Utilizing
Available Maintenance Data, Experience and Skills to Enhance the Performance of Rotating Equipment
Cost-Effectively

A Case Study

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Project Summery

Summary

* In order to contribute to the improvement of rotating equipment performance in a cost-effective way, this project proposed a consistent model, which utilizes eMaintenance Decision Support System (eMDSS)

* The model proposes technical and economic indicators in favor of improving the utilization of at disposal but not utilized maintenance resources including maintenance data, personnel skills and experience to enhance maintenance performance.

* The study utilizes eMDSS, which provides an intelligent facilitator for improvement of accurate decision-making and identifying and prioritizing maintenance problems and investments.

* Based on cost-effective scenario for future with a saving value exceeding 133K€ and profit of 114K€ for just one case equipment throughout hundreds

* Reliability of the achieved results are tested and approved in detail.

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Agenda

* ***Introduction to the Problem***
* ***Model Development into Analysis***
* ***Degree Project Outcomes***
* ***Project applicability/side effects at Case Company***

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Literature survey approach

19 keywords are used in different combinations to cover the whole aspects by searching in 6 scholar search engines; Including but not limited to:

- Maintenance Accurate decision making
- Cost-effective decision making
- Maintenance performance / Skills / Data / Experience
- Analysis tool / Model
- Maintenance Profitability
- Trend extrapolation
- …

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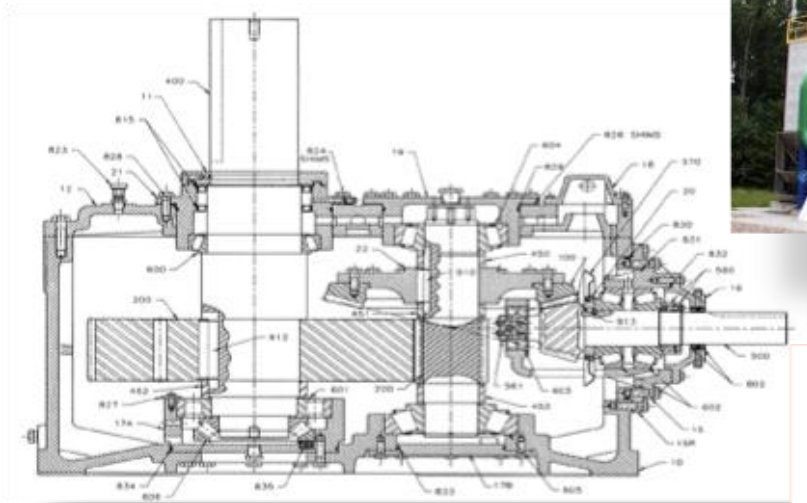
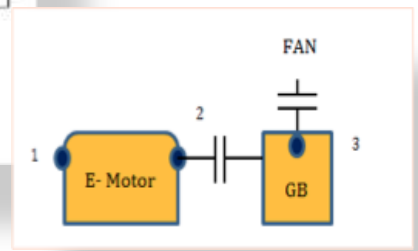
Case study

- Selected Maintenance Strategy: VBM (Vibration Based Maintenance)
- Selected candidate: Cooling tower gearbox (NK4-M-K842)





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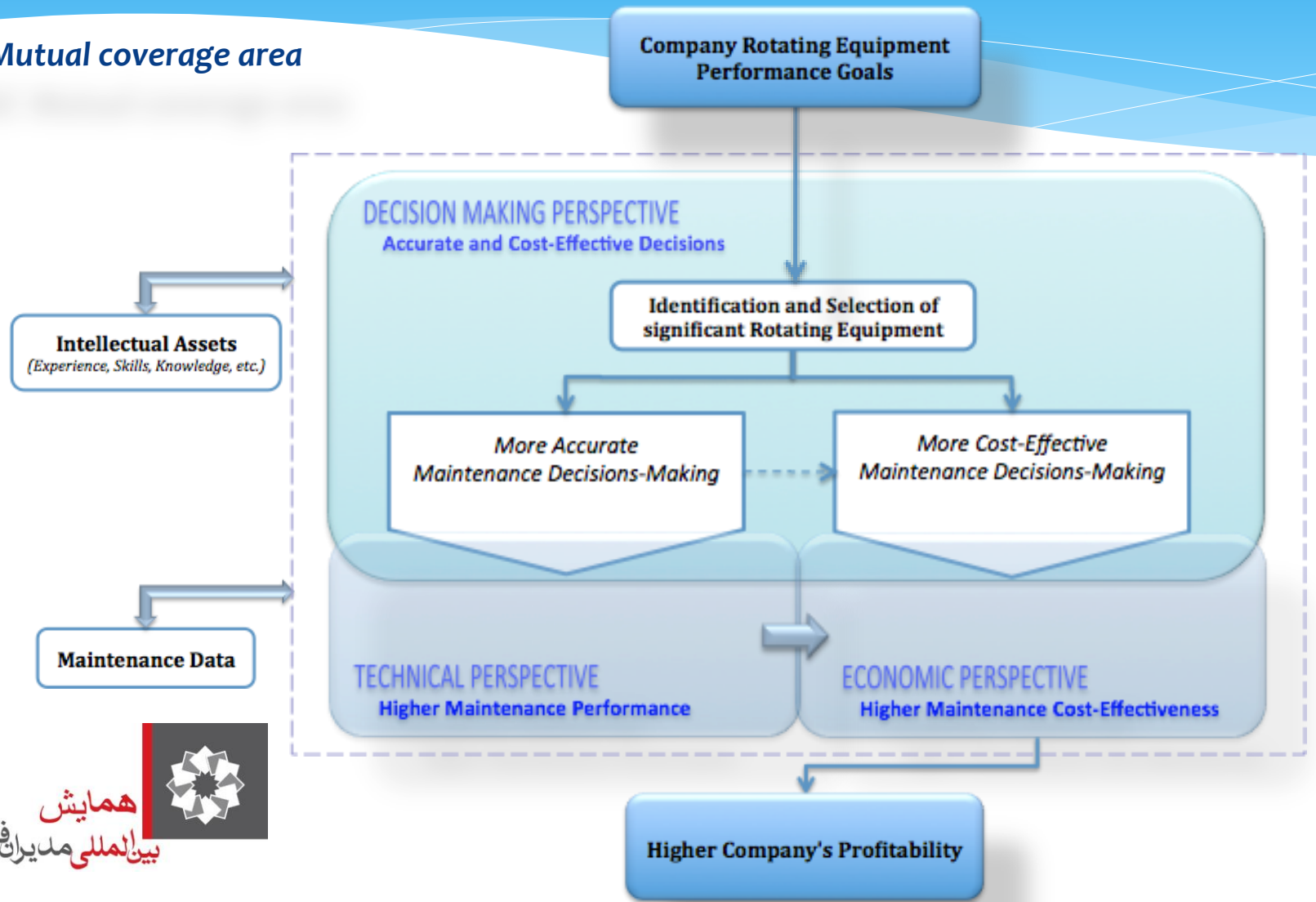
Model Development

General view

Overlaps: *Mutual coverage area*



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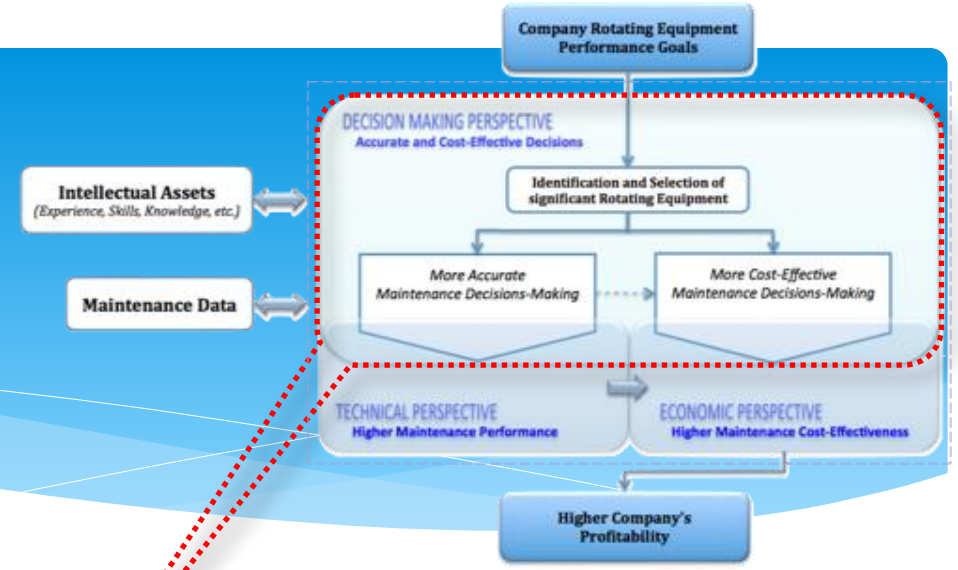
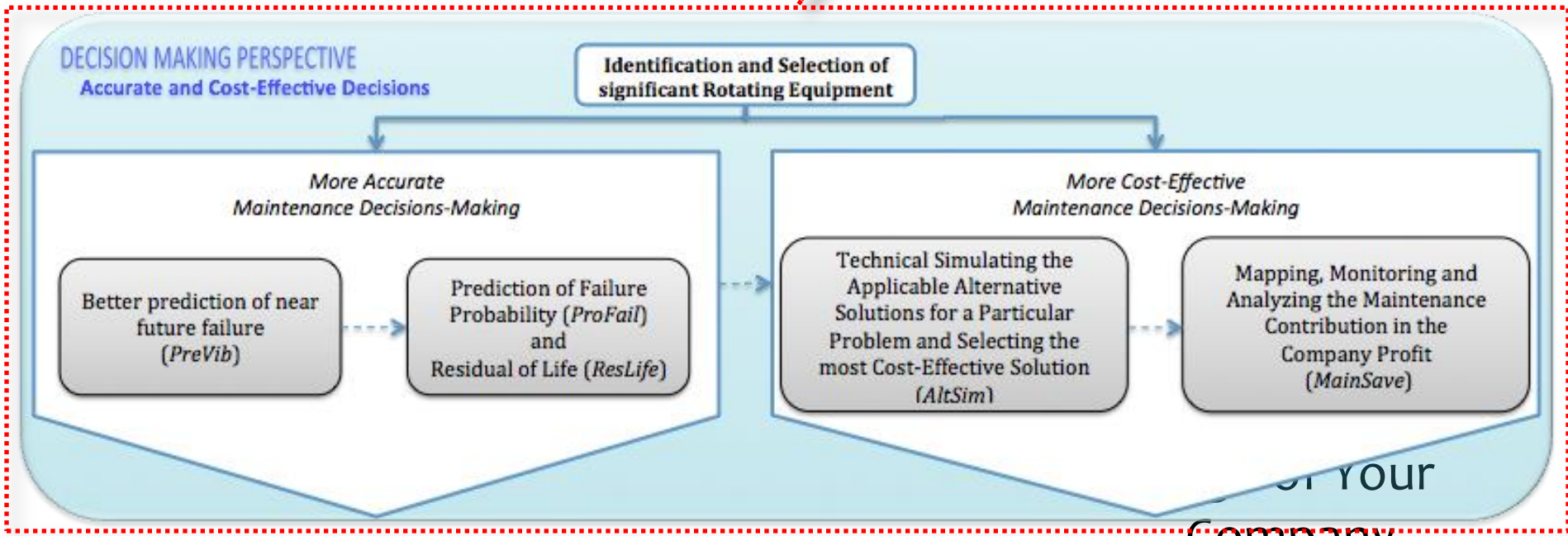
Model Development

Decision-Making perspective





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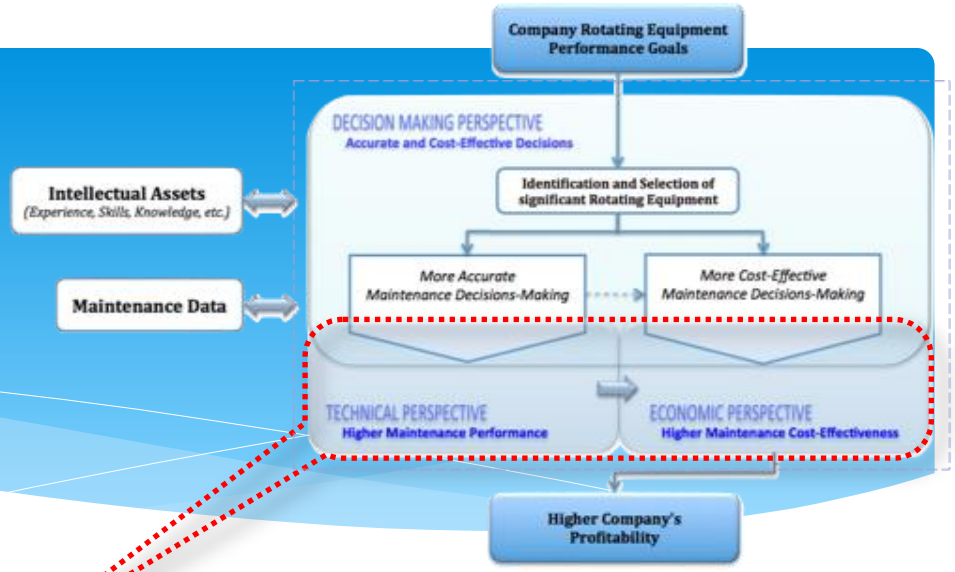
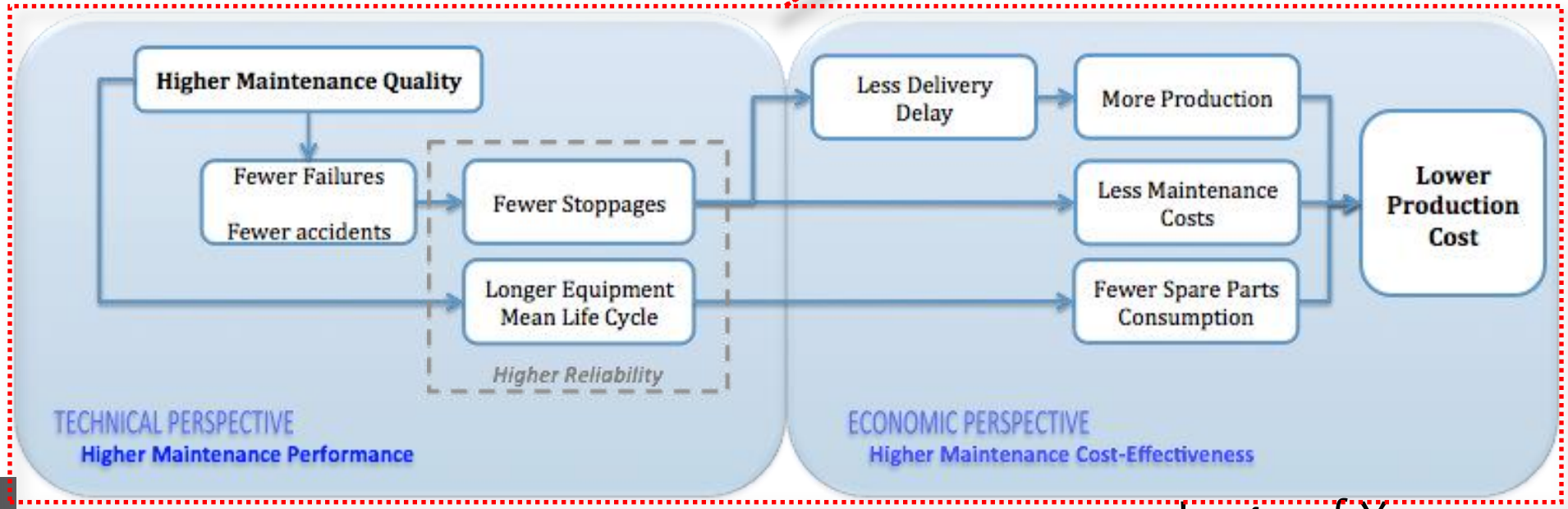
Model Development

Technical and Economic Perspectives





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From Model to Analysis

eMDSS (tested successfully in Volvo; FIAT; Stora enso; Gurato, etc.)

The project recognized and utilized eMDSS software as an *analysis tool/facilitator*

Technical analysis

future vibration predictions; residual life; failure probability

The software learns from failures and corrects its predictions (intelligent)

Economic analysis

Cost-effectiveness analysis for previous maintenance investments

&

Cost-effectiveness analysis for future maintenance scenarios

Accurate Decisions

Investment Simulations

Maintenance Savings

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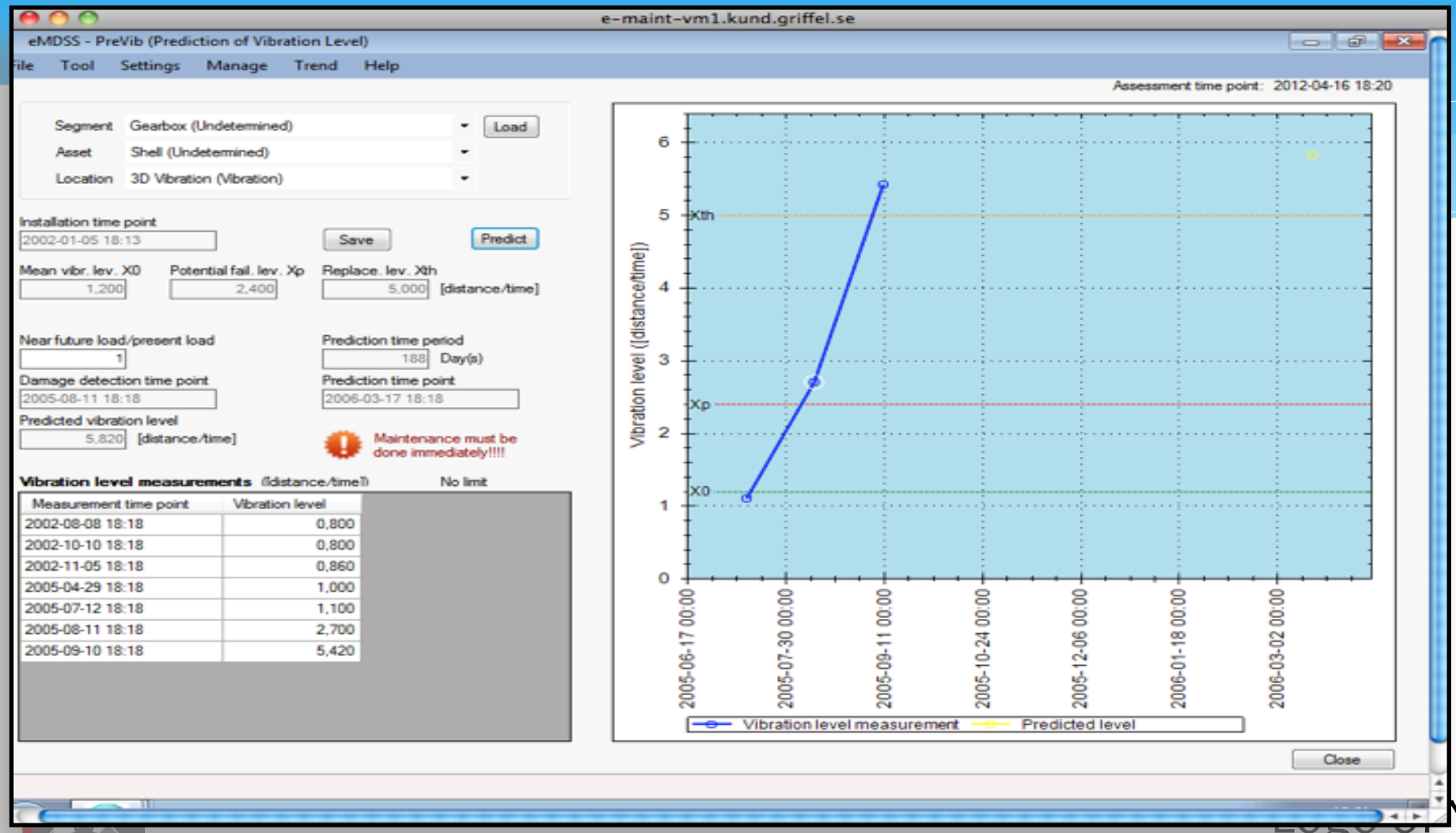
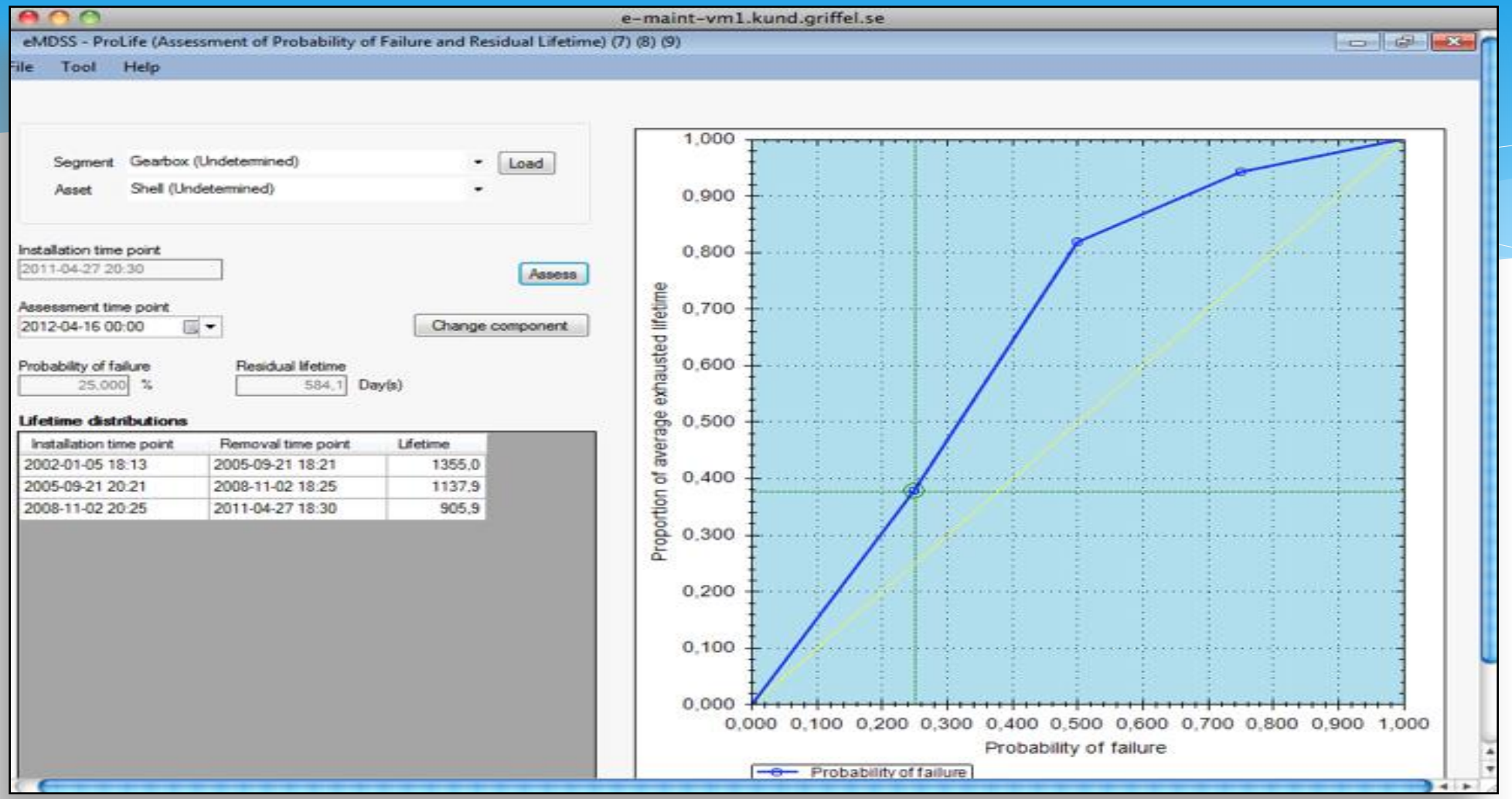
PreVib (Prediction of Vibration Level)



ProLife (Probability of Failure)



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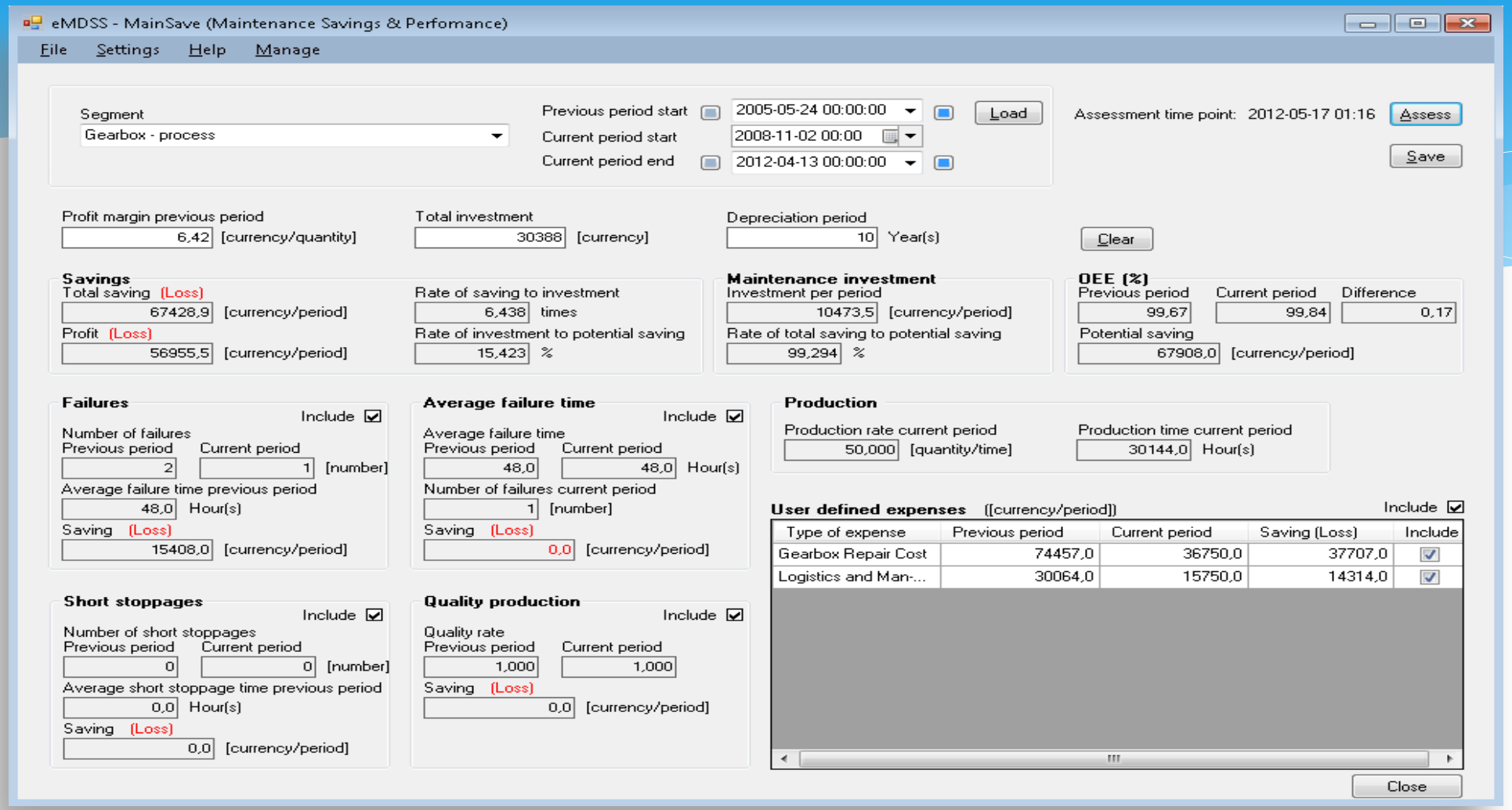
MainSave (Maintenance Savings)



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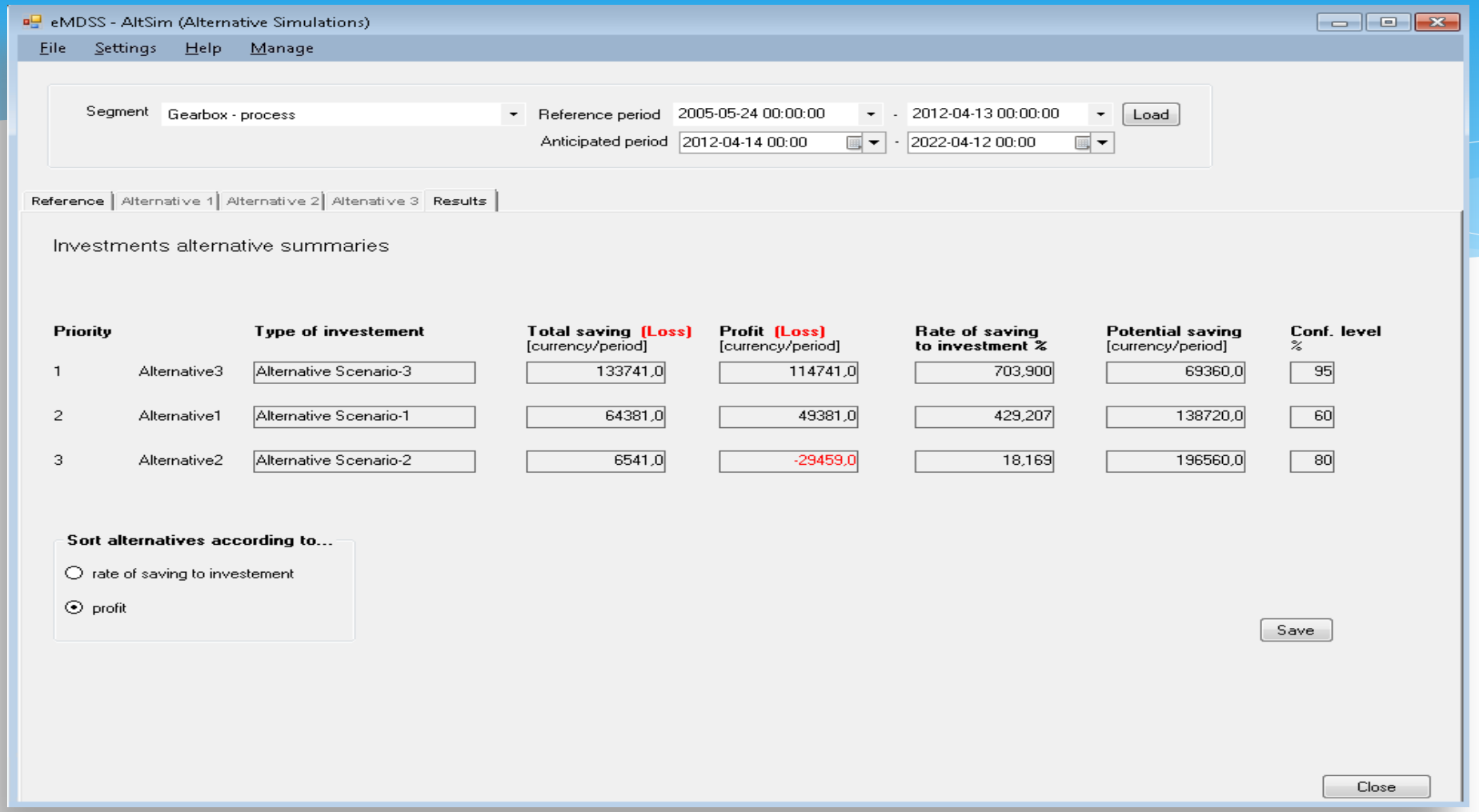
AltSim (Alternative Simulations)



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Project Outcomes

* Higher accuracy in prediction of potential failures
* Just in one case, 148.6K€ cost could have been postponed–at least- for three months

* Higher accuracy in calculating failure probability and residual lifetime
* The last gearbox replacement in 2011 estimated to work for another 584 days with 25% probability of failure.

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Project Outcomes (continued)

* Selection of the most cost-effective maintenance scenario
* the company is recommended to focus on scenario-C with the highest total saving (133,837€) and least potential savings (69,408€).

* Mapping and monitoring previous maintenance investments:
* 25K€ investments in 2008; 67,429€ of savings; 0.17% improvement in OEE; and still 56,955€ of potential saving.

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Thesis Achievements

* **EFNMS** (European Federation of Maintenance Societies) Excellence Award

  for Best Master Thesis in Maintenance (as the Runners-up)

  Helsinki, Finland – 5/2014

* **Utek** (Swedish Maintenance Technology Society) Award

  for the best Master thesis in the field of Asset Management, Availability and Maintenance

  Stockholm, Sweden – 5/2013

* **Sparbanksstitelsen Kronan** Degree project Scholarship Award

  for proven high creativity, entrepreneurship and innovation

  Halmstad, Sweden – 11/2012

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Thanks You

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