

Title Development of a control system for in-store drying of paddy in Northeast China
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Abstract

The purpose of this study was to develop and test a control system using supplementary heating for in-store drying of grain, to be used in major maize growing areas of Northeast China. In-store drying is using near-ambient air ventilation and the control system is aiming at maintaining the relative humidity of the drying air at a constant level. This can be achieved by increasing the temperature of the drying air by up to 5 °C using a small coal or biomass furnace.

The control system is based on the results from previous studies and applies principles of the control theory. The system developed in this study includes a host PC and a distributed data acquisition and control system (DA&C). A drying simulation program, using drying equations for deep-bed drying and various quality models, has been used to investigate the effects of the control parameters and their possible interactions and to optimise the drying process.

Several tests were conducted under different conditions to determine the performance of the control system in terms of response time and accuracy. Weather characteristics of key locations in Northeast China were analysed and found to be suitable for application of this control system. Pilot plant experiments and computer simulation results were compared in order to determine control system performance. Economic aspects of the use of the control system were discussed in terms of fixed cost, labour cost and energy cost.