

## ANNUAL REPORT of Chairperson of COOMET TC 1.5 “Length and Angle” 2013

### 1 General characteristics of cooperation in the field of length and angle

Technical Committee 1.5 “Length and Angle” realizes the COOMET work in the field of metrological assurance of length and angle measurements, including long length and nanoscale.

Within TC there function two Subcommittees:

- SC 1.5.1 “Measurement of long distances outdoors”;
- SC 1.5.2 “Length measurements in the nanometer range”.

### 2 TC work on COOMET Projects

Due to non-expediency of carrying out the following works the following Projects were excluded from the COOMET Program:

#### ***278/UA-a/03 “Conducting of comparisons of line gage comparators”***

After carrying out of measurements in PTB (Germany) the comparison standard was directed to Ukraine. During transportation the standard was hold up for a long term at customs. As the standard stayed in the customs warehouse and in conditions unknown to us, it was necessary to carry out the measurements again. Due to absence of financing it was decided to exclude the Project from the COOMET Work Program.

#### ***370/RU/06 “Comparison of measurement standards of length in the nanometer range”***

Due to absence of financing and long term between the standard measurements being carried out it was decided to exclude the Project from the COOMET Work Program.

#### ***501/UA-a/10 “Comparison of measurement standards of flatness of optical surfaces”***

The Project was excluded due to opening of the Project 570/UA/12 “Comparison of measurement standards of flatness”.

#### **Proposed Projects:**

| No. | Project   | Project Name   |
|-----|-----------|--|
| 1   | 612/UA/13 | Comparison of line scales up to 100 mm   |
| 2   |           | Coordinate-measuring machines. Dimensioning uncertainty  |
| 3   |           | Comparison of measurement standards in the nanometer range   |
| 4   |           | Comparison of standards of evolvent surfaces   |
| 5   |           | "Pilot comparisons of national standards in the field of measurements of flatness at values 0.10 g/m <sup>2</sup> and 0.45 g/m <sup>2</sup> and coverage thickness at values of 10 nm and 50 nm"       |
| 6   |           | Additional comparisons of national standards in the field measurements of the surface coverage density in the range (0.007-0.21) kg/m <sup>2</sup> and coverage thicknesses in the range (1-30) micron |

#### ***612/UA/13 “Comparison of line scales up to 100 mm”***

At this stage there is being manufactured the standard for carrying out of comparisons. The pilot-coordinator is NSC “Institute of Metrology”. The participants are VNIIM (Russia) and INMET (Cuba).

**Agreed Projects:**

| No. | Project      | Project Name  |
|-----|--------------|---|
| 1   | 440/RU/08    | Comparison of stabilized He-Ne/I2 lasers at 633 nm wave-length                                  |
| 2   | 450/UA/09    | Comparison of measurement standards of unit of length for roughness parameters                  |
| 3   | 524/UA-RU/11 | Comparison of measurement standards of face angle   |
| 4   | 527/RU/11    | Additional comparison of the surface coverage density   |
| 5   | 529/RU/11    | Comparison of interferometric measuring systems for tapes up to 20m                             |
| 6   | 563/RU/12    | Comparison of standards of the unit of length in the measurement of deviations from circularity |
| 7   | 564/RU/12    | Comparison of standards of the unit of length in the measurement of deviations from sphericity  |
| 8   | 568/UA/12    | Comparison of initial means of measurement of surface   |
| 9   | 569/UA/12    | Comparison of measurement standards of length in the range from 0.001 to 1 mm                   |
| 10  | 570/UA/12    | Comparison of measurement standards of flatness   |
| 11  | 590/UA/12    | Comparison of precision ranging systems   |
| 12  | 591/UA/12    | Comparison of accurate navigation systems GPS/GLONASS   |
| 13  | 610/UA/13    | Comparisons of standards of flatness diameter up to 300 mm                                      |

***440/RU/08 “ Comparison of stabilized He-Ne/I2 lasers at 633 nm wave-length”***

The Project is closed, the Report B is prepared. The preparation to the final report and drawing up in KCDB is being carried out.

***450/UA/09 “Comparison of measurement standards of unit of length for roughness parameters”***

The Project is closed. The Report A is being drawn up and the results are being approved.

***524/UA-RU/11 “Comparison of measurement standards of face angle”***

The Project is being conducted. INIMET (Cuba) and the Centre on Standardization and Metrology at the Ministry of Economics and Antimonopoly Policy of the Republic of Kyrgyzstan expressed his interest to participation in this comparison. The documents for shipment of the standard to INIMET is being drawn up.

***527/RU/11 “Additional comparison of the surface coverage density”***

The Project is closed, the Report B is prepared. The preparation of the final report and drawing up in KCDB is being carried out.

***529/RU/11 “Comparison of interferometric measuring systems for tapes up to 20m”***

The Project is being conducted. The documents for shipment of the tape to the next participant, NSC “Institute of Metrology” (Ukraine), is being drawn up.

***563/RU/12 “Comparison of standards of the unit of length in the measurement of deviations from circularity”***

The Project is closed. The measurements have been conducted by the participants. The Report B is being prepared.

**564/RU/12 “Comparison of standards of the unit of length in the measurement of deviations from sphericity”**

The Draft Technical Protocol is prepared. The comparison is on the stage of the standard search. NSC “Institute of Metrology” (Ukraine) and VNIIMS (Russia) expressed their interest.

**568/UA/12 “Comparison of initial means of measurement of surface”**

The Project is closed, the Report B is prepared. The preparation of the final report and drawing up in KCDB is being carried out.

**569/UA/12 “Comparison of measurement standards of length in the range from 0.001 to 1 mm”**

The Project is closed. Expected are the data of the standard measurement in BNIIM (Russia) for drawing up of the Report A.

**570/UA/12 “Comparison of measurement standards of flatness”**

The standard is damaged at transportation in BelGIM (Belarus). It is planned to hold repeat measurements with application of another standard.

**590/UA/12 “Comparison of precision ranging systems”**

NSC “Institute of Metrology” (Ukraine) hosted the comparison as the NMI-pilot. Participation in comparisons was confirmed by BelGIM (Belarus) and VNIIFTRI (Russia). At present time the preparation of the Technical Protocol is being carried out.

**591/UA/12 “Comparison of accurate navigation systems GPS/GLONASS”**

NSC “Institute of Metrology” (Ukraine) hosted the comparison as the NMI-pilot. Participation in comparisons was confirmed by VNIIFTRI (Russia). At present time the preparation of the Technical Protocol is being carried out.

**610/UA/13 “Comparisons of standards of flatness diameter up to 300 mm”**

The Project is in process. The measurements are being conducted by the participants of comparisons.

### **3 Proposals on the TC 1.5 meeting results**

1. It was proposed to open the Project on the methods of comparative analysis of different measurement methods of big lengths measurement.

FGUP “VNIIFTRI” expressed its interest in work. The approved name of the Project is “Approval of the measurement results of the bases with the length up to 1 kilometer with laser range finder and GPS receivers”.

2. To ask the countries-members of COOMET “Length and Angle” to state their measuring capabilities in the field of measurements of internal dimensions up to 150 mm.

3. To hold supplementary comparisons of standards in the field of measurements of internal measurements and, in case of statement of this Project, to ask PTB to be the laboratory-pilot.

4. The Technical Committee TC 1.5 “Length and Angle” should consider the issue regarding creation within the committee of the direction “Measurement of Deformation”.

On 22 October, 2013, there was held the TC meeting on length of EURAMET. There were discussed the results of projects of the European Metrological Research Program (EMRP), in particular, of the Project “Dynamic Mechanical Properties and Long-term Deformation Behaviour of Viscous Materials”. Due to the work of EURAMET in this field it is proposed to create the Subcommittee SC 1.5.3 “Measurement of deformation” within COOMET.

#### **4 TC works on participation in realization of international agreements**

In 2013 there was issued the 9-th revision of the classifier of calibration capabilities in the field of the length measurement – “DimVIM: Multilingual CMC classification scheme”. The classifier is available for downloading at the site of BIPM via reference [http://kcdb.bipm.org/appendixC/L/L\\_services.pdf](http://kcdb.bipm.org/appendixC/L/L_services.pdf). The changes in the contents haven't been made.

According to the resolution of the 31-d meeting of JCRB there was renewed the application form for new comparisons and those being conducted (“Key and supplementary comparison registration and progress form”). This application form is available for downloading at the site of BIPM via reference [http://www.bipm.org/utills/common/documents/jcrb/registration\\_and\\_progress\\_form.pdf](http://www.bipm.org/utills/common/documents/jcrb/registration_and_progress_form.pdf). The notification about the change of the application form was send to all members of TC 1.5.

At the meeting of JCRB there was proposed the draft document of EURAMET “Towards sustainable Agreement CIPM MRA”. In the document there are stated proposals on simplification of the system of CIPM MRA realization and increasing of its effectiveness. There are expected the remarks of the member countries of CIPM MRA.

The Chairman of CCL WG-MRA A. Lewis prepared the draft guidelines “CCL survey of the usefulness and accessibility of the current KCDB and of the CIPM MRA processes”. The project is on the stage of discussion and introduction of proposal.

#### **5 Cooperation with International and regional organizations**

##### **Nanoscale 2013**

Within the period 25-26 April, 2013, in Paris (France) there was held the conference “Nanoscale 2013”.

This conference was organized under the guidance of Metrologie et d'Essais (LNE), Physikalisch-Technische Bundesanstalt (PTB) and EURAMET TC-L. During the conference there took place the meetings of a big number of Joint Research Programs (JRP).

##### **Meeting of the Joint Committee on standards and COOMET Committee**

Within the period 4-6, June, in FBU “Nizhniy Novgorod CSM” (Nizhniy Novgorod, Russia) there was held the meeting of the Joint Committee on standards and COOMET Committee. The Chairman of TC 1.5 V. Kupko took part in the meeting with the report about the work of TC performed for 2012.

##### **Kick-off meeting of JRP SIB60 Surveying**

Within the period 8-9 July, 2014, there was held the meeting of the Joint Research Project (JRP) “SIB60 Surveying”. Among COOMET Member Countries in this Project there were represented NSC “Institute of Metrology” (Ukraine) and Physikalisch-Technische Bundesanstalt (PTB).

The meeting was opened by the Project coordinator Dr. F. Pollinger (PTB). The meeting participants delivered the report to the following topics:

- Introduction and management of the Project;
- Structure of the Project Working Groups and the fields of research;
- Description of activity directions and capabilities of NMI in the Project etc.

NSC “Institute of Metrology” was represented by the report of P. Neyezhnikov and V. Kupko “Long Distances Measurements in National Scientific Centre “Institute of Metrology”.

15 reports from each Member Country of JRP SIB60 Surveying were delivered at the meeting.

##### **The Second International Seminar on Metrology**

In September 2013 Mrs. Alejandra Ernandes (INIMET, Cuba) took part in the Second International Seminar on Metrology in Bogotá, Columbia, organized under the sponsorship of Columbian School

of Industrial Carriers (ECCI) for training of her students metrological topics. Alehandra Ernandes delivered the following reports:

- Metrology in routine life;
- Metrological Provision of the national economy;
- Scientific, Legislative and Industrial Metrology;
- Education in Metrology.

### **MTK 441 "NANOTECHNOLOGIES"**

On the 3-d of October in FGUP "VNIIMASH" (Moscow, Russia) there was held the meeting of ITC 441 "NANOTECHNOLOGIES".

The main tasks of ITC are organization and performance of works on national, regional and international standardization in the field of activity connected with development, production, turnover, utilization, safety of nanomaterials, metrological provision of nanoindustry, and also classification and determination of terms in the field of nanotechnologies.

### **The 8<sup>th</sup> Industrial Symposium on Quality 2013 "Quality for development and general welfare"**

In October, 2013, Alehandra Ernandes took part in the meeting of the 8-th Industrial Symposium on Quality 2013 "Quality for development and general welfare" in Havana. At the meeting there was delivered the report "Basics of Metrology". The course book for the higher technical education, which one of the authors she was. This course book will be published in the nearest future.

### **Meeting of the Consultative Committee on length**

Within the period 11-12 November, 2013, in ITRI (Taipei, Taiwan) there was held the regular meeting of the Consultative Committee on length within WG-MRA, WG-S and WG-N.

12 participants from Asian-Pacific Metrological Program (APMP), European Association of National Metrological Institutes (EURAMET) and Intra-African Netrological System (AFRIMETS) took part in the meeting.

On the first day of the meeting the Chairman of CCL on WG-MRA A. Lewis summarized the results of the Committee work for the previous review period. The participants delivered the reports about the stat of comparisons topics.

The following recommendations and normative documents were proposed for discussion in the agenda:

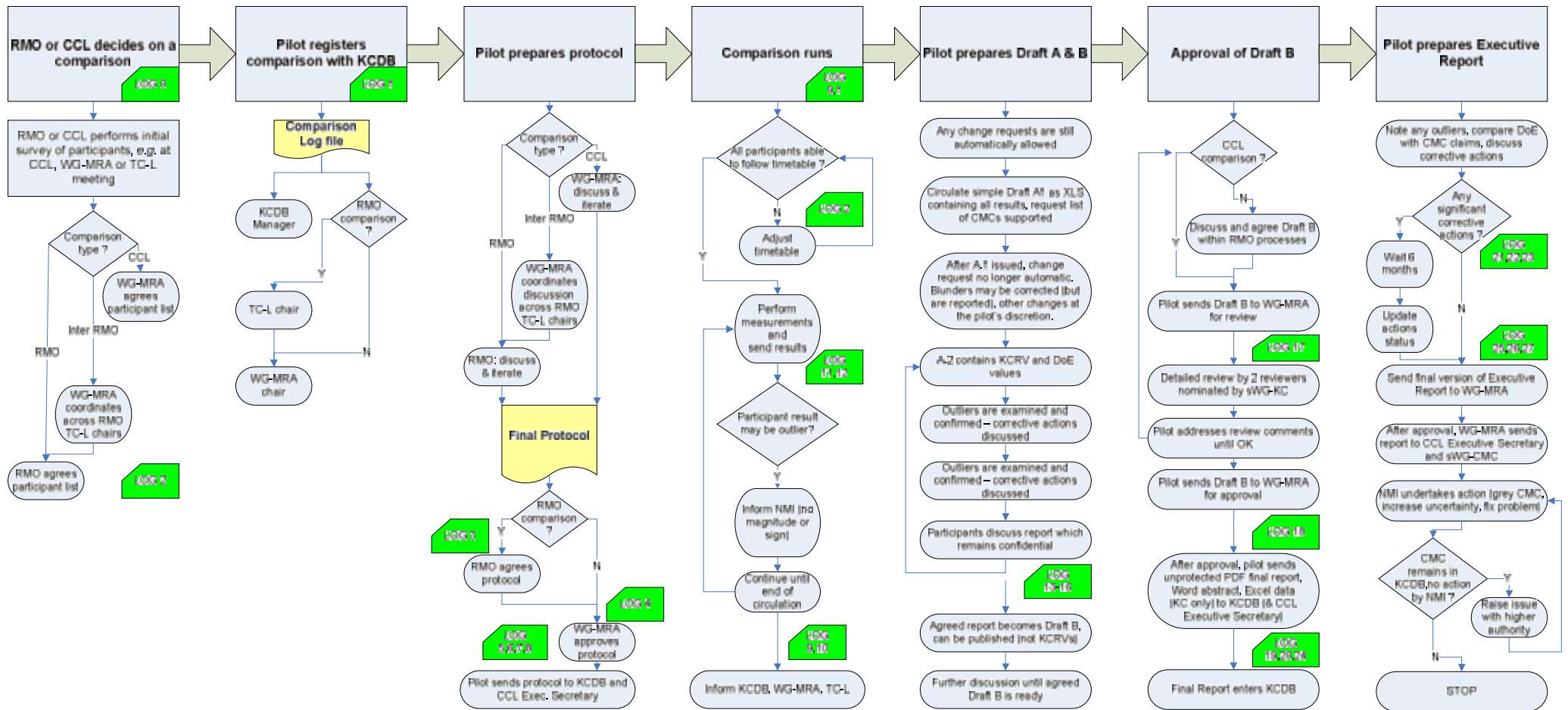
- "Running of MRA comparisons in length metrology and monitoring their impact on CMCs"). Below the comparison conducting scheme stated in this guide is presented.
- "Comparison scheme applied in dimensional metrology";
- "Guide to preparation of Key Comparison Reports in Dimensional Metrology";
- "Strategy 2013-2023 Consultative Committee for Length";
- "Status report on length metrology comparison", etc.

Materials for review and tracking of changes are available at address <http://www.bipm.org/wg/AllowedDocuments.jsp?wg=CCL-WG>.

### **Regular meeting of JRP SIB60 Surveying**

Within the period 16-18 December, 2013, in INRIM (Turin, Italy) there was held the regular meeting of JRP SIB60 Surveying.

17 reports about the result of work of the Project Working Groups for the review period were delivered at the meeting. NSC "Institute of Metrology" was represented by the report of P. Neyezhnikov and V. Kupko to the topic: "The NSC "Institute of Metrology" rangefinders".



The process of comparison conducting is in accordance with “Running of MRA comparisons in length metrology and monitoring their impact on CMCs”

**The representatives of Physikalisch-Technische Bundesanstalt (PTB) took part with the reports in the following conferences:**

- 4. GETPRO Kongress, Würzburg, 05-06, March, 2013
- 4. Symposium Produktionstechnik - innovativ und interdisziplinär, Zwickau, 17-18, April, 2013
- ASPE Spring Topical Meeting 2013, Cambridge, 21-23, April, 2013
- 10th Seminar on Quantitative Microscopy (QM) and 6th Seminar on Nanoscale Calibration Standards and Methods (NanoScale 2013), Paris, 25-26, April, 2013
- SPIE Conference Optical Metrology: Modeling Aspects in Optical Metrology IV, Munich, 13-14, May, 2013
- Conference Optical Measurement Systems for Industrial Inspection, Munich, 13-16, May, 2013
- 114. Jahrestagung der Deutschen Gesellschaft für angewandte Optik 2013 (DGaO 2013), Braunschweig, 21-25, Mai, 2013
- Measurement 2013, Smolenice, 27-30, May, 2013
- 13th International Conference of the European Society for Precision Engineering and Nanotechnology, Berlin, 27-31, May, 2013
- Euspen Conference, 13th International Conference of the European Society for Precision Engineering and Nanotechnology, Berlin, 27-31, Mai, 2013
- 17th ETH-Conference on Combustion Generated Nanoparticles, Zurich, 23-26, June, 2013
- The 11th International Symposium of Measurement Technology and Intelligent Instruments, Aachen and Braunschweig, 01-05, July, 2013
- ISPM 2013, Guiyang, 08, August, 2013
- 62nd CIRP General Assembly, Copenhagen, 18-24, August, 2013
- Fringe 2013: 7. International Workshop on Advanced Optical Imaging & Metrology, Nürtingen, 08-11, September, 2013
- ISMQC 2013, the 11th International Symposium on Measurement and Quality Control, Cracow-Kielce, 11-13, September, 2013
- 11th International Symposium on Measurement and Quality Control 2013, Cracow-Kielce, 11-13, September, 2013
- SPIE Photomask Technology, Monterey, Calif., 10-12, September, 2013
- 6. Kolloquium Mikroproduktion, Braunschweig, 08, Oktober, 2013
- International Conference on Gears, Munich, 07-09, October, 2013
- Mikrosystemtechnik-Kongress, MST 2013, Aachen, 14-16, Oktober, 2013
- 5. Fachtagung Metrologie in der Mikro- und Nanotechnik, Nürtingen, 23-24, Oktober, 2013
- 27th Annual Meeting of the American Society for Precision Engineering, San Diego, CA, 21-26, October, 2013
- 12th IEEE Sensors 2013, Baltimore, Maryland, 03-06, November, 2013
- Seventh International Conference on Sensing Technology (ICST 2013), Wellington, 03-05, December, 2013
- IMEKO TC3 & TC & TC22 International Conference (2014). IMEKO 2014: TC3, TC5 and TC Conference, Cape Town, 03-05, February, 2014
- SPIE Metrology, Inspection, and Process Control for Microlithography XXVII, San Jose, Calif., 24-28, February, 2013

Vladimir Kupko,  
Chairperson of TC 1.5