Title Fuzzy control of the cleaning process on a combine harvester

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Citation Biosystems Engineering, Volume 106, Issue 2, June 2010, Pages 103-111

Keywords combine harvester; cleaning

Abstract

Combine harvesters operate all over the world, harvesting different crops under different environmental conditions. In order to cope with varying soil, climate and crop conditions, it is important to adjust and optimize the internal settings of these machines to the varying conditions. Since many sub-processes (e.g. threshing, cleaning, speed control, header control) have to be continuously optimised or surveyed, automatic control systems are needed to aid the operator in this tedious task. In this study, automation of the cleaning section on a combine harvester was investigated. In preceding studies considerable knowledge about the working principles of the cleaning unit had been gathered using data-based models. Based on experimental data and fuzzy modelling techniques, optimum and non-optimum working conditions were identified. In this paper, a fuzzy control system which combines the knowledge of experienced operators with these data-based models is elaborated. The main goal of the controller for the cleaning section was defined as finding an optimum trade off between acceptable sieve losses and return volume for a desired level of MOG in the grain bin and a certain amount of incoming biomass. The performance and robustness of the control system have been evaluated by field tests during wheat harvest. Promising results were obtained, demonstrating the benefits of an automatic control system for the cleaning section of a combine harvester when environmental conditions rapidly change over time.