

**ANALISIS *PREVENTIVE MAINTENANCE* PADA MOTOR INDUKSI
TIGA FASA *VACUUM PUMP* DI PT. PINDO DELI PERAWANG
MENGUNAKAN METODE MTBF DAN MTTR**

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ABSTRAK

Motor induksi tiga fasa pada sistem *vacuum pump* merupakan peralatan penting yang menunjang proses produksi di PT Pindo Deli *Pulp and Paper* Perawang. Kerusakan pada motor dapat meningkatkan *downtime*, menurunkan keandalan, dan mengganggu produktivitas. Penelitian ini bertujuan menganalisis keandalan motor menggunakan metode MTBF dan MTTR, mengidentifikasi penyebab kerusakan, serta mengevaluasi *preventive maintenance*. Analisis dilakukan terhadap data kerusakan periode Januari–Juni 2026 melalui perhitungan MTBF, MTTR, *availability*, dan *downtime*. Hasil penelitian menunjukkan terdapat 9 kejadian kerusakan dengan total *downtime* 32,02 jam, nilai MTBF kumulatif 3.226,86 jam, MTTR kumulatif 31,85 jam, serta *availability* sebesar 72,62%. Komponen *Filter Vacuum & Belt Vacuum* memiliki MTBF tertinggi (1.170,92 jam), sedangkan komponen Motor memiliki MTTR tertinggi (13,32 jam). Oleh karena itu, program *preventive maintenance* perlu dioptimalkan melalui penentuan interval perawatan berdasarkan MTBF dan MTTR, prioritas pada komponen kritis, serta peningkatan inspeksi rutin agar *downtime* berkurang dan keandalan peralatan meningkat.

Kata kunci : *Preventive Maintenance*, Motor Induksi Tiga Fasa, *Vacuum Pump*, MTBF, MTTR, *Availability*, *Downtime*.

**ANALYSIS OF PREVENTIVE MAINTENANCE FOR THREE-PHASE
INDUCTION MOTORS IN VACUUM PUMPS AT PT. PINDO DELI
PERAWANG USING THE MTBF AND MTTR METHODS**

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ABSTRACT

Three-phase induction motors in vacuum pump systems are critical equipment that support the production process at PT Pindo Deli Pulp and Paper Perawang. Motor failures can increase downtime, reduce reliability, and disrupt productivity. This study aims to analyze motor reliability using the MTBF and MTTR methods, identify the causes of failures, and evaluate preventive maintenance. The analysis was conducted on failure data from January to June 2026 by calculating MTBF, MTTR, availability, and downtime. The results showed that there were 9 failure incidents with a total downtime of 32.02 hours, a cumulative MTBF of 3,226.86 hours, a cumulative MTTR of 31.85 hours, and an availability of 72.62%. The Vacuum Filter and Vacuum Belt components had the highest MTBF (1,170.92 hours), while the Motor component had the highest MTTR (13.32 hours). Therefore, the preventive maintenance program needs to be optimized by determining maintenance intervals based on MTBF and MTTR, prioritizing critical components, and increasing routine inspections to reduce downtime and improve equipment reliability.

Keywords: Preventive Maintenance, Three-Phase Induction Motor, Vacuum Pump, MTBF, MTTR, Availability, Downtime.