



IIGDT Training

“Applied Dimensional Metrology”

Objective:

To provide hands on insight to intermediate and advanced applications and analysis of 2D & 3D measurement instruments used to determine full compliance to mechanical drawings. Gain insight to key error influences that can provide tremendously different measurement results and to know how to optimize the measurement programs to effectively reduce the measurement error/bias. Gain insight to the strengths and limitations of Gage Repeatability and Reproducibility (GR&R) by making visible some key error influences that can cause significant biases in the results and also showing how to test and correct for these biases.

Course Length:

2 days (16-hours) – 1.6 CEU's

Course Content:

3D Measurement

- Traceability of measurement to national laboratories
- Limitations of 1D and 2D measurements
- Understanding key error influences and how to test for and correct

Single Sensor and Multi-Sensor Coordinate Measuring Machines

- Video sensors, laser sensors, whitelight interferometers and micro probes
- Manual & automatic (DCC) CMMs, single point touch sensors, scanning sensors and measuring arms
- 3D surface and form instruments
- Introduction to traceable artifacts and value of interim artifact testing

Methods for analyzing and interpreting data results (2D & 3D)

- Working with CAD and measurement data (point clouds)
- Analytical software – strengths & weaknesses
- Understanding least-squares -vs- Minimum zone fitting
- Understanding criticality of simultaneous requirements within the standards (ASME, ISO, other)

Measurement Uncertainty/Traceability

- Gage Repeatability & Reproducibility (corrected and uncorrected error sources)
- Introduction to the limitations of GR&R and benefits of measurement uncertainty

In each subject group an overview of the tools is followed by a demonstration of best application practices and a discussion of calibration issues and measurement uncertainty factors. Each subject session is concluded with a hands-on lab activity and includes discussions on understanding key error influences and how to test for and correct them. When practical, customer parts will be utilized during this seminar to provide the greatest understanding of measurement technology applicable to customer parts.

Targeted Audience:

Anyone requiring an advanced understanding of measurement systems used for measuring mechanical components and assemblies. Specifiers and decision makers of engineering requirements and specifications as well as specifiers of manufacturing processes and measurement applications and anyone doing statistical analysis of design, manufacturing or measurement data. Engineers, designers, metrologists, technicians, machinists, toolmakers, designers, senior inspectors, senior technicians, statisticians and mechanical engineers at all levels.

Prerequisites:

GD&T - Advanced Applications! An advanced knowledge of GD&T is required to allow all participants to be successful in this class. If not proficient in GD&T at an advanced level it is strongly recommended that all individuals take or retake the advanced course to ensure an optimum and proficient level of understanding.