EUROMET PROJECT
FINAL REPORT OF COMPARISON

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3A. Partners:
(institutions)
KUL, IMGC, PTB

3B. CEC funded?

4. Participating countries:
BE, DE, IT

5. Title:
Intercomparison of techniques for measuring CMM geometric errors

6. Results:

The intercomparison included the following steps:

1. <u>Preliminary experimental activities</u>: two CMMs were used to measure two ball plates –one per CMM– repeatedly in different positions and orientations in the working volumes;

2. <u>calculation of error maps</u>: on the basis of these measurement data, the participants calculated the CMM error maps according to their own techniques; these maps were used afterwards to compensate point coordinates in the subsequent steps;

3. <u>comparison of residuals</u>: statistics of the residual errors of point-to-point distances after compensation on some additional measurement data not used in step 2 were computed; the results were standard deviations within 0.94 µm and a maximum of 3,41 µm, as opposed to 3,23 and 11,94 µm, respectively, on uncompensated raw data.

4. <u>ball-plate compensation</u>: the coordinates of the compensated data in step 3. were compared with the participants' means; statistics of the dispersions are reported in the first three columns of each CMM sub-table. These means were also compared with independent calibration values provided by the PTB, and the results are reported in the last columns.

	CMM1				CMM2			
	IMGC /µm	KUL /µm	PTB /µm	Calibrat. /µm	IMGC /µm	KUL /µm	PTB /µm	Calibrat. /µm
Std. deviation	0.20	0.21	0.22	0.42	0.25	0.32	0.33	0.53
Maximum	0.55	1.03	0.91	1.50	1.04	1,63	1.50	2.45
N. of positions	2	2	2	2	4	4	4	4

5. <u>simulation of point lattices</u>: for each CMM 2000 simulated points regularly disposed in a lattice covering the whole of measuring volumes were compensated; each participant's results were compared with others' after a least-squares best-fit rototranslation. The results were standard deviations within 1,5 µm; in one case a standard deviation of 4 nm was achieved, showing an almost complete coincidence of error maps.

Further details are available from the co-ordinator and in A. Balsamo et al., *Annals of the CIRP*, 46/1/1997, 463-466.

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