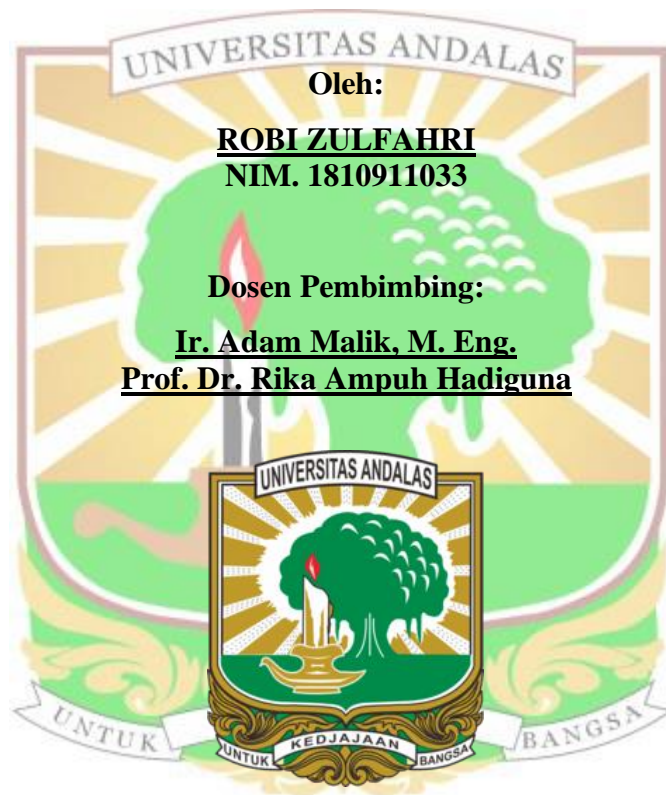


TUGAS AKHIR

**OPTIMALISASI *RELIABILITY* DAN *AVAILABILITY*
MESIN PRODUKSI DI PT INKA (PERSERO)
MELALUI *PREVENTIVE MAINTENANCE* BERBASIS
*AGE REPLACEMENT MODEL***



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ABSTRACT

The Machining Department is the most important department in the production line at PT INKA. However, the department faces the problem of high machine downtime, so preventive measures should be more vigorous. If observed from the high frequency of breakdowns that occur, it is better to re-analyze the performance of the machine periodically and adjust the preventive maintenance strategy according to the condition of the machine. To overcome this, an age replacement model is applied for preventive maintenance of production machines in the Machining Department of PT INKA, thereby reduce production downtime and increase machine reliability and availability. Data analysis shows that the Boring Floor 156 machine, especially the carbon brush, is a critical component. The component has a Mean Time to Failure (MTTF) of 15,349 minutes and a Mean Time to Repair (MTTR) of 287 minutes. The optimal inspection and carbon brush replacement time intervals were found to be 6.9 days and 7.3 days, respectively. Factors such as transmission system, mechanical friction, fit of the carbon brush in the brush holder, operational temperature, and contaminants impact the life of the carbon brush. Preventive measures include regular inspection, using transmission systems that have a tendency to slip such as belt-based systems for heavy drilling processes, commutator cleanliness maintenance, temperature monitoring, noise detection and contamination prevention. Checking the alignment of the carbon brush and brush holder is also important to reduce vibration and wear. The results showed that the preventive maintenance strategy based on the age replacement model increased machine availability to 98%. Demonstrates the effectiveness of routine inspection and component replacement in reducing downtime and improving operational efficiency.

Keywords: *Age Replacement Model, Downtime, Availability, Reliability, Preventive Maintenance, Carbon Brush*

ABSTRAK

Departemen Machining merupakan departemen yang paling penting dalam lini produksi di PT INKA. Namun, departemen tersebut menghadapi masalah *downtime* mesin yang tinggi, sehingga tindakan preventif yang sebaiknya dilakukan lebih gencar. Jika diamati dari tingginya frekuensi kerusakan yang terjadi, maka sebaiknya dilakukan analisis ulang terhadap performa mesin secara berkala dan menyesuaikan strategi *preventive maintenance* yang sesuai dengan kondisi mesin. Mengatasi hal tersebut, diterapkan *age replacement model* untuk *preventive maintenance* mesin produksi di Departemen Machining PT INKA, sehingga mengurangi *downtime* produksi dan meningkatkan *reliability* dan *availability* mesin. Analisis data menunjukkan mesin Boring Floor 156 khususnya *carbon brush*, merupakan komponen kritis. Komponen tersebut memiliki *Mean Time to Failure* (MTTF) sebesar 15.349 menit dan *Mean Time to Repair* (MTTR) sebesar 287 menit. Interval waktu pemeriksaan dan penggantian *carbon brush* yang optimal didapatkan masing-masing 6,9 hari dan 7,3 hari. Faktor-faktor seperti sistem transmisi, gesekan mekanis, kesesuaian *carbon brush* di *brush holder*, suhu operasional, dan kontaminan berdampak pada usia pakai *carbon brush*. Tindakan preventif termasuk pemeriksaan rutin, menggunakan sistem transmisi yang memiliki kecenderungan selip seperti sistem berbasis *belt* untuk proses bor berat, pemeliharaan kebersihan komutator, pemantauan suhu, deteksi *noise* dan pencegahan kontaminasi. Pemeriksaan kesejajaran *carbon brush* dan *brush holder* juga penting untuk mengurangi getaran dan keausan. Hasil penelitian menunjukkan strategi *preventive maintenance* berbasis *age replacement model* meningkatkan *availability* mesin hingga 98%. Menunjukkan efektivitas pemeriksaan rutin dan penggantian komponen dalam mengurangi *downtime* dan meningkatkan efisiensi operasional.

Kata Kunci: *Age Replacement Model, Downtime, Availability, Reliability, Preventive Maintenance, Carbon Brush*