

ABSTRACT

Engine failures are the most frequent type of damage (48%) affecting Hino 500 FM 260 JD dump truck units at PT XYZ. This study aims to analyze the functional failure of a J08E-type engine, characterized by low power and abnormal noise. The failure analysis was conducted using the root cause analysis (RCA) method, incorporating Fishbone diagram, Fault Tree Analysis diagram and 5 Whys approaches, based on historical maintenance data, visual inspections, and component measurements during an overhaul. The results revealed that the primary cause of failure was excessive backlash in the timing gear, particularly on the main idle gear, which led to the desynchronization of the valve mechanism. Severe wear on the main idle gear shaft triggered the excessive backlash, a condition caused by suboptimal lubrication. The 5 Whys analysis identified the root cause as an inconsistent periodic service schedule that frequently exceeded the 500-hour standard, leading to the degradation of lubricant quality. This cascade of issues resulted in fatal damage to internal components, including the valves, pistons, and cylinder liners.

Keywords: *Engine Failure, Backlash, Timing Gear*

INTISARI

Kerusakan *engine* mendominasi frekuensi kerusakan (48%) pada unit *dump truck* Hino 500 FM 260 JD di PT XYZ. Penelitian ini bertujuan untuk menganalisis kegagalan fungsi *engine* tipe J08E, yang ditandai dengan *low power* dan suara *abnormal*. Analisis kegagalan ini menggunakan metode *Root Cause Analysis* (RCA) dengan pendekatan diagram *fishbone*, diagram *Fault Tree Analysis* (FTA) dan *5 Whys*, berdasarkan data historis perawatan, inspeksi visual, serta pengukuran komponen saat *overhaul*. Hasil penelitian menunjukkan penyebab utama kegagalan adalah *over backlash* pada *timing gear*, khususnya pada *main idle gear*, yang mengakibatkan ketidaksinkronan mekanisme katup. Keausan parah pada poros (*shaft*) *main idle gear* menjadi pemicu *backlash* berlebih, yang disebabkan oleh pelumasan tidak optimal. Analisis *5 Whys* mengidentifikasi akar penyebab masalah adalah jadwal perawatan berkala (*periodic service*) yang tidak konsisten dan sering melebihi standar 500 jam, sehingga kualitas pelumas menurun. Dampak kerusakan ini menyebabkan komponen internal seperti katup, piston, dan *cylinder liner* mengalami kerusakan fatal.

Kata Kunci: Kegagalan *Engine*, *Backlash*, *Timing Gear*