

NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM

PRECISION & PERFORMANCE

with Measurement Science

AUGUST 12-17, 2017

Gaylord National Convention Center, National Harbor, Maryland



Tutorial Program
August 12-14

Exhibition Hall
August 14-17

Technical Program
August 15-17



NCSL INTERNATIONAL
Serving the World of Measurement



HOTEL Gaylord National Convention Center

201 Waterfront Street
National Harbor, MD 20745, US
301-965-4000

Reservations: 1-877-491-0468
NCSLI Group Rate: \$184
Government Rate: \$172

EXHIBITORS

- Acucal, Inc.
- ACR Technical Services Inc.
- AccuMac Corporation
- Additel Corporation
- A.K.O. Inc.
- Alcohol Countermeasure Systems Corp.
- Alpha Electronics Corporation
- American Association for Laboratory Accreditation (A2LA)
- Ametek Land, Inc.
- Ametek Test & Calibration Instruments
- Andeen-Hagerling, Inc.
- ANSI-ASQ National Accreditation Board
- ASQ-MQD
- AssetSmart
- Bionetics Corporation
- Cal Lab Solutions, Inc.
- Colorado Engineering Experiment Station Inc. (CEESI)
- Conference on Precision Electromagnetic Measurements (CPEM)
- Consumers Energy Co.
- ESSCO Calibration Laboratory
- EURAMET
- Evolution Scientific, Inc.
- Exelon PowerLabs
- Flexim Americas Corporation
- Fluke Calibration
- GE Measurement & Control Solutions
- GEO Calibration
- Guildline Instruments Limited
- ID Label Inc.
- IndySoft Corporation
- Interface, Inc.
- International Accreditation Service
- ISOTECH North America
- Keysight Technologies
- King Nutronics Corporation
- Liberty Labs, Inc.
- Mahr Federal, Inc.
- Masy Systems, Inc.
- Measurements International
- Measurement Science Conference
- Mensor
- Mettler-Toledo, LLC
- Michell Instruments, Inc.
- Mitutoyo America Corporation
- Morehouse Instrument Company
- NIST - Calibration Services
- National Physical Laboratory (NPL)
- National Research Council of Canada (NRC)
- National Metrology Inst. of Japan (NMIJ/AIST)
- Northrop Grumman
- Norway Labs
- NCSA Technologies & Tra-Cal Labs
- National Voluntary Laboratory Accreditation Program (NVLAP)
- OHM-Labs, Inc.
- On Time Support, Inc.
- Polycontrols
- Pond Engineering Labs, Inc.
- Pratt & Whitney Measurement Systems
- Precision Environments Group
- Qualer
- Quality Magazine
- Ralston Instruments
- RH Systems
- Ricelake Weighing System
- Sartorius Corporation
- Snap-on Specialty Tools
- Standard Calibrations, Inc.
- TEGAM, Inc.
- The Boeing Company
- The Modal Shop, Inc.
- Thunder Scientific Corporation
- Time Electronics
- Tovey Engineering, Inc.
- Transcat, Inc.
- Transmille Calibration
- Trescal, Inc.
- Troemner, LLC
- Vibration Research
- Western Environmental Corporation
- WorkPlace Training

CONFERENCE REGISTRATION

Full Conference Registration Rates Monday, August 14 - Thursday, August 17, 2017

	Regular Rate Ends May 31	Late Rate Begins June 1
Member/Non-Member	\$1,195/\$1,295	\$1,395/\$1,495
One Day Registration Member/Non-Member	\$395/\$495	\$445/\$545
One Day Registration includes: Exhibition Hall, Technical Program and Luncheon for that day.		
Extra Luncheon Ticket	\$45	\$45

Full Conference Registration Includes:

Exhibitor Welcome Reception Monday Evening
Entrance into Exhibition Hall including:
Poster Presentations, Metrology Mixers!
Technical Program Oral Presentations
Learning Labs (New this year! NCSLI Members Only)
Luncheon
Keynote Presentations on Tuesday, Wednesday
and Closing Keynote Breakfast on Thursday
Materials Bag
Committee Meetings
Lots of Networking!

ADDITIONAL PAID WORKSHOPS Tutorial Program Registration Rates Saturday, August 12 - Monday, August 14, 2017

	Regular Rate Ends May 31	Late Rate Begins June 1
1/2-Day Class Registration Member/Non-Member	\$295/\$395	\$325/\$425
1-Day Class Registration Member/Non-Member	\$495/\$595	\$525/\$625
2-Day Class Registration Member/Non-Member	\$695/\$795	\$725/\$825

Tutorial Program Registration Includes:

Continental Breakfast
Afternoon Drinks and Snacks
Amazing Hands-on Training
Materials Bag
(Tutorials with Full Conference Registration only)
Lots of Networking!
Lunch is not included
(There are many onsite restaurants to choose from)

SPONSORS



KEYNOTE SPEAKER

Craig Bomben

Boeing Test & Evaluation



Capt. Craig Bomben is the vice president of Flight Operations for Boeing Test & Evaluation and enterprise chief test pilot. Named to this position in 2015, Bomben provides operational leadership and business oversight for all flight operations, including developmental and production flight tests of Boeing commercial airplanes and military aircraft. Bomben also serves as the skill team captain for pilots across the enterprise.

Bomben assumed the additional responsibility as the VP BT&E Design Build in May 2016. The Design Build Team is responsible for the design, build and ultimate cost of both BT&E Lab Test and Flight Test Value Stream test articles.

Bomben also serves as the Boeing Executive Focal to Washington State University and serves as a board member on the Academic Advisory Board for the Voiland College of Engineering and Architecture.

Prior to his current role, Bomben was the BT&E chief test pilot for military aircraft for two years. In that role, Bomben led a team of pilots, aircrew and support personnel in the development, demonstration and production testing of all military products.

Bomben previously served as chief production pilot for commercial airplanes, assuring regulatory and safety compliance. He also oversaw day-to-day production test operations, including customer acceptance of airplanes.

Prior to assuming the role of chief production pilot for commercial airplanes in 2011, Bomben was responsible for conducting

production and engineering flight tests on ZA004, the third 787 Dreamliner to enter flight test, and was a deputy chief pilot for the 737.

Before joining Boeing as a production flight test pilot in 2006, Bomben was a research test pilot for NASA's Dryden Flight Research Center at Edwards Air Force Base, California for six years. His assignments included a variety of research and support activities while piloting the F/A-18, F-15B, T-38, DC-8, T-34C and King Air aircraft.

A 1987 graduate of the Naval Aviation Officer Training School, Bomben began his naval flying career in 1985 and his test pilot career in 1992 when he graduated from the Naval Test Pilot School. During his 16-year active Navy career, he conducted developmental flight testing of the F14D and FA-18 aircraft as well as the CT-133 and CF-188 aircraft. Bomben led numerous multi-national missions over Iraq in support of Operation Southern Watch and Operation Desert Storm. In 2001, Bomben transitioned to the Naval Reserves as the operations officer for Joint Forces Component Command, San Diego. As a reservist he was called on to serve in Operation Iraqi Freedom and Operation Southern Watch.

Bomben holds a bachelor's degree in electrical engineering from Washington State University and an Executive MBA from the University of Washington, Foster School of Business. Bomben holds type ratings in all current Boeing production models, and has accumulated more than 8,000 hours of flying time in more than 75 different types of aircraft.

TUTORIAL PROGRAM

Saturday, August 12 - Monday, August 14, 2017

Hands-on Training by Industry Experts

Even with the many advances in the training industry, traditional formats remain viable and effective. Classroom or Instructor-led training remains one of the most popular training techniques. It is a personal, face-to-face type of training as opposed to computer-based training and other methods.

Training programs are more beneficial when they provide many opportunities for practicing a skill. Hands-on training means you get to use your hands to perform tasks. This training aims to make conditions as realistic as possible. The biggest benefit of hands-on training is the opportunity for repeated practice.

Now with
3 Full Days
of Tutorials
Starting
Saturday!

SATURDAY & SUNDAY | AUGUST 12-13, 2017
8:00 AM - 5:00 PM (2-DAY)

T1 Evaluation of Measurement Uncertainty: Concepts, Tools, and NIST Guidelines

Instructor: Dr. Antonio Possolo, National Institute of Standards and Technology (NIST)

An introduction to the concepts, tools, and NIST guidelines for the evaluation and expression of measurement uncertainty. No previous familiarity with mathematical techniques for uncertainty evaluation is required, but the participants are expected to have taken a college level calculus course, and to have an interest and skills in computing, for example using R or Matlab®.

SATURDAY | AUGUST 12, 2017
8:00 AM - 5:00 PM (1-DAY)

T2 Understanding ISO/IEC 17025 and Most Common Deficiencies

Instructor: Pam Wright, American Association for Laboratory Accreditation (A2LA)

This full-day tutorial covers ISO/IEC 17025 requirements as well as the ten most commonly cited deficiencies for laboratories that are currently accredited, are in the process of obtaining their ISO 17025 accreditation or for those who are interested in applying the ISO 17025 requirements in their laboratory.

T3 Programmable Josephson Voltage Standard Systems

Instructors: Charles Burroughs, National Institute of Standards and Technology (NIST), Alain Rufenacht, National Institute of Standards and Technology (NIST)

An introduction to the operation and theory of the Programmable Josephson Voltage Standard system. A prototype system will be running for training purposes. We will discuss the basics of Josephson Voltage Standards and the particulars of implementation in the PJVS system. Examples of calibration measurements performed with the PJVS system will be covered, as well as Best Measurement Practices in order to eliminate systematic errors.

T4 Control Charts and Stability Analysis for Calibration Laboratory Reference Standards

Instructor: Jeff Gust, Fluke Calibration

This tutorial provides instruction on how to develop control charts for reference standards utilized in the calibration laboratory. The tutorial will primarily discuss electrical standards, but the application is valid for any metrological discipline. The primary focus will be an in-depth discussion of using linear regression to have a more complete understanding of all sources of uncertainty associated with reference standards. The tutorial also provides ideas about using control charts for daily use of check standards for calibrations that may perform a single measurement such as gage blocks. Real world examples of Laboratory Reference Standards will be used during the tutorial.

T6 Train the Trainer: Peer Review for Improved Performance

Instructor: Jovie Masters, The Training Clinic

Feedback is essential for performance improvement. As an instructor, our peers' feedback is invaluable in helping us achieve the competencies necessary to maximize our performance. In this course you will review the essentials of feedback and the NCSLI instructor feedback process. You'll apply these techniques during practice sessions in which you will provide feedback to instructors and get critiqued on your peer feedback techniques. NCSLI strives to be a learning organization. This workshop prepares you to participate as a Peer Review Official in the Peer-to-Peer Instructor Evaluation process.

T7 Temperature Monitoring and Traceability in the Cold Chain

Instructor: Dr. Cesar (Jun) D. Bautista Jr. MBA, PhD, Masy BioServices

In this course, participants will learn effective temperature monitoring strategies for use in cold-chain transport and storage of temperature-sensitive products. As the range of temperature-sensitive products in our world continues to increase, so does the demand for accurate, traceable temperature monitoring solutions, coupled with cost-effective calibration methodologies. This one-day seminar is designed to address the needs of staff directly involved with the management, storage and transport of cold-chain products, as well as device manufacturers and calibration facilities endeavoring to meet the needs of this rapidly-expanding field. The seminar includes a lecture session followed by a hands-on learning experience.

SUNDAY | AUGUST 13, 2017
8:00 AM – 5:00 PM (1-DAY)

T8 Effective Calibration Interval Analysis

Instructor: Mark Kuster, Pantex Metrology

The lack of interval analysis negatively impacts a test and measurement program, driving up both support and consequence costs due to overly short and long calibration intervals. A poorly conceived or implemented interval analysis system will not fare well either. This tutorial targets the fundamental concepts and practices upon which to establish, evaluate, or modify systems and procedures to start or revive an effective manual or automated interval analysis system. The tutorial will break down the interval analysis implementation process and examine it phase by phase to make recommendations. Topics covered include basic interval analysis theory and background, method selection and effectiveness, available software and other resources, data requirements for calibration management systems, instrument grouping, dogs & gems, reliability targets, initial intervals, data quality, configuration management, interval adjustments, due date extensions, delay dating, off-target reliability analysis and program evaluation. Hands-on exercises will reinforce the material covered. Attendees will receive spreadsheet tools for computing calibration intervals suitable for use on Linux, Mac OS or Windows. To participate in all exercises, attendees should bring a device capable of running spreadsheet software such as LibreOffice Calc or Microsoft Excel.

T9 The Art of Resistance Metrology from Micro-Ohms to Tera-Ohms

Instructors: Marlin Kraft, National Institute of Standards and Technology (NIST), Kai Wendler, National Research Council Canada (NRCC)

This tutorial provides an overview of calibration techniques used at NRC and NIST. The tutorial will cover calibrations from 10 micro ohms to 100 Tera Ohms and will discuss various measurement systems and techniques. A section will be dedicated towards laboratory measurement standard characteristics, including drift, temperature coefficients, power coefficients and measurement system characteristics.

The tutorial is targeted towards the meteorologist making the measurements in the laboratory, from new hires to grizzled veterans. This knowledge will improve their understanding of the measurements being in made in the lab.

T10 Quality Tools Applied to Metrology

Instructor: Georgia Harris, National Institute of Standards and Technology (NIST)

This interactive tutorial is designed for providing a basic knowledge of quality tools and processes through mini lectures, hands-on and team application ideas, and exercises for metrology. Through this session, participants will be able to: describe 7 quality tools and 5 processes (Cause and Effect Diagram, Check/Data Sheet, Control Chart, Histogram, Pareto Chart, Scatter Diagram, Flow Chart, Plan-Do-Check-Act, Gantt Chart, SWOT Analysis, Brainstorming, and Five Whys) and apply all tools and processes to at least one metrology example, such as Root Cause Analyses efforts, through hands-on case studies conducted during the session and that can immediately apply in the laboratory.

T11 Pressure Metrology

Instructor: Michael Bair, Fluke Calibration

This full day tutorial covers all the fundamental challenges of calibrating pressure instruments. The first half of the tutorial concentrates on the physics that have an effect on pressure measurement, including measurement modes, engineering units, the equation for a dead weight pressure gauge, the ideal gas law, surface tension and viscosity. The discussion includes practical considerations such as hardware selections, environmental concerns and data acquisition for all modes, fluids and ranges. The second half applies those concepts to hands on exercises with equipment supplied by the instructor. All participants will have the opportunity to take low pressure gas and high pressure oil calibrations. Error analysis and sources of uncertainties are discussed that are relevant to the hands on exercises.

T12 Intermediate Dimensional Metrology

Instructor: Dr. Ted Doiron, National Institute of Standards and Technology (NIST)

There are a large number of books on Dimensional Metrology, and a few classes and tutorials, but nearly all of them are at the beginner level - how to use the instruments for inspection. Thermal expansion, elastic deformation, stability, refractive index of air, closure and reversal methods, and the large collection of tricks-of-the-trade that make up Dimensional Metrology are generally ignored. This tutorial will be an overview of important techniques and concepts not covered in books and classes. Each concept will be presented with examples of how the techniques make measurements more accurate, and in some cases, more efficient.

T13 RF Power Calibration Centric

Instructor: Andy Brush and Charlie Sperrazza, Tegam

Do you measure RF or microwave power, and need to learn more about traceability and error budgets for these measurements? This course will cover:

- Basics of RF power terminology.
- Understanding power flow equations.
- Measuring RF Power using DC substitution and water-flow thermal methods.
- Tracing RF power measurements through DC and VNA measurements.
- Construction, calibration, and use of transfer standards from microwatts to kilowatts.
- Sources of error in RF measurements, with practical examples of error budgets.

The course is focused on technicians and metrologists who need to calibrate power sensors and create error budgets for testing power sensors. Time will be split between calibration of low-power terminating sensors using feed-through standards with splitters, and calibration of throughline wattmeters using water-flow calorimeters and/or coupler-based transfer standards.

T14 Introduction to Automated Calibration using Microsoft® VB.NET®, C# and Metrology.NET™

Instructor: Michael Schwartz, Cal Lab Solutions

Learn how to write and deploy cutting edge, automated metrology software using the industry standard software tools like VB.NET and C#. Now with VB.NET mixed with Metrology.NET® infostructure & tools, metrology engineers can build better metrology solutions for simple to complex instruments. Attendees will learn how to use the Metrology.NET tools to develop automation and integrated uncertainty calculations all controlled from the convenience an iPad or web browser.

T16 Auditing, Traceability, and Auditing Traceability: Getting Ready for the Upcoming ISO/IEC 17025:2017

Instructors: Isabelle Amen, Leader, National Research Council of Canada (NRC), Kari Harper, NVLAP, National Institute of Standards and Technology (NIST)

This tutorial examines the principles of auditing, the concepts of metrological traceability and tools to apply auditing principles in demonstrating the chain of traceability for measurement results. Auditing concepts such as objective evidence, the internal audit process, and interpersonal skills for auditors will be presented. In the traceability section, emphasis will be placed on the importance of appropriate records for all aspects of the management system and their interdependency with metrological traceability and reporting of results. Using the described auditing principles, both companies with new or mature quality systems will have better success in the auditing process and control of the records necessary to demonstrate the metrological traceability of their measurement results to the International System of Units (SI).

SUNDAY | AUGUST 13, 2017
8:00 AM – 12:00 PM (1/2-DAY)

T15 Fundamentals of Temperature Calibration

Instructor: Mike Coleman, Fluke Calibration

This tutorial is a review of the fundamentals of temperature calibration. Topics include calibration equipment, calibration techniques, curve fitting issues, and the mathematics important to thermometry. Types of thermometers covered include platinum resistance thermometers, thermistors, thermocouples, and combined thermometer/readout systems. This segment is intended for those who are new to temperature calibration, those who need to validate what they already know, or those who just have some nagging questions that need to be answered

SUNDAY | AUGUST 13, 2017
1:00 PM – 5:00 PM (1/2-DAY)

T17 Fundamentals of Torque Calibration

Instructor: Henry Zumbrun, Morehouse Instrument Company

The tutorial will cover the problems with torque measurements, torque traceability and the calibration hierarchy, types of torque standards, the sources of measurement error, and torque wrenches and the proper handling techniques Anyone participating will have enough information to correct problems and start making better torque measurements.

T18 Advanced Topics of Temperature Calibration

Instructor: Mike Coleman, Fluke Calibration

This tutorial continues to build on the principles established in the Fundamentals of Temperature Calibration course. The objective of this course is to deliver the concepts needed to help a metrologist or calibration professional to design an accredited temperature calibration process. The calibration process design will be presented and explored by assembling a GUM compliant uncertainty analysis. In addition, other advanced concepts such as thermocouple theory and ITS-90 fixed-points and mathematics will be presented to provide additional background knowledge and techniques. It isn't required to attend the Fundamentals of Temperature Calibration course before this course but familiarity with fundamental concepts is necessary.

MONDAY | AUGUST 14, 2017
8:00 AM – 5:00 PM (1-DAY)

T19 Risk Based Thinking in Metrology

Instructor: Andy Oldershaw, National Research Council Canada (NRCC)

Risk based thinking has been a growing trend spreading to all aspects of the economy and society for many years. It will become more prominent for laboratories with the adoption of the upcoming ISO/IEC 17025 revision. This module will help those involved planning, managing, implementing and reviewing any aspect of laboratory management systems to apply risk based thinking to determine what the emphasis on risk means to their laboratory. Tools and techniques to identify, analyze, respond to, monitor and review risks will be introduced. Participants will have the opportunity to put them into practice during class room exercises.

T20 High Current DC Measurements and Safety Considerations

Instructor: Mark Evans, Guildline Instruments

This tutorial will cover Precision DC high current measurements and high current sourcing using a 300A current source, several different types of current shunts and associated types of high current cabling. Participants will be able to use different setups and have hands-on practice and to see how different setups affect measurements. Involvement in this workshop will provide the participants with tangible demonstration of the considerations to making good consistent measurements with high current. The participant will receive not only the best practices for these measurements, but the understanding why the techniques demonstrated are the best practices. Design considerations for high current will also be discussed. The measurements with high current will be explored from the perspective of measurement uncertainty such that the effect of the consideration outlined can be quantified in a real-world, practical uncertainty budget. Measurement parasites that affect high current measurements will also be covered. Safety which is an important consideration of high current measurement, safety considerations shall also be covered.

T21 Applying LEAN in a Calibration Laboratory Environment

Instructor: Dean S. Williams, Duke Energy

This hands-on, interactive tutorial provides the basic history and principles of LEAN and how those principles can be applied in a calibration laboratory. Interactive exercises and simulated "calibration labs" run by class participants enhance learning and knowledge retention. Insights and examples from calibration labs that have applied LEAN initiatives are provided to further reinforce the principles. These initiatives helped reduce waste and shorten calibration turn times while streamlining overall operations. Participants will be provided with handouts that document the information presented, contain useful exercises, and provides a list of helpful resources for future reference and study

T22 Dimensional Test Uncertainty

Instructors: Jim Salsbury PhD, Mitutoyo America

New concepts and rules have begun to significantly decrease the measurement uncertainty values reported in calibrations that involve conformity assessment of measuring instruments (verification testing or tolerance-type calibration). The attendees of this tutorial will learn about the uncertainty concepts in the international standard ISO 14253-5:2015 along with background, logic, and some extensions of the key concepts. This tutorial is not complex mathematically but goes deep into the understanding of calibration versus verification. This tutorial will utilize exercises and practical examples from the dimensional metrology field. All attendees should have a basic understanding of measurement uncertainty in accordance to ISO/IEC Guide 98-3 (GUM).

T23 Microwave Measurement Basics

Instructor: Ron Ginley, National Institute of Standards and Technology (NIST)

Do you want to learn more about microwave measurement techniques? This session is the place to be! An introduction to the measurement concepts for microwave power and scattering-parameters will be covered. Specific topics covered will include transmission line theory, practical handling or the do's and don'ts for transmission lines and microwave connectors, Vector Network Analyzer calibration/measurements and real world sources of uncertainties, microwave power detectors types, power measurements and uncertainties, and the session will conclude with a discussion of verification techniques for microwave measurements.

MONDAY | AUGUST 14, 2017
8:00 AM – 12:00 PM (1/2-DAY)

T25 Dynamic Sensors & Calibration

Instructor: Mike Dillon, The Modal Shop

This four-hour tutorial on vibration calibration will dive into calibration theory, standards and methodology for dynamic sensors as well as explanations of different sensor types and the operational theories behind them.

Outcomes:

- Attendees will gain a better understanding of how piezoelectric, piezoresistive, capacitive, shock, vibration and pressure accelerometers function.
- Attendees will gain a better understanding of high frequency, low frequency, shock, pressure, portable vibration calibration and methods.
- Attendees will gain a better understanding of calibration theory and dynamic sensors.

T26 Force Calibration

Instructor: Henry Zumbrun, Morehouse Instrument Company

This tutorial will cover applied force calibration techniques. It will cover the importance of calibrating force measurement devices in the way they are being used to reduce measurement errors and lower uncertainty. Anyone participating will have enough information to correct problems and start making better force measurements.

TECHNICAL PROGRAM

Oral Presentations

SESSION 1

TUESDAY, AUGUST 15, 2017 | 10:30 AM - 11:30 AM

IA - Metrology Education

Topic: Metrology Integration in University Courses

A Framework for Training Classes for Dimensional Measurement Incorporating 3D Printing Artifacts

Dr. Joseph Fuehne, Purdue University

Design of Didactic Fixture and Gages as a Final Project of the Talent Development Program

Dr. Flora Mercader-Trejo, Universidad Politécnica de Santa Rosa Jáuregui

IB - Cutting Edge Metrology

Topic: The New SI: Looking Into the Future

Addressing the Need for Wider Access to the SI Unit of Mass Following the Revision of the International System of Units

Dr. Stuart Davidson, National Physical Laboratory (NPL)

Accurate and Not So Accurate Mass Metrology: How Redefining the Kilogram Makes Metrology Better

Dr. Richard Green, National Research Council of Canada (NRCC)

IC - Electrical Measurements

Topic: Voltage

Use of the Binary Voltage Divider for Traceably Verifying DC Voltage Linearity on 8.5 Digit Calibrators and DMMs

Jack Somppi, Measurements International Ltd.

Experiments to Extend the Retrace Specification of Fluke Zener Reference Standards

Jeff Gust, Fluke Calibration

ID - Mechanical Measurements

Topic: Dimensional

A Submicron Automated Precision Line Scale Calibration System Developed at the Standards and Calibration Laboratory (SCL)

Henry CHIU, Standards and Calibration Laboratory

Accuracy and Uncertainty Characterization of the New NIST High Accuracy ID Laser-Based Micrometer

John Stoup, National Institute of Standards and Technology (NIST)

SESSION 2

TUESDAY, AUGUST 15, 2017 | 1:00 PM – 2:00 PM

2A – Metrology Education

Topic:

Panel: Best Practices and Lessons Learned on University Outreach

Panelists: Salvador Echeverria, Centro Nacional de Metrología (CENAM); Joe Fuehne, Purdue University College of Technology; Georgia Harris, National Institute of Standards and Technology (NIST); William Hinton, Retired Seabrook Station; Claudia Santo, Laboratorio Tecnológico Del Uruguay (LATU)

2B – Mechanical Measurements

Topic: Pressure

Analysis of a Quantum Based Refractometer to Replace Mercury Manometers as the Primary Standard for the United States

Jacob Ricker, National Institute of Standards and Technology (NIST)

A New Semi-Automated System for the Determination of Effective Area of Ruska/Fluke Calibration 246X Piston-Cylinders

Michael Bair, Fluke Calibration

2C – Thermodynamic

Topic: Temperature

Microwave Thermal Analysis and Calibration for Additive Manufacturing

Dr. Ryan Murphy, Sandia National Laboratories

Intermediate Checks of Thermometry Fixed-Points

Douglas Gee, National Research Council Canada (NRCC)

2D – Cutting Edge Metrology

Topic: The New SI: What's Next

Quantum Based Redefinition of the Pascal for Primary Pressure Standards and Measurements

Jay Hendricks, National Institute of Standards and Technology (NIST)

The Next Generation of Metrology – Quantum SI

Gregory Strouse, National Institute of Standards and Technology (NIST)

SESSION 3

TUESDAY, AUGUST 15, 2017 | 2:30 PM - 4:00 PM

3A – Metrology Education

Topic: STEM Outreach

Engineering for Teachers: A Case Study of Professional Development for K-12 STEM Teachers

Hy Tran, PhD, Sandia National Laboratories

STEM and Metrology Education Outreach in New Hampshire

William Hinton, Hinton Technical Services, LLC

A New, Gateway Class Emphasizing Metrology

Dr. Joseph Fuehne, Purdue University

3B – Mechanical Measurements

Topic: Force

Refurbishing the NIST 4.45 MN Deadweight Force Standard Machine

Rick Seifarth, National Institute of Standards and Technology (NIST)

Development of Capabilities for Realization and Dissemination of SI-Traceable Dynamic Force

Akobuije Chijioke, National Institute of Standards and Technology (NIST)

A Fabry-Pérot Optical Cavity as Nanonewton Force Calibration from Photon Momentum

Dr. Ryan Wagner, National Institute of Standards and Technology (NIST)

3C – Electrical Measurements

Topic: Current

Use of Current Transformers in Calibrations of Rogowski Coils at High Pulsed Currents

Dr. Branislav Djokic, National Research Council of Canada (NRCC)

Ultrastable Low-noise Current Amplifier – A New Tool for Small Current Metrology

Dr. Hansjörg Scherer, Physikalisch-Technische Bundesanstalt (PTB)

From Counting Electrons to Calibrating Ammeters: Improved Methodologies for Traceable Measurements of Small Electric Currents

Dr. Stephen Giblin, National Physical Laboratory (NPL)

3D – Quality Systems and Management

Topic: Maintaining Laboratory Quality

Using Analytics to Optimize M&TE Inventory: A Case Study

Dean S. Williams, Duke Energy

Increased Out-of-Tolerance Incidents Customer Complaint Case Study

Ms. Jennifer Fleenor, Tektronix

Effective Audit Preparation

Guy Robinson, Tektronix

SESSION 4

WEDNESDAY, AUGUST 16, 2017 | 10:30 AM - 11:30 AM

4A – Metrology Education

Topic: Professional Development

Panel: Early Career Professionals and Career Planning

Panelists: Cody Luke, The Boeing Company; Matt Aloisio, Radian Research; Travis Gossman, Rockwell Collins; Leah Lindstrom, The Boeing Company; Jennifer Fleenor, Tektronix

4B – Mechanical Measurements

Topic: Mass

Development of a New Scale for Aircraft Weighing

Gerhard Mihm, Technical Center for Information Technology and Electronics, Germany

From the kilogram of one..... to the metric tonnes: Large Mass calibrations at NIST

Kevin Chesnutwood, National Institute of Standards and Technology (NIST)

4C – Quality Systems and Management

Topic: Measurement Data Management

Panel: Vision, Progress and Discussion: A Metrology Information Infrastructure

Panelists: Colin Walker, Qualer; Mark Kuster, Pantex Metrology; Michael Schwartz, Cal Lab Solutions

4D – Electrical Measurements

Topic: Resistance

Calibration of Programmable Loads

Dr. Steven Yang, Standards and Calibration Laboratory

Unmasking a Known Unknown, The Frequency Dependence of dc Standard Resistors

Kai Wendler, National Research Council Canada (NRC)

SESSION 5

WEDNESDAY, AUGUST 16, 2017 | 1:00 PM – 2:00 PM

5A – Metrology Education

Topic: | Abstract

Panel: A New Professional Recognition Scheme for Metrologists

Panelists: Keith Bevan, NPL; Gary Confalone, East Coast Metrology; Georgia Harris, NIST; Pete Loftus, Rolls Royce; Tim Prior, NPL

5B – Mechanical Measurements

Topic: Dimensional

Sphere Diameter Measurement by Interferometry with Repeatability that Breaks the Nanometer-Picometer Threshold

Eric Stanfield, National Institute of Standards and Technology (NIST)

X-Ray Computed Tomography for Dimensional Metrology

Dr. Meghan Shilling, National Institute of Standards and Technology (NIST)

5C – Statistics, Measurement Uncertainty, Measurement Decision Risk

Topic: Uncertainty

Panel: Inferred Uncertainty and Traceability?

Panelists: Dr. Charles Ehrlich, NIST; William Guthrie, NIST; Warren Merkel, NIST; Jeff Gust, Fluke Calibration; Steven Phillips, NIST; Bill Miller, Lockheed Martin; Denver Metrology services

5D – Quality Systems and Management

Topic: Metrology in a Global Environment

Metrology, Citizenship and Trust: Metrology and its Social Value in Society

Dr. Salvador Echeverria-Villagomez, Centro Nacional de Metrologia, Mexico

Maintaining Quality in a Global Calibration Partner Program

Paul Packebush, National Instruments

SESSION 6

WEDNESDAY, AUGUST 16, 2017 | 2:30 PM – 4:00 PM

6A – Metrology Education

Topic: Industry Partnerships and Education

Relationship between Biomedical Engineering and Metrology for Project Development

Roberto Benitez, Etalons SA de CV

The Inclusion of Didactic Metrological Activities in Education

Julio Jimenez, Universidad Politecnica de Santa Rosa Jaureui

Industry Partnering with Higher Education, “Driving Business Success”

Steven Stahley, Cummins Inc.

6B – Mechanical Measurements

Topic: Mass

Calibration of Environmental Sensors for Mass Metrology

Edward Mulhern, National Institute of Standards and Technology (NIST)

Primary Reference for Small Mass Based on Electrostatics

Dr. Gordon Shaw, National Institute of Standards and Technology (NIST)

Comparison of Gravimetric and Resonator Based Mass Measurements

Dr. Hamza Shakeel, National Institute of Standards and Technology (NIST)

6C – Statistics, Measurement Uncertainty, Measurement Decision Risk

Topic: Conformance Testing

Should the Repeatability of the Instrument Under Test be Included in Test Uncertainty?

Dr. Craig Shakarji, National Institute of Standards and Technology (NIST)

Measurement Uncertainty, Decision Risk, and the Contract Process

Travis Gossman, Rockwell Collins

Strategies for Dealing with Low Test Uncertainty Ratios

Dr. Dennis Jackson, NSWC, Corona Division

6D – Precision & Performance

Topic: Safety and Measurement Methods

Measurement in Food Safety

Ms. Wanji Yang, APLAC

Technical Challenges in the Development of a New UHV Pressure Standard (Cold Atom Trap Vacuum Standard)

Ms. Julia Scherschligt, National Institute of Standards and Technology (NIST)

Affordable Humidity Calibration for Small Labs

Guy Robinson, Tektronix

SESSION 7

THURSDAY, AUGUST 17, 2017 | 10:30 AM - 11:30 AM

7B - Mechanical Measurements

Topic: Pressure & Flow

Determination of the Blockage Effect on a Thermal Anemometer using a Small Open Jet Wind Tunnel

Dr. Stephen Rickaby, Antech Calibration Services

Modernized Piston Gauge Calibrations at NIST

Julia Scherschligt, National Institute of Standards and Technology (NIST)

7C - Electrical Measurements

Topic: Voltage

Qualification and Uncertainty Analysis of an Electric Field Mill Calibration System

Dr. Elizabeth Auden, Sandia National Laboratories

Maximum Voltage and Possible Over Voltage Failure Mechanism of Multijunction Thermal Converters

Dr. Stefan Cular, National Institute of Standards and Technology (NIST)

SESSION 8

THURSDAY, AUGUST 17, 2017 | 1:00 PM - 2:00 PM

8A - Quality Systems and Management

Topic: ISO/IEC 17025 Compliance Challenges

Decision Rule Reporting to Comply with Revised ISO/IEC 17025

Bob Stern, Keysight Technologies

Balancing Cost Savings and ISO/IEC 17025

Gary Bennett, National Instruments

8B - Global Standards

Topic: International Collaborations

EA-Sponsored Interlaboratory Comparisons in Europe: The Process and the Lessons Learned

Simona Klenovska, Czech Metrology Institute

SI Redefinition and the Role of the CODATA Task Group on Fundamental Constants

Dr. Barry Wood, National Research Council of Canada (NRCC)

8C - Electrical Measurements

Topic: Electrical

Understanding Transducer Calibration and Recent Technological Improvements

Kevin Van Popering, Vibration Research

Effects of Lead Construction and Materials on AC Voltage Measurements

Michael Bailey, Transmille Ltd

SESSION 9

THURSDAY, AUGUST 17, 2017 | 2:30 PM - 4:00 PM

9A - Metrology Education

Topic: Metrology Outreach and Collaboration

Metrology Outreach and Training: A Fulbright Experience in Mexico

Ms. Georgia Harris, National Institute of Standards and Technology (NIST)

Experience of Uruguay Bringing Metrology Closer to the Population

Claudia Santo, Laboratorio Tecnológico Del Uruguay (LATU)

Metrology and Higher Learning

Ben Jack, JM Test Systems

9B - Cutting Edge Metrology

Topic: Mass

Redefining the Kilogram: Chemistry Perspective

Dr. Juris Meija, National Research Council Canada (NRC)

The Measurement of the Mass of a Magnetically Suspended Artifact and its Uncertainty

Dr. Corey Stambaugh, National Institute of Standards and Technology (NIST)

Redefinition of the Kilogram: The Effect on Mass Dissemination from NIST

Patrick Abbott, National Institute of Standards and Technology (NIST)

9C - Quality Systems and Management

Topic: Software

How New Technology Can Automate OOT Reporting and Close the Measurement GAP

Chris Campbell, AssetSmart

Progress Report Standardized XML Representation of ISO/IEC 17025 Scope of Accreditation Data

David Zajac, Cal Lab Solutions, Inc.

The New ISO 17034 and Reference Material Producer Accreditation

Ms. Ashly Carter, American Association for Laboratory Accreditation (A2LA)

9D - Mechanical Measurements

Topic: Dimensional

Setting the Length of the Meter - How hard could it be?

Dr. Ted Doiron, National Institute of Standards and Technology (NIST)

The Comparison of Different Types of Instruments on Nanoparticle Size Measurements through Interlaboratory Comparisons

Ms. Hsiu-Lin Lin, Center for Measurement Standards/Industrial Technology Research Institute

Concerns with Selecting Calibration Methods and Reporting Results

Jim Salisbury PhD, Mitutoyo America Corporation



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TECHNICAL PROGRAM

Poster Presentations

POSTER SESSION 1

TUESDAY, AUGUST 15, 2017 | 12:15 PM – 1:00 PM

Logical and Cost Effective Calibration Intervals

Tyler Roach, Tektronix

Digital Length Gauge Calibration Optimization Techniques with Reduced Gain and Offset Errors

Wei Lih Ng, Keysight Technologies Malaysia

Exploring the Impact of Teaching Metrology in Manufacturing Processes in Mexico

Dr. Raul Herrera-Basurto, Universidad Aeronáutica en Querétaro

Influence of Micro-environmental Design with Partial Air Conditioning on Mass and Heat Transfer in Greenhouses

Dr. Jiunn-Haur Shaw, Industrial Technology Research Institute (ITRI), Taiwan

Study of High-temperature Three-zone Furnace and Realization of Uniform Temperature Field

Dr. Yan Fan, National Metrology Centre, A*Star, Singapore

The Principles of Evaluating the Economic Feasibility of Expenses for the Creation and Maintenance of the National Measurement Standards at the Required Level

Professor Pavel Neyezhnikov, NSC Institute of Metrology

New Automated Coaxial AC Bridge for Rapid Calibration of AC Resistors

Mariko Koike, Japan Electric Meters Inspection Corporation

Reducing Measurement Uncertainty Using a Smoothing Spline

Michael Dobbert, Keysight Technologies

The Calibration Certificate Statement of Compliance: The End Product of Your Measurement

Emil Hazarian, Wilmington Instrument Company, Inc.

The Impact of Science and Technology on Metrological Traceability

I-jhen Lin, Taiwan accreditation Foundation

The Influence of Different Assigned Value Determination Methods on the Evaluation of Gauge Block Calibration Proficiency Testing Results

Yi-Ting Chen, Center for Measurement Standards/Industrial Technology Research Institute

The Role for Accreditation in the Cannabis Industry

Roger Brauning, American Association for Laboratory Accreditation (A2LA)

Thermometric Fixed Point Cells: Intrinsic Standards or Calibrated Artifacts

Tom Wiandt, Truecal Metrology

MESURA International Network - Metrology, Value Creation and Global Value Chains

Dr. Salvador Echeverria-Villagomez, Centro Nacional de Metrología, México (CENAM)

POSTER SESSION 1, CONTINUED

New NATO Standard ALogP-33 NATO Requirements for Calibration Support of Test & Measurement Equipment

Gerhard Mihm, Technical Center for Information Technology and Electronics WTD 81

Transitioning from Mercury Thermometers to Alternative Thermometers

Dawn Cross, National Institute of Standards and Technology (NIST)

Developing a Standard Test Methodology for the Evaluation of Vaccine Storage Units

Michal Chojnacky, National Institute of Standards and Technology (NIST)

Potential Replacements for the Hg Triple Point on the ITS-90

Weston L. Tew, National Institute of Standards and Technology (NIST)

Ultra-High Resolution Photonic Thermometry

Nikolai N. Klimov, National Institute of Standards and Technology (NIST) (JQI)

Challenging the SPRT - Benchmarking a Photonic Thermometer at ITS-90 Fixed Points

Tobias Herman, National Institute of Standards and Technology (NIST) (JQI)

NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM – AUGUST 12–17, 2017

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Opening Keynotes

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Wildhack Award

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Learning Labs

⚡ Lightning Talks

Networking

Metrology Mixers

Board Meeting

Committee Meetings

Luncheon Buffets

Closing Keynote Breakfast

And More!



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POSTER SESSION 2

WEDNESDAY, AUGUST 16, 2017 | 12:00 PM - 1:00 PM

Accelerated Life Testing of MJTC Using a Microcontroller

Ms. Margaret Edwards, Joint Quantum Institute University of Maryland

Report on the results of a bilateral key comparison of capacitance standards between the BIPM and NMISA, South Africa: Ongoing BIPM key comparison BIPM.EM-K14. a and b)

Michael Khoza, National Metrology Institute of South Africa, (NMISA)

Consideration of Uncertainties from the pH-meter Calibration (electronic unit) in pH Measurement

Saowaluck Ukrisdawithid, Department of Science Service, Thailand

Modernization of the NWS Sterling Field Support Center Laboratories

Dr. Micheal Hicks, National Weather Service (NOAA)

Calibration of Electrostatic Discharge (ESD) Generator in Accordance with IEC61000-4-2: 2008

Dr. Terry Hau Wah LAI, The Standards and Calibration Laboratory, Hong Kong

High Energy - Developing a Unique Partnership for an Accredited Niche Market

Cory Peters, Exelon PowerLabs

Building a Better Bridge to the Asset Management World

Phil Chase, AssetSmart

The Enhanced Performance of the DCC Current Comparator using AccuBridge™ Technology

Duane Brown, Measurements International Ltd.

Best Lessons Learned from FDA Warning Letters 2017

Walter Nowocin, Medtronic

Calibration Capability Analysis for Digital Pressure Gauge through Measurement Audits - the Alternative to Proficiency Testing

Hsiu-Lin Lin, Center for Measurement Standards/Industrial Technology Research Institute, Taiwan

Calibration of the Frame Rate of High Speed Digital Video Recorders by Applying Stationary Counting Method

Dr. Terry Hau Wah LAI, The Standards and Calibration Laboratory, Hong Kong

Characterization of the Dimensions of the Gap on a Laser Triangulation Probe

Wei Ren, National Institute of Standards and Technology (NIST)

Epic Thermometry Battle: Photonics vs Resistance

Zeeshan Ahmed, National Institute of Standards and Technology (NIST)

NIST Report of Weather Station Liquid in Glass Thermometer Metrology

Wyatt Miller, National Institute of Standards and Technology (NIST)

Metrology and Calibration for Navy Laser Weapons: The Need and Importance

Dr. Subrata Sanyal, Naval Surface Warfare Center (NSWC), Corona Division

Metrology and Calibration for Navy Laser Weapons: NSWC Corona Efforts

Dr. Subrata Sanyal, Naval Surface Warfare Center (NSWC), Corona Division

Validation of the Automated Base-Metal Thermocouple Calibration System

Karen Garrity, National Institute of Standards and Technology (NIST)

The Cold Atom Vacuum Standard (CAVS): Creating Vacuum Standards Using Ultra-Cold Atoms

Jim Fedchak, National Institute of Standards and Technology (NIST)

