EUROMET • European Collaboration in Measurement Standards

EUROMET TC Length
Chairman's Annual Report 2003/2004

1. Introduction

The annual Technical Committee for Length (TCL) meeting was held in Dublin over two days in October 2003 and was hosted by NML/Enterprise Ireland. There were 29 attendees from 28 countries. Immediately after the meeting there was a workshop on the subject of software in length metrology.

The TCL Web site (www.npl.co.uk/euromet/length) has been updated to contain copies of all available project forms, as well as details of all length key comparisons, CCL, EUROMET, and bilateral comparisons. The site also contains information on the status of Length CMCs from all RMOs and copies of presentations from several TCL workshops. The web site received over 19,000 accesses in the last 12 months (13,000 the year before).

One third of current TCL projects are concerned with MRA matters including some of the first round of key comparisons and their follow-up projects. This is significant because a series of new key comparisons is about to start, according to the latest agreed CCL schedule guidelines, so by next year, half of the TCL projects will be in direct support of the MRA. One long term service devolution project is about to end (polarimetry/saccharimetry) and some new scientific cooperation projects have begun. Including all the new members, each country has been involved in at least one project.

2. Most important issues and outcomes

Perhaps the biggest issue in TCL at the moment is a result of the additional workload of the MRA across the RMOs. EUROMET is both fortunate and unfortunate in being such a large RMO: it has a large pool of leading NMIs available to distribute the workload of the MRA key comparisons, but its size is also causing problems in key comparisons, where up to 26 participants may seek involvement in the more popular key comparison subjects. Other RMOs have been struggling to start their RMO key comparisons, and now that the second round of CCL comparisons is about to commence, the RMOs and the CCL have had to find a more fair and efficient system of performing the necessary comparisons in support of the MRA.

A new system of key comparisons is to be tried. The CCL will no longer run key comparisons except where specific needs arise. The RMOs will continue to run key comparisons in a set of subjects specified by the CCL. These RMO key comparisons will seek inter-RMO participation and will be organised on a time-staggered basis. This provides for sufficient inter-regional linking and removes the 'double duty' previously imposed on the linking laboratories (those involved in both CCL and RMO key comparisons). In regions where there are few 'top tier' NMIs, this should have the effect of halving the necessary effort in key comparison work for these NMIs. An added advantage is that NMIs performing poorly in one RMI key comparison will be able to join a similar comparison in another RMO, within a shorter timescale than the usual 7-yearly cycle of the key comparisons. Close cooperation between the RMO TCs and the CCL is envisaged.

The details are yet to be worked out and the idea is under trial, with the backing of the BIPM

Director and the CCL. The first comparisons to be operated under the new scheme will probably be EUROMET TCL comparisons which should be starting this year, in the subjects of diameter and 1-D CMM artefacts.

3. Problems / issues encountered

Aside from the new plans on key comparisons to ease the workload, the only other problem in TCL has been delays in completing the internal EUROMET reviews of new or significantly altered CMCs. New CMCs were sent out to the nominated experts, for review, in July 2003 however some experts were unaware of these CMCs, so the CMCs were again sent after the October 2003 TCL meeting. Despite a deadline of December 2003 the review was still not completed by end March 2004. The reasons given were slow response to questions asked by the CMC reviewers and also slow response of the expert reviewers themselves.

A question also arose as to whether or not any CMC entry which claimed traceability to another NMI would require the service offered by the other NMI to also have an accepted CMC entry. It was decided that, ideally, the supplying NMI should have a relevant CMC, but that deviations from this rule were acceptable if the traceability was well documented.

The CCL has also made recommendations to pilots of key comparisons, asking them to immediately notify participants whose results appear anomalous during a key comparison. The MRA text requires data to be withheld until Draft A report is ready but for some key comparisons, this could mean a wait of some years, during which time the potentially erroneous service would still be operated for customers' measurements.

4. Inter-regional contacts and collaboration, etc

The only significant inter-regional contact continues to be via the meetings of the CCL and its working groups (CCL-WGDM and CCL-WGMeP). Last year there were meetings of the CCL and the CCL-WGMeP, at the BIPM in September and also a WGDM meeting during August, in San Diego, where there was an SPIE conference, which included a specific Dimensional Metrology programme. Additionally, around the time of the last CCL meeting, the BIPM hosted a joint meeting of the CCL and CCTF working groups to discuss potential use of radiations specified in the *Mise en Pratique* as secondary realisations of the second.

5. Research trends

In the nanometrology area, projects 'MEMSTAND' and 'NANOMET' were not successful under FP6 application. MEMSTAND has since been resubmitted, NANOMET has not (no suitable call), however the planned NANOMET SPM seminars will continue separately, organized by PTB. These setbacks have delayed the NANO initiative project, which is now, instead, considering organising a small comparison in the area of 'Small CMMs'. With the high capital costs associated with nanometrology research, it is difficult to see how significant progress will be achievable in the NANO initiative project if MEMSTAND re-submission is unsuccessful.

6. MRA: Issues of general interest and concern

6.1 CCL key comparisons

All the first round CCL key comparisons have completed their artefact circulations. Final reports have been received for CCL-K1 (gauge blocks), K2 (long gauge blocks) and K5 (1-D CMM artefacts). Draft reports have been circulated for K3 (angle) and K4 (diameter). K6 (2-D CMM artefacts) is yet to make any report (late due to equipment problems at the pilot laboratory).

KC	Pilot	Status	EUROMET participants	EUROMET meas. date
CCL-K1	CH	completed	CH GB FR	1999
CCL-K2	GB	completed	GB IT DE	1999
CCL-K3	ZA	draft A seen	FR IT CH DE	2001
CCL-K4	USA	draft A seen	CH DE GB IT	2000/2001
CCL-K5	DE	completed	ES IT CH DE	2000/2001
CCL-K6	MX	draft A expected	FR CZ NL GB DE	2001/2002

6.2 NANO studies

The associated NANO pilot studies (organised at the request of the CCL) are half complete: Final reports are available for NANO2 (step height), NANO3 (linescales) and NANO4 (1-D gratings), but NANO1 (linewidth) and NANO5 (2-D grids) are yet to start.

6.3 EUROMET key comparisons

The current status of EUROMET key comparisons is as follows:

KC	Pilot	Project #	Status	Meas. date	Comments
EUROMET.L-K1	FR	471	draft B seen	1999/2000	supersedes L-K1.PREV
EUROMET.L-K1(a)	NO	643	draft A seen	2002	subsequent to L-K1
EUROMET.L-K2	GB	602	running	2002 - 2005	supersedes L-K2.PREV
EUROMET.L-K3	DE	371	completed before MRA	1996 - 1999	L-K3.2005 to be planned
EUROMET.L-K4	CH	384	completed before MRA	1996 - 1998	L-K4.2004 planning about to start
EUROMET.L-K5	DE	372	completed before MRA	1996 - 1998	L-K5.2004 planning to start
EUROMET.L-K6	DE	743	proposed	2004-2005	about to start

6.4 EUROMET supplementary comparisons

Status of the currently active EUROMET supplementary key comparisons is as follows:

SC, subject	Pilot	Project #	Status	Meas. date
EUROMET.L-S10, Squareness	SK	570	draft A seen	2000 - 2002
EUROMET.L-S11, Surface texture	DE	600	completed	2001/2002
EUROMET.L-S12, Gauge blocks by comparison	IE	601	draft A seen	2001/2002
EUROMET.L-S14, Steel tapes	CH	677	running	2003/2004
EUROMET.L-S15, step height measurement by SPM	DE	707	planning	2004/2005

6.5 CMCs

Interregional review of COOMET.L.1 CMCs by EUROMET was finally completed late 2003. Since then, SIM raised some new questions, based on key comparison performance, which have now been dealt with by SIM and EUROMET has also accepted these latest modifications.

The last year saw several interregional reviews of length CMCs by EUROMET, mostly performed by the TCL chairman to avoid additional burden on Length CMC Experts:

- APMP.L.1.2003
- SIM.L.1.2003
- SIM.L.2.2003
- COOMET.L2.2004

Minor CMC updates requested by DE, NO were processed directly.

EUROMET.L.3.2003 containing submissions from AT, BG, CH, CZ, DE, HU, IT, LT, LV, NO, RO, YU was prepared in March 2003 and simple updates were submitted directly in July by the previous TCL chairman. More detailed updates were sent to expert reviewers in July 2003, re-sent in October 2003, but are yet to be completed. This means a delay of at least one year from end of preparation to completion of review.

The First set of CMCs from Slovenia has been received and is being processed.

7. MRA: Lessons learned in implementation of MRA

There is now an agenda item at each TCL meeting, 'Impact of recent key comparison reports on CMC entries'. This is where any problems highlighted by key comparison performance are discussed. In October 2003, some issues were discussed where NMIs had outlying results in key comparisons or NANO studies. The resolution of these problems was discussed and it was decided there was no need to withdraw the relevant CMCs. This was because the technical problems had been solved or the laboratory was suspending the service for the interim period. It

was felt that withdrawal of CMCs followed by subsequent re-instatement would take too long.

8. Selected projects for potential 'case study'

It has been difficult to select a project from TCL as the majority of projects are either key comparisons for MRA purposes or specific co-operations on technical issues, usually between a small number of NMIs. The three projects most fitting the requirements were:

588: Traceability of surveying and geodetic instruments

593: PRAQIII Inter-comparison of length measurements

659: The combination of scanning probe microscopy, optical interferometry and x-ray interferometry

Project 588 was a survey into the traceability routes for techniques and instruments used for large scale metrology, in the surveying and geodesy fields. This is an example of where contact persons were able, through EUROMET, to make an efficient summary of the needs and available resources throughout Europe and to help NMIs decide if there were any metrology gaps which they needed to address.

Project 593 was an international inter laboratory comparison under the PHARE III program, designed to assist with the harmonisation of best practices in length metrology. The comparison was designed to show the equivalence between the NMIs of the PHARE countries and those of existing EUROMET members. This was a forerunner of the MRA and helped provide evidence for these NMIs to join EUROMET.

The last projects was a good examples of where two countries' NMIs agreed to work together on an area of mutual interest. This sort of collaboration was difficult or probably even impossible before EUROMET was set up to allow this type of detailed interaction between scientists of NMIs in Europe.