COBBLESTONE

COURSE ID 2843

Spray Drying: Advanced Technology Overview

DIRECTED BY

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90 MINUTE

ACCREDITED COURSE

- Thermal Efficiency
- Design and Selection of Atomizing Nozzles
- Chamber Design Parameters
- Evaporating and Evaporation Cooling
- How to use a Psychrometric chart
- Method Control and Spray Drying Process
- Define a "Hard to Dry" Liquid Feed
- Troubleshooting Techniques

about the course

This 90-minute accredited course focuses on Spray-Drying technology, a very important process in numerous industries. The course will emphasize the scientific fundamentals and practical operational aspects of Spray-Drying that are seen day-to-day in industries such as Food, Beverages, Chemicals, Pharmaceuticals, Pulp and Paper, etc. The primary goal will be to help scientists, engineers, and operations professionals make an impact in their businesses by improving their understanding of these important processes and by learning important techniques to scale up, improve efficiency, troubleshoot, and maximize throughput. Advanced topics such as Psychrometry and calculation methods will be covered.

Experience top-notch training LIVE from an industry expert that goes beyond traditional lectures. You will engage in an interactive and stimulating learning experience to help you develop the skills you need to excel in your field.

Those attending the LIVE training event must have a webcam on their computer equipped with a microphone and speakers/headset to fully participate.

who should attend

This 90-minute accredited training covers the fundamentals and practical aspects of Spray Drying technology. It is intended for the following target audience: Operations Professionals, Engineers, Scientists, Quality Control Professionals, Environmental, Health, and Safety Professionals, and anyone involved with spray-dependent processes, such as the ones seen in Food, Beverages, Specialty Chemicals, Pharmaceutical, Pulp and Paper, Pilot Plants, etc.

The course will emphasize the following processes: Spray Drying, evaporative cooling, spray and atomization applications such as coating, cooling, and fire protection.

learning objectives

Upon completion of this course, you will be able to:

- Apply the Thermal Efficiency formula as a tool to calculate the optimal inlet and outlet temperatures
- Calculate the parameters required for the design and selection of atomizing nozzles
- Calculate residence times and drying chamber design parameters.
- Explain evaporation and evaporative cooling.
- Calculate main spray drying parameters by using a Psychrometric chart (on paper and computer).
- Explain the methods of control of the spray drying process.
- Explain how to dry challenging products by stating the variables that define a "hard to dry" liquid feed.
- Improve drying operations by using troubleshooting techniques.
- Scale up a process from a pilot plant to a production line.

course outline

Review of Learning Objectives

Module 1: Spray Drying fundamentals, Thermal Efficiency Calculations, Psychrometric charts

Spray Drying Process Overview

- Spray Dryer Zones
- Types of atomizers
- Atomizing process selection

Thermal Efficiency calculation

- Thermal Efficiency Formula
- Correlation between thermal efficiency and dryer throughput

Psychrometry applied to Spray Drying

- Evaporation
- Psychrometric variables
- Psychrometric charts
- Use of the Psychrometric Charts as troubleshooting and optimization tools

Module 2: Calculations

Residence time

- Residence time calculation
- "Hard to Dry" products: Correlation to residence time

Calculations

- Atomization calculations.
- Mass and Energy balance
- Cyclone calculations

Module 3: Special topics. Design and troubleshooting

Explosion suppression and fire protection

- Dust explosion – KST Index.
- Methods of detection and suppression
- Fire deluge systems

Pilot plants

- Scale-up from pilot to production.
- Modeling

Combining fluid bed drying technology with spray drying

- Powder fluidization
- Advantages of the use of a fluid bed dryer in the drying plant
- Agglomeration
- Internal and external fluid bed dryers.
- Vibratory fluid bed dryers versus air conveying fluid beds.
- Case study: Increased production throughput by incorporating FBDs in the lay-out

Spray drying challenges and corrective methods

- Powder discoloration
- Final powder with higher-than-expected moisture content
- Out of spec powder particles
- Drying chamber impingement
- False deployment of dust explosion detection/suppression systems

Questions and Answer Session

Assessment Opportunity

course instructor

Herberto Dutra, Mechanical Engineer with 30 years of experience in processing industries with careers at Kraft Foods, Nestle, Bay Valley, and Sensient, including 20 years of hands-on experience in Spray Drying and processes that require nozzle atomization. Mr. Dutra's expertise ranges from pilot plant scaling up, design and construction of numerous plants, day-to-day operation, troubleshooting, and optimization. Academically, Mr. Dutra holds a bachelor's degree in mechanical engineering from UERJ (Rio de Janeiro, Brazil), an MBA from Keller Graduate School, and is currently finishing his Master's in Mechanical Engineering at Purdue University. Through his employers, Mr. Dutra has written and taught several training courses in Spray Drying, Atomization, Powder Handling, Agglomeration, Liquids Handling, Cooking Processes, Plant Design, Packaging and many other programs developed for Operations Professionals, Engineering, Scientists, etc.

Accreditations

International Accreditors for Continuing Education and Training (IACET)
Cobblestone has been approved as a CEU Accreditor by IACET and awards CEUs for participation in qualified courses. Cobblestone has demonstrated that it complies with the ANSI/IACET Standards and is authorized to offer IACET CEUs for its programs. CEUs will be awarded for participation in Cobblestone's courses at the rate of .1 CEU per contact hour upon successful completion of the entire course and 70% accuracy in the required Learners' Assessment. A minimum score of 80% is required for all courses within a Cobblestone Certification Program. This course offers a total of 1.5 contact hours or .2 CEUs. For further information, visit www.iacet.org