Atomization and Spray Technology  
Focus on Spray Drying  
April 13, 2011  
Madison, Wisconsin  
Discuss and explore innovative and practical solutions to your atomization applications.

"CHUCK COVERED THOROUGHLY THE PRINCIPLES AND FUNDAMENTALS OF ATOMIZATION. HE IS VERY KNOWLEDGEABLE ABOUT NOZZLE DESIGN AND USE."
Process Engineer

Limited enrollment. Act now!

Save time and money! Inquire about on-site & online courses. Call 800-462-0876 today!

Enroll today to succeed tomorrow  

Department of Engineering Professional Development  
432 North Lake Street  Madison, Wisconsin 53706  

Please route this brochure to colleagues who would also benefit by attending.
Atomization and Spray Technology
Focus on Spray Drying
April 13, 2011, in Madison, Wisconsin

Increase Your Understanding
Atomization is an important process used in many industries, including the chemical, biochemical, food and dairy, pharmaceutical, paper, combustion, and agricultural industries. Attend this introductory course for engineers, scientists, and technicians and increase your understanding of the atomization process, design, and applications.

Course Objectives
This course will provide you with a basic understanding of how an atomizer works, the various types of atomizers, and which atomizer is best suited for specific applications.

You will focus on:
- Atomization methods
- Functions of an atomizer
- Various atomizer designs
- Atomizer performance
- Effects of liquid properties
- Effects of operating parameters
- Droplet size distribution
- Spray characteristics
- Proper atomizer/nozzle selection
- Flat spray impact force
- Proper spray overlap

Upon completion of this course, you will be able to:
- Compare different atomizers and select the proper one for your application
- Calculate droplet size, cone angle, and other spray characteristics
- Understand and improve the operation of your existing atomizing system

Bring Your Atomization Problems to Discuss
We encourage you to bring to the course your atomizer design problems and questions. This is your opportunity to discuss and explore innovative and practical solutions to your atomization problems.

How You Will Learn
Your learning experience will include in-depth lectures, class discussions, and examples of atomization shown on video. During the course you will also gain hands-on experience by solving actual atomization problems.

Note: Please bring a calculator for your use during the problem-solving sessions.

Attend and Benefit
This course will focus on spray drying and spray drying applications. Engineers, scientists, and technicians involved in the following application areas will benefit by attending:
- Chemical, petrochemical, and biochemical industries
  - spray towers
  - spray drying
- Specialty chemical manufacturing
- Reactor and pilot plant operations
- Process and project engineering
- Food processing
  - spray drying
- Pharmaceutical

If you are a novice, your instructors will quickly bring you up to speed. If you are an expert, you will benefit from this detailed review. Plan to attend with:
- Process engineers
- Project engineers
- Maintenance engineers
- Mechanical engineers
- Process chemists
- Food technologists
- Research engineers

Your Instructors
Elaine M. Bower is a program director with the Department of Engineering Professional Development at the University of Wisconsin–Madison, where she is responsible for the chemical and process engineering short courses delivered through the department. Previously, she managed research involving a variety of difficult-to-atomize substances for the U.S. Government. She holds a B.S. degree in chemical engineering-biomedical engineering from Carnegie Mellon University and an M.S. degree in chemical engineering from Cornell University.

Chuck Trullinger recently retired from Delavan, a manufacturer and designer of spray nozzles. With more than 40 years at Delavan, Chuck was involved in research, engineering, technical services, and marketing. Chuck continues working as a consultant in the field of atomization and sprays, focusing on proper nozzle selection and operating parameters and optimizing spray systems. He recently authored the article, “The Effects of Liquid Properties and Operating Conditions on Droplet Size.”

For Related Course Descriptions
http://epd.engr.wisc.edu/chemicaleng

ENROLL ONLINE TODAY! Or visit our Web site
Course Outline

Welcome and Introduction
Elaine M. Bower
Program Director
Department of Engineering Professional Development
University of Wisconsin–Madison

Atomization
• Definition
• Process objectives
• Factors to be considered
• Spray patterns
• Drop sizes
• Fluid type and properties
• Sheet disintegration

Atomizers: Various Designs
• Pressure atomizers
  – plain orifice
  – simplex or pressure swirl
  – duplex
  – dual orifice
  – by-pass or return
  – fan spray
• Rotary atomizers
  – spinning disks
• Two fluid atomizers
  – internal mix
  – external mix
  – air-assist
  – air-blast

Factors Affecting Atomization
• Liquid properties
• Viscosity effects
• Operating parameters

Selection and Specification of Spray Nozzles
• Applications
• Atomizer selection

Other Performance Criteria
• Spray properties
• Cone angle
• Liquid distribution
• Patternation
• Maintenance and troubleshooting

Basic Atomization Processes
• Mechanisms for drop breakup
• Disintegration of liquid jets
• Disintegration of liquid sheets
• Flow and atomizers
  – plain orifice atomizers
  – pressure swirl atomizers
  – rotary atomizers
  – film thickness

Spray Drying Applications
• System selection
• Improving operations

Schedule Note
Registration will begin at 8:00 a.m. on Wednesday, April 13, at the Madison Concourse Hotel, One West Dayton Street, Madison, Wisconsin. The course will meet from 8:15 a.m. to 4:00 p.m. The schedule will include midmorning and midafternoon refreshment breaks and lunch at noon.

Past Participants Say...
“GOOD OVERALL PRACTICAL INFORMATION AND PRESENTATION.”
Maintenance Supervisor

“I OBTAINED A GOOD UNDERSTANDING OF HOW CHANGING PROCESS CONDITIONS AFFECT SPRAY PERFORMANCE.”
Design Engineer

“I RECEIVED A BASIC UNDERSTANDING OF DROPLET FORMATION AND THE LIMITATIONS OF DIFFERENT NOZZLES AND ATOMIZERS.”
Process Development Engineer

“I LEARNED HOW TO CONFIGURE OUR NOZZLES TO IMPROVE OUR PRODUCTION RATES AND QUALITY.”
Production Supervisor

“I GAINED A BETTER UNDERSTANDING OF HOW DROPLETS ARE FORMED BY THE NOZZLE.”
Plant Manager

“I GAINED A BETTER UNDERSTANDING OF THE EFFECT OF NOZZLE DESIGN ON DROPLET DISTRIBUTION. WE WILL USE THIS INFORMATION TO IMPROVE THE WAY OUR PRODUCTS ARE TESTED.”
Project Manager

“The practice exercises and rules-of-thumb were very helpful. Chuck is an excellent resource.”
Design Engineer

Come Early for the Companion Course and Save!

Dryer Technology
April 11–12, 2011
Course #M450

Dryer Technology provides a detailed introduction to
• The fundamentals of drying
• Process design of dryers
• Improving dryer efficiency

The course will focus on continuous drying of particulate materials from foods to inorganic chemicals. Emphasis throughout the course will be on aqueous-based, continuous direct dryers.

Call 800-462-0876 for more information or visit epd.engr.wisc.edu/webM450.
You can save by enrolling in both courses. See the enrollment form.
Four Easy Ways to Enroll

Internet:  
http://epd.engr.wisc.edu/webM45

Phone:  
800-462-0876 or 608-262-1299 (TDD 265-2370)

Mail to:  
Engineering Registration  
The Pyle Center, Dept. 107  
702 Langdon Street  
Madison, Wisconsin 53706

Fax:  
800-442-4214 or 608-265-3448

Other Upcoming Courses

For information about the following courses or to receive course brochures, please call 800-462-0876, e-mail custserv@epd.engr.wisc.edu, or visit epd.engr.wisc.edu/chemicaleng

Successful Liquid Mixing Scale-up Methods  
January 11–13, 2011  
Course #M405

Pumps and Process Piping  
January 25–26, 2011  
Course #M431

Hazard Analysis and Risk Assessment  
February 23–24, 2011  
Course #M449

Spray Dryer Absorbers: Fundamentals and Practice  
March 1–2, 2011  
Course #M481

Chemical Engineering for Non-Chemical Engineers  
March 14–16, 2011  
Course #M432

Dryer Technology  
April 11–12, 2011  
Course #M450

Evaporators: Designing, Evaluating, and Operating  
May 3–4, 2011  
Course #M463

Pilot Plant Equipment  
May 10–12, 2011  
Course #M591

On-site Courses Save Time & Money!

UW–Madison can deliver Atomization and Spray Technology:

- At a location of your choice
- At your convenience
- At reduced per-person cost
- Tailored to your needs

To inquire about this on-site course or other courses that we can bring to your site, call 800-462-0876 and ask for Program Director Elaine Bower. Or visit http://epd.engr.wisc.edu/onsite

Need to Know More?

Call toll free 800-462-0876 and ask for
Program Director:  
Elaine M. Bower  
bower@engr.wisc.edu

Program Associate:  
Theresa Rodger  
rodger@epd.engr.wisc.edu

or e-mail custserv@epd.engr.wisc.edu

General Information

Fee of $795 Covers Course notebook, break refreshments, lunch and certificate. We do not publish proceedings. Course materials are distributed only to participants.

Cancellation  
If you cannot attend, please notify us by April 6, 2011, and we will refund your fee. Because this course has limited enrollment, cancellations received after this date and no-shows are subject to the full course fee of $795. You may enroll a substitute at any time before the course starts.

Location  
This course will be held at the Madison Concourse Hotel, One West Dayton Street, Madison, Wisconsin 53703.

Accommodations  
We have reserved a block of sleeping rooms ($108/single, $118 double) for course participants at the Madison Concourse Hotel and Governor’s Club, the course site. To reserve a room, call 800-356-8293 or 608-257-6000 by March 22 and indicate that you will be attending this course under group code 125702.

Earn Continuing Education Credits  
By participating in this course, you will earn 7 Professional Development Hours (PDH) or 0.7 Continuing Education Units (CEU).