

INTISARI

Drive Shaft tercatat sebagai komponen sistem pemindah daya dengan kerusakan tertinggi (36,9%) pada armada *dump truck* PT Samudera Mulia Abadi. Melalui analisis Pareto bertingkat, *bolt* teridentifikasi sebagai sub komponen paling kritis penyumbang 42,2% kegagalan *drive shaft*. Penelitian ini bertujuan mengevaluasi keandalan, korelasi kerusakan antar-komponen, serta menentukan interval perawatan optimal. Berdasarkan uji korelasi *spearman*, frekuensi kerusakan *bolt* berkorelasi kuat dengan total kerusakan *drive shaft* ($\rho = 0,792$; $p < 0,001$), namun lemah terhadap *bearing* dan tidak signifikan pada *u-joint* maupun *yoke*. Analisis distribusi *weibull* (metode MLE) pada 104 data *Time To Failure* (TTF) menghasilkan parameter *Shape* (β) = 0,730 dan MTTF 1.597,86 jam. Nilai $\beta < 1$ menunjukkan pola *infant mortality*, mengindikasikan bahwa akar masalah terletak pada kualitas *retorque* saat perbaikan, bukan pada keausan material. Berdasarkan analisis *B-life*, direkomendasikan interval inspeksi/*retorque bolt* setiap 60 jam operasi (B10). Seluruh hasil komputasi ini telah diverifikasi keakuratannya dan identik dengan hasil keluaran Minitab.

Kata kunci: *Drive Shaft*, *Bolt*, keandalan, korelasi *Spearman*, distribusi *Weibull*, *interval maintenance*

ABSTRACT

The Drive Shaft was recorded as the power train component with the highest failure rate (36.9%) in the dump truck fleet at PT Samudera Mulia Abadi. Through a multi-level Pareto analysis, the bolt was identified as the most critical sub-component, contributing to 42.2% of the total Drive Shaft failures. This study aims to evaluate the component's reliability, analyze the damage correlation between sub-components, and determine the optimal maintenance interval. Based on the Spearman correlation test, the failure frequency of the bolt highly correlates with the total Drive Shaft failures ($\rho = 0.792$; $p < 0.001$), but exhibits a weak correlation with the bearing and no significant correlation with the U-Joint and yoke. The Weibull distribution analysis using the Maximum Likelihood Estimation (MLE) method on 104 Time To Failure (TTF) data points generated a shape parameter (β) of 0.730 and a Mean Time To Failure (MTTF) of 1,597.86 hours. A β value < 1 indicates an infant mortality failure pattern, implying that the root cause is associated with the retorque quality during maintenance rather than material wear-out. Based on the B-life analysis, a bolt inspection or retorque interval is recommended every 60 operating hours (B10). All computational results have been verified for accuracy and are identical to the Minitab software output.

Keywords: *Drive Shaft, Bolt, Spearman Correlation, Weibull Distribution, Reliability, Preventive Maintenance.*