

EXPLOSIVE: COMBUSTIBLE DUST ISSUE

Identifying combustible dust and what you can do to manage it.

By Jamison Scott

It could happen at any woodworking plant. Any time. Anywhere. If your company processes wood flour, or produces fine particles of wood dust during machining operations, you have the potential for a combustible dust explosion.

What Is Combustible Dust?

Although there is no universally accepted definition, the Occupational Safety and Health Administration refers to combustible dusts as fine particles that present an explosion hazard when suspended in air in certain conditions.

Combustible fine particles of wood dust, also known as “deflagrable” wood dust, are classified as having a diameter of 420 microns (0.425mm, 425 um micrometers, 0.0165 inch) or smaller, and having a moisture content of less than 25 percent. In other words, the particles are sized small enough to pass through a U.S. No. 40 standard sieve.

However, not every material is a potential source for combustion. According to OSHA’s Hazard Communication Guidance for Combustible Dust, the physical properties used to determine combustible dust include:

- Minimum Ignition Energy (MIE): “which predicts the ease and likelihood of ignition of a dispersed dust cloud;”
- Minimum Explosible Concentration (MEC): “which measures the minimum amount of dust dispersed in air required to spread an explosion;”
- K_{st} dust deflagration index: which “measures the relative explosion severity compared to other dusts. The larger the value for K_{st} , the more severe the explosion.” Wood flour, for example has a strong explosion class rating of st2. Silica, on the other hand, has a zero rating.

If you have any doubt about the potential explosiveness of the material, have your dust tested by a certified facility.

Proposed: National Standard

Between 1980 and 2008, OSHA recorded 422 incidents of combustible dust-related incidents. Of those, 53 occurred in wood products facilities.

Based on its findings, OSHA has begun the process of developing a standard that will address the fire and explosion hazards of combustible dust. The agency has issued an Advanced Notice of Proposed Rulemaking (ANPR 74 FR 54334) requesting comments, data and other information, on the hazards of combustible dust in the workplace.

Approximately two months ago, OSHA held the first of its Combustible Dust Stakeholder Meetings in Washington, DC, to solicit comments on the proposal to create a national standard. According to Jordan Barab, Deputy Director of Occupational Safety



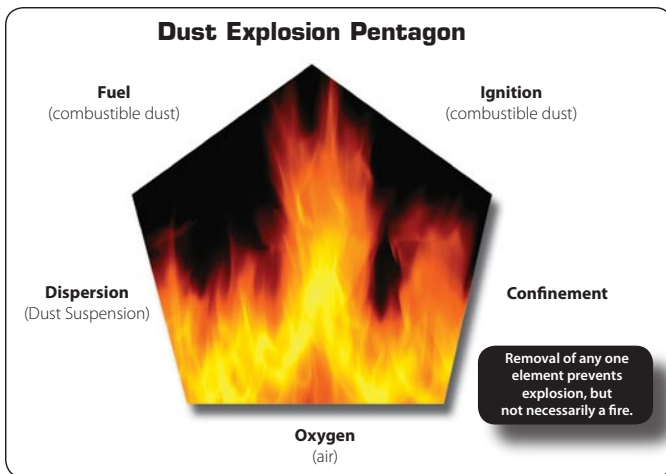
Secondary explosions or deflagrations can occur when pressure waves from the first incident disperse and ignite combustible dust that has accumulated on surfaces. These secondary explosions are usually more devastating than the primary one.

FATAL FIRE AT IMPERIAL SUGAR SPARKED ISSUE

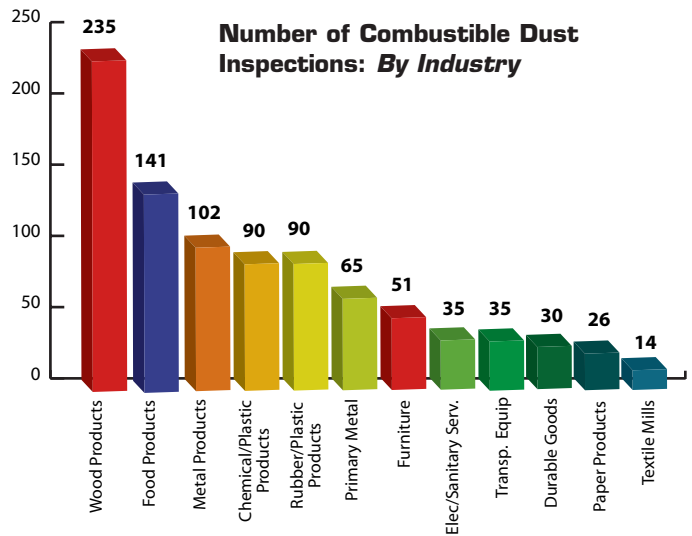
OSHA reissued the Combustible Dust National Emphasis Program in March 2008 following the fatal dust explosion and fire at the Imperial Sugar refinery Port Wentworth, GA. The blast killed 14 workers and injured 36, several with second- and third-degree burns.

The U.S. Chemical Safety Board, which investigates industrial accidents, found written warnings of explosive dust hazards in refinery memos from the 1960s, indicating that the tragedy could have been averted by routine housekeeping. The deaths were blamed on a chain of secondary explosions that spread through the packaging plant, fueled by layers of dust.

For a video, visit csb.gov/videoroom/detail.aspx?VID=33



For any fire to occur, there must be fuel, ignition and oxygen (Classic Fire Triangle). However, for a combustible dust explosion, you must also add dispersion and confinement — the “Dust Explosion Pentagon.” Removal of any one element prevents an explosion, though not necessarily a fire.



OSHA’s NEP for combustible dust applies to 64 industries. Of the more than 1,000 inspections conducted, 25% were at wood products companies and 6% were at furniture companies.

VIOLATIONS IN THE WORKPLACE

The following is a small sampling of some General Duty Clause citations issued by OSHA under the Combustible Dust NEP:

1. Dust collectors located inside buildings, but without proper explosion protection (i.e., venting or suppression).
2. Deflagration isolation systems were not provided.
3. Ductwork for the dust collection system did not maintain a velocity of at least 4,500 fpm to ensure transport of both coarse and fine particles.
4. All components of the dust collection system were not constructed of non-combustible materials, in that cardboard boxes were used as collection hoppers.
5. The air from the dust collector was recycled through duct work back into the work area, without the protection of a spark detection system, high-speed abort gate and/or functioning extinguishing system.
6. Collection points used for manual cleanup of wood dust and other foreign material, including metal, were not provided with magnetic separators, grates or other types of screening to prevent foreign material from entering the dust collection system.
7. Automatic sprinkler systems were not provided on enclosureless dust collectors operating at 5,500 cfm capacity and were not separated by at least 20 feet from each other inside the buildings.

Source: OSHA Status Report on the Combustible Dust National Emphasis Program

and Health, the goal of a standard regulating combustible dust hazards is to “protect workers.” He also noted at the Stakeholder Meeting that the “rulemaking process is slow and painful.”

Feedback to OSHA’s ANPR on Combustible Dust was due last month. OSHA asked for comments on 69 questions which, with questions within questions, actually totaled about 200. One question discussed Hazard Communication and the “Right to Know,” which requires MSDS (material safety data sheets). The ComDust standard is looking to require MSDS sheets on combustible materials. That raises the following questions: How can a piece of wood have an MSDS — a safety sheet for chemicals? Who creates the MSDS? If wood is only combustible if it is 420 microns or smaller, has less than 25 percent moisture and is contained within a dust explosion pentagon (see chart above), does it require an MSDS?

Page 31 of the ANPR states, “In some cases, the hazards of certain dust are widely known (for example, wood dust). In these cases, testing to determine whether the dust is explosive may not be necessary.”

Under the ANPR, methods of combating

combustible dust explosions include:

- Hazard assessment: recognition, assessment, communication (HazCom Standard, MSDS), industry standards (National Fire Protection Assn.) and state and local codes (NFPA).
- Engineering controls: primary (building) to prevent the accumulation of dust on beams and surfaces, and secondary (equipment) such as the use of dust collection and sprinkler systems. Administrative controls include written rules and procedures.
- Housekeeping: identifying and eliminating fugitive dust. Use proper dust collection systems and filters, and make sure to minimize dust escaping from loose ductwork or bags.
- Explosion protection: including spark arrester systems.
- Worker training.

On Now: National Emphasis Program

With plans for a national standard underway, OSHA in the meantime has released its Status Report on the Combustible Dust

AGENCY & LEGISLATIVE SOURCES

Advanced Notice of Proposed Rulemaking for Combustible Dust: osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=21152

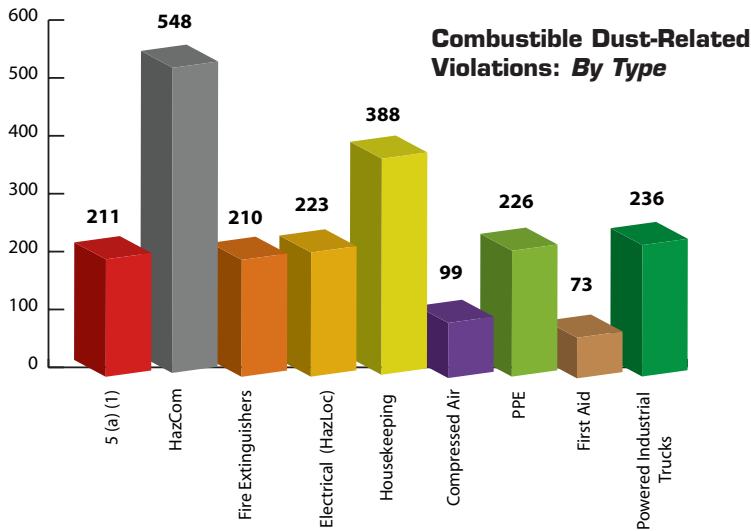
H.R. 849: thomas.loc.gov (congress.gov)

List of Government Regulations: regulations.gov

National Fire Protection Assn.: nfpa.org

Occupational Safety & Health Administration: osha.gov

U.S. Chemical Safety Board: chemsafety.gov



HazCom accounts for 27% of the combustible dust-related violations under the NEP, followed by Housekeeping at 20%.

FACILITY EXEMPTIONS?

At the Combustible Dust Stakeholder Meeting, held Dec. 14 in Washington, DC, discussion was held on whether certain types of facilities should be exempt from the proposed regulation.

For example, one stakeholder participant noted that any business with fewer than 50 employees should be excluded based on the potential “economic burden.” It was also pointed out that a small business owner has “many things to juggle” and that any code must be simple and easy to understand.

It was also suggested that operations that generate non-combustible dusts, such as mineral dust, also should be excluded.

For more on Jamison Scott's recap on the Combustible Dust Stakeholder's Meeting, visit the News Archives on WoodworkingNetwork.com

housekeeping standard (i.e., accumulation of dust on the floor — just a 1/32-inch-thick layer of fugitive dust can be combustible). (See examples of general duty clause violations on page 32.)

Until an OSHA standard is in place, the agency has referenced NFPA standards in combustible dust citations issued under the NEP. The NFPA standards most applicable to the woodworking industry are:

- 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids.
- 664: Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.

However, there is a lot of discussion by manufacturers regarding the fact that the development of an OSHA Combustible Dust Standard could cause confusion should the OSHA standard continue to reference NFPA standards. For example, according to NFPA 654, the AHJ (Authority Having Jurisdiction) is “responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.” But under OSHA, an Inspector is responsible. So who would be responsible?

Cost would also become an issue. NFPA charges for copies of its standards. So if an OSHA regulation were to refer to an NFPA standard, then a copy of the NFPA standard must be obtained and reviewed. Also, each NFPA standard typically refers to other standards. For example, NFPA 654 references

approximately 35 other NFPA standards. At approximately \$30 per standard, times 35, the cost could become a burden, especially for a small business. But more than that is the time that would be needed to digest all the data in the various standards. In order for a standard to be effective, it needs to be simplified.

Legislative Efforts

Congress also has gotten involved in the combustible dust issue. Sponsored by Rep. George Miller (D-CA), and cosponsored by Rep. John Barrow (D-GA) and Rep. Lynn Woolsey (D-CA), the “Worker Protection Against Combustible Dust Explosions and Fires Act of 2009” (H.R. 849) directs the Secretary of Labor to create a standard regulating combustible particulate solids and their dusts.

Requirements of the bill would include:

- Hazard assessment to identify, evaluate and control combustible dust hazards;
- Written program with provisions for inspection, testing, hot work, ignition control and housekeeping;
- Engineering controls, administrative controls and operating procedures;
- Housekeeping procedures to prevent the accumulation of combustible dust;
- Employee participation in hazard assessment and management;
- The availability of safety and health information and training for all employees.

H.R. 849 was referred to the House Subcommittee on Workforce Protections back in March, where it remains under review.

Jamison Scott is a corporate officer of Air Handling Systems and also the chairman of the Wood Machinery Manufacturers of America's Combustible Dust Task Force. Scott was in attendance at the Combustible Dust Stakeholder Meeting held in December. For more information, he can be reached at jscott@airhand.com, or visit airhand.com/combustibledust.asp. A copy of his report from the Stakeholder Meeting is in the News Archives on WoodworkingNetwork.com.

Karen Koenig contributed to this article.

Reprinted with permission.

Copyright 2010

Wood & Wood Products Magazine

Vance Publishing Corp.