Gain Confidence in your Test and Measurement Results

Morehouse provides in-person and virtual courses where you will learn from the experts. The instructors will teach you how to measure better, build tools, simplify uncertainty, and achieve the best result possible with our tools. If you have any questions or need customized training for your team, contact us at info@mhforce.com.

Instructor: Henry Zumbrun, President, Morehouse Instrument Company

Henry's passion is to help labs make better force measurements. He explains error sources and how to use this knowledge to make better measurements. He has taught various classes for NCSLI, NIST, MSC, and A2LA, and has authored published papers and the Guidance on Uncertainty Budgets for Force Measurement and Calibration for A2LA.

Force Fundamentals

Course Description

This course will cover applied force calibration techniques and will include live demonstrations (when taught at Morehouse) to exhibit potential errors made in everyday force measurements. The measurement errors demonstrated and discussed will include errors associated with improper alignment, use of different and/or incorrect adapter types, thread depth and thread loading.

This course also covers the importance of calibrating force measurement devices in the manner in which they are being used in order to reduce errors and lower uncertainty.

Topics

- What is Force Calibration?
- Common Types of Force Measuring Instrumentation
- Troubleshooting a Load Cell
- Calibration Traceability – What it means and how to comply with ISO/IEC 17025 requirements
- ASTM E74 and Other Force Calibration Procedures
- Accuracy, Precision, Resolution and Uncertainty
- Potential Force Measurement Errors with Demonstrations
- Uncertainty Analysis – We will teach uncertainty and provide tools that can save days to weeks of your time

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Implementing Metrology & SPC concepts with Excel

Course Description

This one-day course prepares the metrology professional to apply the power of Microsoft Excel's mathematical and statistical tools to assist in managing the laboratory's Quality Management System including Measurement Uncertainty. It serves as a prerequisite for the Measurement Uncertainty course and reduces the time spent learning both the Excel and Measurement Uncertainty estimation techniques at the same time.

Attendees will become proficient at applying Excel's mathematical and statistical tools by building templates for data collection and measurement uncertainty estimation. We recommended the student brings a computer with Microfsoft Excel to the class.

Learning objectives:
1. Obtain familiarity with Excel mathematical and statistical functions.
2. Learn Excel shortcuts for transforming number formats and other similar techniques.
3. Charting and using trend analysis tools for data interpolation.

Topics

- Excel basic statistical functions
- Basic statistics required for measurement uncertainty
- Applying Excel statistics for Measurement Uncertainty
- Developing a Measurement Uncertainty spreadsheet
- Validation of Spreadsheet
- Central Limit Theorem
- Sources of variation
- Problems related to over-adjusting the process
- Types of variable SPC (Statistical Process Control) charts
- Types of attribute SPC (Statistical Process Control) charts
- Individual/Moving Range Chart Methods
- X-Bar/Range Chart Methods
- Troubleshooting Control Charts and improving processes
- Use of control charts to manage test and calibration lab environments
- Using control charts to comply with ISO 17025 requirements

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Measurement Uncertainty

Course Description

This course covers techniques for laboratories in estimating the measurement uncertainty for their scope of accreditation. It covers several tools and techniques that a lab may apply in measurement uncertainty analysis estimation per ISO Guide 98 (GUM). The tools are generic in nature so that it can be applied to various parameters.
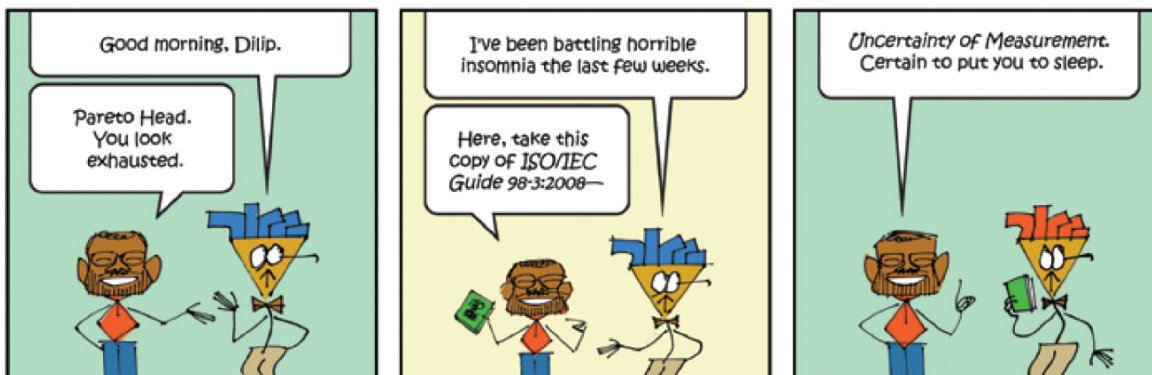
Hands on exercises using a Microsoft Excel spreadsheet provides a practical approach that enables the attendee to apply the methods in their particular applications. Several Excel templates and tools are provided for the attendee to implement.

Implementing Metrology & SPC concepts with Excel is a prerequisite for this course. We recommended the student brings a computer with Microfsoft Excel to the class.

Topics

- What are the minimum contributors for a laboratory to consider for measurement uncertainty estimation?
- How are contributors considered for inclusion in the uncertainty budget?
- How to build a Measurement Uncertainty Budget and interpret it for future improvement of the measurement process.

Mr. Pareto Head   BY MIKE CROSSEN

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ISO/IEC 17025 Implementation

Course Description

This 2-day course provides a general framework of tools for the laboratory seeking ISO/IEC accreditation. Attendees will learn how to interpret the standard and what is required of the laboratory to successfully get accredited the first time. Time saving techniques and tools are shared so that the laboratory does not fail major criteria for accreditation.

Topics

- ISO/IEC 17025 Clause 4 Management Requirements
- ISO/IEC 17025 Clause 5 Technical Requirements
- Purchasing process and review
- Traceability and measurement uncertainty
- Internal auditing techniques
- Corrective/preventive actions, root cause analysis
- Closing an audit action item
- Audit exercises
- Records management

Visit www.mhforce.com/training-programs to register for an upcoming training course.

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