the cooling process of chocolate pastilles.

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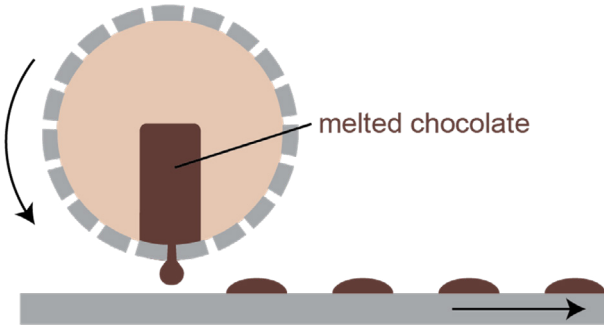
Goal

There is a wide range of processes to generate granular materials. One of these available pro-cesses is pastillation and it is used in a lot of different industries – from the fertilizer to the chocolate industry.

In a pastillator, molten droplets are deposited on a moving and cooled steel belt. These droplets have a constant size and are evenly spaced. The belt moves the droplets away from the droplet generator for further processing. During this, the pastilles cool down and solidify. The aim of this simulation was to identify critical parameters in this cooling process.



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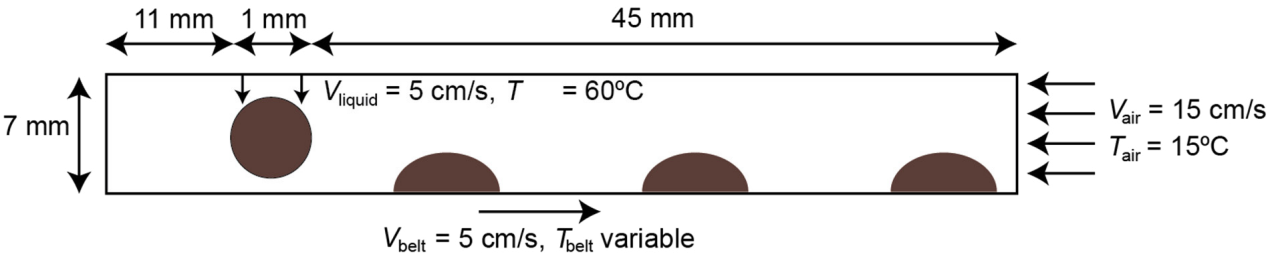
Approach

Performing experimental research can be very time consuming and resourceful. Especially when one wants to perform a sensitivity analysis which requires many experiments with slight-ly deviating operational parameters. We performed a sensitivity analysis for a steel belt cooler.

Several cases were simulated, with different values for several parameters: the velocity of the air moving over the belt (v_{air}), the initial temperature of the air moving over the belt (T_{air}) and the wall temperature of the moving belt (T_{wall}). The average temperature of a pastille ($T_{pas\text{-}tille}$), just before it left the belt, was evaluated and used to compare the different scenarios.



Results

A numerical sensitivity analysis was performed for a pastillator in ANSYS Fluent. The air flow velocity, air temperature and belt temperature were varied. The results clearly show that the most significant parameter is the temperature of the wall of the cooling belt.

The air velocity and air temperature don't have a significant effect on the temperature of the pastille at the end of the belt. Hence, we were able to identify the most important parameter: the temperatu-re of the belt. These results could be used to have a more focused experimental study.