A Brief Introduction to NIMT and Metrology in Thailand

Prayoon Shiowattana
National Institute of Metrology (Thailand)

22 January 2014
Table of Content

• Brief history
• Where we stand?
• What’s next?
• New challenges
BRIEF HISTORY
Thailand Metrology Milestones

1912
Siam became a signatory of the Metre Convention

1923
Weight and Measure Act B.E. 2466

1963
The first Calibration Lab started services at TISTR

1997
National Metrology System Development Act B.E. 2540

1998
National Institute of Metrology (Thailand)
1990s: The Decade of Thailand Metrology Infrastructure Establishment

**1991**
Starting of “the idea” to strengthen metrology infrastructure by “visionaries at DSS”

**1993**
Teaming up to draft “Metrology Development Act” – cooperation with the USA

**1996**
The Eighth National Economic and Social Development Plan (1997 – 2001)
2.2 Develop the S&T infrastructure
(4) Establish a national metrology body

**1996**
Thai-German governmental consultations

**1997**
MOU on “Promotion of the Thai Calibration Service” signed by DSS, TISTR and PTB

**1997**
National Metrology System Development Act B.E. 2540

**1998**
National Institute of Metrology (Thailand)

ASEAN-EU STI Days – Bangkok
Reason to Pass the National Metrological System Development Act

- No responsible agency in developing national measurement system
- Incompatibility of measurement, testing, verification, calibration of measuring devices which are essential to manufacturing, quality control
- Access to international market denied

ASEAN-EU STI Days – Bangkok
Structure of National Metrology Bodies

National Metrology System Development Act B.E. 2540

- Chair: Minister of Science & Technology
- Member: Representatives from ministries, the Bureau of the National Budget, the National Economic and Social Development Board, Thailand Chamber of Commerce, the Federation of Thai Industries, Experts in metrology-related fields

National Metrology Board

- Under supervision of the Ministry of Science & Technology
- Metrology Departments
- Administrative Departments
Labs & Offices
DSS provided 3 floors of its Metrology and Library Building for NIMT to house its labs and offices

Standards & Equipment
High precision measurement systems belonged to TISTR and DSS were transferred to NIMT

Staff
Staff of TISTR and DSS who worked on metrology could transfer to NIMT
• Staff of calibration labs of RAF and THAI
Immediate Challenge

1997 Asia Economic Crisis

How to finance NIMT's development plan?

A number of helping hands
- Australia: NMIA
- Germany: PTB
- Japan: JBIC, JICA & NMIJ
- China: NIM

ASEAN-EU STI Days – Bangkok
Financial needs

How to finance NIMT’s development plan?

Friendship Loan From Japan: JBIC Loans

- **1st Loan**: 29 September 1999
  722 Million Japanese Yen for Development Project 1 (Equipment)
- **2nd Loan**: 22 September 2000
  2,202 Million Japanese Yen for Development Project 2 (Lab building & Equipment)

ASEAN-EU STI Days – Bangkok
Technical support: PTB – NIMT

How to find and gain expertise needs?

Promotion of the Thai Calibration Service

- June 1998: NIMT became the official project partner
- 1998 – 2002 Establishment of basic metrological laboratories and services at NIMT
## Development of NIMT laboratories

<table>
<thead>
<tr>
<th>Mechanical Metrology Department</th>
<th>Dimensional Metrology Department</th>
<th>Electrical Metrology Department</th>
<th>Thermometry Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>Optics</td>
<td>Electrical Quantities</td>
<td>Temperature</td>
</tr>
<tr>
<td>Force &amp; Torque</td>
<td>Length</td>
<td>Time &amp; Frequency</td>
<td>Pyrometry</td>
</tr>
<tr>
<td>Pressure &amp; Vacuum</td>
<td>Diameter</td>
<td>HF &amp; Microwaves</td>
<td></td>
</tr>
<tr>
<td>Volume &amp; Flow</td>
<td>Angle</td>
<td>EM Fields &amp; EMC</td>
<td></td>
</tr>
<tr>
<td>Acoustics &amp; Vibration</td>
<td>Roughness &amp; Roundness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Technical support: JICA – NIMT

How to find and gain expertise needs?

Technical Strengthening of National Institute of Metrology (Thailand)

- 2 Phases
  - October 2002 – October 2004
  - October 2004 – October 2008
- 2 evaluations: 2009 and 2012
Choosing quantity and range of measurement

3 months hand-on training with NMIJ researchers: 36 staff of NIMT involved in these trainings

Procure measurement system & equipment recommended by NMIJ researchers

Preparing calibration procedure

Calibration procedure and lab setting were checked by NMIJ researchers
NIMT’s measurement capabilities: Step by Step

1997
- Metrology System Development Act
- Establishment NIMT
- Signing MRA

1998
- JICA-NIMT Project | Phase I | Phase II | 2002 - 2008

1999
- 1st Master Plan (1999 – 2008)
- 2nd Master Plan (2009 – 2016)

2001
- DKD Accreditation for electrical, mass, pressure and length
- CMCs published in KCDB Website for electrical quantities certified by management system certification for support services
- Relocated to new site at Technopolis
- 2005
- 2006
- 2009
- 2010
- 2011
- 2012
- 2013

2002
- CMCs published in KCDB Website for Chemistry - pH, Time & Frequency and Temperature
- CMCs published in KCDB Website for Photometry
- CMCs published in KCDB Website for Chemical
- CMCs published in KCDB Website for Sound, Chemistry & Mass

2003
- National Metrology System Development Project | Phase 1
- National Metrology System Development Project | Phase 2
- DKD Accreditation for Time & Frequency, Vacuum and Temperature
- IA-Japan Accreditation for Wavelength, Acoustics and Vibration
- CMCs published in KCDB Website for Mass and Pressure

2004
- 2006
- 2009
- 2010
- 2011
- 2012
- 2013

2005
- CMCs published in KCDB Website for Length

2006
- 2009
- 2010
- 2011
- 2012
- 2013

2009
- 2010
- 2011
- 2012
- 2013

2010
- 2011
- 2012
- 2013

2011
- 2012
- 2013

2012
- 2013

2013
- 2014

Adapted from Thaniya’s
WHERE WE STAND?
Labs & Offices

- 2 campuses:
  - one in Pathum-thani
  - the other in Bangkok

- Organisation:
  - 7 Metrology Departments
  - 2 Administrative Departments
  - 1 MIS Center

- 47 labs with strictly controlled temperature and humidity
- Good vibration control
- Energy conservation (operated 24 h)
- Easy maintenance with less interruption
- Good working environment
Standards and Equipment
Staff & Budget

• Staff ~ 200
  – Metrologist: 135
    (Bachelor: 40, Master: 50, PhD: 40, Others: 5)
  – Supporting staff: 65
    (Bachelor: 30, Master: 17, Others: 18)

• Budget
  ~200 Million THB from government
  ~30 Million THB from services
Measurement Capabilities & Services

2000
• 70 measurement capabilities
• 1100 services

2003
• 100 measurement capabilities
• 1400 services

2013
• 560 measurement capabilities
• 2800 services
CIPM-MRA and CMCs

October 1999
• Became signatory to CIPM-MRA

July 2003
• First measurement capabilities entered Appendix C (~300 CMCs in electrical metrology)

December 2013
• 452 measurement capabilities registered in the Appendix C
  • 416 Physical
  • 36 Chemical
Technical Cooperation with developing NMIs

- CLMV group countries (Cambodia, Laos, Myanmar and Vietnam)
- South Asia, Mongolia, Fiji, Philippines, Malaysia, Singapore, Brunei and Indonesia
WHAT’S NEXT?
Modes of Operation

- Building foundation
- Building network
- Create tangible impact

ASEAN-EU STI Days – Bangkok
Building Foundation

**Chemical Metrology & Biometry**
- New lab building
- New equipment

**Physical Metrology**
- Upgrading measurement standards
- New measurements

**International recognition**
- Participate in Key Comparisons
- Research & publish peer reviewed articles
• Construction 600 Million THB
  (~ 20 Million USD)
• Equipment 484 Million THB
  (~ 16 Million USD)

• Area 12,000 m²
• 7 floors, 5 groups of laboratories
Building Network

Domestic Network
- Metrology Club
- Chemical Metrology Laboratory Network

Regional Network
- ASEAN Experts Group on Metrology
- APMP, APMP-DEC

International Network

ASEAN-EU STI Days – Bangkok
Create tangible impacts

New transfer measurement standard

SME and Industry
Quality of Life
Consumer Protection & Fair Trade
Torque transfer wrench
Flatness Interferometer

For flatness measurement and calibration
Standard methods for testing and calibration of medical equipment
Measurement method of rubber latex density for trading
Cane and sugar Industry of Thailand

1. One of the biggest sugar exporter, about 7 million tons, worth approx. 30,000 million baht
2. Internal consumption 3 metric tons, worth approx. 20,000 million baht
3. Involved more than 1,000,000 farmers

“Promotion of metrology system for the quality of cane and sugar”
- Reference Material for Brix measurement
- Calibration of refractometer
- Proficiency Testing scheme for brix determination of the sugar industry
- Awareness seminars

Office of The Cane and Sugar Board (OCSB)

Calibrated weighing machine: Fairness of weighing

Calibrated refractometer: Fairness of trading by CCS measurement
NEW CHALLENGES
How to create larger tangible impact?

Extend our traceability to cover new areas
- Public health
- Food safety
- Consumer protection
- Environmental protection
- Disaster mitigation
- Road safety

Organise & Manage our accumulated knowledge and skills to work with & for our users
- Thai SMEs
- Automotive industries
- Food industries
- Train the trainers
- Consultation

ASEAN Integration
- Build up & harmonise metrology infrastructure to support free flow of goods
- Technical cooperation with CMLV countries

ASEAN-EU STI Days – Bangkok
How to create larger tangible impact?

Public health
- Medical device calibration and verification services
- Regulation on critical medical device calibration and verification

Pollution control
- Traceability for noise and vibration control equipment
- Technique and technology in noise and vibration measurements

Train the trainers
- Train vocational school teachers
- Training courses for worker’s skill improvement
Thank you for your kind attention