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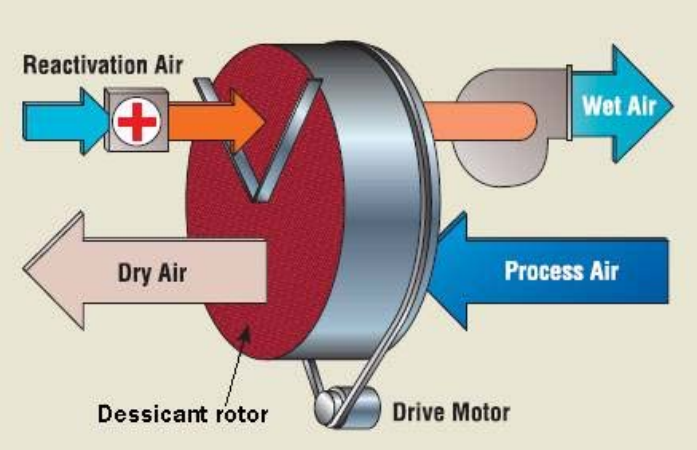
Inlet air humidity control project on TFD spray dryer



Key external stakeholders:

Dairy ingredient manufacturers, infant milk formula manufacturers

Practical implications for stakeholders:

The outcome is:

- The pilot-scale tall-form dryer (TFD) in MTL, Moorepark, is now capable of humidity control of incoming air used in drying
- This feature provides better control over drying conditions in R&D trials, enabling experimental variation due to air variable humidity to be removed
- It enables the influence of air humidity in the manufacture of a new product to be investigated. This assists product development in that issues with stickiness and plant blockage can be addressed at the pilot stage.
- As a demonstration project it is a model for the uptake of such technology by the dairy ingredients manufacturing sector
- This facility is now available to the industry and to Teagasc research as a development tool.

Main results:

In commissioning it was demonstrated that air humidity can be controlled between a dew point of -8°C and 25°C. Product related results will come through other projects.

Opportunity / Benefit:

Interested parties can gain access to the TFD in order to carry out trials under controlled air humidity conditions, i.e. humid or dry conditions can be simulated, and to develop new products and ingredients.

Collaborating Institutions:

N/A

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External collaborators: N/A

1. Project background:

Moisture-laden air entering spray dryers hinders performance because it reduces the rate of evaporation. It was found that production capacity on some products was impaired at times during the mid to late summer period, coinciding with humid weather conditions. In addition, air humidity can impact on product quality by influencing caking during storage. The Advisory Committee on Dairy Processing raised these issues. It was decided to complement the FIRM -funded project on powder stickiness with a demonstration of humidity control in the TFD at Moorepark so as to enhance the product development facility.

2. Questions addressed by the project:

How can stickiness be controlled in the spray drying of ingredients or nutritional foods?

3. The experimental studies:

This was a demonstration project. Adsorption technology was identified as the most energy-efficient means of dehumidification. A specification was drawn up and a tendering process (e-tender) was put in place in order to choose a supplier. The SCADA process control software was modified to control humidity and to display humidity data.

4. Main results:

Modelling of spray drying thermodynamics was carried out in this project in conjunction with the project Investigation of stickiness of milk powder for the purpose of improved process control in milk powder manufacture - 5632. This project enabled models to be validated and strategies for optimising process conditions were simulated on the new system.

5. Opportunity/Benefit:

This project has enhanced the pilot-scale drying facilities at Moorepark by putting a humidity control system in place and has developed expertise on humidity control that is critical to NPD in the ingredients area and which can benefit the ingredients and infant formula sectors in dealing with constraints to process efficiency.

6. Dissemination:

Dissemination has taken place through the Advisory Committee on Dairy Processing, Relay workshops, direct presentations to industry and training courses for industry.

Main publications:

Bloore, C.G. and O'Callaghan, D.J. (2009) 'Process Control in Evaporation and Drying' chapter 10 in Dairy Powders and Concentrated Milk Products, ed. A. Y. Tamime, Wiley-Blackwell ISBN 9781405157643, p332-350.
Bloore, C.G. and O'Callaghan, D.J. (2009) 'Hazards in Drying' in Dairy Powders and Concentrated Milk Products, ed. A. Y. Tamime, Wiley-Blackwell ISBN 9781405157643, pp. 351-369.
Hogan, S.A., O'Callaghan, D.J. and Bloore, C.G. (2009) 'Application of fluidised-bed stickiness apparatus to dairy powder production' *Milchwissenschaft* 64(3) 308-311.

7. Compiled by: Donal O'Callaghan

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