

Ask Joe! Column

Dust Explosion Hazard Awareness

Guest article by David E. Kaelin Sr., Chilworth Technology Inc.



Introduction

There is an old chestnut that says “Let Sleeping Dogs Lie”. This is a mindset we can never use in the management of hazardous materials, including combustible particulate solids (explosible dusts).

The recent report from the US Chemical Safety and Hazard Investigation Board (CSB) states “...combustible dust explosions are a serious hazard in American industry, and ... existing efforts inadequately address this hazard.”

The CSB study examined the record and literature to assess the magnitude of the dust explosion hazard and found that 281 combustible dust incidents were reported in the 25 year period ending in 2005. These incidents were responsible for 119 fatalities, 718 injuries and millions of dollars in lost facilities and productivity.

Many serious incidents were caused by explosions of what might be normally thought of as benign materials such as plastics, rubber, foodstuffs and wood dust. Companies processing and handling finely divided particulate solids need to be aware of the potential for fire and explosion events and how industry best practice and existing Codes and Standards can manage the risk.

Dust Management Deficiencies

Three dust management “efforts” were stressed by the CSB as requiring new emphasis:

1. Existing codes and standards, although comprehensive, are inconsistently applied and, as a result ineffective
2. Material Safety Data Sheets (MSDS) are less than adequate regarding combustible powder properties, and
3. Awareness and training is needed to ensure that operating personnel and those responsible for safety and fire prevention oversight are knowledgeable in the subject of dust explosion hazards and can apply existing codes and standards to prevent dust explosions.

In addition, a common thread in many of the most serious of the incidents was less than adequate housekeeping practices resulting in the ignition of secondary explosions that caused massive damage.

Codes And Standards

OSHA does not currently have a comprehensive dust hazard standard that can be applied to general industry, and as a result most often uses the “general duty” clause when citing employers, usually after an event. This is a less than effective preventive technique.

One of a half dozen important codes for safe management of combustible dusts is the National Fire Protection Association (NFPA), "Standard for the Prevention of Fire and Dust Explosions, from the Manufacturing, Processing and Handling of Combustible Particulate Solids", NFPA 654. This and other applicable best practices are not universally required by fire and building codes, nor are they fully understood or applied by most inspection authorities. i.e., just because you've been inspected by an authority doesn't mean your dust explosion hazard management is appropriate or in keeping with current industry practice.

When conducting a preliminary hazard evaluation of a process or operation, it should be considered best practice in U.S. industry to review all applicable codes and standards to ensure compliance as a minimum effort. Such an effort can be challenging, especially if in-house technical experts are unavailable to interpret the applicability as well as the code and standard specifics.

MSDS - Material Safety Data Sheets

Quantitative combustible dust fire and explosion properties are not specifically and clearly required to be included on Material Safety Data Sheets by the existing OSHA Hazard Communication Standard (HCS) or the American National Standards Institute consensus standard for MSDS format and preparation, ANSI Z400.1. As a result, when explosivity data is included, it is often in the form of less than adequate qualitative statements such as "Powder may form Explosive Dust/Air Mixtures".

A similar statement could be made for all flammable liquids, although flash point data is the most basic data reported on MSDS to communicate the degree of ignition sensitivity for a liquid. Why should ignition sensitivity and explosion severity not be quantified in a similar fashion for explosible dusts? Qualitative statements give no hint as to the conditions required to create an explosion hazard, or the relative violence of the resulting deflagration.

Good information on the hazardous properties of materials is critical to the Process Hazards Analysis (PHA) effort required by the Occupational Safety and Health Administration's (OSHA) Process Safety Management (PSM) standard as well as the Environmental Protection Agency (EPA) Risk Management Plan (RMP) rule. But, what is good information and what level of depth is required in order to adequately understand and therefore control the hazards associated with combustible dusts?

Many companies count on the information in the manufacturer's Material Safety Data Sheet, for input to their PHA effort. Less than adequate information can be a dangerous situation. Chilworth Technology Inc. has fully equipped laboratories to conduct all pertinent fire and explosion, electrostatic, and thermal instability property tests for inclusion in risk assessment and MSDS's. Chilworth testing is conducted per applicable national and/or international standards, and we are ISO 17025 accredited.

Training

Chilworth Technology Inc. is a leading company in providing dust and powder hazard management training courses, which can be tailored to your needs. We have provided dust explosivity hazard safety training to fire marshals, EPA inspectors, and OSHA inspectors as well as industry operating, maintenance and design personnel. Our Process Safety Specialists are experts in the application of best methods for the understanding and control of fire and explosion hazards associated with powder processing.

For more information contact:
Mr. David E. Kaelin Sr.
Senior Process Safety Specialist
Chilworth Technology, Inc.
250 Plainsboro Rd, Bldg #7
Plainsboro, NJ 08536
Tel: 609-799-4449
Fax: 609-799-5559
Email: safety@chilworth.com
Web site: <http://www.chilworth.com/>

+++++

Welcome to Ask Joe!, a monthly column by our resident materials handling guru, Joe Marinelli of Solids Handling Technologies. Joe addresses the issues that bug you the most. And Joe knows!! Formerly with Jenike & Johanson, Solids Flow and Peabody TecTank, Joe is an expert on materials handling.

For past articles, **Ask Joe!** Archived Articles.

Guest articles for the **Ask Joe!** Column are always welcome, for more information please contact Joe Marinelli directly at his email address: joe@solidshandlingtech.com.

© Powder and Bulk.com