

## EUROMET PROJECT FINAL REPORT

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5. Participating countries: AT, DE, HU														
6. Title: Training and practical issues in gauge block metrology														
<p>7. Progress:</p> <p>This project was dealing with two important aspects of gauge block metrology. The first part was basically an on-site training of BEV-staff and OMH-staff in wringing techniques by experts of the PTB. This part was completed in 2004. The roughness correction for interferometrical gauge block calibration was the main work in this project. Different techniques were tested for applicability for the BEV laboratory. The method at the BEV was the simple stack technique which is time consuming and depends on a handful short blocks with nominally the same roughness. PTB uses the TIS (totally integrating sphere) technique which is fast and convenient but needs a calibration and does not work with ceramic artifacts. During this project ways to calibrate the TIS output were discussed and tested. PTB provided a calibration (together with individual roughness values) of a set of 8 steel gauge blocks. These artifacts were then used at BEV for further work. First a recalibration ( with no roughness correction applied) was compared to the values of PTB. Values from the coupled interferometer method were obtained by using transparent wringing platens and inverted mounting. For the evaluations PTB provided measured spectral complex refractive indices of steel. Finally values from the stack technique were also measured. The results can be seen in the table:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <td style="width: 10%;">PTB</td> <td style="width: 40%;">TIS</td> <td style="width: 50%;">5 nm ± 1 nm</td> </tr> <tr> <td>BEV</td> <td>coupled interferometer</td> <td>9 nm ± 10 nm</td> </tr> <tr> <td>BEV</td> <td>stack</td> <td>19 nm ± 10 nm</td> </tr> <tr> <td>BEV</td> <td>comparison to PTB</td> <td>20 nm ± 10 nm</td> </tr> </table> <p>Conclusions:</p> <ul style="list-style-type: none"> <li>• Values obtained by TIS (PTB) and other techniques at BEV do not fit together very well.</li> <li>• The elegant coupled interferometer technique has problems with the fringe fraction calibration used at BEV (as opposed to phase stepping) and with inhomogeneities in the platen material.</li> <li>• For the calibrations of a new TIS gauge blocks with different roughness must be available which is not easy.</li> </ul> <p>Therefore it was decided at BEV to stay at the established stack method.</p>			PTB	TIS	5 nm ± 1 nm	BEV	coupled interferometer	9 nm ± 10 nm	BEV	stack	19 nm ± 10 nm	BEV	comparison to PTB	20 nm ± 10 nm
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9. Completion date: 2006	10. Coordinator's signature: 	11. Date: 2. 2. 2007												