

Bachelor/Master Thesis:

Real-time measurement of the tool pose in robot-based forming using an optical multi-sensor system

Systems Engineering, Production Engineering, Physics, and related

By means of robot-based incremental forming, sheet metal parts can be formed economically and flexibly in small quantities. However, increased geometric deviations occur due to the low rigidity of the robots. To reduce the deviations, the robot cells are planned to be equipped with a multi-sensor system that records the pose of the tool center point (TCP) in real time and passes the data to the robot's control system.

The sensors consist of a shadow mask and a behind-lying camera chip each and detect the position of LEDs attached to the TCP by evaluating the shadows cast by the LEDs through the masks onto the camera chips. Real-time differential measurement of the position of at least three LEDs is required to control the TCP pose.

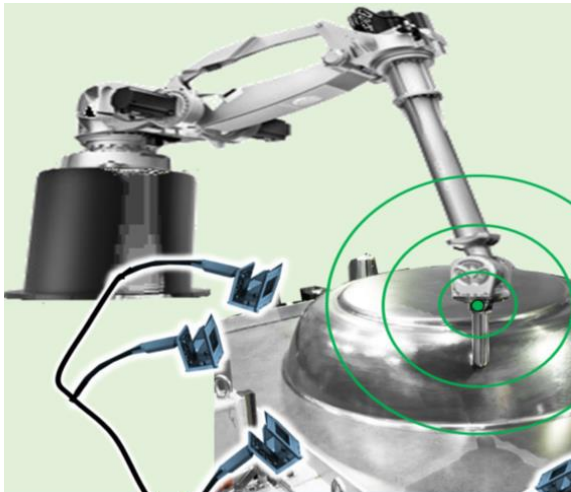


Figure 1: Concept of the TCP measurement using a multi-sensor system of shadow-imaging sensors

Potential contents of the thesis can be:

- Conceptual design and validation of methods for measuring the TCP pose
- Development and validation of suitable masks for real-time processing of the shadow images
- Development and validation a strategy for the calibration of the sensors in the robot cell

Your Profil:

- Interest in optical metrology
- Autonomous and responsible way of working
- Programming skills in MatLab or Python

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