

Abstract:

## **Practical Applications of an enhanced Uncertainty Model for Build-Up Systems for the use of ISO 7500-1 Calibrations**

Falk L. Tegtmeier, Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100,  
D-38116 Braunschweig

Within the EURAMET-funded EMRP SIB 63 project which deals with transfer standards in the meganewton range, a new uncertainty model for a parallel connection of force transducers, a so-called build-up system (BU system) was developed. This lecture, in general, describes an optimized strategy for lowering uncertainties when using BU systems. Therefore, investigations to optimize the mechanical design for such systems were conducted and a new adapted measurement procedure with a derived uncertainty model was developed. Finally, the usefulness of this theory is demonstrated in practical applications at NPL (London, UK), at the MPA (Braunschweig, Germany) and at FJIM (Fuzhou, China). The results finally demonstrate the ability of PTB to calibrate material testing facilities in the higher meganewton range. Such machines are required, for example, in the fields of structural engineering and regenerative power engineering. For this purpose, a 30 MN testing machine for tensile and compressive testing was built at MPA Braunschweig and the TU Braunschweig. The nominal load of this machine is thus greater than the largest European primary standard for tensile and compressive forces. To enable traceability to this standard up to 30 MN, the results of the research project EMRP SIB 63 were further developed in order to enable a metrological link according to the ISO 7500-1 standard.