

**REDUCTION OF MEAN TIME TO REPAIR (MTTR) OF KOMATSU
BULLDOZER BY FAILURE MODE EFFECT ANALYSIS (FMEA)
APPROACH AT PT XYZ IN TANJUNG ENIM JOBSITE**

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BACHELOR'S DEGREE
in

INDUSTRIAL ENGINEERING
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



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July 2025

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.



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ABSTRACT

REDUCTION OF MEAN TIME TO REPAIR (MTTR) OF KOMATSU BULLDOZER BY FAILURE MODE EFFECT ANALYSIS (FMEA) APPROACH AT PT XYZ IN TANJUNG ENIM JOBSITE

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PT XYZ's Tanjung Enim operation faces critical maintenance challenges with Komatsu bulldozer fleet consistently exceeding the 4-hour MTTR target. All three bulldozer models (D375A-6R, D155A-6R, and D85ESS-2) demonstrated excessive repair times of 4.6-5.6 hours, representing 15-40% deviations above target performance. This research aimed to reduce MTTR through systematic application of Failure Mode and Effect Analysis (FMEA) integrated with DMAIC framework, targeting minimum 20% MTTR reduction. A mixed-methods approach was employed over four months, analyzing 588 maintenance events with cross-functional teams of 18 stakeholders. FMEA implementation used modified RPN calculation emphasizing repair time impact. The integrated FMEA-DMAIC approach achieved 23.4% average MTTR reduction, exceeding the 20% target. Individual model improvements were: D375A-6R (28.6% reduction, 5.62→4.01 hours), D155A-6R (29.8% reduction, 5.38→3.78 hours), and D85ESS-2 (13.1% reduction, 4.58→3.98 hours). FMEA identified 47 failure modes with 10 critical modes (RPN >200), led by hydraulic pump contamination (RPN=504). Equipment availability improved from 94.2% to 97.1%, while process capability (Cpk) increased from 0.31 to 1.46. Implementation generated substantial annual savings with 650% ROI and 3.1-month payback period.

Keywords: *MTTR reduction, FMEA methodology, bulldozer maintenance, mining equipment, DMAIC integration, maintenance optimization, root cause analysis.*

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DEDICATION

Alhamdulillah, all praise be to Allah SWT for His blessings and grace. Peace and blessings be upon the noble Prophet Muhammad SAW. I extend my deepest gratitude and highest appreciation to the following parties:

1. Allah SWT, the Almighty, to whom I am deeply grateful for all the blessings that have given me strength and guidance to stay on the right path.
2. My extended family, especially my beloved parents, my wife, and our children. Thank you for your love, time, prayers, attention, support, motivation, and invaluable sacrifices that have enabled me to complete this thesis.
3. My exceptional advisors, Dr. Ir. Gembong Baskoro, M.Sc., IPU, ASEAN Eng., ACPE, APEC Eng. and Dr. Eng. Aditya Tirta Pratama, S.Si., M.T. Thank you for the time and guidance you have provided, which has allowed me to complete this thesis.
4. All the inspiring lecturers, whose names I cannot mention one by one. Thank you so much for your time and participation in the process of completing this thesis.

ACKNOWLEDGEMENTS

Praise and gratitude are expressed to God Almighty for His blessings and guidance, enabling the author to complete this final project titled “REDUCTION OF MEAN TIME TO REPAIR (MTTR) OF KOMATSU BULLDOZER BY FAILURE MODE EFFECT ANALYSIS (FMEA) APPROACH AT PT XYZ IN TANJUNG ENIM JOBSITE.” This thesis is a requirement that must be fulfilled to meet the academic qualifications for obtaining a bachelor’s degree in the Faculty of Industrial Engineering and Information Technology at Swiss German University.

The completion of this final project would not have been possible without the assistance of various parties. These individuals have significantly contributed, both directly and indirectly, to the research process and the preparation of this final project, offering scientific, moral, and material support. On this occasion, the author would like to extend heartfelt gratitude to:

1. The author's parents, father and mother, who have always offered their endless prayers and motivation. May God Almighty reward them with the best blessings that can be bestowed upon His creations.
2. My wife and child, who have continuously provided unwavering support and made extraordinary sacrifices throughout my studies.
3. Dr. Ir. Gembong Baskoro, M.Sc., IPU, ASEAN Eng., ACPE, APEC Eng., and Dr. Eng. Aditya Tirta Pratama, S.Si., M.T., as academic advisors. They have generously dedicated their time to provide invaluable guidance and extensive knowledge, enabling the author to complete this final project.
4. The teaching and administrative staff of the Faculty of Engineering and Information Technology at Swiss German University, who have imparted their knowledge and the completion of this final project.

The author acknowledges that this final project is far from perfect. Therefore, constructive criticism and suggestions are greatly appreciated for further improvement.

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