

Multivariable Testing™ Training Course

The Multivariable Testing™ training course is a three-day, practical applications oriented course for breakthrough improvement of product performance, and/or solution of problems that will not yield to conventional methods. Designed for R&M professionals, product development engineers and designers this course covers powerful statistical testing and its effective management. Worked examples are all based on actual successes of large scope and strategic impact. Applications include research, design, prototype production, manufacturing engineering, manufacture, life testing, measurement precision/accuracy, maintenance/repair and support services. Hardware (electrical, electronic, mechanical and metallurgical) and software (design/development/test/acceptance) examples will be shown and worked. Scope will vary from small scale pilots to large scale nationwide deployments involving thousands of personnel.

The course starts with an overview of MVT™ and its statistical pre-requisites (including system stability/homogeneity and workarounds where such states are not obvious). The statistical methods needed to understand and use MVT™ will then be reviewed. Most of the course will be concerned with MVT™ techniques, effective test design, execution, analysis and implementation. Planning and management will be thoroughly explained with examples.

Course Contents

Introduction and Review

1. What is MVT™?
2. Examples and mathematics to illustrate why it invariably accomplishes breakthrough
3. Interactions – responsible for 1/3 of the breakthrough
4. Why there will usually be 20+ factors, rarely more than 40
5. Review of requisite statistical methods and a 12-step framework to put them to work
6. General procedure for experimentation
7. Connection to strategic issues and executive management
8. Why MVT™ is primarily a top management tool

Brainstorming and Factor Development

1. Generating suggestions for system changes
2. Analyzing historical and process data
3. Managing the front end tasks

Categorizing

1. Making the experimentation manageable
2. Practical
3. Feasible
4. Cost-efficient
5. Why 2/3 of the factor ideas will be discarded
6. Why breakthrough will be accomplished with the remaining factors
7. Illustration of principle that 4/5 of the breakthrough comes from simple, no-cost methods changes
8. Why the solutions are often surprising

Screening

1. Purpose, language and definitions
2. Fundamentals of MVT™ methods
3. Screening designs
4. "Playing the game"

5. Randomization
6. Sample size and experimental precision
7. Estimating experimental error
8. Reflection
9. Quasi-interactions
10. Dummy factors
11. Blocking and stratifying
12. Order of preference for screening designs
13. Analyzing results and verifying conclusions
14. Implementation restrictions at screening stage

Refining

1. Purpose of refining
2. Factorial designs
3. Analysis and verification
4. Improvement prediction models
5. Implementation planning

Implementation

1. Compliance monitoring and sampling schemes
2. Troubleshooting and corrective action
3. Statistical methods to confirm improvement to predicted levels
4. Maintaining the gains
5. Continuous improvement

Management

1. Managing an overall experimentation program for competitive advantage, with case studies
2. Scoping and technical planning of attendee applications and problems
3. Action steps