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NCSLI Newsletter

NCSL International

Serving the World of Measurement Since 1961



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NCSL International is a non-profit Colorado corporation. It is an international association of laboratories and organizations that maintain or have an interest related to measurement standards and calibration facilities.

The NCSLI Newsletter is sent to NCSLI International member organizations (3 copies) and to a special listing of activities and key personnel whose work is closely related to that of NCSLI International. Send member delegate address changes to the NCSL International Business Office at 2995 Wilderness Place, Suite 107 Boulder, CO 80301-5404.

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On the cover: Photo courtesy Bionetics Corp.

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February in Southern California
Measurement Science Conference

Disneyland Hotel

February 27-March 3, 2006

Tutorials, NIST Seminars, Workshops, Conference Exhibits.

See page 49 **Contact:** <www.msc-conf.com>

EDITOR'S MESSAGE

MEASURE, a New Technical Publication from NCSLI

As you can see from the introduction on page 4, Dick Pettit is carrying out the wishes of the NCSLI Board, to begin publication of a new technical journal, MEASURE, for our members. Starting with his first issue in March, 2006, he will meet a quarterly schedule which intermeshes with this newsletter. Dick is exceptionally well qualified to edit this new magazine since he has, for some years, managed the technical paper program for the annual NCSLI conference. Dealing with tens of dozens of paper abstracts and final papers is a massive task, and he showed his ability to do a fine job of it for years.



John Minck
NCSLI Editor

Most of you know that with the large number of pages I devote to continuing and current operations in this newsletter, there is precious little room for technical articles, although the last several years I have tried to publish the four winning papers from the NCSLI Conference. Even then, I have had to truncate them at 4 or 5 pages, which made that a relatively unsatisfactory solution.

Other Changes in the Newsletter

So the central strategy is for this newsletter to stay with NEWS, and for Dick to cover technical aspects of your job and responsibilities. Thereby, he will pick up the NEWS FROM THE NMIs chapter I usually devote to Technical Announcements from the NIST and other NMIs as I get them. In this issue, I have published pages 39-46, since all those stories were delayed from my October, 2005 issue because of the 7-page Keynote slide-set from the Conference which seemed important for October. After this issue, all the NIST stories will appear in MEASURE.

Continued on page 38

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PRESIDENT'S MESSAGE



Jeff Gust
NCSLI President

Standing on the Shoulders of Giants

I would like to begin this column by sharing information about Harry Moody, our 2005 NCSL International President's health condition. As some of you may have heard, Harry experienced a heart attack in late November, and on December 6th, Harry underwent heart bypass surgery. At the time of this writing, he is doing fine and is on the mend. Harry does not like to draw attention to himself generally, so I hope he will forgive me for letting his many friends in the metrology community know how he is doing. I hope that you will all join me in wishing him a speedy recovery.

My mind is awl as I contemplate the honor of being NCSL International President in the year that our organization celebrates our 45th Anniversary. As I look to the long list of the NCSL International Presidents that have preceded me and consider their great accomplishments, I am motivated to provide the leadership necessary to continue our traditions and programs associated with "serving the world of measurement."

In developing the NCSL International objectives for 2006, I am reminded of what Sir Isaac Newton wrote in a letter to fellow scientist Robert Hooke in 1676 where he modestly claimed his success had been built on the achievement of others: "If I have seen further it is by standing on the shoulders of giants."

In 2004, Dave Agy established Key Initiatives for NCSL International. These Key Initiatives were four general long-term goals for the betterment of our organization, with some specific tasks associated with these goals. In 2005 when Harry Moody took office, he continued Agy's Key Initiatives with the addition of new specific tasks. I personally feel that the Key Initiatives established by Agy are important for NCSL International, and am committed to helping realize these Key Initiatives. It is in the spirit of "standing on the shoulders of giants" that I have decided to change the name "Key Initiatives" for 2006 to "Continuing Objectives."

For 2006, the NCSL International Continuing Objectives are:

- Membership
- Publications
- Education and Training
- Marketing NCSLI
- Increasing Deliverables to NCSLI Members
- International Organization
- Local Involvement

In establishing these Continuing Objectives, I have asked the Board of Directors to develop long-range plans that support and harmonize with these objectives. Some of the specific goals of the Continuing Objectives are as follows:

Membership

It is the goal of NCSL International to have a net increase in membership for the year 2006. This is the primary initiative for 2006, and all other objectives support this goal.

Address methods to increase membership by:

- Fill all vacant region/section coordinator positions. Have two meetings per year in each section [or region];
- Continue the Ad Hoc committee to focus on one or two industry segments where NCSLI is underrepresented and grow the membership from those segments [consider dimensional metrology, testing laboratories, the automotive industry, others];
- Continue the workshop offerings and use the tutorial attendance as a guide to the type of workshop[s] offered.

Publications

In March of 2006 NCSL International intends to publish a new trade magazine, MEASURE. This magazine will feature peer-reviewed articles, special profiles, and advertising. Produced in full color, the magazine will be delivered four times per year, in addition to the present NCSLI Newsletter publication.

We are also asking all working groups and committees to continue their efforts in updating present publications as well as developing new ones for the metrology community (see page 4).

Education and Training

The Metrology community is facing a shortage of qualified, trained metrology personnel across the U.S. To address this issue, we need to:

- Complete the Strategic Roadmap for Education and Training;
- Implement the plan developed from the Strategic Roadmap;
- Increase the opportunities for NCSLI members and potential members to obtain Technical Education and Training.

Marketing NCSLI

Through the Vice President of Marketing and the combined efforts and resources of NCSLI we will continue to:

- Develop a cohesive marketing strategy for NCSLI;
- Select an industry in need of metrological support and make the industry aware of the benefits of NCSLI membership.

Increasing Deliverables to NCSLI Members

Our organization needs to continually improve and expand benefits to members with our:

- New publications
- Training opportunities
- Website information

(Continued on page 52)

Introducing "measure" The Journal of Measurement Science

New Metrology Publication

NCSL International is pleased to announce it is launching a new metrology scientific/technical trade journal titled "measure." The journal's primary audience is centered on calibration laboratory personnel - from laboratory managers, to project engineers, to calibration technicians. NCSLI is looking forward to partnering with its Member-ship in the development of this new, quarterly scientific trade publication.

Practical Information

This journal will provide up-to-date information on:

- Calibration techniques
- Uncertainty analysis
- Measurement standards
- Laboratory accreditation
- Quality processes
- Metrology review articles

Magazine Features

- Calibration laboratory excellence
- Industry-wide best metrology practices
- New trends/opportunities in training
- Emerging technologies
- New and existing standards
- Innovative standards & calibration equipment
- Support software
- New products and services

YES: The valuable NCSLI Newsletter will continue to be published with its distinct content of committee updates, liaison news, BOD reports, etc.

NCSLI invites both its Members and measurement science leaders to be a part of this new metrology focused journal!

To contribute a technical article, tech tips, or letter to the Editor, please contact:

Dr. Richard Pettit, Managing Editor
NCSL International measure
Phone: (505) 292-0789
Email: <measure@ncsli.org>



Technical Submissions

All technical articles in measure will be refereed by the NCSLI Technical Review Board, currently managed by Dr. Richard Pettit, Managing Editor. Technical articles are solicited on topics relevant to calibration laboratories, such as:

- Calibration procedures or techniques
- Uncertainty of measurement
- Laboratory accreditation and quality systems
- New or updated metrology standards
- Background/review articles in above areas

For more information, please see "Author Manuscript Instructions" at <www.ncsli.org/measure/tc.cfm>.

Advertising Opportunities

All advertising is reserved exclusively for NCSLI Member Organizations. If you are interested, please see www.ncsli.org/measure/ads.cfm for pricing, specifications, publication calendar, and deadlines

New Products or Services

NCSLI Member Organizations may announce in NCSLI measure the introduction of their new product(s) or new service(s) that are of interest to the NCSLI membership. For more information, see www.ncsli.org/measure/psa.cfm.

For advertising, please contact:

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REPORTS FROM THE BOARD



CENAM REPORT

Salvador Echeverria-Villagomez

Symposium of Metrology 2006
Oct 25, 26, 27, 2006
Santiago de Queretaro, Qro.,
Mexico

Since 1995, CENAM has organized six symposiums of metrology that have been the forum for

national and international specialists to share their experiences and knowledge in this field. This year will not be the exception, as the Symposium of Metrology 2006 will bring together distinguished participants who will talk about their achievements and challenges.

All attendees will have the opportunity to participate in sessions with colleagues who are involved in the daily work of measuring and calibrating, and who will show their methods and new techniques for the solution of measurement problems.

Additionally, an industrial exhibition of measuring instruments and related products will allow the participants to know the avant-grade equipment in the market. They will be able to consult with specialized staff who will recommend the most suitable instrument for every measurement need.

We are looking forward to seeing you at the Symposium of Metrology 2006.

Preliminary Information <www.cenam.mx>

Objectives

- To find solutions to specific problems of measurement
- To update new techniques and measuring instruments
- To promote the collaboration and the exchange of information in Metrology
- To know and to present services and specialized products in Metrology
- To establish and to narrow links among the members of the Metrology community
- To contribute to the strengthening of the National System of Metrology

General Subjects

- Metrology in Mexico; challenges and perspectives
- Measuring instruments; design, use and calibration
- Methods of measurement, application, improvement, and validation
- Metrology in industry
- Development of measuring standards and systems of measurement
- Chemical Metrology and its applications
- Accreditation of calibration and testing laboratories (including chemical analyses)

- Comparisons and proficiency testing
- Estimation of uncertainty in measurements, chemical tests and analyses
- Statistical tools applied to metrology
- Traceability of measurements
- Measurements in quality systems
- Legal Metrology and Standardization
- Metrology in scientific research
- Education in Metrology

ILAC/NACLA REPORT

Anthony Anderson

International Laboratory Accreditation Cooperation (ILAC) Laboratory

Committee (LC)

In September I attended the ILAC 2005 Conference in Auckland New Zealand, and the General Assembly, Executive Committee meeting and other associated meetings, including the Laboratory Committee (LC) which I chair.

Following the successful decision to allow a statement about meeting the principles of ISO 9001:2000 in conjunction with laboratory accreditation, calibration and test certificates, the focus now becomes implementation. The LC discussed with some of the AB's who attended the meeting how this should best be achieved. It is important to note that until a laboratory has been accredited to the new ISO/IEC 17025:2005 version of the standard, the statement on certificates and the joint ISO/ILAC/IAF communiqué cannot be used.

The implementation of the decision is not mandatory and some AB's have indicated they may not instruct their laboratories to use the statement and communiqué. In such situations the LC urges all laboratories to persuade their respective AB's to reconsider and explain the benefits of providing more market clarity on the issue of accreditation versus certification. (A copy of the letter from ILAC to its AB's and the Joint ISO/ILAC/IAF Communiqué was published in the Oct 2005 Newsletter, page 21)

At several meetings during the conference and at the General Assembly (GA), the use of the combined ILAC MRA mark was discussed. Originally, the mark was only to be used on laboratory calibration certificates and test reports by laboratories accredited by an ILAC MRA signatory. Because of the close cooperation between ILAC and IAF, many decisions in ILAC these days are taken considering how IAF implements similar decisions. The IAF joint mark can be used by its accredited certification bodies on many documents including promotional material, letterheads and even business cards. There was considerable opinion within ILAC against too widespread a use of the mark, for fear of misleading the market place as to the true value of being a MRA signatory. This is particularly true where an AB has a very limited scope of accreditation.

Not all services of an AB may be recognized by ILAC and not all services of a laboratory may be accredited.

When the matter was put to a vote in the General Assembly the following resolution was adopted;

"The ILAC General Assembly resolves that the rules for use of the ILAC MRA mark should be amended to allow sub-licensees to use the laboratory combined MRA mark on calibration certificates and test reports, pre-printed letterhead, quotations for work, advertisements, websites and other documents."

ILAC has been considering for some time expanding the MRA into other fields besides calibration and testing. In Auckland an open Forum was held and this issue was discussed at length and a series of criteria were suggested for the development of a discussion paper. The General Assembly supported the Arrangement Committee (ARC) developing a discussion paper that proposes a process to expand or extend the scope of the MRA into other areas considering the following criteria:

- a) Significant relevance to accreditation of laboratories/inspection bodies and bodies involved in related activities
- b) Sufficient substance to enhance the recognition of competence.
- c) Fulfills appropriate needs on an international basis
- d) Lack of inclusion poses threats to ILAC leadership in accreditation
- e) Complementary to or supportive of any of the other standards being currently used
- f) Does not dilute the substance of any existing standard under the ILAC MRA
- g) Document must be produced by an international consensus process (including all relevant interested parties)

Consistent with the intent to expand the MRA, the GA adopted two related resolutions. Firstly, it was resolved that accreditation of medical reference measurement laboratories using ISO 15195 in combination with ISO/IEC 17025 will be included under the current ILAC Arrangement, when appropriate procedures for this activity are developed and agreed upon by ILAC.

Secondly, it was resolved that the accreditation of Reference Materials Producers to ISO Guide 34 in combination with ISO/IEC 17025 be included under the current ILAC arrangement when appropriate procedures for this activity are developed and agreed upon by ILAC.

Earlier this year, ILAC P9, "ILAC Policy for Participation in National and International Proficiency Testing Activities" was published and becomes effective on January 1, 2006. All aspects of proficiency testing continue to be major topics of discussion within ILAC and the Laboratory Committee has been very proactive in this area. The LC has appointed a permanent member to the ILAC Proficiency Testing Consultative Group and the first meeting of this newly formed group was held in Auckland.

The meeting was held as a forum to discuss and identify the major PT issues, necessary work items, terms of reference and resolutions of relevance to ILAC and the other stakeholders in the Group. Among the issues discussed were: the need for revision of ISO/IEC Guide 43 and any other related documents used for the accreditation

of PT Providers; regional and international PT comparisons in support of the ILAC MRA; and significant PT issues for various sectors and interest groups.

The meeting noted the work being done by the Accreditation Committee (AIC) on a possible trade-off policy of using PT data to change an accreditation body's surveillance interval. The LC has concerns over this proposed policy, particularly now that P9 has been published, with respect to application in different sectors. One size does not necessarily fit all regarding minimum frequency of participation.

The general Assembly adopted three resolutions coming out of the first PT Consultative Group meeting. They were:

"Taking into account the current wide use of ILAC G13, and the need for a future Standard to be a suitable common base for accreditation of PT providers in all sectors by ILAC Members, the General Assembly endorses ILAC requesting an urgent revision of ISO/IEC Guide 43 Part 1 & 2 by ISO/CASCO and its conversion into a Standard, and"

"While awaiting the availability of a replacement Standard for ISO/IEC Guide 43, and noting the global use of many PT programs, the General Assembly recognises the need for its Members to use harmonised requirements for the accreditation of PT Providers and endorses the use of ILAC G13 and ISO/IEC Guide 43 as the base criteria for such accreditations, and"

"The General Assembly endorses a review of the text of ILAC G13, while ISO/IEC Guide 43 is being revised/replaced."

During the Conference Banquet, newly recognized MRA signatories were acknowledged at a formal signing ceremony. The new signatories were; Organismo Argentino de Acreditacion (OAA), Argentina for testing and calibration, National Laboratories Accreditation Bureau (NLAB), Egypt for testing and calibration, Polish Centre for Accreditation (PCA), Poland for testing & calibration, International Accreditation Service, Inc (IAS), USA for extension of scope to include calibration, National Accreditation Body of Republica de Cuba (ONARC), Cuba for testing & calibration.

The next meeting of the ILAC Laboratory Committee will be in Madrid, Spain May 8 & 9, 2006 and the 2006 ILAC Conference and General Assembly will be in Cancun, Mexico, November 6 to 14, 2006.

National Cooperation for Laboratory Accreditation (NACLA)

I am pleased to report that another signatory has joined the NACLA MRA. Assured Calibration and Laboratory Accreditation Select Services (ACLASS), a multi-discipline laboratory accreditation body (AB), headquartered in the Washington, DC metro area becomes the 8th AB that has been recognized by NACLA. ACLASS is recognized for testing and calibration. The full scope of recognition is listed on the NACLA web site at < www.nacla.net >

The Laboratory Accreditation Bureau (LAB), previously recognized for testing, has now been recognized for calibration. Their scope is also listed on the NACLA web site. Thom Adams, formerly A2LA's Metrology Manager, and now an independent consultant, has been

contracted by NACLA as its Quality Manager. Thom will be developing a plan to bring NACLA's quality system documentation and practices into compliance with ILAC requirements; both documents and its day-to-day operational needs. He will also be developing a work plan, including a list of NACLA documents and practices that need to be developed.

Fifth Annual Forum on Laboratory Accreditation and Annual General Meeting

March 28 & 29, 2006
 Sheraton Columbia Hotel
 Columbia, MD

- Update on the Global Recognition System of Laboratory Accreditation Bodies
- Update on NELAC/NELAB and Accreditation of Environmental Laboratories
- New Standard for Accreditation Bodies: ISO/IEC 17011: How Is It Working?
- Planning to Implement the New Version of ISO/IEC 17025
- The Growing Importance of PT in Accreditation and Recognition
- Panel Discussion on Assessment/Accreditation Issues:
- CSI NACLA: How Forensic Laboratories Really Operate
- Increasing Government Reliance on NACLA: U.S. Navy; The Nuclear Regulatory Commission
- Guidelines for Calibration Scopes
- Status Report on Key NACLA Programs
- NACLA's Progress in the Past Year
- Dialogue with Stakeholders

Contact <naclaexec@comcast.net>; 703-351-8098;
 <<http://www.nacla.net/>>.

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REPORT FROM THE EUROPEAN COOPERATION IN METROLOGY (EUROMET)

Seton Bennett

Towards a European Metrology Research Programme

The iMERA project, described in the EUROMET report a year ago, has gathered momentum since its launch in April, with work under way on a number of work packages. It includes the overview of national prioritisation processes and the launch of an iMERA web portal.

Six months into the project, some 85 participants took part in a week of workshops and committee meetings in Ljubljana, Slovenia between 17 and 21 October.

The programme for the week included Foresight and Prioritisation Workshops (involving all the iMERA partners), as well as a workshop for EUROMET Technical Committee chairs, Working Group convenors and iMERA partners. A Metrology Community Stakeholders day on Thursday was followed by meetings of the Network Management Committee and Network Steering Committee on Friday. We were delighted to welcome Steve Carpenter and Ileana Martinez from NIST who were invited as observers with a keen interest in the future development of metrology research in Europe.

With 4 million euros of funding from the European Commission, the project's overall aim is to launch a European Metrology Research Programme (EMRP) through a joint action between the European Commission and interested Member (and Associated) States, utilising the little-used Article 169 of the European Treaty. Thus, iMERA has the potential to create, for the first time, a true network of NMIs with common goals and a substantial amount of joint research.

The objectives will be to reduce the level of duplication in research programmes, increase the resources available for major research initiatives in metrology and develop joint centres of excellence to provide the essential metrology support for the European Research Area.

Thoughts are already turning to the mechanisms necessary to establish the EMRP, plan the research programme and handle the associated monitoring, reporting and funding. This will involve creating a legal entity which will undertake these administrative tasks on behalf of the partners, and probably operate the secretariat for EUROMET as well.

Critical decisions about European Union budgets will be made over the next few weeks, enabling formal approval for the EMRP to be sought from the European Council of Ministers and the European Parliament during the first half of 2006. Even if the expected European funding is not forthcoming, many NMIs and their funding ministries have now appreciated the gains which would accrue from joint research activities. It is likely that a limited collaborative programme will be launched in 2007 anyway.

Finally, on behalf of EUROMET, I wish all the readers of the NCSLI Newsletter a very happy new year!

EDUCATOR'S CORNER

Chris Grachanen

The Center for Precision Metrology, UNC, Charlotte

In this issue of the Educator's Corner we will be highlighting the Center for Precision Metrology (CPM) at UNC Charlotte. This prestigious dimensional Metrology program has been in operation for over 15 years, and has conducted research that ranges from industrial coordinate metrology applications to the design and build of a subatomic measuring machine.

Background

The Center for Precision Metrology (CPM) at UNC Charlotte grew from a small group of researchers in the late 1980's. Of these, Dr. Robert J. Hocken, the inaugural and current director of the center, first joined UNC Charlotte in 1988 from the National Bureau of Standards (NBS) - now the National Institute of Standards and Technology (NIST) - in Gaithersburg, MD, and has guided the Center through a number of changes.

One of Bob's first tasks when he arrived was to oversee the construction of the metrology laboratory in the C.C. Cameron Applied Research Center, which was under construction at the time. His knowledge of the necessary technologies for high quality temperature control, and where to obtain these technologies, is responsible for the excellent environment which has housed much of the Center's experimental work over the past decade. Bob, in partnership with other initial metrology group members, Dr. John Patten (now at Western Michigan University) and the late Dr. Bill Shellnut, were able to increase the size of the Center with some important personnel additions.



Part of the main metrology lab at UNC Charlotte.

The first of these additions was Dr. Jay Raja, who has headed both National and International standards committees on the specification and measurement of surface texture. Jay is now the Chairman of the Mechanical Engineering and Engineering Science (ME&ES) department in the Lee College of Engineering at UNC Charlotte. He and his students continue to study surface specification and measurement, with a recent focus on "engineered surfaces." Additional personnel were added to the Center in the early 1990's, primarily through new hires in the ME&ES department. These researchers had varying expertise in metrology, high speed machining, instrumentation, tolerancing, and machine design. A support staff was also developed, providing personnel in the metrology lab, on the manufacturing floor, and in the electronics shop. A chief engineer was also hired for the Center.

Industrial Affiliates

Center for Precision Metrology research projects deal with the practical needs of the industrial community. Through a collaborative Affiliates Program, industrial and Center researchers work together on projects that involve generic and specific manufacturing metrology concerns. In support of the Center's research efforts, affiliate members contribute funds and equipment that are directly applied to student projects and stipends. In addition, the Center receives support from the National Science Foundation through the Industry/University Cooperative Research Center (I/UCRC) program. Project-specific research is funded by contracts with industry to address proprietary application and development projects. Government funding is solicited for sponsoring fundamental and large-scale metrology projects.

Research



The new Engineering Research building.

There have been scores of metrology-related research projects over the past 15 years in the CPM, and one useful way to look at the type of projects is to sort them into the following categories: projects related to manufacturing processes, projects related to metrology and verification, and projects which support the development and/or implementation of National and International standards. In addition, there have been many projects, theses and dissertations devoted to other topics related to metrology: CMM sampling strategies, algorithms for data analysis, software tools for surface texture identification and analysis, and tolerance analysis and optimization. Some of these related projects have been supported by the Center, while others have been supported by industry, the National Science Foundation, the Department of Energy, and other funding agencies.

An (incomplete) sampling of these projects, past and present, follows:

- Measurement sensors
 - vector touch probe
 - GMR crack detection
- Measurement systems
 - portable 3D surface profilometer
 - small hole measurement
- Ultra precision positioning
 - sub atomic measuring machine (SAMM)
- High precision metrology with CMMs
 - measurement of probing forces
 - Scanning CMM Performance Testing
 - Hybrid CMM Performance Testing

- High speed machining
 - tool tuning
 - process planning for monolithic parts
- Optical measurement methods
 - Solder Bumps Volume Metrology
 - Improving Measurements Based on the Cat's Eye Reflection
- Ductile diamond turning of ceramics
- Nano-hardness Indentation Instrumentation
- Accuracy of large scale monolithic parts
- 3D characterization of engineered surfaces
- Large array thermal monitoring of machines
- CMM coordinate sampling strategies for higher accuracy
- X-ray interferometry
- RF Networks for Metrology Applications



The precision CMM lab offers students modern equipment training.

The outcomes from these projects have been varied, from reports of new procedures to prototype instrumentation, from patented methods to new companies. Some projects have also contributed directly to National standards development. One consistent product from these different research projects is a steady flow of well-rounded, metrologically knowledgeable graduate students. These graduates are at many companies as metrologists, managers, and designers and most maintain contact with the Center faculty on a regular basis. The industrial affiliates who help support the center projects are often attractive employers for the students, as the company has already shown that they value metrology research.

Synergistic Activities

The Center for Precision Metrology supports and interacts with a variety of interests, on- and off-campus. The CPM occasionally assists local industry in solving dimensional measurement problems, and has provided measurement support for a number of local (NASCAR) race teams. In addition to this community outreach, the infrastructure of the center allows our students to perform better in many of the society-sponsored (ASME, SAE, etc.) competitions against other schools. The concentration of faculty who prosecute research in metrology, precision machine design, tolerancing, and instrumentation has helped to develop an atmosphere in which the realization of working precision designs is not a textbook exercise, but a daily occurrence. This environment complements the undergraduate curriculum in mechanical engineering, which has a strong focus on the "reduction to practice" of engineering principles.

Future Directions

As the Center has become more mature, additional opportunities have been revealed. The new push for different flavors of nanotechnology is filled with researchers who are unfamiliar with the

problems in measuring objects on these scales - especially measuring with respect to a calibrated standard or providing another form of traceability. The Charlotte Research Institute (CRI) at UNC Charlotte is completing the construction of two new laboratory/research/faculty buildings as part of the campus. Additional buildings will house industrial R&D facilities where university and industrial researchers can collaborate. The CRI will help to provide the basis for interactions in which academic research can be quickly applied and validated in an industrial environment. The partnerships that arise from these joint activities will benefit the Center, local industry and the students who have the opportunity to work on these projects.

For more information about the Center for Precision Metrology (CPM) at UNC Charlotte please contact Dr. Robert Hocken at: <hocken@uncc.edu>

Note: An earlier version of this article was presented at the 2005 NCSLI Conference in Washington, DC.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) ACADEMIC OUTREACH

For NCSLI member delegates who are involved with college academic outreach, the new "ASTM Campus" website at <www.astm.org> offers new capabilities for student members and academicians. By providing a greater focus on standardization in college and university curricula, the ASTM campus will facilitate awareness of standards for both students and educators.

From their website, here are the key elements:

Student Membership. Student Membership in ASTM International is open to students who carry 12+ undergraduate credit hours or 8+ graduate credit hours.

Student Forum. Read profiles of individuals from various industries and tell your standards story in this section of the website.

Professor's Podium. Get tips in a wide range of disciplines from professors regarding the benefits of familiarity with standards throughout all stages of a career.

Standards 101. What does a standard look like? What are the rules and regulations involved in standards development? These and other questions are answered in the Standards 101 classroom.

The inclusion of basic standards education in engineering and technical academic curricula is increasingly viewed as a means of conveying competitive advantage to companies and countries worldwide. ABET, Inc., the recognized U.S. accreditor of college and university programs in applied science, computing, engineering and technology, now requires that standards be incorporated into the major design experience. Thus, standards organizations are taking steps to enhance university-level students' exposure to and understanding of standards.

ASTM's academic outreach will educate anyone who uses or benefits from standards in their careers by facilitating an understanding of standards, their value, development, and implementation.

Standards 101 contains a wealth of fundamental information about standards. This resource provides basic explanations of standardization and the ASTM process as well as links to information on standardization contained throughout the ASTM Web site.

TRAINING INFORMATION

MEASUREMENT UNCERTAINTY CLASS

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<info@quametec.com>
<www.quametec.com>

2006: **February 22-24** Monterey, CA
March 20-22 Charleston, SC
April 24-26 Detroit, MI
May 17-29 Boulder, CO
June 21-23 Detroit, MI
July 17-19 Mississauga, ON
August 23-25 Seattle, WA
September 13-15 Harrisburg, PA
October 23-25 Detroit, MI
November 28-23 Detroit, MI

\$1595 per student. Attendees will receive 3 days of hands-on Measurement Uncertainty training based on the GUM Method, plus a copy of our book, "Measurement Uncertainty Analysis Fundamentals" and a licensed copy of our software, "Uncertainty Toolbox for Microsoft Excel" developed by Quametec. See our website at www.quametec.com for additional information, course outline and our unique class guarantee.

MET/CAL DATABASE AND REPORTS

Fluke Corporation
(425) 446-6330 FAX(425) 446-5992
<caltraining@fluke.com>
March 27-31, 2006 Boulder, CO

\$2495 per student. This 5-day in-depth course uses hands-on sessions to teach a systematic approach to data collection and to consistently and completely manage your metrology assets. Learn to use a relational database, structured query language (SQL) and Crystal Reports to do powerful searching, sorting and reporting. MET/CAL Plus fully supports your traceability documentation requirements, including ISO 9000, ANSI/NCSL Z540-1, ISO Guide 25 and ISO 17025.

MET/CAL PROCEDURE WRITING

Fluke Corporation
(425) 446-6330 FAX(425) 446-5992
<caltraining@fluke.com>
April 3-7, 2006 Boulder, CO

\$2495 per student. In this 5-day in-depth course, you will learn to configure MET/CAL software to establish and maintain traceability, create and edit calibration procedures, and customize the format of reports and calibration certificates. The majority of the class time is spent in hands-on development of MET/CAL procedures and reports.

AUDITING TO ISO 17025

Quametec Corp.
Karen Moor, (810) 225-8588
<info@quametec.com>
<www.quametec.com>

April 27-28, 2006 Detroit, MI
August 21-22, 2006 Seattle, WA

\$895 per student. Become qualified to be an internal Auditor for ISO 17025 compliance by taking the same course that we teach to Laboratory Accreditation Assessors. This 2-day course covers the full standard as well as provides tools and guidance on how to perform and document your Internal Audits. Get it right the first time with professional training on your side. Includes a CD loaded with tools and forms to simplify the required documentation of your internal audit.

PRINCIPLES OF METROLOGY

Fluke Corporation
(425) 446-6330 FAX(425) 446-5992
<caltraining@fluke.com>
May 1-5, 2006 Boulder, CO
September 18-22, 2006 Boulder, CO

\$2495 per student. This is a 5-day workshop covering electrical/electronic measurements and calibration. Participants will receive extensive hands-on time with a wide range of measurement instructions. This course covers all aspects of dc/low frequency calibration.

INTRODUCTION TO UNCERTAINTY ANALYSIS

Integrated Sciences Group
1-800-400-7866
<training@isgmax.com.>
Registration: <www.isgmax.com>
June 14-15, 2006 Boulder, CO

\$895 per person. This 2-day course provides an introduction to the principles of uncertainty analysis as found in the ISO Guide to the Expression of Uncertainty in Measurement (the GUM), published papers and current research. Type A and Type B methods of estimating measurement process uncertainties are discussed and multivariate analysis is outlined. Instruction involves minimal statistics with hands-on use of ISG's Uncertainty Sidekick freeware to illustrate concepts for a variety of direct measurement scenarios. The role that uncertainty estimates play in developing specifications and making decisions is also discussed.

UNCERTAINTY/SPC ANALYSIS

Integrated Sciences Group
1-800-400-7866
<training@isgmax.com.>
Registration: <www.isgmax.com>
June 19-22, 2006 Boulder, CO

\$1895 per person. This 4-day course provides straightforward and easy-to-understand principles of measurement uncertainty analysis for direct and multivariate measurements and measurement systems. Concepts and methods are consistent with those found in the "U.S. Guide to the Expression of Uncertainty in Measurement."

Advanced measurement uncertainty analysis topics that extend these methods and concepts are also presented. Hands-on analyses using ISG's Uncertainty Analyzer software provide practical application of important concepts to the development of uncertainty estimates for direct measurements, multivariate measurements and measurement systems. Applying uncertainty estimates to control measurement processes, establish calibration intervals, and minimize decision risk is also discussed.

WEIGHTS AND MEASURES COURSES

Val Miller, NIST WM Division

Fall 2005 to 2007 Laboratory Metrology Training

Types of Laboratory Metrology Seminars & Description

A number of laboratory metrology seminars will be offered by the NIST Weights and Measures Division between 2005 and 2007. A description of each course, cost, and travel guidance is available on our Internet site at <http://www.nist.gov/labmetrology>. The current schedule and a sign-up form to be returned by e-mail, mail or facsimile are attached and are also available on the Internet site. The duration of all courses (unless otherwise noted) is one week, with the exception of the Basic Mass, Length, and Volume seminar for States, which is two weeks.

The current course offerings are:

- Basic Mass, Length, Volume - for State legal metrologists;
- Basic Mass - for Industry;
- Basic Mass & Weighing - Double Substitution, Workhorse of Mass Metrology -

Location

All courses will meet at the NIST Gaithersburg, MD Campus unless otherwise indicated.

Sign-up and Confirmation

The sign-up form must be returned by facsimile, e-mail, or mail. Telephone requests will **not** be accepted. Once your application is received, you will be notified whether the class is still available, and a confirmation notice will be sent to you approximately six to eight weeks before the seminar with detailed information about the schedule, suggested accommodations, local travel information and location of the seminar.

Current Schedule of Laboratory Metrology Seminars

2006 Dates* Course/Conference Title

January 22 to 25, 2006 NCWM Interim, Jacksonville, FL
February 6 to 10, 2006 Advanced Mass Hands-On, NIST
February 27 to 28, 2006 MSC Mass Short Course, CA
March 1 to 3, 2006 Measurement Science Conference, CA
March 27 to April 7, 2006 Basic Metrology - States, NIST
May 8 to 12, 2006 Basic Mass Industry, NIST
July 9 to 13, 2006 NCWM, Chicago, IL
August 6 to 10, 2006 NCSLI, Nashville, TN
October 29 to November 3, 2006
 Combined Regional Meeting, Broomfield, CO ***

Regional break-out meetings to discuss round robins will begin on Sunday afternoon and finish on Friday morning with round robin planning and business sessions

December 4 to 8, 2006 Basic Mass Industry, NIST
December 11 to 15, 2006 Intermediate Metrology, NIST
2007 Dates* Course/Conference Title
January TBD MSC Mass Short Course, CA
January TBD Measurement Science Conference

January 21 to 24, 2007 NCWM Interim, Jacksonville, FL
February 5 to 9, 2007 CaMAP, TBD***
February 26 to March 2, 2007 8th Advanced Mass, NIST
March 5 to 9, 2007 Advanced Mass Hands-On, NIST
April 16 to 20, 2007 SEMAP, TBD***
March 19 to 30, 2007 Basic Metrology - States, NIST
April 30 to May 4, 2007 Basic Mass Industry, NIST
May 14 to 18, 2007 WRAP, TBD***
July 8 to 12, 2007 NCWM, Park City, UT
July 29 to Aug 7, 2007 NCSLI, St. Paul, MN
September 17 to 21, 2007 NEMAP, TBD***
October 15 to 19, 2007 SWAP, TBD***
October 22 to 26, 2007 MidMAP, TBD***
October 29 to November 2, 2007 Basic Mass Industry, NIST
November 5 to 9, 2007 Intermediate Metrology, NIST

2008 Dates* Course/Conference Title

January 13 to 16, 2008 NCWM Interim, New Orleans, LA
January TBD MSC Mass Short Course, CA
January TBD Measurement Science Conference, CA

*Courses will be added or canceled based on demand and availability of instructors

**Applications for FULL courses will be accepted and retained on a waiting list for cancellations.

***Send e-mail to val.miller@nist.gov for meeting contact information.

For a Weights and Measures Metrology Seminar application blank, email Val Miller at val.miller@nist.gov

NIST Training at the MSC

Eight 2-day NIST Seminars will be offered at the Measurement Science Conference February 27 and 28, 2006 in Anaheim, California. The seminar fee for each seminar is \$695. Registration is on the Measurement Science Conference website at <http://www.msc-conf.com/msc/index.html>

- Double Substitution: Workhorse of Mass Metrology;
- Hands-on Workshop on Estimating and Reporting Measurement Uncertainty ;
- Time and Frequency: Measurements and Applications;
- Experiment Design, Calibrations and Interlaboratory Studies;
- Regression Analysis Using NIST/SEMATECH e-Handbook of Statistical Methods;
- Selection, Calibration, and Use of Contact Thermometers;
- NIST Pressure and Vacuum Measurement Course; and
- NIST Flow Seminar.

Additional NIST workshops that are scheduled throughout the year are usually posted on our general Conference listing on the main NIST website at: http://www.nist.gov/public_affairs/confpage/conflist.htm

MORE SCENES FROM THE 2005 CONFERENCE

Door Prizes

Editor's note: I was short of pages in the October issue, because of the conference keynote slide-set, so I held over some of the pictures of the Washington Conference. One of the most popular events at all our conferences is the Doorprize Circus that Ring Master Mike Suraci organizes each year. This year he was assisted by Steve Doty, Navy, Corona, and Monique Moj.



I was all set to cry foul, because it looked like this winner was President Harry Moody. It wasn't.



Steve and Monique assure that the game is all above board. With our technology, this could probably be done electronically like electronic voting machines?



Not a bad way to spend half an hour. This winner takes home an Apple iPod.



A special drawing was done for Georgia Harris's Educational Committee survey, with the prospects limited to those attendees who submitted a proper survey form.



Metrology Legend Dave Braudaway (Sandia-retired) chooses another metrology text.



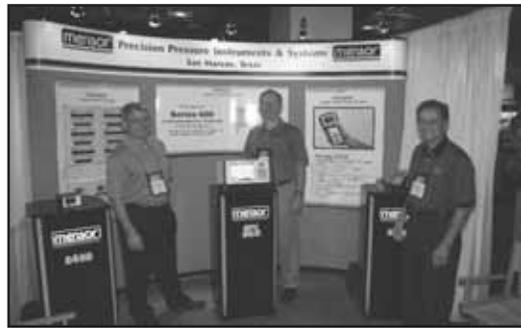
We can all use a Statistical Methods textbook in our technical bookcase.

Exhibits

Editor's Note: The Annual NCSLI Conference offers two main benefits to our member delegates. First is the "Meeting of the Clan" function where the annual visitation of global metrologists offers the personal connections and exposure to the newest thinking of our visionaries and technologists. Second is the ability for attendees to see the latest in equipment and services offered by our loyal exhibitors. The income derived from the exhibits brings our annual budget into balance. It goes without saying that we all appreciate the loyalty of all those dozens of exhibitors and sponsors who put forth their support each year. There were many more not shown here.



More Scenes from the 2005 Conference



SCENES FROM THE MYRTLE BEACH BOARD MEETING



The Top Management of NCSLI lines up in order for some reason. Dave Agy, Past President, Harry Moody, outgoing President, Jeff Gust, incoming President, and our corporate bean-counter, Jack Ferris, Treasurer, now Exec. V.P.



Derek Porter, Ed Pritchard, Craig Gulka and Technical Program Chairman Dick Pettit catch up on issues from the 2005 Conference.



Georgia Harris (r) congratulates Carol Hockert, our most successful Conference V.P. for an amazingly successful meeting in Washington.



Nothing against South Carolina, but it looks like it might not have been the season for a business trip to the coast.



Terry Condor, Jesse Morse and Dave Agy conduct some coffee-time business.

METROLOGY CALENDAR

NCSLI MEETINGS

August 6-10, 2006
NCSLI Workshop & Symposium
Nashville Convention Center, Nashville, TN
CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

May 9-11, 2006
CORM Technical Conference
NIST, Gaithersburg, MD
CONTACT: Sally Bruce, (301) 975-2323
e-mail: <sbruce@nist.gov>

May 16-17, 2006
CIE Symposium and Division 1 Meeting
NRC, Ottawa, ON, Canada
CONTACT: website: <www.iscc.org/jubilee2006>

INDUSTRY MEETINGS

February 27-28, 2006
Measurement Science Conference
Disneyland Hotel, Anaheim, CA
CONTACT: Miguel Cerezo, (805) 447-1128
e-mail: <mcerezo@amgen.com>
website: <www.msc-conf.com>

June 25-28, 2006
5th Oxford Conference on Spectrometry
National Physical Laboratory, Teddington, Msx, UK
CONTACT: UK - Fiona Jones <fiona.jones@npl.co.uk>
US - Art Springsteen
<arts@aviantechnologies.com>
Maria Nadal <maria.nadal@nist.gov>
David Wyble <wyble@cis.rit.edu>

March 1-3, 2006
NIST Seminars at MSC
Disneyland Hotel, Anaheim, CA
CONTACT: Miguel Cerezo, (805) 447-1128
e-mail: <mcerezo@amgen.com>
website: <www.msc-conf.com>

October 25-27, 2006
Symposium of Metrology
CENAM, Santiago de Queretaro, Qro., Mexico
CONTACT: website: <www.cenam.mx>

April 4-6, 2006
International Conference on Metrology CAMET2006-JM2006
Casablanca, Morocco
CONTACT: Saloua Banbarya
e-mail: <camet@acmetrology.com>
website: <www.acmetrology.com>

CHECK WEBSITE FOR UPDATES

<www.ncsli.org/events/>

**You can submit information on your upcoming Region/Section meeting, Committee meeting, or other Metrology-related event on the web! Just click on "Calendar" then "Submit an upcoming event".
Get listed and increase awareness and attendance!**

REPORTS FROM THE REGIONS



October 12, 2005
USAF Primary Standards
Laboratory
Heath, Ohio
Matthew S. Knight
Southern Ohio/Kentucky Section
Coordinator

The fall meeting of the Southern Ohio/Kentucky Section 1132 of NCSLI was held on October 12, 2005, at the USAF Primary Standards Laboratory in Heath, OH. Fifty three participants representing 16 companies and the United States Air Force attended. Following a continental breakfast, Scott Knight, the new Section Coordinator, welcomed everyone and introduced Ben Fullen, the Air Force Primary Standards Laboratory Program Manager, for opening remarks.

Following comments by Mr. Fullen, Scott went over the agenda and introduced Mr. Jeff Gust to start off the meeting.

Jeff Gust, NCSLI, Executive Vice President of NCSLI. Jeff gave an update from the board of directors. He covered highlights from the 2005 NCSLI Workshop & Symposium held in Washington, D.C.

He briefed the awards given during the 2005 NCSLI Workshop & Symposium and the 2006 slate of candidates for NCSLI. He informed us of the new NCSLI magazine - *Measure* - , which is scheduled to be issued in March 2006 and will be published quarterly. He also said *The Metrology Handbook* from ASQ is available through the NCSLI store at a 10 percent discount for members.

Dr. Jaeger, Jaeger Enterprises, reviewed the tutorials that were held at the annual NCSLI Workshop and Symposium in Washington DC, USA on August 7-11, 2005. He also presented the future tutorials for the annual NCSLI Workshop and Symposium to be held in Nashville, TN in August 2006. Klaus commented that the tutorial sessions have been very popular with the workshop & symposium attendees.

Mike Eckart, Engineer for TEGAM, presented a very interesting topic on "*RF Power Sensor Calibration Using a Thermistor Power Standard and a Type IV Power Meter.*" He gave a history of the types of power sensors, their theory of operation, and explained calibration principles and uncertainties.

Jeff Gust, Vice President of Quametec Proficiency Testing Services, discussed Final Results from an Accredited Resistance Proficiency Test. He explained that proficiency testing is a means to verify:

- Laboratory measurement method
- Technical training
- Traceability of standards
- Uncertainty budgets are correct
- Reporting of results is appropriate
- Laboratory understands what measurement the customer wants

This resistance PT was conducted from December 2002 to February 2004. Ten laboratories participated and three of the participants had unsuccessful results. He explained that they use the Quametec Petal as the scheme design for their proficiency tests. This design is also their quality assurance to ensure their artifact stability. Measurements are taken before and after each participant. Results are analyzed and reported to the participants. This presentation is available for download at <www.quametec-pt.com>

- 1.Traceability flow chart
- 2.Capabilities list
- 3.Auxiliary equipment list
- 4.Relevant technical orders
- 5.Trend data and charts
- 6.Uncertainty budgets
- 7.Other supporting documentation

Mr. Harvey Padden, President of Bios International Corporation, gave an informative presentation on Viscous Seal Primary Gas Flow Provers. He explained the history and evolution of primary gas flow standards. The benefits from using viscous-sealed provers are:

- Mercury free
- Small
- Fast
- Portable
- Minimal training required
- Reliable - 20,000 made since 1991

Mr. Padden made his presentation both humorous and enlightening. He explained how the calibration of a viscous-seal prover must be by dimensions and not comparison. Static uncertainty contributions come from the effective piston diameter, measurement length calibration, measurement length drift, thermal expansion, time base calibration, pressure standardization, and temperature standardization. Dynamic uncertainty contributions are mainly piston leakage, pressure, and repeatability of readings. He explained how the ML 800 primary gas flow prover was accurate to approximately 0.1 to 0.2 percent over a range of 5 to 50,000 SCCM.

Prior to adjourning, Scott requested topics that attendees might like to suggest for future meetings. Names were drawn for door prizes, provided by NCSLI and TEGAM. Scott mentioned that the Spring 2006 meeting might be co-hosted with Batelle in Columbus.



This meeting was a test to see if the mid-Ohio group could get along without retired Coordinator Charlie Mays.

Attendees:

Lloyd	Baker	Visteon Automotive Products
Willie	Bertini	Bionetics
Andy	Brush	TEGAM
Mike	Cadenhead	Bionetics
Michael	Carney	Bionetics
Alice	Chaffin	Battelle Memorial Institute
Scott	Christian	Boeing Guidance Repair Center-Heath
Bob	Cleland	AFMETCAL Det1/ML
Alan	Clune	AFMETCAL Det1/ML
Stan	Coleman	AFMETCAL Det1/ML
Jim	Daum	Bionetics
Mike	Eckart	TEGAM
John	Eddleblutte	Boeing Guidance Repair Center-Heath
Donald	Erden	AFMETCAL/Det 1
Larry	Follin	Delphi Delco Electronics Systems
Charles	Francis	Mettler-Toledo, Inc.
Ben	Fullen	Bionetics
Jack	Gard	Bionetics
Bill	Gebel	Bionetics
Jeff	Gust	Verizon Logistics
Jim	Hendershot	Bionetics
Steve	Herzog	Bionetics
Jeff	Hetrick	Bionetics
Bill	Hiirt	ACLASS
Scott	Hummel	Bionetics
Klaus	Jaeger	Bionetics
David	Kennedy	Bionetics
Scott	Knight	Bionetics
Greg	Levy	Bionetics
Alan	Long	Bionetics
Bob	Lovsey	Tosoh SMD Inc.
Dave	Madden	AFMETCAL Det1/ML
Barry	Mancz	AFMETCAL Det 1
Charlie	Mays	Guest
Mike	McDonough	Thermo Forma
James	Meyer	Battelle Memorial Institute
Jon	Morrison	AFMETCAL Det1/ML
Robert	Nappier	AFMETCAL Det1/ML
David	Nebel	DEN Technical Services
Chuck	Nichols	AFMETCAL Det1
Earl	Paazig	AFMETCAL Det 1
Harvey	Padden	Bios International Corporation
Chris	Pero	Bionetics
Nathan	Plank	AFMETCAL Det 1
Randy	Roberts	AFMETCAL/Det 1
Dave	Schick	AFMETCAL Det1/ML
Karen	Semer	AFMETCAL Det1/ML
Dilip	Shah	E=MC3 Solutions
Sheila	Starr	Bionetics
Mike	Sumich	AFMETCAL/Det 1
Dan	Weiland	Tosoh Smd Inc.
Aaron	Welborn	Bionetics Corp.
Harry	Willey	Bionetics



Robert Bosch Corp.
Farmington Hills, MI
Patrick Butler
Michigan Section Coordinator

Editor's Note: How's this for Patrick recovering from a computer crash, and winging his regional meeting report from memory?

The Michigan Section Meeting was held on November 2, 2005 at the Robert Bosch Corporation in Farmington Hills, MI.

Our host welcomed us with coffee, juice and donuts provided by Bosch. After Patrick Butler made some opening remarks, Lloyd Baker gave the Board of Directors' Update.

Jim Jenkins of the Quametec Corporation shed some light on measurement uncertainty. We decided we had all been pretty much exposed to it, now what are we going to do with it. His presentation was entitled, "*Managing Measurement Uncertainty.*"

Next, Chuck Pitzen of Honeywell-Sensotec explained how the design of pressure and load sensors affects the calibration. He brought in many samples or load cells and pressure transducer so we could all get a first-hand look.

Chris Novak from Honeywell-Lebow offered similar insight but on torque sensors.

After a lunch provided by Measurement Instruments, we switched gears and went into a Fluke Met/Cal User's Group Meeting.

Steve Griffin from Fluke gave an overview of some of the new products and services coming from Fluke. We got into the nuts and bolts of database management so we could understand where the data is and how to put it into reports properly. We also discussed available stored procedures. Finally, Steve highlighted some tips and tricks.

Attendees:

Patrick Butler	Robert Bosch Corporation
Sam Davis	Robert Bosch Corporation
Ryan Davanzo	Robert Bosch Corporation
Darren Martin	Robert Bosch Corporation
Greg Minar	General Motors
Lloyd Baker	Dynamic Technology
Rhonda Carradine	DTE Energy
Joe Gunn	OCS Technologies
Chris Church	Measurement Instruments
Scott Stewart	Measurement Instruments
Mike Noble	Fluke
Steve Griffin	Fluke
Chuck Pitzen	Honeywell-Sensotec
Chris Novak	Honeywell-Lebow
Ron Storteboom	Medallion Instrumentation Systems
Jerry Bambach	ATI Systems



May 10, 2005
 Boston Scientific
 Maple Grove, MN
 Shawn Mason
 Section Coordinator

Editor's Note: I have mentioned before my policy of running meeting reports even if a bit dated, because they usually contain pertinent information of interest to members.

In a real sense these region/sectional meeting reports show the creativity and innovation of the local members in their agendas.

The May 10, 2005 meeting of the Twin Cities NCSLI Section was hosted by Boston Scientific, which was held at their facility in Maple Grove, MN, and was attended by 82 participants and 33 companies. We thank Harry Spinks from Boston Scientific for providing their facility and an excellent meeting room along with coffee, soda, pastries, and lunch.

Speaker: Reinhard Schwind - Sartorius

Topic: Balances and Scales in an Analytical Environment

The following topics were covered in this presentation: Balances and Scales in an Analytical Environment, Terminology, Overview of Mass and Weighing, Influence Factors, and Quality Management Systems. Reinhard started out by talking about the basis for the procedure of measuring mass, which is measurement of the force exerted by a mass ($W = m \times g$). Next he talked about classification of laboratory balances according to their construction principle, which included the following: Suspended Weighing Pans, Top Loading, Strain Gauge, and a Weighing System with Electromagnetic Force Compensation.

He then talked about terminology and definitions, which included the following:

Capacity, Readability, Reproducibility, Resolution, and Accuracy.

Capacity - the maximum weight value a balance/scale is capable of displaying,

Readability - smallest difference in mass that can be read on a balance,

Reproducibility - the ability of a weighing instruments to display corresponding results under constant test conditions,

Reproducibility - the difference between the individual measured values within a series of test measurements.

Resolution - a term not yet precisely standardized, informally used to mean the quotient of the maximum capacity and the readability,

Accuracy - the difference between the value measured and the pre-set or nominal volume of the measuring instrument,

Next he discussed influence factors that affect weighing, which include the following: Gravitational Acceleration, Tilt Angle of the Balance, Electrostatic Charges, Magnetic/Magnetizable Samples, Ambient Effects, Correcting Errors, Balance Operation, and Handling Samples for Optimal Weighing Results.

Gravitational Acceleration - when a balance is moved it can measure lighter than the actual mass, it should be calibrated every time it is moved,

Tilt - if a balance is tilted it also might read less so it is important to level the balance before performing the calibration,

Electrostatic Charges - the weighing results can drift in one direction because of friction, in order to reduce friction use a faraday cage, rap sample in conductive metal foil, or increase the distance between the weighing pan and the sample,

Ambient - temp, humidity, and barometric pressure effect the air density and thus the buoyancy of the sample in air, temp has the strongest effect because it can cause different thermal expansion of the various materials of the individual components,

Air Currents - can cause convection currents, which will cause instability in the results.

Finally, he reviewed Quality Management Systems which conform to ISO 9000, EN 45000 FF/DIN, ISO 17025, GLP, USP, and GMP.

Speaker: Carl LeBella/Karen von Holtz - (IEST)

Topic: Clean Room Standards

Carl first discussed Federal Standard 209E, ISO 14644-1, and IEST RP-CC-006.3 clean room standards. He stated that the ISO 14644-1 standard uses different class designators, has more classifications than the Federal Standard 209E. Another difference between the Federal standard and the ISO standard is that the Federal standard uses unidirectional for sample locations and 2 locations, 5 samples versus 1 location, 1 sample for the ISO standard.

When performing the particle sample location grid the Federal Standard 209E is 8 for all classes, the ISO standard has 25 for class 100; 20 for class 1000; and 2 for class 100,000. Next he talked about reporting. The ISO standard includes proof of calibration for diagnostic equipment. The ISO standard addresses single non-random outliers that can be excluded and in the Federal Standard outliers are not addressed. Another major difference is that the ISO standard specifies requirements for periodic testing, additional tests beyond particle testing and monitoring the room to provide evidence of continued compliance. In part 2 of the ISO 14644 standard re-qualification is required:

- Upon completion of remedial actions after out-of-compliance condition
 - Particles levels exceeded class
- Significant change from performance specifications
 - Customer changes use of clean room from mfg to storage, or adds equipment
- Significant interruption of air movement
 - Air handling systems fails for a period of time
- Special maintenance significantly affecting operations
 - Maintenance performs HEPA filter replacement or relocation

Finally he reviewed IEST-RP-CC006.3 Testing Cleanrooms. It is a recommended practice, not a standard, blends both 209E and ISO 14644, good source of methodology, and it can be used as a reference document when specifying cleanroom tests, bid documents, and monitoring plan development.

Summary and Conclusions:

- Perform regular particle testing of cleanrooms per schedule under ISO 14644
 - CSI performs to both 209E and 14644
 - CSI performs room pressure differential testing concurrent with particle testing
- Perform HEPA filter leak and velocity testing annually
- Perform airflow visualization, recovery, and containment leakage testing only where appropriate for configuration

Speaker: Rick Brion - Martin Calibration
Topic: Featured Lab

Speaker: Karl Kurtz - DH Instruments
Topic: Very Low Pressure

Transmitters	Transducers	Calibrators	Digital Manometers	Capacitance Diaphragm	Magnehelic Gauges	Dead Weight Testers
± 0.1% of Range	± 0.05% of Range	± 0.035% of Range	± 0.035% of Range	± 0.06% of Reading	± 2% to 4% FS	± 0.015% of reading

Kurt then talked about Techniques, which included Environmental, Hardware, and Procedures. Environmental - the biggest concerns are short-term stability and pressure transients. Pressure transients are caused by air handling systems, doors opening and closing and objects moving in the room. Hardware - the pressures may not be the same at any given time because of speed and internal averaging. The diameter of the tube can have a big influence on the pressure equilibrium. Filters can cause pressure restrictions. Steel tubing is more affected by temperature. Procedures - How the zero is established needs to be done, where to start the calibration lowest pressure or zero, zeroing must be done when both instruments are at the same pressure within the tolerance of the DUT. Finally he talked about uncertainty.

Type B Reference	Type B Multimeter	Type B Resistor	Type B Ambient Conditions	Type B Line Pressure also Type A because it is different in every state	Type B Resolution
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Type A Pressure Head Calculations	Type A Orientation Level of Table	Type A Residuals form Regression Fit	Type A Technician Gage R&R	Type A Gravity	Type A Density
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Speaker: Roger Muse/Bill Hurt - ACLASS
Topic: Accreditation

Roger began with the proposed changes to ISO/IEC 17025 and the timeline. It was amended to align ISO/IEC 17025 better with ISO 9001:2000. Voted out by National Standards November 2004, 96% approval February 2005, still needs ratification by ISO and IAF, new edition to be published June 2005.

He briefly talked about some of the changes:

- Quality System replaced by Management System
- Clients replaced by Customer
- Changes to management requirements to reflect content of ISO 9001:2000
- Numerous changes, additions, and deletions to the clause within the standard
- Subclauses 4.2.3 and 4.2.4 includes top management
- 5.2.2 the effectiveness of the training actions taken shall be evaluated

- Added regular checking of equipment for stability and integrity
- 5.9.2 re: analysis of quality control data
- ISO 9001:1994, ISO 9002:1994 replaced with ISO9001:2000
- Statement removed "laboratories fulfilling the requirements of ISO/IEC 17025 then also automatically fulfill the requirement of the ISO 9001"

ILAC agreed to include statement on the certificate "This laboratory operates a management system that meets the PRINCIPLES of ISO 9001:2000

He also mentioned that the labs have two years from the release date to comply and a major overhaul is expected in 2009, which will include synchronization with ISO 9001 and ISO 14001. Next he talked about International, Regional, and National Cooperation.

International Cooperation includes ILAC, Regional includes: APLAC, EA, IAAC, SADCA, CAC-MAS-Q, and National includes NACLA. Finally he stated that the ISO Guide 58 will be replaced by ISO 17011.



Host Harry Spinks of Boston Scientific leads off the day by welcoming the large group to his facility and reviewing the housekeeping details.



Rich Brion overviews Martin Calibration Co as the Featured Lab of the Day.



Karl Kurtz of DH Instruments teaches the group the theory and practice of low pressure measurements.

Attendees:

- | | |
|-------------------|----------------------------------|
| Liimatta, Steven | 3M Center Calibration Laboratory |
| Conder, Terry | 3M Corporate Metrology |
| Nelson, Ross | 3M Corporate Metrology |
| Otto, Jeff | 3M Corporate Metrology |
| Hirt, Bill | Aclass |
| Muse, Roger | Aclass |
| Killian, Jay | Andersen Corp |
| Nordgren, Roger | Arrow Lab Spec Inc |
| Ladoucer, Rich | BNSF Railway |
| Manders, Jim | BNSF Railway |
| Alle, Scott | Boston Scientific |
| Anderson, Mark | Boston Scientific |
| Dukat, John | Boston Scientific |
| Farley, John | Boston Scientific |
| Schneider, Tom | Boston Scientific |
| Spinks, Harry | Boston Scientific |
| Kruta, Kevin | Calmetrics |
| Urban, Gregory | Computype Inc |
| Mueller, Dave | Control House Inc |
| Kurtz, Karl | DH Instruments |
| Fliescher, Mike | Donaldson Company |
| Johnson, Mitch | Donaldson Company |
| Erickson, Doug | General Dynamics |
| Fowler, Kurt | Goodrich |
| Imholte, Mike | Guidant |
| Roden, Larry | Guidant |
| White, Charles | Guidant |
| Boyles, Steve | Honeywell |
| Franzwa, Stacy | Hutchinson Technology Inc |
| Johnson, Mike | Hutchinson Technology Inc |
| Peters, Tim | Hutchinson Technology Inc |
| Snitker, Craig | Hutchinson Technology Inc |
| Vonholtz, Karen | IEST |
| Meyer, Gary | J & G Technology |
| Bowman, Neil | Martin Calibration |
| Brion, Rick | Martin Calibration |
| Singer, Jason | Martin Calibration |
| Siskoff, Dave | Martin Calibration |
| Anderson, Mike | Medtronic |
| Bohrer, Bob | Medtronic |
| Burch, Doug | Medtronic |
| Clark, Thomas | Medtronic |
| Desmarais, Ben | Medtronic |
| Hentz, Derrick | Medtronic |
| Karolevitz, Jason | Medtronic |
| Keller, Karl | Medtronic |
| Ludwig, Dave | Medtronic |
| Nowacin, Walter | Medtronic |
| Persell, Vickie | Medtronic |
| Petersen, Al | Medtronic |
| Rasset, Pat | Medtronic |
| Scheibel, Curtis | Medtronic |
| Adams, Bruce | MN Weights & Measures |
| Hockert, Carol | MN Weights & Measures |
| Kreitlow, Dave | MTS |
| Moser, Bill | MTS |
| Rust, Kevin | MTS |
| Ellis, Chuck | NAPT |
| Newman, Judy | NAPT |
| Brady, Dennis | Palen Kimball |
| Walton, Doug | Palen Kimball |
| Mcdougall, Jane | Precision Repair & Calibration |
| Dobbs, Clark | Ridgewater College |
| Feddon, Frank | Ridgewater College |
| Gomez, Jerry | Ridgewater College |
| Linder, Mark | Ridgewater College |
| Oneil, Herb | Ridgewater College |
| Allen, Rick | Rosemount Inc |
| Johnson, Eric | Rosemount Inc |

- | | |
|-------------------|--------------------|
| Wetterstrom, Ed | Rosemount Inc |
| Golder, Bob | Sartorius |
| Schwind, Reinhard | Sartorius |
| Radke, Scott | Smith Medical |
| Canfield, Jim | St Jude Medical |
| Marcotte, Kris | St Jude Medical |
| Mason, Shawn | St Jude Medical |
| Meysenbourg, Andy | St Jude Medical |
| Voelk, Bill | St Jude Medical |
| Edeker, Todd | USDA |
| Dolezal, James | United Standards |
| Hanssen, Paul | Workplace Training |
| Degroot, Gaylord | |



Sept. 20, 2005
 St. Jude Medical
 St. Paul, MN
 Shawn Mason
 Twin Cities Section Coordinator

The September 20, 2005 meeting of the Twin Cities NCSLI Section was hosted by St. Jude Medical, which was held at their facility in St. Paul, MN, and was attended by 77 participants representing 36 companies. We thank Rich Slechta from St. Jude Medical for providing their facility, which was held in their cafeteria along with coffee, soda, pastries, and lunch.

Speaker: Jesse Morse - Fluke
Topic: Z540 Writing Committee

The following topics were covered in this presentation: What is the standards writing committee?, membership to be on the committee, what are they doing now.

Jesse started out by talking about what you need to do to become a member of the standards writing committee: You need to fill out a member application, need your companies' support, and the application is reviewed by the chairman. Next he talked about the new standards that are being revised or already out. They are as follows: ANSI/NCSLI Z540.1 - 1994 (R2002), ANSI/NCSLI Z540.2 - 1997 (R2002), and ANSI/ISO/IEC 17025: 2005. He also mentioned that there is a Z540-x which is a complement to ANSI/ISO/IEC 17025. Finally Jesse mentioned that standards last for 5 years and at that time there are three options: improve, rescind or reaffirm. The committee web page is as follows:
 <www.Ncsli.Org/Committees/Index.Cfm>.

Speaker: Dana Leaman - A2LA
Topic: Laboratories and Calibration Providers Lets Talk

The following topics were covered in this presentation: What does the Cal Lab need to ask for and receive, what does the calibration provider need to ask for and provide. Dana started out by saying that what is needed is better communication between calibration providers and their clients, so that the client gets what is needed to meet their requirements with fewer frustrations experienced by the calibration providers. 17025 provides appropriate accommodations to the laboratory's clients through (section 5.6.2.1) Traceability requirements by fostering the client/customer relationship between calibration providers and the clients. Laboratory accreditation is one efficient and economical means to verify competence and the links in the traceability chain.

Reports from the Regions

Next she talked about verification of traceability for a measurement demonstrated by including the accreditation logo on the calibration certificate.

Problems that are being seen are as follows:

- Miscommunication between the client and the provider
- Lack of knowledge from the testing laboratories and their procurement agents
- Intimidation or impatience from the calibration provider
- Lack of attention to the purchasing requirements by the client or their procurement agents
- Lack of attention to the contract review requirements by the provider
- Angry clients that don't get what they think they should get;
- Frustrated calibration providers who aren't asked the right questions, or don't ask them;
- Assessors who write lots of deficiencies and;
- Lots of amended calibration certificates (section 5.10.9)

Assessors are writing a lot of deficiencies for the following:

- Contract Review (4.4)
 - Subcontracting (section 4.5)
 - Purchasing (section 4.6)
 - Reporting the results (section 5.10)
 - Amended calibration certificates (section 5.10.9)

Then she discussed what does the client need to ask for? If accreditation is needed get the Scope, (section 4.6, Purchasing) make sure it has the appropriate accuracy and units of measure. If the client is accredited for an ASTM method, make sure that they are accredited to that specific procedure. Clearly indicate for an accredited calibration. If an accredited calibration is needed, ask for the symbol (or at least reference to the accreditation body) on the calibration certificate. The symbol/reference must include the provider's accreditation certificate number on the certificate. If you need the uncertainty of the measurement ask for it (section 5.10.4.1b)

Next she talked about what does the calibration provider need to ask for?: Ask the client if they need accredited work (section 4.4 contract review) If the client needs accredited work, the sub contractor must also be accredited to perform the requested calibration (section 4.5) The subcontractor must issue its own calibration certificate to the provider, with the accreditation logo if necessary (section 5.10.6). Be sure to ask if the client would like to have a recommendation on the calibration interval included in the calibration certificate, and if they do, get it in writing because 17025, section 5.10.4.4 does not allow intervals on calibration certificates without client agreement or legal regulations.

Finally she reviewed what the calibration provider needs to provide?: If the client has a need for the estimation of uncertainty to be included on the calibration certificate, laboratories need that uncertainty in order to estimate the uncertainty for their own accredited measurements. If not required on the certificate, the provider must keep the uncertainty records for future reference. If the estimation of measurement uncertainty is reported on the certificate along with the results, the uncertainty must be representative of the unit under test (UUT). It is never acceptable to simply reiterate the Best Measurement Capability (BMC) from the provider's scope of accreditation unless it is applicable to that result and that UUT. A statement of traceability to the SI and the route taken must be

included in the calibration certificate (section 5.10.4.1c)

When an instrument for calibration has been adjusted or repaired, the before and after data must be provided (section 5.10.4.3)

Speaker: Karl Reiter - Watlow Gordon

Topic: Thermocouples

The following topics were covered in this presentation: EMF Generation, Law of Intermediate Metals, Law of Intermediate Temperature, ANSI/ASTM/NIST standards, Temperature Curve, Sources of Error, and Calibration Uncertainty. Karl first mentioned that EMF is generated in the temperature gradient and that the length of the thermocouple has no effect on the output.

Next he discussed the Law of Intermediate Temperature: a third metal can be added without measurement errors, but the new additional junctions formed must be at the same temperature, and the Law of Intermediate Temp: the EMF output of a thermocouple will be accurate regardless of the external heat source applied to either metal.

Then he talked about temperature standards which include the following: ANSI MC 96.1 - 1982, ASTM E-230, and ASTM E-220. The ASTM E-230 lists the letter, description and the type of material. Next he showed a curve illustrating the types of thermocouples verses millivolt output. Karl then talked about the thermocouple color codes, non standard thermocouples, time response, and tolerance bands. There are two tolerance bands; standard limits and special limits.

Next Karl covered sources of error which include the following sources:

- Thermal shunting
- Electrical shunting
- Calibration errors
- Extension wire errors
- Reference junction errors
- Measurement system errors
- Drift, aging and hysteresis in T/C material
- Temp. gradient errors in inhomogeneous T/C's
- Magnetic effects in T/C's
- Noise and grounding in T/C circuits

Karl then overviewed calibration methods. ASTM E 220 - Standard Test Method for Calibration of Thermocouples By Comparison Techniques using unused thermocouples and used thermocouples. Calibration of unused thermocouples might include the following standards:

- SPRT 25 ohm -328 to 1220 F
- SPRT 100 ohm -328 to 752 F
- Type S 200 to 2700 F
- Type B 1000 to 3100 F
- Oil bath 80 to 500 F
- Salt bath 500 to 1000F
- Furnace 600 to 3000

Using an Ice bath for cold junction reference (DI water) and Freezing point cells - Zinc, Antimony (Aluminum 10/1993), Silver & Gold.

Calibration of used thermocouples includes the following methods: Conventional Method, Preferred Method, and the Alternate Method.

- The Conventional Method is the same as new or unused, the Preferred is having the Standard next to the UUT, and the Alternate Method is switching the Standard with the UUT.

Finally Karl talked about Measurement Uncertainty, he stated that Uncertainty - is largely the language of statistics:

- Average & Mean
- Normal or Gaussian Distribution
- Standard Deviation and Variance
- Bias - systematic difference averages of sets
- Precision - scatter between averages of sets
- Degree of freedom - number of independent comparisons available

Speaker: Terry Conder/Jim Dolezal - 3M/USL

Topic: NCSLI and ILC updates

Terry started out by reviewing the NCSLI member delegate and the new NCSLI webpage. Jim talked about the End Standard ILC results and any upcoming ILC's.

Speaker: Dana Leaman/Gaylord Degroot/Kevin Rust/Jim Dolezal - A2LA/NAPT/MTS/USL

Topic: Panel Discussion: 17025 as it relates to small labs

This was the first time doing the panel discussion; we started out by putting up the new changes to 17025 on the screen and posed a few questions to get the ball rolling. I asked Dana Leaman to take control of the discussion. After the first debate the audience started asking questions. Some of the topics discussed were Traceability and Sub Contracting. Traceability: How do you get traceability when the OEM is the only one that can calibrate it and they are not accredited. How can you get a waiver for traceability? Sub Contracting; What do you do when you have a lab that sub contracts and does not inform you. I thought it went well and probably would add it to other section meetings.

Speaker: Jesse Morse - Fluke

Topic: Shielding and Guarding

The following topics were covered in this presentation: Common mode voltages and where they come from, normal mode voltages and what causes them, how to use shielding and guarding to reduce or eliminate them.

Jesse first started out by stating that the education and skill of the technician plays an important role in the overall uncertainty of a measurement that includes how to properly hookup a cal system. Knowing how to connect instruments together in a measurement or calibration process is essential to getting correct and repeatable results.

Next he talked about common mode voltages. When there is a difference of potential between the points of grounds they are common mode voltages and are said to "float". It is called common mode source because it is common to high and low ground lines. These ground loop errors can be handled by using a separate ground return. Ground loop errors caused by earth ground can cause measurement errors when the signal Lo lead is NOT isolated from ground. Jesse then talked about practical hints for grounding.

He warned to never operate equipment with the connection between grounds unconnected. Whenever possible plug all the instruments into the same receptacle. The best solution is to run a solid copper buss bar around the perimeter of the lab and ground each instrument to it. He also stated if possible, keep signal interconnections as short as possible with low resistance cable to reduce resistive and reactive impedances. He then talked about shielding, which is needed to reduce the following sources of noise: florescent lights, power lines, crt's, and high speed digital logic. Errors due to electric interference cause voltage between the high and low inputs and is referred to as normal mode voltages. If fluorescent lights are the source, you have several hundred volts at power line frequency and stray capacitance.

The Faraday Shield is used to reduce the error due to capacitance coupling. Magnetic coupling is another source of noise, and can be reduced by using two basic approaches: reduce the area of the pick up loop, reduce the area of the magnetic intensity. Finally, Jesse recapped about "Guarding Hints". Beware of confusing the label "GRD" with ground, "GRD" means guard and "GND" means Chassis or Ground.

Speaker: Ron Finstad - IRCON

Topic: Black Body and Pyrometers

The following topics were covered in this presentation: IR Theory, Black Bodies, Emissivity, and Pyrometer Basics.

Ron first reviewed IR Theory; it is a non-contact method that is used in a continuous process that measures the product not the environment. IR is radiation that is coming off a source and is dissipated when absorbed.

Next he talked about the different wavelengths.

- Red Wavelength Longer than Blue
- Infrared Wavelength Longer than Red
- IR Energy is Composed of Energy Packets called Photons
- Photons travel at the Speed of Light
- Can Be Reflected or Focused Using a Mirror or Lens
- Dissipate Heat When Absorbed
- Amount of Energy is Inversely Proportional to Wavelength
- IR is emitted by all Objects at all Wavelengths
- Increases as Temperature Increases
- Travels at the Speed of Light
- Can Be Reflected or Concentrated using Lenses

Ron then covered Black Bodies.

- Perfect Emitter
- Perfect Absorber
- Calibration Standard for All Infrared Thermometers

He then talked about Emissivity. Emissivity is the Radiance of a real object at wavelength divided by the Radiance of a blackbody at wavelength. Another way to think about Emissivity is that Emissivity is a percentage of how a real object emits energy compared to a blackbody for an example, $E = 0.8$ means the Emissivity is 80% of a blackbody.

- Emissivity of a blackbody = 1.0
- Emissivity of everything else < 1.0
- Changes with wavelength except for a graybody
- Usually does not change with temperature except with a material or surface change (e.g. - Solid to liquid, non-oxidized to oxidized)

Reports from the Regions

He discussed single color vs. two color optical pyrometers. A single color optical pyrometer has some limitations that cause measurement errors. They are as follows:

- Small objects (too small to fill the cone-of-vision).
- Dust, smoke or steam which obscures the line of sight.
- Windows in the process that get dirty and are difficult to keep clean.
- Emissivity of the product changes (due to change in alloy or surface condition).

A two-color or ratio pyrometer can operate properly even with these problems, and indicate the correct temperature. Basically, a two-color thermometer works properly as long as whatever affects one wavelength, must affect the other wavelength the same amount. Technically, we say the obstruction has to be a graybody. If this obstruction is a true graybody, then the only reason the detected ratio changes is due to a change in temperature. Every two-color thermometer has a limit as to how much signal can be reduced. This is called the reduction ratio. The reduction in signal can vary from 0% to as high as 99% of the signal and still read an accurate temperature.

Attendees:

Ackerman, Dennis	3M Corporate Metrology Laboratory
Conder, Terry	3M Corporate Metrology Laboratory
Ashburn, Dave	3M Hutchinson
Leaman, Dana	A2LA
Meza, Soby	Alliant Techsystems
Killian, Jay	Andersen Corp
Nordgren, Roger	Arrow Lab
Spinks, Harry	Boston Scientific
Kruta, Kevin	Calmetric
Mueller, Dave	Control House Inc
Bethke, Dwayne	Cummins Power Gen / Onan
Schiro, William	Cummins Power Gen / Onan
Johnson, Mitch	Donaldson
Zemaitis, Roger	Dytec Instruments
Brusso, Jim	Engel Metallurgical
O'keefe, Pat	Entherm Inc
Morse, Jesse	Fluke
Drees, Julia	Guidant
Imholte, Mike	Guidant
Roden, Larry	Guidant
Satre, Vickie	Guidant
Boyles, Steve	Honeywell
Henry, Kent	Honeywell
Finstad, Ron	Irecon
Brady, Dennis	ISI / Palen Kimball
Meyer, Gary	J & G Technology
Enke, Rod	Lockheed Martin
Schepers, Jim	Lockheed Martin
Brandenburg, Ralph	LSUSA
Willey, Jeffrey	Measurements Int'l
Bohrer, Robert	Medtronic
Burch, Doug	Medtronic
Morgan, Jeanne	Medtronic
Nowocin, Walter	Medtronic
Persell, Vickie	Medtronic
Petersen, Al	Medtronic
Scheible, Curtis	Medtronic
Grangroth, Julie	MTS
Kreitlow, Dave	MTS
Moser, Bill	MTS
Plath, Tiia	MTS
Reigel, Dave	MTS
Remer, Bob	MTS
Rust, Kevin	MTS
Degroot, Gaylord	NAPT
Evink, Doug	Palen Kimball Co
Modougall, Jane	Precision Repair & Calibration
Gomez, Jerry	Ridgewater College
Huerta, Francisco	Ridgewater College
Huerta, Tony	Ridgewater College
Jiminez, Juan	Ridgewater College
Jiminez, Moises	Ridgewater College
Nygaard, George	Ridgewater College
Oneil, Herb	Ridgewater College
Wetterstrom, Ed	Rosemount / Emerson Process
Duret, Jeff	Simco Electronics
Hudson, Nat	Smith's Medical
Amundson, Dustin	St Jude
Czech, Mike	St Jude

Demmer, Tim	St Jude
Erickson, Ron	St Jude
Jackson, Mike	St Jude
Marcotte, Kris	St Jude
Marcotte, Sue	St Jude
Martz, Gary	St Jude
Mason, Shawn	St Jude
Meysenbourg, Andrew	St Jude
Slechta, Rich	St Jude
Voelk, Bill	St Jude
Adams, Bruce	State Of Minnesota Wts & Meas
Zasadny, Mark	State Of Minnesota Wts & Meas
Dahl, Dave	Trane
Stremcha, Terry	Trane
Dolezal, Jim	United Standards
Reiter, Karl	Watlow Gordon
Hanssen, Paul	Workplace Training



November 10, 2005
 Garmin International
 Olathe, KS
 Roger Burton
 Kansas City Section Coordinator

The Fall 2005 NCSLI Kansas City section meeting was held on November 10, 2005 at Garmin International in Olathe, Kansas. Thirty people from twelve different companies were in attendance. After Roger Burton welcomed the group, John Donart gave a brief history and overview of Garmin International. After John's talk, there were three technical presentations:

Speaker: Ron Hanshaw, Honeywell FM&T
Topic: Temperature Calibration Automation

Ron overviewed automation improvements he recently implemented in the temperature calibration lab at FM&T. Ron's presentation explained the need for automation, the goals that were established for the project, and the barriers that existed. Details were given on how the processes were automated utilizing Visual Basic as the programming language. The software was designed using three basic operator screens; the worksheet input screen, the equipment input screen, and the data display screen. The project resulted in a number of accomplishments including reduced calibration time, less chance for operator data entry error, reduced variability, and the ability to calibrate multiple instruments or multiple channels on one instrument.

Speaker: Bob Graham, Sandia National Laboratories
Topic: Ensuring the Quality of Measurement Data: Four Questions Everyone Should Ask Themselves

Bob's presentation gave us four important questions to ask when making measurements. Specifically, 1) What do you measure that is important? 2) How good do the measurements have to be? 3) How do you know they are good enough? And, 4) Someday, when you need to, will you know what you measured and how? Bob discussed several real life examples and provided a sample sheet to use to document the answers to these questions. As a result of Bob's presentation, the audience was challenged to use critical thinking when answering the questions.

Speaker: Wayne Holland, Honeywell FM&T
Topic: Accurate Usage of Force Weights

Wayne's presentation highlighted the important factors to be considered when using force weights. Wayne explained the difference between mass weights and force weights, and explained the measuring units for the different measurement systems in use. The force of gravity affects the use of force weights, and three different approaches were presented to determine the local gravitational acceleration at any specific location. These methods include measurement, interpolation of the National Oceanic and Atmospheric Administration (NOAA) grid, and calculation. For anyone interested in using the NOAA grid method, the URL is <www.ngs.noaa.gov/chi-bin/grav_pdx.prd>

Following the morning's technical presentations, the group headed outside to the beautiful courtyard area for a group photo. After the group photo, everyone enjoyed a great catered lunch provided by Garmin.

Speaker: John Donart, Garmin International
Topic: GPS Overview

John explained the basic infrastructure and theory used to implement GPS technology. Several products were shown that employ GPS technology. One of the most interesting products was the nuvi™ Travel Assistant. The unit includes a GPS navigator, MP3 player, clock, calculator, and a text-speech interface for several different languages.

Speaker: Rick Blumhorst, Garmin International
Topic: Garmin's Calibration Recall System

Rick gave an overview of the calibration recall system used at Garmin, or, "How we do what we have to do with what we have to do it with". The system was developed at Garmin and utilizes Microsoft Access and Outlook to automate routine tasks. The development and structure of the database was also presented.

Speaker: Wayne Cummings, Fluke
Topic: Monitoring Your Calibration Standards in Compliance with ISO 17025

Wayne discussed the benefits of monitoring the performance of laboratory instruments, the use of control charts to analyze the data, different methods of performing intermediate checks, and how to make decisions based upon the check data. He provided examples of methods that can be used for intermediate checks and a recommended list of actions for satisfying the requirements for intermediate checks.

Following the technical presentations, we toured the Garmin facility. The tour included the calibration laboratory, the testing laboratory, a view of the production area, the product support department, and the expanded warehouse facility. Following the tour, evaluation forms were completed and a drawing was held for door prizes.

I would like to thank John Donart, Ron Hanshaw, Bob Graham, Wayne Holland, Rick Blumhorst, and Wayne Cummings for giving excellent presentations. In addition, I would like to thank Fluke and Garmin International for providing door prizes for the meeting. Lastly, Joe Robinson, John Donart, and Rick Blumhorst of Garmin deserve a special thank you for hosting the meeting and providing lunch and refreshments.

I am pleased to announce Ron Hanshaw will be our new Section Coordinator.



A bright clear day in Olathe. But you have to know that those Western Plains will be in for some blizzardy days before long.

Attendees:

- | | |
|-----------------|--|
| Gus Cannon | Aptuit |
| Scott Grubb | Aptuit |
| Doug MacClymont | DTI |
| Wayne Cummings | Fluke |
| Rick Blumhorst | Garmin |
| John Donart | Garmin |
| Don Mikulick | Garmin |
| Joe Robinson | Garmin |
| Jeff Heimbach | Garmin |
| Dennis Berger | Honeywell FM&T |
| Roger Burton | Honeywell FM&T |
| Jerry Ford | Honeywell FM&T |
| Ron Hanshaw | Honeywell FM&T |
| Wayne Holland | Honeywell FM&T |
| Ron Lidberg | Honeywell FM&T |
| Henry Maulden | Honeywell FM&T |
| Randy Randel | Honeywell FM&T |
| Ron Russell | Honeywell FM&T |
| Fred Stimpfle | Honeywell FM&T |
| Kris Dalager | Honeywell |
| Marty Hansen | Honeywell |
| Jason Hendricks | Midwest Research Institute |
| Steve Liggett | Midwest Research Institute |
| Dave Upton | Midwest Research Institute |
| Keith Wilson | Midwest Research Institute |
| Nathan Gorn | National Nuclear Security Administration |
| Bob Graham | Sandia National Laboratories |
| Hank Phillips | Sauer-Danfoss |
| Beth Karriker | Test & Measurement, Inc. |
| Bill Wilkins | Wolf Creek Nuclear Operating Corp. |



September 21, 2005
 Promega Corporation
 Fitchburg, WI
 Erin Mundt,
 Madison Section Coordinator

Our final meeting of 2005 was held on September 21, 2005 at Promega Corporation in Fitchburg, WI.

Presentations included the following:

- "Shielding and Guarding" by Jesse Morse of Fluke
- Z540 Standards Writing Committee update by Jesse Morse, NCSLI Marketing Vice President.
- Terry Condon, the Central US Vice President, gave an update on the Board of Directors meetings, NCSLI website and member delegates responsibilities and benefits.
- Ron Finstad of Ircan Inc presented "Black Body and Pyrometers."
- Dana Leaman of A2LA presented a discussion on requirements of Sections 4.4 and 4.6 of ISO 17025 and how they relate to testing and calibration laboratories.

Reports from the Regions

Prior to adjourning for the day, the new Section Coordinator, Erin Mundt, requested that all attendees fill out a survey regarding current job functions/scope, suggestions for future topics and additional personnel to invite to future meetings.

Special thanks to Jay Bucher and the Promega Metrology group for hosting the Fall 2005 meeting and providing refreshments.



The obligatory attendance pix for posterity.

Attendees:

- | | |
|-----------------|--|
| Erin Mundt | Genzyme Corporation |
| Jay Bucher | Promega Corporation (NCSLI Regional Coordinator) |
| Cori Pinchard | Promega Corporation |
| Keela Sniadach | Promega Corporation |
| Karl Wigdal | Promega Corporation |
| Ron Finstad | Ircon Inc |
| Terry Condor | 3M |
| Andy Duchaine | J.H. Metrology |
| Dana Leaman | A2LA |
| Jesse Morse | Fluke |
| Dik Balcitis | Hamilton Sundstrand Aerospace |
| Neil Willert | J.H. Metrology |
| Donald Brockman | Covance |
| John Roethke | Gala Biotech |
| Mike Boothe | Cal Lab Co |
| Don Navis | Covance |
| Doug Burgess | Northrop Grumman |
| David Stockert | Covance |



November 16, 2005
Tucker Electronics
Garland, TX
Gregg Shuman
North Texas/Oklahoma
Coordinator

Our monthly meeting, hosted by Craig Leong of Tucker Electronics was held at Tucker Electronics in Garland, Texas. The meeting opened with Mr. Jim Tucker as our keynote speaker. He also provided a short history of Tucker Electronics and how the company has grown and expanded its service offerings over the years. Tucker Electronics has been instrumental in providing the regional group with support and services, and has been very responsive to local laboratories needs.

Gregg Shuman thanked Mr. Tucker for his great opening. Gregg provided an overview of the meeting's agenda and welcomed the first presenter.

Reginald (Reg) Bale from Tektronix provided an overview of Tektronix's new AFG-3000 Arbitrary Generator. Reg began by demonstrating the market research that went into the development of a greatly needed generator to fill the void required by the test and measurement community. The unit proved to be quick and nimble in its ability to fulfill both standard and arbitrary waveform requirements at a cost that is priced to be competitive with both comparable equipment and many company's capital level requirements.

Tucker provided lunch and the meal was catered by Babe's Chicken (a unique family style restaurant in the DFW area) and was extremely tasty. Open discussions on the local choice of restaurants ensued and some very entertaining dialog was exchanged.

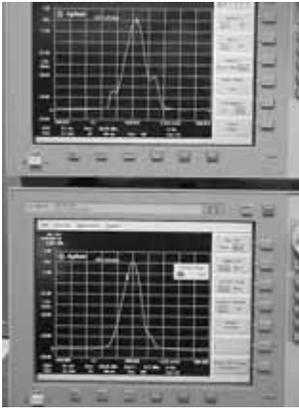
After lunch, Gregg presented the NCSLI benchmark survey results to the group. The attendees used this as an opportunity to have very candid discussion on the pros and cons of each measure and the effects on the customer's perception of services based on the data presented in the benchmark survey. The group also discussed areas they would like to see added to future surveys to better benchmark the metrology community in an internal performance enhanced level of detail.

After a short break for pictures and refreshments, Gregg presented an overview on interlaboratory comparisons. The objective of the presentation was to get the group involved in regional ILCs to prepare for accreditation and proficiency testing. This will provide valuable feedback to the calibration system performance in a more timely and cost effective approach. This will help laboratories help prepare themselves for the rigors of attaining accreditation.

The meeting concluded with an open discussion of future presentations the group would like to have scheduled. The meeting proved to be a very productive and informative meeting for all attendees. Door prizes, sponsored by Wayne Cummings of Fluke and Craig Leong of Tucker, were then awarded.



Gregg wins my prize for the most exceptionally crisp digital photos I have seen. I was also intrigued by the take-out bags that look a bit like the "goodie bags" that Academy Award Nominees get to take home with fancy watches, etc.



During Reginald Bale's presentation of Tek's new Arbitrary Waveform Generator, these scope photos were shown, interestingly displayed on an Agilent scope?

Attendees:

- | | |
|-----------------|--------------------|
| Scott Ranibolt | Bell Helicopter |
| Eddie Dooly | Bell Helicopter |
| Mguel A. Correa | Cal Labs, Inc |
| Dave Upton | E.M.A. Industrial |
| Gene Little | Entegris |
| Gary Smith | Motorola |
| Wayne Cummings | Fluke |
| Billy Curry | STPNOC |
| Jonh Criffin | STPNOC |
| Mike Berry | STPNOC |
| Keith Scoggins | STPNOC |
| Bryon Alday | TRS Rentelco |
| Reginald Bale | Tektronics |
| Craig Leong | Tucker Electronics |
| Juan Perez | Tucker Electronics |
| Gregg Shuman | Verizon |



Dec. 7, 2005
 Proteus Industries
 Mt. View, CA
 Richard Fertell
 Region 7 Coordinator

Our group met at Proteus Industries Inc. in Mountain View, CA. We passed the coordinator title to Richard, and honored or poked fun at Guy Fleming for his many years (153 years by some counts) as the Region 7 Coordinator.

Mike of Proteus gave an update of new instruments and industry applications for flow sensing.

Guy of LMTO reviewed the NCSLI WebSite and announced the February 2006 Measurement Science Conference and the August 2006 National NCSLI Conference.

John Minck, NCSLI Newsletter editor, led discussion of the NCSLI Newsletter, which he edits, and the new Measure Magazine, which will be edited by Richard Pettit. The group discussed proposals for the continuing newsletter content - Management, Kaisen Events, Fiscal, Cost Justifications and more.

Measure will be all technical. Dick has been technical program Chairman for our annual conference for some years now, so it will be a good fit. Some advertising space will be sold.

Mark of Heusser presented proposed changes to UPS 41: Balances & Scales. It is harmonized with U.S. NIST 6919, with International Standards, such as OIML R111 (see <www.OIML.org>). It also

specifies what to do and how to report measurement uncertainty - on-going chart & std dev., minimum of 32 measurements for stability over time, with two acceptable methods for determining linearity...also see <www.neweigh.com> for more information.

Larry of DH Instruments presented a new method and system for Gas Mass Flow. The method involves dynamic mass measurement with custom scale design utilizing repeated automated scale check during the flow measurements. It provides for IR temperature monitoring of the pressure vessel and corrections for outside world hose connection. Software monitors and controls the intricate process. The system will be compared with U.S. NIST Standard, which uses a different measurement principle, not the dynamic mass changes of the DHI method.

Guy of LMTO presented an overview of "Transporting M&TE and Lessons Learned." Personnel need to be routinely trained in fragile packaging and handling needs. Forming foam packaging is too hot for use directly with sensitive equipment, instead use a mockup shape to form foam until cool, then place wrapped equipment in foam. Shock and temperature monitors help record environmental journey of equipment in transport and storage, which are helpful in finding problem areas. Outsourcing calibration from calibration labs has additional expenses, packaging equipment & material & personnel at Service Center and Outside Lab, transportation service, environmental monitoring, time for travel & packaging and monitoring the additional process.

Charles of SMUD announced that the Nuclear Regulatory Commission has accepted ISO 17025 Accreditation in lieu of NRC Auditing. This new process requires applying to NRC for acceptance of Lab.

Jim of Fluke presented RF Calibration Equipment in development. Industry study showed opportunities and need to consolidate several different models and add new features.

Richard of Proteus showed three industrial cartoons on measurement fundamentals: "Why Measurement is Important & Constants of Nature vs. Artifacts," "Why Temperature Measurement is Important & ITS-1990," and "Why Liquid Flow Rate Measurement is Important & Examples of Flow Rate Primary & Secondary Standards." These 3-5 minute industrial cartoons will be placed on the <www.proteusind.com> website as part of their School of Measurement Series on Liquid Flow Rate, Temperature, Pressure and related measurements.

The series ranges from introductory level to state-of-the-art technique implementations, such as photo steps of the TPW Realization and Cost Justifications for performing this type of measurement and the related equipment. The group gave improvement suggestions as well discussed developing industrial cartoons for other measurement topics for NCSLI.

For the meeting wrap-up, we discussed: 1. keeping the meeting to a half-day (some people travel great distances), 2. meeting in April, 3. increasing membership and 4. developing local industry participation by bringing a friend from another company. We will target bio-medical, chemical, oil and automotive. Future topics to review: ISO17025-2005 by AALA, ASQ Tech Cert, Govt. App Job Classifications, ISO9001, Automation in the Laboratory, Pipette Calibration, EMC Standards and Lab Management.



Rich Fertell (front) takes over the Region 7 leadership from Guy Fleming of Lockheed-Martin (left front).

Attendees:

Charles Fallon	SMUD
Tien Nguyen	SMUD
David Bessonon	Ward/Davis
Larry Renda	DH Instruments
Victor Cleland	United Air Lines
Mike Livengood	Novo Nordisk
Rick Vasquez	Dade Behring Inc.
Marc Robinson	SMUD
Guy Fleming	LMTO
Jeff Tuthill	Novo Nordisk
Brandon Downing	Metric Test
Richard Rodds	Fluke
Jim Wookey	Fluke
Mark Ruenfenacht	Heusser
Andy Lozinski	United Air Lines
Michael Pluchar	Ward/Davis
Siraj Rajabali	United Air Lines
John Minck	Agilent
Brian Lee	Anritsu
Mike Roeder	Proteus Industries Inc.
York Xu	Proteus Industries Inc.
Richard Fertell	Proteus Industries Inc.



November 18, 2005
 Vancouver, BC, Canada
 Carol Johanson, Northwest US
 Region Coordinator
 Malcolm Smith, Western Canada
 Section Coordinator

On November 18, 2005, in Vancouver, BC we held a joint meeting between sections 1750 and 1430. This repeated our success with a similar joint meeting, November 2002. It was hoped that the option to stay the weekend in Canada would interest many of our members to make the trip. Some did, mostly from Washington State.

For the bulk of the day's material we were able to "piggy back" the temperature and pressure presentations given by Mr. Dallen Baugh from Hart Scientific and Mr. Matt Daniels from DH Instruments during the previous two days' 1750 section meetings in Alberta. For the Vancouver meeting we were able to add two further presentations - one from Mr. Jack Somppi of Fluke, "Monitoring the Performance of Laboratory Standards," and one from Mr. Dan Fitzsimmons of Boeing, "Reliability, Sampling, and Measurement Risk in the Aerospace Industry." Bernard Morris spoke on Temperature Measurement.

Our thanks to all these companies for the support they gave us and to all the attendees for their enthusiastic participation.



These combined meetings between Seattle and Vancouver seem to be quite successful.

Attendees:

Kenneth Buckner	Boeing
Derek Porter	Boeing
Steven Cart	Boeing
Mike Moore	Boeing
Vicki Dunlop	Boeing
Thomas Valenti	Boeing
Todd Fraser	Boeing
David Larson	Boeing
Liem Mai	Boeing
Jeff Dean	Boeing
Tommy Coffey	Boeing
Jagir Sidhu	QLT, Inc.
Ke Ji	QLT, Inc.
Cliff Nahm	Cascade Engineering Services Inc.
Dana Korcek	JR Labs, Inc.
Cipriano Cruz	Certispec Services, Inc.
John Atkins	Energy Northwest
Chris Szekrenyes	and 3 others Terasen Gas
Kevin Kline	and 1 other On Site Calibration Services
Mike Price	Wescan Calibration
Philip Thornhill	Wescan Calibration
Ken Nazareth	Wescan Calibration
C.C. Lai	Wescan Calibration
Brad Rudnicki	Wescan Calibration
David Yan	Photon Control
Steve Ante	Photon Control
Igor Sharuda	Photon Control
Cori Wong	Photon Control
Ondrej Mecl	Photon Control
Jan Johansen	JJ Calibrations
Carolyn Johansen	JJ Calibrations
Dianne Rake	Global Calibration Services
Carol Rake	Global Calibration Services
Bernie Baird	Global Calibration Services
Steve Koski	Global Calibration Services
Chris Fox	Global Calibration Services
Tim Fox	Global Calibration Services
Bill LeMesurier	Eustis Co.
Mike Boyd and 1 other	Crumbs Northwest
Paul Harrison	Cascade Aerospace
William Kling	Schlumberger Water Services.
Dallen Baugh	Hart Scientific
Pat Stuart	Fluke Electronics Canada
Steve Johal	Fluke Electronics Canada
Matt Daniels	DH Instruments
Ken Roberts	Cameron Instruments
Jack Somppi	Fluke Electronics
Dan Fitzsimmons	Boeing
Malcolm Smith	Wescan Calibration



Nov. 16-17, 2005
 Calgary and Edmonton
 Malcolm Smith
 Western Canada Section
 Coordinator

On November 16, 2005, in Calgary and the following day in Edmonton, we held one-day meetings, the first in many years in Alberta. Alberta is booming these days, with vast reserves of oil (oil sands) and natural gas underpinning its economy.

Driven particularly by the requirements of the energy industry, we offered two half-day "tutorials" - in the morning on temperature calibration and measurement and in the afternoon on pressure calibration and measurement.

We were extremely fortunate to get "factory" support from Hart Scientific (a Fluke company) and from DH Instruments for these meetings. Mr. Dallen Baugh from Hart Scientific gave the temperature presentations and Mr. Matt Daniels from DH Instruments gave the pressure presentations.

Both presentations were of very high quality (as one would expect) and provided great amounts of useful information to attendees.

Our thanks to both companies for the support they gave us. It'll be a hard act to follow.

Calgary, November 16, 2005



A nice turnout in Calgary, oil boomtown. Does it look like any of these folks have spent time on an oil rig?

Attendees:

Katherine Chabauty
 Thomas Rozek
 Andy Morrow
 Wayne Cincinnati
 Jim Llwellyn
 Reah Tharby
 Gail Strasser
 Darcy Mazurat
 Howard Dunbar
 Frank Johnston
 Christopher Mulders
 Dale Pillar
 James Lamb
 Tyler Gouldie
 Art Davidson
 Robert Smallwood
 Dallen Baugh
 Pat Stuart
 Garvin Stafford
 Matt Daniels
 Ken Roberts
 Stephen Kelly
 Malcolm Smith

Real Time Measurement Inc
 Real Time Measurement Inc
 Real Time Measurement Inc
 Galvanic Applied Science
 Atco Gas
 Atco Gas
 Atco Gas
 Atco Gas
 Atco Gas
 Atomic Energy of Canada
 Canadian Blood Services
 Wescan Calibration
 Spartan Controls
 Spartek
 Spartek
 Weatherford
 Hart Scientific
 Fluke Canada
 Fluke Canada
 DH Instruments
 Cameron Instruments
 Cameron Instruments
 Wescan Calibration

Edmonton, November 17, 2005



Kudos to the Western Canada organizers for this terrific turnout. I saw a recent TV report on the oil sands fields in upper Canada, and it was mind-numbing to see the scope of those operations. And they said they were making money at \$25 per barrel.

Attendees:

Brad Kirchmayer
 Darlene Cox
 Rob James
 Brent Robson
 Kevin Carter
 Barry Bolton
 Trevor Jang
 Bhisam Prasad
 Chuck Hwang
 Chris Bourgeois
 Roberto Palomino
 Jacques Goudreau
 Steve Busenius
 Ron Merkel
 Darryn Semeniuk
 Scott Jacobs
 Kelly Thornton
 Ming Chong
 Allan Chong
 Jim Wilson
 Mckinley Brewin
 Kevin Cyca
 Dallen Baugh
 Pat Stuart
 Ken Reeves
 Matt Daniels
 Ken Roberts
 Stephen Kelly
 Malcolm Smith

Atco Gas
 Atco Gas
 Atco Gas
 Atco Gas
 Atco Gas
 Atco Gas
 Syntech Enerflex
 Syntech Enerflex
 Precision Energy Services.
 Accutech Rentals, Ltd.
 Pyramid Corporation
 Pyramid Corporation
 Pyramid Corporation
 Schlumberger Canada Ltd
 Schlumberger Canada Ltd.
 Celanese Canada
 KC Quality
 KC Quality
 NRC
 NRC
 ARC
 Hart Scientific
 Fluke Canada
 Fluke Canada
 DH Instruments
 Cameron Instruments
 Cameron Instruments
 Wescan Calibration



Oct 21-22, 2005
 Bishkek, Kyrgystan
 Turdukulov Ulan
 Central Asia Coordinator
 Report from NCSL International
 Region 6000

Reported by Dr. Svetlana Zhanaidarova

NCSLI Region 6000 held its fifth meeting in conjunction with the Central Asian Cooperation on metrology, accreditation, standardization and quality (CAC MAS-Q). The meeting was dedicated to accreditation and CAC MAS-Q development perspectives. The new ILAC/IAF approach for regional bodies, which enhances opportunities for developing countries to achieve mutual recognition in the area of accreditation on a regional basis was discussed at the meeting.

Representatives the United States Agency for International Development, the International Trade Center UNTAD/WTO, the World Bank and the European Commission participated in the meeting.

Welcome Addresses:

- Prime Minister's Office of the Kyrgyz Republic - Mr. Rysmendiev Asan, Head of the Industry and Trade Department of the PM's Office.
- Ministry of Industry, Trade and Tourism (MITT) - Mrs. Janyl Tumenbaeva, Deputy Minister.
- Acting Chairman of CAC MAS-Q - Atakhanov Patidin, Director General of the National Institute for Standardards and Metrology -Kyrgyzstan

Reports CAC MAS-Q Participation in international fora:

- BIPM-ILAC Meeting, France, March 2005 - Nina Mukhamedshina, Chairman of Accreditation Committee
- ILAC/IAF General Assembly Meeting, New Zealand, Sept 2005 - Serik Kurmangaliev, Director of National Center on Accreditation of Kazakhstan.
- CAC MAS-Q Report by the Secretariat - Dr. Svetlana Zhanaidarova

Special Presentations:

Options for a Regional Body and Benefits of Accreditation - Dr. Mauricio N. Frota (former President SIM, Brazilian Metrology Society) and John Gilmour, Past Chairman ILAC.

Requirements of ILAC-IAF - John Gilmour and Dr. Mauricio N. Frota

- IAF/ILAC A1:2005 Requirements - To become an ILAC-IAF recognized Regional Group for the purpose of recognition.
- IAF/ILAC A2:2005 Requirements - To become an ILAC-IAF recognized Regional Group for evaluating single accreditation bodies for the purpose of qualifying them to sign applicable multi-lateral mutual recognition arrangements.

Requirements of ISO/IEC17011 - John Gilmour

WTO Requirements - Improving and Maintaining Market Access using the WTO Agreements on TBT and SPS (focused on conformity assessment) - Shyam Gujadhur, Senior Advisor on Export Quality Managment, ITC-Geneva.

Technical Regulation: What needs to be regulated and how to make the transition to a largely voluntary system of standards and a limiting scope on technical regulation - Colm M. Halloran, International Consultant on Technical regulation for EuroAid.

Rationalization of provision of measurement traceability through the regional approach - Dr. Mauricio N. Frota.

Svetlana Zhanaidarova read the letter from NCSL I President and was presented with recognition of translation of "Guide to Selecting Standards-Laboratory Environments Recommended Practice RP-14," and permission to distribute it among members of CAC MAS-Q for use.

Attendees:

Name	Position	Country
Atakhanov Patidin	Director of National Institute on standardization and metrology (NISM)	Kyrgyzstan
Mukhamedshina Nina	Head of department on accreditation (NISM)	Kyrgyzstan
Turdukulov Ulan	Head of metrology department (NISM)	Kyrgyzstan
Kazakbaev Eldar	Head of informational center on standards (NISM)	Kyrgyzstan

Abdulvosid Abdurakhmanov	Head of department on accreditation of test divisions Tajikstandard	Tajikistan
Rakhimov Dzhurakhon	Head of metrology department	Tajikistan
Mirsaidov Zhamshid	Head of department of inspection control Uzstandard	Uzbekistan
Mirmakhmudov Mirali	Head of department of organizing certification and regional centers Uzstandard	Uzbekistan
Kurmangaliev Serik Zhanyl Tumenbaeva	Director Ltd "National center on accreditation" Deputy Minister Ministry of Industry, Trade and Tourism (MITT)	Kazakhstan
Cliff Brown	Kyrgyz Republic Country Representative USAID	Kyrgyzstan
Lorenzo Constantino	The World Bank Office in the Kyrgyz Republic Finance and Private Sector Development	Kyrgyzstan
David Akopyan	UNCTAD/WTO ITC Chief Technical Advisor	Kyrgyzstan
Pierre-Yves Lucas	EU/TACIS	
Mauricio N. Frota	The EC Delegation Project Manager Former Director of the Brazilian Metrology Institute; PUC-Rio/Brazil	Kazakhstan
John Gilmour	Senior consultant MAS-Q program UNCTAD/WTO ITC	Brazil
Tatyana Orlova	Senior consultant UNCTAD/WTO ITC	Australia
Shyam Gujadhur	Senior consultant UNCTAD/WTO ITC	Australia
Colm M. Halloran	Senior Advisor on Export Quality Management, UNCTAD/WTO ITC	Geneva
Kelly Seibold	International Consultant on Technical regulation for EuroAid	
Irene Burns	Chief of Party, TFI/Pragma Corporation/USAID	Kazakhstan
Nursulu Ahmetova	Regional Coordinator TFI/Pragma Corporation/USAID	Kazakhstan
Fatima Toktosunova	Deputy Country Manager Trade and Customs Lawyer, TFI/Pragma Corporation/USAID	Kyrgyzstan
Zhanaidarova-Nemeroff Svetlana	Deputy Director MAS-Q Program in Center Asia/USAID/Pragma Corporation	Kyrgyzstan
Dinara Demegeneva	Translator/ USAID/ Pragma Corporation	Kazakhstan
Sanat Zhaparov	Translator/ USAID/ Pragma Corporation	Kyrgyzstan
Ramiliya Ruzieva	MAS-Q Manager TFI/Pragma Corporation/USAID	Tajikistan



International Report
Malcolm Smith, V.P.

SIM Region

Neither Steve Stahley nor I were able to attend the recent SIM General Assembly. Continuity is not being maintained, although both Steve and I did attend the SIM planning meeting in Washington DC. I have assured the SIM President that we will make extraordinary efforts, if need be, to ensure that we are represented at SIM's 2006 General Assembly.

The CENAM/NCSLI automotive road show planned for the Fall has been rescheduled for the Spring at Steve's request.

Canada's annual NCSLI meeting, normally held in the fall, has been postponed to the Spring of 2006 because of key personnel changes.

European Region

Prof Dr Czichos, EUROLAB, attended Washington Board meetings - giving substance to the association between NCSLI and EUROLAB and a direct consequence of Harry and Klaus' attendance at EUROLAB in 2004.

With the appointment of Mr. Ionel Urdea Marcus from the Romanian National Institute of Metrology as regional NCSLI coordinator for Eastern Europe (3500), we have now filled 4 of the 5 positions in Europe. Still vacant is the position for the Ireland/United Kingdom, Region 3100.

COMMITTEE NEWS

A STATUS REPORT ON ANSI/NCSL Z540 SERIES OF STANDARDS AND ANSI/ISO/IEC 17025

Jesse Morse
Bob Fritzsche

The purpose of this article is to report the status of Z540 standards activity to the NCSLI membership, and to clarify the current standing of the standards developed by the NCSLI 174 Writing Committee.

ANSI/NCSL Z540.1-1994 (R2002); "General Requirements for Calibration Laboratories and Measuring and Test Equipment."

Part I of this standard sets out the competency demonstration requirements for calibration laboratories. Part II sets out quality assurance requirements to control the accuracy of measuring and test equipment.

This standard was approved and issued in 1994, and reaffirmed by the Committee in 2002. It will continue as an American National Standard until about June 2007. It has not been replaced nor superseded by ANSI/ISO/IEC 17025: 2005 and continues to be applied by government and industry.

ANSI/NCSLI Z540.2-1997 (R2002); "U.S. Guide to the Expression of Uncertainty in Measurement."

This standard is an adoption of the ISO publication "Guide to the Expression of Uncertainty in Measurement" (GUM). Additional guidance on the topic of measurement uncertainty can be found in complementary documents which are also based on the GUM, such as NIST Technical Note 1297 "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results" and NCSL Recommended Practice RP-12, *Determining and Reporting Measurement Uncertainties*.

The Committee voted to reaffirm this document without revision in 2002. The reaffirmation will extend its life through about June 2007.

ANSI/ISO/IEC 17025: 2005; "General Requirements for the Competence of Testing and Cal Labs."

This standard specifies the competency demonstration requirements for test and calibration laboratories. Compliance with the requirements of this standard indicates that a laboratory operates a quality management system for their testing and calibration activities that also meets the principles of ISO 9001.

The original 1999 issue of this standard was revised by ISO this year to improve alignment with the ISO 9000 standards. The Committee has voted to adopt it as an American National Standard along with ASTM and ASQ. In accordance with ANSI policy, this standard will be reviewed in about 2010.

New Standard Z540.3; "Requirements for the Calibration of Measurement and Test Equipment."

The objective of the proposed standard is to establish the technical requirements for the calibration of measuring and test equipment

through the use of a system of functional components. Collectively, these components are used to manage and assure that the accuracy and reliability of the measuring and test equipment are in accordance with identified performance requirements.

In addition, this standard includes and updates the relevant calibration system requirements for measuring and test equipment described by the previous standards such as Part II of ANSI/NCSL Z540.1 (R2002) and Military Standard 45662A. It should be noted that this standard is not intended to be used as a competency demonstration of standard calibration laboratories as ANSI/ISO/IEC 17025: 2005 and Part I of ANSI/NCSL Z540.1 (R2002) serve this purpose.

A final draft of a new standard has been distributed to all of the Committee members for review and vote by Letter Ballot. The ballot will close on January 12, 2006. Committee officers and the ANSI Secretariat are working through the official accredited processes per the Committee operating procedure and ANSI policy.

ANSI requires such documents to be available to the all interested groups for comment. This notice is to alert all interested parties within NCSLI of the current action.

General information about ANSI/NCSL standards:

American National Standards have a five-year life. Prior to the end of the five years, the 174 Writing Committee must review a standard that is within the scope of its charter. Then, following proper procedure, it must decide to revise, reaffirm, or rescind it. In some cases ANSI approves an extension to give the Committee time to go through due process. That was the case with ANSI/NCSL Z540-1:1994, which went through multiple extensions.

Applicable documents become ANSI/NCSLI American National Standards after being processed by the NCSLI 174 Writing Committee. This Committee is accredited by ANSI and approved to produce standards by following very strict policies and procedures. These policies and procedures can be found on the Committee web page at <<http://www.ncsli.org/committees/174/>>. Minutes from the Committee meetings are also located there. Meetings are open and occur at each NCSLI Conference and Measurement Science Conference (MSC). All people are invited to observe the meetings.

It is important to remember that NCSLI cannot persuade or dissuade, within itself, the establishment of an American National Standard (ANS). Standards, such as ANSI/NCSL Z540-1, are written or adopted by the 174 Writing Committee representing NCSLI, but the Committee itself is accredited by ANSI as a standards developer. The committee operates under strict ANSI rules and must be comprised of a balance of members from areas of government and industry in which a published standard might be used. The Committee also operates its meetings according to "Robert's Rules" to insure appropriate parliamentary procedure is followed. All this is to be sure no one faction (even NCSLI) drives the creation or elimination of a standard. Actions are always by general consensus of the voting body, and all standards must be approved by the ANSI Board of Standards Review.

In closing, I invite you to attend our meetings as this way you can be aware of the future activities relating to standards that may affect your laboratory, business, or agency.

STANDARDS POLICY

Doug Sugg, V.P.

U.S. MEASUREMENT REQUIREMENTS

Jeff Walden

The USMRC is continuing to pursue the 2005-2009 LRP Goals and Objectives. At the August Workshop & Symposium:

1. The USMRC sponsored a panel titled "The Calibration Paradigm in the Year 2020". This was Session 2C, and was on Monday, August 8, from 2:30 PM until 4:00 PM.
2. The panel was made up of the following:
3. Panel Moderators:
 - Jeff Walden, U.S. Navy Metrology R&D Program Chair, NCSLI USMRC Committee
 - Chet Franklin, Computer Sciences Corp., Measurement Science Group, Norco Operations
4. Panel Members:
 - Carroll Brickencamp, The Pi Group
 - Marc Desrosiers, NIST
 - Mladen Jakovcic, Croatian Metrology Society
 - Dennis Swyt, NIST
 - Istvan Zoltan, Budapest Univ. of Technology & Economics
5. A tabletop display was set up in the exhibit hall for promoting the value of the USMRC, and other committees.
6. A revised survey, based in part on NIST inputs, has been developed and will be put on the NCSLI website later this year.

Committee Meeting;

- During the committee meeting it was decided that the USMRC will follow the activities of, and as much as possible participate in, NIST's USMS initiative.
- It was agreed that for the next committee meeting, at MSC, the agenda would be to explore ways in which the USMRC can be more effective.
- Improve on the tabletop display for the MSC.

Meet with us at MSC

The committee meeting at MSC will be on Wednesday, March 2, from 4:00 to 6:00 PM. The meeting agenda will include two topics. Our first topic will be a follow up of our discussion at the workshop in D.C. on the USMRC survey, and how our committee can improve on it. The second topic will be a planning discussion on how our committee can interface with NIST on the U.S. Measurement System (USMS) initiative.

The committee is always looking for new members; anyone who is interested (either in being a member or just making a contribution) can contact Jeff Walden at <Jeffrey.Walden@navy.mil>, or Chet Franklin at <cfranklin@cscnrc.com>. For more information regarding the US Measurement Requirements Committee, go to <www.ncsli.org>, click on Committees, and go to 131.

CANADIAN MEASUREMENT REQUIREMENTS

Dave Stevens

Dave Stevens stated that the Canadian Measurement Requirements Committee has been inactive.

GLOSSARY AND ACRONYMS COMMITTEE

Emil Hazarian

In aligning with Doug Sugg V.P., and BoD/Standards Policy new requirements, the Glossary Committee proposed a new charter, short and long terms objectives with refines meant to blend better into NCSLI prospective. Subject to being ratified by NCSLI/BoD, they are as follows:

Charter

Locate, obtain, evaluate, compile, and catalog listing of terms and their various definitions that are related to Measurements, Test, and Calibration. Publish and distribute a NCSLI Glossary of useful definitions.

2006 Goals and Objectives

1. Routinely revise and update existing NCSLI Glossary of Metrology-Related Terms.
2. Update the NCSLI Glossary of Metrology-Related Terms and Acronym List on the Web site
3. Analyze, select and validate new proposed terms, for submission.
4. Create a validation process system

2007-2010 Goals and Objectives

1. Reconvene Committee each year to review, and update the Glossary and Acronym List if deemed necessary.
2. Amend Charter as needed to incorporate an NCSLI Dictionary if a dictionary is deemed necessary.
3. Work with the business office to maintain the NCSLI Internet site and control access as necessary.
4. Create a base of references (see appendix), books, domestic and international standard documents and other documents for keeping update with current terms and definitions in the field of measurement, and measurement related such as statistics, quality assurance, accreditation, standardization.
5. Assure all NSCLI RPs revisions are using only VIM terms and definitions when they exist, and/or specific terms and definitions from other recognized sources.
6. Disseminate NCSLI glossary terms, definitions and acronyms by developing a suitable training lecture.
7. Resolve enquiries by providing useful information.

Also a list of desired references was drafted.

NCSLI /Glossary Committee Draft list of useful references

1. ISO Guide 30---1992 (Second edition)
"Terms and definitions used in connection with reference materials"
2. ISO Guide 2: *"General Terms and their Definitions Concerning Standardization and Related Activities"*
3. International Organization for Standardization, ISO 8402:
"Quality Management and Quality Assurance-Vocabulary," 2nd ed., Geneva, 1994

4. ANSI/ISO/ASQ Q9000: 2000, "Quality management systems - Fundamentals and Vocabulary."
5. BIPM/IEC/ISO/OIML, "International vocabulary of basic and general terms in metrology (VIM): 1993."
6. ISO/IEC 17000: "Conformity assessment - Vocabulary and general principles."
7. ISO 3534-1:1993(E/F). "Statistics - Vocabulary and Symbols Part 1: Probability and General Statistical Terms."
8. ISO 5725-1:1994(E). "Accuracy (trueness and precision) of Measurement Methods and Results-Part 1: General Principles and Definitions."
9. ISO 9000:2000. "Quality Management Systems - Fundamentals and Vocabulary."
10. ISO/IEC Guide 43-1
11. VIML brochure
12. Dictionary of Statistics
13. MacMillan, "The Dictionary of Measurement," Mike Darton and John Clark, MacMillan Publishing Co, New York, NY, 1994. ISBN:0-02-525750-1
14. "Glossary and Tables for Statistical Quality Control," Quality Press, ASQC, Milwaukee, WI 1983
15. Mettler-Toledo, "Dictionary of Weighing Terms--A practical guide to the terminology of weighing," Mettler Instrument Corporation, Box 71, Hightstown, NJ 08520

Please feel free to make any comments and suggestions, and address them to Emil Hazarian, US Navy Corona, California, at 951-273-4902 or <emil.hazariane@navy.mil>.

LEGAL METROLOGY

Val Miller

Plans for the 2006 meeting of the NCSLI Legal Metrology committee include a series of discussions detailing the Legal Metrology systems of several nations, perhaps those of the members of NAFTA. Final plans have yet to be established; however, it is thought that a discussion of this type should be of interest to a wide number of NCSLI members, and fits quite well with the theme of the 2006 NCSLI Conference.

MEASUREMENT SCIENCE & TECHNOLOGY

Richard Pettit, V.P.

AUTOMATIC TEST & CALIBRATION SYSTEMS COMMITTEE

David Seaver

Bill Kotzky, Teradyne, Inc., chaired the committee meeting in Washington, DC. The committee spent time reaffirming the mission to produce a NCSLI recommended practice (RP) dealing with the validation of software for automatic test and calibration systems (AT&CS). Using lessons learned that were presented in a paper given at the conference detailing the development of the ASQ Metrology Handbook, the committee defined the target audience and the coverage. The time frame for the production of the document will be decided at the next meeting, which will be a virtual meeting.

Another important issue discussed was the place for an uncertainty discussion or review in the document. As part of Bob Kilgore's assignment from the last meeting, he presented his review of software safety for the project.

The next step for the team will be to work with the NCSLI Business Office to secure resources to store reference material produced by the group and set up a communication process for the RP development and future virtual meetings.

MEASUREMENT COMPARISON PROGRAMS

Jim Wheeler & Al Teruel

The committee completed the updating and review of RP-15 "Recommended Practice for Interlaboratory Comparisons" and the final document has been sent to the NCSLI Board for its review and approval. Many thanks to Bob Watters, NIST, for completely updating all figures in the document and to Jeff Gust, Quametec, for providing an example ILC report for the document.

Jay Klevens, Process Instruments Inc., is developing a high resistance Interlaboratory Comparison (ILC). NIST, Gaithersburg, has agreed to provide opening and closing calibration data at a reasonable cost. The group had an organizational meeting at the 2005 NCSLI Conference.

There was an organizational meeting for anyone interested in participating in a UV Round Robin at the 2005 NCSLI Conference. Tom Larason, NIST, is very interested in starting this ILC but currently does not have the time to devote to the startup process. However, if others are interested, they can get this ILC going.

INTRINSIC & DERIVED STANDARDS

David Deaver

Yi-hua Tang, NIST, reports that all the measurements scheduled for the NCSLI Josephson Volt System ILC 2005 have been completed. The full data analysis should be done in the next few weeks. The JVC committee is working on an agreement concerning the overall data analysis. For this ILC, NIST used their new portable Josephson Volt system to monitor the transfer standards at several selected pivot laboratories. This JVS took a great effort from everyone, especially the sub-pivot labs. As a reward, all the sub-pivot labs finished with an improvement of about an order of magnitude in uncertainty for the comparison.

We also learned several good lessons about how to maintain a JVS system in satisfactory condition. We would like to thank the management of the Quantum Electrical Metrology Division at NIST for supporting this activity from the beginning to the end. The JVS ILC Organizing Committee consisted of the following five members: Dave Deaver, Fluke; Clark Hamilton, VMetrix; Harold Parks, Sandia; Yi-hua Tang, NIST; and Barry Wood, NRC.

Ruben Salazar and David Allen, Boeing, are chairing a working group that is in the process of revising the Dead Weight Pressure, RISP-4. The electronic document was re-formatted and reviewed by the NCSLI technical editor. Ruska is assisting with the development of new, updated figures. The committee is developing an uncertainty analysis for performing a cross-float calibration and updating the uncertainty analysis associated with the mass standards by considering the proper way to handle correlated uncertainties.

DIMENSIONAL METROLOGY

Jim Salisbury

One of the missions of the dimensional committee is to keep NCSLI members informed of developments in dimensional standards. The only news to report this quarter is the schedule of upcoming meetings:

- ISO TC213 (all working groups): January 10-18, 2006, in Charlotte, NC

INDUSTRIAL PROGRAMS

Roxanne Robinson, V.P.

HEALTHCARE METROLOGY

David Walters

No reported activity.

UTILITIES

Peter Buzzard

Our next meeting is in January 2006, at Phoenix; not associated with MSC

TEST EQUIPMENT ASSET MANAGEMENT

Rob Parchinski

We are working to establish the subcommittee on manufacturer specifications

AIRLINE METROLOGY

Joe Cebulski

The Airline industry is suffering major financial pains that impact committee activity. They want to establish an ILC for low pressure Hg manometers and had hoped to hold a committee meeting at Delta before the end of 2005.

AUTOMOTIVE METROLOGY

Pat Butler

The new chairman is getting acclimated. He is hosting a sectional meeting near Detroit in November 2005 and will discuss this committee's work.

SMALL BUSINESS INITIATIVE

TBD

We are seeking a new chair.

DOCUMENTARY STANDARDS APPLICATIONS

Larry E. Nielsen, V.P.

LABORATORY EVALUATION RESOURCES

TBD

Reactivation of this committee is being sought to develop a handbook to ANSI/ISO/IEC 17025:2005. The August meeting in Washington, DC included discussion of committee charter and development of a handbook for the new Z540.X standard.

LABORATORY FACILITIES

Dr. David Braudaway

The revision to RP-14, "*Recommended Practice for Selecting Standards Laboratory Environments*," is in process by the Publications Oversight committee and has completed two rounds of editing. This document should now be ready for board for review prior to the winter meeting. Work continues on a new RP on verification of laboratory environments.

Editor's Note: RP-14 was approved by the Board just before this issue went to press.

METROLOGY PRACTICES

Dr. Howard Castrup

Work continues on revision or development of RPs for calibration interval analysis, measurement decision risk analysis, SPC and Bayesian methods, metrology decision support analysis, and uncertainty analysis.

WRITING COMMITTEE

Jesse Morse

Work continues on the new "coordination draft" of the latest proposal for replacing Z540.1-1994. (See Z540 status report, page 31)

ACCREDITATION RESOURCES

James Jenkins

The latest revision to RP-9, "Calibration Laboratory Capability Documentation Guideline," completed the editorial process and was distributed to voting board members for review on September 7. This document also completed the editorial process and was distributed to voting board members for review on September 29. The August meeting in Washington, DC included discussion of plans for future projects.

Report:

Our committee has recently completed work on a document titled, "*Comparison of ANSI/ISO/IEC 17025:2000 to ANSI/ISO/IEC 17025:2005*." This document will benefit member laboratories as they transition to the new 17025 standard.

The committee will meet at Measurement Science Conference to discuss future products that will assist member laboratories either seeking or maintaining ANSI/ISO/IEC 17025 laboratory accreditation. The committee will also work on the content for the laboratory accreditation resources information page for the NCSLI website.

CALIBRATION PROCEDURES

Dale Varner

Work continues on the draft revision to RP-3, "*Calibration Procedures*."

MARKETING

Jesse Morse, V.P.

We have been working on a variety of promotional activities for NCSLI 2006.

1. Facilitated a revision of the "Member Renewal Form" and developed a cover letter to go with it to encourage members to renew promptly. The work on the new form was done by the Boulder staff.
2. Worked with the business manager and the MarCom company, have developed a poster for the Nashville conference. It went to print in October and will be included with the calendar mailing in November.
3. Worked with the business manager, Promotions Committee Chair, and the MarCom company, have developed a wall calendar including metrological events and personages. This was targeted for mailing to members in November.
4. Worked with the business manager and the MarCom company, have a new NCSLI poster in work depicting the SI chart, plus one depicting Ohms Law. These are targeted to be Q4 deliverables.
5. Worked through Seton Bennett to obtain permission for NCSLI to use posters created for NPL as NCSLI documents. This will be part of 2006 marketing deliverables - budget permitting.

CONFERENCE MANAGEMENT

Carol Hockert, V.P.

2005 National Workshop and Symposium, Washington, D.C.

Editor's Note: Considering the 2005 economic climate and that fact that the NCSLI Annual Conference is by and large organized and executed by an all-industrial volunteer group, the continued success of our meetings is extraordinary. So I consider it an honor to publish Carol's final report on the 2005 conference which recognizes in a small way all that work by all those talented people.

Conference Director: Gary Jennings did an outstanding job as conference director. He made announcements each day, participated in the International Event, and helped out wherever he was needed throughout the conference.

Secretary: Lynn Matthews did a great job of recording action items and making sure they were properly assigned to the appropriate committee member. She was also a great volunteer throughout the conference.

Exhibits: There were 154 exhibit spaces sold in Washington, which was a sellout. We also had 14 paid sponsors and 2 special services.

Guest Program: The three guest programs were well attended.

NIST Tours: NIST hosted a special tour of the AML for NMI directors. This was very well attended. Additionally, there were tours of the lab on Friday for those attendees who were interested.

Registration: A total of 1142 persons attended the conference. Of those, 519 were paid registrants, 9 were exhibitor attendees, 299 were complimentary, and 315 were exhibitors only. Additionally, we had a total of 52 visitors on Wednesday morning.

Technical Program: Dick Pettit did a superb job of putting together the technical program, which included six tracks of speakers. We had a couple of plenary sessions again this year and both sessions had a large audience. We also had translation into Spanish for the first time for one entire technical track.

Tutorials: Klaus Jaeger had another excellent turnout for the tutorials scheduled before and after the conference. There were a total of 323 participants in 19 tutorials, and we had to cancel only one of the originally scheduled 20 due to lack of interest.

Publicity: Jesse Morse and his sub-committee put together a comprehensive marketing plan and the result was a coordinated set of marketing tools which used the conference theme throughout. We look forward to even better stuff in 2006.

Finance: The bottom line is that the conference income was greater than expenses by approximately \$119,000, which falls short of the budgeted amount of \$162,150.

Best Paper: Doug Sugg oversaw the process for evaluating papers, and best paper scoring went very smoothly. The overall best paper award went to John Kitching of NIST for his paper titled, "*Chip Scale Atomic Clocks at NIST.*" Winners in other categories were: Fiona Redgrave from NPL for "*Metrology...Who Benefits and Why Should They Care?*"; Dennis Minor of NIST for "*Stabilization of SPTs for ITS-90 Calibrations*"; and Alan Steele of NRC for "*Simplifications from Simulations.*"

Awards: The Wildhack Award was presented by Dave Agy, and the winner was Dick Pettit. Other awards were presented to outstanding region and section coordinators, ILC coordinators, and committees that have completed publications; and scholarships were presented to qualifying schools.

Conference Evaluation: Terry Conder has taken on the task of restructuring the various conference evaluation forms and of making use of the data gathered. He will be giving a presentation at the board meeting on the future process for this sub-committee. This year's data has already generated a number of action items for the conference committee.

Entertainment: Our Keynote speaker was Hratch Semerjian, Deputy Director of NIST. His talk, titled "*Expanding the Frontiers of Measurement,*" focused on the new Advanced Measurement Laboratory. The speakers at lunch were Mark Hurwitz, CEO of ANSI, Greg Hahn, of Clean Comedians, and John Kitching, of NIST. Banquet entertainment was an improv comedy group called Galileo Players. Feedback from this performance was less than satisfactory. The International Event took place aboard the Nina's Dandy Riverboat on the Potomac. It sold out (214 attended) and feedback was very positive.

Door Prizes: Mike Suraci and Steve Doty organized their usual popular event for the last afternoon, displaying a varied selection of door prizes.

Photographs: Georgia Harris had her hands full trying to coordinate all of the photographers this year. We had over 3000 pictures taken during the week.

2006 Workshop and Symposium, Nashville, TN

Plans are well underway for the 2006 conference. Areas of focus right now are marketing plans, identifying the keynote speaker and the selling of sponsorships. The poster has been ordered using the theme for 2006.

EDUCATION & TRAINING

Georgia L. Harris, V.P.

TRAINING RESOURCES

TBD

Training Information Directory - Regina Reese is the working group contact for updating the Training Information Directory. Paul Hanssen and Thomas Weidemyer have been working to update information in the Directory as well. Historically, this publication provided information on training that was available throughout the metrology community (by and for everyone). It was commonly referenced as the best resource available when requests for training were received. However, once it was converted to an on-line resource, it was not updated as often, and only NCSLI members were able to add training opportunities, and it became less valuable for our members and the entire community.

With a limited amount of effort early in 2005, the directory content began growing - from 6 items to a total of 70 items (as of today). This includes the following items:

- 4 Text Books
- 50 Instructed Courses
- 6 Self-Study Courses
- 1 Video Instruction
- 9 Computer Aided Courses

Since the Training Information Directory used to be about 83 pages, in double column format, in about 8 pt font, we certainly hope that there's more training going on out there! If you or your company is an NCSLI member, you can post items yourself (get username and password from your member delegate or call the business office for assistance). If you are not an NCSLI member, please submit training items to Regina Reese at <regina.reese@us.army.mil> for posting.

Training Aids Library - Reminder to all NCSLI members - the training library is a member benefit and we are working to update it so that it is more valuable and we need your input. A number of resources were added to the library this year - a significant collection of leadership and management resources and some resources related to the ASQ/MQD Certified Calibration Technician program (a primer and a CD-ROM preparation course).

Recommendations for resources for the Library are requested! Please send input to <gharris@nist.gov>. If you have resources such as current CD-ROM courses, video tapes, text books, etc. that you would like to donate to NCSLI, please send those to Georgia Harris for evaluation (be sure to note that the intent is for the Library and provide an estimate of what you think the value is). (Send to Georgia Harris, NIST, W&M Division, MS 2600, Gaithersburg, MD 20899). Items that are not put in the Training Aids Library will be returned.

If you have significant numbers of items (e.g., more than 5 or so, or an "estate," please contact Georgia before sending items). As with the Scholarship

Sponsorship program, we are looking at ways to acknowledge receipt of donated items and their value. We are also looking for people to assist in expanding the database for the Training Aids Library to identify dates, sources, ISBN, and to write abstracts for

the items. We would also like an assessment process created for the items in the library.

Susan Dass presented an analysis of several video tapes from the Training Aids Library, identifying potential updates and target audiences at the 2005 Conference. If you are interested in being a part of any of these working groups or in being on the Training Resources committee, please contact Georgia at <gharris@nist.gov>.

PERSONNEL TRAINING & QUALIFICATIONS

Gloria Neely

The final formatted Guide for Personnel Qualifications was prepared by David Smith and should be posted soon. Gloria Neely is leading a new effort to evaluate methods for documenting on-the-job training efforts. The committee has a draft title and scope and is collecting potential references as the work to prepare an RP on this topic. There was a lot of interest expressed at the Conference committee meetings and a number of resources have already been sent to Gloria.

Title: "Recommended Practice for Documenting Metrology Education, Training, and OJT."

Abstract: This recommended practice provides a method by which metrology education, training, and on-the-job training can be documented in the metrology laboratory. The methods are designed to ensure that various aspects of training can be used to ensure compliance to the requirements of ISO/IEC 17025 and to facilitate acceptance of Metrology Education, Training, and OJT records by future employers.

Scope: This RP will focus on documenting metrology education, training, and OJT. The extent of education and training required of a technician depends on many factors including the size and measurement requirements of the laboratory. Training will likely be obtained through a combination of formal training courses and on-the-job training. In order to hone new skills, and continually stay sharp in previously certified measurement areas, the technician will most likely spend a portion of each year receiving training in various measurement areas and/or re-qualifying in specific measurement areas with a supervisor or other certified personnel with expertise in a specific area likely overseeing the OJT.

The content/output of this document will provide a method by which this education/training can be captured and preserved. Documenting this training will focus on identifying the type of training and clearly capturing this training. This RP will include various sample methods that can be used for the purpose of documenting this education/training.

If you are interested in participating in the current OJT project, please contact Gloria Neely at <gloria.neely@navy.mil>.

WORKING GROUP ON S.O.C. JOB DESCRIPTIONS

Chris Grachanen

Chris's (working group chair) paper on this topic, presented by Dilip Shah at the Conference was reprinted with some minor editing in the October Newsletter to let people know about this joint effort between ASQ/MQD and NCSLI that can have a significant impact on future position classifications and labor statistics that are available.

The final survey has been distributed to ASQ/MQD members and was circulated to all NCSLI October 5th, 2005. We expect a final report in the Fall of 2005 with input being submitted to the U.S. Department of Labor for inclusion in the Standard Occupational Classification and Occupational Outlook Handbook.

It should be noted that the results of this project can pave the way for major outreach activities to schools at all levels to advise them of the updates, available scholarships, and possible careers in metrology and calibration. A number of ideas about outreach were shared at committee meetings and sessions at the 2005 NCSLI conference.

EDUCATION LIAISON

Mark Lapinskes

Mark (chair) has updated the contact information for all of the schools on the NCSLI website. Scholarships were provided to nine schools in the total amount of \$17,900. The Scholarship Administrative Guideline was updated earlier in 2005 and was circulated to the Board prior to the October board meeting for review.

School, Amount for 2004, Amount for 2005

Butler County Community College
Butler, PA
\$3,000 \$3,000

Central Georgia Technical College
Macon, GA
\$1,000 \$2,500

Purdue University School of
Technology at New Albany
New Albany, Indiana
\$600 \$400

Ridgewater College
Hutchinson, MN
\$3,000 \$3,000

Fleming College
Peterborough, Ontario Canada
\$0.00 \$2,000

Tidewater Community College
Virginia Beach, VA
\$2,000 \$2,000

University of North Carolina at Charlotte
Charlotte, NC
\$2,000 \$2,000

University of Central FL
\$0.00 \$2,000
Orlando, FL

Sinclair Community College
Dayton, Ohio
\$0.00 \$1,000

Totals \$11,600.00 \$17,900.00

Four of these nine schools were present at the Conference to receive their scholarships and included: Herb O'Neil, Ridgewater College (MN), Tony Abel, Central Georgia Technical College (GA), Graham Cameron, Fleming College (Ontario), and Ed Morse, University of North Carolina, Charlotte (NC).

A draft AG on the Scholarship Sponsorships, and a draft brochure were circulated to the board for review. Comments have been received. Once the AG is "finalized" the brochure and contents will be worked on with Marketing/Publicity to begin implementation and collection of scholarship funds. The Scholarship Sponsorship program will provide a method for NCSLI to supplement the general scholarship program as well as the Joe D. Simmons Memorial Scholarship.

The Simmons scholarship is overseen by a committee which includes representatives from NCSLI, MSC, and ASQ/MQD. Mark Lapinskes and Georgia Harris participate in regular Scholarship Committee meetings. I have contacted Joan Casseday at ACIL (American Council of Independent Laboratories) to find out how they handle donations as a non-profit organization. NCSLI, MSC, and ASQ/MQD have all offered to provide web space and/or links for the Joe D. Simmons Memorial Scholarship. MSC has metrology scholarships as well.

Our organizations should all work together to promote the availability of scholarship funds to the larger math, science, engineering, quality, and metrology/calibration communities. We all seem to be having similar problems in getting the word out about the availability, marketing the resources, and getting qualified schools and students to apply for the funds.

We need everyone to encourage people they know to promote and apply for the scholarship funds that are available in metrology/calibration/quality. An additional project we would like to do as a part of the Education Liaison Committee includes publishing a compendium of Text Books and other "resources" currently in use in the metrology/quality programs, along with a curriculum list that includes course titles and course descriptions.

We would like the schools providing these courses to be able to compare course descriptions and classroom resources and improve through sharing. The next step would be to ask the community served by graduating students, whether the curriculum is meeting their needs. Doing either of these projects will require some volunteers to step forward to get involved. Please send your contact name/information to Mark Lapinskes at:
<Mark.Lapinskes@sypris.com>.

Additional E&T Activities

Strategic Roadmap

- The paper that was presented at the 2005 Conference has posted on NCSLI website with a request for additional comments.
- ASQ/MQD posted the draft Strategic Roadmap paper from the 2005 NCSLI conference for review and input in September and suggestions have been coming in.
- Georgia Harris and Mark Lapinskes will meet with the MSC Board of Directors in November. Doug Sugg has been paving the way for this meeting and for support for combined support from the Measurement Science Conference on the Strategic Roadmapping effort for metrology education and training.

- Georgia Harris will coordinate a panel session at the MSC in February on the Strategic Roadmapping effort to gather additional input and communicate results and ongoing activities.

Priority Item: Outreach

- As noted at the August board meeting, Outreach is the number one item on which conference attendees suggested that we focus our efforts. This was also evident during committee meetings and sessions at the conference.
- Marketing Meeting in November - Georgia Harris and Mark Lapinskes will meet with the Marketing VP, Jesse Morse, and the Publicity Committee, Jim "Smitty" Smith, and Business Manager, Craig Gulka at Southern California Edison in November to plan for immediate and strategic "marketing" and outreach efforts to support metrology education and training.

2005 Kiosk Survey & Interviews

As noted at the board meeting in August, the kiosk survey indicated the relative priority attendees thought we should focus on. The surveys also provided a significant list of items. In addition, information and ideas have been collected section meetings throughout the country, during focus group sessions, and during sessions and committee meetings at the conference. Ideas have been added to the list of possible things we could do. Carroll Brickenkamp has also been making telephone contacts with metrology training managers to gather additional insight and ideas about "what we should do." There are a number of common themes and the suggestions for what we should do that will be presented for discussion in the workshop to be held at the October board meeting.

Editor's Message (Continued from page 2)

In another move, we will remove the regular roster pages in the back of each issue, devoted to the Roster assignments, and refer the reader to the NCSLI website for the current Roster assignments. In that way, we keep up with continuing changes of our 130 volunteer assignments. In one sense, most of the value of the Roster pages is for those volunteers themselves, plus the Board, who deal with one another on a continuing basis. A formal printed Roster publication will be published and distributed to the membership in February of each year. Log on to the website, and go to the "volunteer" line along the top of the page.

A Narrative History of NCSLI



As I occasionally talk to some of our NCSLI roster volunteers, or other member delegates for one reason or another, I sometimes find that they have only been members for a few years. Typically they join up because they were invited to a regional meeting, or perhaps their senior metrology manager has retired and handed them the membership duties.

In our 40th Anniversary Year of 2001, I took the occasion of the commemorative supplement of the newsletter to prepare a four-article history of the founding of NCSLI in 1961. I intended it for the backgrounding information of those new members who may not have read or heard of our history. Jerry Hayes and John van de Houten helped out with their remembrances of the critical state of national calibration deficiencies in the Navy and military programs of the late 1950s, that they were associated with. In the now-famous measurement meeting at Boulder in 1960, the industrial and military and government attendees came to the conclusion that a national attack on the lack of a national measurement system needed to be launched.

If you recently joined NCSLI, you can request a copy of the July, 2001 Commemorative issue from the Business Office, or email me and I will send you an electronic pdf copy.

John L. Minck
Editor

NEWS FROM THE NMIs

NIST

NIST/JILA FELLOW SHARES NOBEL PRIZE IN PHYSICS

On Oct. 4, John L. (Jan) Hall of the National Institute of Standards and Technology (NIST) and the University of Colorado at Boulder and Theodor W. Hänsch of the Max-Planck-Institute of Quantum Optics, Garching and Ludwig-Maximilians-Universität, Munich, Germany, were named winners of the 2005 Nobel Prize in Physics, sharing the honor with Roy J. Glauber of Harvard University.

Hall, 71, is a scientist emeritus in the NIST Quantum Physics Division and a fellow of JILA, a joint research institution of NIST and the University of Colorado in Boulder, Colo. He was one of the founding fellows of JILA (created in 1962 as the Joint Institute for Laboratory Astrophysics), and he significantly contributed to the development of the laser, first demonstrated in 1961, from a laboratory curiosity to one of the fundamental tools of modern science and a ubiquitous component of modern communications systems.

Hall is known as a preeminent laser experimentalist, concentrating on improving the precision and accuracy with which lasers can produce a specific, sharp frequency or color of light, and the stability with which they can hold that frequency. His work has been essential to the development of the laser as a precision measurement tool. In the 1960s he worked on the development of the methane-stabilized helium-neon laser, which became the cornerstone of a famous experiment at NIST to measure the speed of light at least 100 times better than any previous determination. The work ultimately led to a fundamental redefinition of the meter, the basic unit of distance measurement.

Precise control of the frequency and improved stability have enabled a broad range of laser applications in science and technology, including precision spectroscopy for physical and chemical analysis, new tests and measurements of fundamental physical laws and constants, time and length metrology, and fiber-optic communications, among others.

Hall shares the Nobel Prize with Hänsch "for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique."

For further information and congratulatory quotes, see www.nist.gov/public_affairs/releases/2005_Nobel_Prize_Hall.htm.

NANO-SIZED CHIP FEATURES MEASURED WITH ATOM 'RULER' (NEW SRM)

Device features on computer chips as small as 40 nanometers (nm) wide—less than one-thousandth the width of a human hair—now can be measured reliably thanks to new test structures developed by a team of physicists, engineers, and statisticians at the NIST, SEMATECH

and other collaborators. The test structures are replicated on reference materials that will allow better calibration of tools that monitor the manufacturing of microprocessors and similar integrated circuits.

The new test structures are the culmination of NIST's more than four-year effort to provide standard "rulers" for measuring the narrowest linear features that can be controllably etched into a chip. The NIST rulers are precisely etched lines of crystalline silicon ranging in width from 40 nm to 275 nm. The spacing of atoms within the box-shaped silicon crystals is used like hash marks on a ruler to measure the dimensions of these test structures. Industry can use these reference materials to calibrate tools to reliably measure microprocessor-device gates, for example, which control the flow of electrical charges in chips.

"We have caught up to the semiconductor industry roadmap for linewidth reference-material dimensions with this work," says Richard Allen, one of the NIST researchers involved in the project. "With the semiconductor industry, one has to run at full speed just to keep up."

The new reference materials, configured as a 9 millimeter (mm) by 11 mm chip embedded in a silicon wafer, are now being evaluated by SEMATECH member companies. Compared to a batch of prototype test structures produced by NIST in 2001, the new reference materials offer a wider range of reference feature sizes, including some that are much narrower, and they are measured much more precisely (with uncertainties of less than 2 nm compared to 14 nm previously). In the absence of reference materials such as these, companies have calibrated measurement tools using in-house standards, which may neither be accurate nor agree with each other.

The new materials were unveiled publicly at a workshop co-sponsored by NIST and SEMATECH last March 2, in conjunction with a SPIE (International Society for Optical Engineering) meeting in San Jose, Calif.

For further information, see www.nist.gov/public_affairs/releases/atom_rulers.htm.

NEW FACILITY RECOGNIZED IN LAB DESIGN COMPETITION

The NIST and HDR Inc. accepted an award on March 22 for "high honors" in R&D Magazine's 2005 Lab of the Year competition for the Advanced Measurement Laboratory, a new facility completed last year on NIST's Gaithersburg, Md., campus. HDR provided architecture and engineering services on the project.

The \$235 million facility, regarded as the most technologically-advanced research facility of its kind in the world, was judged by a jury of representatives from the architectural, scientific and laboratory equipment communities, as well as R&D Magazine editors. Specific criteria the judges considered included siting, planning,

traffic flow, aesthetics, working conditions, lab design, opportunities for collaboration and idea exchange, energy efficiency, cost to build and cost to operate.

The AML is an essential part of NIST's mission of advancing U.S. technological competitiveness. The new facility allows NIST to provide the sophisticated measurements and standards needed by U.S. industry and the scientific community for key 21st-century technologies such as nanotechnology, semiconductors, biotechnology, advanced materials, quantum computing and advanced manufacturing. It provides NIST researchers with simultaneous tight control of temperature, humidity, acoustics and vibration, as well as excellent air cleanliness and electrical power quality. The facility was dedicated on June 21, 2004.

For further information on the AML, see <www.nist.gov/public_affairs/releases/aml_dedication.htm>.

NIST, UTAH STATE COLLABORATE ON SENSOR TECHNOLOGY

An agreement signed March 14 between the NIST and Utah State University (USU) creates a formal partnership for collaboration in the development and calibration of optical sensors for defense, homeland security, weather prediction and climate research.

The signing ceremony was hosted by Utah Senator Bob Bennett with Under Secretary of Commerce for Technology Phillip Bond, NIST Acting Director Hratch Semerjian, USU President Stan Albrecht, Utah Senator Orrin Hatch, staff from Utah Rep. Rob Bishop's office, and other NIST and USU representatives in attendance.

"NIST is signing this memorandum of understanding today because we believe that, by working together, exchanging people, and sharing resources, our institutions can spur greater progress in innovation, research and education," said Bond.

NIST and Utah State have an extensive history of collaboration in measurements and standards for optical instruments, with an emphasis on space-based applications. The Memorandum of Understanding (MOU) will enhance that partnership. The two organizations will address areas of critical technical importance for improving national security and calibrating instruments used in assessing the extent and consequences of climate change, a necessary prerequisite for developing effective environmental policies. Other potential areas of collaboration include biotechnology, nanotechnology, and computational chemistry.

For additional information, see <www.nist.gov/public_affairs/releases/nist_usu_partner.htm>.

STUDY EXAMINES MEASUREMENT OF SERVICE SECTOR R&D

The services sector in the United States-which includes everything from restaurants to telecommunications to banking-is a major driving force of the economy, generating about 80 percent of the U.S.

gross domestic product. As a result, tracking innovation in the services sector is an important indicator of future economic health.

But a new joint research project of the NIST and the National Science Foundation (NSF) found that it has become progressively more difficult to classify the research and development (R&D) that fuels innovation in the services sector. "The distinction between the manufacturing and service sectors is becoming increasingly blurred," producing important impacts on the reporting of R&D activities, write Michael Gallaher and co-authors from RTI International of Research Triangle Park, N.C.

In some cases, data collected for NSF's annual Survey of Industry Research and Development are classified as services R&D because the parent company is part of the service economy, yet the R&D described is directed at new manufactured products. In other cases, manufacturing companies are increasingly providing services and conducting service-related R&D that ends up being classified as manufacturing R&D. To improve the accuracy of the survey, the study makes a number of recommendations for improved definitions and revised wording of questions.

The study included detailed case studies from telecommunications, financial, system integration, and research, development and testing services. R&D in telecommunications, for example, might include the work required to deliver videos and other multimedia to wireless phones. In emerging areas such as biotechnology, small firms increasingly use contract research organizations (CROs) to provide complementary research services.

NIST plans to use the study results for strategic planning to identify infrastructure improvements that will help foster innovation in the technology services sector.

*M. Gallaher, A.Link, J. Petrusa, RTI International. "Measuring Service-Sector Research and Development, March 2005." Available at <<http://www.nist.gov/director/prog-ofc/report05-1.pdf>>.

NEW LOW-LEVEL 137CS CALIBRATION RANGE FOR RADIATION MEASURING INSTRUMENTS ACHIEVED

The Radiation Interactions and Dosimetry Group of the Ionizing Radiation Division maintains and disseminates the national measurement standards for air-kerma (exposure) from 60Co and 137Cs gamma-ray beams. The dissemination of the primary standard is performed via calibration of gamma-ray measuring instruments.

Researchers have extended the calibration range down to 3µGy/h, approaching environmental-dosimetry levels. The new capability is implemented using a 137Cs source and a new positioning system. Ionization chambers and gamma-ray detection instruments can be positioned precisely over distances from 60 cm to 450 cm. Data-acquisition software has been developed to interface with an electrometer, a pressure transducer, and a temperature probe. The design and operation of the 137Cs source has been upgraded to allow stability and reproducibility of the measurements. The new capability fills a need for NIST-traceable calibrations at very low radiation levels and already has been used in pilot testing of detectors during the development by the division of American National Standards

Institute performance standards for radiation and nuclear-material detectors for the Department of Homeland Security.

Contact: Ronnie Minniti, (301) 975-5586,
<ronnie.minniti@nist.gov>.

SHADOW TECHNIQUE IMPROVES MEASUREMENT OF MICRO HOLES

Sometimes seeing a shadow can be as good or better than seeing the real thing. A new measurement method* developed by researchers working at the NIST is a case in point. The method uses the shadow cast by a small glass probe to infer the dimensions of tiny, microscale holes or other micrometer-sized components. The technique may provide an improved quality control method for measuring the interior dimensions of fuel nozzles, fiber optic connectors, biomedical stents, ink jet cartridges and other precision-engineered products.

Designed to be implemented with the type of coordinate measuring machine (CMM) routinely used in precision manufacturing settings, the method uses a flexible glass fiber with a microsphere attached on one end. The glass probe is attached to the CMM's positioning system, inserted into the part to be measured, and systematically touched to the part's interior walls in multiple locations. A light-emitting diode is used to illuminate the glass fiber. While the microsphere inside the part is not visible, the shadow of the attached fiber-with a bright band of light at its center-shows the amount of deflection in the probe each time the part's interior is touched. A camera records the shadow positions. Based on prior calibration of the force required to bend the probe a specific distance, the part's dimensions can be determined with an uncertainty of about 35 nanometers (nm). The method can be used for holes as small as 100 micrometers in diameter.

"Our probe has a much smaller measurement uncertainty than other available methods and it is very cost effective to make," says Bala Muralikrishnan, a NIST guest researcher from the University of North Carolina at Charlotte.

The thin, glass fiber is about 20 millimeters long and 50 micrometers in diameter, making it especially useful for measuring relatively deep holes not easily measured with other methods. Replacement probes cost about \$100 compared to about \$1,000 for those manufactured using silicon micromachining techniques.

*B. Muralikrishnan, J.A. Stone and J. R. Stoup. "Measuring internal geometry of fiber ferrules." Presented at the SME MicroManufacturing Conference, Minneapolis, Minn., May 4-5, 2005.

Contact: Gail Porter, <gail.porter@nist.gov>, (301) 975-3392

FINDING THE TRUE MEASURE OF NANOSCALE 'ROUGHNESS'

Straight edges, good. Wavy edges, bad. This simple description holds true whether you are painting the living room or manufacturing nanoscale circuit features.

In a technical paper* published in June, researchers at the NIST and SEMATECH describe an improved method for determining nanoscale "linewidth roughness," an important quality control factor in semiconductor fabrication. Their research shows that current industry measurement methods may be exaggerating roughness of the smoothest circuit features by 40 percent or more above true values.

As circuit features shrink in size to below 50 nanometers, wavy or rough edges within semiconductor transistors may cause circuit current losses or may prevent the devices from reliably turning on and off with the same amount of voltage.

"With this type of measurement," says NIST's John Villarrubia, "besides the real roughness there is also a false roughness caused by measurement noise. Our method includes a correction to remove bias or systematic error from the measurement."

Random noise, by definition, causes the measured value to be sometimes higher, sometimes lower than the true value, and can be minimized by simply averaging an adequate number of measurements. Systematic error, however, is consistently above or consistently below the true value due to some quirk of the measurement method.

The noise in nanoscale scanning electron microscope (SEM) images consistently adds extra roughness, says Villarrubia. The NIST/SEMATECH method involves taking two or more images at exactly the same location on a circuit feature, comparing the values, and subtracting the false roughness caused by measurement noise. SEM manufacturers should be able to incorporate the new method into their proprietary software for automated linewidth roughness measurements.

* J.S. Villarrubia and B.D. Bunday, "Unbiased Estimation of Linewidth Roughness," Proceedings of SPIE 5752 (2005) pp. 480-488.

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NEW NIST METHOD IMPROVES ACCURACY OF SPECTROMETERS

Measurements of the intensity of light at different wavelengths can be made more accurately now, thanks to a new, simple method for correcting common instrument errors. The new method, developed by researchers at the NIST, will benefit fields such as color measurement, lighting development, remote sensing, biotechnology and astronomy.

The NIST method improves the measurement accuracy of spectrometers, devices that measure optical radiation at different wavelengths. Spectrometers are used widely in industrial settings and academic research to analyze the emissions from lamps or other light sources, as well as to analyze optical properties of materials. The NIST method corrects errors arising from the presence of stray light, unwanted scattered radiation within an instrument.

Stray light is often the major source of measurement uncertainty for commonly used spectrometers. It can cause unexpectedly large systematic errors, even as much as 100 percent depending upon the application, when an instrument tries to measure a very low level of

radiation at some wavelength while there are relatively high levels in other wavelength regions.

The new NIST method nearly eliminates stray light errors, to a level less than 0.001 percent of the total signal, a desirable level for most industrial and scientific applications. This allows very accurate measurement of low-power components of radiation and accurate measurements across a large dynamic range of intensities.

NIST researchers implemented and validated the method using a commercial CCD-array spectrograph, which measures light in the visible region instantly. They characterized the response to monochromatic emissions from tunable lasers that covered the instrument's full spectral range. Calculations were made using the measured data to produce a matrix that quantified the magnitude of the stray-light signal for every element (or pixel) of the detector array for every wavelength of light. The matrix then was used to correct the instrument's output signals for stray light. The method is simple and fast enough to be incorporated into an instrument's software to perform real-time stray-light corrections without much reduction in the instrument's speed.

NIST recently began offering a special calibration service to characterize spectrometers for stray light using the new method. Plans are being made to transfer the technique to industry, and a technical paper is in preparation. For further information about the calibration service, contact Yuqin Zong at <yzong@nist.gov>, or (301) 975-2332.

NEW DESIGN DEVELOPED FOR SILICON NANOWIRE TRANSISTORS

In an advance for nanoscale electronics, researchers at the NIST have demonstrated a new design for silicon nanowire transistors that both simplifies processing and allows the devices to be switched on and off more easily.

The NIST design, described in a paper published June 29 by the journal *Nanotechnology*,* uses a simplified type of contact between the nanowire channel and the positive and negative electrodes of the transistor. The design allows more electrical current to flow in and out of the silicon. The researchers believe the design is the first to demonstrate a "Schottky barrier" type contact for a nanowire transistor built using a "top-down" approach. This barrier, an easily formed metal contact that electrons can tunnel through, requires much less doping with impurities than do conventional ohmic contacts, thereby simplifying processing requirements. Schottky contacts also offer more resistance and restrict electrical flow to one direction when the transistor is off.

In the NIST transistor design, the 60-nanometer-wide channels exhibit a much greater difference in current between the on and off states than is true for larger reference channels up to 5 micrometers wide. This suggests that when a channel is scaled down to the nano regime, the ultra-narrow proportions significantly reduce the current leakage associated with defects in silicon. As a result, the transistors are less sensitive to electronic "noise" in the channel and can be turned on and off more effectively, according to the paper's lead author, Sang-Mo Koo, a NIST guest researcher.

Silicon nanowire devices have received considerable attention recently for possible use in integrated nanoscale electronics as well as for studying fundamental properties of structures and devices with very small dimensions. The NIST work overcomes some key difficulties in making reliable devices or test structures at nanoscale dimensions. The results also suggest that nanowire transistors made with conventional lithographic fabrication methods can improve performance in nanoscale electronics, while allowing industry to retain its existing silicon technology infrastructure.

*S.M. Koo, M.D. Edelstein, Q.Li, C.A. Richter and E.M. Vogel. 2005. "Silicon nanowires as enhancement-mode Schottky barrier field-effect transistors." *Nanotechnology* 16. Posted online June 29.

NEW WEB SERVICE TRACKS FOREIGN TECH REGULATIONS

Want to know about pending changes in technical regulations in Brazil, the United Kingdom, Korea or any of the 148 nations that are members of the World Trade Organization (WTO)? Then sign up for the Notify U.S. service to be unveiled July 1 by the NIST.

Notify U.S. is the successor to Export Alert!, the e-mail regulations-notification system previously offered by NIST and the International Trade Administration. This new Web-based service offers a fast, comprehensive, global perspective on proposed technical regulations and conformity assessment procedures that might influence U.S. access to export markets. Notify U.S. provides users with access to notifications and full texts of regulations issued by the WTO members. In addition, users can monitor proposed changes across chosen countries and 41 fields of industrial or technical activities, or they can select a subset of fields.

As in Export Alert!, users will receive e-mail messages informing them when proposed regulations are issued by countries or in fields of technical activity they monitor.

The new, free service is operated by NIST's National Center for Standards and Certification Information (NCSCI). NCSCI is the nation's designated Inquiry Point under the WTO Agreement on Technical Barriers to Trade. At the request of Notify U.S. users, the Center will secure the full text of a proposed regulation referenced in a notification. To learn more-and to sign up-go to the Notify U.S. Web site at <www.nist.gov/notifyus>.

NEW INFRARED TOOL MEASURES SILICON WAFER THICKNESS

In the last few years, semiconductor circuit features have shrunk to sub-100 nanometer (nm) dimensions, while the size of the thin silicon wafers that these circuits are constructed on has grown from 200 millimeters (mm) to 300 mm (about 12 inches). The payoff is a higher yield of finished devices from fewer wafers.

The tough part, however, is to make wafers substantially larger while simultaneously meeting higher quality control specifications. The optics and materials for "printing" nanoscale circuit lines require that the wafers used are perfectly flat and of uniform thick-

ness. To help the semiconductor industry meet its 2010 quality control roadmap goals, researchers at the NIST recently developed a new instrument that accurately measures differences in thickness across a 300 mm wafer with an excellent repeatability of 5 nm. The researchers hope the tool, with further refinements, will allow them to establish a new calibration service for "master wafers" used in the industry to measure wafer thickness.

The NIST researchers will describe the instrument, the Improved Infrared Interferometer, or IR3 for short, at a technical conference* in late July. Like all interferometers, the IR3 uses intersecting waves of light to create interference patterns, which in turn can be used as a ruler to measure nanoscale dimensions. While most interferometers use red laser light, the IR3 uses infrared laser light. And unlike visible light, these much longer wavelengths pass right through a silicon wafer. This means that IR3 can illuminate the top and bottom on a 300 mm wafer and produce a detailed spatial map of differences in thickness in one pass. Conventional tools require spinning the wafer and measuring at multiple locations.

The NIST researchers make precision measurements of the wafer's index of refraction—the amount that light is "bent" as it passes through the silicon—as a critical step in correctly interpreting the interference patterns. Increased precision in the refractive index measurement will be necessary before "absolute" measurements of thickness rather than relative differences will be possible with the new instrument.

*Q. Wang, U. Griesmann and R. Polvani. "Interferometric thickness calibration of 300 mm silicon wafers." ASPE Summer Topical Meeting on Precision Interferometric Metrology (July 20-22, 2005).

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NIST FINDS ROUGH SPOT IN SURFACE MEASUREMENT

For makers of computers, disk drives and other sophisticated technologies, a guiding principle is that the smoother the surfaces of chips and other components, the better these devices and the products, themselves, will function.

So, some manufacturers might be surprised to learn that a fast and increasingly popular method for measuring surface texture can yield misleading results. As reported at recent conferences and in an upcoming issue of Applied Optics,* a team of NIST researchers has found that roughness measurements made with white-light interferometric microscopes, introduced in the early 1990s, differed by as much as 80 percent from those obtained with two other surface-profiling methods.

Interferometric microscopes are used to measure surface heights, lengths and spaces by analyzing the interference patterns created by two light beams—one reflected by a reference specimen and the other by the object of interest.

To date, the team has evaluated a total of five white light instruments from three different vendors. They compared roughness measurements of gratings with both wavelike surfaces and random surfaces.

White light interferometers were compared with "phase shifting" interferometers, which use specialized single-color light sources, and with accurate, but sometimes destructive, stylus profiling instruments that trace a sharp probe over a surface. The latter two tools were in agreement across the spectrum of test samples within the expected measurement range of the phase shift interferometers. For measurements of relatively rough surfaces, white light interferometers also yielded results that corresponded closely. But for measurements of surfaces with an average roughness between 50 and 300 nanometers, results diverged significantly, peaking at about 100 nanometers.

"The discrepancy seems to be unrelated to the specific white light instrument used or to the randomness of the surface profile," explains Ted Vorburger, head of NIST's Surface and Microform Metrology Group.

The comparative study was carried out as part of an effort to develop international standards for three-dimensional measurements of surface texture. NIST researchers are now evaluating theoretical explanations for the observed discrepancies.

*H.G. Rhee, T.V. Vorburger, J.W. Lee and J. Fu, "Discrepancies between roughness measurements obtained with phase shifting interferometry and white-light interferometry." Applied Optics, 2005.

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COMPACT JILA SYSTEM STABILIZES LASER FREQUENCY

A compact, inexpensive method for stabilizing lasers that uses a new design to reduce sensitivity to vibration and gravity 100 times better than similar approaches has been demonstrated by scientists at JILA in Boulder, Colo. JILA is a joint institute of the NIST and the University of Colorado at Boulder.

The method, described in the July 15 issue of Optics Letters,* stabilizes laser light to a single frequency, so that it can be used as a reliable reference oscillator for technologies such as optical clocks and light-based radar (lidar). The new stabilizer design performs better than similar systems of comparable size and is much smaller and less expensive than the best-performing systems, according to physicist John Hall, a co-author of the paper.

Laser systems are highly sensitive to environmental disturbances, such as electronic "noise" and vibration from soft drink vending machines or other equipment with mechanical motors. To stabilize operations in cases when high precision is needed, lasers are often "locked" to a single wavelength/frequency using an optical "cavity," a small glass cylinder with a mirror facing inward on each end. Laser light bounces back and forth between the mirrors and, depending on the exact distance between them, only one wavelength will "fit" that distance best and be reinforced with each reflection. Information from this stabilized laser light is then fed back to the laser source to keep the laser locked on this one frequency. But the cavity can vibrate, or expand in response to temperature changes, causing corresponding slight frequency changes. Researchers have tried various improvements such as using cavities made of low-expansion glass.

In the latest advance, the JILA team made the cavity shorter and positioned it vertically instead of horizontally, with symmetrical mounting supports so that gravity and vibration forces yield opposing distortions in the two halves, and thus balance out to a zero net effect. The system was demonstrated with an infrared laser. "We designed the cavity so it doesn't care if it's vibrating," says Hall, who helped develop a leading resonant cavity design two decades ago. "We get good performance with a complete reduction of complexity and cost." The work was supported by the Office of Naval Research, National Aeronautics and Space Administration, National Science Foundation and NIST.

*M. Notcutt, L.S. Ma, J. Ye, and J.L. Hall. 2005. "Simple and compact 1-Hz laser system via improved mounting configuration of a reference cavity." *Optics Letters*. July 15.

Contact: Gail Porter, <gail.porter@nist.gov>, (301) 975-3392

TEMPERATURE CONTROL IMPROVES NIST X-RAY DETECTOR

Researchers at the NIST have developed an improved experimental X-ray detector that could pave the way to a new generation of wide-range, high-resolution trace chemical analysis instruments. In a recently published technical paper*, the researchers described how they used improved temperature-sensing and control systems to detect X-rays across a very broad range of energies (6 keV or more), with pinpoint energy resolution (an uncertainty of only 2 eV).

The detector's ability to distinguish between X-rays with very similar energies should be especially useful to the semiconductor industry for chemical analysis of microscopic circuit features or contaminants. Many types of high-resolution microscopes routinely used in the industry and throughout science produce detailed chemical maps by scanning a surface with electrons and then analyzing the X-rays emitted, which are characteristic of specific elements.

The NIST device, an improved version of its previous microcalorimeter X-ray detector, uses a quantum-level, transition edge sensor (TES). NIST has led development of these sensors for several years. A TES works by measuring the current across a thin metal film that is held just at the knife-edge transition temperature between a superconducting state and normal conductance. A single X-ray photon striking the detector raises the temperature enough to alter the current proportional to the energy of the photon.

TES microcalorimeters offer an unequalled combination of high resolution with detection of a broad energy range, allowing identification of many different chemical elements simultaneously. The two kinds of detectors conventionally used in X-ray microanalysis typically have a resolution of no better than 130 eV, or have a high resolution but only for a very narrow range of energies. TES sensors, however, must be kept at very low temperatures (about 97 millikelvin) for hours at a stretch to collect trace-level data. Tiny changes in temperature would cause previous versions of the instrument to "drift" over time, requiring constant recalibrations. The improved temperature control system for the new detector eliminates this problem, making the system much more practical for a broad range of applications.

*T. Jach, J.A. Small and D.E. Newbury. "Improving energy stability in the National Institute of Standards and Technology microcalorimeter X-ray detector." *Powder Diffraction* v. 20, No. 2, June 2005.

TANDEM IONS MAY LEAD THE WAY TO BETTER ATOMIC CLOCKS

NIST physicists have used the natural oscillations of two different types of charged atoms, or ions, confined together in a single trap, to produce the "ticks" that may power a future atomic clock.

As reported in the July 29, 2005, issue of *Science*,* the unusual tandem technique involves use of a single beryllium ion to accurately sense the higher-frequency vibrations of a single aluminum ion. The NIST group used ultraviolet lasers to transfer energy from the aluminum's vibrations to a shared "rocking" motion of the pair of ions, and then detected the magnitude of the vibrations through the beryllium ion. The new technique solves a long-standing problem of how to monitor the properties of an aluminum ion, which cannot be manipulated easily using standard laser techniques.

"Our experiments show that we can transfer information back and forth efficiently between different kinds of atoms. Now we are applying this technique to develop accurate optical clocks based on single ions," said Till Rosenband of NIST's Time and Frequency Division in Boulder, Colo.

The tandem approach might be used to make an atomic clock based on optical frequencies, which has the potential to be more accurate than today's microwave-based atomic clocks. It also may allow simplified designs for quantum computers, a potentially very powerful technology using the quantum properties of matter and light to represent 1s and 0s.

The work was supported in part by the Office of Naval Research and the Advanced Research and Development Activity/National Security Agency.

*P.O. Schmidt, T. Rosenband, C. Langer, W.M. Itano, J.C. Bergquist and D.J. Wineland. "Spectroscopy using quantum logic." *Science*, Vol. 309, Issue 5735, pp. 749-752 (2005).

IMPROVING SECURITY OF HANDHELD IT DEVICES

Handheld devices such as personal digital assistants are becoming indispensable tools for today's highly mobile workforce. Small and relatively inexpensive, these devices can be used for many functions, including sending and receiving e-mail, storing documents, delivering presentations and remotely accessing data.

While their small size can be an advantage, it also can be a disadvantage since handheld devices can be easier to misplace or to steal than a desktop or notebook computer. If they do fall into the wrong hands, gaining access to the information they store can be relatively easy. The NIST has recently issued two reports aimed at making it harder for unauthorized users to access information from these devices.

Proximity Beacons and Mobile Device Authentication (NISTIR 7200) describes how two different kinds of location-based authentication mechanisms that use signals from wireless beacons can be used to authenticate handheld device users. If the user is in an unauthorized location or a location outside a defined boundary, access will be denied or an additional authentication mechanism must be satisfied before gaining access.

While many organizations use smart cards for security, they require a card reader that can be nearly as large as the handheld device. Smart Cards and Mobile Device Authentication (NISTIR 7206) describes two types of smart cards that use standard interfaces supported by handheld devices, avoiding the use of more cumbersome, standard-size smart card readers.

Both reports describe these innovative authentication mechanisms and provide details on their design and implementation. The reports are available at <<http://csrc.nist.gov/publications/nistir/index.html>>.

IT PROGRAM HOPES TO FOSTER BETTER SECURITY CHECKLISTS.

Widespread electronic attacks on computer systems have become commonplace with threats ranging from remotely launched attacks on network services to malicious code spread through e-mails. To make matters worse, vulnerabilities in IT products such as operating systems are discovered almost daily. But, securing today's complex systems and products can be very complicated, arduous and time-consuming for even the most experienced system administrator. While the solutions to IT security are complex, one basic, yet effective tool is the security configuration checklist, sometimes called a lockdown or hardening guide. Basically, a checklist is a series of instructions for configuring an information technology (IT) product to a baseline or benchmark level of security.

The NIST, with sponsorship from the Department of Homeland Security (DHS), has developed a program to facilitate the development and sharing of security configuration checklists. The program helps developers make checklists that conform to common operational environments; provides guidelines for making better documented and more usable checklists; provides a managed process for reviewing, updating and maintaining checklists; and includes an easy-to-use repository of checklists.

A new NIST report, *"Security Configuration Checklists Program for IT Products-Guidance for Checklists Users and Developers,"* (NIST Special Publication 800-70) gives an overview of the NIST Checklist Program, explains how to retrieve checklists from NIST's repository and provides general information about threats and baseline technical security policies for associated operational environments. It also describes the policies, procedures and general requirements for checklist developers to participate in the program. The report and other information is available at <<http://checklists.nist.gov>>.

Quick Links

Practice Guide Describes Engineering Standards. The NIST, in cooperation with the ASM International Surface Engineering Committee, has issued a guide to published standards for the measurement and characterization of inorganic material surfaces. NIST Recommended Practice Guide: *"Surface Engineering Measurement Standards for Inorganic Materials,"* (NIST Special Publication 960-9) directs the user to appropriate standards based on material type, property of interest, and measurement or characterization method. Each summary includes a general description of the standard, the intended application, specimen requirements, type of data produced and the limits of the method. NIST SP 960-9 may be downloaded in Adobe Acrobat format at <www.msel.nist.gov/practiceguides/SP960_9.pdf>. A free print copy may be obtained by contacting Joyce Harris, (301) 975-6045, <joyce.harris@nist.gov>.

New Guide Is Timely for Radio Controlled Clocks, Watches. Got the correct time? Radio controlled clocks and watches that automatically synchronize to official U.S. time provided by the NIST have become more popular as prices drop and style choices increase. Sometimes called "atomic timepieces," these devices receive their time from NIST radio station WWVB located near Ft. Collins, CO, which is indirectly referenced to the NIST-F1 cesium fountain atomic clock in Boulder, CO. WWVB broadcasts its signal throughout the nation at 60 kilohertz to clocks and watches with miniature radio receivers tuned to that frequency.

A new booklet and accompanying Web page produced by NIST's time and frequency experts offer consumers advice on choosing the radio controlled clock or watch that best suits their needs. For those already owning a WWVB-tuned timepiece, the guide provides tips on fixing several common operating problems. For manufacturers, the document recommends best practices for clock control, synchronization methods, time-zone settings, daylight savings time practices, hardware specifications and other topics.

The brochure, WWVB Radio Controlled Clocks: Recommended Practices for Manufacturers and Consumers, may be downloaded from <<http://tf.nist.gov/timefreq/stations/radioclocks.htm>>. A print copy can be requested by phone at (303) 497-4343, or e-mail at <sp960@boulder.nist.gov>.

Draft Guidelines Released for IT Security Controls. To help federal agencies comply with the Federal Information Security Management Act (FISMA) of 2002, the National Institute of Standards and Technology (NIST) issued Special Publication 800-53, *"Recommended Security Controls for Federal Information Systems,"* in February 2005. NIST SP 800-53 provides guidance on selecting security controls for information systems in key areas such as risk assessment, contingency planning, and identification and authentication. A companion document, NIST SP 800-53A, *"Guide for Assessing the Security Controls in Federal Information Systems,"* has been drafted to help agencies take the next step: assessing the effectiveness of security controls once they are in place. NIST SP 800-53A, and instructions on how to submit comments on it, may be found at <<http://csrc.nist.gov/publications/drafts.html>>.

NIST's Manufacturing Lab Prints 2005 Program Guide. With a value-added contribution of \$1.4 trillion, U.S. manufacturing directly accounts for approximately 13 percent of the U.S. gross domestic product. The NIST's Manufacturing Engineering Laboratory (MEL) has just released its annual 2005 guide to programs serving that critical national sector. The publication summarizes MEL work in dimensional metrology, homeland and industrial control security, intelligent control of mobility systems, manufacturing interoperability, manufacturing metrology and standards for health care enterprise, mechanical metrology, nanotechnology and smart machining systems. Each program notes the resources, objectives, customer needs addressed, accomplishments, current year plans, lifetime objectives and related measurement and standards work. Special MEL activities also are reviewed, including the laboratory's role in the international Intelligent Manufacturing Systems (IMS) program, Systems Integration for Manufacturing Applications (SIMA) and the National Science and Technology Council Interagency Working Group on Manufacturing Research and Development. MEL: The Programs of the Manufacturing Engineering Laboratory 2005 (NIS-TIR 7218) is available at www.mel.nist.gov/proj/pdf/bb05web.pdf.

Progress in implementation of NIST quality systems. All NIST divisions that supply calibration services that have CMCs in the Key Comparison Database have been assessed and approved by SIM. Other NIST divisions that have calibration services that are not in the key comparison database are now in the process of having their quality systems assessed. The quality systems for the Electromagnetics and Time and Frequency Divisions will be presented for SIM approval in October. NIST is now in the process of completing the assessment of the quality systems for the Analytical Chemistry Division for SRM services and hopes to present this to SIM in October. NIST was the only SIM NMI that did not have to withdraw CMC's because its quality system had not been approved. Finally, the Measurement Services Division will have its quality system (an ISO 9000-based system) evaluated at the end of August.

VOLUNTEER ROSTER PAGES MOVE ON-LINE

Newsletter Roster



On-Line Roster



Starting with this issue, the familiar 8 or 9 pages of roster pictures in the back of each newsletter will be discontinued, and moved onto the NCSLI website. For many years these pages have offered readers a continuing sense that there were 130+ industrial volunteers working hard to make our organization successful. The names and faces were right there, staring out at you, each issue

But, time moves on, and with a relatively large turnover in those very volunteers, it seemed appropriate to move the listings to the NCSLI website, where they can be maintained with the most up-to-date appointments. It's an easy access. Just go

to the NCSLI website, look for the title on the top of the home page, "Volunteer roster," and see all those eager industrial folks listed by Board, Committee, Regional, etc. And they still have their pictures there too, although some have been to shy to furnish recent pictures.

Give it a try. And this would be a good time for us to recognize the tireless efforts of all those legions of volunteers. They make our NCSLI world go 'round.

NCSLI NEWSNOTES

CALL FOR PAPERS

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Paper, Panel, and Workshop content must relate to the Suggested Topics. Wherever appropriate, the papers should also relate to the conference theme. In all cases, they must be non-commercial and objective. Abstracts are required for all proposed Workshops, Panels, and Papers.

Due Dates Proposed Abstracts: January 9, 2006
All Manuscripts: April 24, 2006

Editor's Note: With a quarterly newsletter like this, it is difficult to sometimes find enough advance notice for deadlines. For any potential paper presenter, be aware that Technical Chairman, Dick Pettit, maintains a list of good paper presenters for use when other papers are dropped for various reasons. So even if the deadline has passed you should consider submitting your abstract.

Theoretical

- New and Improved Standards
- Measurement Uncertainties (GUM and Z540.2-1997 (R2002))
- Intrinsic and Derived Standards
- Advances in Measurement Disciplines
- Traceability Issues
- Standards & Calibrations at National Metrology Institutes

Applied

- Laboratory Automation
- Calibration Processes or Procedures
- Improvements or New Trends in Instrumentation
- Interlaboratory Comparisons
- Metrology applications in industry, government, Telecommunications, automotive, chemistry, space, and other specialized disciplines

Management/Quality

- ISO & ANSI Standards (ISO 900x, ISO/IEC 17025, ISO 17011, Z540-1, Z540-2, etc.)
- Metrology Management Information Systems
- Equipment Management
- Laboratory Accreditation and Quality Processes
- Metrology Education and Training
- National & Regional Measurement Systems

Requirements and General Information

Abstracts must be 350 words or less and be submitted electronically. Submitters must ensure that they receive confirmation of the receipt of abstract by NCSLI.

The 2005 Technical Program Chair will assemble a team to review all the abstracts and select those that are top rated for presentation at the Conference. Once abstracts are selected for the technical program, authors will be provided manuscript instructions. Deadlines must be met. Authors, who meet the manuscript deadline and review process, so that the paper is included in the Conference Proceedings CD, will receive one complimentary registration.

All abstracts and manuscripts should be electronic and submitted to the Website at <www.ncsli.org/conference/abstract/>. Authors must ensure receipt of abstracts and manuscripts by NCSLI.

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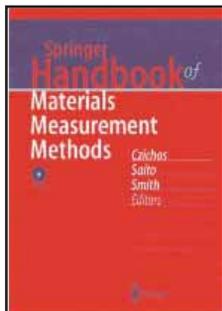
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HANDBOOK OF MATERIALS MEASUREMENT METHODS

Horst Czichos



Horst Czichos, our NCSLI Board Representative from Eurolab, is co-author of a new "*Springer Handbook of Materials Measurement Methods*." The handbook is under preparation and the editors include Horst, Tetsuya Saito of Japan and Leslie Smith of NIST. This handbook has been in development for three years. The first chapter, "Measurement Principles and Structures" is written by Andrew Wallard. The book is due spring 2006.

Since materials constitute the physical matter of all products-machines, devices, plants, commodities, means of information, communications, transport, habitation, and energy supply-materials measurements have a wide scope and impact for science and technology, economy and society. The handbook compiles advanced methods for measurements and characterization methods from the macroscopic to the nanometer scale.

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LIAISON NEWS

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Sally Bruce, Liaison Delegate

Call for Papers CORM 2006:

Light Measurement Techniques, Instrument Calibration, and Uncertainties

Industry and National Metrology Institutes
Partners in Light Measurement Problem Solving
May 9-11, 2006

Green Auditorium: NIST Gaithersburg, MD

Abstracts are now being accepted for contributed papers. The 2006 Annual CORM Technical Conference will be structured to provide interaction between the optical radiation industry and National Metrology Institutes (NMI's) such as the National Institute of Standards and Technology (NIST), National Research Council (NRC) of Canada, and National Center for Metrology (CENAM) of Mexico. The organizers invite industry to present optical radiation measurement problems and issues pertaining to the following:

1. Imaging photometry and Colorimetry
2. Spectral and photometric flux and intensity of LEDs, lamps and luminaires
3. Ultraviolet lamps
4. Detector responsivity
5. Electronic displays

An NMI representative will present available solutions, if any, or technology status, development, and ideas for improvement.

!! New to CORM 2006 !! : A question and answer period involving industry, NMI, and audience participation will be initiated to stimulate technological solutions and innovation. This is your opportunity to contribute as well as work with professionals in many different areas of metrology and optical measurements.

Presentations are not considered property of CORM and can be previously-presented material. Abstract Contributions: Please submit a one (1) page abstract by January 15, 2006 including title, author names, contact information (address, e-mail and telephone) Abstracts should be submitted by e-mail with "CORM 2006" in the subject line as a PDF or MS word file to either of the conference organizers:

Jason Chonko Email: <ljchonko@keithley.com>
or Tim Moggridge E-mail: <timm@instrumentsystems.com>

Fifth Oxford Conference on Spectrometry (Oxford V) Sunday June 25- Wednesday, June 28, 2006

Second Announcement and Call for Papers
Bushy House, National Physical Laboratory Teddington,
Middlesex UK
Co-Sponsored by: NPL ORM Club and CORM

Session Titles

1. Fluorescence, including applications of optical radiation in biotechnology

2. Appearance (and advances in colorimetry)
3. Measurement scales, uncertainty and intercomparisons
4. Fourier Transform and other advances in instrumentation and measurement

Contacts: UK: Ms. Fiona Jones (NPL) <Fiona.Jones@npl.co.uk>
US: Dr. Art Springsteen: <arts@aviantechnologies.com>
Dr. Maria Nadal: <maria.nadal@nist.gov>
Mr. David Wyble: <Wyble@cis.rit.edu>

Papers, Titles, and Abstracts should be submitted Fiona Jones and copied to Art Springsteen (email addresses above).

Deadline for Abstracts is 1 March 2006

Accommodations

Rooms have been booked at St Mary's College. There will be some minibuses for NPL staff to drive conference delegates to and from the college. There are also several hotels within the vicinity from which it is easy to reach NPL by car or public transport (a few are with walking distance). A list of these accommodations will be included with the registration instructions and in the next announcement.

CIE Symposium and Division 1 meeting May 16-17, 2006

NRC, Ottawa, Canada

2006 is the 75th Anniversary of the CIE Standard Colorimetric Observer. To celebrate the occasion, the ISCC and the CIE are hosting an Expert Symposium on the Standard Colorimetric Observer, May 16-17, 2006 at the National Research Council in Ottawa, Canada.

The goals of the Symposium are to recall the many advances that have been made since the introduction of the Standard Colorimetric Observer, to understand the current state of colorimetry and colour appearance, and to provide guidance on directions for future work.

Specific topics will include:

- Standard Colorimetric Observer - past, present, and future
- Colour matching functions
- Colour appearance
- Temporal and spatial issues in colorimetry
- Colour differences and tolerances
- Colour management
- Instruments and standards

For more information, visit the Symposium website at <<http://www.iscc.org/jubilee2006>>. Authors are invited to submit two-page extended abstracts of their proposed contributions by January 15, 2006.

MEASUREMENT SCIENCE CONFERENCE

Miguel Cerezo, Liaison Delegate

Thirty-Sixth Annual MSC Line-Up Announced

February 27 - March 3, 2006.
Disneyland Hotel,
Anaheim, CA

Measurement Science Conference (MSC) Chairman, John Fishell, recently announced the schedule for the 36th Annual Conference.

One of the key features of the MSC Conference is the excellent quality of training available to attendees. "We are glad to announce that the National Institute of Standards and Technology (NIST) will once again be joining the Conference and leading two days of seminars," said NIST Seminars/Tutorials Chairman Bob Fritzsche. "As one of the largest off-campus conferences NIST participates in, this is an outstanding opportunity for hands-on training with the global leader in measurement standards," continued Fritzsche.

The Conference will also feature three special sessions dedicated to Recommended Practice (RP) and standard revisions that were discussed at the National Conference of Standards Laboratories International (NCSLI) Conference last August. Programs Chairman Mark Kaufman said, "The RPs being discussed for revision and feedback are RPs 1, and 12, and ANSI/NCSLI standard Z540. These sessions will be an excellent opportunity for participants to get the latest status and to provide their input on the recommended revisions."

Already known for its valuable tutorials for technicians, the Conference is expecting this year's anticipated increase in attendee registration to particularly benefit exhibitors. "Our technical program is especially strong this year, and based on the feedback we've received so far, we expect increased registration of attendees. This really benefits our exhibitors who will have the opportunity to market to even more people than before, not only the people who use their products, but those who buy their products," said Fishell.

A number of leading companies and organizations in the test and measurement field have already seen this opportunity and will be at the Conference. "We have a strong line-up of exhibitors at the 2006 Conference, with major companies like Fluke, Agilent, Northrop Grumman, and the U.S. Navy," said Exhibits Chairwoman Kara Harmon. "In addition to these established exhibitors, we strongly encourage first-time exhibitors to participate by taking advantage of our special discount offers, providing an opportunity to gain recognition at the Measurement Science Conference."

"Last year, we celebrated our 35th anniversary conference and are looking forward to the next 35. We've made some exciting changes for the 2006 Conference to accommodate growth, and we're looking forward to making additional enhancements in the coming months to make this the best conference ever," said Fishell.

Further updates on the workshop schedule, NIST tutorial schedule, technical paper presentations, as well as the latest Conference updates, can all be found by logging on to the website at <www.msc-conf.com> or calling toll free 1-866-672-6327.

Events Summary: Monday-Tuesday, February 27-28, 2006

NIST Seminars (see page 11)

Wednesday, March 1, 2006

Tutorial Workshops
Exhibits

Thursday-Friday, March 2-3, 2006

Technical Paper Presentations
Award Luncheons
Exhibits

About The Measurement Science Conference

For more than 35 years, the Measurement Science Conference has been a leader in promoting education and professionalism in the measurement science disciplines. The annual conference attracts expert speakers, exhibitors, and attendees from around the world for the weeklong event focused on the dynamic measurement science field.

ASQ MEASUREMENT QUALITY DIVISION (MQD)

Chris Grachenan, Liaison Delegate

Certified Calibration Technician (CCT) Update

The next date for the CCT exam will be 03 Dec 2005. There are 159 examinees scheduled to take the test. Given previous pass rates for the CCT exam I anticipate CCT alumni will easily exceed 500 after the Dec. exam offering. Good luck to all examinees but as I've said before, luck has little to do with passing the exam.

Metrology Job Description (MJD) Initiative Update

The MJD Initiative survey has been completed with 609 folks taking the survey. Professional Examination Services (PES), administrators of the MJD Initiative, is currently compiling the survey results. The next step will be to develop short narrative job descriptions for Calibration Technician, Calibration Engineering and Metrologist based on survey results. These job descriptions will then be presented to the 163.1 Working Group on Standard Occupational Classifications for approval before submission to the U.S Dept. of Labor, Standard Occupation Classification (SOC) folks. Heartfelt thanks go out to all survey participants for taking the time to make a difference.

MQD Newsletter

The latest issue of the MQD quarterly newsletter, The Standard, is available via the MQD website at <<http://www.asq.org/measure>>. Check it out; this issue's cover is of the recently minted CCT challenge coin that will be proudly presented to all CCT alumni.

ASIA PACIFIC LABORATORY ACCREDITATION COOPERATION (APLAC)

Peter Unger, Liaison Delegate

APLAC Multilateral Mutual Recognition Arrangement

Three more signatories were added to the APLAC MRA: CAEAL, Canada for testing; BPSLAS, Philippines for testing and calibration; and EMA, Mexico for testing, calibration and inspection. The list of signatories to the APLAC MRA is available on request. The goal of recognizing at least one accreditation body before the end of 2005 which is both a member of APLAC and from a member economy of the Asia Pacific Economic Cooperation (APEC) has been successfully accomplished.

APLAC General Assembly

The annual general meeting of the Asia Pacific Laboratory Accreditation Cooperation (APLAC) took place in Chang Mai, Thailand, 14-18 November 2005.

APLAC MRA Council

The APLAC MRA Council met in Chang Mai, Thailand. Several initial evaluations and re-evaluation reports were considered.

MRA peer evaluation training on ISO/IEC 17011 was held in April 2005, with 42 lead evaluators and other APLAC members in attendance. The key changes and transition plan for ISO/IEC 17011:2004 for accreditation bodies was agreed.

There are twenty-three signatories to the APLAC MRA (23 for testing; 20 for calibration; and 10 for inspection accreditation).

APLAC Publications

APLAC documents and membership lists are available as PDF files from the APLAC web site: <www.aplac.org>.

"APLAC News Notes," published bi-monthly, is available only by electronic distribution (as a PDF) and via the APLAC web site.

APEC Funded Projects

The Asia Pacific Economic Cooperation (APEC) has funded 6 calibration and 15 testing proficiency testing programs to be run over 3 years.

Board of Management of APLAC

JoAnne Dupont was elected to the Board of Management replacing Jeffrey Horlick. The following officers serve on the APLAC Board of Management for 2006:

Chair: Tony Russell (NATA, Australia)
 Officers: JoAnne Dupont (SCC, Canada)
 Terence S S Chan (HKAS, Hong Kong)
 Katuo Seta, (IAJapan, Japan)
 Chang Kwei Fern (SAC, Singapore)
 Wei Hao (CNAL, China)

MRA Council Chair: Terence Chan (HKAS, Hong Kong)
 Immediate Past Chair: Peter Unger (A2LA, USA)

The contact details for the APLAC secretariat are:

Dr Helen Liddy, APLAC Secretary
 71-73 Flemington Road
 North Melbourne VIC 3051
 AUSTRALIA
 Telephone: +61 3 9329 1633; Facsimile: +61 3 9326 5148;

E-mail: <aplac@nata.asn.au>

The APLAC Committee Chairs are:

Proficiency Testing Mr Philip Briggs, NATA (Australia)
 Public Information Mr Ian Roy, IANZ (New Zealand)
 Technical Yoshimoto Uematsu, JNLA (Japan)
 Training Mr Wei Hao, CNAL (People's Republic of China)

Nominations Committee: Chuck Ramani (IAS, USA)

ISA INTERNATIONAL

Mike Suraci, Liaison Delegate

Walt Bajek, Past ISA President, has inquired status re/IMEKO.

I participated with Dr. David Braudaway and others in the updating of "ISA - TR52.00.01 Recommended Environments for Standards Laboratories."

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

TBD

John Kalemkerian has left ANSI. The Executive VP is working with Craig Gulka (ANSI Secretariat) to find a suitable replacement.

EUROPEAN COOPERATION FOR ACCREDITATION (EU)

TBD

The Executive VP is working with Tony Anderson to locate a suitable replacement.

ASME B89 COMMITTEE.

Dr. Jim Salisbury, Liaison Delegate

This Liaison Delegate relationship has been established as an action item assigned to Harry Moody and by vote from the ASME. Dr. Jim Salisbury has been assigned as the liaison delegate.

ACCREDITATION BODIES

Dana Leaman, Liaison Delegate

At the last BOD meeting, this liaison delegate has been renamed Accreditation Bodies Liaison Delegate. Dana Leaman contacted all accreditation bodies in the U.S. and reported the following:

- Confirmation during the recent ILAC meetings for two year implementation of ISO/IEC 17025:2005 by June 2007.
- Joint ISO-ILAC-IAF Communiqué has been published.
- Office of Nuclear Reactor Regulation approved a requested change to their Quality Assurance (QA) Program to use calibration services from organizations accredited by A2LA and NVLAP to ISO 17025.
- Boeing (MTL) now recognizes laboratories accredited by ILAC signatories for material testing services.
- ACLASS attained signatory status with NACLA.
- LAB has expanded its scope of recognition with NACLA so that there are no restrictions on the types of testing and calibration that they may accredit.

NACLA scopes of recognition are available on the NACLA website, <www.nacla.net>

INTERNATIONAL MEASUREMENT CONFEDERATION (IMEKO)

Chester Franklin, Liaison Delegate

IMEKO XVIII, World Congress:

"Metrology for a Sustainable Development,"

September 17 - 22, 2006
 Rio de Janeiro, Brazil
 (previously announced as May 7 - 12)

International Organization

As new economies emerge, NCSLI needs to be available to them by our continued participation in international organizations such as (but not limited to) EUROMET, EUROLAB and ILAC. Now that the organization of the international regions has been completed, we hope to begin conducting local meetings in our international regions.

Additionally, NCSLI supports international activities by co-sponsoring metrology conferences throughout the world.

Local Involvement:

The largest portion of NCSL International members resides in North America, and as such we need to ensure that we meet their needs. In 2006 we need to use all of the resources of NCSL International to ensure that each section regularly conducts local section meetings. These local meetings provide a wealth of information to the metrology community and are a great source of new members.

Details of how these continuing objectives are being realized through the work of the Board of Directors, the committees, region and section coordinators are contained in the 2006 Long Range Plan (LRP). The LRP is available for viewing by all NCSL International members by contacting the NCSL International business office. I am pleased to say that the 2006 LRP was completed and approved by the Board of Directors at the October 2005 Board of Directors meeting.

Recent Accomplishments

Some other activities were accomplished at the October Board of Directors meeting that tie into Past President Harry Moody's Key Initiatives. Three documents were approved for publication and distribution. They are:

- RP 9 - "*Calibration Laboratory Capability Documentation Guideline*" Revision 2005 - Approved for Publication
- RP 15 - "*Recommended Practice for Interlaboratory Comparisons*" Revision 2005 - Approved for Publication
- "*Comparison of ANSI/ISO/IEC 17025:2000 to ANSI/ISO/IEC 17025:2005*" New Publication Approved for Publication

These publications also increase deliverables to NCSL International members by providing relevant and up-to-the-minute information on their subject matter. These documents are available for download at the NCSL International website and will be part of the CD to be distributed to members shortly. Another member benefit worth men-

tioning is that the ASQ Metrology Handbook is available for sale at the NCSL International website for members at a price that is 10% less than ASQ charges for it at their bookstore!

Also accomplished at the October 2005 Board of Directors meeting was the completion and approval of the organizational budget for 2006. I am pleased to report that we have submitted a balanced budget, which is the goal of any nonprofit organization. Our total budget is \$1,489,250. The details of the budget are included in the LRP. This may seem like a great deal of money (and it is), but this is what is needed to pay for the expenses associated with the annual conference, and office staff to support NCSL International activities. It is important to remember that we are still an organization of volunteers. Each Region and Section coordinator, Committee chair, and Board Member, supported by their company, donates all time and expenses associated with their activities.

In wrapping things up, I would like to welcome new Board of Directors member Roger Burton from Honeywell as the new Vice President of the Southeastern U.S. Division. I am excited at the prospect of working with him as he will be an excellent addition to the Board of Directors.

Wildhack Nominations

Lastly, I would remind everyone that nominations for the NCSLI Wildhack award are due to Past President Harry Moody by the end of January. Please contact the NCSL International Business office for the administrative guideline for submissions. This award is the most prestigious award that we present and we need your input in nominating worthy candidates!

I look forward to serving you as the President of NCSL International for 2006 and am always available to hear your questions, comments, and/or concerns about how we can best continue "Serving the World of Measurement!"

Jeff Gust
NCSLI President

NEW NCSLI MEMBERS

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GMP Technical Solutions, LLC
 Strafford, NH 03884
 Member Delegate:
 Kevin J. Grady
 (603) 335-6790

NY/PA/NJ REGION

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 Pittsburgh, PA 15203
 Member Delegate:
 Jay Klevens

MID-WESTERN US REGION

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 Portage, IN 46368
 Member Delegate:
 Michael Lerner
 (219) 762-3165

NVFEL - U.S. EPA
 Ann Arbor, MI 48105
 Member Delegate:
 Max Miller
 (734) 214-4880

MID-ATLANTIC US REGION

ComSonics Mobile Calibration
 Harrisonburg, VA 22801
 Member Delegate:
 John W. Jacobs, Jr.
 (540) 434-5965

Precision Measurement, Inc.
 Fort Walton Beach, FL 32548
 Member Delegate:
 David A. Haines
 (850) 225-3013

SOUTHWESTERN US REGION

Precision Labs
 Irvine, CA 92618
 Member Delegate:
 Mary S. Kelly
 (949) 606-4780

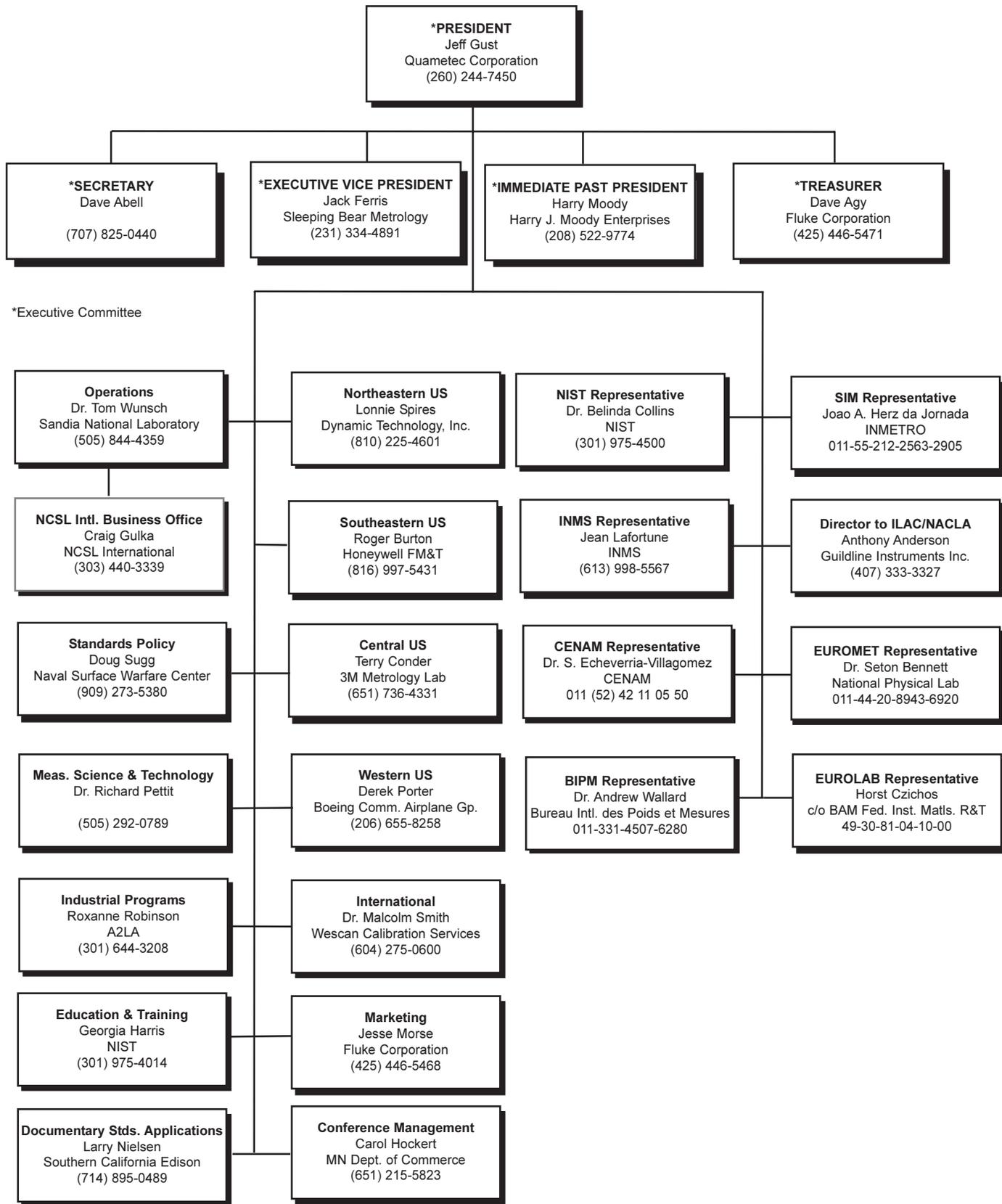
2006 NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM

August 6-10, 2005

Nashville, TN

VP/Conference Management	Carol Hockert	(651) 215-5823	FAX (651) 639-4014
2006 Conference Director	Edward Pritchard	(865) 574-4261	FAX (865) 574-2802
Minutes	Lynn Matthews	(425) 446-5530	FAX (425) 446-5992
Meeting Planner	Tom Huttemann	(252) 255-1690	FAX (252) 255-1927
Exhibits	Craig Gulka	(303) 440-3339	FAX (303) 440-3384
Registration	Joan Wilshire	(303) 440-3339	FAX (303) 440-3384
	Craig Gulka	(303) 440-3339	FAX (303) 440-3384
Technical Program	Karen Semer	(740) 788-5150	FAX (740) 788-5021
Tutorials Program	Klaus Jaeger	(408) 867-1743	FAX (408) 867-3705
Guest Program	Tom Huttemann	(252) 763-1600	FAX (252) 255-1927
Publicity/Marketing	Jesse Morse	(425) 446-5468	FAX (425) 446-5992
	Jim Smith	(714) 896-1670	FAX (714) 896-5534
Finance	Jack Ferris	(231) 334-4891	FAX (231) 334-3788
Best Paper Selection	Doug Sugg	(909) 273-5380	FAX (909) 273-5500
	Jack Somppi	(425) 446-5469	FAX (425) 446-5992
Conference Evaluation	Terry Conder	(651) 736-4331	FAX (651) 736-7325
Entertainment	Carol Hockert	(651) 215-5823	FAX (651) 639-4014
Door Prizes	Steve Doty	(951) 273-5221	FAX (951) 273-5175
Site Selection	Tony Anderson	(407) 333-3327	FAX (407) 333-3309
VP Operations	Tom Wunsch	(505) 844-4359	FAX (505) 844-7699
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PUBLICATIONS PRICE LIST

Prices effective January 2006

	Members	Non-Members
ANSI and ISO Standards:		
ANSI/NCSL Z540-1-1994 (R2002) (Calibration & Measurement & Test Equip. General Requirements)	50.00	90.00
ANSI/NCSL Z540-2-1997 (R2002) (U.S. Guide to the Expression of Uncertainty in Measurement)	85.00	110.00
ANS/ISO/IEC 17025: 2005 (General Requirements for the Competence of Testing and Cal Labs)	85.00	110.00
ISO 10012:2003 (Measurement Management Systems - Requirements for Measurement Processes and Measuring Equipment)	85.00	110.00
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Catalog of Intrinsic and Derived Standards	25.00	50.00
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LM-2 NCSLI Glossary of Metrology-Related Terms	25.00	50.00
LM-3 Guide to Achieving Laboratory Accreditation	25.00	50.00
LM-4 Calibration Laboratory Manager's Guidebook	25.00	50.00
LM-5 Companion Volume to Guide to Achieving Lab. Accred.	75.00	150.00
LM-6 Guide to Measurement Uncertainty for Calibration Laboratories - DRAFT	25.00	50.00
LM-7 Comparison Between ANSI/NCSL Z540-1-1994 (R2002) & ANS/ISO/IEC 17025: 2005	25.00	45.00
LM-8 Comparison of ANS/ISO/IEC 17025:2000 to ANS/ISO/IEC 17025:2005	25.00	45.00
LM-9 ANSI/NCSL Z540-1-1994 Handbook	80.00	160.00
LM-10 1999, 2001, 2003, or 2005 Benchmarking Survey	25.00	50.00
Metrology Reference and Textbooks		
Calibration: Philosophy in Practice (2nd Ed.)	60.00	70.00
The Metrology Handbook	85.00	95.00
Managing the Metrology System (3rd Ed.)	32.00	35.00
The Uncertainty of Measurements: Physical and Chemical Metrology Impact and Analysis	59.00	65.00
NCSLI Workshop & Symposium Proceedings:		
2005 (CD-ROM only)	250.00	400.00
Miscellaneous:		
Duplicate or Replacement Plaques (members only)	100.00	
Royal Egyptian Cubit	45.00	75.00

Payment: Please remit payment with order (in U.S. funds only). Make checks payable to: NCSL International. Purchase Orders are accepted. Or charge to your Visa, MasterCard, Discover, or American Express by phone.

Shipping: Minimum shipping & handling fee is \$8.00. Additional charges may apply.

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If your company* is a member of NCSL International, then you may subscribe to the NCSL International Publications Club for \$225 the first year and \$65 each subsequent year.

The idea of an NCSL International Publications Club and a subscription to it, is for more people in an organization that is already a member of NCSL International, to have their own copies of the many publications available through NCSL International. This will be particularly useful to large organizations.

As a subscriber, an individual would receive all the mailings of the Newsletter, ANSI Z540-1, Z540-1 Handbook, Z540-2, and 17025, other general membership publications that become available during the year, and the following CD's:

- ❖ Recommended Practices
- ❖ Recommended Intrinsic/Derived Standards Practices
- ❖ Laboratory Management Publications
- ❖ Conference Proceedings from 1990 through current

The Member Organization may also post 1 copy of NCSLI documents available electronically (with the exception of *standards*) on **one** company internal Intranet site/server. NCSL International Member Delegates will continue to receive all publications as part of their regular membership, and also official Board of Directors Ballots and selected Surveys not part of the publications club.

Annual renewal subscriptions will include all new or revised publications and four quarterly newsletters.

First year subscription rate: \$225.00 Renewal rate: \$65.00

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2006 Application for Membership in NCSL International

NCSL International is a nonprofit association of laboratories or organizations that maintain or have an interest related to measurement standards and calibration facilities. Each Member Organization appoints a "Member Delegate" who has the responsibility of representing the member company or organization in NCSL International.

Member Company or Organization (Enter name above as it is to appear on membership certificate and wall plaque)

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Title _____

Department or Division _____

Delegate's Business Mailing Address _____

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 (____)

Telephone Number _____ Extension _____ Fax Number _____

E-mail address _____

Company's URL Address _____

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 (____)

Telephone Number _____ Extension _____ Fax Number _____

E-mail address _____

Signature of Appointing Officer _____

Date _____

***The Appointing Officer is the individual from the above company who is appointing the Member Delegate, and is usually the Member Delegate's supervisor.**

- New Corporate Member Fee (Jan-Dec 2006)\$400
- New Educational Institution Member Fee (Jan-Dec 2006)\$400

New Membership above plus annual dues renewal (Advance payment is guaranteed at \$325 per year. No refund for advance payment.)

- New Member \$400 + 2007 dues \$325 = \$725
- New Member \$400 + 2007/2008 dues \$650 = \$1,050
- New Member \$400 + 2007/2008/2009 dues \$975 = \$1,375
- New Member \$400 + 2007/2008/2009/2010 dues \$1,300 = \$1,700

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BOARD OF DIRECTORS' MEETING DATES

January 16-18, 2006
Marriott San Antonio River Center
San Antonio, TX

April 24-26, 2006
NCSLI Headquarters
Boulder, CO

August 6, 11-12, 2006
Renaissance Nashville
(in conjunction with the NCSL International Workshop &
Symposium, August 6-10, 2006)

October, 2006
CENAM
Queretaro, Mexico

NEWSLETTER EDITORIAL SCHEDULE FOR 2006-07

Issue Date	In Mail	To Printer	Last Editorial to Editor
Apr 06	10 Apr. 06	15 Mar 06	1 Mar. 06
Jul. 06	10 Jul. 06	15 Jun. 06	1 Jun. 06
Oct. 06	10 Oct. 06	15 Sep. 06	1 Sep. 06
Jan 07	10 Jan. 07	15 Dec. 06	1 Dec. 06

EDITOR'S NOTE:

This schedule is for guidance for anyone who needs to submit material for publication in the Newsletter.

FUTURE CONFERENCES

2006 NCSL International Workshop & Symposium
August 6-10, 2006
Nashville, TN

2007 NCSL International Workshop & Symposium
July 29-August 2, 2007
St. Paul, MN

Abstracts are required for Workshops, Panels, and Papers. For more information contact:

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The NCSLI Vision

Promote competitiveness and success of NCSL International members by improving the quality of products and services through excellence in calibration, testing, and metrology education and training.

The NCSLI Mission

NCSL International (NCSLI) is a continuing, nonprofit corporation, oriented toward organizations involved in Metrology and related activities.

The mission of NCSL International is to advance technical and managerial excellence in the field of Metrology, Measurement Standards, Conformity Assessment, Instrument Calibration, as well as Test and Measurement, through voluntary activities aimed at improving product and service quality, productivity, and the competitiveness of member Organizations in the international marketplace.

NCSLI Volunteer Roster Moves On-Line (see page 46)

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