

REPORT FROM EURAMET TECHNICAL COMMITTEE FOR ACOUSTICS, ULTRASOUND AND VIBRATION (TC-AUV)

1. Introduction

This report summarizes activities within EURAMET Technical Committee for Acoustics, Ultrasound and Vibration (TC-AUV) from September 2006 to August 2008.

TC-AUV activities are organized in the following way: General issues are under the responsibility of the Technical Committee and technical issues are dealt with in the three Sub-Committees (SC) covering different subject fields: Sound in Air, Ultrasound and Underwater Acoustics, Acceleration and Vibration. The activities of each Sub-Committee are coordinated by a permanent convener. The structure of TC-AUV was slightly changed in the year 2008. Due to a lack of participants and active projects within SC "Underwater Acoustics", by decision of the 2nd EURAMET General Assembly the SC was merged with SC "Ultrasound". Membership within the Sub-Committees is currently as follows:

SC "Acceleration and Vibration"	: 15
SC "Sound in Air"	: 18
SC "Ultrasound and Underwater Acoustics"	: 4

Overall, TC-AUV has representatives from 24 members and associates of EURAMET out of 37.

All TC-AUV Sub-Committees have regular annual meetings. The period under review started with the meeting of SC "Acceleration and Vibration" held at BEV (Austria) on April 12-13, 2007. The meeting of SC "Ultrasound" was held at NPL (UK) on April 20, 2007, and meetings of SC "Sound in Air" and TC-AUV were arranged at PTB (Braunschweig, Germany) on May 10-11, 2007.

Four meetings were organized in the year 2008. Meeting of the SC "Acceleration & Vibration" was held on April 10 -11, 2008 at METAS (Bern-Wabern, Switzerland). The meeting was attended by 15 persons representing 14 NMIs and DIs from 14 countries. Joint meeting of SC "Ultrasound" and "Underwater Acoustics" was hosted by PTB (Braunschweig, Germany) on 18th of April 2008. The meeting was attended by 7 persons representing 5 NMIs and DIs from 4 countries. Meetings of SC "Sound in Air" and TC-AUV were held on May 8-9, 2008 in Bucharest (Romania). INM was the host of the meetings. Last two meetings were attended by 19 persons representing 17 NMIs and DIs.

Meetings of SC's usually include very interesting discussions covering specific technical issues. An adhoc workshop on the different versions of sine-approximation systems set up and used in different NMIs organized during last SC "Acceleration and Vibration" meeting could be given as an example. Presentations on the subject were given by representatives of six NMIs or DIs.

2. Projects

All project within EURAMET are divided into four different categories: "Comparisons", "Cooperation in Research", "Traceability" and "Consultation". Currently there are a total of 8 active projects (1 - comparison, 3 - consultation, 1 - cooperation, 3 - traceability) in TC-AUV. 4 projects (3 comparison, 1 cooperation) were completed in 2006 and 3 projects (2 comparisons, 1 cooperation) were completed in 2007. Additionally 2 projects in the field of "Sound in Air" under the category "Cooperation in Research" were completed and officially closed in 2008. The statistics of TC-AUV projects are given in following tables.

Table 1. Statistics of TC-AUV Projects

	Number of Projects
Proposed	6
Agreed	8
Completed	30
TOTAL	44

Table 2. Distribution of Projects by Category

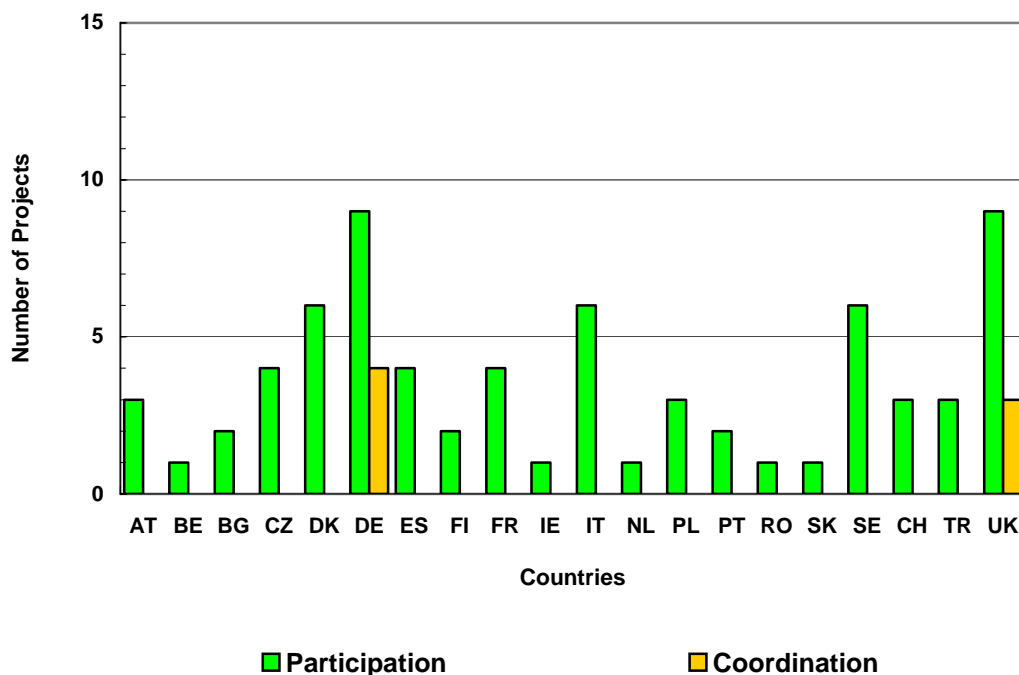
	Comparison	Co-operation	Traceability	Consultation	Total
Proposed	2 (1)	3 (2)	-	1 (0)	6 (3)
Agreed	1 (3)	1 (5)	3 (3)	3 (4)	8 (15)
Completed	13 (10)	16 (13)	-	1 (0)	30 (23)

(Figures in brackets denote the numbers for the year 2006)

Table 3. Distribution of Active Projects by Subject Field

	Number of Projects
Sound in Air	2
Vibration	5
Ultrasound and Underwater Acoustics	1
TOTAL	11

The involvement of EURAMET members in EURAMET TC-AUV projects is shown in the following graph.



Details of the EURAMET projects could be found on the EURAMET web-site www.euramet.eu and a brief summary of a single active EURAMET TC-AUV project under the category “Cooperation in Research” is given below:

Project No 792 The project entitled “**Investigation of methods for secondary free-field calibration of working standard microphones**”. The project is intended to investigate the viability of different methods of secondary free-field calibration of microphones and compare the results of these methods. It also addresses the need for a suitable sound source for free-field calibration. The results of the project are to be the input for the IEC working group preparing the next part of the IEC 61094 series of standards on measurement microphones to describe methods of secondary free-field calibration of working standard microphones by comparison with laboratory standard microphones.

In general, during the establishment of new Regional Metrology Organization, EURAMET, and transferring the responsibilities from EUROMET to EURAMET in 2007, main efforts were put for closing all old projects and updating the project data base accordingly. The new projects were proposed and carried out starting from June 2008. At the preliminary stage proposals for 2 new projects were discussed in SC “Acceleration and Vibration”, for 2 new projects in SC “Ultrasound and Underwater Acoustics” and 5 projects in the SC “Sound in Air”.

3. Comparisons

3.1. Key Comparisons

NMIs and DIs from EURAMET are participating in the following CCAUV comparisons:

CCAUV.A-K2 “Calibration of LS1P microphones at low frequencies” with 6 participants from EURAMET (BEV, CEM, DPLA, NPL, PTB, UME). The measurement stage within the comparison was completed in 2006. Draft B of the comparison report is discussed by participants and is submitted to CCAUV for approval in October 2008.

CCAUV.A-K4 “Free-field reciprocity calibration of LS2F microphones” with 3 participants from EURAMET (LNE, DPLA, PTB). The measurement stage within the comparison, which is piloted by DPLA (DK), is completed. Pilot laboratory will issue Draft A of the comparison report before CCAUV meeting.

CCAUV.V-K1.1 “Calibration of accelerometers” with a single participant from EURAMET. PTB (DE) is a pilot of the comparison with a participation of 4 NMIs from other RMOs. The measurement stage within the comparison was completed in 2007. Draft B of the comparison report is discussed by participants and is submitted to CCAUV for approval in October 2008.

The following EURAMET AUV comparisons are in progress:

EUROMET AUV.V-K1.1 (EUROMET project 897) with 5 participants: BEV (AT), INETI (PT), LNE (FR), BIM-NCM (BG) and PTB (DE). PTB is acting as the pilot of the comparison. Currently Draft B of the comparison report is approved by participants and it is submitted to CCAUV for approval.

EURAMET NMIs and DIs are also involved in key comparisons within other RMOs. The examples of these comparisons are following:

COOMET.AUV.A-K1: 4 participants from EURAMET (PTB, SMU, GUM, UME). PTB is the pilot of the comparison. Draft B of the comparison report is approved by participants and it is submitted to CCAUV for approval.

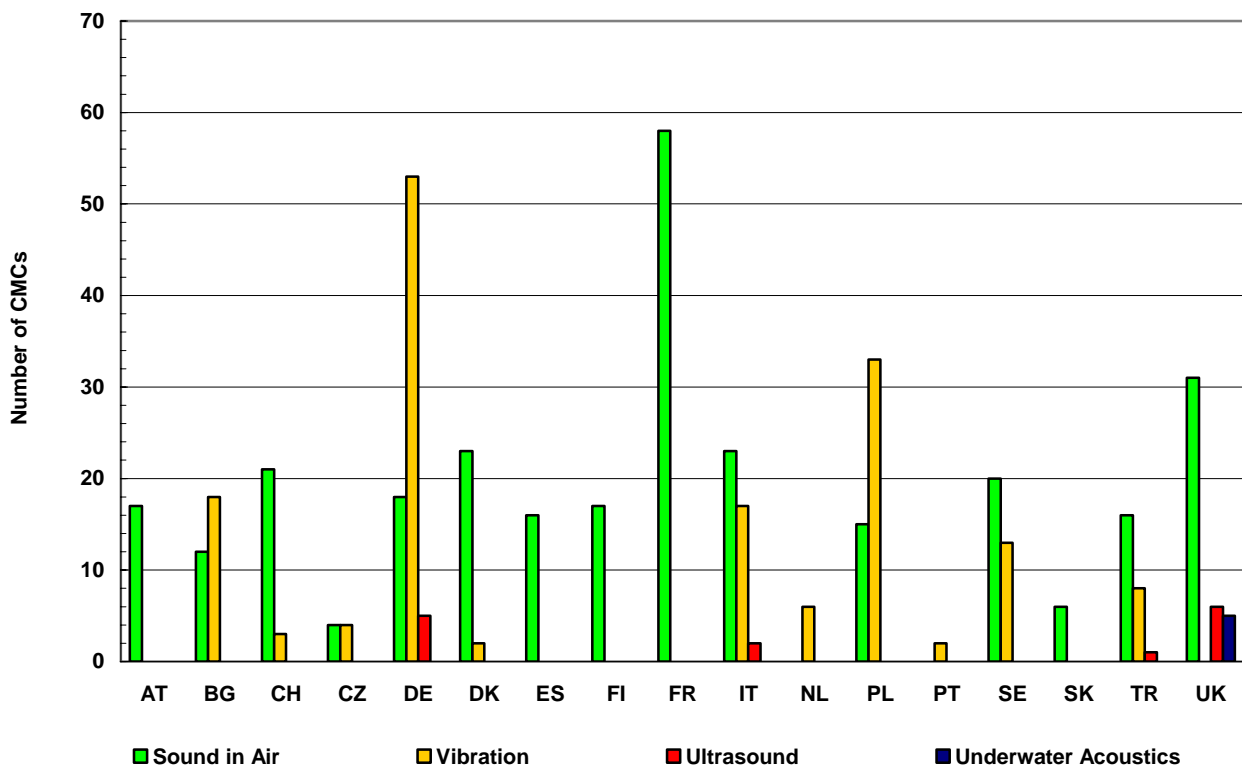
COOMET.AUV.V-K1: 3 participants from EURAMET (GUM, UME, INM). VNIIM (RU) is the pilot of the comparison. Measurement stage within the comparison is completed.

3.2. Bilateral Comparisons

There were no bilateral comparisons within the period under review. However, new comparison between PTB (Germany) and METAS (Switzerland) in the field of vibration is in the preparatory stage. Comparison is already registered as a EURAMET Project 1066 on the EURAMET database. Later comparison was registered at the BIPM KCDB with identification code EURAMET.AUV.V-K1.2.

4. CMCs

17 European countries have CMC entries approved and published on the BIPM KCDB. The overall number of published CMCs is 475. The distribution of EURAMET AUV CMCs by country and subject field is given in the following graph.



A new CMC batch containing new and modified entries from 11 countries was compiled in 2007. The internal review process started in January 2007. New and modified CMCs from five countries (Denmark, Italy, Poland, Portugal and United Kingdom) were approved by the EURAMET TC-AUV CMC Working Group. For the other 6 countries, additional documentary evidence and further discussion was required. This action concerns modified CMCs with declared uncertainty values smaller than those declared in a relevant CCAUV and RMO key comparisons.

It was decided to split the CMC batch into two batches. The first batch (EUROMET.AUV.7.2007) containing CMC entries from Denmark, Italy, Poland, Portugal and United Kingdom was forwarded for interregional review in summer 2007. All entries within the EUROMET.AUV.7.2007 CMC batch

were approved and published on the BIPM KCDB in January 2008. The remaining part of the previous CMC batch passed regional review in 2008 and compiled new CMC batch (EUROMET.AUV.8.2008) was released for interregional review in June 2008. Batch consists of new/modified CMC entries from Denmark, Austria, Spain and Romania.

Further intra review of new EURAMET CMCs in AUV field will start in the beginning of 2009. Intention to submit new or modified CMCs was expressed by Bulgaria, France, and Czech Republic.

During the period under review, EURAMET TC-AUV reviewed two CMC batches from other RMOs. The COOMET.AUV.4.2007 CMC batch, containing nine new CMC entries for the field of sound in air from DNDI (Ukraine) was reviewed and approved in September 2007. APMP.AUV.3.2006 CMC batch containing 19 entries in the field of sound in air and 2 entries for ultrasonic power measurements from NIM (China) was reviewed and approved in February 2007.

Currently, EURAMET TC-AUV is involved in the review of APMP.AUV.2008.4.2008 CMC batch containing new and modified CMC entries in the field of sound in air and vibration.

Due to the fact that in 2007, many NMIs and DIs submitted modified CMCs entries with uncertainty values lower than those declared in relevant key and supplementary comparisons, there was agreement on the need for a new guidelines document describing general principles for such situations. **“Guidelines for Change and Interpretation of Uncertainty Statements in CMC Claims with Response to Results of Key Comparisons”** was prepared and discussed in 2007. It is planned to recommend the document to the TC AUVs of other RMOs via the CCAUV Executive Secretary. In addition, **“Guidelines for Bilateral Comparison”** was prepared in order to regulate the situation with respect to the organization and carrying out of bilateral comparisons within TC-AUV. Both documents were approved after discussion via e-mail communication. Many principles outlined in the **“Guidelines for Change and Interpretation of Uncertainty Statements in CMC Claims with Response to Results of Key Comparisons”** were used during the revision of the EURAMET Guide 8 and now included in the new version of the Guide 8.

5. Participation in ERA-NET+ Bridging Action

EURAMET TC-AUV was involved in the preparation of two Joint Research Project (JRP) within the bridging action ERANET+ toward European Metrology Research Program (EMRP). The first JRP, entitled **“External Cancer Beam Therapy”** includes a work package related to the characterization of High Intensity Focused Ultrasonic (HIFU) transducers. Four NMIs, PTB (DE), NPL (UK), INRIM (IT) and UME (TR), are involved in the activities within the work package. The project was selected by the EMRP Committee for funding and started in 2008. The second project entitled **“Virtual Human”** includes the **“Artificial Ear”** work package. This project was not selected for funding.

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25th of September 2008
Gebze – Kocaeli / TURKEY