FINAL PROJECT

CUTTING FORCE DETECTION AND CONTROL ON LATHE USING FUZZY LOGIC CONTROLLER

Submitted as One of The Requirements for Completing Undergraduate Education Program

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ABSTRACT

In the conventional turning process, a lathe is operated manually by an operator with special skills. The manual operation has several weaknesses i.e. the quality of the product depends on the skill of the operator, the measurement accuracy is less accurate, need a long time to set the machine, the cutting rate depends on the operator's experience, and the quality of the surface product must be checked regularly. To overcome these weaknesses, it is necessary to have such a control system to optimize the feed rate on a lathe by considering allowable cutting force and other machining limitations. For this reason, this final project researched on the detection and control of cutting forces on lathes using a fuzzy logic controller. This research was conducted by modifying a variable speed bench lathe. The feed rotary on the lathe was replaced with a stepper motor so that the feed motion could be carried out automatically. A loadcell is attached to the tool post to detect cutting force during machining time. The program for adjusting the feed rate and detecting cutting force is created based on the fuzzy logic controller method. The sensor's cutting force read was used as a value to adjust the feed rate. The result shows that the overall cutting force has been successfully controlled at setpoint 2.55 N and the delay time output also followed the trend of cutting force input.

Keywords: cutting force, feed rate, control system, fuzzy control

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