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The First Gulf Metrology Forum

Doha: 14-15 December 2015

Directory chairmen, speakers and summaries of working papers

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الدوحة: 14-15 ديسمبر 2015

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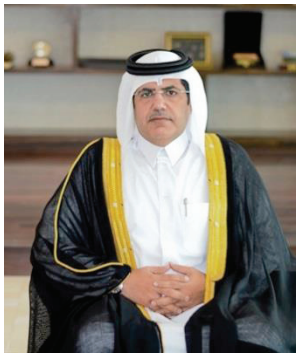

Speech of H.E. the Minister of Environment State of Qatar

It is the pleasure of the State of Qatar to host this First Gulf Metrology Forum which comes along with interesting global developments in the fields of energy, industry, economy and technology.

The Forum aims to provide a platform for metrology professionals from government agencies and the private sector to exchange viewpoints and expertise, as well as to explore appropriate means and methods for developing and updating current metrological infrastructure in the GCC States.

Reliable metrological results are important in all aspects of modern life, especially in the industrial sector, and in the development and supply of metrological services according to the requirements of society and economy.

It is necessary to have a fully-established integrated metrology infrastructure that performs very well to reach a sustainable economy. Here comes the role of policy-makers to regularly study the work and performance of metrological infrastructure.

The participation of prominent personalities in the field of metrology in this important Forum represents a good opportunity to discuss organizational and technological structure, market trends, applications and latest innovative products. We are confident that the Forum will contribute to identify the beneficial aspects through the exchange of ideas and information in this area.

We wish the Forum every success.

Ahmed bin Amer Al-Hemaidi

Speech of H.E. Secretary General
Gulf Organization for Industrial Consulting

I am pleased to welcome you to this special First Gulf Metrology Forum which targets the growing metrological requirements in the Gulf as well as in world markets in order to support international cooperation in this area, facilitate commercial traffic and encourage the manufacturing industries and services in the GCC.

Industrial standards and measurements have become a requirement in international trade, and in global technological progress, and in the course of industrial development. Hence, it became necessary for us to raise local awareness of industrial standards, and to enable the national capacities of such standards, all the way to manufacture high quality products according to international standards. This requires: close cooperation between bodies of standards in the Gulf States for the establishment of a national system for modern standards, enhancing cognitive and procedural environment, and updating legal frameworks, research and applications.

Metrology improves the output of the manufacturing industry, in which the measurements apply to all levels of production, from raw materials to finished products. Rather, metrology works on manufacturing high quality products, and has a direct impact on profitability, capacity and sustainability. It removes barriers obstructing the flow of trade, and contributes to the development of trade, consumer protection, environment and public health.

Also, all industrial production sectors benefit from metrology like the large industries of oil and gas, petrochemicals and refining, together with the small and medium industries such as plastics, metals, mining, cardboard, wires, dyes, dairy products and other industries.

In the light of increasing global competition, it has become imperative for the Arab Gulf States to unify and modernize standardization and calibration activities. This means: Update of metrology legislations and conformity with international practices, as well as strengthening the technical capacity of metrology in order to obtain international recognition.

The presence of a unified metrology system for the GCC States, in line with international legislations, will facilitate the movement of bilateral trade between them and the countries of the world. It will also ensure the protection of health and safety of the community, and will improve the quality of products and industrial processes, as well as protection of the environment and imposition of laws and regulations. This would contribute to the quality of products and services, ensure their safety, and raise the level of national competitiveness.

We welcome you to Doha and we wish your Forum every success.

Abdul Aziz Bin Hamad Al Ageel

Speech of H.E. Secretary General GCC Standardization Organization

I am pleased to welcome all professionals and those interested in metrology science attending this First Gulf Forum for Metrology, which is held by the will of God in Doha, capital of dear Qatar. I would like to thank the Gulf Organization for Industrial Consulting (GOIC) for its generous initiative to hold this specialized activity which has been absent from our region for nearly ten years since the convening of the Third Middle East Conference for Metrology and Instrumentation in the Kingdom of Bahrain in May 2006.

No doubt that the call for the GCC Standardization Organization (GSO) and the Gulf Metrology community to participate in this event, reflects the wisdom of the management of the Gulf Organization for Industrial Consulting, to coordinate and unite Gulf efforts to implement all activities in the Gulf and highlight them.

Metrology or standards is an activity that includes all theoretical and practical aspects of measurement and its applications that support the quality of products and industrial and commercial operations, and that protect the safety and health of members of the community. This activity is supported by scientific and technological progress currently enjoyed by the community. Most of the research and studies are issued by research centers in the pioneering national metrology laboratories. Many of the leading industries that dominate the world markets, with the quality of their products, are provided with appropriate infrastructure by their countries in the field of metrology.

The world economy today depends on measurements and reliable tests. Such measurements and tests should not constitute any obstacles or barriers to international trade. To attain this end, the appropriate infrastructure should be available in the field of metrology in order to enable the Gulf economy to verify the quality of its products and services though internationally recognized methods. This will raise the level of competitiveness, help to ensure the safety of products and services, and significantly contribute to the national economy.

In conclusion, I would like to pay tribute to the efforts of the high technical committee organizing this Forum, the outstanding level of scientific papers and the professionalism of the distinguished speakers in their respective disciplines.

I wish every success for the Forum, and look forward for fruitful recommendations.

Nabil bin Ameen Molla

Speech of the Chairman of Forum Organizing Committee
H.E. Assistant Secretary General for Industrial Project Sector
Gulf Organization for Industrial Consulting

It is my pleasure to welcome all of you to this First Gulf Metrology Forum.

For some time, the Forum's Technical and Organizing Committee has made substantive and organizational preparations to choose suitable themes for this Forum, taking into account the major developments in the various fields of energy, industry, economy and technology. Metrology results, with their scientific, industrial and legal classifications, have become a necessity in this activity, particularly in the areas of trade facilitation and promotion of manufacturing industries and services.

Due to the importance of the subject, and the major role played by the metrology and calibration activities in product and services development, trade, consumer protection, environment and public health, the Committee has worked hard to add prominent personalities in these various disciplines to this Forum.

The Committee held several meetings, revised working papers, communicate with foreign experts and approved the program of action.

I am pleased on this occasion to extend our thanks and appreciation to those who prepared the working papers for their efforts for timely processing.

I would also like to thank our sponsors and supporters, whose great support would add to the success of this Forum and achievement of its goals.

I am pleased to emphasize that the second version of this Forum will be held during the last quarter of the year 2016. We will communicate with you accordingly.

We welcome all of you in this important Forum, hoping every success for the Forum and good stay for our guests.

Dr. Ali Hamed Al-Mulla

Forum Agenda

Day 1 : Monday 14th December 2015

08:30 – 09:00	Registration
Session One	Inauguration
09:00 – 09:05	Recitation from the Holy Quran Inaugural Address
09:05 – 09:15	H.E Eng. Ahmed bin Amer Al-Hemaidi Minister of Environment Ministry of Environment - Qatar Patronage
09:15 – 09:25	H.E Mr. Abdulaziz Hamad Al-Ageel Secretary General Gulf Organization for Industrial Consulting (GOIC)-Qatar
09:25 – 09:35	H.E Mr. Nabil bin Ameen Molla Secretary General GCC Standardization Organization - KSA
09:35 – 09:45	Dr. Martin Milton Director, Bureau International des Poids et Mesures (BIPM) - France Keynote Speaker
09:45 – 10:05	- Signing of MOU between Ministry of Environment and Economic Zones Company Qatar (MANATEQ) - GOIC honoring the forum Patron - Honoring Sponsors - Honoring Organizers - Honoring Supporters
10:05 – 10:30	Tea Break

Session Two : **Scientific & Legal Metrology**
Session Chairman
Dr. Georgios Tsorbatzoglou
Director of Scientific and Industrial Metrology, Emirates Metrology Institute - UAE

10:30 - 11:00 **The importance of metrology for the developing countries and for GCC countries**
Dr. Martin Milton
Director, Bureau International des Poids et Mesures (BIPM) - France

11:00 - 11:15 **Qatari National Center for Metrology: necessity and challenges**
H.E. Dr. Mohammed Bin Saif Al Kuwari
Assistant Undersecretary for Laboratories and Standardization.
Ministry of Environment - Qatar

11:15 – 11:30 **The role of legal metrology in a global market**
Dr. Stephen Patoray
Director, International Bureau of Legal Metrology(BIML) - France

11:30 – 11:45 **From basic calibration capabilities to fundamental research: evolution of medium size metrology institute**
Dr. Mustafa ÇETİNTAŞ
Director, Turkish National Metrology Institute - Turkey

11:45 – 12:00 **Prayer Break**

12:00 – 12:15 **Knowledge Transfer in Metrology – The Key towards Excellence. Innovation and Creativity in Modern Organizations**
Prof. Dr. Mohamed A. Aichouni
Professor, Vice-Dean
Engineering College, Hail University, KSA

12:15 – 12:30 **A Metrology lab as a core infrastructure for an innovation ecosystem**
Eng. José Luis Prieto Calviño
Director, Quality & Operations at LOMG
Metrology Tech Centre , Galicia-Spain

12:30 – 12:45 **National Metrology Institute and Customer Protection**
Prof. Dr. Yasser A. Abdelaziz
Expert and Consultant for Central Laboratories
Qatar General Organization for Standards and Metrology (QS)
Ministry of Environment, Qatar

12:45 – 13:00 **Calibration, its Importance and the Role of the Qatar Armed Forces Calibration Center**
Brigadier Nasser Bakhit Al-Jattal
Qatar Armed Forces, Calibration Center, Qatar

13:00 – 14:00 **General Discussion and Concluding Remarks - Day one**

14:00 – 15:30 **Lunch hosted by Gulf Organization for Industrial Consulting (GOIC) in Honor of the Participants**

16:30 – 18:30 **Tour in Doha Souq Waqif**

Forum Agenda

Day 2: Tuesday 15th December 2015

Session Three : Industrial Metrology & Energy

Session Chairman
H.E. Dr. Mohammed Bin Saif Al Kuwari
Assistant Undersecretary for Laboratories and Standardization
Ministry of Environment - Qatar

09:00 – 09:15 The importance to trade and global competitiveness of international recognition of national measurement capabilities – the Asia Pacific experience
Dr. Peter Fisk
Chair, The Asia Pacific Metrology Program
Chief Executive and Chief Metrologist
National Measurement Institute - Australia

09:15 – 09:30 GULFMET a Platform for CMCs Recognition
Eng. Mohammed Ahmad Al Mulla
President, Gulf Association for Metrology, GULFMET- KSA

09:30 – 09:45 Metrology needs in GCC region from SME Perspective
Eng. Suleiman Al Balushi
Engineering consultant
Industrial Investment Department - Industrial Projects Sector
Gulf Organization for Industrial Consulting - Qatar

09:45 - 10:00 INCO-LABS, The Story of Quality
Eng. Abdulaziz A. Al-Obaidan
Vice-Chairman and CEO
INCO Industrial Laboratories - Kuwait

10:00 – 10:15 The establishment of the Emirates Metrology Institute
Dr. Georgios Tsorbatzoglou
Director of Scientific and Industrial Metrology, Emirates Metrology Institute - UAE

10:15 – 10:30 Metrology and measurement challenges of energy efficiency
Eng. Ala Hussain Abdulrahim Hasanien
Electrical Specialist - Central Laboratories Department
Qatar General Organization for Standards and Metrology
Ministry of Environment, Qatar

10:30 – 10:45 Tea Break

10:45 – 11:00 Building metrology into process, products, and services will enable Future factory (case study)
Dr. Hazim M. Al-Hajjaj
Micro Automation Industries - UAE

11:00 – 11:30 **Optimization of Thermal Radiation Source for High Temperature Infrared Thermometer Calibration**
Eng. Gavin McQuillan
Product Manager, Temperature Calibration Products
Fluke. UK

11:30 – 11:45 **Secondary Standard Dosimetry Laboratory and its function within Qatar and The IAEA/WHO Network of SSDL**
Mr. Mohammed M. Hushari
Specialist of Physics - Central Laboratories Department
Qatar General Organization for Standards and Metrology
Ministry of Environment, Qatar

11:45 – 12:00 **Coordination Metrological Activities among GSO Member States**
Eng. Omar S. Kanakrieh
Head, Metrology Division
GCC Standardization Organization
Kingdom of Saudi Arabia

12:00 – 12:15 **Prayer Break**

Session Four : **Health & Food**
Session Chairman
Dr. Ali Hamed Al-Mulla
Chairman of the Forum Organizing Committee
Assistant Secretary General for Industrial Projects Sector
Gulf Organization for Industrial Consulting - Qatar

12:15 - 12:30 **Food Metrology: Status in Korea & KRISS (Korea Research Institute of Standards & Science)**
Dr. Hyong-Ha Kim
Principle Research Scientist
Korea Research Institute of Standards and Science (KRISS)
Republic of Korea

12:30 – 12:45 **Calibrating Medical Devices in KSA Hospitals: Reality and Challenges**
Eng. Hamad Ibrahim Al-Badr
Senior Biomedical Engineer
Biomedical Engineering Department
Prince Sultan Military Medical City (PSMMC)
Kingdom of Saudi Arabia

12:45 – 13:00 **'Awfou Alkail' Experience in Medical Equipment Calibration**
Eng. Ahmed Hamtu Al-Hawsawi
High Level Metrologist
General manager. Awfou Alkail Trading.(EST)
Kingdom of Saudi Arabia

13:00 – 13:30 **Open Discussion and Concluding Remarks - Day Two**

13:30 – 14:00 **Closing Session - Recommendations and final forum statement**

14:00 – 15:30 **Lunch hosted by Gulf Organization for Industrial Consulting (GOIC) in Honor of the Participants**

Dr. Martin Milton

Director, Bureau International des Poids et Mesures (BIPM) - France

Dr Martin Milton received a BA in Physics from Oxford University in 1981 and a PhD in Laser Physics from Southampton University in 1990 followed by an MBA from the London Business School in 1991.

Dr Milton joined the BIPM in October 2012 as Director Designate and became Director on 1 January 2013.

Before his move to the BIPM, Dr Milton spent 31 years at the National Physical Laboratory (NPL), United Kingdom. He was a Fellow in the Analytical Science Division and led the "Gas Metrology and Trace Analysis" Group which was one of a small number of groups at the NPL rated "internationally leading" for both its impact and its science quality by an independent international peer-review panel.

Dr Milton is also Honorary Professor in the Department of Chemistry at the University of York (UK), Fellow of the Institute of Physics (UK), Fellow of the International Union of Pure and Applied Chemistry (IUPAC), Member of the Editorial Boards of *Metrologia* and Kaye and Laby, Member of the Measurement Board of the National Measurement Office (UK), the Science Council of the European Measurement Research Programme (EMRP) and the Scientific Council of INRIM (Italy), Chairman of the Joint Committee of the RMOs and the BIPM (JCRB) and the Joint Committee for Guides on Metrology (JCGM).

Dr Martin Milton has published 83 papers in peer-reviewed journals and has received several awards:

2003 Worshipful Company of Scientific Instrument Makers Prize for the best paper published in Measurement Science and Technology

2008 Citation from the IPCC in recognition of a contribution to the Nobel Peace Prize

2007 NPL Gold Award

2009 Serco Global Award for Innovation

2014 NCSLI Conference Best Paper Award for the paper and presentation 'Electrical Units in the New SI: Saying Goodbye to the 1990 Values."

H.E. Dr. Mohammed bin Saif Al-Kuwari
Assistant Undersecretary for Laboratories and Standardization, Ministry of Environment - Qatar

Dr. Al-Kuwari graduated as a Civil Engineer from Cairo University in 1980. He then joined the graduate school in Ain Shams University and obtained a Master's in Civil Engineering, and later went back Cairo University and obtained his Ph.D. in Civil Engineering (concrete and Asphalt) in 1992.
During the period 1996 – 2002 he was the head of Central Material Laboratory Department (CML) at the Ministry of Municipal Affairs – Qatar .
Dr. Al-Kuwari currently serves as an Assistant Undersecretary for Standardization in Ministry of Environment and was formerly Director General of the Qatar General Organization for Standards and Metrology (QGOSM) during the period 2002 - 2008.
Dr. Al-Kuwari authored 14 books in various scientific, environmental and human rights issues and contributed more than 39 scientific and technical research papers in the fields of materials engineering, buildings and construction specifications and other general areas. He was also invited to speak in more than 40 venues ranging from technical lectures to general public awareness seminars.
Dr. Al-Kuwari represented the State of Qatar in more than 90 regional and international meeting and venues, most of which were related to Housings, Standardization, International Trade and Human Rights.
Dr. Al-Kuwari is a Chairman and a member at more than 21 Local, Arab and International committees.
Dr. Al-Kuwari has been awarded in many occasions by national and regional (Gulf, Arab and International) institutions for his contributions and engagements in the body of civil and environment sciences.

Title: *Qatari National Center for metrology … necessity and challenges*

Abstract:

Many developed countries around the world realized the importance of metrology and related sciences, those countries were confirmed it is impossible to do real scientific renaissance without the presence of a scientific metrology center, where the metrology and related sciences has a direct impact on different aspects of life. Those countries initiated to establish specialized scientific institutes called the National Metrology Institutes, some of these institutes were established from more than 130 years.
Since the establishment of the State of Qatar, it has applied and activated a national measurement system depends on the existence of a national measurement references reserved and developed from a competent bodies, all that was emerged through the Qatar Law No. (21) for the year 1972 on the harmonization and identification of standards and weights.
As part of the current great renaissance of Qatar in the economic, social, human and scientific aspects, there is a real and urgent opportunity to establish the Qatari National Center for Metrology to cover many disciplines and important scientific fields, which concerned with international system of units also to work to develop, disseminate and apply it in all life aspects.
The National Metrology Center can provide measurement and calibration services for all types of devices and equipment used in factories and companies, laboratories, hospitals, oil/gas, research centers and universities in the state, all of that would be a real investment by reducing costs and fees for these services, which currently drain abroad.

Dr. Stephen Patoray

Director, International Bureau of Legal Metrology(BIML) - France

As Director of the International Bureau of Legal Metrology, (BIML) Stephen Patoray leads a small group of highly dedicated professionals who provide all administrative support to the International Organization of Legal Metrology (OIML).

Stephen is a results driven professional with a progressive and varied engineering and management career in quality, manufacturing, legal metrology, automation and association management.

Educated as a Mechanical Engineer with a Master's Degree in Business Administration, he is also experienced in standards development, quality auditing and certification. With strong analytical, problem solving and organizational skills he is capable of developing the plan and leading the team to achieve the required goals.

Title: *The role of legal metrology in a global market*

Abstract:

OIML is an intergovernmental treaty organisation established in 1955 in order to promote the global harmonisation of legal metrology procedures.
Its activities fall into five main areas:

- Developing standards and related documents for use by legal metrology authorities and industry.
- Providing mutual recognition systems which reduce trade barriers and costs in a global market.
- Representing the interests of the legal metrology community within international organizations and forums concerned with metrology, standardization, testing, certification and accreditation
- Promoting and facilitating the exchange of knowledge and competencies within the legal metrology community
- Raising awareness of the contribution that a sound legal metrology infrastructure can make to a modern economy

As a member-driven organisation, OIML's priorities are to focus on those areas which its membership as a whole regards as most important. These are (i) to make the process of producing new or revised standards quicker and more efficient; (ii) to develop the OIML Certificates Systems so they are more widely used both by Member States and business; and (iii) to make its activities more useful to countries and economies with emerging metrology systems.
An important part of OIML's activities is the support it can offer to members of the world-wide legal metrology community, both directly and by making the case for policy-makers to keep national legal metrology systems in line with current best practice. This requires a clear understanding of what is meant by legal metrology, and some possible shortcomings in the current definition.
Finally, the challenges of assessing both the qualitative and quantitative benefits of legal metrology initiatives are considered. A central theme is the interconnection of scientific, industrial and legal metrology with respect to a quality infrastructure and the standards that support them in a global market.

Dr. Mustafa Cetintas
Director, Turkish National Metrology Institute - Turkey

Mustafa ÇETİNTAŞ received B.S. and M.S. degrees in Physics from the Middle East Technical University and Kocaeli University in 1992 and 1998, respectively. He completed his Ph.D. degree in Physics at the Gebze High Technology Institute in 2003. His M.S. and Ph.D. studies were on the subject of two-photon laser absorption spectroscopy of Rb atoms.

In 1993, Mustafa ÇETİNTAŞ was employed by the National Metrology Institute (TÜBİTAK UME) of Turkey. He worked in the electromagnetic metrology group laboratories, which includes the electromagnetic compatibility, wavelength standards and time and frequency laboratories. His research interests include laser spectroscopy, frequency stabilization of lasers and electromagnetic metrology. At the end of 2011, he was appointed Deputy Director responsible for the Physical and Electrical laboratories at TÜBİTAK UME. He has been the Acting Director of TÜBİTAK UME for the past two years and is also the Chairman of the SMIIC Metrology Committee.

Title: *From basic calibration capabilities to fundamental research: evolution of medium size metrology institute*

Abstract:

A well-functioning National Metrology Institute (NMI) is the hallmark of a strong and sustainable national quality infrastructure. Although Turkey, as the Ottoman Empire, was among the 17 original signatories of the Meter Convention, efforts to establish a NMI began in early 1980s. When formally established, there were few laboratories operational at the institute. Their activities were focused on metrological fields with the highest priority for the national economy like mass, temperature, pressure, and basic electrical quantities. However, guided by target oriented strategic planning that took into account the existing and future needs of national industry and aided by supportive government policies, the institute significantly expanded its capabilities over the past 30 years. This development was financially supported not just from national resources, but also through several projects funded by the United Nations Industrial Development Organization (UNIDO), German Technical Cooperation Agency (GTZ) and World Bank. Currently, the National Metrology Institute (TÜBİTAK UME) of Turkey maintains 30 metrology laboratories covering activities not only in traditional metrology fields, but also newly expanding and experimental fields, such as chemical and biological metrology.

The first and foremost activity of TÜBİTAK UME as a national metrology institute is the establishment and maintenance of national measurement standards in accordance with SI units and the dissemination of traceability to the SI through the provision of calibration services to accredited and non-accredited calibration laboratories and industry. Training and consultancy services in metrology are provided to both national and international customers upon demand. Additionally, in its position as the most advanced metrology institution in the country, TÜBİTAK UME lends significant support to other elements of the national quality infrastructure. As the metrology landscape in Turkey has evolved and matured, accredited laboratories have absorbed a greater share of the demand for routine calibration services, which has allowed TÜBİTAK UME to implement a strategy to devote more of its financial and human resources to research and

development activities.

TÜBİTAK UME is very active in the international arena. The institute is full member of six CIPM Consultative Committees and observer in two of them. It is a full member of the European Association of National Metrology Institutes (EURAMET) and associate member of the Euro-Asian Cooperation of National Metrological Institutions (COOMET) and the Gulf Association for Metrology (GULFMET). Additionally, TÜBİTAK UME is a member of the Network of Analytical Chemistry Laboratories in Europe (EURACHEM) and International Measurement Confederation (IMEKO) and has chairmanship of the Metrology Committee within the Standards and Metrology Institute of Islamic Countries (SMIIC). TÜBİTAK UME is among institutes that signed the CIPM Mutual Recognition Arrangement (MRA) in October 1999, which provided for the recognition of its calibration and measurement capabilities by all other signatories of the arrangement.

Since with establishment of basic calibration capabilities at the very beginning up to the recent years, TÜBİTAK UME has placed a growing emphasis on research activities that cross into areas that are outside its traditional remit as a national metrology institute. One of the critical aims of the R&D activities carried out is to lay the foundation for the progression of Turkish industry into more advanced production technologies. Research and development activities carried out by TÜBİTAK UME include a Watt balance project, many joint research projects (JRP) under the European Metrology Research Programme (EMRP) and other programmes jointly funded by partner countries and the European Commission. Up to now, 24 JRPs have been completed, while 23 are in progress. Of these, TÜBİTAK UME acts as the coordinator in of three JRPs.
This paper presents an overview of the evolution of the National Metrology Institute of Turkey as an example of a developing medium size NMI.

Prof. Dr. Mohamed Aichouni
Professor, Vice-Dean
Engineering College, Hail University - KSA

- Professor of Quality Engineering
- Research team leader "*Program for Creativity and Innovation Skills Development through Total Quality and Business Excellence Concepts". And Principal Researcher at "Muaalleem Mohamed BinLadin Research Chair on Quality in the Construction Industry"*
- Author of books on Quality Improvement and Metrology.
- Actual Vice Dean of the College of Engineering at Hail University
- Ex-Vice Rector of the University of Mostaganem, Algeria
- Member of a Steering Committee on National Metrology Plan, Algeria, 2008-2010
- ASQ, SQC, KAQA Member

Title: ***Knowledge Transfer in Metrology – The Key towards Excellence, Innovation and Creativity in Modern Organizations***

Abstract:

Metrology, defined as the science or art of measurements, is an essential tool for scientific research and discovery as well as technological innovation. Reliable and accurate measurements are of crucial importance in almost every aspect of our daily life, ranging from fundamental science, through health, safety, defense to trade and business. It is therefore not surprising that one of the more essential ingredients in improving trade, innovation, growth and well-being is efficient transfer of measurement knowledge. The European 'Lisbon' strategy emphasizes the role of research, education, and innovation in fostering economic growth and improving life quality of citizens.

Measurement knowledge transfer is a key factor in metrology's impact on modern society since better measurement is an essential component in promoting innovation, growth and welfare. KT can be considered as an essential element in any national metrology program since new measurement knowledge, created in research, needs to be transferred to be useful at the industrial and business levels. This can only be achieved through education and training. Metrology KT is a two-way information exchange between national metrology institutes (NMIs) and metrology stakeholders such as universities, practitioners, industry, and regulators. There are a wide variety of knowledge transfer protocols that have evolved at different degrees in developed countries. These include: (a) direct research collaboration between universities and research centers with industry, (b) collaborations with regulatory agencies and national bodies of metrology and standardization, (d) "metrology clubs" – interest groups and non-profit organizations, (e) best practice guides and good laboratory practices, (f) Technical and scientific publications and participation in documentary standards activities.

The present paper will be dedicated to discuss the fundamental concepts of knowledge transfer in metrology science from a world class perspective, the metrological system structure (scientific metrology, legal metrology and industrial metrology), and to examine the actual situation of metrology Knowledge Transfer in the Arab world countries. The paper will present international benchmarks that can be used by industrial and academic institutions in Arab countries to position metrology in their strategies as driver for quality, excellence and innovation.

Eng. José Luis Prieto Calviño
Director, Quality & Operations at LOMG
Metrology Tech Centre , Galicia - Spain

Quality & Operations Director at LOMG (Metrology TechCentre in Galicia-Spain) since December 1996.
M. Sc. in Industrial and Management Engineering. Escuela Técnica Superior de Ingenieros Industriales from Universidad Politécnica de Madrid – Spain (1988).

LOMG representative for AEC (Asociación Española de la Calidad); EFQM (European Foundation for Quality Management). Member of LEAN Management Institute for Spain; EUROLAB aisbl (European Federation of National Associations of Measurement, Testing and Analytical Laboratories).
From year 2000 to 2006, Assessment Team Leader for EEA (EFQM Excellence Award).

He has attended international workshops and conferences as panelist in topics related to Excellence, Quality at labs, Innovation and the role of technical centres in Regional systems for innovation.

Title: *A Metrology Lab as A Core Infrastructure For An Innovation Ecosystem*

Abstract:

An innovation ecosystem describes the large and diverse array of participants and resources that contribute to and are necessary for ongoing innovation in a modern economy. This included entrepreneurs, investors, researchers, university faculty, venture capitalists as well as business development and other technical service providers.

Against this background, how can a metrology lab meet the challenge of being a core infrastructure?

There is no single answer to this question. This paper tries to share LOMG experience about the transformation from a metrology lab to a measurement technical center, a core infrastructure within an innovation ecosystem.

And the basis for it can be found in this Galileo Galilei's statement: ""It measures what is measurable and make measurable what is not"

Prof. Dr. Yasser A. Abdelaziz
Expert and Consultant for the Central Laboratories
Ministry of Environment – Qatar

- Metrology and Laboratory Accreditation Expert & Consultant, Qatar Standards, MOE.
- Doctor of Philosophy (PhD-Thermometry, Metrology – Physics), 2001; Helwan University.
- Prof. Dr. (Researcher) at Thermometry Dept. NIS-Egypt.
- Lead Assessor Licensed from-a2La (NLAB, EGAC-Egypt).
- International consultant for testing/calibration laboratory accreditation, UNIDO-United Nation UN.
- Gust Researcher Visits for IMGC- Italy for three months, 1995/1996, NIST - USA for one month, 1999, NPL - UK for three months, 1999/2000, INM/CNAM-France for six months, 2004/2005 and PTB- Germany for six months, 2008.
- Attained and participated in more than 24 international Conferences and Workshops.
- Referee for the 6 international scientific journals.
- Author for 25 scientific and technical research papers in the fields of metrology and quality.
- Author for 2 books in metrology.

Title: *National Metrology Institute and Customer Protection*

Abstract:

National Metrology Institutes (NMI) is considered as the party responsible to keep and development of the national measurement references each country, so they offer big budgets to ensure its perfect functions. Where these institutes are considered as the main guarantor of good performance for legal metrology, test and inspect laboratories in the country.

Map of the World Trade currently has changed after the existence of the new regional economic blocs, which led to trade activity, especially after the World Trade Organization has worked to removed trade barriers which had an effective impact on the ease of movement of goods across the border.

At the same time the consumer found him in front of a flood of goods of varying prices and quality, which leads to consumer disorder, where he did not know any of those better quality goods, safer and more fulfilling to his needs and best efficiency.

So the tests and calibrations performed on those goods and products in the laboratories inspection bodies and then the marks and certificates of conformity become the only source of confidence for consumer in making his decision.

Brigadier Nasser Bakhit Al-Jattal
Qatar Armed Forces, Calibration Center – Qatar

Brigadier-General Al Jattal, holds a diploma in aviation engineering from Britain. He attended many specialized courses in aviation sciences and in metrology. He also attended advanced courses in administration of calibration laboratories in Britain, in doubt ratios in Kuwait and in public calibration in Bahrain.

Brigadier-General Al Jattal held several positions in the field of measurement and calibration where he worked as an assistant to the director and deputy director of the calibration center of Qatar Armed Forces. He is also a member of the Gulf Technical Committee for measurements of mass and associated volumes/lengths/heat. Among his responsibilities is participation in committees of military nature.

Title: *Calibration, its Importance and the Role of the Qatari Armed Forces Calibration Center*

Abstract:

Industry has occupied an important position in Qatar National Vision 2030, and in the Development Strategy of 2011-2016. Metrology shall be included as a strategic option within the positive methodologies of the State of Qatar along with the other options in the areas of political, economic and social modernization. This is to keep pace with the level of the age and knowledge growing. The paper aims to clarify and highlight the role of the Calibration Center of the Qatari Armed Forces, and to increase awareness and guidance of the importance of metrology and calibration.

The paper focuses on metrology and calibration, the importance of calibration, calibration of different devices, the role of the Calibration Center of the Qatari Armed Forces, the organs which benefit from the services of the Calibration Center, types of laboratories in the Calibration Center, support services of the Calibration Center, development, achievements of the Centre and its future visions.

Dr. Peter Fisk
Chair, Asian Pacific Metrology Programme
Chief Executive and Chief Metrologist
National Measurement Institute – Australia

Peter Fisk graduated from the Australian National University in 1986 with a PhD degree in atomic physics.
Between 1986 and 1991 he was a Research Fellow in the Laser Physics Centre, Research School of Physical Sciences, conducting full time research in solid state physics and quantum optics and giving lecture courses to advanced physics students.

Following a short period as a Visiting Scientist at the IBM Almaden Research Centre in California, he joined the CSIRO National Measurement Laboratory (NML) in 1991 to start and lead a new research project on atomic clock development. In 1993 he was appointed Head of the Time and Frequency group of NML. On 1 July 2004 he was appointed General Manager of the Physical Metrology Branch of the National Measurement Institute (NMI).
Peter was appointed NMI's Chief Executive and Chief Metrologist on 9 February 2012.

Title: *The importance to trade and global competitiveness of international recognition of national measurement capabilities – the Asia Pacific experience*

Abstract:

Global assurance in measurement underpins testing, conformance, and international trade. Expanding global trade and pressure to eliminate technical barriers to trade require greater accountability and demonstrated competence of national metrology institutes (NMIs), sitting as they do at the interface between national and international measurement systems. The global Mutual Recognition Arrangement of the International Committee for Weights and Measures (the CIPM MRA) was established in 1999 to address these demands. It relies for its effective implementation on the work of the Regional Metrology Organizations (RMOs) including the Asia-Pacific Metrology Programme (APMP) and the newly established Gulf Association for Metrology (GULFMET).
The First Gulf Metrology Forum is being held shortly after the initiation by the CIPM of a systematic review of the effectiveness of the CIPM MRA in achieving its objectives, after its operation over more than 15 years. NMIs and RMOs have been asked to take part in an in-depth analysis of the benefits of the CIPM MRA to stakeholders, in particular in the facilitation of trade and enhancing industry competitiveness in global markets.
The creation of GULFMET provides Gulf States with the regional framework to participate in what is now a mature international system of recognition of national measurement systems and capabilities, thereby providing similar benefits to local government and industry stakeholders, among others. This will have increased relevance with the growth of the region's industry-base into new economic sectors. GULFMET's measurement infrastructure will also support the progress of the Gulf Cooperation Council (GCC) towards a complete globally connected and recognised Standards and Conformance Infrastructure that will provide essential support to achieving its key goal of economic diversification in a global market.

Eng. Mohammed Ahmad AL Mulla
President, Gulf Association for Metrology,
GULFMET- KSA

Started his career as maintenance engineer at Dubai central laboratory Department (DCLD) of Dubai Municipality in 1989 later in 1998 promoted to head of Calibration and Maintenance Unit and helped in setting up the calibration laboratories of DCLD.
IN 2002 became the Head of Metrology Section of DCLD managed to earn UKAS accreditation for calibration laboratory at DCLD, and in 2006 served DM as Head of Consumer Material Section. In 2007 moved to Emirates Standardization and Metrology Authority (ESMA) as Director of Metrology Department, participated in developing UAE Measurement System, participated in developing GCC Unified Metrology System. In 2010 appointed as President of Gulf Regional Metrology Association (GULFMET).Member of Emirates Transport BOD, member of Union Traffic Council also holds many memberships in UAE National Committees as well as few Technical committees in Gulf Standardization Organization (GSO). In December 2014 moved to Abu Dhabi Quality and Conformity Council and till date serve as Quality Manager at Emirates Metrology Institute Love to play football and cooking.

Title: *GULFMET a Platform for CMCs Recognition*

Abstract:

Gulf Association for Metrology (GULFMET)is a new Regional Metrology Organization (RMO) established in June 2010 under the auspices of GCC Standardization Organization (GSO), bringing together National Metrology Institutes (NMIs) of the United Arab Emirates, Kingdom of Bahrain, Kingdom of Saudi Arabia, Sultanate of Oman, State of Qatar, State of Kuwait and the Republic of Yemen.
GULFMET aims at enhancing the metrological infrastructure and activities within the member states, and to ensure the technical capabilities of national metrology institutes and designated institutes participating in the GULFMET as an RMO.
GULFMET plays an important role in the CIPM MRA. The GULFMET is responsible for carrying out comparisons and other actions within their regions to support mutual confidence in the validity of the calibration and measurement certificates of their member NMIs.
Through the Joint Committee of the RMOs and the BIPM (JCRB), they carry out an inter-regional review of declared capabilities before approved CMCs are published in the KCDB,
This presentation focuses on how GULFMET will help members state to implement the CIPM MRA requirement.
The Regional Metrology Organizations (RMOs) play an important role in the CIPM MRA. The RMOs are responsible for carrying out comparisons and other actions within their regions to support mutual confidence in the validity of the calibration and measurement certificates of their member NMIs. Through the Joint Committee of the RMOs and the BIPM (JCRB), they carry out an inter-regional review of declared capabilities before approved CMCs are published in the KCDB, and they make policy suggestions to the CIPM on the operation of the CIPM MRA.
More information on the CIPM MRA is available by clicking on the tabs above.

Eng. Suleiman Al Balushi
Engineering consultant
Industrial Investment Department - Industrial Projects Sector
Gulf Organization for Industrial Consulting - Qatar

Suleiman AlBalushi, holds M.Sc. in Energy Management & Policy from University of Pennsylvania (Philadelphia, USA), Masters Diploma in Petroleum Economics from French Petroleum Institute, IFP (Paris, France), and B.Sc in Petroleum Engineering from University of Texas (Austin, USA).

Suleiman has held various senior positions in the Ministry of Oil and Gas in Oman as Director General of Planning and Projects Evaluation, Gas and Petroleum Industries, Acting CEO and Deputy CEO of Oman Gas Company and now he is an Engineering Consultant in the Gulf Organization for Industrial Consulting.

While at GOIC, his work involves special studies related to energy and environment, industrial sectoral studies, manufacturing opportunities, potential for energy efficiency, renewable energy and waste management in the GCC.

While at Oman Gas, he has successfully completed landmark gas projects, cross country gas pipelines, gas supply stations, takeover of operations of gas network and successful refinancing of Oman Gas Company Loan.

At the Ministry of Oil and Gas , Suleiman planned and executed multi-million dollar projects in the gas sector, developed five year economic plans, gas master plans and secured the interests of the government in various investment projects in Oil ,Gas, Refining, LNG and power.

Title: *Metrology needs in GCC region from SME Perspective*

Abstract:

Metrology in the GCC applies to all commodities and services which has a direct impact on the profitability, capabilities and the sustainability of a business. Measurements are applied at all levels of production, process and service activities right from concept stage to final output. Reliability of these measurement system are crucial for sustaining any business.

Metrology plays an important role as part of the development of the SMEs in the region. They are facing difficulties in making resources available to study there needs for metrology and in many cases they are not aware about metrology. This presentation will highlight the role of metrology in the industrial sector in the GCC, recent GOIC industrial research finding from companies and their aspirations for better infrastructure to promote and facilitate SMEs with their metrology needs and outline the sustainable industrial development in the GCC region.

Eng. Abdulaziz A. Al-Obaidan
Vic-Chairman and CEO
INCO Industrial Laboratories – Kuwait

- Vice Chairman and Chief Executive Officer of INCO-LABS based in Kuwait since 2004
- Obtained B. Sc. Degree in Mechanical Engineering from The Ohio State University (U.S.A.) in 1998
- Management of specialized laboratories in Construction Materials Testing, Geotechnical

  Investigation, Calibration, Surveying, Structural Evaluation and Environmental Testing. Accredited laboratories to ISO/IEC 17025 from The American Association for Laboratory Accreditation (A2LA) in the field of Construction Materials Testing, Geotechnical Testing and Calibration
- Vice President of the Steering Committee of GCCLAB, a non-profit cooperation for all laboratories established in GSO member states, and operates under the umbrella of the GSO (GCC Standardization Organization)
- Member of the Laboratories Committee in Kuwait Society of Engineers

Title: ***INCO-LABS … The Story of Quality***

Abstract:

The story of quality in INCO-LABS is an ideal example for the implementation of the ISO 17025 requirements. Proud to be the first accredited laboratory in the State of Kuwait in the field of Construction Materials and Geotechnical Testing since 2007 and in the field of Calibration since 2012. INCO-LABS passed through several challenges in order to obtain the ISO 17025 accreditation from The American Association for Laboratory Accreditation (A2LA). The accreditation is not limited to maintain the quality of the work but it is utilized to continuously improve the quality of work. Therefore, it is about a story that will never end !

Dr. Georgios Tsorbatzoglou
Director of Scientific and Industrial Metrology,
Emirates Metrology Institute - UAE

PhD in Materials Engineering, MPhil in Materials Science, B.Sc (Honours) in Physics
Metrologist (background in mechanical measurements)

Team Leader or/and Expert in International Projects for establishing Infrastructure in Quality (Metrology, Accreditation, Standardizations, Testing) at: FYROM, Cyprus, Greece, Montenegro, BiH, Egypt, Lebanon, Kosovo, Ukraine, Bangladesh, Serbia.

Technical Assessor for ISO 17025pCalibration Labs

12 years QM experience at calibration, inspection organization

Advisor to the SG of QCC/Abu Dhabi and Director of Scientific & Industrial Metrology in EMI, for the last 4.5 years.

Title: *The Emirates Metrology Institute establishment project*

Abstract:

The Emirates Metrology Institute (EMI) is a sector of the Abu Dhabi Quality and Conformity Council (QCC) which was established in accordance with Local Law No. 3 in 2009 aiming to raise the quality of Abu Dhabi's products contributing to enabling a diversified economy.

The EMI based on the know-how of its personnel and on its world class infrastructures is the cornerstone for the development of the metrology system in UAE and provides the required assurance on measurements related to science, research and development, production process quality control, product features, health protection, environment and property protection, as well as on regular economic transactions and exchange of goods in all market related areas and processes. EMI laboratories are currently covering the following measuring fields: Mass, Volume, Flow, Temperature, Humidity, Length, Force, Pressure, Torque, Electrical quantities (DC and LF/AC), Time-Frequency. EMI is following an ongoing 5 year plan for launching and supplementing the capabilities of all laboratories, which can be considered the first phase of EMI's development. Actions have been planned step by step for full integration to international metrology system.

EMI, established within a short period, has capabilities that are comparable, if no better, than those of other national laboratories much older than EMI. EMI has been established from scratch within 4 years and this 'journey" as well as its current capabilities will be presented during the forum.

Eng. Ala Hussain Abdulrahim Hasanien
Central Laboratories Department
The Qatar General Organization for Standards and Metrology – Qatar

Electrical Engineer, worked as an electrical measurements specialist in the National Institute for Standards in Egypt then as Technical Manager in the first private lab in Egypt and Arab countries for the Electromagnetic Compatibility (EMC) tests and now as Senior Electrical Engineer in the Qatar General Organization for Standardization.

Works as Technical Assessor in the Egyptian Accreditation Council.

Member of the Technical Committee of the IEC TC77, TC 65 & TC 25
Member of the National Electrotechnical Committee of the State of Qatar

Title: *Metrology and measurement challenges of energy efficiency*

Abstract:

Energy efficiency is the most important technical challenges in our modern times due to the high costs of setting up electrical power plants and energy production until it reaches to the consumer, so most of countries turn to improve the energy efficiency of electric appliances to save millions of dollars which paid either in production or in the treatment of bad effects of Carbon dioxide and other harmful gases emissions, and here Metrology will play a big role in achieving energy conservation through the provision of a traceable measurement techniques and test methods for the energy-efficient electrical appliances which contributes to energy conservation as well as to achieve consumers satisfaction by providing high-quality and energy-efficient products.

Dr. Hazim Al-hajjaj
Micro Automation Industries - UAE

AL Hajjaj is Founder and CEO of Micro Automation Industries, a leading business in manufacturing electronic systems in the UAE. Since 1977, Mr. Al Hajjaj has been working in the field of electronics Engineering and control systems, setting up many companies in the region and Europe for design, development, manufacturing and marketing of microprocessor based electronic control product and Internet of The Things (IoT).

Title: ***"Building metrology into process, products, and services will enable Future factory" case study***

Abstract:

The future Factory or so called Industrial revolution 4.0 uses information and communications technologies to digitise their processes and reap huge benefits in the form of improved quality, lower costs, and increased efficiency. The most significant characteristic of the future factory is that data can be exchanged across.

Case study: Micro Automation Industries, will show case their development of real time measurement system that lead to increase productivity, trace quality, and process optimization. Furthermore its plan to develop the system to enable worker, machines, material communicate online, so that independent decision can be taken within the work flow on real time to allow greater product diversity and facilitate shorter delivery time.

The system have been accepted as scientific paper in IEOM 2015(IEEE forum) and got interest of US university.

Eng. Gavin McQuillan
Product Manager, Temperature Calibration Products
Fluke - UK

B.Sc. (Hons) Physics, University of London
M.Sc. Management of IT, Sunderland University
15 years with Fluke Calibration covering electrical and temperature disciplines

Title: ***Optimization of Thermal Radiation Source for High Temperature Infrared Thermometer Calibration***

Abstract:

Industrial level infrared thermometers are being increasingly designed to measure temperatures above 500 °C. A thermal radiation source is needed to calibrate these instruments. The infrared thermometers designed to measure these temperatures generally measure with a smaller field-of-view. This means there is a possibility of using a blackbody cavity as the thermal radiation source. A previous attempt was made to use a cavity mounted inside of a furnace meant for thermocouple calibration for a thermal radiation source. However, when the cavity's emissivity was measured, it was found the emissivity was not constant for different wavelengths and was very dependent on cavity position. This paper discuses a new attempt to mount a cavity inside a thermocouple furnace with much better temperature uniformity. It discusses the measurements made to verify the emissivity of the cavity using industrial radiation thermometers. It also talks about measurements made with industrial handheld infrared thermometers and compares these measurements to measurements made using other thermal radiation sources and the associated measurement uncertainty.

Eng. Mohammed Hushari
Central Laboratories Department
The Qatar General Organization for Standards and Metrology
Ministry of Environment – Qatar

Expert and supervisor of radiological protection accredited by the British nuclear power.
33 years of experience in the field of radiation protection, radioactive environmental studies and risk assessment.
Teacher in Master of Radiation Protection Program in collaboration with the International Atomic Energy Agency.
Participated in more than 30 scientific papers published in prestigious scientific journals
Currently working in the Ministry of Environment in Qatar

Title 1: *Secondary Standard Dosimetry Laboratory and its Function within the Qatar and The IAEA/WHO Network of SSDL*

Abstract:
Environmental preservation is a top priority for Qatar according to Qatar vision 2030. For that Qatar has already adopted legislation to protect its citizens and natural resources and implement sustainable development which is meet the main objective of SSDl laboratory, proposed SSDL Laboratory which designated by Ministry of Environment to provide the necessary link in traceability of radiation dosimetry to national/international network standards for users within Qatar.The main objective of our SSDL is to improve dosimetric accuracy in various fields of radiation dosimetry such as, in medicine ,industry ,....and environment.

Title 2: *Individual Dosimetry Quality Control , Harmonization with Metrology System in Qatar*

Abstract:
Among approximately 3000 radiation Workers in different radiation applications in Qatar, are monitored using (TLDs) , these workers needs accurate and reliable dose monitoring. Quality assurance programme of a personal dosimetry system using (TLD) requires regular stability checks of the TL dosimetry system. Irradiation of TLDs in a internal TLD irradiator is often not frequent enough to fulfil requirements on accuracy and stability of the TL dosimetry system. Accuracy of TLD reader's work is affected by dust, condensates, electronic components stabilities, etc. It is necessary to perform TLD system stability checks prior to regular monthly personal dosimetry in order to detect any deviation from the previous absolute calibration of the TLD reader and perform corrections in this work the main calibration done by internal sources and other check gamma surces (Cs-137, and Co-60).

Eng. Omar S. Kanakrieh
Head, Metrology Division
GCC Standardization Organization - Kingdom of Saudi Arabia

Eng. Omar received a bachelor degree in Mechanical engineering in 1984. He worked in Jordan for almost 13 years as standards Engineer then moved to the private sector and worked with consultancy firm as QMS consultant. He is an IRCA Registered Quality Management System Lead Auditor and a Certificated Technical Auditor – Laboratories Accreditation.

Currently, he deals with Standardization and Metrology issues in GCC Standardization Organization / Saudi Arabia and involves in standards drafting works of road vehicles and other area.

Title: ***Coordination Metrological Activities among GSO Member States***

Abstract:

The investment in Metrological infrastructure is costly in terms of technical capabilities (facilities, equipment, high qualifications human resources, training and maintenance required to keep this infrastructure on high level of reliability.

Usually the metrological infrastructure in any country shall meet the needs of industrial and services sectors, which should be indentified by a comprehensive survey of these needs.

GSO Member States possess metrological technical capabilities vary from state to state in terms measurement and calibration capabilities (CMCs).

Therefore, GSO has taken strategic initiative to make use of the available capabilities in the member states and employ it to serve other states. Furthermore, GSO is coordinating with the GSO member states to share the available resources and direct them to avoid duplication in terms of planning to invest in developing their available technical capabilities.

Dr. Hyong-Ha Kim
Director, International Cooperation Division
National Research Council of Science & Technology, Korea
Principal Research Scientist, Korea Research Institute of Standards and Science – South Korea

Hyong-Ha Kim graduated with Honors receiving her B.S. & M.S. degrees from Seoul National University. She earned her Ph.D. from the University of Texas at Austin majoring in Molecular Biology. During her training, she received various awards and scholarships including the 'Harold C. Bold Award for Teaching Excellence', and the 'Ralph Alston Memorial Scholarship for Excellence in Research'.
She joined the **Korea Research Institute of Standards & Science** (KRISS) in 2002 and is currently a **Principal Research Scientist**. She served as the Head of the Bioanalysis Center, and Director of the Global Partnership Office. Her research mainly focuses on Bioanalysis and Biological Measurement Standards, in fields including food, GMOs and biopharmaceuticals.
She is currently dispatched from KRISS, serving as the **International Cooperation Division Director of the National Research Council of Science and Technology,** a higher level council which governs the 25 research institutes including KRISS.
Internationally, she is the Vice Chair of the Food and Nutrition Technical Committee of International Measurement Confederation's Metrology, and an Expert Evaluator for the EU Research Directorate General of the European Commission. Nationally, she is serving in various National/Governmental committees including: International Cooperation Committee, Committee for Basic Research, and Assessment Committee for the Ministry of Science. She is also the National Assembly's S&T Advisory Group Member, National Agricultural Products Quality Management Service's Consulting Official, and Board Member of the Botanical Society of Korea.

Title: *Food Metrology: Status in Korea & KRISS (Korea Research Institute of Standards & Science)*

Abstract:

As the economic status of people has improved, and quality of life became an important issue to human beings, in addition to longevity, health became an important matter to our everyday lives no matter where we live. Closely related to our health, the quality and safety of the food we consume everyday became major issues to the global population.
A broad spectrum of factors exist that threaten the safety of our food, including inorganic contaminants such as heavy metals, organic contaminants such as pesticides and environmental hormones, biological contaminants such as various pathological microorganisms. There are also issues such as food safety related origin management, organic food labelling, and genetically modified food products that raise concerns of the public from time to time. On the contrary, concerns of quality of life have also brought to light the world of nutraceuticals and endless choices of nutrient supplements. This has also called the needs of systematic management and development of standards for food nutrients.
Korea has put efforts into establishing an organized 'Food Standard Management System' through the cooperation of the Ministry of Food and Drug Safety and the Ministry of Agriculture, Food, and Rural Affairs, dealing with a wide range of items covering food, feed, livestock, fisheries, etc. During this talk, the food safety & origin management system the Food Standard Management System in Korea will be introduced as an example of National Food Safety System.

Within the scope of this system, there are numerous testing labs and organizations in Korea which test imported food, including raw materials and processed food, feed for animals, etc. These labs need standardized testing protocols and measurement standards to ensure valid results of the testing.

The Korea Research Institute of Standards and Science (KRISS) has been developing various types of measurement standards and reference materials for food metrology in the past decade. In this talk, the national and international activities that KRISS has carried out to establish Food Metrology in Korea will be introduced.

Developing standards for food metrology, or food measurement vastly differ from establishing physical standards by every aspect from the core. One huge difference and difficult obstacle to overcome is the food matrix effect that affects/hinders the measurement of the measurand, i.e., if one is measuring vitamin B in cornflake cereal, the matrix is every component except the vitamin B, including starch, sugar, lipid, etc. Therefore, as it can be easily imagined, pure vitamin B measurement cannot replace the vitamin B measurement in food matrix. This complicates food metrology since every reference material, in principle has to be made as matrix reference material as for direct comparison, rather than pure measurands. This complicates the production of reference materials, shortens the storage life of them, and narrows the range of usage of one typical food reference material.

Another huge difference is that, chemical/biological do not have absolute measurement methods and only can be done in a relative matter, i.e., being compared with a (very similar) reference material. You first have to measure a known amount to calibrate or make sure your instrument/protocol is working well, and then proceed to measure the unknown material, and the former is the (certified) reference material.

KRISS has established an absolute measurement standard using the isotope dilution mass spectrometry method (IDMS) which is considered as a primary method for chemical measurement standards, since (1) measurement results are traceable to the SI unit, (2) high accuracy measurement and (3) complete uncertainty statements are available. With this method, KRISS has developed many certified reference materials for food metrology which has a designated value of the measurand(s), and has conducted regular proficiency testings within Korea and also with various international bodies. During this talk, examples of proficiency testings conducted will be presented, along with results before and after the application of IDMS primary method to the testing materials.

Since the limits and complexities of the nature of food metrology and food reference materials, and also since every countries' priority for the item to establish food measurement varies, it is important that each country invest its financial and human resources to establish its own standard for food metrology.

Eng. Hamad Ibrahim Al-Badr
Senior Biomedical Engineer
Biomedical Engineering Department
Prince Sultan Military Medical City (PSMMC)
- Kingdom of Saudi Arabia

Education:
Ph.D. in Higher Education, King Saud University, Riyadh, 2015, Thesis title:" Improving University Engineering Education in Saudi Arabia: Proposed strategy".
Master degree in Biomedical Engineering, California State University- Long Beach, 2004
Bachelor degree in Physics, King Saud University, Riyadh, 1993.

Employment:
8/2010 – present: Senior of Biomedical Engineers, Biomedical Engineering Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.
1/2005 – 7/2010: Biomedical Technology and Electronics Instructor at Electronics Department, Riyadh College of Technology, Riyadh, Saudi Arabia.
9/1993 – 12/2005: Physics instructor, Riyadh College of Technology, Riyadh, Saudi Arabia.

Organizations Membership:
2002- present: Institute of Electrical Engineers (IEEE)
2002- present: Association for the Advancement of Medical Instrumentation (AAMI)
2005- Present: American Society for Engineering Education (ASEE)
2005- Present: Saudi Council of Engineers
2005- Present: Saudi Commission for Health Specialties
2006- Present: Saudi Scientific Society Biomedical Engineering

Title: *Calibrating Medical Devices in Saudi Arabian Hospitals: Reality and Challenges*

Abstract:

Medical devices maintenance, not only, costs billion dollars every year from the national limited income, but also, needs to be handled professionally, to minimize health risks to medical workers, the patients, and the environment. A comprehensive effort and knowledge based methods are needed to improve medical devices maintenance to have them safe, their life is maximized, and total costs are minimized. Like many other developing countries, Saudi Arabia is in need of appropriate and comprehensive solutions to improve medical devices maintenance including performance inspections, corrective and preventive maintenance to justify clinical risk caused by adverse events in health care.

This paper aims to give an overview on the practices of medical devices maintenance, the regulatory requirements of medical devices calibration. Also, to show the procedures of calibrating medical devices and the requirements. The paper will demonstrate the challenges that face calibrating process for medical devices in Saudi Arabian Hospitals.

Keywords: Medical Devices Maintenance, Medical Devices Calibration, Saudi Arabia

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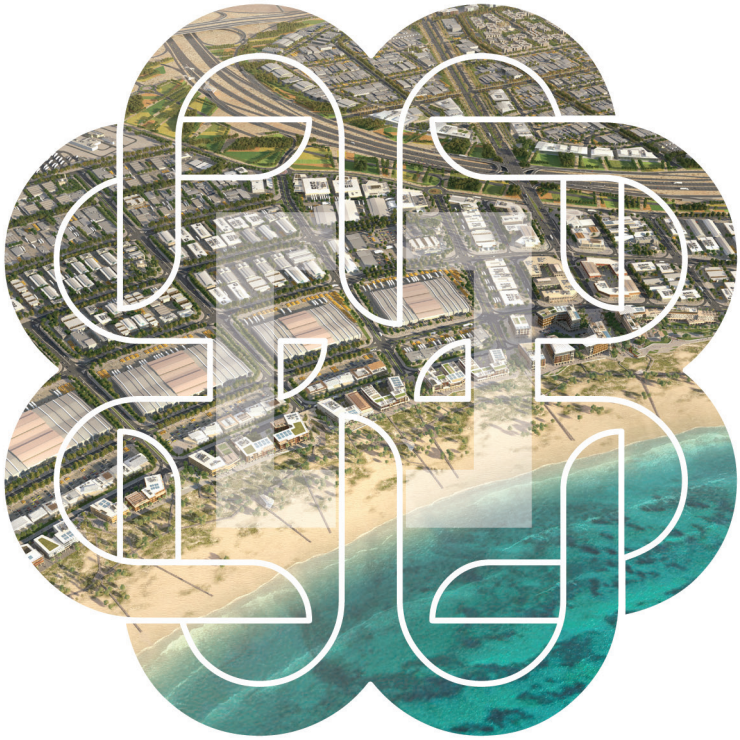

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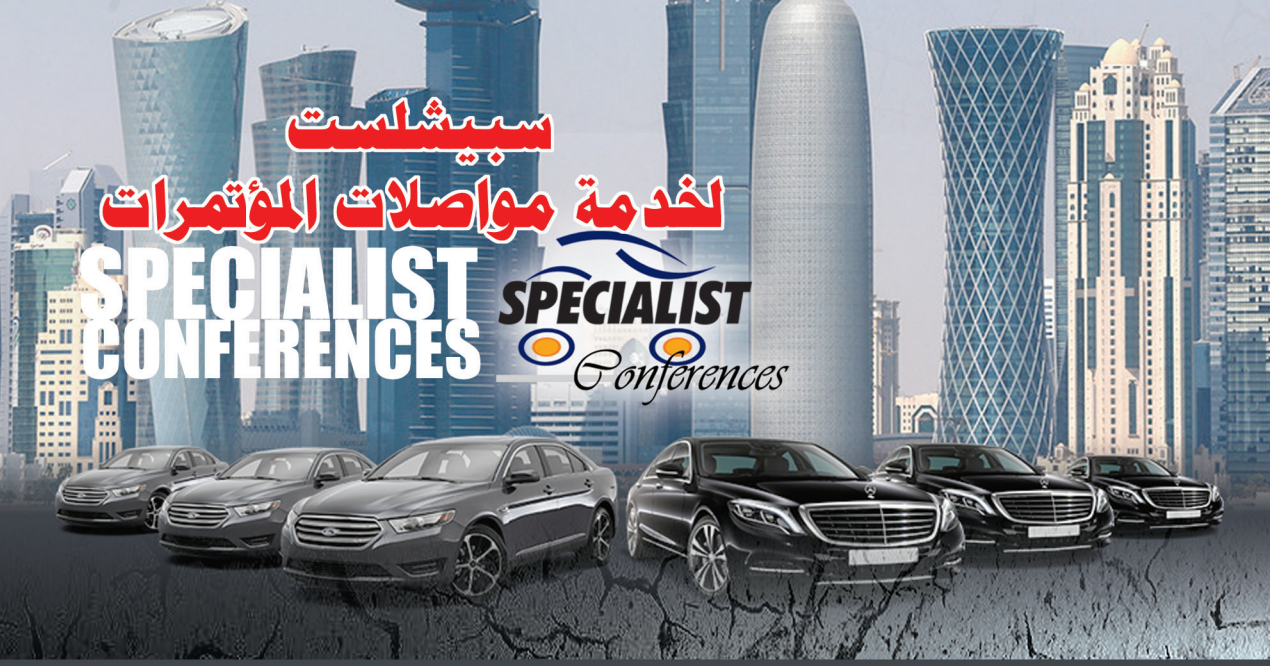

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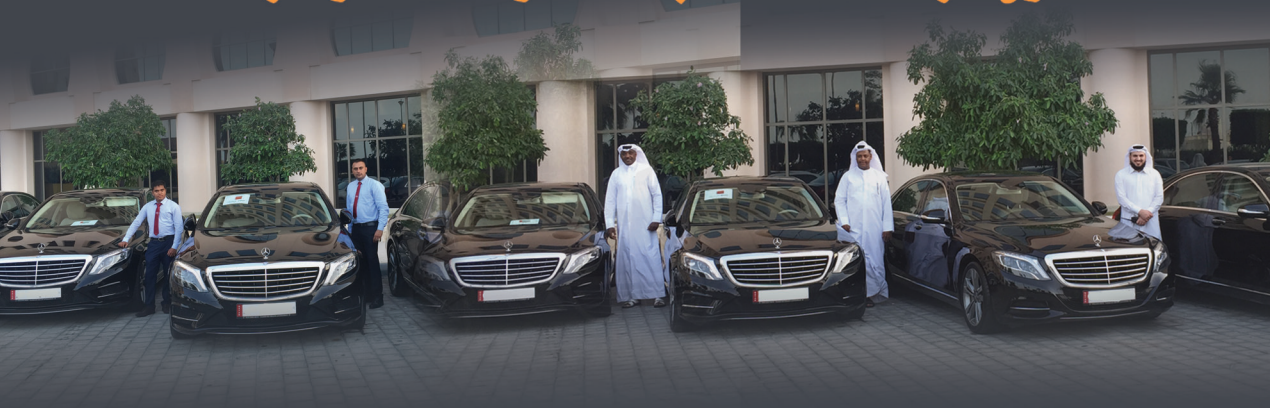

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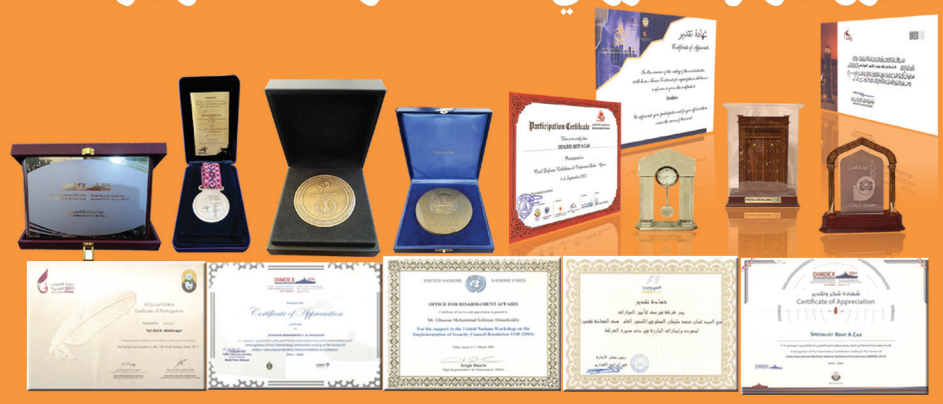

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