

## Reliability Black Belt®

Training number: Reliability\_A02

### About the topic:

Effective reliability engineering is about knowledge engineering: knowing why you do what you do, knowing that you do it well, and always learning how to do it better.

The Reliability Black Belt® adds specialist tools that are key to deeper understanding of reliability and causes of failure.

### Training procedure and goal:

The Reliability Black Belt® comprises the second module in the qualification as a Reliability Engineer. This module builds upon the structure provided by the Reliability Green Belt®. The Reliability Black Belt® adds specialized tools from the fields of Reliability Management, Root Cause Analysis, Design of Experiments, Durability Modeling, RAM/LCC and Software Quality; that allow development of greater understanding and improved decision-making.

The goal of this module is to train specialists who can independently solve complex problems and work on challenging issues in your organization. The Reliability Black Belt® is thus also able to professionally handle organizational and project-specific interfaces (e.g. Production, Sales and Purchasing).

### Target group:

Engineers, technicians, specialists, managers and executives from the areas of development, testing, design, research, production and quality assurance who wish to deepen their reliability skill-set.

### Training content:

- **Reliability Management**  
Reliability process | Reliability targets – system view/component view | Reliability monitoring | Reliability growth management
- **Repairable Systems and RAM/LCC**  
Availability and maintenance | Modeling and simulation of system parameters | Composition and optimization of maintenance plans | RAM/LCC
- **Life-stress Models - Physics of Failure**  
Degradation modeling | Monte-Carlo simulation | Life-stress models of various technologies | Multi-parameter damage accumulation
- **Design of Experiments DoE**  
Fractional and full factorial experimental designs | Test for non-linearity | Main effects and interactions | Robust design - increasing the robustness of a design by consideration of non-linearities and interactions | Setting up of system behavior models from empirical data

- **Root Cause Analysis**

Simple questioning techniques | Families of variation | Multi-vari-analysis | Concentration chart | Paired comparisons | Process search | Components search | Variables search | Validation techniques

- **Reliability of Electronics and Software**

Reliability validation of electronic components and systems | Quality and reliability of software-intensive systems | Dimensions of software quality | Capability of software development process

**Prerequisites:**

Participation in the Reliability Green Belt® training

**Software requirements:**

Each participant must have a laptop with the following software: Microsoft Excel, Adobe Reader and Minitab (Version R15 or above). A demo version of the software Minitab can be downloaded from [www.minitab.com](http://www.minitab.com).

**Examination / certification:**

The training will end in all cases with a certificate of participation. Furthermore, participants may elect to take a written examination for a certified **Reliability Black Belt®** at the end of the course. The certificate will be awarded by the University of Stuttgart and the Institute of Machine Components. The examination is in multiple choice form.

**Training duration:**

5-day training:                    Monday from 09:00 am to 05:30 pm  
    Tuesday to Thursday from 08:15 am to 05:30 pm  
    Friday from 08:15 am to 01:30 pm

Examination:                     Friday from 01:30 pm to 03:30 pm

**Training fee:**

Detailed information is available on our website [www.reliability-academy.com](http://www.reliability-academy.com)

**Scope of services:**

- Training documents in paper form
- Training documents as pdf document
- Certificate of participation
- Catering during the training

**Examination fee / certification:**

Detailed information is available on our website [www.reliability-academy.com](http://www.reliability-academy.com)

**Dates / Registration:**

Detailed information is available on our website [www.reliability-academy.com](http://www.reliability-academy.com)

**In-house:**

We also offer all our seminars and trainings as an in-house event.

**Coaching:**

Should you so wish, we can put together a time and content tailored coaching concept for you after completion of the training.