

## INTISARI

Penggantian oli mesin pada unit *heavy dump truck* dengan interval penggantian 500 jam menyebabkan peningkatan limbah B3 berupa *oil waste* dan *oil filter waste*. Setelah dilakukan pengujian pelumas saat interval 500 jam, didapati hasil pengujian pelumas menunjukkan oli mesin dalam kondisi normal. Hasil tersebut memungkinkan dilakukannya peningkatan interval penggantian oli mesin. Penelitian ini bertujuan untuk menganalisis kualitas oli mesin pada unit *heavy dump truck* Komatsu HD 785-7 saat penerapan *Extended Oil Drain Interval* (EODI) dari 500 jam menjadi 750 jam. Metode yang digunakan adalah pengujian laboratorium melalui Program Analisis Pelumas (PAP) untuk parameter *Total Base Number* (TBN), viskositas kinematik, kontaminan (*soot*, silika, kadar air), dan *wear metal*. Pemantauan kondisi mesin juga dilakukan menggunakan *Vehicle Health Monitoring System* (VHMS). Hasil penelitian menunjukkan bahwa setelah EODI 750 jam, nilai TBN meningkat rata-rata 15,32%, viskositas kinematik stabil dengan perubahan di bawah 0,3%, dan tidak terjadi peningkatan signifikan pada *wear metal* maupun kontaminan. Data VHMS juga menunjukkan tekanan dan suhu oli mesin tetap dalam batas normal. Penerapan EODI 750 jam berhasil menghemat penggunaan oli mesin sebanyak 2.739 liter/tahun atau penurunan biaya konsumsi oli sebesar Rp342.370.000,00/tahun, mengurangi volume limbah B3 cair sebesar 2.739 liter/tahun atau senilai Rp4.108.500,00, serta menurunkan penggunaan *oil filter* sebanyak 78 unit/tahun senilai Rp66.300.000,00 dari empat unit *heavy dump truck*. Sehingga total penghematan biaya yang didapatkan selama satu tahun dari keempat unit *heavy dump truck* adalah sebesar Rp412.778.500,00/tahun. Disimpulkan bahwa EODI 750 jam aman diterapkan tanpa mengorbankan kualitas pelumasan serta memberikan manfaat ekonomi dan lingkungan.

**Kata kunci:** *Extended Oil Drain Interval*, Analisis Pelumas, *Heavy Dump Truck*, Penghematan Biaya, Limbah B3

## **ABSTRACT**

*The replacement of engine oil in heavy-duty dump truck units at a 500-hour interval results in an increase in B3 waste, including oil waste and oil filter waste. After testing the lubricant at the 500-hour interval, the results showed that the engine oil was in normal condition. These results indicate the potential for extending the engine oil replacement interval. This research aims to analyze the quality of engine oil in Komatsu HD 785-7 heavy dump truck units following the implementation of an Extended Oil Drain Interval (EODI) from 500 hours to 750 hours. The method used was laboratory testing through a Lubricant Analysis Program (PAP) for the parameters of Total Base Number (TBN), kinematic viscosity, contaminants (soot, silica, water content), and wear metals. Engine condition monitoring was also carried out using the Vehicle Health Monitoring System (VHMS). The results show that after the 750-hour EODI, the TBN value increased by an average of 15.32%, kinematic viscosity remained stable with a change of less than 0.3%, and there was no significant increase in wear metals or contaminants. VHMS data also indicated that engine oil pressure and temperature remained within normal limits. The implementation of the 750-hour EODI successfully saved engine oil usage by 2,739 liters per year, equivalent to a reduction in oil consumption costs of IDR 342,370,000.00 per year, reduced liquid B3 waste volume by 2,739 liters per year valued at IDR 4,108,500.00, and decreased oil filter usage by 78 units per year valued at IDR 66,300,000.00 from four heavy dump truck units. The total cost that could be minimized over one year from the four heavy dump truck units was IDR 412,778,500.00 per year. It is concluded that the 750-hour EODI can be safely applied without compromising lubrication quality, providing both economic and environmental benefits.*

**Keywords:** *Extended Oil Drain Interval, Oil Analysis, Heavy Dump Truck, Cost Saving, B3 Waste*