PREDICTIVE MAINTENANCE OF MINING EQUIPMENT IN INDONESIA LEADING HEAVY EQUIPMENT COMPANY

By

Ferdinand Widjaja
21952023

MASTER'S DEGREE
in

MASTER OF MECHANICAL ENGINEERING – ENGINEERING MANAGEMENT
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

Revision after Thesis Defense on February 2nd, 2021

SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

February 2021

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

Ferdinand Widjaja

Student _____ Date _____

Approved by:

Dena Hendriana, B.Sc., M.Sc., Ph. D.

Thesis Advisor _____ Date _____

Dr. Eka Budiarto, S.T., M.Sc.

Thesis Co-Advisor _____ Date _____

Dr. Maulahikmah Galinium, S.Kom., M.Sc.

Dean _____ Date _____

ABSTRACT

PREDICTIVE MAINTENANCE OF MINING EQUIPMENT IN INDONESIA LEADING HEAVY EQUIPMENT COMPANY

By

Ferdinand Widjaja
Dena Hendriana, B.Sc., M.Sc., Ph. D., Advisor
Dr. Eka Budiarto, S.T., M.Sc., Co-Advisor

SWISS GERMAN UNIVERSITY

The use of heavy equipment in a production process, especially coal mining, is very dominant and is the main work tool. Therefore, the productivity of mining is very dependent on the performance of the heavy equipment used. In maintaining the performance of today's machines, it is not enough only with preventive and corrective maintenance, but also with predictive maintenance (PdM). Through PdM, it is expected that heavy equipment performance can be maintained properly because it can reduce the unscheduled breakdowns.

PdM in this research aims to help prioritize heavy equipment routine service management, so that more urgent heavy equipment conditions will get priority for maintenance first so as to prevent unscheduled breakdowns compared to current service management which still uses time based as the only maintenance priority tool. PdM will focus on finding warnings and indicators that can be used to determine the remaining useful life (RUL) of engine components by using data from telemetry, oil analysis, historical component lifetime and other maintenance data. In this research, we get the predictive maintenance results in the form of 2 types of warnings and also the RUL prediction with a mean absolute error of 91 hours compared to the actual RUL.

Keywords: Coal Mining, Heavy Equipment, Predictive Maintenance, Early Warning, Monitoring System.

DEDICATION

I dedicated this research for My Family and My Company – PT United Tractors Tbk.

ACKNOWLEDGEMENTS

I would like to thanks to Mr. Dena Hendriana, B.Sc., M.Sc., Ph. D. and Mr. Dr. Eka Budiarto, S.T., M.Sc. and all lecturers who have guided me while studying in Swiss German University. And also, to Mr. Edhie Sarwono and the management of PT United Tractors Tbk. who gave me the opportunity to take a master's degree.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES