

## ***ABSTRACT***

*The cement industry demands high efficiency in heavy equipment operations, particularly in the undercarriage components of CAT D8R bulldozers. PT Indocement Tunggal Prakarsa Tbk recorded 79 cases of undercarriage damage with a total downtime of 5,636.50 hours during the period January 2023–September 2024, with track link components accounting for 44 cases and half of the total downtime. This study developed a wear measurement system based on Custom Track Service (CTS) integrated with Microsoft Excel VBA Macro, replacing the manual method previously used in the Mining Heavy Equipment Department (MHED). This system enables real-time data recording, analysis, and reporting, allowing maintenance decisions to be made directly on-site. The system implementation demonstrated significant efficiency improvements, with data input 97% faster, data processing 95% faster, and report generation 99% faster. Additionally, the system produces valid measurement accuracy comparable to manual CTS and dealer data. Feature testing and user evaluations indicate the system functions optimally and effectively supports preventive and predictive maintenance, as well as the digitalization of heavy equipment management in the mining industry.*

**Keywords:** *Track Link, CAT D8R Bulldozer, Custom Track Service (CTS), Excel VBA Macro, Wear, Undercarriage, Heavy Equipment Maintenance*

## INTISARI

Industri semen menuntut efisiensi tinggi dalam operasional alat berat, khususnya pada komponen *undercarriage* Bulldozer CAT D8R. PT Indocement Tunggal Prakarsa Tbk mencatat 79 kasus kerusakan *undercarriage* dengan total *downtime* 5.636,50 jam pada periode Januari 2023–September 2024, di mana komponen *track link* menyumbang 44 kasus dan setengah dari total *downtime* tersebut. Penelitian ini mengembangkan sistem pengukuran keausan berbasis *Custom Track Service* (CTS) yang terintegrasi dengan Microsoft Excel VBA *Macro*, sebagai pengganti metode manual yang sebelumnya digunakan di Divisi *Mining Heavy Equipment Department* (MHED). Sistem ini memungkinkan proses pencatatan, analisis, dan pelaporan data secara *real-time* sehingga keputusan perawatan dapat dilakukan langsung di lapangan. Implementasi sistem menunjukkan peningkatan efisiensi yang signifikan, dengan proses input data 97% lebih cepat, pengolahan data 95% lebih cepat, serta pembuatan laporan 99% lebih cepat. Selain itu, sistem menghasilkan akurasi pengukuran yang valid dan setara dengan data *manual book* CTS dan *dealer*. Uji fitur dan evaluasi pengguna menunjukkan sistem berfungsi optimal dan efektif mendukung pemeliharaan preventif, prediktif, serta digitalisasi pengelolaan alat berat di industri pertambangan.

Kata Kunci: *Track Link*, *Bulldozer* CAT D8R, *Custom Track Service* (CTS), Excel VBA *Macro*, Keausan, *Undercarriage*, Pemeliharaan Alat Berat