

EUROMET Mass Annual Report 2000

1 General Aspects

The Euromet Mass year 2000 was again dominated by the collation, review and correction of individual CMC Tables submitted by member NMIs, for entry into the BIPM databank as Appendix C in support of the CIPM-MRA. In Section 3 below, the status of the Mass tables is described. Although there have been some problems with certain deleted entries on account of their overly optimistic assigned uncertainties, it is envisaged that ratification by the JCRB and entry to the databank be effected for Mass CMCs by the end of 2001.

Section 2 contains a short report of the Mass Contact Persons Meeting held in Lisbon in February 2001, therein the meeting for the first time of Mass representatives from other RMOs. Contact has been made and collaboration over the CMC tables has begun.

The statistics of Euromet Mass activities for 2000, defined in **four project categories**: *Interlaboratory comparison; Research collaboration; Traceability (calibration); Consultative collaboration*, are shown in three histograms:

Figure 1 shows the frequency of these categories in each technical section (M&DQ), **Fig. 2** shows the number of projects in each section. Up to the end of 2000 there were 36 projects overall, as usual the sections Mass, Pressure and Force being most strongly represented. The histogram of **Fig. 3** shows the members' participation in and coordination of projects, which can be regarded as a reflection of regional metrological strength in the member countries.

2 Meetings

The EUROMET Mass Contact Persons' (CP) meeting was held in IPQ, Lisbon, Portugal, from 22. to 23. February 2001, chaired by the Rapporteur. There were 45 delegates from 27 countries (a record number of countries). Particularly interesting and beneficial this year was the participation of the Mass representatives from the other RMOs APMP, SIM, SADCMET and COOMET, as well as NIST (USA). Prior to this meeting, on 19. February, subfield pressure and density CMC Chairpersons' sessions were held to finalise the CMC tables in these subjects; the other subfields' tables are complete and ready for ratification. Subsequently, on the 20. and 21. February, 11 auxiliary sessions were held in IPQ, chaired by the Project Coordinators, to discuss the progress of their respective Euromet Mass projects. The current projects, updated to March 2001, are collated in **Table 1**.

The Rapporteur used the opportunity for discussion with the other RMOs to advance the inter-regional harmonisation of the CMC work; and since it appears that Euromet is in the lead here, the meeting was certainly also beneficial for the RMOs' progress towards entry of their own CMC tables into the reciprocal review loops, and thence to the databank. A mutual collaboration decision was taken (see also Section 3).

The Rapporteur-elect for the period of office 2001-2004/5 was introduced to delegates at the CP meeting: *Dr. Lars Nielsen* of DFM (DK) will take up office in May 2001. In addition, last year three subfield conveners had been nominated and elected to help distribute the Rapporteur's workload more evenly,

partly in consequence of the time-consuming CMC work: *Dr. Lars Nielsen* (DFM/DK) for Mass, *Dr. Rolf Kümme* (PTB/DE) for Force and *Mrs. Pauline Leggat* (NPL/UK) for Pressure.

3 Mutual Recognition Arrangement (CIPM-MRA)

Key Comparisons

The following completed, or still ongoing (see Table1), key comparisons have been submitted to the BIPM key comparison database, as Appendix B of the CIPM-MRA; there has been provisional acceptance:

Mass: Project N° 215 (regional); N° 445 (to run in three stages until 2004) and N° 510 (completion expected for 2003)

Density: Project N° 236

Pressure: Project N° 45 and 110 (the results of these were discussed at the CP meeting above, in the light of a reappraisal and new analysis of the results to establish the equivalence of all the participating labs.); Project N° 305; N° 389, N° 439 and N° 442

Force: Project N° 505; N° 518 (to start 2002) and N° 535 (to start 2003); all three are regional

Viscosity: Project N° 273; N° 303 and N° 415.

Calibration and Measurement Capabilities

The Euromet Mass *internal review* (fourth Contact Persons' loop) of the full CMC M&DQ submitted table entries, from all participating NMI members, took place in the summer of 2000. Since then, harmonisation corrections have been made and such progress that almost all subfield entries have been finalised. and could be ratified at the CP meeting in Lisbon, February 2001. At the time of this report, we are collecting the completed and signed CMC review-Questionnaires from each submitting country (NMI) in each subfield. The tables, the appropriate Questionnaires and a CMC review report shall be forwarded to the Euromet Chairman by 15. May this year, in anticipation of JCRB presentation in October and entry into the databank end of 2001. Those countries who sent in late entries (after internal review and after the CP meeting) have been deferred to a new review in 2002.

At the CP meeting in Lisbon, it was decided that all five RMOs present would *mutually interchange* their Mass CMC tables for *reciprocal review* as soon as these are finalised.

4 Projects

Table 1 represents the status quo of Euromet Mass Projects, grouped according to subject with relevant information on each:

Reference List

Rapporteur: 2000 EUROMET Mass and Derived Quantities Newsletter, Issue 8 (in press).

Table 1: EUROMET MASS Projects**Subfield Mass**

Number of Project	Coordinator	Subject	Report
215 C Class: Key comparison (regional)	Severn (GB)	Intercomparison stainless steel kg BE, DE, DK, ES, FI, FR, GB, IT, NO, SE	NPL Report CMAM 36A Sept. 2000
336 A Class: Research cooperation EC funded	Becker (DE)	Primary mass standards based on atomic mass CEC, DE, IT, SE	Ongoing 28.03.00
351 A Class: Research cooperation	Gosset (FR)	Workshop "Secondary & reference mass standards" (BIPM) CZ, DE, DK, ES, FI, FR, GB, IT, NL, NO, SE, TR	Ongoing 25.03.00
395 A Class: Research cooperation	Gläser (DE)	Convection effects in mass calibration due to temperature (BIPM) DE, DK, ES, FI, FR, GB, IT, SE, TR	Ongoing 12.04.00
402 A Class: Cooperation	Spurný (SK)	Elaboration of guide for mass measurement CZ, DK, ES, FI, FR, GB, IT, NL, NO, SE, SK, TR	Ongoing 11.02.00
445 A Class: Key comparison	Pendrill (SE)	Comparison of mass standards in multiples and sub-multiples of the kilogram All Members & Associate Members	Ongoing 30.10.00
461 A Class: Comparison	Kriz (CZ)	Comparison of 500 kg mass standard weight AT, BE, CH, CZ, DK, ES, FI, GB, GR, HU, IT, IE, NO, SE, SI, TR	Ongoing 15.03.00
503 C Class: Consultation on facilities	Plassa (IT)	Determination of CO ₂ content for air buoyancy calculation in mass measurement (BIPM), CH, DE, DK, ES, FI, FR, GB, IT, NL, SE, TR	Final report 11.12.00
509 A Class: Research, comparison	Davidson (GB)	Intercomparison of Pt-Ir kilogram standards (BIPM), BE, CH, CZ, DE, DK, ES, FI, FR, GB, HU, IT, NO, PL, SE, SI, SK,	Start: August 2000 10.02.2000
510 A Class: Key comparison	Davidson (GB)	Comparison of mass standards of the kilogram (stainless steel) BE, CH, CZ, DE, DK, ES, FI, FR, GB, HU, IE, IS, IT, NL, NO, PT, SI, TR	Ongoing 10.02.00

A = Agreed**P = Proposal****C = Completed**

519 A Class: Research cooperation	Khelifa (FR)	Correlations between air humidity & abnormal dispersion of refractive index of air (BIPM), DE, DK, FR, GB, IT, SE	Ongoing 24.03.00
551 A Class: Research cooperation	Pinot (FR)	Study of roughness measurement techniques for characterisation of mass standard surface quality FR, SE, USA	Ongoing 28.02.00
592 C Class: Comparison	Carneiro (DK)	PRAQIII intercomparison of mass measurements AL, BA, BG, CZ, EE, FYROM, GB, HU, LT, LV, PL, RO, SK, SI	Start: 01.03.00 Final report: 01.08.00
598 A Class: Research cooperation	Glaeser (DE)	Investigation of magnetic interactions between mass standards and weighing instruments CH, DE, ES, FI, FR, GB, SE	Ongoing 17.02.00

Subfield Density

Number of Project	Coordinator	Subject	Report
138 A/O Class: Traceability	Bettin (DE)	Calibration of master hydrometers DE, GB	Ongoing 10.10.00
144 A Class: Research cooperation	Gläser (DE)	Air density (BIPM), DE, GB, SE	Ongoing 12.04.00
339 C Class: Comparison	Richard (CH)	Intercomparison of volume standards by hydrostatic weighing (BIPM) AT, BE, CH, DE, DK, ES, FR, GB, HU, IT, SE	Final report 07.04.00

Subfield Pressure

Number of Project	Coordinator	Subject	Report
291 C Class: Consultation	Legras (FR)	Uncertainty digital piston manometer DE, DK, ES, FI, FR GB, IE, IT, NL, SE	Final report 03.04.00
389 C Class: Key comparison	Perkin (GB)	100 MPa hydraulic pressure comparison BE, CH, CZ, DE, DK, ES, FI, FR, GB, IT, NL, PT, SE, SK, TR	Final report 29.09.00
439 A Class: Key comparison	Redgrave (GB)	Gas media and gauge mode from 50 kPa to 7 MPa AT, BG, CZ, DE, DK, ES, FI, FR, GB, HU, IE, IT, NL, PL, PT, RU, SE, SK, TR, ZA	Ongoing 15.02.00
442 A Class: Key comparison	Legras (FR)	Comparison in the low pressure range $1 \cdot 10^{-4}$ Pa to 1000 Pa CZ, BG, DE, ES, FI, FR, GB, HU, IT, NL, SE, SI, SK, TR	Ongoing (two phases) 17.02.00

455 A Class: Consultation on facilities	Rantanen (FI)	Intercomparison in the pressure range 50 to 350 kPa CZ, ES, FI, NL	Ongoing 30.03.00
463 A Class: Research cooperation	Sabuga (DE)	Calculation of elastic distortion and associated uncertainty in piston cylinders operating up to 1 GPa DE, FR, GB, IT, TR	Ongoing 15.02.00
499 A Class: Research cooperation	Leggat (GB)	Bulletin-board of concerns, problems and experiences BE, CH, DE, DK, ES, FI, FR, GB, GR, HU, IE, IT, NL, NO, PL, PT, SE, TR, ZA	Ongoing 17.02.00
534 A Class: Research cooperation	Tesar (CZ)	Low pressure digital piston manometer with nominal effective area 100 cm ² CZ, DE, GB, IE, SE	Ongoing 29.02.00
537 A Class: Interlaboratory comparison	Tesar (CZ)	Bilateral comparison linking to CCM key comparison in pressure range to 7 MPa CZ, TR	Ongoing 29.02.00

Subfield Force

Number of Project	Coordinator	Subject	Report
113 A/O Class: Research cooperation	Ferrero (IT)	Force multi-component DE, FI, FR, GB, IT, PT, TR	Ongoing 03.04.00
285 A Class: Comparison	Sawla (DE)	Force traceability 16,5 MN DE, DK, FI, GB, IT, SE, TR	Ongoing 11.12.00
286 A Class: Comparison	Sawla (DE)	Force traceability at national laboratory level in range up to 2MN DE, FI, SE, TR	Ongoing 11.12.00
349 C Class: Traceability	Gosset (FR)	Calibration of torque measuring devices and transfer standards up to 200 kNm DE, FR, GB	Final report 24.02.00
505 A Class: Key comparison (regional)	Kumme (DE)	Comparison of force standards from 500 kN to 4 MN BE, CH, CZ, DE, ES, FI, GB, HU, IT, PL, SE, TR	Ongoing 13.12.00
518 P Class: Key comparison (regional)	Knott (GB)	Intercomparison of force standards at 50 kN and 100 kN AT, CH, CZ, DE, GB, GR, HU, NL, PL, PT	To start: 01.01.2003
535 P Class: Key comparison (regional)	Pusa (FI)	Intercomparison of force standards at 5 kN and 10 kN CH, CZ, DE, FI, HU, IT, PL, PT, SE,	To start: 01.01.2002

Subfield Viscosity

Number of Project	Coordinator	Subject	Report
005 A/O Class: Traceability	Klingenberg (DE)	Viscosity measurement services DE, GB	Ongoing 04.12.00
415 A Class: Key comparison (regional)	Klingenberg (DE)	Intercomparison in high viscosity range and test of surface tension correction factors DE, FR, IT, NL, PL, PT, SK RO, RU, JAP	Ongoing 04.12.00

Subfield Hardness

Number of Project	Coordinator	Subject	Report
26 A Class: traceability	Germak (IT)	Hardness standards GB, IT	Ongoing 16.02.01

Others

Number of Project	Coordinator	Subject	Report
604 A Class: Research cooperation	Simpson (GB)	Comparison issues All members participating in M&DQ work (23 countries)	Started March 2000 Ongoing 20.11.00

Figure 1: Frequency of categories according to technical section

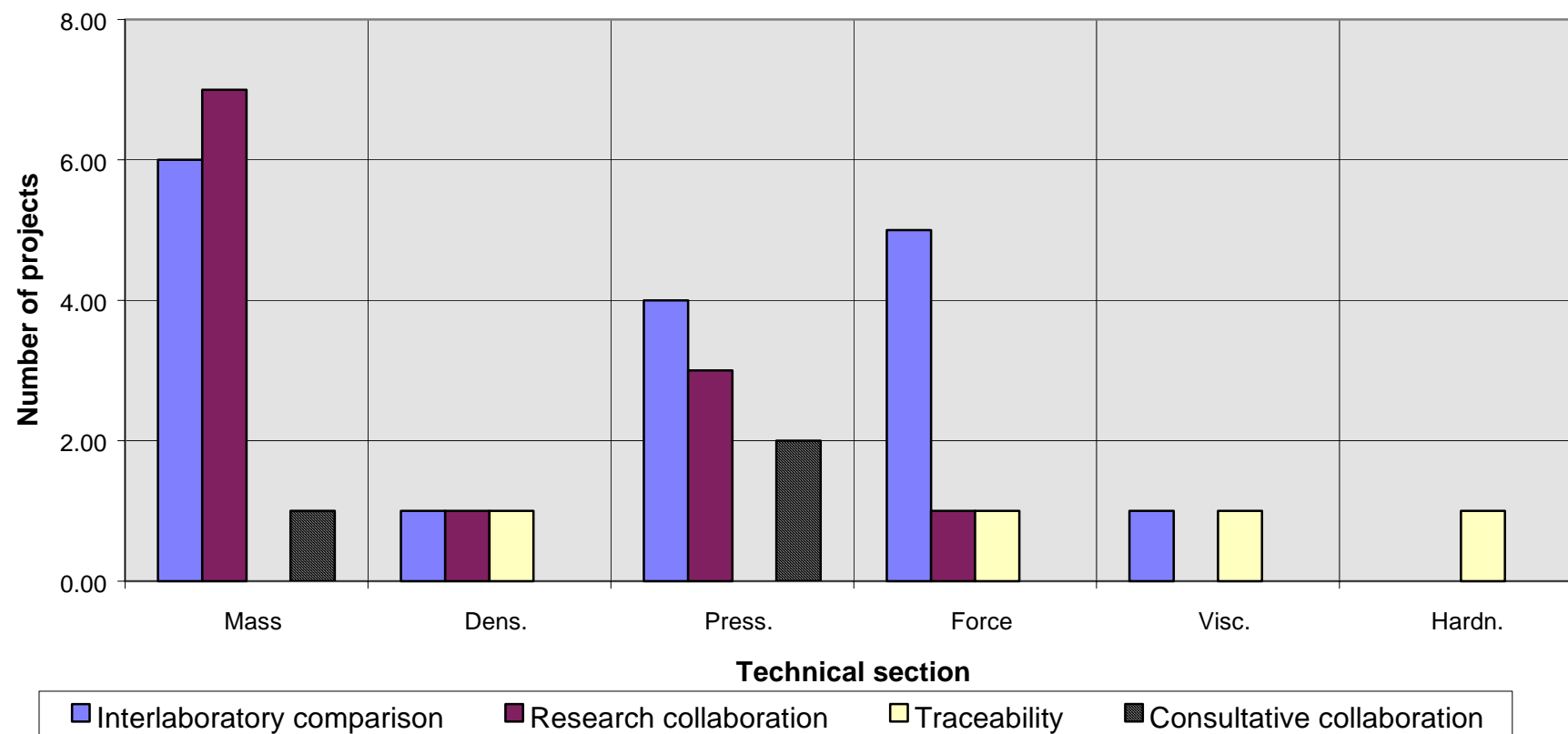


Figure 2: Number of projects according to technical section

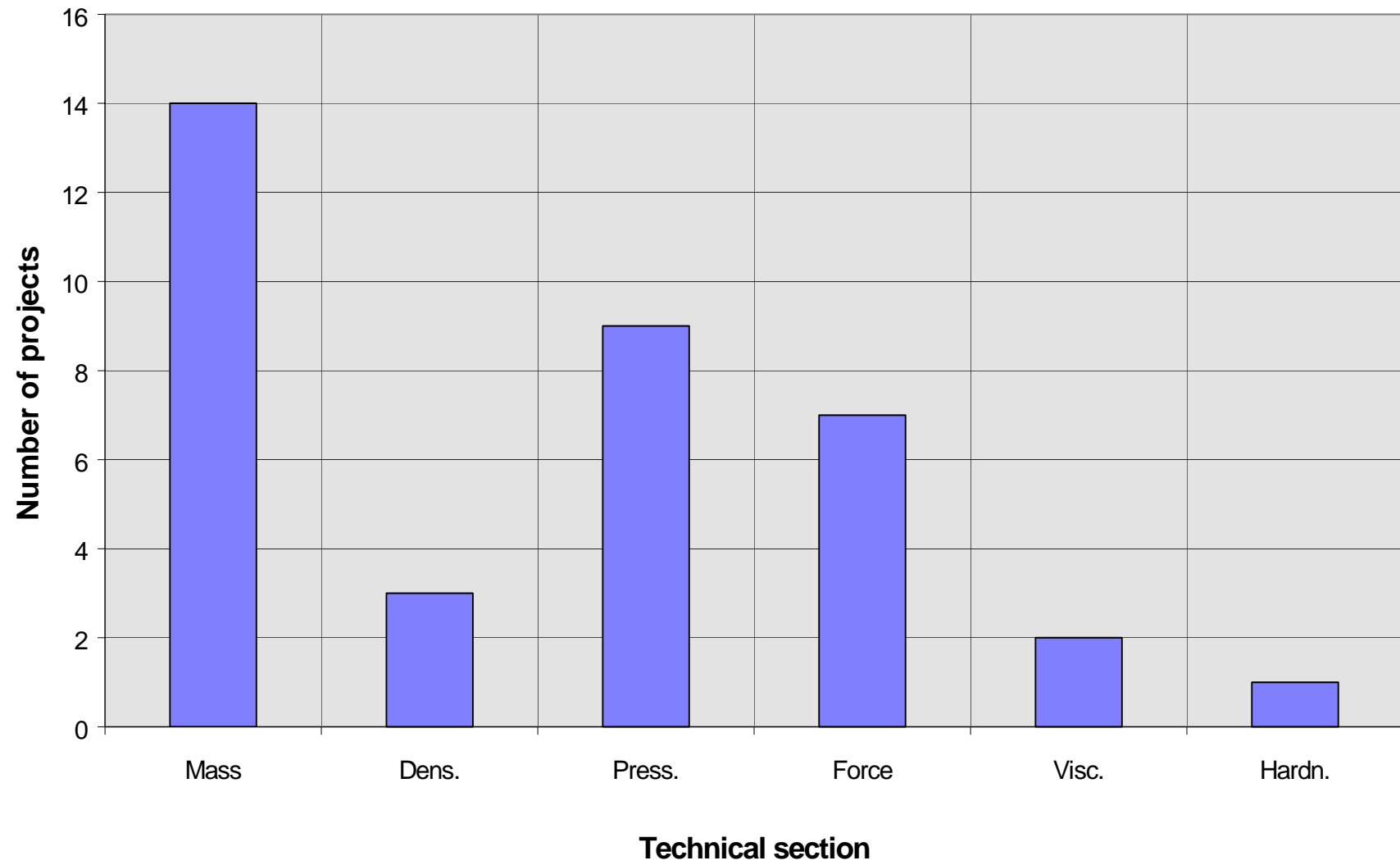


Figure 3: Participation in and coordination of projects

