

INTISARI

ANALISIS LAJU KEAUSAN *BRAKE LINING* MENGGUNAKAN METODE REGRESI LINIER PADA *DUMP* *TRUCK* KAPASITAS 40 TON

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Penelitian ini menganalisis laju keausan *brake lining* pada 13 unit *dump truck* di PT XYZ, menggunakan metode regresi linier terhadap data historis ketebalan dan jam operasi (HM) dari 6 posisi pengukuran (78 titik data). Hasil regresi menunjukkan nilai koefisien determinasi (R^2) sebesar 0,9966, dengan laju keausan tertinggi terkonsentrasi pada Posisi 3 dan 4 ($\pm 0,005$ mm/HM) dibandingkan posisi tepi ($\pm 0,003$ mm/HM), mengindikasikan keausan asimetris akibat distribusi beban pada sumbu roda tengah. Estimasi *Remaining Useful Life* (RUL) hingga batas 7,5 mm berkisar antara 91 HM hingga 5.125 HM, dengan selisih RUL antar posisi dalam satu unit mencapai 2.543 HM (DT 208), yang menunjukkan inefisiensi kebijakan penggantian serentak berbasis interval tetap. Berdasarkan temuan ini, direkomendasikan strategi perawatan berbasis posisi kritis dan *condition-based maintenance* menggunakan data historis PM untuk mengoptimalkan jam operasional dan biaya perawatan.

Kata kunci: *brake lining*, laju keausan, regresi linier, *Remaining Useful Life*, keausan asimetris, *dump truck*, *condition-based maintenance*

ABSTRACT

The operational reliability of heavy equipment, particularly the Volvo FMX 400 dump truck, is highly dependent on the condition of its critical components, such as the braking system. Operating under extreme and continuous loads accelerates brake lining wear, often leading to unplanned downtime, decreased productivity, and severe safety hazards if not monitored effectively. This research aims to systematically analyze the brake lining wear rate on Volvo FMX 400 dump trucks and develop a predictive maintenance model to accurately estimate their remaining useful life. The study employs an empirical, quantitative methodology utilizing linear regression analysis. Historical maintenance data, specifically focusing on the hour meter intervals and corresponding brake lining thickness degradation from multiple operational units, were collected and rigorously analyzed. By applying linear regression, a mathematical model was established to determine the direct correlation between equipment operational hours and wear progression. The findings demonstrate a highly significant linear relationship, proving that linear regression is a robust and accurate tool for predicting the remaining operational lifespan of brake components in this specific heavy-duty context. Consequently, the developed predictive model allows maintenance management to transition from traditional reactive or rigid preventive schedules to a dynamic, data-driven predictive maintenance strategy. The implementation of this model successfully optimizes maintenance intervals, significantly reduces the risk of unexpected brake failures on site, enhances overall fleet safety, and minimizes long-term operational costs.

Keywords: brake lining, wear rate, linear regression, Remaining Useful Life, asymmetric wear, dump truck, condition-based maintenance