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Aloha – this word meaning both hello and goodbye fits well as this will be my last president’s message. It has been a pleasure reporting back to the members quarterly, through this message, on the progress we’re making on our strategic plan. During the third quarter, we’ve been no less busy pursuing our goals at the regions, in the committees, at the conference and on the board.

First, congratulations to our Vice President of Conference Management, Terry Conder, our 2008 Conference Director, Tony Anderson, our Meeting Planner, Tom Huttemann, our Business Manager, Craig Gulka, our entire conference committee, the speakers, the exhibitors, the sponsors, the volunteers and the staff who made the 2008 Workshop and Symposium in Orlando a huge success. There were a number of changes made to the conference format and program as a result of both the visioning meeting held in February, and the focus on learning and development as one of the organization’s 2008 key objectives. One new event was the Fundraiser sponsored by Sypris and Tektronix which raised $1500 for the Education Development Fund. There was also an interactive session during the conference where attendees moved from station to station, testing out a variety of outreach tools such as measurement kits and a metric jeopardy game.

See Terry Conder’s 2008 Conference Report for more details on conference highlights – yes, I did get to hold a live alligator for 20 minutes and we’ve got pictures!

Other progress in learning and development includes the first regional training event, held in the Twin Cities in September. Look for a complete report on this inaugural training in an upcoming edition of metrologist. And for all of you federal employees; don’t forget that NCSLI is now listed in the Combined Federal Campaign, code 26683.

At the board meeting in Orlando, we had excellent attendance that included a number of liaisons, international guests and committee chairs. This allowed for a balanced discussion of our strategy in establishing and maintaining relationships with various entities such as Regional Metrology Organizations (RMO), professional organizations and other liaisons. We are looking to formalize relationships through letters of intent, administrative guidelines and board approvals with the intent of having perhaps fewer, but certainly more meaningful relationships with outside organizations in the future.

There are three more months left in 2008 – plenty of time to wrap up a number of projects still underway. The board will be approving next year’s strategic plan at the October board meeting, and soon you’ll be reading about NCSLI’s big plans for 2009!

So here it is at last, finally, the swan song for the 2008 president of NCSLI International. As I reflect back on the past year, I am grateful for many things. I am thankful for the many friends I’ve made through NCSLI, and for the opportunity that I’ve had being part of this great organization and putting some small mark on its history. Also let me express my appreciation for the board of directors of NCSLI, and for the staff in the Boulder office. It was truly my good fortune to have been able to serve and work closely with them. I am grateful that life is longer than one year, since this one has gone by so quickly. So thank you for giving me these experiences, for being a part of NCSLI and for sharing the vision of a bright metrological future. I’ll say farewell for now, but never good bye. Aloha.

Caroline Hockert, NCSLI President
Calendar Highlights

NCSLI Training Center
For detailed information on our classes go to www.ncsli.org.

Integrated Sciences Group
Tel 661.872.1683
October 27–31, 2008
Uncertainty/SPC Analysis
April 27–29, 2009
Introduction to Uncertainty Analysis
May 11–13, 2009
Measurement Decision Risk Analysis
May 14–15, 2009
Interval Analysis Concepts and Methods
June 22–26, 2009
Uncertainty/SPC Analysis

September 21–23, 2009
Introduction to Uncertainty Analysis
October 19–23, 2009
Uncertainty/SPC Analysis

WorkPlace Training
Tel 952.471.8554
October 6–7, 2008
SPC for Calibration and Testing Laboratories
October 8–10, 2008
Measurement Uncertainty

NCSLI Board of Directors Meetings
October 20–22, 2008
Gatlinburg, Tennessee
Park Vista Hotel
800.227.5622

January 26–28, 2009
San Diego, California
Town & Country
800.772.8527

April 27–29, 2009
Banff, Alberta, Canada
Banff Park Lodge
800.661.9266

July 27–30, 2009
San Antonio, Texas
Grand Hyatt
800.233.1234

October 12–14, 2009
Albuquerque, New Mexico
Embassy Suites
800.362.2779

Region Meetings

New England 1110
October 6, 2008
Contact: Tim Cooke
774.402.1145
tcooke@transcat.com

Atlanta 1221
October 8, 2008
Contact: Tony Abel
478.757.3637
table@centralgatech.edu

Madison Wisconsin 1317
October 17, 2008
Contact: Keela Sniadach
800.356.9526 x4681
keela.sniadach@promega.com

Tennessee Section 1224
October 23, 2008
Contact: Ed Pritchard
866.788.9555
epritchard@modusmet.com
For detailed information on Regional Meetings go to www.ncsli.org/calendar

International Events

ICIMEC
October 8–10, 2008
www.inmetro.gov.br/cimmec

CENAM
October 22–24, 2008
www.cenam.mx/simposio2008/

NCSLI-Japan
Annual Technical Forum
November 21, 2008
Tokyo Metropolitan Ohta-ku Industrial Plaza

14th International Congress of Metrology
Paris, France
June 22–25, 2009
www.metrologie2009.com

www.ncsli.org

October 2008 : Metrologist 3
Welcome New Members

Technical Diagnostic Services, Inc.
Technical Diagnostic Services (TDS) is an integrated start-up, maintenance, operations, training, workforce development, test and diagnostic equipment Company with over 40 years of successful experience in the energy field, primarily at power utility and petrochemical facilities. TDS provides calibration and repair for TDS’ equipment division and to our industrial, government and commercial customers. TDS provides NIST traceable calibrations that meet the requirements of ANSI/NCSL Z540-1 and ISO/IEC 17025.

For more information contact
Michael J. Pezet
817-465-9494
mike@technicaldiagnostic.com

American Technical Services, Inc.
American Technical Services, Inc., is a diversified professional services company providing government and commercial clients a wide array of engineering, information technology, and consulting services. ATS is committed to providing cutting-edge technologies and cost effective solutions. We offer comprehensive engineering services including systems engineering, evaluation, analysis, design and development, system production, installation and integration. We also offer a full spectrum of services necessary for implementation and installation of successful IT systems, as well as business management, and planning services designed to increase efficiency and effectiveness.

For more information contact
Alen Petrossian
818-291-0722
alen@atspage.com

MMC Oil & Gas Engineering
MMC Oil & Gas Engineering Sdn Bhd, a subsidiary of MMC Engineering Group Bhd was formed in 1984 to provide complete engineering design services to the oil & gas and petrochemical industries. Since then, MMC Oil & Gas has developed its expertise to also under take EPCC turnkey projects for onshore facilities.

For more information contact
Mr. Munos Eb
60-66-910-414
recruitment@mmcoge.com

Chemitox, Inc.
Established in 1975 and has been doing testing related with plastics, PWBs, insulation systems based on safety standard in the US and Europe.

For more information contact
Kuniko Ito
03-3727-7111
k-ito@chemitox.co.jp

Saudi Arabian Standards Organization (SASO)
Saudi Arabian Standards Organization (SASO) is a governmental body in charge of Metrology issues in Saudi Arabia.

For more information contact
Nabil Ameen Molla
00966-1-4520000
aalyahya@saso.org.sa

Aexxis LLC
Abacusware builds complete web based software solutions for the Calibration and Metrology industry. Modern technical service companies require advanced tools that enhance work flow and create efficiencies while assisting users to meet compliance requirements. The company’s business process and data sheet creation tools facilitate customer interactions, manage vendor relationships and track assets throughout their service cycle. Abacusware’s products are designed to integrate with existing systems, to evolve with your business requirements, to provide a full service solution to managing complex business processes efficiently and to give end-users comprehensive, flexible reporting functions.

For more information contact
Bruce Read
770-227-9933
www.abacusware.com

Underwriters Laboratories, Inc. (New York)
Underwriters Laboratories, Inc. (UL) is an independent product safety certification organization that has been testing products and writing standards for safety for over a century. UL evaluates more than 19,000 types of products, components, materials and systems annually with 21 billion UL Marks appearing on 72,000 manufacturers’ products each year. UL’s worldwide family of companies and network of service providers includes 62 laboratory, testing and certification facilities serving customers in 99 countries.

For more information contact
Samuel Asante
631-546-2330
samuel.asante@us.ul.com

Sangart, Inc.
Sangart, Inc. is a privately held biopharmaceutical company focused on the research, development and commercialization of oxygen transport agents. Sangart’s approach to the development of oxygen transport agents employs novel technologies and is based on more than two decades of research into the mechanism of oxygen transport by cell-free hemoglobin. Sangart’s lead product, Hemospan®, is designed to deliver oxygen effectively and efficiently to tissues at risk of oxygen deprivation. Sangart was founded in 1998 and is located in San Diego, California.

For more information contact
Jeff Gabaldon
858-450-2400
jgabaldon@sangart.com
Underwriters Laboratories, Inc. (Illinois)
For more information contact
Marcel Orlando Hill
847-664-2234
marcel.hill@us.ul.com

Lav Calibration
Lav Calibration is a provider of quality calibration services backed by committed management and employees with a singular commitment to bringing a quality advantage to our customers.
For more information contact
Wilfredo Lapuz
818-341-9054
wblapuz@yahoo.com

Measurement International (Florida)
Manufacturer of automated and stand alone primary electrical standards for the DC metrology & AC power industries.
For more information contact
Jeff Willey
407-706-0328
jeffwilley@mintl.com

The Modal Shop, Inc.
The Modal Shop, a member of the PCB Group of companies, provides vibration and acoustic measurement instrumentation. We are a sister company of PCB Piezotronics, a leading supplier of precision piezoelectric accelerometers, pressure transducers, force transducers and microphones. As a compliment to these sensors, The Modal Shop offers structural dynamics and vibro-acoustic measurement solutions including test equipment rentals, application engineering services, calibration systems for accelerometers, dynamic pressure transducers and microphones, calibration and modal electrodynamic shakers, sensor signal conditioning systems, TEDS smart sensor products and other structural test accessories. In addition, we are A2LA certified for accelerometer and microphone calibration services.
For more information contact
Eric Seller
513-351-9919
eseller@modalshop.com

Setra Systems, Inc.
For more information contact
Tiago Anes
978-263-1400
anes@setra.com

Bodycote Metech
Bodycote Metech is one of the leading 3rd party calibration providers in Europe. With more than 270 employees at 10 locations in Sweden, Denmark, Finland, and Germany and with onsite solutions around the world, Bodycote Metech is a partner to nearly all industrial sectors, including Telecom, Electronics, Engineering, Power Generation and Pharma, as well as to the public and defense sectors. Bodycote Metech provides a complete and cost-effective service with the aim of enabling customers and partners to reduce Test & Measurement costs and focus on their core business. Bodycote Metech provides traceable and ISO 17025 accredited calibration in Electronic, Dimension, Torque, Pressure, Temperature, Optical, Flow and other physical parameters.
For more information contact
Patrik Persson
46-76-866-47-11
patrik.persson@bodycote.com

New Member Profiles
www.ncsli.org October 2008: Metrologist 5

Become a Member
Today!

<table>
<thead>
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<td>Associate Membership</td>
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<tr>
<td>Student Membership</td>
<td>$50</td>
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For more information on NCSLI membership go to www.ncsli.org. See inside back cover for additional information.

Software

- **UncertaintyAnalyzer**
  The Swiss Army Knife of Uncertainty Analysis.
- **SPCView**
  SPC for Measurement Processes.
- **Uncertainty Sidekick Pro**
  Low-Cost Uncertainty Analysis for Serious Users.
- **AccuracyRatio**
  The Only Complete Measurement Decision Risk Analysis Tool.
- **IntervalMAX**
  The Calibration Interval Analysis Enterprise System.

Training

- **Uncertainty / SPC Analysis**
- **Introduction to Uncertainty Analysis**
- **Interval Analysis Concepts and Methods**
- **Measurement Decision Risk Analysis**

www.ncsli.org
The NCSLI Board of Directors meets four times a year, and each meeting has a different focus. This meeting is the most exciting since it coincides with the annual Workshop and Symposium, providing the opportunity for a wide range of visitors and liaisons to attend the meeting. A total of fifty-seven people attended at some time during the two day meeting.

A representative list of presenters included Belinda Collins (NIST United States), Alan Steele (NRCC/INMS Canada), Salvador Echeverria-Villagomez (CENAM Mexico), Andrew Wallard (BIPM Paris), Dianne Lalla-Rodrigues (SIM Antigua and Barbuda), Doug Leonard (NACLA United States), Seton Bennett (EURAMET United Kingdom), Horst Czichos (EUROLAB Germany) and Woogab Lee the Secretary of the Asia Pacific Metrology Program from KRISS Korea. Other attendees were Steve Sidney and John Wilson of NLA South Africa and Klaus-Dieter Sommer of the German Society for Measurement and Automatic Control (GMA).

Ichiro Fujima and Masahiro Okaji from NMJJ Japan gave an informative presentation on the history and current activities of the National Metrology Institute of Japan. Dr. Okaji is the Director-General of NMJJ.

Pierre Claudel gave a presentation on next year’s French Metrology Congress (CFM) scheduled for June 2009 in Paris. The call for papers is open and details are available at www.metrologie2009.com. This wide range of presenters highlights the International component of NCSLI International.

Dr. Belinda Collins of NIST expressed her appreciation for the role NCSLI played in the planning and operation of the recent CPEM 2008 Conference held in Boulder, Colorado in June. The next CPEM 2010 will be held in Daejeon Korea and will be hosted by KRISS.

Dr. Andrew Wallard of the BIPM Paris gave an extensive report. Of interest are his comments regarding the International System of Units (SI). Several years ago there was a proposal to redefine four of the base units, the kilogram, ampere, mole and Kelvin. This was not accomplished in 2007 and those pressing for changes still feel it may be possible to do so by 2011. There remain significant differences between the research groups in the measurement of the Planck constant that would redefine the kilogram.

Dr. Wallard also reported that a major achievement of the year was the finalization of the third edition of the VIM (International Vocabulary of Metrology – Basic and General Concepts and Associated Terms). The VIM “three” is now available from the BIPM website for free download www.bipm.org.

Reports were also made by all of the NCSLI Vice Presidents. Of special interest is the report of Derek Porter, the VP of Documentary Standards. He reported that there are four documents of over 200 pages each that are in the final stages of publication review and should be done by the end of the year. They are the Handbook for ANSI/NCSLI Z540.3-2006, RP-1 on Calibration Intervals, RP-12 on Uncertainty and RP-18 on Decision Risk Analysis. Once approved for publication, these will be sent to members by CD-ROM, one of the many benefits of membership in NCSLI.

Jesse Morse, VP of Marketing also reported on a number of activities in the marketing group. He has appointed Jim “Smitty” Smith of Boeing as the membership committee chair. Jim is encouraging people to contact him with ideas.

I think everyone really enjoyed the set of banners which were hung between the Dolphin Conference Center and Swan Hotel walkway displaying a number of clever sayings to catch the eye. My favorite was ‘embrace your inner nerd.’ Who says metrologists don’t have a sense of humor!

President Carol Hockert and next year’s President Malcolm Smith updated the Board on their efforts to streamline the numerous relationships and liaisons that exist between NCSLI and other organizations. Their work will be finalized at the October 2008 Board meeting and become an integral part of Malcolm’s plan for next year. Clarifying these relationships will set the stage for NCSLI to be even more effective in the international arena and with other professional organizations.

The Board always welcomes visitors at these meetings. Plan to join us for the next one in Gatlinburg, Tennessee October 20-22, 2008.

dave_abell@pacbell.net

NCSLI Board Members and visitors, 2008
As Immediate Past President, it was my great pleasure at the NCSLI annual conference in Orlando to present the 2008 William A. Wildhack award. The Wildhack award was established in 1970 in honor and recognition of William A. Wildhack, a long-time employee of the US National Bureau of Standards, now the National Institute of Standards and Technology (NIST). William Wildhack was not only a founder of the NCSLI International, but through wisdom, leadership and dedication helped shape the organization during its early and formative years. This Award is the highest honor of the NCSLI International and is awarded annually to an individual or group of individuals for outstanding contributions in the field of metrology and measurement science. The contributions may be in any appropriate form including oral presentation, conference paper, technical or administrative innovation or accomplishment, and outstanding leadership to NCSLI.

The purpose of the award is to provide incentive for and recognition of outstanding contributions to the field of Metrology and, in particular, contributions that are consistent with the goals and objectives of the NCSLI International.

On a personal note I would like to say that this part of my NCSLI board career is one of the most gratifying, in that this award is peer recognition of an individual’s accomplishments in the field of metrology. And, as in past years, there were several deserving candidates this year.

This year’s award was presented to Harry J. Moody a person with a long history of support and active participation in NCSLI International. Harry was born January 8, 1945 to Harry John Moody and Betty Louise Kersley in Ottawa, Kansas. He graduated from the University of Wyoming with a master’s degree in physics. Following his graduation he worked at Boeing in Wichita, Kansas, and at the Wolf Creek Nuclear Power Plant in Burlington, Kansas. He then moved to Idaho where he worked at the Idaho National Engineering and Environmental Laboratory. While at the Idaho National Lab, he rose to be the department manager of calibration services. He served as chairman of the Lockheed Martin Metrology panel in 1966. He also served on the steering committee for the Department of Energy Metrology Committee.

After his retirement, he spent three good months doing honey-do projects for his wife Sue, before he decided it was harder working for her, and formed his own consulting company, Harry J. Moody Enterprises. He presently is a lead assessor for both A2LA and NAVLAP. Harry is known for his outstanding technical and assessment skills and serves on assessments around the globe.

Over the years Harry’s activities in NCSLI have included serving as Calibration/Certification Committee Chairman, Vice President of the Western Division, Treasurer, Executive Vice President and NCSLI President in 2005. Most notably, he was the driving force behind the organization of the uncertainty road shows that are still going on today. He has been active at the NCSLI conferences by presenting papers, hosting sessions and helping to establish the invited technical paper track at the conference. He continues his involvement by serving as the International Deputy for Europe, thereby attending important metrology functions in Europe and providing a very important liaison for NCSLI to the European community.

Harry and Sue, his wife of 44 years, live in Idaho Falls, Idaho. They have two married children, Cheryl and Steven, and three grandchildren, Owen, Abby, Maddie and a baby boy due in November.
It certainly was a magical time at the 2008 NCSLI annual conference in Orlando the week of August 3rd through the 7th. The theme of this year’s conference was Metrology’s Impact on Business. To support this year’s theme and as a result of a conference visioning meeting held earlier this year to design a more innovative conference, the conference learning objectives were developed and shared with conference participants. The purposes of the learning objectives are to help the conference committee, sponsors, exhibitors, presenters, and attendees focus the content of the outcomes of the conference, and to help define the level of involvement of conference participants. Some of the learning objectives were to learn best practices for laboratory management and accreditation, to exchange ideas, techniques, and innovations with others interested in metrology industry trends, to build a network of peers to help resolve mutual metrology problems, and to contribute to the development of industry-wide practices through involvement in NCSLI committees. Hopefully, you took the opportunity to explore the learning objectives, and the tools and techniques to deploy the learning objectives that were presented in the NCSLI Journal.

Concerning the business of the conference, 1116 attended the 2008 conference representing 43 countries and 44 states. 372 students attended the conference tutorials, with many attending the several all-day tutorials. 141 papers were presented in the technical program, representing 111 speakers, 35 panelists and three substitute papers. Enhancements to the technical program included increased percentage of panel discussions, requests that speakers communicate the learning objectives of their paper, an emphasis on audience participation, and designated lunch tables for speaker follow-up. Exhibitors presented their technical solutions to metrology problems in 181 booths, representing 138 companies.

In his keynote speech opening the conference entitled “Why the Kilogram Should be Redefined,” Dr. Richard Davis, BIPM, explained that one of the these days, perhaps in 2011, the decision will be made to redefine the kilogram. When this happens, the unit of mass will no longer be derived from an artifact maintained and used at the International Bureau of Weights and Measures, thus putting an end to a remarkable 120-year history. Some proposed new definitions were presented, along with their practical realizations. Perhaps the conclusion of this story will be
announced at the 2011 50th NCSLI anniversary conference in Washington DC. Another exciting activity of the opening session was the presentation of the Wildhack award to Harry Moody for his outstanding service to NCSLI and the metrology community. Many of Harry’s contributions include Calibration and Certification Committee Chairman, Vice President of the Western Division, Treasurer, Executive Vice President, President in 2005 and currently International Deputy for Europe.

Both the opening session and the closing session were accompanied by a wonderful slide and sound presentation produced by the Photography Committee.

Our imaginations were engaged with the luncheon speakers. Jeff VanKooten, The Center for Generational Studies, shared his insights into the themes, influences, and typical behaviors of the Matures, Baby Boomers, Generation X’ers, and Millennials generation classifications. In his presentation, “Hey Dude! Managing Age Diversity in Today’s Workplace,” he helped us take a realistic, yet amusing look at how these generations relate, and helped us understand the values and attitudes of both new and experienced workers. Tim Williams from Gatorland amazed the audience as we explored and learned about the behaviors of some of the local reptiles and creatures. Some of the Conference Committee and Board of Directors members learned up-close and personal the specific nature and habits of some of these creatures.

As we conclude the 2008 conference, please take time to reflect on your conference experience. Did you accomplish all of your goals and plans? What plans will be implemented? What would you do differently in preparing to attend next year’s conference in San Antonio? Consider writing a formal trip report, and including your action plans with milestones, to ensure your commitment to implementing your lessons learned. Review the conference objectives and trip report with your manager. Share your ideas, information, conference proceedings, session handouts and exhibitor information with others in your organizations. Finally, consider submitting a paper at next year’s conference to share your knowledge and expertise with others, and to enable others to have a richer learning experience.

tmconder@mmm.com
Metrology’s Impact on Global Trade

It used to be politics that governed the relationships between nations. Increasingly today trade and the workings of the global economy, engines of wealth creation, shape the way nations relate to each other. Seven thousand or so years ago, the recording of trade transactions was an important contributor to the development of written language, and about that time we saw the beginning of simple systems enabling sellers and buyers to agree on the quantities of the items they were trading.

We’re a long way from those times, but it isn’t a great intellectual stretch to understand how the modern version of those two simple tools support today’s global trade.

Trade is the lifeblood of today’s global economy and all trade requires agreement between sellers and buyers. Metrology, measurement, is at the core of all trade. It is the trust and assurance informed by accurate measurement that enables trade to occur, whether that trade is in vast quantities of sophisticated manufactured items between international corporations in different parts of the world, or between an individual and his or her butcher for a steak for the evening’s dinner.

When it comes to global trade, it is the relatively recent development and broad acceptance of an integrated and effective global measurement system, starting with the oversight of the International Committee for Weights and Measures (CGPM) and working its way down eventually to manufacturing, service, regulatory and governance organizations wherever in the world they may be, that enables today’s vast flow of goods and services to take place. Competent measurement programs assure that parts and services provided in one geographic location, by one or various suppliers will in concert result, in another part of the world entirely, in products and services that fit together and/or work as intended by their designers.

Competent and harmonized measurement programs don’t just spring out of the air. They have been made possible by the development and operation over the past 150 years or so of an increasingly well implemented world-wide metrology system.

Without great metrology, modern global trade would be impossible.

Call for Papers  Exhibit Sales  Sponsorship Programs
callforpapers@ncsli.org | exhibits@ncsli.org | cgulka@ncsli.org

WWW.NCSLI.ORG  NCSLI INTERNATIONAL  SERVING THE WORLD OF MEASUREMENT
Best Papers The Scoring Process

One of the last, but certainly the most important and prestigious activities of our NCSLI annual conferences, is the awarding of the Best Paper awards. The best paper award process begins many months prior to the conference with the organization of the technical program by the Technical Program Chair and the program committee. The technical program tracks or sessions may change from year to year, depending on the interest of the membership and current trends in the global metrology industry. In 2008, these tracks were International, Learning and Development, Management and Analytical, Dimensional, and Technical. Once the tracks are finalized, potential papers are invited, recruited, and encouraged from around the world. The authors of the potential papers submit an abstract to the manuscript page on the NCSLI website. Based upon the quality and numbers of papers submitted for each track, the Technical Program Chair and the program committee select the papers for the upcoming conference. Now the most creative phase of the process begins, in which the writers move their abstract and ideas to the content of the paper. During this time, the Best Paper Chair is also recruiting judges of the papers. These volunteer judges are the technical and subject matter experts in their fields, and have usually evaluated papers in the past. Once all of the papers have been updated to the manuscript page on the NCSLI website, the judging phase begins. A minimum of two judges score each paper based on specific, weighted criteria, which include newness and originality of the work, technically sound, clarity of figures and tables, and comprehensiveness of references.

The best paper total score or rating is based upon the sum total of three factors – the judges’ score from the previous reviews prior to the conference, the evaluations by the attendees of the sessions, and the evaluations by the hosts of each session. Thus, not only are the technical aspects of each paper evaluated, but the clarity and professionalism of the actual on-stage presentation are included in the comprehensive overall score. As the conference week progresses, a volunteer team scans the audience’s evaluations and host’s evaluations into the best paper database, which is combined with the previous judges’ scores to arrive at the total sum score. The best paper for each track or category is the paper with the highest sum score. The overall best paper for the conference is the highest scoring paper of the five paper categories. The recipients of the best paper for each category and the conference overall best paper receive a handsome plaque and a financial honorarium in recognition of their accomplishment.

I would strongly encourage that you take the opportunity and challenge to write and submit a paper at a future NCSLI conference. You too may be honored as the recipient of the prestigious Best Paper Award. ■

International
“Uncertainties Related to a Calibration of Rogowski Coils”
Branislav Djokic

Learning and Development
“A Measurement Standard for Evaluating Metrology Positions”
Danny Newcombe

Management and Analytical
“A Guard Band Strategy for Managing False Accept Risk”
Michael Dobbert

Dimensional
“Sensitivity Drift Behavior Precision Mass Comparator for Weighing Prototype”
Shih Mean Lee

Technical
“The Design and Implementation of a Fully Automated Cross Float System for the Comparison of Piston Gauges in Both Gauge and Absolute Measurement Modes”
Michael Bair

Dimensional: Overall Best Paper
“Sensitivity Drift Behavior Precision Mass Comparator for Weighing Prototype”
Shih Mean Lee

ONE STOP CALIBRATION
Securing one vendor for all your calibration needs yields the combined benefits of a true “single-source supplier”. You will enjoy our TAM Online which allows you to view your equipment database and certificates of calibration online via the privacy of our secure servers. No one offers a more complete calibration solution. Call 810.225.4601 or visit www.dical.com and take advantage of “One Stop” calibration services.

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I have a gage block tie pin. Some of you reading this article may have seen me wearing it at an NCSL International meeting. I used to wear it to work every day. When Mitutoyo’s dress code changed last year to business casual I stopped wearing ties every day. I don’t miss wearing ties, but I often miss my gage block. I find the concept of gage blocks fascinating, and I always look forward to somebody asking me about my unusual tie pin. I’m not sure if everybody enjoys the metrology lesson that is my typical answer, but I embrace the opportunity to be a subtle walking advertisement for my chosen career. In the end, however, gage blocks are pretty boring. They are still very important, but they are a little boring. And although Mitutoyo’s lab calibrates thousands of gage blocks every year (see Figure 1), the field of dimensional metrology is much more than just the calibration of gage blocks.

If you have had the opportunity to attend any of the dimensional metrology technical sessions at the last few NCSL International Annual Workshops and Symposia, you would have seen the breadth of topics all under the banner of dimensional metrology. Many of us in the dimensional metrology field are now using highly complex measuring equipment, like coordinate measuring machines (CMMs) equipped with multiple sensor technologies. And some of us dimensional metrologists get the opportunity to measure with uncertainties down to just a few nanometers. Fully automated, programmable, expensive, and fancy measuring machines in highly temperature controlled clean rooms with super low uncertainty – now that’s a little more exciting than a gage block.

But with new equipment and needs comes new challenges. Even traditional measurement methods are being challenged due to the demand for higher accuracy and precision. The basic comparative calibration process is still valid today. At Mitutoyo America’s calibration lab over 60,000 gage blocks are calibrated every year using mechanical comparators like the one shown here.

Figure 1. Length gages have been in use for about 5000 years, and the basic comparative calibration process is still valid today. At Mitutoyo America’s calibration lab over 60,000 gage blocks are calibrated every year using mechanical comparators like the one shown here.
to the increasingly tighter tolerances found in manufacturing. As the functional demands for products increase, like reliability and performance, then the product tolerances often get tighter. This in turn requires more advanced and more accurate manufacturing and measuring methods. In the end, the productivity and accuracy of calibration methods must also continue to improve. Like many other fields, the trickle down effect from improved product performance has had a big impact in the dimensional metrology field. Due to the growing complexity and difficulty in our industry, and the desire to bring together a community of users to discuss real and practical issues, the Dimensional Metrology Committee of NCSL International was formed in January 2005.

Modern calibration methods for length gages, as shown in Figure 2, are a good example of how the dimensional metrology field is changing. Length gages have historically been calibrated using comparative methods. The length standard to be calibrated is placed next to a master standard of similar size and material, and a high-resolution indicator is used to compare the lengths of the two. While this same method is still used today, some labs have moved toward more automated methods, like a CMM. Besides being faster and possibly more accurate, the CMM approach also usually eliminates the need for direct comparisons, but in doing so, introduces new issues for which the traditional dimensional metrologist may not be prepared. For example, CMMs have complicated three-dimensional calibration issues, along with advanced probing systems, complex thermal issues, high level programming software, and built-in temperature compensation systems that must be understood.

The CMM is also commonly found in labs calibrating special master gages or inspecting manufactured workpieces. For an ISO/IEC 17025 accredited lab, the estimation of uncertainty in these situa-

Figure 3. At the Gage and Standards Laboratory in the Naval Surface Warfare Center in Corona, California, a high accuracy CMM is used to calibrate a wide variety of specialty gages.
tions can be quite complicated. Along with understanding metrology, these measurement scenarios introduce a number of advanced software issues as well as complexity with the geometric dimensioning and tolerancing (GD&T) that is being measured. For labs doing inspection of tightly tolerated specialty gages on CMMs, like shown in Figure 3, the skills required of the dimensional metrologist today may be different than those required with prior technology.

The complexity of CMMs, combined with their wide-spread use, prompted the Dimensional Metrology Committee to organize technical sessions on various aspects of CMM use during the past three NCSLI International Annual Workshops and Symposia. The wide range of CMM-related presentations has included calibration methods, training, new national standards, uncertainty analysis, and facility design. In addition, a new tutorial was created for the 2008 workshop to directly address the use of CMMs in the calibration lab. These CMM-related activities are a good example of the mission of the Dimensional Metrology Committee, which was chartered to serve as a forum focused on measurement concerns in the dimensional metrology field.

One of the main goals of the Dimensional Metrology Committee is to enrich the NCSLI International Annual Workshop and Symposium with educational and interesting technical talks for the dimensional metrologist. The 2008 workshop in Orlando featured eight technical sessions – three full days – of dimensional metrology related talks. The committee goals are to find talks that cover a range of interests and technical levels. Some talks are more fundamental, such as calibration methods for surface plates, while others present more advanced methods, such as reversal techniques for high accuracy calibrations (see Figure 4). Another

Figure 2. For the calibration of step gages, the CMM process (on the right) offers speed, automation, and a lower uncertainty when compared to the traditional manual comparison technique (on the left). However, the CMM process also introduces three-dimensional calibration issues, temperature compensation, and complex probing systems.
highlight of the 2008 Annual Workshop and Symposium was a panel session on accreditation in dimensional metrology, which directly addressed concerns and issues for ISO/IEC 17025 accredited labs.

Another goal of the Dimensional Metrology Committee is to keep members up to date with pertinent developments in metrology standards, particular those coming from ASME B89, which is responsible for most American dimensional metrology standards, and ISO TC213, which is responsible for international standards in the dimensional metrology world. Committee meetings include updates from members of both ASME and ISO working groups and offer opportunities for NCSL International members to provide feedback to the latest draft standards. In addition, the Annual Workshop and Symposium includes technical sessions on new and important dimensional metrology standards.

The Dimensional Metrology Committee is also working on a new NCSL International Recommended Practice (RP) on the calibration of CMMs. While excellent ISO and ASME standards on testing CMM performance exist, the standards are written for the specification and purchase of CMMs, not for calibration purposes. No internationally accepted recommendations currently exist for how to use the ISO and ASME CMM standards for the purpose of calibration, particularly for ISO/IEC 17025 accredited labs, and the committee hopes to fill this gap with the new CMM calibration RP. If all goes well, attendees of the 2009 NCSL International Annual Workshop and Symposium in San Antonio will have a chance to hear some of the details of this new RP.

When the Dimensional Metrology Committee was first formed, it was hoped that the committee could pull dimensional metrologists together, as no other forum exists to listen to and address the calibration concerns of the dimensional metrology field. The turnout at committee meetings has been encouraging and enthusiastic, and the committee hopes to have a significant positive impact on the dimensional metrology field into the future.

For more information on the Dimensional Metrology Committee, please contact one of the committee members, Dr. Jim Salsbury at Mitutoyo America Corporation, jim.salsbury@mitutoyo.com, 630-723-3619, or Dr. Hy Tran at Sandia National Lab, hdttran@sandia.gov, 505-844-5417.

Figure 4. By combining a high accuracy roundness machine, great temperature control, and a reversal measurement procedure, it is possible to calibrate the roundness of precision hemispheres with an uncertainty of only a few nanometers.
Equipment Specifications
Metrology’s Missing Link
by Suzanne Castrup
Integrated Sciences Group

Manufacturer specifications are an important element of cost and quality control for testing, calibration and other measurement processes. They are used for the selection of measuring and test equipment (MTE) or establishing equipment substitutions for a given measurement application. In addition, manufacturer specified tolerances are used to compute test uncertainty ratios and estimate bias uncertainties essential for measurement uncertainty analysis and decision risk analysis.

Ideally, manufacturer specifications should provide performance characteristics that can be used to evaluate the suitability of MTE for a given application. However, understanding specifications and using them to compare equipment from different manufacturers or vendors can be a perplexing task. This primarily results from inconsistent terminology, units, and methods used to develop and report equipment specifications.

Until recently, the metrology community has not formally addressed the problem of interpreting and applying equipment specifications. Before we delve into interpreting and applying specifications, it is important to clarify what constitutes MTE. In the fields of measurement science and metrology, MTE include artifacts, instruments, sensors and transducers, signal conditioners, data acquisition units, data processors and output displays.

MTE are calibrated periodically to determine if they are performing within manufacturer specified tolerance limits. In fact, the elapsed time or interval between calibrations is often based on in-tolerance or out-of-tolerance data acquired from periodic calibrations.

Manufacturers Specifications

MTE specifications should provide adequate details about the expected performance characteristics of a representative group of devices or items (i.e., a specific manufacturer and model). This information should be reported in a logical format, using consistent terms, abbreviations and units that clearly convey pertinent performance characteristics. Depending on the MTE, manufacturers may include both static and dynamic performance characteristics.

Static performance characteristics provide an indication of how the equipment or device responds to a steady-state input at one particular time. Static characteristics include, but are limited to, sensitivity (or gain), zero offset, nonlinearity, repeatability, hysteresis, resolution, noise, thermal sensitivity shift, thermal zero shift, temperature coefficient, and accuracy.

Dynamic performance characteristics provide an indication of how the equipment or device responds to changes in input over time. Dynamic characteristics include warm-up time, response time, settling time, zero drift, sensitivity drift, stability, upper and lower cutoff frequencies, bandwidth, resonant frequency, frequency response, damping and phase shift.

Other characteristics are often included in manufacturer specifications to indicate input and output ranges, environmental operating conditions, external power requirements, weight, dimensions and other physical aspects of the equipment or device.

Specifications describe the performance of MTE parameters or attributes that are covered under the product warranty. Some manufacturers may provide ample information detailing individual performance specifications, while others may only provide a single specification for overall accuracy. In some instances, specifications can be complicated, including numerous time or range dependent characteristics. And, since specification documents are also a means for manufacturers to market their products, they often contain additional information about features, operating condition limits, or other qualifiers that establish warranty terms.

Interpreting Specifications

For the most part, specifications are intended to convey tolerances or limits that are expected to bound the performance characteristics MTE parameters or attributes. For example, these limits may correspond to temperature, shock and vibration parameters that affect the sensitivity and/or zero offset of a sensing device.

Unfortunately, there is no universal guide or standard regarding the development and reporting of MTE specifications. Inconsistency in the methods used to develop and report performance specifications, and in the terms and units used to convey this information, create obstacles to the proper understanding and interpretation of MTE specifications.

With few exceptions, the vast majority of specification documents fall short of providing crucial information about the confidence levels associated with reported specification limits. MTE manufacturers also don’t indicate the applicable statistical distribution for a particular performance characteristic.

Ultimately, the MTE user must determine which specifications
are relevant to their application. This requires a basic understanding of the fundamental operating principles of the MTE for proper interpretation of performance specifications. In some cases, first-hand experience about the MTE may be gained through calibration and testing. In other cases, detailed knowledge about the MTE may be obtained from operating manuals, training courses, patents and other technical documents provided by the manufacturer. It is a good practice to

1. Review the specifications and highlight the MTE characteristics that need clarification.
2. Check the operating manual and associated technical documents for other useful details.
3. Request additional information and clarification from the manufacturer’s engineering or technical support department.

Applying Specifications

Manufacturer specifications are used to purchase or substitute MTE for a given measurement application, estimate bias uncertainties and establish tolerance limits for calibration and testing. Accordingly, MTE users must be proficient at identifying applicable specifications and in interpreting and combining them.

It is also important that manufacturers and users have a good understanding and assessment of the confidence levels and error distributions applicable to MTE specifications. This is a crucial part of the process and requires some further discussion.

Confidence Levels

Some manufacturer MTE specifications are established by testing a selected sample of the produced model population. Since the test results are applied to the entire MTE model population, limits are developed to ensure that a large percentage of the MTE model population will perform as specified. Consequently, the specifications are confidence limits with associated confidence levels.

Ideally, confidence levels should be commensurate with what MTE manufacturers consider to be the maximum allowable false accept risk (FAR). The general requirement is to minimize the probability of shipping an MTE item with nonconforming (or out-of-compliance) performance characteristics. In this regard, the primary factor in setting the maximum allowable FAR may be the costs associated with shipping nonconforming products.

For example, an MTE manufacturer may require a maximum allowable FAR of 1% for all performance specifications. In this case, a 99% confidence level would be used to establish the MTE specification limits. Similarly, if the maximum allowable FAR is 5%, then a 95% confidence level should be used to establish the specification limits.

Alternatively, some manufacturers may test the entire produced MTE model population to ensure that individual items are performing within specified limits prior to shipment. However, this compliance testing process does not ensure a 100% probability (or confidence level) that the customer will receive an in-tolerance item. The reasons for this include:

Manufacturers may attempt to mitigate this problem by increasing the MTE specification limits. This can be accomplished by using a higher confidence level (e.g., 99.9%) to establish larger specification limits. Alternatively, some manufacturers may employ arbitrary guardbanding methods and multiplying factors. In either case, the resulting MTE specifications are not equivalent to 100% confidence limits.

Error Distributions

MTE performance characteristics, such as nonlinearity, repeatability, hysteresis, resolution, noise, thermal stability and zero shift constitute sources of measurement error. Measurement errors are random variables that can be characterized by statistical distributions. Therefore, MTE performance characteristics are also considered to be random variables that follow statistical distributions.

The statistical distribution for a type of measurement error is a mathematical description that relates the frequency of occurrence of values to the values themselves. Error distributions include, but are not limited to normal, lognormal, uniform (rectangular), triangular, quadratic, exponential, U-shaped and trapezoidal.

This concept is important to the interpretation and application of MTE specifications because an error distribution allows us to determine the probability that a performance characteristic is compliant with its specification.

Some manufacturers may state that specifications simply bound the value of an MTE characteristic and do not imply any underlying statistical distribution. Yet, when asked for clarification, many manufacturers indicate that the normal distribution is used as the underlying performance distribution.

There are a couple of exceptions when the uniform distribution would be applicable. These include digital output resolution error and quantization error resulting from the digital conversion of an analog signal. If the limits are asymmetric about a specified nominal value, the lognormal or other asymmetric distribution may be applicable.

Conclusions

The issues regarding the interpretation and application of manufacturer specifications summarized in this article are based on a paper entitled “Obtaining and Using Equipment Specifications,” presented at the 2005 NCSLI Workshop & Symposium, Washington, D.C. Subsequent to the presentation of this paper, the NCSLI 155.1 subcommittee was formed to identify and publish recommended practices for developing, reporting, obtaining, interpreting, validating and applying MTE specifications. The document will be titled NCSLI RP-5 “Measuring and Testing Equipment Specifications.”

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October 2008: Metrologist 17
In the July issue of *metrologist*, I talked about Lost Knowledge, asked what you would share in your Last Lecture, and noted several Action Items we would be pursuing. I got several very encouraging emails as a follow-up to that article. It seems that our latest Metrology Knowledge Management effort has struck a chord with many of you. I wanted to take an opportunity to report on the status of this effort and to gather additional input from you.

**We have identified a theme for this ongoing effort!**

It is “Metrology Knowledge Management” and the tagline reads “We NEED to KNOW before you GO! Capturing Metrology Knowledge Today!”

**Thank You for Your Participation**

Randy Motz (Qualtech Resource Group, Inc.) recorded about 30 interviews during the conference and will be editing them. The average recording is about 12 minutes, so we have about six hours of audio tape to review and edit into some useable formats. One of the first steps will be to note some of the key ideas that participants had for our Outreach efforts. Randy will provide a set of instructions on how to record future interviews (the technical aspects of recording) and an estimate of the level of effort that is required to record and edit audio files for our applications. As we expand on the initial effort and develop knowledge management taxonomy for metrology, and the ability to archive and retrieve content, we need to have a good foundation of what level of effort will be required to generate good cost estimates. We also captured photos of everyone who participated in an interview. We hope to provide content from some of the interviews on the website in the near future and a summary of ideas in a future article.

Thank you to John Fishell (retired, NSWC) who did a lot of initial legwork to provide guidance on the project, along with Doug Sugg and Arman Hovakemian at NWSC for supporting the effort, to Randy Motz and Howard Zion (Transcat) who conducted the interviews, and to Diana Poulton (NSWC) and Paul Becker (Guest) who helped staff the booths and recruit people for interviews and to share ideas, to Linda Stone and Craig Gulkia for providing booth space and developing banners, and to everyone who stepped forward to be interviewed!

**Interview Questions**

The following questions are those we used in the initial effort. We focused the initial effort on content that could be used in our Outreach efforts. If you didn’t get a chance to be interviewed, please think about being among the first to sign up at the Measurement Science Conference in 2009. Time slots filled rather quickly in Orlando! You now have our initial questions in advance to give it some thought.

- How did you get involved in a career in metrology/calibration? How did you hear about it? How did you get your first position?
- Tell me about your career in metrology. Where have you worked? What have you done? What are you doing today?
• Is there anyone or anything that helped you the most in your metrology career such as a mentor or professional group or specific education opportunity or career assignment? Is there anything that prepared you for a career in metrology?
• How have you maintained your professional education and kept up with advances in metrology?
• Why do you think students should consider metrology as a career field?
• What do you think is the best approach to try to reach out to students to enlighten them on metrology as a potential career field?
• Knowing that we are interested in developing educational outreach resources and materials to inform students of metrology as a career, is there anything you would suggest or add that might help us in this effort?

Opportunities Still Abound!
We plan to record interviews at the 2009 Measurement Science Conference and will need a team of people to record interviews, staff the booth, conduct interviews, and of course people interested in being interviewed. Please let me know if you want to be on the team!

As I noted in my last article: the clips will need to be indexed and sorted and keywords will need to be identified. To do an exceptional job with the material, we need resources to capture, compile and make the information available and to be readily searched. We will be able to use some of the material for audio casts and pod casts; some of it might be useful for developing training materials; some of it might help generate new ideas; some of it may inspire the next generation of students to pursue a career in metrology through the DVD/Multimedia tool the 164 Education Liaison and Outreach Committee is hoping to develop (pending resources); and some content might be used to further a creative idea that you submit. If you have a background in recording or in video taping, we would especially appreciate your help at MSC.

Your role? Think of some questions that you would like to have asked and submit ideas for how we can use the material. Maybe your role is to obtain corporate sponsorships or other resources to take the project and material to the next level. Maybe you would like to be on the team?

If you have ideas for questions and/or want to be involved in this new adventure, please contact Georgia Harris at gharris@nist.gov.

Notice:
The Last Lecture
I mentioned Randy Pausch and the Last Lecture in my July article. I am sorry to note that Randy lost his fight with pancreatic cancer shortly after the article came out, on July 25, 2008. An Enduring Legacy article is on the Carnegie Mellon website: www.cmu.edu/homepage/beyond/2008/summer/an-enduring-legacy.shtml.

gharris@nist.gov
Resources for Metrology Ambassadors

by Christopher L. Grachanen

Continuing our theme on Metrology Ambassadors and the important role they play in helping get the word out about the Metrology field to young people and other folks not familiar with it, I would like to discuss various resources that are available for Ambassadors. The aim of these resources is to assist Ambassadors in conducting Metrology outreach activities by providing materials and handouts conveying the essence of the Metrology profession and relating the message of challenging and rewarding career opportunities awaiting prospective Metrology candidates.

I would like to begin by first talking about the NCSLI website for Learning and Development at: www.ncsli.org/training/index.cfm.

This site provides an overview of NCSLI's Learning and Development programs as well as the Strategic Framework from which NCSLI training, education and outreach initiatives originate. The four committees comprising NCSLI's Learning and Development program are: 161: Training Resources, 162: Financial Resources, 163: Workplace and Professional Development, 164: Education Liaison and Outreach. Information about each committee may be found at the aforementioned website.

To assist Metrology Ambassadors in presenting the Metrology career field to students and other groups at outreach gatherings, NCSLI created a PowerPoint entitled Metrology, The Science of Measurement. This presentation starts off with a historical perspective of the Metrology field and then fast forwards to today, citing many examples of how Metrology affects our daily lives and explaining basic Metrological concepts. Special emphasis is given to the various industries where Metrology professionals are essential to providing services and creating and maintaining products. The Metrology, The Science of Measurement presentation is in MS PowerPoint format and may be freely distributed to interested parties. Copies may be obtained at: www.ncsli.org/training/education.cfm.

One of the most commonly used vehicles for conveying information to individuals and groups is via flyers and brochures. NCSLI’s outreach flyer “Careers in Metrology” provides a macro overview of the Metrology profession and relates some of the challenges and opportunities available to those considering a career in Metrology. The flyer was created to entice people (especially young students) to learn more about what it takes to become a Metrology Professional, what activities Metrology professionals are engaged in and to convey a general outlook perspective. The “Careers in Metrology” color flyer is in PDF format and like the PowerPoint presentation can be freely distributed to interested parties. The “Careers in Metrology” flyer is also available in a two sided color poster,
where the second side announces the Joe D. Simmons Scholarship, which can be requested from NCSLI Headquarters or downloaded from the NCSLI website. Other educational resources on the metric system (SI) of measurement are available from the NIST Metric Program, www.nist.gov/metric.

To provide a more interactive, rewarding experience for outreach event attendees, Metrology Ambassadors often bring with them tools of the trade such as calipers, temperature/humidity monitors, force gauges, etc., so interested parties can experience the taking and recording of measurements and evaluation of results. Hands on activities help students better grasp Metrological concepts, instills a better understanding for what it takes to make valid measurements and makes for a more interesting and fun presentation. Typically Metrology Ambassadors borrow test equipment from their place of employment and develop lesson plans in order to bring home various aspects of a measurement process and provide a visual interpretation of measurement results. NCSLI, in an effort to assist Metrology Ambassadors with these hands on activities, is in the final process of evaluating Vernier, Inc. metrology measurement kits for just this purpose. One such kit was demonstrated by Dilip Shah during the very lively and interactive Education Outreach session at the NCSLI conference in Orlando.

Similar measurement kits have been used by other education programs, including the NIST Summer Institute for Middle School Science Teachers. The Metrology measurement kits not only will provide several measurement probes suitable for making various measurements in a classroom or lecture hall environment but will also include lesson plans for conducting experiments with the purpose of educating participants about general Metrological concepts as well as the measurement technology(s) incorporated in each device. It is envisioned that Metrology Ambassadors will be able to check out Metrology measurement kits (from the NCSLI training library), eliminating the need to 1) borrow test equipment from work and 2) develop their own lesson plans. More about Metrology kits will be presented in a future issue of metrologist magazine.

Rounding out the resources available for Metrology Ambassadors will be NCSLI’s Metrology Multimedia DVD (MMDVD) which, as of this writing, the request for proposal (RFP) has been finalized, posted on the NCSLI website, and disseminated to multimedia content providers for bids. The MMDVD’s content will include two narrative videos, various publications and resource listings as well as hyperlinks to on-line content all in an interactive, multimedia environment. The intent of the MMDVD is to provide consumers with an overview of the Metrology field and the means to research, drill down if you will, more in-depth information about measurement sciences and schools, organizations, agencies and industries involved in Metrology related programs and activities. Funding for this important project has yet to be secured and readers are encouraged to contribute, as well as encourage their companies to contribute, to NCSLI’s tax exempt Educational Development Fund. This fund provides financial resources for scholarships

Continued on page 22
Learning and Development

and education outreach projects, helping to ensure a steady stream of trained Metrology personnel for the future. More information about NCSLI’s Education Development Fund may be found at: www.ncsli.org/training/financial.cfm.

The American Society for Quality, Measurement Quality Division has dedicated $10,000 for this project and has issued a matching challenge to other organizations and potential corporate sponsors. All sponsors will be recognized on the final product when it is distributed.

NIST Metric System Resources Available to Metrology Ambassadors

The NIST Metric Program is a great source for educational materials for Metrology Ambassadors to supplement outreach activities when they visit with students and teachers in the classroom or invite visitors into their laboratories. NIST has several handouts available in bulk so that each student can receive a copy, such as metric conversion cards and wall charts that explain the history of measurement systems in the U.S. and the seven base units of the SI.

In addition, the NIST Metric Program website, www.nist.gov/metric, has numerous educational materials that can be downloaded and reproduced freely. The Metric Pyramid (NIST LC 1140) is a great three-dimensional teaching tool that teachers can use in the classroom. You can also find several resources on metric measurements that are used in sports, such as the Olympics and the Tour de France, including the 2008 World Metrology Day “Measurement in Sports” resources developed by the BIPM.

Requests for metric educational metric system (SI) materials can be submitted to:
NIST, Weights and Measures Division, Metric Program
100 Bureau Drive, M/S 2600
Gaithersburg, MD 20899
Tel: 301-975-3690
TheSl@nist.gov

The NIST Summer Institute for Middle School Science Teachers

Collaboration between NIST and local school districts, is a two-week long workshop designed to support middle school science teachers through a combination of hands-on activities, lectures, tours, and visits with scientists in their laboratories. Planned to coordinate with the middle school curriculum, the teachers are provided with resources and instructional tools for teaching math and science, with an emphasis on the measurement science used at NIST. Led entirely by NIST scientists, the Summer Institute translates the cutting-edge research done in the laboratory into activities intended to be carried out in the classroom.

The NIST Summer Institute has incorporated the use of the Vernier LabQuest as a teaching tool, designed to streamline the sometimes frustrating and time-consuming data collection process. Use of the LabQuest and probes enables the students to focus on what the experiment is designed to teach instead of getting distracted and bogged down in data collection. Teacher participants are given the LabQuest and a selection of ten probes early in the two-week workshop and encouraged to consider ways to incorporate the material focused on at NIST using the LabQuest. NIST scientist-presenters are loaned LabQuests and probes and encouraged to develop activities to teach their subject material using the LabQuest. Teachers return to their schools energized by the busy two weeks and with a portfolio of activities ready for the classroom as well as the supplies and equipment for those activities.

For more information, contact Mary Satterfield, mary.satterfield@nist.gov, 301-975-5364.

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Standard Occupational Classifications

One of Chris Grachanen’s major metrology training and education efforts has been to spearhead the creation of job descriptions for calibration technicians, calibration engineers and Metrologists for inclusion in the U.S. Bureau of Labor Statistics’ Standard Occupational Classification (SOC) listing. This work involved the collaboration between NCSLI and the American Society for Quality, Measurement Quality Division, along with a contract with Professional Examination Services to evaluate hundreds of submitted job descriptions and to synthesize standard descriptions. The SOC is updated once every ten years and is the foundation for the Bureau’s Outlook Occupational Handbook used by educators and counselors to provide career guidance to high school and college students. To this end, Chris chaired the NCSLI 163.1 Working Group on Standard Occupational Classifications and developed formal job descriptions submitted to the SOC and which were recently used in the 2007 NCSLI Benchmarking survey. Chris continues to maintain correspondence with the U.S. Office of Personnel Management (OPM) trying to standardize occupation classifications across government agencies. The committees will be working to develop standard HR packages for disseminating information about metrology occupations. Chris was one of the founding members of NCSLI’s 164.1 Metrology Education and Training Outreach committee and is the current chair of the 164 Education Liaison and Outreach committee and 164.2 Communications subcommittee.

Prolific Author and Presenter

Chris has been a regular presenter at NCSLI regional meetings since 1992 and has presented at NCSLI’s annual workshop and symposium and the annual ASQ Measurement Quality Conference. He received NCSLI’s 1998 Dr. Allan V. Astin award for best conference paper outlining experiences learned from laboratory accreditation. Chris was awarded the NCSLI Quality & Management track best paper for the Metrology Job Description Initiative in 2006 and was nominated for a best paper award at the 2008 American Society of Engineering Education for a paper on NCSLI Education Outreach, which he co-authored.

No doubt you have come across Chris’ writing in the metrology, quality, and engineering arenas. Chris has authored numerous Metrology articles appearing in Quality Progress, Test & Measurement World magazine, NCSLI’s Measure, Metrologist, Cal Lab magazine, and the American Society for Quality (ASQ), Measurement Quality Division’s (MQD) quarterly newsletter The Standard. He is also an editorial advisor for Cal Lab magazine. Chris authored the Educator’s Corner column for NCSLI’s quarterly newsletter for many years, and continues to submit content to metrologist. Much of Chris’s writing has promoted education, training, outreach, and enhancing the metrology profession: specifically note the 2008 series on Metrology Ambassadors and the Job Description efforts.

Workshops and Training Resources

He has regularly conducted free workshops on measurement uncertainty topics for various organizations such as NASA, SIMCO, Ruska, GE Industrial Control Systems, and others. Chris has made many noteworthy contributions to metrology education and training such as his three freeware metrology programs; Tolerance Calculator, Uncertainty Calculator and Mismatch Uncertainty Calculator with users registered in over 50 countries. Numerous examples, on-line help files, operating manuals and hundreds of correspondences have helped users understand the mathematics behind the calculations.

Certified Calibration Technician Program

Chris championed the creation of the ASQ’s Certified Calibration Technician (CCT) body of knowledge which spanned nearly four years with participation from hundreds of calibration practitioners from the U.S. Dept. of Defense, U.S. Dept. of Energy, NASA, academic institutes, fortune 100 companies and private calibration facilities. The CCT body of knowledge has been the foundation for numerous training courses as well as several outstanding training publications. There are currently 996 Certified Calibration Technicians. For his leadership in the development of the CCT program, ASQ’s Certification Board presented Chris with ASQ’s 2003 Excellence Award. Using the CCT body of knowledge as a guide, Chris and others coauthored ASQ’s The Metrology Handbook, the proceeds of which go to support ASQ-MQD’s metrology related activities.

Continued on page 24
Awards Dedicated to Metrology

In 2004, Chris received a $20,000 cash honorarium for being the Test and Measurement World’s Test Engineer of the Year which he donated to several community colleges that offer metrology programs. In addition, Tidewater Community College of Virginia established the National Instruments and Chris Grachannen Metrology Scholarship to attract students into curricula that will prepare them to enter the metrology field.

Background

Chris’s work-related interests include: Metrology Education, Uncertainty Analysis, Automation, and Proficiency Testing. Chris is a master engineer and operations manager for Hewlett-Packard’s Houston Metrology Group. Chris holds a B.S. in Technology and Management from the Univ. of Maryland, a B.S. in Electronics Engineering from the Cooks Institute of Electronics Engineering, and an MBA from Regis University. Chris and his bride of 23 years, Patricia, reside in Spring, Texas and are the proud parents of three children, Susan, Christopher and Abbey.

Sypris and Tektronix Support the NCSLI Education Development Fund

Sypris Test & Measurement and Tektronix Held a Texas Hold-Em Poker and Black Jack benefit event at the 2008 conference in Orlando. The event was held on Sunday afternoon and was enjoyed by a number of conference attendees. The grand prize winner was Ron Boone who won a 42-inch flat screen television. Additional winners included: Tim Bolduc, 2nd prize ($200 gift certificate to Swan/Dolphin restaurants); Keith Carradine, 3rd prize (poker set). Raffle Prize winners were: Keith Carradine (2 night stay at the Regal Sun Resort); Jessica Smith (2 tickets to Universal Studios. The event raised $1,500 that was donated to the NCSLI Education Development Fund during Wednesday’s luncheon and awards ceremony by Kelly Radziski, the Marketing Communications Coordinator for Sypris Test & Measurement.

NCSLI Now Registered with the CFC Fund

Government Employees! NCSLI International needs YOU! As you may have heard, NCSLI International is now registered with the Combined Federal Campaign (CFC) to accept charitable contributions to our Education Development Fund for education and training efforts.

Our CFC code is 26683. CFC media resources can be obtained off our website at www.ncsli.org/training/financial.cfm to be used at local events and in your local media.

NCSLI provides measurement science (metrology) resources, education and training, scholarships and metrology outreach to improve the quality of products and services supporting excellence in calibration and testing.

Types of projects funded by NCSLI:

- Scholarship support for schools with measurement science programs
- Sponsorship of the Joe D. Simmons scholarship to individuals studying metrology and/or quality assurance
- Educational materials such as handouts, measurement kits, posters and flyers
- Outreach programs supporting teachers, students and professionals with information about measurement sciences and careers in metrology

To promote NCSLI at your local CFC events or to volunteer as a contact at your military or government facility, please contact: Mark Lapinskes, mark.lapinskes@sypris.com or Georgia Harris, gharris@nist.gov
The Joe D. Simmons Memorial Scholarship for the academic year 2008–2009 has been awarded to Christine Donaldson, a student at the California State University Dominguez Hills enrolled in the Bachelor of Science in Quality Assurance program.

Upon completion of her BSQA degree in 2009, Donaldson plans to pursue a Masters Degree in Quality Assurance. She hopes to be able to teach in addition to continuing to work in the quality field.

In addition to being a student, Donaldson is an FAA-Certified Repairman at a repair station that performs a specialized epoxy surface restoration to aircraft components. Her position at this station has changed over the years from Customer Service Manager to Quality Control Receiving Inspector, to her current position as Quality Assurance Manager, with the added responsibility of Repair Development.

The Simmons Scholarship is pleased to recognize her ability and hard work by presenting a $3000 award to support Christine Donaldson at the California State University Dominguez Hills for the school year beginning in September.

The Scholarship was established in memory of Dr. Joe D. Simmons, who was Chief of the NIST Calibration Program, NIST liaison to the National Conference of Standards Laboratories.

The Scholarship is cosponsored by the ASQ Measurement Quality Division, the Measurement Science Conference and NCSL International, and is supported by many individual friends and colleagues of Joe Simmons. ■

n.belecki@ieee.org

Joe D. Simmons Scholarship Winner
by Norman Belecki

Joe D. Simmons MEMORIAL SCHOLARSHIP

Founded in the memory of Joe Simmons to support the study of metrology and metrology-related quality topics.

Outstanding students are encouraged to apply for the $3000 scholarship.

Completed applications are due March 1.

For application forms or more information contact your advisor, student aid office, or the Scholarship itself at

Simmons_Scholar@comcast.net

www.simmons-scholarship.com

or write to: Simmons Scholarship

7413 Mill Run Drive, Derwood, MD 20855-1156

PROMOTING ACADEMIC EXCELLENCE IN METROLOGY

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A NC S L I “ M etrology F ilm F estival” would be a hard sell, even if the venue was Tel - luride, Colorado or C annes, France. After all, what films could we show? I suppose we could show the classic animated piece Why C alibrate? (featu red in the July 200 8 issue of M etrologist), but it lasts for just 12 minutes and would be over while most of the audience was still in the popcorn line. After that, we could screen the soul stirring What is N C S L? film. That would result in another 15 minutes of rapture for a few propeller heads, but most of the audience would rather watch paint dry.

M etrology related films are few and far between, but the idea of a “Metrology Film Festival” was too good to resist. I t took some searching, but we’ve found five films that deal, at least superficially, with our noble profession. S o grab a bag of buttered popcorn, a king sized box of “J unior M ints,” and an extra large blue raspberry “I ce” and let’s go to the movies!

The Great G u y (1936)

T here’s a persistent rumor that D ave Braud away had a small part in this 72 year old film, but I wasn’t able to verify it. E ven the film was hard to find, my local video store didn’t have it, nor did the local library. I finally broke down and bought it from Amazon for $1, plus $3 shipping. Was it the best four bucks I’ve ever spent? N ot even close, but it does feature the legendary J imm y C agney in the leading role. A nd due to a pronounced lack of competition, it might be the best metrology movie ever made.

C agney was the ultimate movie tough guy. I t’s hard to imagine that now, in the modern era of muscle bound stars like Stallone and Schwarzenegger, because Cagney weighed maybe 130 pounds soaking wet. But he had been an amateur boxer in real life, and as one writer notes, was “able to project a contentious and arrogant confidence.” The Great Guy isn’t as memorable as Cagney classics like The Public Enemy (1931) or Angels with Dirty Faces (1938), but it still has its moments.
David and Lisa (1962)

This well crafted, low budget movie was a surprise hit when released in 1962. Time Magazine called it the best American film of the year. Director Frank Perry and his wife Eleanor, who wrote the screenplay, were both nominated for Oscars.

David and Lisa is not a “feel good” film, but it has some touching scenes and will hold your interest in spite of its slow pace. David (played by Keir Dullea) is a smart young guy, almost college age, who suffers from a severe case of obsessive compulsive disorder. As a result, he is brought by his mother to a residential treatment center where he befriends a girl named Lisa (played by Janet Margolin), who has two personalities. The acting is first rate, with terrific performances from Margolin and Howard Da Silva, who plays the psychiatrist Dr. Swinford.

The metrology connection in David and Lisa is David’s obsession with time and time keeping. He wants to control the passage of time, which of course is impossible. He is obsessed with clocks, but refuses to own a watch because none of them are accurate enough to satisfy his obsession. There is some chilling dialogue where David brings up the concept of a radio controlled watch to Dr. Swinford, many years before any such devices were commercially available. If you happen to measure time interval or frequency, the lesson you’ll learn from David and Lisa is simply this: Just measure it, don’t think about it too much.

Longitude (1999)

Many metrologists know the story of John Harrison, the British clockmaker who solved what was arguably the most pressing measurement problem of all-time, the quest to accurately establish the longitude of a ship at sea. Many lives and massive amounts of money had been lost due to poor navigation, so the British Parliament offered a huge reward to anyone who could solve the longitude problem, a sum that would exceed ten million U. S. dollars in today’s currency. Harrison spent most of his life, from about 1720 to about 1770, working on the longitude problem. He built a series of beautifully engineered mechanical clocks, while the scientists of his day continued to look unsuccessfully for astronomical solutions. Harrison’s clocks were so advanced that their accuracy was not surpassed for almost 200 years.

The most famous book about Harrison is a slim volume published by Dava Sobel in 1996, called Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time. Although previous authors had perhaps done a better job of telling Harrison’s story, Sobel’s book became a bestseller, the first best-seller ever written about timekeeping! It inspired the movie Longitude, which was made for British television in 1999, and later aired on A&E in the United States (there was no theatrical release but the film is available on DVD).

The movie is more than three hours long, but this is one of those rare instances where the movie is better than the book. It’s a story about innovation, persistence, and dealing with adversity, and anyone who designs measurement systems or metrology instruments will be inspired by Harrison’s relentless pursuit of perfection. I give Longitude two stopwatches up!


This flick cost about 110 million bucks to make and bombed at the box office. The reviewers weren’t kind, audiences for the most part didn’t like it, and the storyline isn’t true to the classic adventure novel by Jules Verne. One reviewer noted that Verne would have wept for 80 days if he had seen this movie. Not only that, but the story had been filmed so many times before (the 1956 version earned five Oscars including best picture) that it was almost inexplicable that it was filmed again. In fact, the only positive things about this 2004 update are the impressive cinematography, and the affable performance of Jackie Chan, who smiles a lot while showing off his martial arts skills.

This film made it to our festival because it brings the character of Lord Kelvin (played by Jim Broadbent) to the big screen. Lord Kelvin, of course, was a real person who wasn’t in the novel or in any of the other film versions, but he gets to parade around here with the fictional characters that Verne created. Metrologists know LK as an iconic figure who the base unit of temperature is named after, as is the absolute temperature scale that he first proposed in
1848. He later became the first to suggest an atomic oscillator (1879), and had far too many other achievements to list here. But in 80 Days, LK is just an evil villain, nothing more, nothing less. If you brought tomatoes to the film festival, here’s your chance to toss them at the screen!

To be fair, Broadbent’s portrayal of Kelvin is tongue in cheek, and isn’t completely false. By all accounts Kelvin was a self-confident man, and his hubris sometimes got the best of him. In 1895, eight years prior to when the Wright Brothers (who also appear in the film) proved him wrong, LK declared that “Heavier-than-air flying machines are impossible.” He also famously stated in 1900 that “There is nothing new to be discovered in physics now. All that remains is more and more precise measurement,” a quote that is paraphrased in the movie. The filmmakers obviously took the dark side of LK and ran with it, but making him evil was still a bit of a stretch. Many other scientists have made similar mistakes when attempting to predict the future. So if you see this film with your kids or others who haven’t heard of Kelvin before, be sure to give the man his due.

Minutemen (2008)
This Disney Channel original movie was made for kids, but still has an entertaining, if somewhat predictable plot. A pint sized high school kid named Charley invents a time machine, and he and two of his “uncool” friends go back in time to save fellow students from embarrassing situations that have “ruined” their lives. Charley really, really loves science, and a lot of the scenes are populated with computers and instruments, but as is the case in most “science” movies, no details are discussed. However, one scene briefly mentions Nikola Tesla, which proves that the writers did at least a tiny bit of homework.

The time travel shenanigans cause some problems. Some of the students they help turn out to be jerks afterwards. And some guys at a nearby laboratory somehow are monitoring the “vortex” created by the time travel, which leads to the FBI getting involved. In a scene late in the movie, law enforcement agents burst into the high school hallway and confront a group of students. The first officer holds up his badge and shouts “FBI!” A second officer holds up his badge and announces “CIA!” Then, a third guy holds up his business card backwards (why do they pick on us?) and shouts “Bureau of Weights and Measures!” One of the kids then tells the W&M official, “In the future you should probably go first.”

Unlike Cagney, who had the lead role in The Great Guy, this weights and measures man (played by Trevor Snarr) gets maybe five seconds of screen time. If you blink, you’ll miss it. Even so, millions of kids have now heard weights and measures mentioned, and Snarr’s 15 milliseconds of fame puts Minutemen on the metrology movie map.

So there you have it, five flicks that belong in every metrologist’s DVD library (I had my fingers crossed when I typed that). These will have to do until Hollywood gives us the metrology movies that we really want to see, like Gone With The Kilogram, My Big Fat Quality Manual Is Greek To Me, and Meet the Fockers, I Mean the Lab Assessors.

Special thanks to Georgia Harris of NIST and Bob Zaja of the Naval Surface Warfare Center for mentioning The Great Guy, and Elizabeth Gentry of NIST for telling me about Minutemen.

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Do you know of any references to metrology in pop culture (from literature, movies, music, sports, advertising, television, theater, etc.)? If so, drop me a line at lombardi@nist.gov. We’ll try to include your reference in a future column, and if we do, we’ll give you credit for the suggestion.
Meeting Planning for the Emerging Generations

by Robert Wendover

As the number of young professional’s increases within the meetings you plan, it will be imperative to take their needs and desires into consideration. You might even begin by asking if a live gathering is necessary. Many young professionals prefer to meet and learn electronically. While this may appear threatening at first, planners who stay ahead of the curve in understanding the true role of meetings in today’s organizations are the ones who will continue to thrive. Review the questions below to see if you are adequately responding to the expectations of these emerging groups.

Planning Team – Most of association and corporate leadership is still dominated by Baby Boomers (those born approximately 1946–64). Those in the emerging generations deserve a seat at the planning table during the development of meetings. What can you do to recruit and involve young people in the design, implementation and evaluation of the meetings you plan? They’ll share a wealth of information and suggestions if asked.

Dates – With the new diversity of ages attending meetings, the conflicting needs are multiplying. Have you/can you take young parents’ scheduling concerns into consideration, for example? (School starts, popular school holidays, spring breaks, etc?) If you schedule meetings during shoulder season to save money, will you be precluding younger workers who are balancing work responsibilities and child care?

If you schedule meetings on a Saturday, will young professionals refuse to attend because they don’t work on weekends due to personal commitments? How can you determine the best time for different meetings? A series of poorly timed events can significantly impact association revenue or corporate productivity.

Location – Attracting young professionals to out-of-town meetings can be difficult due to the commitments they may have at home. Will the destination city be available at a reasonable airfare if young attendees are traveling with families? Will the location offer opportunities for entertainment? Many of those in younger generations may wish to combine a business meeting with a long weekend of rest and relaxation.

Amenities: Do the locations you choose have amenities that might appeal to younger members or employees? Are there local attractions they might find entertaining? Are there child care and kids’ activities available for those who want to bring their children? While the emerging generations understand that travel for meetings is sometimes necessary, they still look for ways to make it balanced and enjoyable.

If the meeting is being held in town, will it be timed for those who may have child-care responsibilities? Will the location force a percentage to spend too much time commuting to and from the gathering? The cost savings of choosing an out-of-the-way location may be defeated if young people find the time and distance too onerous. How can you balance the two?

Sponsorships – Sponsorships play an increasingly critical role in the delivery of meetings for both associations and corporations. How can potential sponsors be most effectively approached to convince them to participate? Remember that the “good ole boy” who has said “yes” for the past 15 years may be replaced by a young “upstart” who doesn’t see the value. Once those sponsors are on board, consider how they can best engage those in all generations of attendees. Specialized websites? Useful giveaways like CDs? Memory sticks? Interactive media? How can these organizations best connect with those attending your meeting? It’s your job to help them engage.

Promotion – What is the best way to reach your young members or workers? Most likely over the web. How well does your meeting’s website perform when contacted by a member? Has it been intuitively designed so it is easily navigable? Do the images reflect those of different ages and cultures? Is the copy written in such a way that younger generations will find attractive? Are there links provided to associated activities such as hotel registration, local attractions, auto rentals and airlines? Is there an electronic matching service for those who want to share a room? Can visitors click on the photos or descriptions of those speaking to hear a 30-second preview of what will be covered? You get the picture.

Registration – As a society, we are fast evolving into a “one-click” marketplace. Young people expect to register for meetings in the same way they purchase a book from Amazon.com. While emerging professionals may still read material sent through the mail, they are less likely to act on it because it requires extra steps like filling out paper forms and looking for postage. In a perfect world, they would like to click on a link that takes them to the registration page, auto-fills the information the organization has collected about them before and then sends them a confirming e-mail, all within a minute or two. If the confirming e-mail includes an incentive for booking hotel rooms early, they’ll like it even better. Does your organization do all this?

As the emerging generations continue to increase in their influence, the meetings they attend will transition with their needs and expectations. How well equipped are you to remain on the cutting edge of this transition?
The U.S. Measurement Requirements Committee (USMRC) met during the NCSLI Conference in Orlando, Florida on August 6, 2008. Jeff Walden called the meeting to order at 1640 with introductions by attendees. Belinda Collins summarized the activities of the USMS Office. She stated that 723 measurement needs were identified and are documented in the current USMS report. She responded to a question from Dexter about the total size of the requirements by stating that it is known that the report represents a limited sample of the total needs. A revised report is scheduled for December of 2008. She expressed appreciation for the efforts of the USMRC for assisting in helping to authenticate the needs that were identified. She also gave a summary of the two sessions at the current conference, which were a combination of efforts by the USMS and the DoD, and emphasized that this was an example of the cooperative environment that is needed. The next step is to look ahead toward the needs of the next five years, especially in the areas of biochemical and energy needs. She introduced the new USMS web portal and stressed its value as a tool for the continued identification of needs and for coordinating solutions. This portal will provide some access controls in order to assure that security and propriety concerns are addressed. The portal might include a blog and/or chat room. John Fishell stressed the importance of connecting with the Department of Energy, NASA and possibly the Coast Guard. Jeff emphasized the need to publicize and promote the efforts of the USMS office. He suggested that a USMS presentation could be included in NCSLI Section meetings. Belinda agreed that this would be a good idea. Jeff asked Chet to work with the California Inland Empire Section chair to arrange for a presentation. He will also contact the NCSLI office to request a broadcast e-mail to the entire membership. He suggested another measurement needs session at MSC. Doug reported that the USMRC will not send out a survey in the near future, and that the NCSLI board has directed the USMRC to support the USMS Office. He will work with the MSC Technical Programs Chair to arrange a time slot for a session during the MSC 2009 conference.

“Round Robin Template” found at the above link. When properly used, it will produce a full report package. After Val’s great presentation, we shared information on completed, planned, and needed ILCs. We also discussed the progress made with setting up the committee’s blog site to list ILC activities. Doug reported that the J-Volt ILC ran very smoothly and is essentially complete with final data being assimilated. The final report will be published in 2009. In March of this year in preparation for the ILC, Dr. Yi-Hua Tang of NIST traveled with the NIST Josephson Voltage System and conducted a direct, array-to-array comparison with the Lockheed-Martin Lab in Denver—the pivot lab for the ILC. The artifacts were shipped to the first participating lab later that month. As of July 22nd all 12 participant labs had completed measurements and reported results to the pivot lab.

The next meeting for 142 Committee will be at the MSC in Anaheim, CA in March 2009.

A utilities committee round robin for 100 amps is about midway through the participating labs. A report is planned for the NCSLI Conference in San Antonio.
151 Healthcare Metrology
Marcus McNeely, Committee Chair
mbmcneely@coolblue.com

The 151 Committee held three meetings at the Orlando NCSLI Conference, all of which had high attendance. Fourteen new members joined the Healthcare Metrology Committee at the Orlando conference, boosting membership to 129.

RP-6 (Calibration Quality Systems for the Healthcare Industries), under the direction of Walter Nowocin and a team of 14 volunteers, was submitted to the BOD for final approval. This was the first revision since 1998. Future review / update processes are being discussed.

The 151 Committee seeks formal FDA recognition (preferably through a published guidance) of Contract Cal lab traceability to SI, through ILAC recognized accreditation when the scope of accreditation and uncertainty budget consideration is documented and approved by healthcare metrology organizations. Ultimately, no further documentation beyond the accreditation scope and uncertainty budget should be necessary to demonstrate this traceability.

Additionally, we seek formal recognition by the FDA of the “CIPM 52” so that we may use other NMI’s without possibility of having to present further audit documentation.

Citing the International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use, ICH Harmonised Tripartite Guideline, Stability Testing of New Drug Substances and Products, Q1A (R2), the following storage conditions are recommended:
- Long term: 25 °C ±2 °C/60% RH ±5% RH
- Intermediate or long term: 30 °C ±2 °C/65% RH ±5% RH
- Accelerated: 40 °C ±2 °C/75% RH ±5% RH

The 151 Committee seeks clarification in the Q1A (R2) document specifying these temperature and relative humidity ranges are not simultaneously obtainable in stability chambers, given prevailing uniform dew point and pressure conditions.

As a proactive measure, The 151 Committee aspires to create a comprehensive gap analyses between the requirements of ISO/IEC 17025 and the 21 CFRs regulating healthcare metrology in US markets. While 17025 is not a current FDA requirement, this document would serve as a useful roadmap regardless of the ultimate regulations in this arena.

Onsite workshops hosted at NIST in Gaithersburg are currently being discussed to address multiple topics pertinent to healthcare metrology. Further, FDA participation may be bolstered due to its proximity to NIST.

A venue within future conferences (such as a track or session) to host healthcare metrology abstracts and panels is currently under consideration by the committee. Alongside the needed “expansion space,” we feel we may bolster overall conference attendance by healthcare metrology professionals where pertinent papers/panels are made available.

The next onsite meeting for 151 Committee will be at the MSC in Anaheim, CA in March 2009.

153 Utilities Committee
William Hinton, Committee Chair
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The 153 Utilities Committee held meetings during the symposium in Orlando on Sunday August 3, and again on Tuesday August 5. The meetings were very productive and covered a wide range of topics.

The Utilities Committee forum continues to be very robust with large traffic and topic count. System crashes andspam are recurring issues and have typically been the result of hacking. Larry Johnson (NCSLI IT manager) has been able to recover the Utilities Forum from the weekly backup file with minimal data loss. We continue to review the Snitz forum and our options in hopes of restoring subscription and notification service.

Committee members are engaged in RP (Recommended Practices) rewrite efforts with other committees. Recommended practices RP-1, 173.1 Calibration Intervals Subcommittee, Metrology Practices Committee - NCSLI/173, Calibration Interval Subcommittee RP-1 Working Group; 155.1 Committee RP-5 "INTERPRETING AND APPLYING MEASUREMENT AND TEST EQUIPMENT SPECIFICATIONS." Recommended practice RP-12 was briefly discussed with some lively comment regarding Appendix H - Bayesian Analysis. Dennis Dubro proposed the possibility of developing a white paper that would provide a user tool to the Bayesian methodology. This proposal met with approval from the group.

The topic of training, qualification and documentation is applicable to all members. Richard Brenia (Edison ESI) and Mike Kurzeja both presented papers during the conference and lead a discussion that focused on how technicians are brought into the lab and trained and qualified on the capabilities of the lab. Most labs have training and documentation systems that ranges from simple Supervisor file folders to systems linked to progression and formal training programs. Programs will be made available to committee members from those member utilities who allow the release of information.

Software control and verification was discussed. Most utilities require software to be entered into a central tracking system with the user providing a classification or safety significance to the software. All software that may impact a system, structure or component does require some level of verification. One utility treats their software as a standard with a calibration sticker and due date for a review to confirm adequacy.

Dennis Dubro stated that he is often requested to justify their existence as a utility lab. Most of the committee members stated that in the last year they had been approached with similar requests. In light of the requests for clear and concise benefits to NCSLI membership, we are assessing our charter. The goal is to provide more details that can be used to support our membership in NCSLI and would indicate how our participation is necessary to support our committee, NCSLI and industry. Dennis stated that knowing where we are now and where we are going and how we will get there is important as the paradigm shifts.

Peter Buzzard, NCSLI VP of Industrial Programs stated that

Continued on page 32
the Board of Directors is emphasizing education, training and participation with the local sections. It was also recommended that committee members take a look at RP-17, “Documenting Metrology Education, Training and On-The-Job Training.” Pete has preliminary information from his email benchmark survey on equipment failure rates but has asked the committee to take a second look and hopes additional members will respond.

Several Inter-Laboratory Comparisons (ILC’s) continue with the support of committee members and others outside the committee as well.

ILC 153-3 – gas flow less than 20 SLPM. Cory Peters and James Reid have been the pivot lab and the math engine respectively behind this ILC. The artifact failed in use and was repaired and the ILC continues. James has been assessing the data and reports seeing a shift beyond E-normal at flow rates above 16 SLPM. The pivot lab was asked to perform comparison readings against their mole bloc and a bell prover to try and identify the source of the shift.

ILC 153-2 – The RTD artifact for this ILC was transferred to Edison ESI where it will be managed by Richard Brenia. A reposting of the call to participate will be issued following a review of the charter and procedure. The ILC will commence following this review.

Current Shunt ILC – This is an external ILC managed by Ohm-Lab. Five labs took data from the two current shunts before it was identified that a connector problem existed. This has been resolved and the first five labs will be asked to repeat the testing after everyone completes their first run.

Two additional ILC’s have been proposed with Dave Schuette asking if there is interest in doing an ILC around a triple point artifact. Cory Peters said he would also create an additional ILC around a 10K Hz frequency source.

Cyber Security – Those plants currently working to implement a cyber security program in response to NRC draft Regulatory Guide DR-5022, discussed how M&TE that connects to plant systems, structures and components are being identified and managed. Bill Hinton and Pete Buzzard are participating representatives from the NCSLI to the SDO (Standards Development Organization) in Gaithersburg, MD. During the summer meeting in July 2008, Dr. Jennifer Uhle of the NRC and Russell Sydor, the branch chief in charge of the cyber security draft guide were informed of our approach to divorce M&TE from the controls of the cyber security program unless the asset is connected into the plant communication or control systems. He stated that our approach is in alignment with their RegGuide development. He further stated that the lack of acknowledgement towards M&TE and how it should be handled was an apparent oversight. He took our approach as a comment against the draft. It was suggested that additional cyber security information is available at www.uscert.com.

Cory Peters gave a discussion on how they are working with vendors to develop a test set for LLRT (Local Leak Rate Testing) for nuclear containment penetrations. This identified excellent synergies between industry, committee members and vendors and how goals can be attained through leverage. There will be more information made available as the project and testing are completed. Exelon management was asked to make the results of their project available to the committee membership. A response is pending.

Please refer to the Utility Committee minutes from the Orlando meetings for expanded comments and information on current and planned committee activities.

164 Education Liaison and Outreach

Chris Grachanen, Committee Chair
Elizabeth Gentry, Committee Co-Chair

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The 164 committee hosted both an interactive panel session and a committee meeting during the 2008 NCSLI conference in Orlando, Florida.

The 164 panel session was not your typical panel session by any means. The interactive content of the session was the brainchild of Georgia Harris (VP Learning and Development) and the hard work of Elizabeth Gentry (164 Committee co-chair). The session started out with Elizabeth leading a competitive Metric Estimation game which pitted teams, drawn up from session attendees, against each other to correctly guess physical parameters of common household items using Metric (SI) units. This activity was fun, educational, and somewhat humbling (given the wide dispersion of guesses). So much fun in fact that a session in another room sent one of their henchmen Val Miller to quiet us down. After the Metric activity the teams broke up and folk were instructed to visit various Metrology Ambassador Stations setup around the room. The stations were hosted by volunteers who provided session participants with information about their experiences with metrology education outreach activities and opportunities. In addition suggestions were solicited regarding future projects for the 164 committee. Station volunteers stamped visitor “Education Passports” which were put in a drawing for some neat prizes at the end of the session. Comments received from attendees about the session were extremely positive with many folks asking how come we don’t do more interactive sessions at NCSLI conferences. Thanks goes out to all volunteers for making this session an overwhelming success: John Fishell, Michelle Foncannon, Elizabeth Gentry, Chris Grachanen, Georgia Harris, William Hinton, Van Hyder, Diana Poulton, Mary Satterfield, Dilip Shah, and Thomas Weidmyer!
The 161 Training Resources Committee met at the recent NCSLI conference in Orlando. Several training providers were in attendance and provided valuable input into the pros and cons of the new Regional Training Events. The first NCSLI sponsored regional training event is scheduled for September 3 and 4 at 3M as a follow-on to the Twin Cities fall section meeting. The topic will be uncertainty. Lessons learned from this event will be incorporated into future events. We are seeking future event coordinators, and we would also like to encourage training providers interested in getting involved in regional training to register on the NCSLI website at www.ncsli.org/ldp.

The 161 committee also briefly discussed TALOS (training aids library online service) activity. Late last year we purchased many new CDs and DVDs, which resulted in many more members visiting the TALOS website and checking out resources. TALOS activity was double during just the first 7 months of 2008. 63% of the titles checked out in 2008 were from the recently acquired selection. The committee is planning to purchase additional copies of the most popular training aids. If you have any suggestions as to future additions to the training aids library, please contact the 161 committee. Please direct questions regarding regional training events or training resources to the committee chairs Helga Alexander and Matthew Denslow.

The subcommittee, part of the 173 Metrology Practices Committee headed by Howard Castrup, has been working toward release of the 4th edition of RP-1. We recently concluded a series of working meetings at the 2008 NCSLI Workshop & Symposium in Orlando, following up on work at and after the 2008 Measurement Science Conference in Anaheim. Both conferences proved very productive for the RP-1 working group.

Since our last progress report at the 2007 St. Paul NCSLI conference, we have concentrated on reviewing and finalizing the existing document edits and identifying the most important material yet to be added. As a result, only one existing topic (data consistency testing) has unresolved edits. Further in-progress recommendations we currently expect in the 4th edition cover variables data analysis (using actual numeric values for each calibration point), data retention policies, and required data fields.

Obviously, calibration intervals interrelate to other aspects of metrology including quality, risk analysis, uncertainty analysis, and equipment specifications, so the committee coordinates work with other recommended practices and standards working groups to improve integration and consistency between documents. In August, we released RP-1’s revised glossary to the related committees for review. The RP-1 and Z540.3 handbook working groups are also coordinating related text and references to provide a better product for users of both documents.

We hope to announce the 4th edition’s release in our next report. RP-1 work will continue afterward, however, as new material appears and previously published techniques prove their worth—we envision a continuous change accumulation process that will result in frequently published updates to maintain the RP’s currency. As always, we welcome your ideas, comments and suggestions to make the RP more useful.
The Northern Ohio Section 1131 biannual meeting, hosted by Mike Yeager and Bill Coll from FirstEnergy BETA Laboratory in Mayfield Village, Ohio was held on July 17, 2008. The 20 attendees were treated to pastries and coffee along with a catered lunch provided by Techni-Tool and Agilent.

The meeting was kicked off with welcoming comments by FirstEnergy BETA Lab’s Mike Yeager and Broadview Instrument’s Tom Powis. Tom then introduced the guest speakers from Agilent, Tom Brennan and Kevin Kersner. For the morning segment, Kevin provided an insightful presentation on Mixed Signal Oscilloscopes. Agilent was kind enough to bring oscilloscopes for the attendees to use while following the presentation. The attendees were engaged and asked many questions.

During the lunch break, Mike Yeager provided a tour of the FirstEnergy BETA Lab facility. After lunch, Agilent conducted hands-on lab exercises using the Mixed Signal Oscilloscopes.

The meeting ended with closing comments and door prizes courtesy of NCSLI, Techni-Tool, Agilent, and FirstEnergy BETA Lab. Our fall meeting is scheduled for late October/early November at FirstEnergy BETA Lab. The date and agenda have not been set.

Kevin Kersner of Agilent Technologies explaining the basics of digitizing oscilloscopes.

Northern Indiana Section 1134
Doug Leonard, Section Coordinator
Hosted By: Karl Schmidt Unisia, Inc.
May 20, 2008

On May 20, 2008 18 people attended the Northern Indiana Section meeting held at Karl Schmidt Unisia, Inc in Fort Wayne, Indiana. Karl Schmidt Unisia, Inc an accredited testing laboratory that focuses on Engine Durability Testing for Spark/Compression Ignition Engines provided excellent facilities, with Laboratory Accreditation Bureau providing refreshments for the attendees.

Doug Leonard, Laboratory Accreditation Bureau Managing Director and NCSLI Northern Indiana Section Coordinator, began the meeting by welcoming everyone, and having attendees introduce themselves.

The first speaker Lloyd Baker, NCSLI Midwest U.S. Region Coordinator, gave a slide show presentation of the 2008 NCSLI Board of Directors meeting. He informed us of the many changes/upgrades that were accomplished during the meeting. He also spoke to us about the new 2009 approved candidates for the NCSLI board. He reviewed the many upcoming meetings, events, and training courses being sponsored by NCSLI.

Mr. Baker provided us with very insightful information into the many resources that are available through NCSLI.
The next presenter, Doug Leonard, gave a presentation titled History of Metrology, in honor of World Metrology Day, originated on May 20, 1875, the day of the signing of the meter convention. He notified us that there were 17 original signatories and that the United States signed in 1878. Mr. Leonard spoke to us about what metrology is, why we have it, and how it affects us. Mr. Leonard reviewed the many subfields of Metrology with us and explained each of them. He also spoke about NCSL International being founded in 1961 and currently having over 1000 member organizations from 45 nations. Mr. Leonard’s presentation was very informative and interesting showing how metrology affects our everyday lives.

Our next presenter, Angie Coffman, Indianapolis Scale Quality Manager, gave a presentation titled Metrology Training, Experience with Central Georgia Technical College. Mrs. Coffman spoke to us about the Associates Degree in Metrology available through Central Georgia Technical College along with many other online programs provided through the college. We were notified that Central Georgia Technical College is the only completely online Metrology Degree in the world and that they currently have students from 7 different states, as well as England and Canada taking courses. In 2007 NCSL International gave Central Georgia Technical College $4000.00 in scholarship money. Mrs. Coffman provided a very insightful presentation into the many opportunities provided by Central Georgia Technical College to anyone interested in pursuing a degree in Metrology.

Next Ryan Fischer, Laboratory Accreditation Bureau Calibration Program and PT/ILC Manager, gave a presentation titled ANSI/NCSL Z540.3-2006 Requirements for the Calibration of Measuring and Test Equipment, originally presented at the NACLA Forum in April of 2008. Mr. Fischer reviewed the ANSI/NCSL Z540.3-2006 standard as well as explained the differences it has from other standards.

Our final presenter, John Busald of Dytec Midwest, Inc., spoke to us about the Economic Stimulus Act of 2008 and how businesses can take advantage of the stimulus package when purchasing equipment for their laboratories or facilities.

After the presentations, door prizes provided by Laboratory Accreditation Bureau, John Busald of Dytec Midwest, Inc and NCSLI were raffled off. The day ended with a tour of Karl Schmidt Unisia, Inc laboratories.

We would like to thank Karl Schmidt Unisia, Inc, Laboratory Accreditation Bureau, and our presenters Lloyd Baker, Doug Leonard, Angie Coffman, Ryan Fischer, and John Busald for their valued help and time.

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A combined meeting of sections 1211 and 1213 was held at NIST on April 23, 2008. The meeting was well attended and received by 52 people. The meeting started with a continental breakfast and coffee sponsored by Creative Marketing Associates (CMA). Tom Hettenhouser, Virginia section coordinator, and Vernon Alt, Maryland section coordinator started the meeting with announcements, an overview of the agenda, and a review of the latest NCSLI board report.

The first speaker, Elizabeth Gentry of NIST Weights and Measures, discussed the “Strategic Framework” for Learning and Development and touched on each one of the 4 committees, 161-Training Resources, 162-Financial Resources, 163-Workplace and Professional Development and 164-Education Liaison and Outreach. Next year NCSLI will be listed in the CFC (Combined Federal Campaign).

Peter Dack of Fluke spoke about the requirements of the RF Source used in Spectrum Analyzer calibration and how multiple sources are required to cover the characteristics and range, such as Low Noise, Flatness and Attenuation accuracy from low frequency up into the microwave range. Peter also pointed out that proper organization of the tests can reduce the number of connect and disconnects throughout the cal procedure, thereby reducing calibration times and connector wear.

Prior to lunch at the NIST cafeteria, the group broke into smaller groups to attend lab tours of their choice. These tours consisted of temperature, flow, force, dimensional, and radiometry. Thank you to Greg Strouse, Aaron Johnson, Rick Seifarth, Ted Doiron, and Cameron Miller for their time and effort in hosting these tours.

After lunch, Tom Hettenhouser of NVLAP then gave a presentation on uncertainty analysis. Tom started by
giving us the formal definition of uncertainty then he hit us with our favorite formula. Once the moans and groans subsided, it actually got easier when Tom showed us how using MS Excel can simplify our calculations. Many questions were asked, which were fielded by Tom as well as many of the attendees.

After the afternoon break and group photo, Michelle Foncannon of NIST Weights and Measures, gave a presentation on risk analysis. Michelle started her presentation with a SAT style analogy question, “Measurement Uncertainty is to the Measurand as Blank is to Risk.” Michelle’s assistant, Elizabeth Gentry, handed out sweets to attendees who provided inputs and answers. Michelle tabulated the responses on an easel then proceeded to the correct answer using deductive reasoning and an understanding of Measurement Uncertainty. She stressed the value of evaluating both False Acceptances and False Rejections and noted that guard banding only addresses False Acceptances. Using an example Michelle demonstrated three different ways to calculate the risk associated with a performance decision. MS Excel was again shown to have useful formulas. This was a very lively and informative presentation.

The day concluded with door prizes provided by CMA and NCSLI. Feedback from the meeting survey was mostly positive and comments will definitely be incorporated into the next event held at NIST which is expected to be next spring. Virginia’s next meeting is expected to be held in the Norfolk area sometime in October.

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Atlanta Section 1221
Ron Kirstatter, Section Coordinator
Hosted By: Applied Technical Services, Inc.
April 29, 2008

April 29th the NCSLI Atlanta Section 1221 held their semiannual meeting in Marietta, GA. With a mix of subjects on the agenda 33 attendees from 22 companies representing a wide range of industries and occupations were on hand.

Our host for this session, Cole Miller of Applied Technical Services, Inc. (ATS), welcomed everyone and explained a little about what takes place in their Marietta facility.

The Atlanta Section Representative and U.S. Marine Corps’ METCAL Quality Manager, Ron Kirstatter, opened the meeting with the Board of Directors meeting highlights from San Juan, Puerto Rico in January.

Pamela Wright a Senior Accrediting Officer with A2LA followed with “Common Misinterpretations of ISO/IEC 17025 and A2LA Requirements.” Accreditation is high on the priority list with many facilities across the country and Pamela met member’s questions with clear concise answers. Pamela explained “About 25 % of A2LA complaints are related to vendor concerns usually because complainant failed to meet 4.6.2, 4.6.3 or both.” Additional topics included: Traceability, Move Policy, Normative Documents, PT Sub-disciplines, Section 11 of Advertising Policy, Scope Additions, Sub-contracting, Method Validation, Management Review, Internal Audit, and Responding to Deficiencies.

After a short break Frank Liebmann, Electrical Engineer with Fluke/Hart Scientific enlightened all on “Infrared Calibration Development at Fluke Corporation Hart Scientific Division.” The characteristics of the IR 418X Precision IR Calibrator, IR Thermometers and SSE, Cavity Bath Development, Radiometric Calibration and Uncertainties were covered. A statistical demonstration of why we need a 150 mm (6 inch) diameter target was represented through results of size of source testing done at Hart Scientific. Appropriately it was concluded that users of IR calibrators need to be better educated in the use and technology behind these instruments.


Denis Newton with Fred V. Fowler Co. was unable to make the meeting so “Calibration of Linear Measurement Instruments” will be rescheduled.

Lunch was moved up and everyone was treated to catered barbeque in a great sun filled Georgia afternoon compliments of ATS.

Following lunch a guided tour of ATS covered metallurgy and materials testing, chemical analysis, non-destructive testing, fire and explosion investigations, IT support services and the calibration facilities. What don’t they do?

The meeting was closed with several door prize giveaways. The next meeting will be in April 2009. Date and location to be determined.

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The Region 1222 Central Florida Section of the NCSLI held their spring meeting on May 8, 2008 at Lockheed Martin Simulation Training and Support in Orlando, Florida. Bart Hynes, LM STS Manager of Test and Assurance, welcomed the speakers and attendees to Lockheed STS and provided a brief summary of Lockheed Martin STS Business Operations. To kick the meeting off, our Sponsor, Jeff Stevens of Southern Marketing Associates, provided a large assortment of pastries, coffee, and afternoon refreshments to the members. Our fall meeting hosted 53 attendees from 23 different companies.

Our guest speakers included Ron Ainsworth of Hart Scientific, Randy Fowler of Fluke Corp., Perry King and Paul Reese of Wyle Labs, and Jerry Gaffney of GEC Instruments. We would like to thank all of our presenters, their respected companies, and NCSLI for providing a great meeting.

Our first speaker was Ron Ainsworth of Hart Scientific. Ron’s presentation “Temperature Uncertainty Budgets, and How to Use them,” provided a vast amount of information concerning evaluation of uncertainties and effects that must be taken into consideration on various thermocouples and thermometer measurements and calibrations. Ron did an outstanding job in defining the tools and calculations needed to allow accurate temperature measurements.

Our next speaker was Randy Fowler of Fluke Corporation. Randy’s presentation was titled “Characterizing & Disciplining Electrical Calibrator Instrumentation to Improve Test Accuracies & Measurement Uncertainties.” Randy presented practical methods in improving inadequate traceable accuracies of existing calibrators for supporting new improved instrumentation. Randy demonstrated how characterization by means of identifying actual performance errors of calibrators will improve calibration uncertainties, thus improving both increased quality and confidence in calibration tests over a greater workload.

Our next speaker was Perry King of Wyle Labs. Perry’s presentation, “The New ANSI/NCSLI Z540.3 Standard” included some of the new requirements of the ANSI/NCSLI Z540.3 Standard as it relates to tolerances, accuracies, and reliability as associated to False Accept Risk Requirements (FAR). Perry provided various computation methods and explanations for successful FAR analysis for the new standard.

Lunch was next on the agenda. Lunch was graciously provided by our meeting host, Ray Minchin, Calibration Services Manager at Lockheed Martin Simulation Training and Support.

Following lunch, our next speaker was Jerry Gaffney of GEC Instruments. Jerry’s presentation “Ultra Accurate Temperature Measurements with Thermocouples” provided genuine definitions pertaining to thermocouple measurements, and how accuracies can be improved in the measurement process. Jerry also provided a live demonstration of thermocouple measurements giving real time data utilizing an ice bath and laptop for a controller.

The final event for the day was a factory tour of Lockheed Martin Simulation Training & Support facility.

We would like to give special thanks to Ray Minchin and Lockheed Martin for hosting this conference and to Jeff Stevens and Southern Marketing for providing the morning and afternoon refreshments. We would also like to give special thanks to Chris Isler and Tim Alongi for providing the factory tour of the Lockheed Martin facility.
We had an excellent and very productive section meeting with many participants from multiple metrology laboratories, pharmaceuticals, universities and schools.

The meeting was held at the “Escuela de Bellas Artes, Carolina, PR and was conducted by Dimaries Nieves, the PR Section Coordinator. Mettler Toledo and VWR Advance Instruments were the sponsors, providing the snacks and lunch for the attendees.

During this week, the NCSLI Board of Directors was conducting their meeting in San Juan, PR, so we took the opportunity to invite them to participate with us and conduct some talks. This was the first time that the NCSLI BOD visited our island. Dimaries Nieves, the meeting host, opened the meeting by welcoming the attendees and introducing the NCSLI BOD members that attended the meeting.

NCSLI VP of Northeastern US, Dana Leaman, updated the group on News from the recent NCSLI BOD meeting. She also spoke about the new NCSLI me•tro•g•ist Worldwide News publication, the new NCSLI blog, and the highlights from Learning and Development.

We were very thankful and happy with the presence of Andrew Wallard, Director of Bureau International Des Poids Et Mesures (BIPM). He gave a very interesting and informative presentation about BIPM and what the BIPM does.

He talked about the foundation of BIPM and the General Conference on Weights and Measures. He explained the mission of BIPM, its important role through history and its active participation around the world. He explained the International Measurement System, the importance of metrology in different areas as political, scientific, food services and in the Olympic Games. All attendees were excited with the presentation and information provided by Mr. Wallard, and grateful to have him attend our meeting. Thanks for your time, Andrew!!!

Georgia Harris gave a report on the US Measurement System. She talked about NIST products and services available, and the growing demand for more and better measurements to obtain the strongest economy. She mentioned the sense of urgency that reigns in the economy to ensure that the required capabilities to accelerate innovations in science and industry are under development, or planned.

Dana Leaman, A2LA, presented the Laboratory Accreditation. In this talk she discussed the hierarchy of the Conformity Assessment, the benefits, and specified the differences between three main words, Certification, Registration, and Accreditation. She also discussed the accreditation process, the mutual recognition agreements and the qualifications of the accreditation bodies.

Mark Lapinskes, NCSLI VP, Southeast US, discussed “Careers in Metrology,” using a current article from me•tro•g•ist. He talked about metrology, and the different types of careers in the metrology field. He discussed the reasons to select a metrology career, the different types of careers, and the proposed definitions for calibration technician, calibration engineer, and metrologist.

Salvador Echeverría-Villagómez from CENAM presented the MESURA Program. He discussed the objectives and its benefits for the industries.

Randy Fowler from Fluke Precision Measurement was the last speaker of the day. His topic was “Estimation of Uncertainties in Electrical Measurements.”

The meeting was concluded with questions, and much excitement about the next NCSLI Section meeting.

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The NCSL International South Texas Section summer meeting was held on July 24, 2008 at the Holiday Inn in San Antonio, Texas. The meeting was hosted by Larry Mock of Mensor Corporation and Wayne Cummings of Fluke Corporation. The meeting was conducted by Keith Scoggins, the South Texas Section coordinator and metrology laboratory supervisor at the South Texas Project Nuclear Operating Company.

Opening comments were made by Keith Scoggins to welcome everyone to the meeting and to also request feedback on the types of presentations attendees would like to see in future section meetings.

The first speaker of the morning was Larry Mock from the Mensor Corporation. Larry’s presentation was on how to predict the weather utilizing a barometer. Larry discussed how weather influences barometric pressure and by understanding wind conditions we can predict weather changes.

The next presentation was given by Paul Hanssen from Workplace Training. Paul gave a very informative presentation on Texas grants and education funding. Paul will be working with the Texas sections to determine if these funds would be available to provide training to NCSLI members in Texas, more to come on this subject.

Next up was Wayne Cummings from the Fluke Corporation. Wayne’s presentation was about the Economic Stimulus Act of 2008. Wayne discussed how companies could purchase new equipment and take a large tax deduction to offset the expenditure.

A superb lunch was provided by our host, Mensor Corporation. After lunch, Keith Scoggins from the South Texas Project Nuclear Operating Company gave a presentation on the Nuclear Power Renaissance. Keith discussed the need for more nuclear power in the US and what issues must be addressed as we go forward with new construction. Keith also explained how metrology industry would benefit from the nuclear renaissance.

The next speaker of the day was Doug Lynde from On-Time Support. Doug’s presentation was on implementing web applications in asset management systems. Doug discussed a web based application server software package designed to execute on a server hosting the metrology database, and accepts connections from a variety of (configurable) sources and provides data from the metrology database to those sources.

The last speaker of the day was Jack Herring from Michell Instruments. Jack’s presentation was on a bench-top accredited humidity cal system. Jack described problems associated with making reliable humidity measurements with a bench-top humidity instrument.

In addition to the above speakers, there was an exhibit area where several vendors were allowed to show their products and services. During the breaks and lunch the vendors were available to discuss and demonstrate their products with the attendees.

A special thanks to Larry Mock and all the folks of Mensor Corporation for their support in providing the meeting location and lunch. Also, appreciation is extended to Wayne Cummings of Fluke for his support and providing breakfast and refreshments during the breaks.

The next South Texas Section meeting will be at Hewlett-Packard service center in Houston, Texas on January 22, 2009.

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AGT hosted the Gulf Coast Section meeting on June 12, 2008 at the John C. Stennis Space Center. The meeting had twenty-one attendees. Presentations on infrared thermometry and electrical uncertainty were given by Jon Sanders and Joe Baker respectively, both from the Fluke Corporation. Both presentations were very informative and well received by all attendees. After a lunch provided by AGT, everyone was encouraged to attend the upcoming NCSLI Conference in Orlando. All attendees were made aware of the recent BLS issue on listing metrology positions and asked to participate in a response. For icing on the cake, attendees were given the opportunity to view a Space Shuttle Main Engine test firing. The meeting was a great success and it indicates the Gulf Coast Section is coming back strong. The next meeting is tentatively scheduled for early November and will be hosted by JM Test in Baton Rouge, Louisiana.

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Activities of the International Organization of Legal Metrology (OIML) – Part I

The Weights and Measures Division of the National Institute of Standards and Technology (NIST) is responsible for coordinating U.S. participation in the International Organization of Legal Metrology (OIML) and other international legal metrology organizations.

Learn more about OIML at the website www.oiml.org and about NIST Weights and Measures Division at the WMD website www.nist.gov/owm. Dr. Charles Ehrlich, Group Leader of the International Legal Metrology Group (ILMG), can be contacted at charles.ehrlich@nist.gov or at (301) 975-4834 or by fax at (301) 975-8091.

Please note: OIML publications are available without cost at http://www.oiml.org.

I. Highlights of Selected OIML Activities

This section reports on recent activities and the status of work in OIML Technical Committees (TCs) and Technical Subcommittees (SCs) of specific interest to members of the NCWM.

Also included are schedules of future activities of the Secretariats, the U.S. National Work Groups (USNWGs), and the International Work Groups (IWGs) of the Committees and Subcommittees.

TC 3/SC 1 “Pattern approval and evaluation” (United States)

The subcommittee approved the U.S. proposal for a combined revision of OIML D 19 “Pattern evaluation and pattern approval” and D 20 “Initial and subsequent verification of measuring instruments and processes” into a single document entitled “Principles of metrological control of measuring instruments: type approval and verification.” Key elements of OIML D 3 “Legal qualification of measuring instruments,” R 34 “Accuracy classes of measuring instruments,” and R 42 “Metal stamps for verification officers” will also be incorporated into the combined revision of OIML D 19 and D 20. The revised documents will incorporate recent developments such as the OIML certificate system, D 27 “Initial verification of measuring instruments utilizing the manufacturer’s quality management system,” and the “Framework for a mutual acceptance arrangement (MAA) on OIML type evaluations.” Consideration will be given to the appropriate conformity assessment options developed by the ISO Council Committee on Conformity Assessment (ISO CASCO), including quality systems, product certification, and accreditation. Consideration will also be given to information technology and statistical methods to increase or decrease verification intervals based upon proven instrument performance. For more information on this activity, contact Dr. Ralph Richter at (301) 975-3997 or at ralph.richter@nist.gov if you would like copies of the documents or to participate in any of these projects.

TC 3/SC 5 “Conformity assessment” (United States and BIML)

The subcommittee held a meeting in May 2008 to begin the revision of documents B 3 (concerning the OIML Certificate System) and B 10 (concerning the OIML Mutual Acceptance Arrangement). The meeting included discussion of a new document on the incorporation of measurement uncertainty into conformity assessment decisions in legal metrology. For more information on the activities of this subcommittee, contact Dr. Charles Ehrlich at (301) 975-4834 or at charles.ehrlich@nist.gov.

TC 5/SC 2 “Software” (Germany and BIML)

A 2nd CD of OIML “General requirements for software-controlled measuring instruments” was received in February 2008 and was circulated to interested U.S. parties. When complete, the OIML document will serve as guidance for software requirements in International Recommendations by OIML technical committees. The final draft document is now in out for vote with a September 2008 deadline. Please contact Dr. Ambler Thompson at (301) 975-2333 or at ambler@nist.gov if you would like to receive information and participate in this project.

TC 6 “Prepackaged products” (South Africa)

In September 2007, NIST hosted the OIML TC 6 committee at NIST in Gaithersburg, Maryland. There was continued discussion on the issue of an OIML International Quantity Mark, referred to as an IQ Mark. The IQ Mark would be a program that would allow for an international system of acceptance of prepackaged goods. The IQ Mark is designed to eliminate trade barriers on prepackaged goods. Receiving countries would want imported packages to meet all requirements. On the other side, packers in exporting countries want to be sure that prepackages will not be rejected after their product has arrived in the destination country.

Such a program would also require that participants meet specific requirements in order to participate in a program for quantity control and marking of pre-packed goods. The United States is participating in a work group that will develop guidelines on good manufacturing practice and additional documentation for selected criteria that would be used in the IQ Mark’s accreditation programs. Please contact Lisa Warfield at lisa.warfield@nist.gov or (301) 975-3308 if you would like more information or to participate in any of these projects.

TC 8/SC 1 “Static volume and mass measurement” (Austria and Germany)

The subcommittee has two documents currently out for a CIML postal ballot: OIML R 71 “Fixed storage tanks,” and R 85 “Automatic level gages for measuring the level of liquid in fixed storage tanks.” Final approval for both of these Recommendations is expected in October 2008. The revision of R 80 “Road and rail tankers” should be completed in 2009. Please contact Ralph Richter at (301) 975-3997 or at ralph.richter@nist.gov if you would like copies of the documents or to participate in any of these projects.
TC 8/SC 3 “Dynamic volume and mass measurement for liquids other than water” (United States and Germany)

OIML R 117-1 “Dynamic measuring systems for liquids other than water, Part 1: Metrological and technical requirements” has undergone an extensive revision and was published in March 2008. The Recommendation obtained 100% international “yes” votes and final CIML approval at the CIML meeting in Shanghai, China, in October 2007. The revision incorporates new instrument technologies and includes a merger with OIML Recommendations R 86 “Drum meters” and R 105 “Mass flowmeters.” The US-led project involved working closely with technical experts from 28 nations. Subcommittee work on R 117-2 “Test methods” and R 117-3 “Test report format” has begun. If you have any questions or would like to participate in this project, please contact Ralph Richter at (301) 975-3997 or ralph.richter@nist.gov.

TC 8/SC 6 “Measurement of cryogenic liquids” (United States)

The Secretariat has initiated a new project to revise R 81 “Dynamic measuring devices and systems for cryogenic liquids.” The response to a questionnaire indicated that a revision was justified to update: (1) electronic tests in accordance with the latest edition of OIML D 11 (2004) and/or the latest IEC and ISO standards; (2) technical requirements to include new developments in hydrogen measurements; and (3) Annex C to include current recommendations for density equations. The Secretariat is forming a National Work Group to establish a U.S. position on the appropriate updates to the document. Please contact Juana Williams at juana.williams@nist.gov or (301) 975-3989 to obtain more information or to participate in this effort.

TC 8/SC 7 “Gas metering” (Netherlands)

In October 2007, the CIML approved the merger of TC 8/SC 7 (with France and Belgium as co-secretariats) and TC 8/SC 8 “Gas meters” (with Netherlands as secretariat). Netherlands has assumed responsibility of this newly merged technical subcommittee. Also in October 2007, the CIML approved two new Recommendations from this subcommittee R139 “Measuring systems for compressed natural gas (CNG) for vehicles” and R140 “Measuring systems for gaseous fuel” (written to cover large pipelines with large flow rates and high operating pressures). Both of these Recommendations were published in 2008.

The final draft of OIML R 137-1 “Gas meters” was approved by the CIML at their October 2006 meeting in Cape Town, South Africa. Development of R 137-2 “Test methods” is now underway. Please contact Ralph Richter at (301) 975-3997 or ralph.richter@nist.gov if you would like to obtain a copy of any of these gas measurement documents or if you would like to participate in future work of this subcommittee.

TC 9 “Instruments for measuring mass” (United States)

The Secretariat plans to revise OIML R 60, “Metrological regulation for load cells” now that the new edition of R 76-1 “Non-automatic weighing instruments” was published in December 2007. For more information on these efforts, please contact Steve Cook at steven.cook@nist.gov or (301) 975-4003.

TC 9/SC 1 “Nonautomatic weighing instruments” (Germany and France)

The revision of R 76 “Non-automatic weighing instruments” is of major importance to U.S. interests because the Recommendation serves as the foundation for a majority of the laws and regulations that govern weighing instruments around the world. The revision includes new language addressing metrological controls for type evaluations, conformity, initial and subsequent inspections, suitability of separable components and requirements for metrological software. The USNWG was consulted concerning proposals to harmonize NIST Handbook 44 and R 76. The final revision of R 76 was published in December 2007. For more information on these efforts, please contact Steve Cook at (301) 975-4003 or steven.cook@nist.gov.

TC 9/SC 2 “Automatic weighing instruments” (United Kingdom)

The Revision of R 134-1 “Automatic instruments for weighing road vehicles in motion – total load and axle weighing” was approved by CIML in October 2006. The test report format of this document, R 134-2, has been approved by the subcommittee and is going through a final editorial process at the BIML. Comments and a U.S. “yes” vote on the 4th CD of R 106 Parts 1 and 2, “Automatic rail-weightbridges” were sent in July 2008. The Subcommittee approved a revision of R 107 “Discontinuous totalizing automatic weighing instruments (totalizing hopper weighers),” and CIML approval was granted on the recommendation in October 2007. If you would like to receive copies of these documents or work on these projects, Richard Harshman is the contact at (301) 975-8107 or at harshman@nist.gov.

TC 17/SC 1 “Humidity” (China)

The Secretariat (China) is working closely with the United States and a small IWG to revise OIML R 59 “Moisture meters for cereal grains and oilseeds.” All drafts have been distributed to the USNWG, which for the most part is a subset of the NTEP Grain Sector. A TC 17/SC 1 meeting was hosted by NIST in September 2007 to discuss the comments to the 4 CD. Please contact Diane Lee at (301) 975-4405 or at diane.lee@nist.gov if you would like to participate in this work group.

TC 17/SC 2 “Quality Analysis of Agricultural Products” (Australia)

A new subcommittee has been formed to study the issues and write a new document “Measuring instruments for protein determination in grains.” Australia is the Secretariat for this new subcommittee. A TC 17/SC 8 meeting was hosted by NIST in September 2007 to discuss the 2 CD. At the September 2007 meeting the TC 17/SC 8 Subcommittee also discussed comments concerning the maximum permissible errors (MPRs) and harmonization of the TC 17/SC 8 Recommendation for protein with the TC 17/SC 1 Recommendation for moisture. Please contact Diane Lee at (301) 975-4405 or at diane.lee@nist.gov if you would like to participate in this work group.

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The scope of this new contribution to the metrologist is to report on developments and news in the fields of measurement and testing science and technology in the form of a *letter from Europe*. In this letter an overview on the development and activities of EUROLAB is given.

EUROLAB evolved in connection with the evolution of the European Union (EU) whose basic features are outlined in the box below.

EUROLAB was initially formed on the basis of a Memorandum of Understanding (MoU) between National Associations of Conformity Assessment Bodies (CABs) of the EU Member Countries; the MoU was signed in Brussels on 27 April 1990. EUROLAB, since 1998 – known as European Federation of National Associations of Measurement, Testing and Analytical Laboratories – a legal entity in the form of an international association under Belgian law (aisbl: association internationale scientifique sans but lucrative). It represents now a network of more than 3000 public and private laboratories and conformity assessment bodies with the following objectives:

- **Representation** by formulating and voicing the opinion of European laboratories regarding political and technical issues having direct impact on their activity, both on the European scene and worldwide.

- **Coordination** by interacting with all European organisations having activities of interest to the laboratory community, and striving to avoid duplication of efforts.

- **Action** by providing adequate means for exchange of information and experience, such as the publication of Position Papers, Technical Reports, Seminars, etc.

- **Promotion** of cost-effective testing, calibration, measurement services, for which accuracy and quality assurance requirements should be adjusted to actual needs.

EUROLAB is organized as follows: the General Assembly is the central body. It consists of two representatives from every National Member Association (one from the public and one from the private sector) and one representative from every International Affiliate. The General Assembly elects the Board of Administrators (BoA) and confirms the Technical Secretariat nominated by the BoA. Since 2006 EUROLAB’s Technical Secretariat is located at LNE, the French National Institute for Metrology and Testing in Paris (Laboratoire National de Metrologie et d’Essais – LNE, Paris). EUROLAB’s Technical Secretariat represents now a network of more than 3000 public and private laboratories and conformity assessment bodies with the following objectives:

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EUROLAB is organized as follows: the General Assembly is the central body. It consists of two representatives from every National Member Association (one from the public and one from the private sector) and one representative from every International Affiliate. The General Assembly elects the Board of Administrators (BoA) and confirms the Technical Secretariat nominated by the BoA. Since 2006 EUROLAB’s Technical Secretariat is located at LNE, the French National Institute for Metrology and Testing in Paris (Laboratoire National de Metrologie et d’Essais – LNE, Paris). EUROLAB’s Technical Secretariat represents now a network of more than 3000 public and private laboratories and conformity assessment bodies with the following objectives:

- **Representation** by formulating and voicing the opinion of European laboratories regarding political and technical issues having direct impact on their activity, both on the European scene and worldwide.

- **Coordination** by interacting with all European organisations having activities of interest to the laboratory community, and striving to avoid duplication of efforts.

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A dozen people from Japan Region 5200 attended the Symposium held in Orlando.

It was a 24 hour journey for me from the time I left home to the time I arrived at the Dolphin Hotel.

Horst Czichos, EUROLAB Past President
Professor at TFH Berlin, University of Applied Science
E-Mail: horst.czichos@t-online.de
Phone: + 49-30-8013913

Puzzle Solution

Solution: The minimum number of marks is 7. They can be placed on the ruler in two different formats: 0, 1, 2, 3, 7, 12, and 15 or 0, 1, 2, 3, 8, 12, and 15. See the Golden Ruler to the right.

The table shows one way that all the units, from 1 to 15, are measured.
Choosing the Right Detector for Laser Power and Energy Measurements*

by Marla Dowell, NIST

If you’re reading the *metrologist*, there’s no need to explain to you the importance of good metrology in general. However, you may not realize the importance of good laser metrology and its many pitfalls until you realize how much of today’s commonplace conveniences – from long distance communications to LASIK (laser-assisted in situ keratomileusis) to state-of-the-art cutting and marking tools – rely on modern optoelectronic devices. For example, there are numerous laser parameters to measure, such as power, energy, pulse width, angular distribution, spatial uniformity, and spectral content, just to name a few. Which of these is a critical measurement parameter depends on the application. While spectral content is a critical parameter for optical communications, power and spatial uniformity are important for LASIK. Choosing the right measurement tool can be just as confusing – there are optical detectors, beam profilers, spectrum analyzers, wavefront analyzers, and others too numerous to mention. The term “optical detector” alone can refer to the material from which the detector is made (germanium detector) or the principle upon which it operates (fast pulse detector). Despite apparent differences, the two labels may refer to the same physical device.1

Let’s consider laser metrology requirements for excimer laser photolithography, a microfabrication process for integrated circuits. It’s important to understand the principal of operation behind an excimer laser photolithography tool for this discussion. An excimer laser source illuminates a mask. The mask contains the information that will be printed onto the wafer. The wafer is coated with an ultraviolet-sensitive photoresist. The projection optics transfer the mask pattern to the wafer. The resolution of the tool is proportional to the wavelength of the source divided by the numerical aperture of the projection optics. The numerical aperture describes the angular spread of light that reaches the wafer plane.

There are a number of laser measurements that are important for both tool development and performance. Measurements at the source are used as part of a feedback mechanism to stabilize the source’s pulse energy. Like a photograph, there is an optimum laser exposure that will lead to the best resolution of small features at the wafer plane – over or under exposure of an object leads to reduced image contrast and poor resolution. Optical material characterization measurements, such as transmittance and birefringence, are important for tool development and performance as well. However for this article, we will limit the discussion to laser power and energy measurements.

There are several questions to ask yourself before purchasing a detector for laser power and/or energy measurements:

1. Is the detector for laser power or energy measurements? Do you want to measure individual or average pulse energy? You can measure average pulse energy with a power meter if you know the number of pulses and the repetition rate of your laser. In general, power meters are slower than energy meter meters. Some detectors, such as pyroelectric detectors, are only sensitive to pulsed sources. Also consider the power and energy range of interest in your selec-

---

*Figure 1. Angular dependence of two i-line (365 nm) dose probes. The arrow indicates the relative response at a numerical aperture (N.A.) of 0.5. A significant measurement error can be introduced due to the imperfect cosine response of a dose probe. This offset would be unaccounted for if the meters were calibrated using a parallel beam but intended for use in a tool with off-axis illumination.*
tration. Some detectors are linear over a wider range of laser power and/or energies than others.

2. Is the laser pulsed or continuous-wave (cw)? Keep in mind that although a pulsed-laser and a cw-laser may have the equivalent average power, you should take into account the peak powers when determining whether or not you will exceed a detector’s damage threshold for pulsed-laser measurements.

3. Are spatial and angular uniformity important to your measurements? Spatial non-uniformities can lead to reproducibility problems if the size of your laser beam is small relative to the size of the detector. Angular uniformity can be critical in applications that use diverging laser beams. (See Figure 1.)

4. Will you be using this detector at several laser wavelengths? Is so, you should choose a detector with a spectrally-flat response or one where the calibration factor is specified at the wavelengths of interest.

5. What level of accuracy is important to your application? At NIST, we have developed primary standard calorimeters for laser power and energy measurements. (See Figure 2.) These electrically-calibrated calorimeters provide a direct comparison between optical and electrical energy, thus tying optical measurements to SI units. (Most commercial detectors are not electrically-calibrated; some detectors will detect only a fraction of the incident light because they have reflective surfaces. One can correct for the reflective losses by calibrating the detector against a primary standard or by measuring the surface reflectance. See Figure 3.) The overall expanded uncertainty associated with NIST calorimeters is typically less than 1%. However, measurements made with these calorimeters are time-consuming and difficult. You must consider the trade-off between accuracy and throughput in the detector selection process.

Finally, for some applications, only the relative change in laser power or energy is important. Therefore, long-term stability rather than absolute accuracy should be your primary consideration in detector selection.

In conclusion, there are a number of issues to take into consideration when purchasing a detector for laser power and energy measurements. Choose carefully or risk performing the wrong measurement for your application. NIST offers an annual short course that covers many of the common measurement problems and concerns that arise in making accurate laser measurements. Finally, when in doubt feel free to contact me with your questions about accurate laser measurements.

References:

mdowell@boulder.nist.gov
Take Ten

You are given the job of making a special Golden Ruler for the new President of your company. The ruler will be 15 units long. You could make a ruler with marks at 0, 1, 2, 3, … , 15 (Standard Ruler). With the Standard Ruler, it is easy to measure any whole number length from 1 unit to 15 units.

However, the Manager of the Metrology Department gives you this puzzle: Make the Golden Ruler with the minimum number of marks and still be able to measure every whole number length from 1 unit to 15 units between different pairs of marks. What is the minimum number of marks needed?

Math Question
Golden Ruler Puzzle

0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Puzzle Solution on Page 43

NCSL International would like to thank its 2008 Workshop & Symposium Sponsors for their outstanding contributions to the overall success of this year’s Conference event in Orlando, Florida.

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Once again we are reminded of the achievements that are made possible when we surround ourselves with the extraordinary people that make up the NCSLI organization.

We look forward to another successful year in 2009!
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_______________________________________________________________________________________________________________________

Please select the number of years of desired membership:

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<th>Associate2</th>
<th>Individual</th>
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1 Includes one-time $75 setup fee.  2 Membership is January thru December of current year.

Please remit the proper amount from the table above (in U.S. funds). Make checks payable to: NCSL International

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