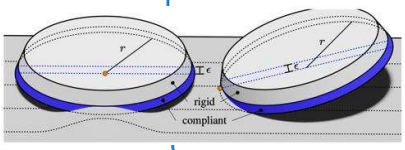
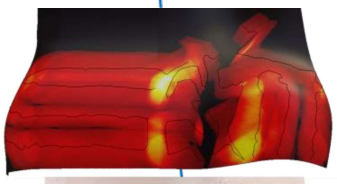
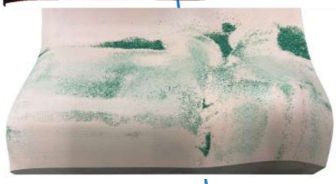
# Working Student

## Geometry Generation and Data Collection for Surface Finishing





### What you can expect:

Despite technological advances, grinding and polishing work is still carried out by hand to a large extent, which is a laborious task for craftsmen and also poses a health risk due to the noise and fine dust pollution. To tackle this problem, a DLR research project aims to develop robot technologies that can automate these tasks, potentially assisting craftsmen. To this end, methods are to be designed that efficiently generate 3D meshes for different workpiece shapes automatically to be able to transfer strategies for surface processing to robot systems using machine learning based on the generated data for training. In this context, we are looking for a working student to work on the development of an automatic mesh generation methods with the possibility to extend the topic for master's thesis.

### Tasks:

Look into various methods for generating workpiece geometries with different characteristics. Analyze their strengths, limitations, and potential applications. Design and implement a suitable method for automatic mesh generation using Python 3. Ensure that the implementation is efficient, scalable, and suitable for real-world applications. Create a comprehensive data set using an existing DLR planning software for grinding/polishing trajectories, including triangulated meshes in STL or OBJ file formats from mesh generation and planning solutions. Optimize the implemented method to take advantage of parallelization techniques, resulting in significant improvements in processing speed and efficiency.

### Your main tasks:

- Familiarization with various methods for the automatic generation of geometries
- Concept design and implementation of a suitable method for automatic mesh generation
- Creation of a data set using existing DLR planning software
- Optimization for creating large datasets / Parallelization of the method

### Your Qualifications:

- Good programming skills with Python 3
- Understanding of triangulated meshes (STL, OBJ files)
- Basic knowledge of 3D software, such as Blender, for editing 3D objects
- Ability to work independently
- Strong problem-solving skills

### Contact:

German Aerospace Center (DLR)
Institute of Robotics and Mechatronics
Stefan Schneyer
Münchener Str. 20
82334 Weßling
E-mail: Stefan.Schneyer@dlr.de

Related Links:

- https://openreview.net/pdf?id=sNnmyyrJ0q
- https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10175386
- https://www.youtube.com/watch?v=nf6Z8xXO47o
- https://lerosh.de/