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## Using an industrial robot system at STRESS-SPEC for high accuracy neutron strain measurement

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The Heinz Maier-Leibnitz Zentrum (MLZ) operates at Germany's sole neutron source FRM II the diffractometer STRESS-SPEC optimised for fast strain mapping and texture analyses. The STRESS-SPEC group was the first to pioneer sample handling and positioning via industrial robots at neutron diffractometers [1, 2]. However, the current robot is limited in its use due to insufficient absolute positioning accuracy of up to  $\pm 0.5$  mm in some cases. Usually, an absolute positioning accuracy of 10% of the smallest gauge volume size –which in case of modern neutron diffractometers is in the order of  $1 \times 1 \times 1$  mm<sup>3</sup> –is necessary to allow accurate strain tensor determination and correct centering of local texture measurements. The original robot setup at the neutron diffractometer STRESS-SPEC has therefore been upgraded to a high accuracy positioning/metrology system. We will give a short introduction on the complete measurement process chain for the new robot environment. To achieve a spatial accuracy of 50  $\mu$ m or better during measurement of the full strain tensor, the sample position is tracked by an optical metrology system and actively corrected, which we will show in detail. Furthermore we will also present a custom fit sample environment and give an outlook what might be possible in current neutron strain scanners using such a system.

[1] H.-G. Brokmeier et al., Mater. Sci. For. 652 (2010) pp. 197–201.

[2] C. Randau et al., Nucl. Instr. Meth. A: 794 (2015) pp. 67–75.

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