



NCSLI Meeting Hosted by Philips.

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## Boulder & Denver



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On Thursday, July 19, 2018 the NCSLI Boulder/Denver Section met at Philips Company in Colorado Springs, CO. Included in this section meeting were highly educational talks on topics like uncertainty measurements, flow meters, thermocouple accuracy, measurement standard changes, and much more. The morning kicked off with an introduction of our speakers and by providing useful information for new or returning members. Following this introduction was a

meet-and-greet where our 12 attendees could congregate and get to know one another and exchange information.

Our first presentation was by Dr. Jun Bautista with Micro Quality Calibration, Inc. Dr. Bautista presented “New Concepts & Best Practices in the Calibration of Climatic Chambers.” His focus was on determining levels of unavoidable uncertainty in measurements and calibrations. Highlighting the difference between errors and uncertainty as a matter of the accuracy of the input, formulations involved, and subsequent evaluations. Dr. Bautista cited eight steps to follow correctly in order to determine uncertainty. Also discussed during his presentation were uncertainty elements for 1-P and 2-P dew



Pikes Peak from Garden of the Gods, near Colorado Springs, Colorado.

point generators, measuring humidity levels and electrical resistance using impedance RH hygrometers and methods for the measurement and calibration of newly-designed secondary standards by which laboratories can conduct test-specific queries. After Dr. Bautista's presentation ended, attendees were given a 15-minute question and answer period.

Thomas Kegel with Colorado Engineering Experimentation Station Inc. (CEESI) presented "Coriolis and Ultrasonic Flowmeter Technology." Tom's presentation contained a host of information on flow meter operation and multipath designs in the context of measuring molasses production. Important pieces of this



Dr. Jun Bautista, Micro Quality Calibration, Inc.



Thomas Kegel, Colorado Engineering Experimentation Station Inc. (CEESI).

field of measurement include the pipe friction factor composed of surface roughness and the Reynolds number ( $Re$ ), which are based on flow profile distortion, swirls in the mixture, meter error, and distortion elements. Key diagnostics in the process are gain, signal/noise ratio, speed sound, flow velocity ratios, performance, rejects, turbulence, and standard deviation. Following the briefing on these diagnostics was a demonstration of examples of the Coriolis effect; lessons on meter installation, orientation, flange misalignment, vibration effects, and zero shift. Tom wrapped things up by discussing the final metrological applications of molasses production, which are measuring the variable density and amount of entrained air in each batch.

Next up Dan Jackson with Tegam, Inc. presented “Best Practices of Measuring Temperature with Thermocouples.” Mr. Jackson went over the detriment of thermocouple inaccuracies and the three laws that



Dan Jackson, Tegam, Inc.  
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govern how they work: the law of homogenous material, intermediate metals, and successive/intermediate temperature. Second, he went over cold junction compensation and its accuracy, thermal coefficient and the time constant used. Imperative to the thermocouple discussion is also the matter of electrical safety. Jackson stressed the importance of never touching anything in an elevated electrical level with thermocouples, running thermocouple cables in single wire trays away from the power conductor, and remaining grounded around noisy electrical equipment. Also covered were proper connection procedures for thermocouples; appropriate gauge wire usage to account for high temperature ratings, surface measurements, immersion measurements and risks to consider when dealing with thermocouples.



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After lunch, we sat down to listen to Anna Escarcega with Metrology ERP, Inc. discuss the updated ISO/IEC 17025: 2017 standard in relation to impartiality and risk. Escarcega went more into depth about the goals and risks associated with these changes, as well as the impact of change on things like calibrations and company infrastructure. As a result of these changes, risk and impartiality have become larger components of the standard—initially transparent risks proving quite detrimental to the accuracy and quality of calibrations. Reviewing, identifying, citing, and properly documenting all ID'd risks is an important consideration she highlighted as one of the most important changes to the standard. She also noted that if a laboratory is ISO/IEC 17025:2017 compliant, they are also ISO 9001:2015 compliant. Impartiality is imperative to both of these standards, she said. Regular impartiality and risk assessments are important to the upkeep of impartiality, since lacking

such an attitude can cost people their lives in metrology careers. Escarcega finished up by summarizing the standard changes and refreshing our memories on additional definitions and clause names.

This meeting was full of incredible conversation and immersive training material. Participation and questions were encouraged, and in return both were facilitated by attendees. Our objective of spreading valuable knowledge to new laboratories and the professionals they entail was a success. Regular discussion of risk, updates, procedures, and always exercising impartiality are paramount in the advancement and continued quality assurance of the measurement science world. Changes that are geared toward the improvement of our collective industry must be widespread and common knowledge amongst our experts in order to ensure that each laboratory's discoveries can be distributed across the globe for the betterment of all scientists and engineers.



Meeting attendees.