

## Training Content:

### ► Procedure of the Education

The Reliability Master Black Belt® education is divided into the four steps project definition, project assessment, project phase with coaching, and final report with certification.

### ► Project Definition

Potential projects are defined together with the coach. The projects should comprise practical application of training elements from the Reliability Green Belt® and the Reliability Black Belt®. In agreement with the coach it is also possible to integrate other reliability engineering techniques. There may be several distinct projects to be worked on. It is not necessary to acquire all the necessary points for certification by just one project.

### ► Project Assessment

After the definition of the projects an assessment follows regarding the worthiness for certification. Certification requires the projects which are to be worked on to provide a minimum number of points. The number of points depends on the depth of reliability work measured by three levels (basic, advanced, expert). The assessment is done by the University of Stuttgart and the Reliability Engineering Academy.

### ► Project Phase / Coaching

During the processing of the projects, the participant is continuously supervised by an experienced coach of the Reliability Engineering Academy regarding the project work and the reporting. A coaching budget of 10 days is included. The exact coaching effort is determined individually with the participant and can be adapted during the training period.

### ► Final Report / Certification

For the certification two requirements need to be fulfilled:

1. Sufficient over-all points from the projects which were worked on
2. Written project report (minimum 20 pages)

### TRAINING FEE:

Due to the specific project plan and the individual coaching we give price information only on request.

### SCOPE OF SERVICES:

Individual coaching accompanying your projects provided by reliability experts of the Reliability Engineering Academy.

### DATES / REGISTRATION:

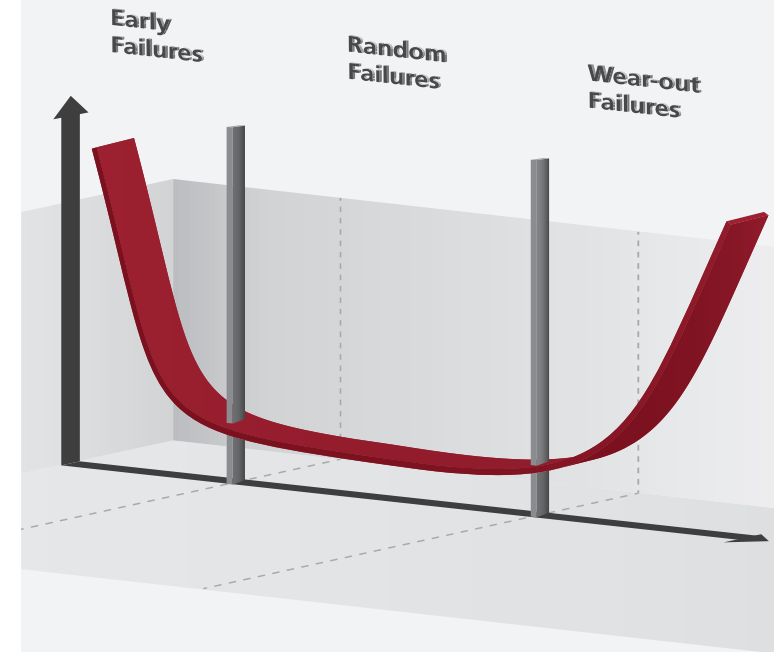
Detailed information is available on our website [www.reliability-academy.com](http://www.reliability-academy.com)

## CONTACT

Please contact us

Reliability Engineering Academy

[www.reliability-academy.com](http://www.reliability-academy.com)



**RELIABILITY  
MASTER BLACK BELT**



Training

Certified by the University of Stuttgart



**University of Stuttgart**  
Germany



## RELIABILITY MASTER BLACK BELT®

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 Master Black Belt®** mentors the participant through application of reliability engineering in real development; using the tools learned in the Reliability Green and Black Belts, gaining knowledge through context, and finding new tools as required.

### TRAINING GOAL:

The **Reliability Master Black Belt®** is the highest level of the certified reliability engineer education program. The education is a Training-on-the-job. Contents from the **Reliability Green Belt®** and the **Reliability Black Belt®** education and also other disciplines of reliability engineering shall be applied to the participant's own projects. The participants are mentored to apply reliability methods, to investigate and solve reliability problems, and to facilitate reliability engineering in their companies. Participants receive individual mentoring by the reliability experts of the Reliability Engineering Academy. This provides the necessary professional support and assures the quality and success of the **Reliability Master Black Belt®** education.

### TOPICS OVERVIEW:

Overview of possible topics and excerpts of content that could be worked on in the projects

**Reliability Planning:** Forerunner reliability analysis, customer requirements, reliability targets, requirements book specifications

**Systems Analysis:** Systems definition and borders, reliability block diagram, Boole, FTA, FMEA, HAZOP, DRBFM

**Stress Analysis:** Load spectra, load types, varying stress conditions, customer load spectra

**Modeling of Damage and Aging:** S/N-curves, cumulative damage models (Miner's rule, Haibach's rule)

**Reliability Prediction and Calculation:** Data analysis, Weibull analysis, failure rate calculation, reliability of electronic devices, reliability key figures, failure rate standards (SN29500, Military Handbook 217-F, NPRD)

**Reliability Test Planning:** Reliability testing requirements, assessment of reliability test plans, DVP&R, testing by suppliers, prior knowledge incorporation, accelerated testing, HALT

**Testing:** Test documentation (failures, times to failure, times to suspensions, etc.)

**Field Data Analysis:** Analysis of field failure data, warranty and policy costs, correlation between field and testing, cost analysis, data collection systems

**Reliability Management:** Reliability process, reliability assessment, risk assessment, assessment and monitoring of measures, maturity management, reliability reporting

**Repairable Systems / RAM:** Availability, maintainability, LCC

**Software Quality and Software Reliability:** Requirements and specification, functional safety, software testing

**DoE:** Test plan development, testing manual, variance reduction, screening, modelling

**Life-stress Modeling:** Coffin-Manson, Arrhenius, etc., multidimensional cumulative damage modeling

**Reliability Growth:** Duane, Crow-AMSAA

**Reliability Monitoring:** Monitoring of testing status, reliability, life, etc.

**Root Cause Analysis:** Root Causes, components search, Multi-Vari, families of variance, validation tests

### TARGET GROUP:

Engineers, technicians, specialists, managers and executives from the areas of development, testing, design, research, production and quality assurance who wish to take their reliability engineering skills to the highest level.

### EXAMINATION / CERTIFICATION:

The education is finished by a final project report. The coach evaluates the projects and their professional depth. Finally the **Reliability Master Black Belt®** certificate is issued by the University of Stuttgart and the Institute of Machine Components.