

**DEVELOPMENT OF AN EVENT-DRIVEN DIAGNOSTIC AND VISUALIZATION
SYSTEM FOR MTTR REDUCTION IN GEOTHERMAL TURBINE-GENERATOR**

By

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

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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.

Jason Viriya

Student

Date

Approved by:

Dr. Eng. Aditya T. Pratama, S.Si., M.T

Thesis Advisor

Date

Dr. Tanika D. Sofianti, S.T., M.T.T

Thesis Co-Advisor

Date

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

Dean

Date

ABSTRACT

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By

Jason Viriya

Dr. Eng. Aditya T. Pratama, S.Si., M.T, Advisor

Dr. Tanika D. Sofianti ST MT, Co-Advisor

SWISS GERMAN UNIVERSITY



Unplanned turbine-generator trips in geothermal power plants impose diagnostic delays that contribute substantially to Mean Time to Repair (MTTR). This study proposes an event-driven diagnostic framework for fault isolation in industrial turbine-generator systems, instantiated within the PI Asset Framework and validated through a geothermal power plant case study. The research follows the DMAIC framework, with system development conducted through a waterfall approach. The system classifies outage events, identifies the primary triggering cause through signal comparison, and evaluates fifteen indication parameters across nine sensor groups. Active trip indications are mapped to failure modes and corrective actions from plant FMEA documentation, delivered through a PI Vision dashboard and automated email notification. Black-box testing confirmed full functional conformity across all sixteen requirements. User Acceptance Testing by four maintenance engineers yielded complete affirmative responses, and User Experience Questionnaire evaluation rated five of six scales as Excellent. PERT-based estimation projects a diagnostic time reduction of 383.0 minutes, a 47.1% improvement over the manual baseline, corresponding to MTTR reductions of 12.53% to 32.78% across uncertainty scenarios.

Keywords: event-based diagnostics, fault isolation, mean time to repair, rule-based logic.



DEDICATION

I wholeheartedly dedicate this thesis to my colleagues and friends in the Industrial Engineering department, particularly Shavel, Davin, Darren.

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