Sub-project: “Powermoulds”

The Use of Embedded Diagnostics Systems in the Injection Moulding Tool

Project period
08/2013 – 08/2016

Problem
Sensor signals in the injection moulding tool are only rarely used by the machine operator for fault analysis and optimisation of the manufacturing process. However, the optimum process window is not only important for special products in medical applications, but also for any type of conventional products. The goal of this research project is the development of an intelligent embedded diagnostics system (EDS) for automatic recording and monitoring of the process parameters.

Solution approach
A permanently installed EDS, including integrated signal processing, is used to help derive specific decision-making aids for the machine operator in the event of a fault using machine learning methods. The statistical test plans for the two test moulds serve for teaching the assessment algorithms. In addition, a 3D scanner and other devices are used for investigating quality characteristics of the manufactured plastic products and for teaching the computer-assisted evaluation algorithms.

Fig. 1: Design drawing of the two-component tension rod for investigating the adhesion of the plane of division

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Fig. 2: Representation of a laboratory pattern of the recording hardware

Fig. 3: Evaluation criteria of the manufacturing process
Results

A statistical test plan is implemented to facilitate recording of a majority of possible fault events. The thus implemented manufacturing conditions, in connection with other quality criteria, permit an objective assessment of the component quality. In this regard, specific amplifier techniques are used to facilitate more efficient use of the sensor data. Thanks to the use of machine learning methods, such as e.g. decision trees, fuzzy guidelines, support vector machines or Artificial Neural Networks, it is possible to derive and represent decision-making aids for the machine operator.

Keywords / Technologies

- Hard and software development
- Microcontroller programming
- Assessment and analysis using SCILAB
- Machine learning methods
- 3D measurement / quality control
- Sensor selection and positioning
- Statistical test planning
- Data fusion

Project partners

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Publications