Maintenance and Dependability

Introduction

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Learning objectives

After completing the course the student shall be able to:

• compile a technical specification for dependable production equipment with respect to the expected life cycle cost
• compiling and planning of preventive maintenance of production equipment
• analyze and evaluate the maintenance and reliability data from equipment and draw conclusions from the analysis
• apply basic principles for spare parts management
• explain the differences, advantages and disadvantages of common maintenance concepts
• relate the maintenance activities to the various costs they may be associated with
• categorize maintenance-related wastes
• describe the current trends, challenges and opportunities for the maintenance of dependable production systems

Antti Salonen
Literature


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<td>Course presentation Introduction to Maintenance and Dependability</td>
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<td>Early Equipment Management</td>
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<td>Life Cycle Costing</td>
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<td>Analysis of Maintenance data</td>
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<td>CMMS and Introduction to condition monitoring</td>
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<td>Maintenance Planning and Scheduling</td>
<td>Maheshwaran Gopalakrishnan, Chalmers University of Technology</td>
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<td>Overview of condition monitoring and vibration transducers</td>
<td>Professor Emeritus Robert Randall, University of New South Wales</td>
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<td>Dissertation: CBM in Manufacturing Industry</td>
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<td>Maintenance and dependability management concepts</td>
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<td>The physics of Machining equipment</td>
<td>Andreas Archenti, Royal Institute of Technology KTH</td>
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<td>Maintenance economy</td>
<td>Martin Asp, Volvo GTO</td>
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<td>Maintenance as a value adding activity</td>
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<td>Future trends and challenges in maintenance</td>
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Le2: Early Equipment Management

- Early Equipment Management
- Experience feedback and re-use
- Reliability engineering

Literature:

Lecturer: Antti Salonen
Le3: Life Cycle Costing

• LCC/LCP

• Applications for dependability

Literature:

Lecturer: Dr. Marcus Bengtsson
- Maintenance expert, Volvo CE
- Researcher, Mdh
Le4: Reliability analysis

- Reliability calculations
- Total Time in Test, TTT-plot

Literature:
To be decided

Lecturer: Antti Salonen
Le5: Weibull analysis

• Weibull analysis

• Other statistical analysis

Literature:
To be decided

Lecturer: Antti Salonen
Le6a: CMMS

• What is CMMS

• Basic modules/functions

Literature:


Lecturer: Antti Salonen
Le6b: Condition monitoring

- Overview
- Vibration analysis
- Shock Pulse Measurement

Literature:

Lecturer: Antti Salonen
Le7: Planning and Scheduling

• Maintenance planning

• Criticality analysis

Literature:

Lecturer: Maheshwaran Gopalakrishnan
PhD student, Chalmers University of Technology
Le8: Vibration transducers

Literature:
TBD.

Lecturer: Dr. Robert Randall
Professor Emeritus, University of New South Wales, Australia
On Friday, December 1st, Ali Rastegari will defend his dissertation
"Condition-Based Maintenance in The Manufacturing Industry: From Strategy to Implementation”.

Opponent: Professor Emeritus Robert Randall, UNSW
Grading committee:
Professor Basim Al-Najjar Linnaeus University
Docent Åsa Fasth, Chalmers University of Technology
Docent Shahina Begum, Mälardalen University
Le9: Spare parts Management

- Categorizing Spare parts
- Inventory levels / order points
- Risk analysis

Literature:

Lecturer: Antti Salonen
Le10: Management concepts

- Deeper into TPM and RCM
- World Class Maintenance
- Asset Management

Literature:


Lecturer: Antti Salonen
Le11: Equipment physics

• Introduction to machine tools, configurations and accuracy
• Capability assessments and their link to maintenance

Literature:
TBA

Lecturer: Andreas Archenti
Researcher, Royal Institute of Technology, KTH
Le12: Maintenance economy

• The cost of downtime
• Financial impact of maintenance
• Cost deployment

Literature:

Lecturer: Martin Asp
Technical specialist, Volvo GTO
Le13: Value adding Maintenance

- Requirements and needs
- Maintenance related loss
- Service level agreements

Literature:

Lecturer: Antti Salonen (and maybe Marcus Bengtsson)
Le14: Trends and Challenges

- IoT
- Data analysis
- AI

Literature:

Lecturer: Antti Salonen (and guests)
Examination

Hand-in INL1: LCC analysis 1.5 credits

Hand-in INL2: Data analysis 1.5 credits

Home exam HEM1: 4.5 credits
An exam to be written at home, based on specified literature.

Antti Salonen
Communication

Course web page: [http://zoomin.idt.mdh.se/course/ppu420/](http://zoomin.idt.mdh.se/course/ppu420/)

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