592e On-Line Correction of Process Temperature Deviations in Continuous Retorts

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Unavoidable process temperature deviations in continuous retort operations can compromise product safety and quality as well as production efficiency if improperly handled. Methods for on-line correction of such process deviations are hard to find in the literature due to the lack of a suitable algorithm which can quickly evaluate the effect of process temperature deviations and make proper control decision.

The objective of this study was to develop control strategies to automatically correct the adverse effects of process temperature deviations through proper adjustments of the container conveyor speed.

The Apparent Position Numerical Solution method was used to quickly analyze the effect of temperature deviations on the resulting temperature-time profiles and the Weibull model, which has been shown to be able to provide a more accurate estimation of microbial inactivation, was used to calculate the accumulated lethality. The Fixed Point (FP) and the Worst Case (WC) methods were developed as suitable algorithms for the correction of process temperature deviations. The FP algorithm consists of the selection of a point that for convenience is located close to the retort steam chamber exit, whereas the WC algorithm consists of searching for the worst case container once a process deviation occurs. Once either the FP method or the WC method is applied due to a process temperature deviation, a new conveyor speed is calculated by estimating the time needed for the container located at either the FP or the WC container to reach the targeted lethality.

The two algorithms were tested using simulations for situations where step or linear changes in processing temperatures were occurring during the operation of a commercial hydrostatic retort. Both algorithms provided fast and accurate estimations of the effect of process deviations on the product temperature and process lethality. This shows the potential of these algorithms for industrial applications.