitian ini bertujuan untuk mengetahui pengaruh kondisi jalan angkut terhadap *failure rate* dan *fuel consumption* alat angkut tipe Caterpillar 777D, 785C, dan 789C di PT BUMA *Jobsite* Lati Mine Operation (LMO). Data diperoleh melalui pengamatan langsung dan dokumentasi perusahaan selama periode Maret–April 2025, mencakup data kerusakan jalan, dimensi jalan, data kerusakan unit, dan volume bahan bakar. Perhitungan *failure rate* dilakukan menggunakan parameter hasil estimasi dari distribusi Weibull, Lognormal, dan Eksponensial. Konsumsi bahan bakar didapat dari data sekunder perusahaan serta dihitung berdasarkan efisiensi kerja dan kebutuhan *rimpull* unit. Hasil penelitian menunjukkan bahwa setelah perbaikan *surface* jalan, terdapat penurunan *total resistance*, perubahan laju kegagalan berupa kenaikan serta penurunan *failure rate*. Selain perubahan laju kegagalan, terdapat peningkatan nilai *Time Between Failure* (TBF) masing-masing alat. Berdasarkan hasil Paired T-Test dan Wilcoxon Sign-Rank Test, perbaikan jalan terbukti berpengaruh terhadap *failure rate* alat angkut. Pengaruh tidak selalu positif sehingga dapat disimpulkan bahwa perbaikan jalan tidak selalu memberikan dampak positif, tergantung pada faktor-faktor eksternal seperti intensitas operasi, usia alat, dan manajemen perawatan. Selain itu, kondisi jalan angkut juga. Berdasarkan hasil analisis regresi linear berganda, setiap kenaikan 1% pada *Rolling Resistance* meningkatkan konsumsi bahan bakar sebesar 8,99 liter/jam, *Grade Resistance* sebesar 4,441 liter/jam, dan setiap peningkatan 1 ton pada GVW meningkatkan konsumsi bahan bakar sebesar 0,3114 liter/jam.

Kata kunci: *Failure rate*, konsumsi bahan bakar, alat angkut, jalan tambang

ABSTRACT

ANALYSIS OF HAUL ROAD CONDITION'S IMPACT ON HAULER FAILURE RATE AND FUEL CONSUMPTION AT PT BUMA LMO

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Damaged and substandard haul road conditions can accelerate component failure in haul trucks, resulting in increased failure rates and fuel consumption. This study aims to determine the effect of haul road conditions on the failure rate and fuel consumption of Caterpillar 777D, 785C, and 789C hauling units at PT BUMA Jobsite Lati Mine Operation (LMO). Data were obtained through direct field observation and company documentation during the period of March to April 2025, covering road damage data, road dimensions, equipment failure records, and fuel volume. Failure rate calculations were based on parameter estimations from Weibull, Lognormal, and Exponential distributions. Fuel consumption was obtained from secondary company data and calculated based on operational efficiency and unit rimpull requirements. The results showed that after road surface repairs, total resistance decreased, and the failure rate either increased or decreased depending on the unit. In addition, the Time Between Failure (TBF) increased across all units. Based on the Paired T-Test and Wilcoxon Sign-Rank Test, road repairs were proven to influence the failure rate of haul trucks. However, this influence was not always positive, indicating that road improvements do not consistently produce better outcomes, as they are affected by external factors such as operating intensity, equipment age, and maintenance management. Furthermore, haul road conditions significantly affected fuel consumption. Based on multiple linear regression analysis, every 1% increase in Rolling Resistance raises fuel consumption by 8.99 L/h, Grade Resistance by 4.441 L/h, and every 1-ton increase in Gross Vehicle Weight (GVW) increases fuel consumption by 0.3114 L/h.

Keywords: Failure rate, fuel consumption, mine haul truck, haul road