



A 5-day Robust Design Course

Course Description

High manufacturing costs, rework, early failures in the field and high warranty costs are often symptomatic of a sensitive design. Discovering a sensitive design in manufacture or in the hands of the customer is not good for business as options of tightening specifications, redesign or even “living with it” are all extremely expensive. Robust Design provides a complete methodology that can be used in the design of systems to ensure that they perform consistently in the hands of the customer. It comprises a process and tool kit that allows the designer to assess the impact of variation that the system is likely to experience in use, and if necessary modify the design the system if it is found to be sensitive.

This 5-day Robust Design course is a natural follow-on from the Systems Engineering Short Course. It aims to both educate and train participants in the concepts, principles and practice of Robust Design. The Course will cover the theoretical basis of Robust Design established by Dr Genichi Taguchi through the concept of the *loss function* and his parameter and tolerance design approach. It will also present a pragmatic proven process for undertaking Robust Design together with the tools necessary to complete the steps.

Course Numbers and Who Should Attend?

The 5-day Robust Design Course can be delivered to up to 20 participants. The course is suitable for all personnel involved in the detailed design and optimisation of any complex system.

Benefits to the Individual and Business

During an intensive five days of teaching and practical ‘hands on’ exercises, participants will be challenged to develop the skills and mind-set that can be applied to ensure a conceptual design is robust against likely sources of variation.

At the end of the course participants will:

- have an understanding the principles of Robust Design and how it applies to the creation of a new system through the appropriate blend of people, process and tools
- understand the importance of Taguchi’s “loss function” and recognise where it can be applied practically
- be able to identify and prioritise system parameters that contribute to system sensitivity
- be able to perform qualitative and quantitative sensitivity assessments
- be able to undertake parameter and tolerance design
- be able to use Design of Experiments to search a system design solution space
- be able to specify statistical tolerances
- know how Robust Design contributes to verification and validation evidence
- be able to consider the impact on future business of adopting Robust Design.

Learning Approach

The learning approach is based on the Kolb learning cycle with a significant proportion of the course set aside for exercises to reinforce the learning. Indeed, many of the small group exercises involve a case study that provides a practical focus for the course and enables the delegates to practise the methodology and tools presented.

Course Agenda

	Monday	Tuesday	Wednesday	Thursday	Friday
0830	Introductions, Aims and Agenda	Review of Day 1	Review of Day 2	Review of Day 3	
0930		Robust Design Process and Tools		Fractional Factorial Design of Experiments	Consolidation Exercise
1030	The Concepts and Principles of Robust Design		Measuring Robustness through metrics		
1130		Qualitative Robustness Assessment using Parameter Diagrams		Principles Confounding and Resolution	
1230	The Systems Approach to System Design		Searching the Design Space using Design of Experiments	Designing Experiments	Handling Noise in Design of Experiments
1300	Lunch	Lunch	Lunch	Lunch	Lunch
1400	Understanding Variation	Qualitative Robustness Assessment using Design-Noise Matrix		Screening Designs Types and Uses	Specifying Statistical Design Specification And Quality Function Deployment
1500	Randomness and Chance		Full-Factorial Design of Experiments		
1600	Assignable and Chance Causes		Designing Experiments		Course Close and Summary
1700	Probability Distributions	Qualitative Robustness Assessment Design Failure Mode and Effects Analysis	Running Experiments	Response Surface Methods	
			Analysing Experiments		

Course Delivery and Costs

The 5-day Robust Design Course is very intensive and is delivered by two tutor/consultants.

The cost of delivering the 5-day course, excluding delivery tutor accommodation and expenses, but including all courseware, is £14,500. VAT will apply at the prevailing rate.

The course can be tailored to suit individual customer's engineering lifecycle and review processes.

More Information and Contact Details

For more information about the 5-day Robust Design Course or any of our other Systems Engineering courses please contact Dr Stuart Burge on +44 (0) 7803 131614 or sburge@burgehugheswalsh.co.uk.