CALIBRATION & REPAIR TRAINING

This 2-day training offers specialized training in calibration and repair for the individual who has some knowledge of basic Metrology. Approximately 75% of the workshop involves “Hands-on” calibration, repair and adjustments of micrometers, calipers, indicators height gages, etc. Course also covers NIST Traceability, Certificates of Conformance, Gage Management, Standards, etc. Each student is encouraged to participate in actual calibrations and repairs using IICT equipment.

Goal
- Equip attendees with knowledge to meet current and future calibration needs
- Leave this class prepared to save your company money on calibrations
- Provide attendees opportunity for personal growth in the Quality Field

TOPICS COVERED IN THIS TRAINING:

- Definition of Calibration & Traceability.
- Rule of 10 to 1 and 4 to 1.
- NIST Test number and Test Date-Traceability.
- Overview of Calibration Terminology.
- Overview of National Standards, Primary Standards, Reference Standards and Working Standards.
- Calibration labels and stickers.
- Gage Block Usage and Handling.
- Determining Calibration cycle times.
- Hands on Calibration Methods of; (using IICT supplied master Gage Blocks, Bench Micrometer, Thread Measuring Wires, etc.)
  - Micrometers
  - Calipers
  - Indicators
  - Sine bars
  - Levels
  - Thread gages
  - Pin Gages
  - Plug Gages
  - Squares
  - Height Gages
  - Other Gages as customer requests
  - Discussion on Optical Comparators, Surface Plates, Ring Gages, CMM’s, etc
  - “Hands-on” Repair techniques of Micrometers, Calipers and Dial Indicators
TOPICS COVERED

- ISO-10012:2003 Related Standards
- Certificate of Conformance vs. Certificate of Analysis
- National Institute of Standards and Technology
- Which Systems Need to Be Calibrated, Controlled, or Verified in a Measurement System
- Qualifications to Calibrate Systems & Document Procedures
- Choosing the Proper Equipment
- Three Elements: Capability, Traceability, Reliability
- Maintaining Traceability
- Why Registration to a Quality Management System Is Not Sufficient
- How Software Affects Your Calibration System
- Using Outside Calibration Services
- Hands-on calibration, repair and adjustments of Micrometers, Calipers, Indicators, Height Gages (this comprises approximately 75% of the total class time)
- Definition of Calibration & Traceability
- Rule of 10 to 1 and 4 to 1 in calibration
- Certificate of Conformance vs. Certificate of Calibration
- NIST Test Number and Test Date Traceability
- Overview of Calibration Terminology
- Overview of National Standards, Primary Standards, Reference Standards and working Standards
- Calibration labels and stickers
- Gage Block Usage and Handling
- Uncertainty of Measurement
- Contracted calibration
- Training
- Calibration Environmental Conditions
- Record & Record Retention
- Audits—internal & external
- Determining Calibration Cycle times
- “Hands-On” Student participation calibrating and repairing micrometers, calipers, indicators (not test)
- “Hands-On” Student participation calibrating Thread, Plug, Pin and Ring Gages; Sine Bars; Levels; V-blocks; Height Gages, other hard gaging as requested
- Discussions and calibrations of CMM, Optical Comparators, Surface Plates and other equipment as requested

Each student is provided with the following materials:

**Items student keeps**
- Notebook of materials with pen

**Items students do not keep**
- Gages for calibration (Micrometer, caliper, indicator, etc)
- Master gages (gage blocks, thread gages, ring gages, Bench Micrometer, Thread measuring wires, etc.)
- Tools for repairing gages
- Gages to disassemble and repair