



2019 NCSL INTERNATIONAL
WORKSHOP & SYMPOSIUM
August 24–29, 2019
Huntington Convention Center, Cleveland, OH
Call for Papers
Abstract Deadline March 31, 2019
Manuscript Deadline May 20, 2019

NCSL INTERNATIONAL
Serving the World of Measurement

Course Catalog Number: Tmf-3
Course Track: Force Measurements
Course Topic: Calibration
Course Career Level: Beginner

Monday, August 25 | 1:00 PM - 5:00 PM | 1/2-Day PM (4 Hours)

Course Title: Force Calibration for Everyone with a Focus on Measurement Errors and Risk

Instructor: Henry Zumbrun, Morehouse Instrument Company, Inc.

Abstract: Not familiar with all the sources of measurement error in relation to force measurements? These errors include proper calibration adapters. Did you know, using a top block for compression loading can produce up to a 0.5 % error if the end user is using something with a different hardness and /or flatness. Using the wrong pin size on a tension link can cause a 2 % error on a device with an accuracy of 0.1 % of full scale. The measurement errors demonstrated and discussed will include errors associated with improper alignment and use of different and/or incorrect adapter types, thread depth and thread loading as well as some load cell troubleshooting techniques. We will also discuss over 20 common major error sources and how to avoid them. We will then focus on *ISO/IEC 17025:2017* section 6.4.5 “The equipment used for measurement shall be capable of achieving the measurement accuracy and or measurement uncertainty required to provide a valid result.” Taking this section into account, we will discuss measurement decision risk with a focus on *ANSI/NCSL Z540.3* Method 5 and Method 6 and how the Test Uncertainty Ratio (TUR) impacts the laboratories ability to make statements of conformity to a specification per section 7.1.3 of the *ISO/IEC 17025:2017* standard. All participants will receive a USB drive with several helpful documents and excel sheets. Included will be a risk calculator and an uncertainty template which will simply calculating calibration and measurement capability (CMC) uncertainty component for both force and torque scopes of accreditation.

Learning Objective:

1. Identify and Quantify force measurement errors.
2. Implementation of techniques for proper calibration of equipment.
3. Use the appropriate force equipment and method to make statements of conformance.

Instructor Curriculum Vitae (CV): Henry Zumbrun is President of Morehouse Instrument Company. We create a better, safer world by helping companies improve their force and torque measurements. The key to our success is offering products with the lowest measurement uncertainties available. Ultimately, this helps our customer base make more accurate measurements, which saves on cost, reduces risk, and increases quality. My passion is to help any lab make better force measurements. I want to explain error sources and how to use this knowledge so that you can make better measurements. There are so many labs out there who take short cuts, or do not follow the proper guidelines and they may be calibrating your equipment. This equipment may then be responsible for bridges collapsing, product failures, or satellites exploding. These measurements are serious and we welcome anyone wanting to make better measurements into this, or any other class.

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