

2010 Process Safety Training Courses

Chemical Reaction Safety, Electrostatics, Dust & Flammability

November 1-4, 2010

Course Overview

Fauske & Associates, LLC (FAI) offers a series of four (4) individual courses designed to identify hazards and control strategies that allow for the safe development and scale-up of batch and semi-batch chemical processes. The topics are:



- 1) Preliminary hazard assessment and quantification of the desired reaction(s);
- 2) Characterization of the unwanted chemical/decomposition hazards;
- 3) Flammability and electrostatic hazards; and
- 4) Dust/flammable explosion hazards, prevention and protection practices including OSHA combustible dust national emphasis program.

Each one-day course runs from 9 am to 5 pm daily over four consecutive days and can be attended individually or as a series. A continental breakfast, lunch, and snacks are provided.

Who Should Attend?

FAI have designed these courses for personnel in R&D, Process Development, and Full-Scale Production in the chemical, petrochemical, food, cosmetic, detergent, plastic, paper, agrochemicals and pharmaceutical industries. Personnel include but are not limited to chemists, engineers, technicians, and operational staff.

Course Design and Objectives

Scaling-up at any level in a safe and compliant manner requires technical understanding of all critical process issues and implementation of the right level of safety measures in the plant. FAI has developed a series of courses to train engineers, chemists, and operational personnel to work with their process safety laboratories to systematically identify and assess hazards in a quantitative manner to develop inherently safer processes.

It is critical to have a process safety strategy in place to identify hazards associated with raw materials, solvents, by-products, chemical reactions, and various work-up unit operations that produce intermediates, bulk product and final product form. Once the hazards are identified and understood, appropriate safeguards or redesign the process to eliminate a hazard. As a chemical process scales up, it is essential that we understand what the basis of safety is and how we maintain the process within safe limits to avoid an incident. If needed, adiabatic tests can be conducted to simulate a worst-case scenario and design appropriate explosion protection for new/existing reactors. When working with flammable solids, liquid and gases we need to have a practical understanding of fire/explosion hazards, electrostatic issues and what control measures are needed. Once the solid product is produced, it is worked up in various unit operations where powders and dust are an issue. It is necessary to quantify the sensitivity and amount of powder needed to be a dust explosive hazard, and the severity of the explosion. Knowing these properties allows for the right the right level of explosion prevention, electrical classification, and management of electrostatic issues. A scientific calculator is recommended for these courses.

Day 1 – Monday

Preliminary Hazard Assessment Quantification of the Desired Process Chemistry Reaction Hazards

Course Objectives

This course will demonstrate the need for process safety testing and management strategies to allow for a safe and compliant scale-up of batch and semi-batch processes. It will take a step-wise approach to this safety evaluation. The first step is a preliminary assessment strategy for conducting a literature review and screening tests (calorimetry, calculations) to identify highly-energetic materials. The next step is conduct a quantitative assessment of the desired and quench reaction to determine heat of reaction, adiabatic temperature rise, heat-flow/off gas rates, and determination of the risks associated with the current reaction has been design.

Content- Power Point Slide Presentation

- Introduction
- Review of significant incidents
- Suggested tests at each stage of production
- Small-scale tests
- Theoretical calculations (Predictions)
- Quantitation of the desired & quench reactions
- Process redesign
- Inherent safety
- Case studies
- Workshop
- Quiz
- Course Evaluation

Day 2 – Tuesday

Characterization of the Unwanted Reactivity

Course Objectives

Every chemical process needs to be assessed in order to identify unwanted reactivity. If no adverse reactivity is observed, then the process can be safely scaled-up. However, if adverse reactions (thermal runaway reaction, decomposition, or generation of off-gases) are detected, it is necessary to quantify the energy, pressure, and temperature parameters including their respective rates. The need and choice of specific tests, data interpretation, and examples of calculations will be provided for a variety of different systems. Commonly used protective measures for safeguarding personnel and plant equipment, will be discussed.

Content- Power Point Slide Presentation

- Introduction
- Review of significant incidents
- Adverse testing strategy
- Calorimetric testing
- Data interpretation
- Process redesign
- Protective measures
- Case studies
- Workshop
- Quiz
- Course Evaluation

Day 3 – Wednesday
Understanding and Controlling
Flammability and Electrostatics Hazards

Course Objectives

This course will allow engineers and process safety personnel to identify hazards of conducting process with combustible and flammable solvents. A review of common flammable and electrostatic properties will be discussed in terms of batch and semi-batch process and work-up operations. We will present case studies which will help to focus attendees on critical data needed to conduct a proper assessment to determine safeguards that are needed to conduct scale-ups in a safe and compliant manner.

Content- Power Point Slide Presentation

- Introduction – Basic Theory and Definitions
- Review of significant incidents
- Conditions for a Fire & Explosion
- Small-scale tests
- Theoretical calculations (Predictions)
- Special conditions
- Ignition Factors including Electrostatics
- Explosion control
- Case studies
- Workshop
- Quiz
- Course Evaluation

Day 4 – Thursday
Dust Explosion Hazards,
Prevention and Protection Practices

Course Objectives

This course will make all participants aware of important issues associated with OSHA's Dust National Emphasis Program, NFPA 654 and other relevant Standards/Codes. There will be a logical approach presented on how to characterize a powder's hazardous dust properties. Once the hazards are identified and quantified, there will be a description of various techniques used to control and/or avoid dust explosions in a safe and compliant manner. Worked examples will be presented to demonstrate ignition sensitivity, explosion severity, and the Class II test relative to a "standard" dust. The workshop will allow student to understand and practice various dust calculations.

Content- Power Point Slide Presentation

- Introduction – Basic Theory and Definitions
- Review of Significant Dust Explosions
- OSHA Dust National Emphasis Program
- NFPA Standards, International Fire Codes
- Hazard Analysis (Dust Pentagon)
- Data Collection and Process Modeling
- Laboratory Testing
- Mitigating Factors including Electrostatics
- Explosion Control Strategies
- Case studies
- Workshop
- Quiz
- Course Evaluation

In-Company Training

All of the above mentioned courses can be presented as in-house courses at a location convenient to our client. FAI subject matter experts will travel to the client's venue and present the courses. When there are between 10-30 attendees, it is generally more cost effective to have FAI personnel present the course at a company facility. In addition, the course can be customized.

Subject Matter Experts:



Hans Fauske, D.Sc., President

Since leaving Argonne National Laboratory in 1980 where he served as the first Director of the Fast Reactor Safety Technology Management Center and was responsible for the planning and management of the DOE program, Dr. Fauske has been involved in projects covering a wide range of safety issues. He served as a Senior Consultant to the Industry Degraded Core Rulemaking program (IDCOR) and as a Senior Technical Advisor to the Clinch River Breeder Project. He also provided overall technical direction for the AIChE Design Institute for Emergency Relief Systems (DIERS), which was funded by 28 chemical firms in the U.S.A. and abroad. Currently, he is performing a key role in resolving potential process safety issues and the development of inherently safe nuclear and chemical process reactor concepts.

Dr. Fauske has published more than 200 scientific articles and holds numerous patents in the areas of nuclear and chemical process safety. He was a member of the editorial boards of the Journal of Loss Prevention in the Process Industries and the International Journal of Multi-Phase Flow. He has taught at several universities in the U.S.A. and abroad and served as the sixth BASF Renowned Scientist Lecturer from 1989 to 1990. He is a fellow of both the American Nuclear Society and the American Institute of Chemical Engineers. In 1975, he became the first person in the field of reactor technology to receive the University of Chicago Medal for Distinguished Performance at Argonne National Laboratory. In 1982, he became the third recipient of the Tommy Thompson Award, the highest honor that the American Nuclear Society bestows in the field of reactor safety. In 1991, he received the ANS Thermal-Hydraulics Division Technical Achievement Award, in 1992 the prestigious AIChE Donald Q. Kern Award for his significant contributions in the area of nuclear and chemical process safety, and in 1996 the AIChE Robert E. Wilson Award in Nuclear Chemical Engineering for his leadership and contributions in developing methods to help assure safety in the nuclear power and chemical process industries. In 2004, he received the Outstanding Achievement Award, from the University of Minnesota, for demonstrating outstanding achievements in his field on an international level.

James Burelbach, Ph.D., Senior Consulting Engineer

Dr. Burelbach is responsible for supporting and growing our international network of agents and distributors. This activity draws on extensive hands-on expertise developing, improving, and actively using our VSP2 and ARSST adiabatic safety calorimeters and RMS reactivity management software products as well as significant travel experience providing equipment and software training to customers throughout the world. Dr. Burelbach is also responsible for our partnership with ChemiSens (Sweden) to distribute their state-of-the-art reaction calorimeter equipment throughout North America, and to provide reaction calorimetry contract testing services using our CPA202 system. Prior to taking his current position, Burelbach has been the Manager of Chemical Testing and Consulting Services at FAI, responsible for all aspects of our growing contract testing business. He has been a Senior Chemical Engineer at Fauske & Associates, LLC, since 1988.

Dr. Burelbach has a strong background in process hazard analysis for the chemical and nuclear industries. His diverse responsibilities have included analysis of emergency pressure relief and effluent handling designs for reactive chemical systems, using VSP2 and ARSST adiabatic calorimeters along with RMS best practice vent sizing methods based on DIERS two-phase flow methodology. He is a frequent speaker at related industry forums, including AIChE, DIERS, EDUG, NATAS, and Mary Kay O'Connor. He has provided onsite reactive systems testing, installation of new VSP2 and ARSST equipment, technical training, and customer support, and has developed a SACHE module utilizing the ARSST for undergraduate process safety education. In addition to thermal stability and runaway reaction testing, his previous research includes experiments on battery materials, ignitability of solvent layers, flame spread over liquid fuel pools, natural convection enhanced evaporation, thermocapillary flow in thin liquid layers, organic intrusion into waste tank sludge, interfacial stability in liquid-liquid tube flows, and ozone-olefin autoignition. He has supported chemical process incident investigations and nuclear plant risk assessment and accident management programs, and has experience in fault tree analysis and model development for simulation of severe accidents and two-phase flow transients. Dr. Burelbach has published numerous (archival) journal articles in nuclear safety, film mechanics, combustion, and heat transfer.

Ashok Dastidar, Ph.D., M.A.Sc., M.B.A., Manager, Dust & Flammability Consulting & Testing Services

Dr. Ashok Ghose Dastidar specializes in Chemical Process Hazards Analysis, Flammable Dusts, Liquids & Vapors Explosion and Combustion Hazards Analysis and Testing and Electrostatic Hazards Analysis. He has extensive technical experience performing tests and analyzing data to determine the following: Electrostatic Hazards – Field measurements, discharge potential, charge transfer and ignitability; Flammability Hazards – ease of ignitability and explosion severity of liquid and vapor explosions; Thermal Stability and Reactivity Hazards – by Differential Scanning Calorimetry and Dewar Tests; Hazard Analysis and Risk Mitigation – using HAZOP, FMEA/FMECA, and FTA.

Dr. Dastidar has published 12 articles including: A. G. Dastidar, B. N. Reyes, and C. J. Dahn, "Evaluation of dust and hybrid explosion potential in process plants", Process Safety Progress, vol 24, no. 4, pp 294-298, 2005. He has also presented at more than 23 conferences including: A. G. Dastidar, C. J. Dahn, B. Cole and K. H. Lo, "Incendiary Nature and Electrostatic Discharge Characteristics of FRP Pipes", Fourth International Conference on Composite Materials for Offshore Operations. Houston, TX, October 4 – October 6, 2005.



Michael Epstein, Ph.D., Vice President of Consulting Services

Dr. Epstein joined Fauske & Associates in 1980 after nine years of research experience at Argonne National Laboratory, where he was Manager of Post Accident Heat Removal Section in the Reactor Analysis and Safety Division. His research and consulting work have resulted in novel design and hazard evaluation methods for various processes of interest to the chemical and power-generation industries. These have included simple (algebraic) methods for evaluating relief systems for deflagrations and decompositions in chemical process vessels, designing advanced solar/gas-driven desiccant air conditioning systems, predicting air flows in a fire environment, and estimating the deposition rate of coagulating toxic aerosols in enclosures. His recent work is related to assessing the hazards associated with flammable vapor and dust clouds. He served as a member of the flammable gas safety issue panel (SCOPE) for the Hanford site tanks.

Dr. Epstein has published over 120 (archival) journal articles in the areas of convective energy and mass transport, phase transformations, aerosol phenomena, and combustion. In 1984, he received a National Science Foundation Award to conduct fundamental research on density-driven natural convection. In 1987, he was co-recipient of the William H. Doyle Award for the best paper at the New Orleans Loss Prevention Symposium. He has also participated as an invited speaker and lecturer at several universities and technical symposia and he has served as an advisor to graduate students at several universities. He was a Technical Editor of the ASME Journal of Heat Transfer (1979-1985) and was Chairman of the AIChE's Committee on Safety of Chemical Processes and Hazardous Materials (1988-1991).

Richard (Rick) Kwasny, Ph.D., CSP, CPEA Senior Consulting Engineer

Dr. Kwasny is a recognized specialist in the areas of chemical reactivity and process safety. His expertise encompasses chemical reaction hazards (reactivity, flammability, and dust) associated with process scale-up, technology transfer, process hazard analysis (PHA), transportation issues, and process safety management (PSM). He has a comprehensive knowledge of standards and regulations including National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA) standards, and United Nations (UN) / Department of Transportation (DOT) testing/interpretation. He is a member of American Society for Testing and Materials (ASTM) International Technical Committee E-27 (Hazard Potential of Chemicals), American Chemical Society (ACS), American Institute of Chemical Engineers (AIChE), American Society of Safety Engineers (ASSE), and The Board of Environmental, Health and Safety Auditor Certifications (BEAC) and a Certified Safety Professional (CSP). Dr. Kwasny is a senior engineering consultant with Fauske & Associates, LLC. He has conducted numerous technical and educational seminars on chemical reactivity. He earned his Ph.D. in chemical engineering from South Bank University; his thesis was "Hazard Assessment Strategies for Reduction Reactions".

Ken Kurko, Manager, Thermal Stability Projects

Ken Kurko is currently responsible for designing and coordinating all ARC testing and support services. In addition, he provides calorimetry contract testing services utilizing our ARC, ARSST, DSC, TAM, and VSP2 instruments. This includes traveling to provide ARSST equipment and software training to our U.S. customers as well as providing remote technical support. His responsibilities also consist of analysis of emergency relief systems using methods consistent with DIERS two-phase flow methodology. He has also performed extensive campaigns for flammability testing of gaseous mixtures as well as liquid/gas mixtures.

Ms. Amy Theis, P.E., Manager Chemical Testing & Chemical QA Services

Ms. Theis is currently responsible for designing and coordinating ARSST and VSP2 adiabatic testing services. This position utilizes her experience providing technical support and training to ARSST customers worldwide as well as her hands-on experience performing VSP2 tests. In addition, she is the Quality Assurance Manager which provides support for two testing service groups. One group is responsible for the adiabatic, dust and flammability testing services which are compliant with ISO 17025. The other group consists of safety-related nuclear activities that require compliance with 10CFR50 Appendix B and 10CRF21. Prior to taking this current position, Ms. Theis was responsible for the performance verification, trouble-shooting, improvements, software development, customer training and support related to ARSST calorimeter systems. She has been a chemical engineer at Fauske & Associates, LLC since 1999. Ms. Theis has a strong background in process hazard analysis for the chemical industry. Her diverse responsibilities have included analysis of emergency pressure relief and effluent handling designs for reactive chemical systems based on DIERS two-phase flow methodology. Publications include work related to safe process scale-up which have appeared in Process Safety Progress. She is a frequent speaker at several industry-related forums including AIChE, DIERS, EDUG, and NATAS. In addition, she has been a guest lecturer for undergraduate Chemical Process Safety and Process Design courses in her efforts to educate university students about the importance of chemical process safety in the workplace. In support of these efforts, she is an active participant in the SACHE (Safety and Chemical Engineering Education) program and developed a Runaway Reaction module which is part of the Student Safety Certificate Program.



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REGISTRATION FORM
November 1-4, 2010

[Chicago Marriott Southwest at Burr Ridge](#)
1200 Burr Ridge Pkwy
Burr Ridge
(630) 986-4100

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Burr Ridge, IL
1+-877-FAUSKE1

First Name:	
Last Name:	
Company:	
Address:	
City:	
State:	Payment Method:
ZIP:	<input type="checkbox"/> Visa <input type="checkbox"/> MC <input type="checkbox"/> Amex <input type="checkbox"/> Company Check
Telephone:	Account Number:
Cell:	Expiration Date:
Fax:	Name on Account:
Email:	Signature:
Please choose which day(s) you will be attending:	
<input type="checkbox"/> Day 1: Monday - <i>Preliminary Hazard Assessment Quantification of the Desired Reaction Hazards</i>	
<input type="checkbox"/> Day 2: Tuesday - <i>Characterization of the Unwanted Reactivity</i>	
<input type="checkbox"/> Day 3: Wednesday - <i>Understanding and Controlling Flammability and Electrostatics Hazards</i>	
<input type="checkbox"/> Day 4: Thursday - <i>Dust Explosion Hazards, Prevention and Protection Practices</i>	
Prices:	
\$ 489.00 each day	
\$ 1,956.00 for all four days	
Fees include hotel room, breakfast, lunch and 2 snack breaks	
All fees must be received prior to course commencement. We accept Visa, MC, Amex or company check.	
Cancellation Policy: Cancellations will be accepted up to October 15, 2010.	
Contact: Lisa Karcz, karcz@fauske.com , 630-887-5232, FAX: 630-986-5481	
www.fauske.com	

