Conference
Precision Photonics Systems ´22
Dornbirn, Austria

IN-PROCESS MEASUREMENT FOR PRECISION MANUFACTURING OF OPTICAL COMPONENTS

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Manufacturing of optical components places the highest demands on the manufacturing processes as well as on the metrology in order to achieve typical form deviations <100 nm. The paper presents the 1D distance measurement system used and the challenges in determining its position in the machine tool coordinate system. Using a demonstrator, the achievable measurement uncertainty is estimated and the use of the measurement system as on-machine metrology system in closed-loop machining is discussed.

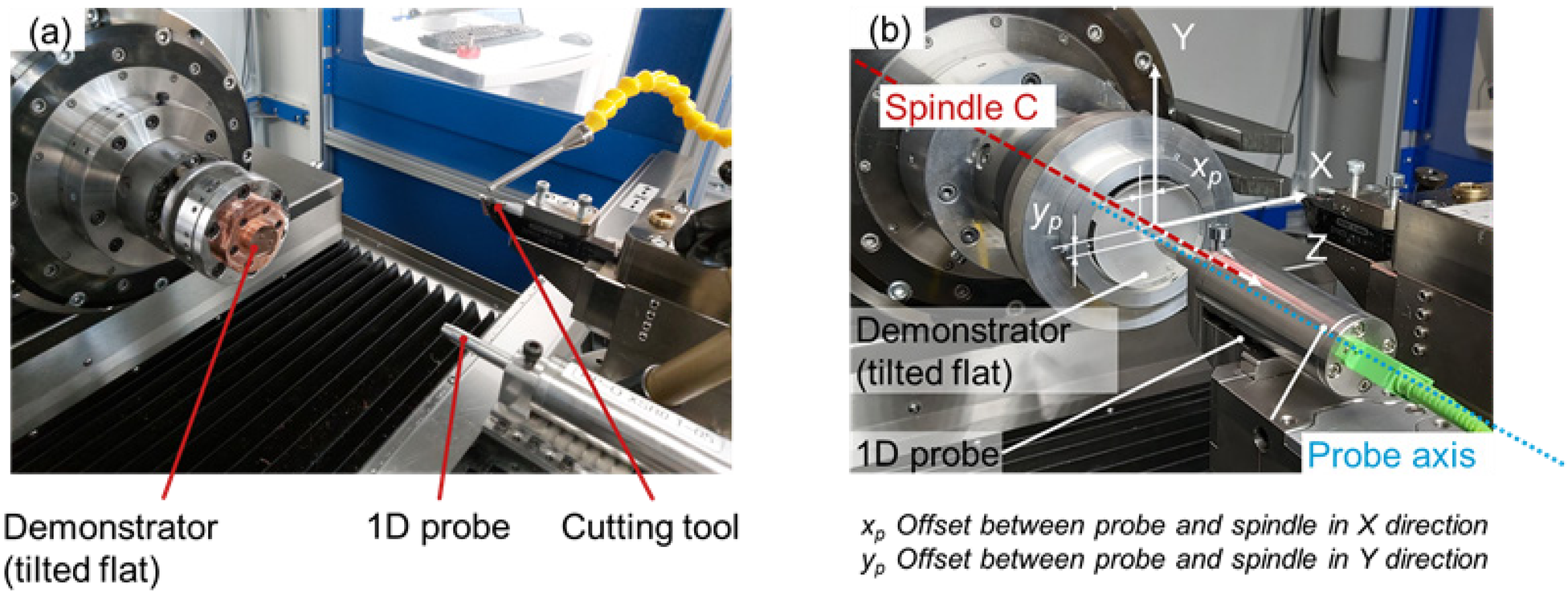

Figure 1: (a) The on-machine metrology system, integrated on an ultra-precision turning machine. (b) The probe off-sets in X and Y direction with respect to the machine tool coordinate system.

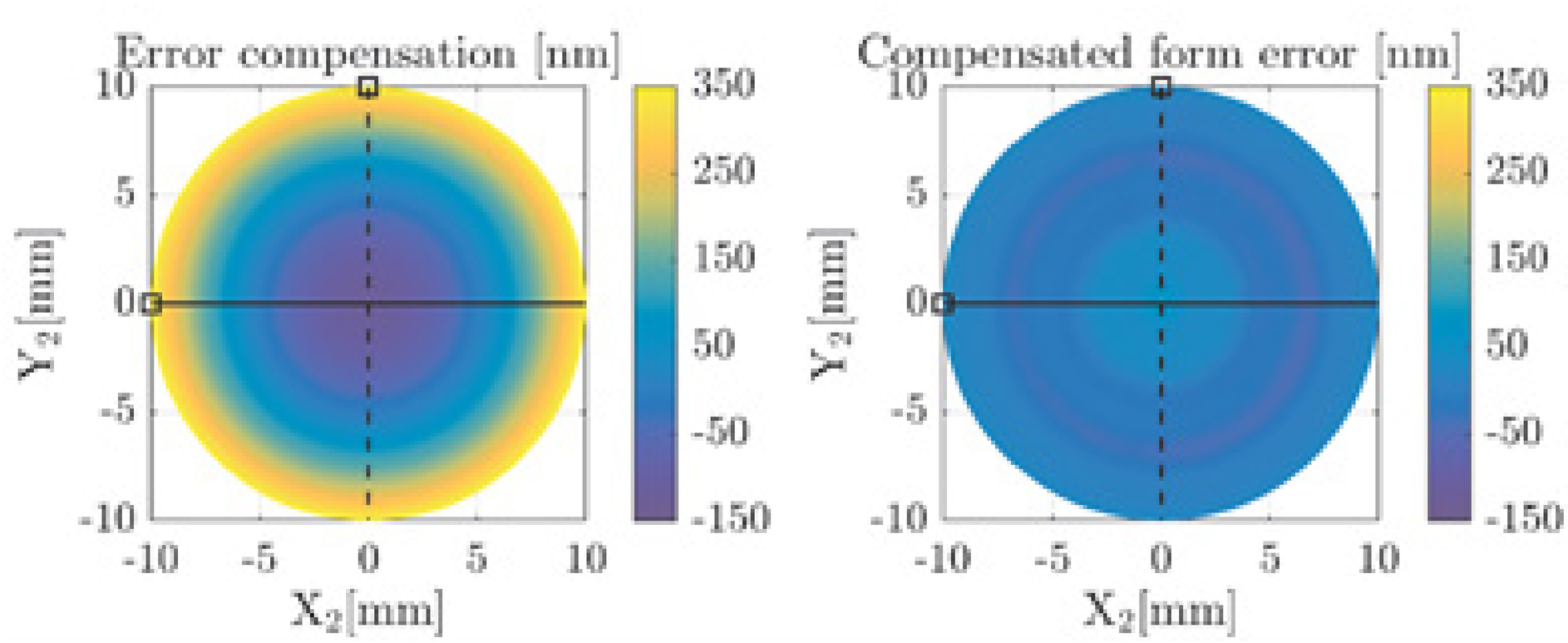

Figure 2: (a) Initial form error before the correction machining. (b) Reduced form error after the correction machining.