

Dissertation title:

Adaptiv process control of the quasi-static process load of gear grinding

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The gear grinding is subject to numerous influencing variables, which cause fluctuating process load. This results in considerable quality issues in practice. The aim of this work is to develop an adaptive control system for generating gear grinding with ceramic grinding tools. This system is intended to increase the productivity of the gear grinding process, meanwhile the required work piece quality is maintained.

The acceptance of the users in the practice is a key factor of the success of the system. This goal can be achieved by proven reliability, user-friendliness and effectiveness of the system. In order to increase the reliability of the system, the critical influencing variables with respect to the process load were found. Then a signal based control method was developed. The current signals of the machine axis and the vibration signals were investigated. The results show, that the process load can be quantified by signals of good repeat accuracy. New Models were developed, to quantify the process load in the mathematical way. Furthermore, a new method for finding the tracking signal was developed, which is valid for all work pieces. This method supports the implementing the system and increases the user-friendliness. This system based on a new field dependent control strategy. The whole system was tested in the serial production. The effectiveness of the system could be proven.