

Calibration of multiple light stripe sensors to create a multi-sensor system for the 3D measurement of complex macro geometries

Third-party funds-project, Production Metrology

Motivation

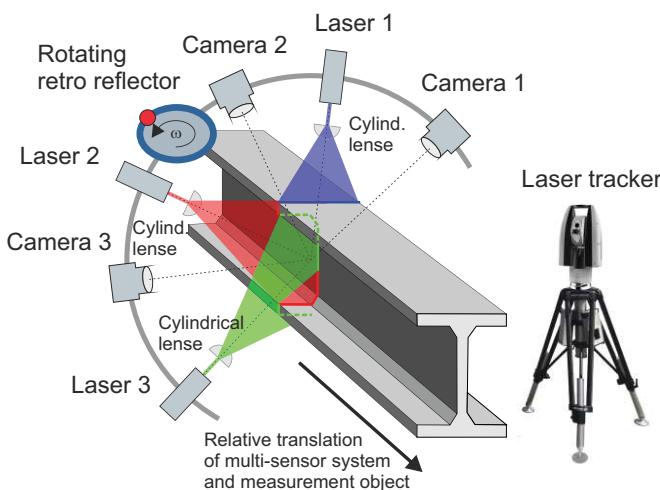
- 3D measurements of complex shaped macro geometries with short acquisition time
- Contact-free measurement, increased measuring volume, no undercuts, no repositioning

Objective

- Development of an optical multi-sensor measuring system for 3D geometry acquisition
- Automation of the measurement process using multiple light stripe sensors, a laser tracker and a positioning system
- Software development for the identification and validation of critical surface areas

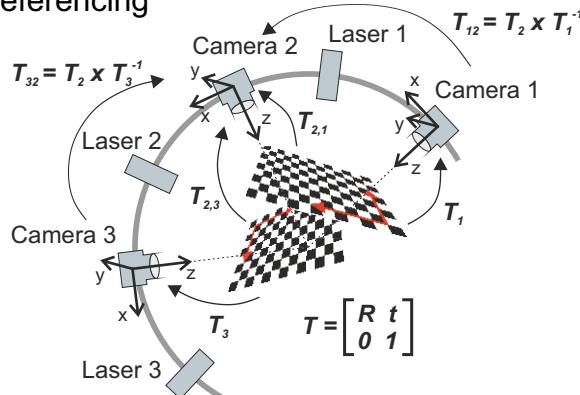
Approach, Setup and Results

- Contact-free measurement by means of the light-section method
- Application of multiple light-section sensors



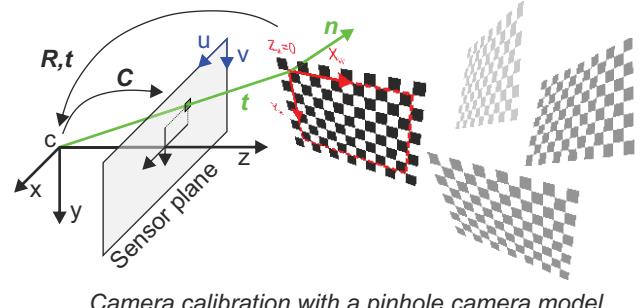
Measuring system with laser tracker and rotating retroreflector

- Arrangement of the calibration pattern in the field of view of two adjusted cameras for referencing



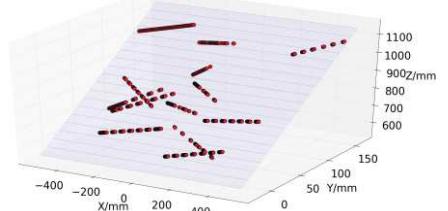
Principle schematic of the coordinate transformation

- Plane based camera calibration considering radial and tangential distortion

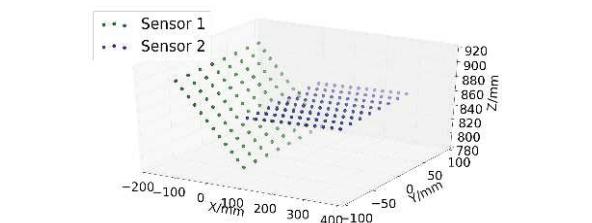


Camera calibration with a pinhole camera model

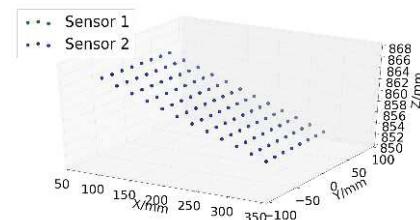
- Laser plane calibration using multiple laser stripes projected on the calibration pattern



Laser plane calibration



Markers in own coordinate system before referencing



Markers in global coordinate system after referencing