

Increasing energy efficiency by steering DRoplet AGglomeration in Spray dryers

Publieke samenvatting / Public summary

Aanleiding

The Energy use in industry due to drying operations is significant and approximately 15% of the total industrial energy use. Energy prices are increasing especially with the current geopolitical situation, driving energy costs for the industry. Therefore, the industry is under heavy pressure to make big steps in increasing process efficiency of dryers, specifically spray dryers, being one of THE most energy intensive unit operations. Increasing the energy efficiency of spray dryers will reduce the need for heat, which is a clear ambition in MMIP 7.1 of Mission C. To create a breakthrough in the efficiency of spray drying plants, we believe that better understanding of spray drying and agglomeration processes will enable us to develop smart strategies to steer these processes to optimum process efficiency. Specifically, more control on sticky and agglomeration behaviour for varying products allow us to steer spray dryers towards increased capacity, higher process efficiency and less off-spec product formation.

Doelstelling

Currently, the spray drying operational conditions are determined by trial and error in combination with empirical experience. We estimated that energy use during spray drying may be reduced with 20% directly, while additional reduction in wasted raw materials can provide even more energy savings (up to 62%). In this project, Eindhoven University of Technology, Wageningen University and the industrial partners join forces to accelerate

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understanding of spray drying technology and facilitate implementation of improvements to realise these energy savings.

Korte omschrijving

This project is part of the DRAGONS program that is a continuation on the previous EEMS and StAggloP ISPT projects, which focused on the atomisation of liquids with high solids content and the agglomeration process during spray drying, respectively. The follow-up DRAGONS program will consist of 2 phases: DRAGONS Egg and DRAGONS Hatchling. The DRAGONS program consists of three pillars 1) individual droplet drying and collisions, 2) modelling and testing spray drying and agglomeration at the pilot-scale and 3) validation during spray drying at the industrial-scale. In the DRAGONS Egg project, TU/e, WUR and the industrial partners will continue their advanced numerical modelling and experimental research efforts on spray drying at the droplet scale (first pillar).

Resultaat

The final goal of the DRAGONS program is to develop a lumped parameter model to help industrial partners to optimise their industrial-size spray drying processes in terms of process efficiency and product quality and thus facilitate the realization of expected energy savings and CO₂ reductions on their sites by the end of the program (i.e. in 2028). In this part of the program, we will focus on gaining fundamental understanding of individual droplet drying and binary collisions. This work is a steppingstone in building the lumped parameter model.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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