

### **ABSTRACT**

*Lifetime Prediction Analysis of Cutting Edge on Motor Grader XCMG GR3005T Pro Using Weibull Method*

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*The cutting edge is a critical component of a motor grader, experiencing wear due to constant contact with working surfaces. At the research site, there is no systematic replacement plan for cutting edges, often resulting in delayed maintenance and equipment downtime. This final project aims to predict the cutting edge's lifetime, provide recommendations for periodic maintenance, and estimate spare parts requirements. The Weibull distribution method was applied to historical cutting edge replacement data of the XCMG GR3005T Pro unit from January to December 2024. Data were analyzed using Minitab software to calculate distribution parameters, Mean Time To Failure (MTTF), reliability, and failure rate. The analysis showed that the cutting edge has an MTTF of 146.82 hours with a reliability level of 51.26% at that time. Periodic replacement is recommended every 150 operating hours. Additionally, using the age replacement approach, it is estimated that four cutting edge units are needed for every 500 hours of operation. These findings are expected to support more effective maintenance planning and spare parts availability, ensuring optimal equipment performance.*

*Keywords: cutting edge, motor grader, weibull distribution, periodic maintenance, forecast spare part*

## INTISARI

### *ANALISIS PREDIKSI LIFETIME CUTTING EDGE PADA MOTOR GRADER XCMG GR3005T PRO DENGAN METODE WEIBULL*

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*Cutting edge* merupakan komponen vital pada motor grader yang mengalami keausan karena kontak langsung dengan permukaan kerja. Di lokasi penelitian, belum terdapat perencanaan penggantian *cutting edge* yang sistematis, sehingga sering terjadi keterlambatan penggantian dan downtime alat. Penelitian ini bertujuan untuk memprediksi *lifetime cutting edge* dan menyusun rekomendasi *periodic maintenance* serta estimasi kebutuhan suku cadang. Metode yang digunakan adalah analisis distribusi Weibull terhadap data penggantian *cutting edge* unit XCMG GR3005T Pro periode Januari–Desember 2024. Proses analisis meliputi penghitungan parameter distribusi, *Mean Time To Failure* (MTTF), *reliability*, dan *failure rate* menggunakan perangkat lunak Minitab. Hasil penelitian menunjukkan bahwa nilai MTTF komponen adalah 146,82 jam dengan tingkat keandalan 51,26% pada waktu tersebut. Rekomendasi perawatan berkala disarankan setiap 150 jam operasi. Selain itu, diperoleh estimasi kebutuhan empat unit *cutting edge* setiap 500 jam operasi. Temuan ini diharapkan mendukung efisiensi perencanaan perawatan dan ketersediaan suku cadang agar alat tetap beroperasi optimal.

Kata kunci: *Cutting Edge*, Motor Grader, Distribusi Weibull, *Periodic Maintenance*, *Spare Part Forecasting*.