

## Development of a solution algorithm for optimal positioning of strain gauges (SG) on an arbitrary geometry

### Keywords:

Applied Mathematics; Algorithmics; Optimization; Sensor Technology; Mechatronics

### Description:

The increasing complexity of modern products requires further development of manufacturing technologies. Thus, the degree of automation is steadily increasing and robots are being used more and more. In order for these robots to be integrated and adapted as well as possible into the production process, they are increasingly being equipped with sensor technology. Not only are forces and moments detected by sensors at the individual joints, but also at the tool holder. The special sensors at the tool holder must be able to detect different load cases depending on the requirements. Therefore, different types of sensors are offered on the market. By considering the requirements and load cases in the development process of the sensor, sensors specifically adapted to the customer can be developed in short periods of time using a design tool.

The force and torque sensor is a mechatronic system, consisting of a measuring body and electronics. The measuring body deforms elastically under load. This deformation can be detected with strain gauges (SG) and conclusions about the applied loads can be drawn. The design tool should consider the customer's requirements and loads and be able to determine the measuring body and the optimal position of the SG.

Therefore, this work aims to develop a solution algorithm that finds the optimal position of the SG on the measuring body, considering predefined boundary conditions. The basis for the algorithm are the strain matrices of the measuring body, which are determined by a finite element analysis (FEA).

This work requires profound knowledge in applied mathematics and algorithmics. In addition, knowledge in sensor technology and mechatronics is desirable. This work can be carried out as an internship and there is the possibility for a final thesis (Master's) on this topic.

### Start date:

Immediate

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