Empirical modeling study in predicting temperature profile within the convective oven

ABSTRACT

Baking process is an important unit operation in the food industry. A good understanding on the dynamic behavior during baking process is important to ensure proper control. This study aims to develop the empirical model of the cake baking process using laboratory scale convection oven. Set point temperature was chosen as the manipulated variable and actual oven temperature was the controlled variable. No disturbance was considered in this process. Empirical model is developed by applying step change in the set point temperature. The model is represented using second order plus time delay (SOPTD). By increasing the operating temperature, there is a significantly decreases of process gain of the system and the damping coefficient, and a significantly increases of natural damping coefficient and time delay. The developed model fits well with the validated data, $R2 > 0.9$.

Keyword: Empirical modeling; Oven; Baking