Course: Reliability Engineering — credits: 3

Course code	ELVH19ARE
Name	Reliability Engineering
Study year	2022-2023
ECTS credits	3
Language	English
Coordinator	B.D. Williams

Modes of delivery	Lecture Practical / Training
Assessments	Reliability Engineering - Assignment

Learning outcomes

1. The student can analyse quality and reliability of a design by understanding and applying some typical design methodology tools such as those used in ‘TQM, DMAIC, DFSS, HAZOP, FMEA, MuSCow, Guage R&R ’.
1. The student can find acceptable tolerances of a design based on worst-case and statistical tolerancing methods.

Content

Reliable design:

No one disputes the need for systems to be reliable1. But how do you design a product that performs without failure for a stated period of time? Engineering education is traditionally concerned with teaching how you can build a prototype of a product. The ways in which products fail, the effect of failure and aspects of design manufacture, maintenance and use which affects the likelihood of failure are not usually taught. Basic parameters like mass, dimensions, friction coefficients, strength and stresses are never absolute but subject to variability1. Understanding the cause and effect of variability is necessary for the creation of reliable products. In this study unit you will learn how to assess the possible failures and its effects (risks). You will learn to use probability testing for reliability assessment purpose. You will also learn modelling methods to model the variation in the design.

Once you have assessed the variation and the risks associated with your product you can start to (re)design your product towards a more reliable product. Several methods of mitigation will be taught. You will learn about feedback and control, simulations, software improvements and design excellence.

Typical aspects that will be covered could include

- Introduction Quality systems
- QFD (Quality Function Deployment)
- FMEA (Failure Means and Effects Analysis)
- SIPOC (Supplier, Input, Product, Output, Customer product map)
- Benchmarking
- Risk assessment
- Gage R&R
- Characterization
- Transfer functions
- Process capability models
- Tolerance design
- Product validation, product verification
- Control Plan
- Quality plan
- Continue improvement (control systems/SPC, tracking systems)

[1]Practical Reliability Engineering, 4th Edition, Patrick O’Connor, Wiley 2002, ISBN 978-0-470-84463-2

Included in programme(s)

Exchange Technology to Innovate (autumn)
Electrical Engineering Major Sensor Technology
Minor Technology to Innovate

School(s)

Institute of Engineering

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