

## Project ProRo

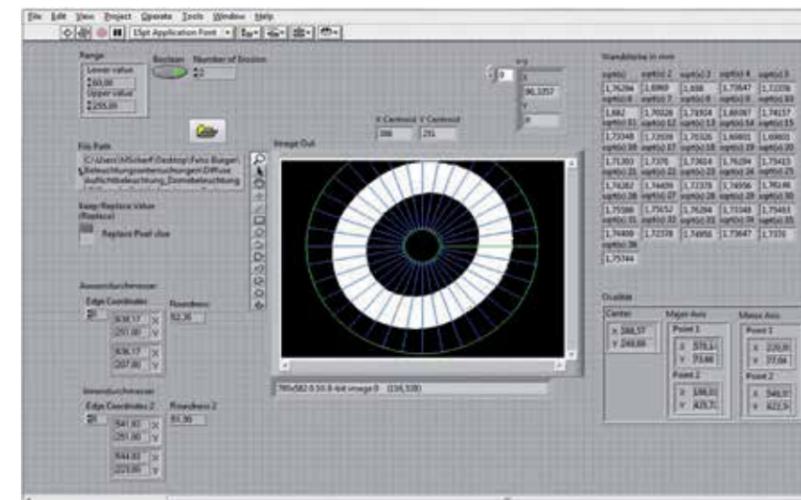
### Reliable Process of Tube Bending

The chair of Automated Manufacturing and Assembly under the leadership of Prof. Dr.-Ing. Michael Weyrich develops a sensor- and simulation-module for high-precision and reliable tube bending. The bending performance is affected by manufacturing tolerances, control processes and inhomogeneity of the raw material. In cooperation with the chair of Forming Technology and an industrial partner the aim in this project is to develop a sensor based control system which is able to compensate parameter variation of the raw material.

With such a control system it is possible to implement high-precision bending performance. The first step is a geometric measuring of the raw material. If the parameters ovality and wall thickness are well known, the following steps are plastomechanical calculations and

FEM-Simulations of the bending process to work out adjustment parameters for each bending.

In this project one task is to develop and build up a vision system consisting of a camera, a dome-lighting and a tube positioning unit. The system enables a precise optical measurement of tubes. Therefore, images of the front surface of tubes are captured and analyzed in further steps. The developed user interface visualizes the measuring process and provides an interface to the FEM-Simulation. After calibrating the vision system parallel calculation steps are used to determine the ovality and the wall thickness of each tube. After that these two parameters are available to calculate specific adjustment values.



#### I Project Management and Execution

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