



Fired Up: Combustible Dust Raises Explosive Issues



By now, most manufacturers are familiar with the story of combustible dust. They've read about it in the newspaper, Googled it online, watched it on CBS *60 Minutes* special,¹ or received a letter from the Occupational Safety and Health Administration informing them their facility is considered high-risk for a combustible dust explosion. They have a solid picture in their minds of what an industrial explosion scene looks like: the remnants of a facility, a gaping hole, a collapsed roof, workers covered in soot and blood. It's like a well-crafted movie scene, except its real-life.

Combustible dust has been the culprit of deadly work-place blasts for decades, but it wasn't until an explosion in 2008 that killed 14 people at the Imperial Sugar Refinery in Port Wentworth, Ga, that the issue began getting the attention it deserved. OSHA stepped in, reissuing its Combustible Dust National Emphasis Program and the industrial world became inundated with statistics, definitions and preventative measures.

But with all the media attention and new-found information regarding combustible dust explosions, very little attention has been devoted to the most common combustible dust-related incident happening daily at facilities across the United States: fires. Essentially precursors to explosions, combustible-dust fires are often regarded as "part of the business," especially in heavy-industrial manufacturing facilities where eliminating hazardous dust is next to impossible. But although small dust-related fires might be the norm for some manufacturers, flames that don't lead to a deadly explosion should be considered a near miss. Yet unlike explosions that get often get top billing in newspapers and on the nightly news, small fires usually get just a few brief sentences, if covered at all. They also are rarely reported to state and federal agencies, since aside from random inspections, OSHA only investigates significant incidents involving a fatality or extensive injuries.²

John Astad, founder of the Combustible Dust Policy Institute, has taken the issue into his own hands, starting a grass-roots effort to raise awareness and understanding of all facets of the combustible dust issue. Through his research, which includes combing the web for news articles that contain key words and calling on local fire departments, Astad discovered through media accounts that 80% of combustible dust incidents in 2008 were solely fires, and 30% of dust explosions were at facilities where they had experienced prior related fires.³ Here are just some of the incidents Astad has come across through his research:

- In June 2008, New Jersey firefighters responded to a fire at a paper recycling facility when paper particles in the duct system became overheated and ignited. The fire chief confirmed that similar fires happen several times a year at the location.⁴
- On June 20, 2009, five local fire departments converged on a fire at a sawmill in Pike County, Ohio. While the cause of this particular fire was unknown, the sheriff's office said that the location is the site of fire calls from time to time because the dust related to cutting wood leads to easy combustion.⁵
- In the summer of 2008, a wood stove pellet plant went up in flames twice in a six week period. Both incidents led to an explosion. A spark that ignited wood dust was responsible for at least one of the fires. Local residents, who have felt up to four blasts, described the company as a "hazard."⁶

Combustible dust fires occur when the three components of the fire triangle exist:

- Combustible dust (fuel)
- Ignition source (heat)
- Oxygen in air (oxidizer)

Most industrial facilities have all three elements, and if fire ignites in a contained area where combustible dust particles have accumulated,

such as a duct system or an overhead beam, the formula for an explosion is complete. While an initial blast can be devastating, it often stirs up additional dust, leading to a secondary blast that can take down an entire facility.

Dust and debris are inevitable in the manufacturing sector and the only way to completely eliminate combustible dust incidents is to shut down operation. Obviously, this is not an option, and so plants dealing with combustible dust must take the proper steps to educate themselves, decrease their risk, and be adequately prepared should a combustible dust incident occur.

A comprehensive maintenance plan is a solid first step in preventing a combustible dust-related fire or explosion and can greatly minimize the tragic effects of a secondary blast. By letting dust accumulate on surfaces, facilities are literally adding fuel to the fire and efforts should be taken to insure that dust deposits greater than 1/32", the thickness of a paperclip, are promptly removed, according to OSHA's Combustible Dust NEP.⁷ While mops and brooms have their place in industrial facilities, the process is time-consuming and often creates dust clouds. They also are very limited in what they can clean. A properly equipped, HEPA-filtered industrial vacuum suitable for collecting combustible dust can get the job done in half the time and be used to remove dust from machinery, floors, walls, and overhead pipes and vents. (See sidebar for more information).

Aside from proper maintenance techniques to reduce dust-build up, Astad is spreading the word about best engineering practices. As outlined in the National Fire Protection Association's combustible dust standards, housekeeping alone will not minimize the severity and probability of occurrence. Employees and managers should be trained to recognize and prevent combustible dust fires, and facilities should have a damage control plan which includes sprinklers, explosion protection systems, and deflagration venting.

In April 2009, OSHA announced the beginning of a rulemaking process that will hopefully one day make the aforementioned recommendations mandatory, although the process isn't free from criticism. OSHA has been accused of doing too little, too late, and many are afraid that any combustible dust legislation will be hurriedly passed through to quiet the masses or without consideration for how companies will pay for mandatory systems. And while John Astad is critical of OSHA's Combustible Dust NEP, he certainly doesn't blame them and is appreciative of the steps they've taken thus far.

"The current (OSHA) Combustible Dust NEP formulated through the Chemical Safety Board recommendations is a start, but stakeholders throughout industry still have a long way to go," he says.

Astad cautions that before any rulemaking process can proceed in a manner that adequately protects the workplace, while allowing companies to remain profitable, regulatory agencies must fully recognize the scope of the issue, and that includes accurately accounting for each and every combustible dust incident, including fires.

"Many people are saying that OSHA doesn't have the resources, but that's not true if we all worked together," says Astad. "Including local fire departments, authorities having jurisdiction, manufacturers, and those serving the industrial sector. We all have a stake in this and we can all make a difference."

Dust-related fires and explosions have been happening since the dawn of manufacturing, and while industrial fires are not 100% preventable, manufacturers should no longer view them as inevitable. The industrial sector has come a long way from the workplace tragedies of the industrial revolution, and with endless resources of education and means of prevention at their fingertips, there's no reason why today's manufacturers should go up in smoke.

Combating Combustible Dust With Explosion Proof Vacuums

OSHA's Combustible Dust NEP calls for electrical vacuums used in dusty areas to be approved for the hazard-classified location, as required under standard 1910.307(b).

Unfortunately, most plant supervisors assume the machinery in their plants is explosion-proof, including the industrial vacuums, but as seen in multiple tragedies, it often isn't the case. In fact, using a vacuum that is not certified explosion-proof or intrinsically safe to collect materials classified explosive by the National Fire Protection Association actually adds to the risk of explosion.

Certifiable Explosion-Proof: Beware of "Dress Up"

An "explosion-proof" vacuum (EXP) is explosion-proof to the core. This means that everything from the outer shell to the internal mechanics including the motor, switches, filters and inner chambers, is grounded and constructed of non-sparking materials like stainless steel. Some industrial vacuum companies offer basic models dressed up with a few anti-static accessories and describe them as suitable for explosive material. These imposters can still create arcs, sparks or

heat that can cause ignition of the exterior atmosphere and overheating that can ignite dust blanketing the vacuum.

NRTL Approval

Purchasing an explosion-proof vacuum approved by a nationally recognized testing laboratory such as the Canadian Safety Association (CSA) or Underwriters Laboratories (UL) will protect buyers by providing legal certification that the vacuum can be used in a particular NFPA-classified environment. It ensures every component in the vacuum from the ground up meets strict standards for preventing shock and fire hazards.

Explosion-Proof Vs. Intrinsically Safe

In environments where electricity is unavailable or undesirable, air-operated vacuums for hazardous locations are excellent alternatives, especially in facilities where compressed air is the main power source. But just because a vacuum is air-operated, doesn't make it explosion-proof. "Intrinsically safe" vacuums, as they are called, should still be constructed of non-sparking materials and outfitted with ignition-proof parts and accessories that meet the highest level of operational safety.

About Nilfisk CFM

Nilfisk CFM, the industrial vacuum division of Nilfisk-Advance America, helps its industrial customers meet their individual cleaning requirements and challenges with an extensive range of high-performance vacuum cleaners.

From its Malvern, Pa, headquarters, Nilfisk CFM provides industrial vacuums for heavy-duty applications that require maximum suction power, and specialty vacuums for clean applications that demand "absolute" air purity and facility cleanliness. The company's vacuums are equipped with industry-specific features and exceptionally efficient filtration systems, ensuring dust- and debris-free facilities in the food, chemical/pharmaceutical, electronics, metalworking/powder coating, and a variety of manufacturing industries. For more information, visit www.explosionproof-vacuum.com.

References

- ¹ "Is Enough Done to Stop Explosive Dust?". 60 Minutes. CBS.
- ² "OSHA Response to Significant Events of Potentially Catastrophic Consequences". <http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=1666&ptable=DIRECTIVES>.
- ³ "Combustible Dust Policy Incident Blog". <<http://dustexplosions.blogspot.com/2009/06/osha-regioniv-combustible-dust.html>>.
- ⁴ "Fire quickly extinguished at Homasote Co". NJ.com. <http://www.nj.com/mercer/index.ssf/2008/04/fire_quickly_extinguished_at_h.html>.
- ⁵ "Sawmill Fire in Pike County". NBC4. <http://www.nbc4i.com/cmh/news/local/article/sawmill_fire_in_pike_county/16816>.
- ⁶ "Fire reported for second time in six weeks at wood stove pellet plant". The Herald Mail. <http://www.herald-mail.com/?cmd=displaystory&story_id=201753&format=html>.
- ⁷ "Combustible Dust in Industry: Preventing and Mitigating the Effects of Fire and Explosions". <<http://www.osha.gov/dts/shib/shib073105.html>>.