

ABSTRACT

Komatsu D155 – A Bulldozer Ripper Tip Lifetime Analysis For Maintenance Planning and Spare Parts Procurement

Ripper tip is a critical component used in the ripping process and is directly exposed to abrasive working conditions, making it susceptible to wear. At the research site, component replacement is still carried out after severe wear occurs, and spare parts procurement has not been planned systematically, resulting in potential downtime due to spare part shortages. This study aims to predict the lifetime of the ripper tip, determine an appropriate periodic maintenance interval, and estimate annual spare part requirements. The Weibull distribution method was applied to historical replacement data to calculate distribution parameters, Mean Time To Failure (MTTF), reliability, and failure rate. Furthermore, the Reliability Centered Spare (RCS) approach was used to estimate spare part requirements. The results show that the ripper tip has an MTTF of 282.83 operating hours with a reliability value of 48.9% at that time. Based on the analysis, periodic replacement is recommended every 280 operating hours to reduce the risk of unexpected failures. In addition, the RCS analysis indicates that 24 ripper tip units are required annually to support maintenance activities and prevent spare part shortages. These findings can be used as a basis for maintenance planning and spare parts procurement to improve equipment reliability and operational efficiency.

Keywords: *ripper tip, weibull distribution, reliability, periodic maintenance, reliability centered spare*

INTISARI

Analisis Lifetime Ripper Tip Bulldozer Komatsu D155 – A Untuk Perencanaan Perawatan dan Pengadaan Suku Cadang

Ripper tip merupakan komponen kritis yang berfungsi pada proses *ripping* dan bekerja secara langsung pada kondisi operasi yang abrasif sehingga rentan mengalami keausan. Di lokasi penelitian, penggantian komponen masih dilakukan setelah terjadi keausan berat dan pengadaan suku cadang belum direncanakan secara sistematis, sehingga berpotensi menimbulkan *downtime* akibat keterlambatan penggantian komponen. Penelitian ini bertujuan untuk memprediksi umur pakai *ripper tip*, menentukan interval perawatan berkala yang optimal, serta memperkirakan kebutuhan suku cadang tahunan. Metode distribusi Weibull digunakan untuk menganalisis data historis penggantian komponen guna memperoleh parameter distribusi, nilai *Mean Time To Failure* (MTTF), *reliability*, dan *failure rate*. Selanjutnya, metode *Reliability Centered Spare* (RCS) digunakan untuk menghitung kebutuhan suku cadang. Hasil penelitian menunjukkan bahwa komponen *ripper tip* memiliki nilai MTTF sebesar 282,83 jam operasi dengan nilai *reliability* sebesar 48,9% pada waktu tersebut. Berdasarkan hasil analisis, interval penggantian komponen direkomendasikan setiap 280 jam operasi untuk mengurangi risiko kegagalan mendadak. Selain itu, hasil perhitungan RCS menunjukkan kebutuhan suku cadang sebanyak 24 unit per tahun. Hasil penelitian ini diharapkan dapat menjadi dasar dalam penyusunan strategi pemeliharaan dan perencanaan pengadaan suku cadang guna meningkatkan keandalan serta efisiensi operasional.

Kata kunci: *ripper tip*, distribusi Weibull, *reliability*, *periodic maintenance*, *reliability centered spare*.