

ABSTRACT

Analysis of the Impact of General Overhaul on the Engine Performance of Scania K320IA-6x2/2 Using Rated Speed Testing

The use of CNG gas-fueled diesel engines in urban bus fleets demands high reliability under intensive operational conditions. This study analyzes the impact of General Overhaul (GOH) on the engine performance of a Scania K320IA-6x2/2 type OC09 bus unit TJ 202 at PT XYZ. The engine suffered performance degradation marked by low power symptoms and low coolant levels, identified as caused by a cracked cylinder head 3 and a leaking coolant sleeve. Rated Speed testing was conducted using SDP3 (Scania Diagnos & Programmer 3) software across four testing sessions producing four data groups (Group 1–4) with 292 data points total. RPM and torque parameters from SDP3 were converted to power (HP) using mathematical equations. Statistical analyses including Kolmogorov-Smirnov normality tests, Pearson/Spearman correlation, and Mann-Whitney U comparative tests were validated using SPSS. Results show all performance parameter pairs have very strong correlation ($r > 0.80$). Mann-Whitney U reveals significant differences ($p < 0.0001$) with average increases of 78.89% in torque, 32.32% in RPM, and 151.14% in power after GOH, confirming that GOH effectively restored engine performance close to factory specifications.

Keywords: *General Overhaul; Rated Speed; SDP3; Scania K320IA; Statistical Test*

ANALISIS DAMPAK *GENERAL OVERHAUL* TERHADAP PERFORMA *ENGINE* SCANIA K320IA-6X2/2 MENGGUNAKAN PENGUJIAN *RATED SPEED*

Penggunaan mesin diesel berbahan bakar gas CNG pada armada bus transportasi kota menuntut keandalan tinggi dalam kondisi operasional yang intensif. Penelitian ini menganalisis dampak *General Overhaul* (GOH) terhadap performa *engine* Scania K320IA-6x2/2 tipe OC09 pada unit bus kota TJ 202 di PT XYZ. *Engine* mengalami penurunan performa yang ditandai dengan gejala *low power* dan level air pendingin rendah, yang diidentifikasi disebabkan oleh keretakan kepala silinder 3 dan kebocoran *sleeve coolant*. Pengujian *Rated Speed* dilakukan menggunakan *software* SDP3 (*Scania Diagnos & Programmer 3*) pada empat sesi pengujian yang menghasilkan empat kelompok data (Kelompok 1–4) dengan total 292 titik data. Parameter RPM dan torsi dari SDP3 dikonversi menjadi daya (HP) menggunakan persamaan matematis. Analisis statistik meliputi uji normalitas Kolmogorov-Smirnov, uji korelasi Pearson/Spearman, dan uji komparatif Mann-Whitney U yang seluruhnya divalidasi menggunakan SPSS. Hasil menunjukkan seluruh pasangan parameter performa memiliki korelasi sangat kuat ($r > 0,80$). Uji Mann-Whitney U menunjukkan perbedaan yang signifikan ($p < 0,0001$) dengan peningkatan rata-rata torsi sebesar 78,89%, RPM sebesar 32,32%, dan daya sebesar 151,14% sesudah GOH. Temuan ini membuktikan bahwa GOH efektif mengembalikan performa engine mendekati standar pabrikan.

Kata Kunci: *General Overhaul*; *Rated Speed*; SDP3; Scania K320IA; Uji Statistik