

## The robot at Stress Spec and future perspectives

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### Abstract

Stress-Spec is the materials science diffractometer at the Forschungsneutronenquelle Heinz Mayer-Leibnitz FRM II Garching/Germany, which has been equipped with a robot type Stäubli RX160 [1]. Main usage of Stress Spec is crystallographic texture [2] and residual stress [3] investigations of different types of materials and sample geometries. The robot has a much greater freedom in sample positioning than an Eulerian cradle. Furthermore, by a robot a combined analysis of crystallographic texture and residual stress analysis become possible on identical gauge volume despite the different effective counting time of both investigations.

First applications have been performed for global texture analysis of some metallic samples. In the case of global texture analysis the robot can be used to run a 'fast' continuous scanning of pole figures. That results in a gain of about 30% beamtime, but it can be improved by more detector space and faster readout detector electronics. Recently, the robot was added by sample changer unit. By this a set of sample can be studied one after the other automatically, which can be of different materials. Another application was the combined investigation of the residual stress profile and the texture gradient over a friction welded Al7020 – steel 316L sample of 20mm Ø and 160mm length. The robot can carry about 30kg and in a first test a Cu-tube of 12kg weight (length – diameter – wall thickness) was handled by the robot to get the texture variation around the perimenter. It has to be noticed that firstly the sample geometry must be scanned by a laser system before, secondly that primary and secondary slit systems have to be used to define the gauge volume and thirdly absorption correction is necessary.

Due to the present improvements comparing standard sample manipulation by x-,y-,z-stage and/or Eulerian cradle with a robot system some visions for future instrumentation are proposed.

### References:

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