



MSI newsletter

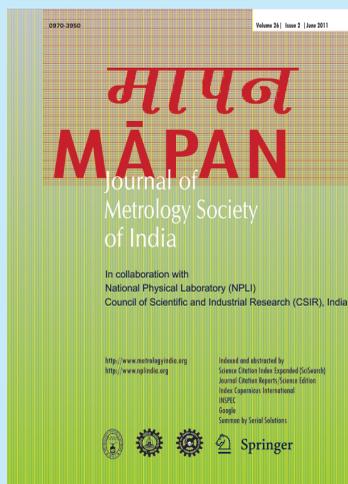
Metrology Society of India

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Highlights of this issue

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A K Bandyopadhyay p. 3



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World Metrology Day and National Technology Day, Celebrations at NPL

The Metrology Society of India (MSI) and National Physical Laboratory (NPL), Council of Scientific and Industrial Research (CSIR) celebrated World Metrology Day and National Technology Day, on May 20, 2011. Prof. R. C. Budhani, Director, NPL and President MSI, delivered the welcome address. Dr. Krishan Lal, President, Indian National Science Academy (INSA) gave a preamble on the occasion. Prof. Srikumar Banerjee, Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy (DAE), Government of India, delivered the key note address on "Chemistry and Nuclear Energy". Dr. A. K. Bandyopadhyay, Vice President, MSI proposed the vote of thanks.

Speaking on the occasion, Prof. Budhani mentioned that the Nation celebrates National Technology Day on May 11, every year to commemorate monumental Shakti experiments at Pokhran, the first flight of Hansa aircraft, the first launch of Trishul missile and overall achievements of Indian scientists and engineers in technology sector. Highlighting the role of NPL, he mentioned that NPL has rich history of strategic partnership with DAE, Indian Space Research Organisation (ISRO), and Defense Research Organisation (DRDO). The NPL provides excellent brand of metrology, science and technology of materials and has served the nation well by maintaining the primary standards, providing apex levels calibrations and spreading awareness of precision measurements and standards by running a large number of courses. He further mentioned that NPL is a well respected National Metrology Institute (NMI). Its measurement capabilities are at par with other NMIs and are even better in some areas. It is also helping economies of South Asian Association for Regional Cooperation (SAARC) nations in setting up their metrology laboratories.



(From left) Prof. R.C. Budhani, Dr. Krishan Lal and Prof. Srikumar Banerjee. Prof. Srikumar Banerjee, Chairman, Atomic Energy Commission and Secretary, DAE, GOI is inaugurating the celebrations of World Metrology Day and National Technology Day



Releasing the first MSI Newsletter, (from left) Dr. A.K. Bandyopadhyay, Dr. Krishan Lal, Dr. S. Banerjee and Prof. R.C. Budhani

The NPL already has quantum standards of length, time, DC voltage and electrical resistance. Its next objective is to have quantum standards of temperature, mass and intensity

of photon flux. Highlighting the importance of metrology in material science, he mentioned that the metrology and material science are intimately intertwined; one thrives on the strength of the other. He also highlighted the NPL's initiatives and achievements in the areas of material science, energy harvesting, radio and atmospheric sciences etc. While briefing the audiences on NPL's future programmes, he mentioned that NPL would like to have fabrication laboratories for superconducting/ 2D electron gas based devices and chips for quantum standards of DC voltage and resistance indigenously. The NPL is taking initiatives for having facilities for measuring light intensity down to single photon and measure time with an accuracy of 10^{-15} s using optical clocks.

Giving a brief background of the World Metrology Day, May 20, which marks the celebration of signing of the Metre Convention, the international treaty, Dr. Lal spoke about the historical Metre Convention and its celebrations in the form of World Metrology Day. He further highlighted the importance of CIPM mutual recognition arrangements in the area of metrology. While giving a brief history of international measurement systems and adoption of SI in India, he mentioned that it was a great vision of Pandit Nehru that made it possible to adopt SI units by an act of Parliament in India. He also highlighted the important role of NPL in MRA.

Dr. Srikumar Banerjee spoke on the topic of "Chemistry and Nuclear Energy". While mentioning the importance of Madam Curie's discovery of Po and Ra, he mentioned that this year has been declared as international year of chemistry to mark the centenary of this discovery. In his address, Dr. Banerjee highlighted the importance of accurate measurements and the important role of chemistry in nuclear energy. While talking about the discovery of nuclear fission by Enrico Fermi, he mentioned that the most important example for chemical measurement is nuclear fission. He also informed the audience on the nuclear energy programme and scientific basis of nuclear safety.

He mentioned that the energy need is growing rapidly in India and the estimated growth is growing 10 % growth. This need cannot be fulfilled by means like hydrothermal etc. If we go for achieving it by burning coal alone, we have to worry not only about coal reserve but also about Carbon Dioxide emission. Thus use of nuclear energy is essential.

The World Metrology Day poster was released on this occasion and this day also marked as the release of MSI newsletter (www.metrologyindia.org). The teams of inventors from NPL were awarded for their patents and software copyrights.



Dr. Srikumar Banerjee distributing prizes to Mr. Bijender Pal (top), Dr. Sanjay Yadav (middle) and Mr. Saood Ahmed (bottom) of NPL, on behalf of their teams for inventions / copyrights in the field of metrology

World Metrology Day Celebrations by Metrology Society of India-Southern Region Chapter (MSI-SRC)

MSI-SRC also celebrated World Metrology Day. The celebrations were held on 20th May at Solitaire Hotel, Bangalore. Shri B.R. Satyan, Director CMTI was chief guest whereas Dr. A. Radhakrishna, Joint Director, Shriram Institute of Industrial Research Bangalore; Prof. T. Venkatesh Thuppil, Principal Advisor, Quality Council of India (QCI), Bangalore; Shri. G. Devananda, Additional Director, Gas Turbine Research Establishment (GTRE), Bangalore and Shri. K.S. Shetty, Managing Director, Tespa Tools Pvt. Ltd., Chennai were the guest of honour.

Redefining Kilogram and Its Relevance to the Society

The kilogram is the only one of the seven SI units which is still defined in relation to an artifact known as international prototype of the kilogram (IPK) rather than to fundamental physical constant or an unchanging property of nature. Historically, the kilogram was originally defined as the mass of one litre of pure water at a temperature of 4 degrees Celsius and standard atmospheric pressure (for details, please refer to www.bipm.org). This definition was difficult to realize accurately, partially because the density of water depends on the pressure, temperature etc. and importantly pressure units include mass as a factor (pressure = force per unit area), introducing a circular dependency (correlated parameter) in the definition of the kilogram. To avoid these problems, the kilogram was redefined as precisely the mass of a particular standard mass of some substance which is stable in their form and which can be fabricated and designed to approximate the original definition. Since 1889, the SI system defines the unit to be equal to the mass of the international prototype of the kilogram (IPK), which is made from an alloy of platinum and iridium of 39 mm height and diameter, and kept at the Bureau International des Poids et Mesures (International Bureau of Weights and Measures) known as "Official Standard" from 1880.

Official copies of the prototype kilogram are made available as national prototypes provided that economy signs "Convention of the Meter Agreement". The Republic of India has signed the Convention of the Meter in 1957 and has been given copy no. 57 of the international prototype kilogram, which serves as its Primary Standard of Mass. The national prototype kilogram k-57 was fabricated by M/s Johnson Matthey & Co. Ltd. London in 1954, calibrated by the BIPM in June 1955 and then handed over to CSIR/National Physical Laboratory in late 1958.

It is to be mentioned here that since "BIPM Official Standard" is an artifact, by definition, the error in the repeatability of the current definition is exactly zero; however, it is found by comparing this "Official Standard" with its "Official Copies", which are made of roughly the same materials and kept under the same conditions, the mass of the "Official Standard" appears to be changing relative to the mass of its copies. The drift of the kilogram prototype together with its copies (relative to an unchanging standard) could be as large as 20×10^{-9} kg per year. The prototype and its copies appear to gain mass over time and lose mass when washed for use in comparisons. Therefore, it is difficult to state that any object in the universe that had a mass of 1 kilogram 100 years ago, and has not changed. This perspective is counter productive and defeats the purpose of a standard unit of mass, since the standard should not change arbitrarily over time.

In reference to our national standard (k-57) since its procurement and first calibration in 1955, the national prototype kilogram has been cleared and recalibrated three times by BIPM. The mass values of k-57 given by BIPM are 1 kg - 0.054 mg in 1955, 1 kg - 0.022 mg in 1985, 1 kg - 0.036 mg in 1992 and 1 kg - 0.044 mg in 2002. Thus, from the first to second calibration of

k-57, its mass value increased at the rate of $1 \mu\text{g}$ per year. From second to third calibration, it has decreased at the rate of $2 \mu\text{g}$ per year and from third to fourth calibration it has further decreased by $0.8 \mu\text{g}$ per year. The observed variations in the "Official Standard", "Official Copies", and the "National Standards" have intensified the search for a new definition of the kilogram which should be, as mentioned, realized independently. There is an ongoing effort to introduce a new definition for the kilogram by way of fundamental or atomic constants. The proposals being worked on are:



Dr. A.K. Bandyopadhyay,
Head, Apex Level
Standards and
Industrial Metrology

a) Atom-counting approaches

These include the Avogadro approach and the its accumulation approach

- The Avogadro approach attempts at defining the kilogram by a fixed count of silicon atoms. As a practical realization, a sphere will be used where the size is measured by interferometry (Fig. 1).
- The ion accumulation approach involves accumulation of gold atoms and measuring the electrical current required to neutralise them .

b) Fundamental-constant approaches

These include the Watt balance and the levitated superconductor approach

- The Watt balance uses the current balance that formerly was used to define the ampere to relate the kilogram to a value for Planck's constant, based on the definitions of the volt and the ohm (Fig. 2).
- The levitated superconductor approach relates the kilogram to electrical quantities by levitating a superconducting body in a

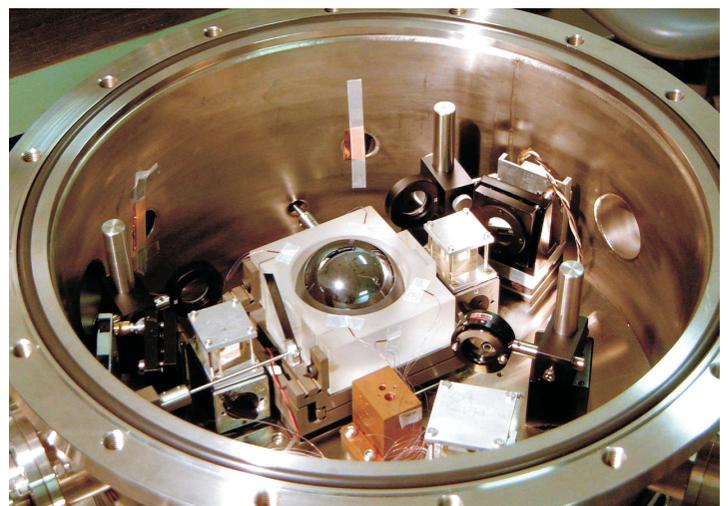


Fig. 1. Set up for Avogadro Constant at National Metrology Institute of Japan (NMIJ) [Courtesy: Dr. Kenichi Fujii of NMIJ – AdMet -2006]

magnetic field generated by a superconducting coil, and measuring the electrical current required in the coil.

Due to the limitations of the experimental apparatus, process and procedure of measurements, at this moment, the maximum relative uncertainty achieved for (i) Watt balance is about 5×10^{-8} , while for (ii) Avogadro constant from Si crystal, it is 5×10^{-7} , however, (iii) the Levitation of a superconducting body leads to 10^{-6} . On the other hand, as mentioned, the change in the "Official Standards of BIPM" is 2×10^{-8} per year. The large difference of the uncertainty in measurement of mass by different other methods in comparison to the 100 years data of the "Official Standards of BIPM", has indicated that we should go for better innovative measurements and improve the agreement till then we should not go for the redefinition of mass unit (one of conclusions of the last CCM -2011, BIPM meeting held on May 8-13, 2011).

Since mass is the base unit and it is connected with volume, density, force, pressure etc. any confusion in the definition would drastically effect the measurement science & technology, international trade and commerce. Many examples can be cited but two are mentioned: (1) in the pharmaceutical industries,

1mg (10^{-6} kg) is required to be measured for various drug components where the increase in the relative uncertainty from 2×10^{-8} to 5×10^{-8} may cost a substantial error in the measurement and results failure of drug delivery even. (2) Similarly, in the nano force measurement (10^{-9} Pa) which is very common in the atomic and subatomic level and these days they are carried out by Atomic Force Microscopy or equivalent technique, increase in the uncertainty in measurement may effect the overall performance of the instrument.

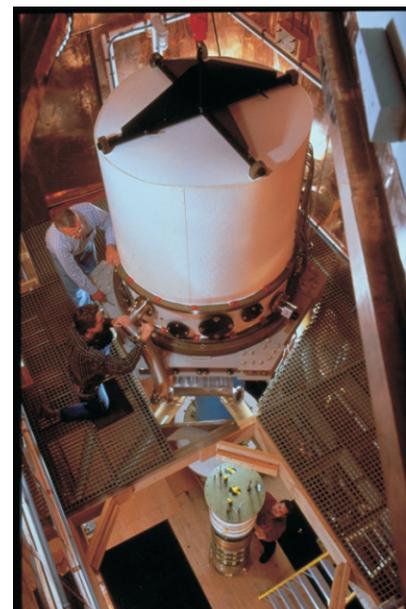


Fig. 2. Set up for Watt balance at NIST (USA) [Courtesy: Dr. William E. Anderson of NIST – AdMet-2009]

NABL Activities

World Accreditation Day Celebrations and Launch of a New program for Accreditation of Proficiency Testing (PT) Providers by (NABL)

NABL celebrated World Accreditation Day (WAD) on 9th June 2011, at Silver Oak, India Habitat Centre, New Delhi. The World Accreditation Day is a global initiative jointly established by the International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC) to raise awareness of the importance of accreditation-related activities. The theme of this year's celebrations was "How accreditation is used to support the work of Regulators". The celebration was inaugurated by Dr. T. Ramasami, Secretary Department of Science and Technology and Chairman, NABL. Inaugurating the event, he urged the regulators to further improve the quality in their operations through the use of accredited systems. The role of NMIs and their relationship with accreditation and regulators was detailed by Prof. R.C. Budhani, Director, National Physical Laboratory. Mr. V.N. Gaur, CEO, The Food Safety and Standards Authority of India emphasized on the importance of accreditation for food safety, security and related regulations. Mr. Anil Jauri, Director, National Accreditation Board for Certification Bodies (NABCB) highlighted the importance of accreditation for regulations and role of NABCB in this regard.

The NABL also added a new dimension in the area of accreditation as its new program

"Accreditation of PT Providers" which was launched by Dr. T. Ramasami, Secretary Department of Science and Technology and Chairman, NABL.

In line with the theme of celebrations, talks were delivered by regulators from Bureau of Energy Efficiency, Central Pollution



Launch of NABL's accreditation programme for PT providers (from left) Shri Anil Jauhri, Prof. R.C. Budhani, Dr. T. Ramasami, Shri V.N. Gaur and Shri Anil Relia

Control Board, Export Inspection Council, Directorate General Health Services and Bureau of Indian Standards. The speakers detailed their role and how accreditation has helped in improving the quality in implementation of their regulations.

In the second half of the day, celebrations included a guidance session on accreditation of PT providers. This session was chaired by Shri Anil Relia, Director, NABL. Shri Relia detailed the participants about the steps taken by NABL to start the program and detailed about the four documents (180 series) relevant to accreditation of PT providers.

Training Program for Mechanical Testing PT Providers

As a follow up of the earlier NABL- PTB training course held in April 2011, in which 23 assessors of various disciplines were trained to assess the potential PT providers, NABL conducted a 4-day training program for mechanical testing

laboratories in July 2011 in Delhi. This training was attended by 34 participants from various organization and the faculty was from PTB, Germany. The NABL has signed a 'Terms of Agreement (ToA)' with PTB, Germany. As a part of this ToA, PTB is providing help in training of assessors and PT providers. The next series of training programs for PT providers in the field of Chemical and Medical are scheduled to be held during September 4-8, 2011 at New Delhi and October 4-8, 2011 at Bangalore, respectively. More details on the training programs are provided in the NABL website www.nabl-india.org.

Accreditation Awareness Programs

NABL also conducted two accreditation awareness programmes for ISO 15189:2007, the criteria for accreditation of medical laboratories during May and July 2011 at Guwahati and Hyderabad respectively.

Activities and Events

Pressure Metrology Training Program

Metrology Society of India - Southern Region Chapter (MSI-SRC) organized an advanced training on pressure metrology on 13th July at Hotel Atria, Bengaluru. This training was organized, jointly with Fluke Corporation and TTL Technologies to impart the MSI members and non-members, an in depth understanding on the nuances of pressure metrology and hands on experience with High end Piston Gauges and Pressure Controllers.

Dr.Hema Khurana, the President of South chapter inaugurated the program and delivered the welcome address. Treasurer Mr. G. Nagabhushan talked about the significance of metrology in today's world. Mr. Karl Kurtz, an experienced metrologist and trainer from Fluke Corporation provided the training. Twenty metrologist from government laboratories, corporate laboratories and 3rd party private laboratories, traveled from places like Baroda, Chennai and Trivandrum to attend this event. Based on the feedback from the participants, it

was felt that the measurement uncertainty is an area where many members are looking forward to help in future.



Dr. Hema Khurana, President of MSI –SRC and Mr. Karl Kurtz from Fluke Corporation, at inauguration

News and Views

Dr. P. Banerjee Superannuates from NPL

Dr. P. Banerjee, Vice President of MSI, superannuated from NPL on 31st May 2011 after 35 years of distinguished service. Dr. Banerjee was Scientist G and was heading the Time, Frequency and Electrical standards at the time of his retirement. He had also served briefly as the Acting Director of NPL during Aug-Nov, 2009. Presently, Dr Banerjee is the Chairman, Commission-A of the International Union of Radio Science (URSI). Dr Banerjee has had an outstanding research career and his significant contributions include design and development of Time & Frequency instrumentation,

precise time synchronizations via GNSS satellites such as GPS/ GLONASS and Time scale formulations. He is the inventor of the Teleclock – the telephone time dissemination system at NPL. Dr Banerjee was a member of the seventh Indian Antarctic expedition.

To felicitate Dr. Banerjee on his superannuation, a half day scientific



Dr. P. Banerjee

workshop was organized at NPL on 20 May, 2011 afternoon. The workshop was chaired by Prof ESR Gopal, INSA Honorary Scientist, IISc, Bangalore & former Director, NPL and consisted of following four lectures by eminent scientists.

- Prof Ashish Das Gupta, Institute of Radio Physics and Electronics, Kolkata spoke on “Effect of Ionospheric Scintillations on GPS Accuracy”.
- Prof. Subramaniam Ananthkrishnan, Dept of Electronic Science, Pune University, Pune (formerly with GMRT, TIFR, Pune) talked about “Radio Astronomical Observations and the Importance of Timing”.
- A Lecture on “Theory of Trapped Ion Frequency Standards” was delivered by Prof Bhanu P Das, Indian Institute of Astrophysics, Bangalore, and
- Prof Rupamanjari Ghosh, School of Physical Sciences, JNU spoke on “Bulk Quantum Mechanics at Room Temperature Optical Slowing Down”.

The participants appreciated the workshop and said that it



Prof. B.P. Das, Prof. E.S.R. Gopal, Prof. R. Ghosh, Prof. R.C. Budhani, Dr. P. Banerjee, Prof. S. Ananthkrishnan, Prof. A. Das Gupta and Dr. A. Sen Gupta (from left) at the seminar

was very useful as all the topics discussed were current topics in the field.

Participation of the National Physical Laboratory in the 13th CCM Meeting from 9th to 13th May, 2011 at BIPM, Paris, France

The establishment of the Comite Consultatif pour la Masse et Grandeur Apparentee (CCM) originates from the resolution 3 of 25th General Conference of Weights and Measures (CGPM) held in 1975. The CGPM asked the International Bureau of Weights and Measures (BIPM) and National Laboratories to continue research to improve the precision of the comparisons of mass standards and instructed BIPM to organize a verification of the national mass standards. Since the first meeting in 1981, the CCM has formally met twelve times at the BIPM, Paris after an interval of nearly two to three years. The scope of the CCM was remarkably expanded from only the mass to mass and related quantities. Eight different Working Groups (WGs) were created. These 8 WGs are (1) Density, (2) Mass standards, (3) Force, (4) High Pressure, (5) Low Pressure, (6) Avogadro constant, (7) Hardness and (8) Fluid Flow. The task of these 8 WGs is to guide the activities of the designated parameter and report them to CCM and then transmit onwards to CIPM. The 13th CCM meeting started with the two-day brain storming WG meetings of eight working groups (WG) from May 9-13, 2011. CSIR/NPL became the permanent member of this supreme body with voting power from October, 2008. In view of the Mutual Recognition Arrangement (MRA), the representation in this very crucial committee was very important. For example, the improved Calibration Measurement Capabilities (CMCs) of Mass



Participants CCM meeting. Dr. A.K. Bandyopadhyay (on extreme left, bottom row) represented NPL, India

standards of NPLI is submitted on 2009 but they were pending because of the obstructions by one of the Regional Metrology Organizations (RMO) on the pretext that they do not have enough proof to establish such a low CMCs. This is the time when NPLI got the opportunity to explain the International Scientific Body (CCM), the research and development work perused by the scientists of NPL/CSIR to achieve that high level of accuracies, it was voted unanimously and the CMCs were published on 28th May, 2011 in the key comparison data base (KCDB) of BIPM (www.bipm.org). This is an achievement as when we go for low uncertainty in measurement comparable to NIST (USA), PTB (Germany), NMI (Japan), there is an always requirement to explain our findings, otherwise delay and even rejection of publication of CMCs will be quite common.

SAARC-PTB Preparatory Workshop on Inter-laboratory Comparisons

This workshop was held in Colombo during June 6-8, 2011 in accordance with the proposed objectives of undergoing South Asian Association for Regional Cooperation and Physikalische Technische Bundesanstalt (SAARC-PTB) Technical Cooperation in the field of infrastructure to promote regional cooperation in Metrology. It was organized by the Ministry of Cooperative and Internal Trade (MCIT) of Sri Lanka jointly with Measurement, Units Standards and Services Department (MUSSD), Sri Lanka.

It was a three days workshop held for SAARC countries namely BSTI- Bangladesh, NBSM- Nepal, MUSSD - Sri Lanka and NPSL- Pakistan in order to get prepared for participation in the SAARC-PTB inter-comparison in "Temperature" and "Length" parameters to be organized and coordinated by NPL, India and for "Mass" parameter to be coordinated by NPSL, Pakistan. In total, 16 participants from four SAARC countries including NPL, India attended the workshop.

The workshop was inaugurated by Mr. Sunil S. Sirisena, Secretary, Ministry of Cooperative and Internal Trade (MCIT). In his inaugural remarks, Mr. Sirisena welcomed the delegates and emphasized the need of standards, and international inter-comparisons especially among SAARC member countries to start with, so as to remove technical barriers to intra-regional trade. According to him, Sri Lanka considers this very important and essential and the effort made towards this will help in improving the economic condition of the country and its people. He wished a very successful workshop for all the participants and thanked NPL and PTB for taking the initiative. He assured all the cooperation from his Ministry of Cooperative and Internal Trade.

Mr. K. Premasiri Kumara, Director of MUSSD expressed his thanks to the Secretary, MCIT for his full support in organizing the workshop. Mr. Kumara also thanked PTB for the financial support and SAARC Secretariat, Kathmandu, for their continued support and efficient coordination enabling delegates from the member countries to participate in the program. He expressed his



Participants of PTB-SAARC preparatory workshop

hope that his colleagues from MUSSD will take full advantage of the workshop and will gain significant knowledge during three days of deliberations. He thanked NPL for its help in drafting the programme and covering different aspects related to the theme of the workshop.

NPL, India took the responsibility to provide faculty for the deliberations. Dr. K. P. Chaudhary, Dr. Y.P. Singh and Mr. Anil Kumar covered the three parameters of Length, Temperature and Mass respectively. Dr. Virendra Shanker, SAARC-PTB Programme Coordinator from NPL, India, moderated the workshop proceedings.

The workshop had 6-sessions, two sessions each day. The sessions covered general topics like Inter-comparison for Quality Assurance, Metrology Concepts for Inter-comparison etc and specific topics on Calibration Procedures, Uncertainty Measurements and Technical Protocols related to Inter-comparison for the three metrological parameters. The role and responsibilities of pilot laboratories and participating laboratories were also discussed. Further discussions were held on issues like mode of dispatch of artifacts, packaging instructions, custom formalities, time schedule of the comparison and coordination mechanism of the program in working group/parallel sessions.

One Mega-Newton Force Standard Established at NPL

Force Standards Group, NPL has established one mega-Newton force standard with uncertainty of realised force 20 ppm up to 100 kN on dead weight side and 90 ppm up to 1000 kN on the lever multiplication side. The machine has been procured from M/s GTM, Germany under the net work project of CSIR

After its commissioning, APMP key comparison at 50 kN and 100 kN was carried out. This force standard machine will be used to provide calibration of class '00' force transducers up to 1000 kN as per the latest ISO 376 2011, as soon as it is adopted by BIS. Further, the force calibration of higher accuracy force transducers will be done on this on the request of the customers.



1MN force standard machine

Upcoming Events

First Announcement of 2nd National Conference on Advances in Metrology – AdMet 2012

The forthcoming 2nd National conference on Advances in Metrology (AdMet 2012), which is scheduled to take place at ARAI, Pune, (India) from February 6-8, 2012. The AdMet-2012 offers a unique opportunity to learn and share about advances, technology and products in the area of metrology. The theme of the AdMet 2012 is "Precision Measurement and its Applications in Auto Industry". With the liberation of economy and globalization of trade, considerable efforts are being made in building the confidence that measurement made in one location in the world are compatible/equivalent to those made in other locations on the same or related products.

The AdMet EXPO 2012 will also be conducted concurrently, offering metrological and allied companies to display their products / technologies. The first announcement (www.metrologyindia.org) invites professionals, engineers and academicians to present / share their work in the field of advances in metrology during this conference.

For details please contact :

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Fax: +91-20-30231104, Tel.: +91-20-30231250, (M) : +91- 997 558 1051 or visit web site <http://www.araiindia.com>

Seminar on Importance of Precision Measurement in Engineering

This one day seminar is being organised by Metrology Society of India- Eastern Region Chapter (MSI-ERC) jointly with Department of Applied Electronics and Instrumentation Engineering (AEIE), Netaji Subhash Engineering College (NSEC), Kolkata and Central Mechanical Engineering Research Institute (CMERI), Durgapur, on 26th August, 2011 at Netaji Subhash Engineering College, Technocity, Garia, Kolkata-700 152.

For details please contact:

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Prof. Animesh Bhattacharya, animeshb_17@yahoo.com; **Prof. Anuradha Saha**, anuradha.nsec@gmail.com

Measurement Science for Medical Applications; Where Doctors Meet Engineers

This one day seminar is being organised by Metrology Society of India (ERC) on 24th September, 2011 at Desun Hospital.

For details please contact :

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Mr. Susovan Dasgupta, sdg@pnmhospital.com

A Letter to the Editor

Dear Dr Bandyopadhyay,

I have just received the Vol.1, No.1, May 2011 of MSI News Letter. It is a wonderful effort. I must congratulate you and the whole Publication Team for coming out with such a beautiful and purposeful publication. I feel that it would be worthwhile to mention the frequency of this publication also.

I also take this opportunity to say a few words about Mapan. I have been thinking to write to you for last few months, express my appreciation for the glorious improvement in the publication of Mapan, under your able guidance. The

Publication Committee deserves all praise for bringing it comparable to any International Journal.

I would be interested to know if you are also thinking of updating the Hand Book of MSI ? The last one was published in 2007.

Regards

V. N. Bindal

(Ex-Vice President, MSI & Ex Chairman Publication Committee, MSI)

Metrological Quotes

"Total Quality Management is not a destination but a journey toward improvement." - **V. Daniel Hunt**

"A mistake is an event, the full benefit of which has not yet been turned to your advantage." - **Edwin Land**

"The quality of a person's life is in direct proportion to their commitment to excellence, regardless of their chosen field of endeavor" - **Vince Lombardi**

"The world is chaos without measurement" - **Peter Buzzard**

Compiled by: **Dr. Sanjay Yadav, NPL, New Delhi**

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