



ABSTRACT

Operational availability of ,dump truck is pivotal to meeting mining production targets. This study examines the pattern and severity of torque rod bushing damage in Hino 500 truck operated by PT XYZ and its relationship with operating hour (hour meter). Data from 50 units observed between January and May 2025 were analyzed across six bushing points Front Upper (FU), Rear Upper (RU), Front Left (FL), Front Right (FR), Rear Left (RL), and Rear Right (RR) using descriptive statistics, simple linear regression, and Pearson correlation. Damage occurred predominantly at the rear positions (RL and RR), affecting about 70% of units. The regression model $\hat{Y} = -2,794 + 0,000565X$, with $r = 0,875$ and $R^2 = 0,766$, indicates a strong positive link between operating hours and damage severity, averaging a 0,565-point increase per 1.000 hours. Units exceeding 13,000 hours tended toward severe damage, while those under 8.000 hours showed minor deterioration. By position, the rear group showed the strongest relationship ($r = 0,775$; $R^2 = 0,60$), reflecting higher dynamic loads. A predictive maintenance program is recommended: prioritize inspection and replacement of rear bushings every 6.000–7.000 hours to preempt failures typically emerging beyond 10.000 hours, reduce downtime, and maintain fleet availability above 75%.

Keywords: Torque rod bushing, ,dump truck, linear regression



INTISARI

Ketersediaan operasional *dump truck* sangat menentukan pencapaian target produksi tambang. Studi ini menelaah pola dan tingkat keparahan kerusakan *bushing torque rod* pada truk Hino 500 milik PT XYZ serta kaitannya dengan jam operasi (*hour meter*). Data 50 unit yang diamati Januari sampai Mei 2025 dianalisis pada enam titik *bushing Front Upper (FU)*, *Rear Upper (RU)*, *Front Left (FL)*, *Front Right (FR)*, *Rear Left (RL)*, dan *Rear Right (RR)* menggunakan statistik deskriptif, regresi linier sederhana, dan korelasi Pearson. Kerusakan dominan terjadi pada posisi belakang (*RL* dan *RR*), sekitar 70% unit. Model regresi: $Y = -2,794 + 0,000565 X$, $r = 0,875$, $R^2 = 0,766$, menunjukkan hubungan positif kuat, dengan kenaikan rata-rata 0,565 poin per 1.000 jam. Unit dengan jam operasi di atas 13.000 cenderung mengalami kerusakan berat, sedangkan di bawah 8.000 cenderung ringan. Per posisi, kelompok belakang menunjukkan hubungan terkuat ($r = 0,775$; $R^2 = 0,60$) akibat beban dinamis. Disarankan pemeliharaan prediktif, prioritaskan inspeksi atau penggantian *bushing* belakang setiap 6.000 sampai 7.000 jam untuk mencegah kegagalan yang umum muncul setelah 10.000 jam, mengurangi *downtime*, dan menjaga ketersediaan unit minimal 75%.

Keywords: *Bushing torque rod, dump truck, regresi linier*