

Intelligent control of grain drying process using fuzzy logic controller.

ABSTRACT

Controlling grain drying process has always been a challenging task for engineers and researchers in food and agricultural sectors. The main obstacles to obtain the best control system for the grain drying system are due to the long delay process, highly non-linear behaviour and parameter uncertainties exist in the plant. Applying an intelligent controller such as fuzzy logic controller to a grain drying system is a good choice as fuzzy logic controller is a very powerful control methodology that can estimate functions based on partial knowledge of the system in case of parameter uncertainties and can deal with non-linear behaviour. This paper focused on the design and application of fuzzy logic controller in order to obtain the grain output moisture content close to the set-point in spite of disturbances. Two inputs and one output fuzzy logic controller has been designed to drive the grain flow rate which is used as the manipulated variable. A new algorithm of fuzzy logic controller for a grain drying process has been introduced. Simulation tests have been carried out using the process model developed by Liu and Bakker-Arkema for a cross-flow grain dryer. The overall results from the tests are very promising and the fuzzy logic controller is stable and robust towards input disturbance. Although the design process of fuzzy logic controller is simple; however it provides very fast response to make the grain output moisture content close to the set-point and to reject disturbance exists during the grain drying process.