

Automatisches Kalibrieren und Prüfen von Manometer

An interesting project has been provided by the business unit Process Instrumentation of the Baumer Group. Among many other things they produce pressure gauges for the process industries like the oil and gas industry. Today these manometers are produced in a factory by Bourdon in France and must be calibrated manually by specially trained workers because during the production process many tolerances influence the behaviour of each individual gauge differently.

The aim of this thesis is to advance the automation of this calibration process to not only decrease the total production time but to also increase the quality by eliminating possibilities of human imprecisions. Furthermore, repetitive tasks can be reduced with the use of a vision system and along with this, new options of tracking each single gauge through the complete process can be implemented, which includes a certificate saved for each manometer.

Designing and building a new workbench includes the initial research about all the different types of gauges that need to be handled. With the help of a specification book and a factory visit in France, it was clear that there are two important sizes of gauges.

The two different sizes of gauges come with different calibration mechanisms. The bigger gauges are calibrated by moving a screw along a curved slot, while the smaller gauges are calibrated by deforming a small metal part in a specific way. For the screw calibration there is already a fully automated method working in the factory in France but for the deformation of the small metal part a newly developed, automated method is developed and implemented in this Thesis.

Different ideas have been created and concepts have been evaluated, before building a complete prototype workbench able to calibrate all types of gauges, experiments are done using a quickly build test setup. Since this project was too extensive to be handled by one person, a separated group of bachelor students have simultaneously been working on methods to precisely generate the needed pressures in a quick and reliable way.

With this thesis the foundations for a new workbench have been conceptualised, designed, built, and tested for gauges of the smaller diameter with a newly developed calibration tool and setup. The workbench should also be capable of calibrating the bigger gauges with the known method, although time did not allow to test this. The project is continued by two bachelor students for completion.



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Picture 1: Manometer Calibration
Station (Frontal View)