THE VERIFICATION OF MATERIAL FLOW IN A BREWERY MALT TANK USING THE DEM METHOD

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Biotechnology is one of the fastest growing areas of research. In addition to the biotechnological process itself, it is also necessary to deal with the construction and design of devices. This paper aims to analyse the emptying process of a brewery malt tank with a closing element using the DEM method. Since the tank is to be mounted on pre-existing equipment, it was necessary to adapt to this fact.

Despite the fact, that the mechanical-physical and flow properties of ground barley malt were obtained by experimental measurements, it was possible to determine the optimal shape and dimensions of the tank according to the assignment. The layout of the mini brewery didn´t allow the creation of a tank with symmetrical outlet, so it was necessary to come up with a different design solution. Assuming an asymmetrical outlet with a closing element, the slope of the tank wall was set to 60° in the maximum case, while the calculations determined the optimal slope as 41°. The use of such a slope had to be verified subsequently, for which the simulation in the EDEM Academic programme, using the DEM method, was used. The simulations proved that even though the material from the tank didn´t discharge evenly in the whole volume (on one side of the outlet the flow was affected by the 60° slope of the tank wall), the arch wasn´t formed and the whole amount of this material was easily discharged.

The simulation of the tank emptying process is only one way to verify the correct design of the tank. Therefore, it is necessary to perform the verification for the given barley malt samples on the pre-existing device. If the tank wasn´t emptied optimally, elements preventing the formation of an arch would be applied.

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