

Chair for Laser Technology LLT
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Master Thesis Engineering

Investigation of calibration patterns for robot-based galvanometer laser scanning applications

Motivation

Costs of laser sources have decreased drastically over time and weight of processing heads has done as well. Therefore robot-based, highly flexible laser material processing systems could enable cost-efficient lot-size one manufacturing. Unfortunately, this is not yet the case. Readily available robotic systems are not yet accurate enough. They are not optimized for laser material processing. At the Digital Photonic Production group at the Chair for Laser Technology together with Aixpath GmbH, we are building prototypical novel kinematic systems for laser material processing, developing custom algorithmic solutions and process specific sensor concepts.

Scope of the Thesis

Laser galvanometer scanners offer highly dynamic manipulation of laser spot position, which we want to use to compensate robot inaccuracies during motion. To accurately do so, system specific error sources such as switching times of used laser beam source or subsiding of mirror oscillations need to be compensated in the system control. Scope of the available thesis is the development and experimental testing of a parameter tuning routine for laser galvanometer scanners.

Tasks include:

- Literature review scanner control parameter tuning
- Development of a parameter tuning process
- Programming of laser scanner control and image processing
- Investigation of correlation between parameters and observable error patterns
- Hands-on experimental testing in our laser lab

Requirements

You study an engineering subject at the faculty of mechanical and are keen on working together with a group of students and PhD students on robot-based laser material processing?

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Figure 1: Galvanometer Scanner mounted to an industrial robot

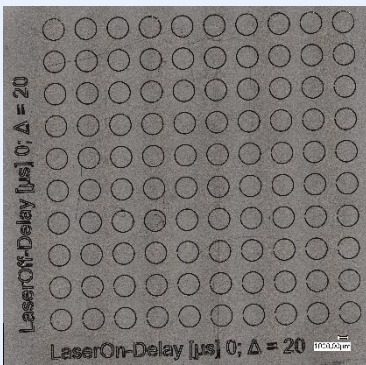


Figure 2: Calibration pattern produced by robot-based laser marking

Our Profile

The Chair for Laser Technology LLT at RWTH Aachen University is in cooperation with the Fraunhofer Institute for Laser Technology ILT Europe's leading center for fundamental and applied research in laser technology.