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Analisis Kegagalan Komponen Haul Truck Menggunakan Metode FMEA dan RCA
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ABSTRACT

The 785 haul truck is the primary coal hauling unit at PT XYZ's East Kalimantan site, where downtime from unscheduled breakdowns directly impacts production targets. Operational data from January to December 2025 indicates that 6 of 14 units (RT601, RT602, RT603, RT604, RT609, and RT612) exhibited Mean Time To Repair (MTTR) values exceeding the 4-hour maximum threshold. This study aims to identify priority components across these six units, analyze Failure Mode and Effect Analysis (FMEA) and Root Cause Analysis (RCA) evaluations, and formulate the impacts of implementing maintenance recommendations.

The methodology begins with a multi-level Pareto analysis on 2025 breakdown report data to isolate components with the highest failure contributions. FMEA is then applied by weighting Severity, Occurrence, and Detection ratings through interviews with site technical engineers, supervisors, maintenance planners, and mechanics to calculate Risk Priority Numbers (RPN). Components exceeding the critical RPN threshold undergo root cause analysis using Fishbone diagrams and the 5 Whys technique

The Pareto analysis identified 34 of 72 components contributing to 80.28% of total failures. From these, a critical RPN threshold of 167.64 was established, isolating 16 critical risks led by the work lamp (360), injector (320), and window regulator (300). Key recommendations include converting halogen work lamps to LED, protecting wiring connectors and autolube hoses, and enforcing standard procedures alongside a stop-work policy. Implementing these recommendations is projected to reduce breakdown frequency and duration while improving unit Physical Availability.

Keywords: haul truck, FMEA, RCA, risk priority number, unscheduled breakdown

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INTISARI

Unit *haul truck* 785 merupakan armada utama pengangkutan batu bara di PT XYZ *site* Kalimantan Timur, sehingga *downtime* akibat *unscheduled breakdown* berdampak langsung pada target produksi. Data operasional periode Januari–Desember 2025 menunjukkan 6 dari 14 unit (RT601, RT602, RT603, RT604, RT609, dan RT612) memiliki nilai *Mean Time To Repair* (MTTR) melebihi batas maksimum 4 jam. Penelitian ini bertujuan mengidentifikasi komponen prioritas pada keenam unit tersebut, menganalisis hasil evaluasi *Failure Mode and Effect Analysis* (FMEA) dan *Root Cause Analysis* (RCA), serta merumuskan dampak penerapan rekomendasi perawatan.

Metode penelitian diawali dengan analisis diagram Pareto bertingkat terhadap data *breakdown report* tahun 2025 untuk menentukan komponen berkontribusi kegagalan tertinggi. Selanjutnya, FMEA diterapkan melalui pembobotan nilai *Severity*, *Occurrence*, dan *Detection* dari hasil diskusi dan wawancara bersama *site technical engineer*, *supervisor*, *maintenance planner*, dan mekanik guna menghitung *Risk Priority Number* (RPN). Komponen dengan RPN di atas batas kritis dilakukan analisis *root cause* menggunakan diagram *fishbone* dan *5 Whys*.

Hasil Pareto mengidentifikasi 34 dari 72 komponen menyumbang 80,28% kegagalan. Dari jumlah tersebut, diperoleh batas kritis RPN sebesar 167,64 dengan 16 risiko kritis, di mana RPN tertinggi berada pada *work lamp* (360), *injector* (320), dan *window regulator* (300). Rekomendasi utama mencakup konversi *work lamp* halogen ke LED, proteksi konektor kabel dan *hose autolube*, serta penegakan prosedur standar dan *stop work policy*. Penerapan rekomendasi ini diproyeksikan dapat menurunkan frekuensi dan durasi *breakdown* serta meningkatkan *Physical Availability* unit.

Kata Kunci: *haul truck*, FMEA, RCA, *risk priority number*, *unscheduled breakdown*