

Reliability Foundation 1

Reliability; The key to a successful product

Purpose of the course

In order to cope with the latest economic situation, organizations must develop new products, processes and services that have a high level of reliability. The failure of components or systems over time can lead to high impact consequences (claims, image damage). RMS (Reliability-Maintenance-Safety) Engineering is an upcoming discipline in product development that helps with accurate and quantitative methods to get a grip on the Reliability of your product.

The participants of Reliability Foundation 1 are trained to become professional Reliability Engineers that are capable to make profound reliability analysis based on warranty, test or field-data, including Failure-forecasting and solid management recommendations. Other trained capabilities are the creation of test-plans, DOE's and modelling Physics of Failure. For systems and install-base equipment they learn how to measure Reliability Growth during project validation, Reliability performance in the field and forecasting the system Reliability and Life-Cycle-Costs. The students become the people who support projects on the aspect of Reliability in close cooperation with the Six Sigma methodology. They coach and train others in the organization to follow the same methodology.

Target group

The Reliability Foundation Modules aim at people working in the areas of design, testing, warranty analysis, reliability analysis, project planning, maintenance or inspection. The Reliability Foundation is also suitable for teachers at universities and HBO academies. It is specifically meant as a deepening and extension of existing Six Sigma Black Belt trainings in the area of Reliability.

Work and thinking level / experience level

Academic or HBO level, or equivalent level of knowledge gained by experience. Experience in data analysis is an advantage.

Course duration: 2 x 3 days

Max number of students: 18

What will be learned – the skills

In the course the following topics will be treated:

- Life data analysis with Weibull and other distributions (e/g log normal, extreme values)
- Risk analysis; Failure forecasting
- Maintenance prediction and planning; Warranty periods; Optimal replacement point
- Modeling of repairable systems with independent failure-modes
- Small sample sizes; Weibayes analysis
- Considering test time versus costs; Zero failure testing, Sudden-Death test, Reliability Validation Planning, Confidence Growth
- Multiple failure modes, System Reliability; Crow-AMSAA trend analysis
- Design for Reliability in DfSS
- Life Data collection; Usage of field data; Use of data after warranty period; FRACAS systems.
- Execution and analysis of accelerated life tests, stress tests (ALT, HALT, MEOST, ...)
- Modeling of Accelerated Life tests (Arrhenius, Eyring, Power law, Coffin-Manson, Larsen-Miller)
- Complicated DoE's, Taguchi methods
- Management aspects of Reliability Engineering

The focus of the course is on the practical applicability of statistics in Reliability Analysis.

Cooperation

The overall Reliability Foundation program is established according to VDI 4002 in cooperation with the University of Stuttgart. The University is responsible for the quality of the program and is supported by the University of Amsterdam and the "Vrije Universiteit Brussel".

University Certification

Following the two foundation modules, two additional modules out of the complete program and the final thesis will result in the certificate "VDI Zuverlässigkeitsingenieur" issued by the University of Stuttgart.

Course content

The course is split up in two blocks. Each Block has three course days from 09:00 - ~17:00 hours. Between the blocks there is a 2 week break during which the participants can further study the presented material and have time to apply it to their own projects.

Lectures are alternated with exercises, cases and demonstrations. Low cycle fatigue experiments are part of the workshop. The text of the "New Weibull Handbook©" by dr. R.B. Abernethy, will be followed during the course. Hands-on practice with the accompanying SuperSMITH™ and Reliability TOOLS RVP© Software is scheduled for both the afternoons of day 4 and 5. During day 3 Minitab software will be used to create complex DoE's. Analysis of your own data is strongly recommended.

Block 1 / day 1-3

- Weibull Plot: defects and suspensions, plot creation and interpretation, shape Beta (β)
- Goodness-of-fit, distribution analysis
- 3-parameter Weibull, Log-Normal
- Risk analysis: failure-forecasting
- Dauser Shift, Zero failure & Sudden Death testing
- DoE's, Taguchi in Minitab Software
- Design for Reliability in DfSS

Block 2 / day 4-6

- Confidence intervals, Batch Analysis
- Binominal, Poisson, Exponential, Kaplan-Meier
- Reliability Tools, Reliability Validation Plan
- Crow-AMSAA: Reliability Growth, Extended CA
- Hands-on Practice with Software
- Accelerated life/stress tests, (ALT, HALT, MEOST)
- Modeling of Accelerated Life tests

Number of participants

Due to the nature of the course the minimum number of participants is 8 and the maximum is 18. Admission is in order of entry of signed subscription forms.

What to bring to the course?

During the course participants need a laptop with CD-reader. EXCEL plus the statistical software package Minitab (version 16) need to be installed. A 30-day trial version of this package can be downloaded from the website www.minitab.com. In the training room WLAN access is available to access your company Minitab license. The included SuperSMITH™ Software needs to be installed during the course. Admin rights (temp) might be required

for installation. A scientific calculator (log function) is required for day 1 and 2. And bring your own data !

Teachers

Teachers of the course are Ing. R. Schop of Weibull Reliability Engineering; Dr. J. de Mast of IBIS UvA; Prof. Dr. M. van Overmeire of the Vrije Universiteit Brussels.

Dommel Valley Platform

The Dommel Valley Platform is an initiative of Philips Healthcare, Aalberts Industries, University of Amsterdam and Holland Innovative. By now over 10 well-known enterprises have become member of the platform. Its goal is sharing knowledge in the field of with respect to product design, product quality and product reliability. The platform organizes trainings as well as seminars related to robust design and reliability and thus bringing open innovation into practice.

Location & Costs

The course will be given in the training room of Holland Innovative at the High Tech Campus 9 (Beta building) in Eindhoven. Included in the course price are 6 days training, Syllabus, meeting arrangements, the "New Weibull Handbook©" , SuperSMITH™ personal software license, Reliability TOOLS RVP© Software, exercise booklet PlayTIME©, meals and coffee/tea.

The costs are € 4.250 (ex VAT) per participant. Not included in the course price are the costs for the theoretical exam and certification by the University of Stuttgart.

Subscription

Subscription can be done by filling in the subscription form, which can be ordered via academy@holland-innovative.nl or via the contact mentioned below. Subscription is also possible via the web site www.holland-innovative.nl.

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