

Conceptual Solution and Thermal Analysis of the Final Cooling Process of Biscuits in One Confectionary Factory in Serbia

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Abstract : The paper presents the conceptual solution for the final cooling of the chocolate dressing of biscuits in one confectionary factory in Serbia. The proposed concept solution was derived from the desired technological process of final cooling of biscuits and the required process parameters that were to be achieved, and which were an integral part of the project task. The desired process parameters for achieving proper hardening and coating formation are the exchanged amount of heat in the time unit between the two media (air and chocolate dressing), the speed of air inside the tunnel cooler, and the surface of all biscuits in contact with the air. These parameters were calculated in the paper. The final cooling of chocolate dressing on biscuits could be optimized by changing process parameters and dimensions of the tunnel cooler and looking for the appropriate values for them. The accurate temperature predictions and fluid flow analysis could be conducted by using heat balance and flow balance equations, having in mind the theory of similarity. Furthermore, some parameters were adopted from previous technology processes, such as the inlet temperature of biscuits and input air temperature. A thermal calculation was carried out, and it was demonstrated that the percentage error between the contact surface of the air and the chocolate biscuit topping, which is obtained from the heat balance and geometrically through the proposed conceptual solution, does not exceed 0.67%, which is a very good agreement. This enabled the quality of the cooling process of chocolate dressing applied on the biscuit and the hardness of its coating.

Keywords : chocolate dressing, air, cooling, heat balance

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