Metal Finishing

Date: Friday, May 01, 2009
Location: NEW YORK, NY
Circulation (DMA): 24,570 (N/A)
Type (Frequency): Magazine (13Y)
Page: 37,38,39
Keyword: Nilfisk-CFM

ORGANIC finishing

BY PAUL R. MILLER, NILFISK CFM, MALVERN, PA.

When the Dust Settles

A tutorial on explosion-proof vacuums.

Ever since finely ground motes of sugar caused a tragic explosion at a sugar factory in Savannah, Ga., killing 14, combustible dust has been largely absent from media coverage. The tragedy sparked serious finger pointing and brought to light a catastrophic issue that was hiding in the shadows of nearly every industrial plant that handles dry solids. The Department of Labor's Occupational Safety and Health Administration (OSHA) was quickly put on the hot seat, but they responded fast and with a message heard loud and clear: there are an estimated 30,000 U.S. facilities at risk for a combustible dust explosion, and the agency is going to show up unannounced at as many of those plants as possible.[1]

OSHA's announcement of random inspections also came with a reissue of CPL 03-00-008, its National Emphasis Program (NEP) on Combustible Dust that calls attention to the agency's rigorous expectations for combustible dust-related explosion prevention. The NEP also outlines what OSHA auditors will be looking for during their visits: items such as dust accumulation of more than 1/32", the thickness of a paper clip, covering more than 5% of a plant. However, these expectations are nothing new for the powder coating industry. As a fine organic dust with static disposition, coating powder has been closely monitored by OSHA for decades.

First issued in 1974, OSHA Standard 1910.107 regulates the steps that should be taken in spray finishing using flammable and combustible materials. Aside from daily booth cleaning, it calls for horizontal surfaces such as ledges, beams, pipes, hoods, booths, and floors to be kept free of the accumulation of powder coating dusts. The standard also requires surfaces to be cleaned in such a manner so as to avoid scattering dust to other places or creating dust clouds.[2]

Because traditional methods like sweeping and compressed air hardly combat fine dust, powder coating facilities often meet these standards with shop-style vacuums. Although these vacuums might be acceptable for general cleaning of dust and debris outside of coating booths, using them to collect combustible metal dust can not only be deadly, but it may also violate the requirements set forth in OSHA's Combustible Dust NEP, which 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 plant is explosion-proof, including their industrial vacuums. However, as seen in multiple tragedies, this often is not the case. In fact, using a vacuum that is not certified explosion-proof or intrinsically safe to collect materials classified as explosive by the National Fire Protection Agency actually adds to the risk of explosion.

CERTIFIABLE EXPLOSION-PROOF: BEWARE OF "DRESS UP"

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

Figure 1: An explosion-proof vacuum should be certified by an internationally recognized testing laboratory.
(Images courtesy of Nilfisk CFM.)

Metal Finishing

Date: Friday, May 01, 2009
Location: NEW YORK, NY
Circulation (DMA): 24,570 (N/A)
Type (Frequency): Magazine (13Y)
Page: 37,38,39
Keyword: Nilfisk-CFM

ORGANIC finishing

Figure 2: Powder coating facilities should develop and implement hazardous dust inspection, testing, housekeeping, and control procedures in order to prevent dust-related explosions.

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

Purchasing an EXP vacuum approved by a nationally recognized testing laboratory, such as the Canadian Safety Association (CSA) or Underwriters Laboratories (UL), will protect buyers from acquiring a poser 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 powder coating facilities where compressed air is often the main power source. But just because a vacuum is air-operated, that does not make it explosion-proof. Intrinsically safe vacuums, as they are referred to, should still be constructed of non-sparking materials and outfitted with ignition-proof parts and accessories that meet the highest level of operational safety. Whereas only electric vacuums can be certified and deemed "explosion-proof" by a nationally recognized testing laboratory, intrinsically safe vacuums should still meet the requirements for use in the NFPA-classified environment. Plant managers should beware of vacuum companies that refer to their pneumatic models as "certified explosion-proof." Explosion-proof certification for air-operated machines simply does not exist.

FILTRATION

Superior filtration does not have to be sacrificed on an EXP model, especially when collecting potentially hazardous material such as metal dust. For peak safety and operating efficiency, an EXP vacuum should have a multi-stage, graduated filtration system that uses a series of progressively finer anti-static filters to trap and retain particles as they move through the vacuum. To eliminate combustible dust from being exhausted back into the ambient air, a HEPA or ULPA filter can be positioned after the motor to filter the exhaust stream. Quality HEPA filters offer an efficient, effective way to trap and retain the smallest dust particles, down to and including 0.3 microns. ULPA filters capture even smaller particles, down to, and including, 0.12 microns.

Powder coaters might also look for a vacuum that is equipped with a manual or automatic filter cleaner. Because powder dust is usually very fine and sticky, this feature will allow the user to regularly shake the filter and dislodge caked-on dust without having to open the vacuum cleaner.

SPILL RESPONSE

Spill response should also be taken into account when purchasing an EXP vacuum. Although OSHA's NEP is specifically looking at companies that handle dry solids, manufac-

PREVENTING "EXPLOSIVE" SITUATIONS

An ignitable material, an ignition source, and oxygen—these are all it takes for a potential explosion at your facility. Most manufacturing plants have all three. In 2006, fatalities involving explosions and fires increased by 26% in the manufacturing sector, according to the Bureau of Labor Statistics Census of Fatal Occupational Injuries. In addition to injuries, explosions cost companies millions of dollars. Between 1992 and 2002, Factory Mutual Global's pharmaceutical and chemical clients experienced dust explosions resulting in $32 million in losses. And OSHA has estimated that there are approximately 30,000 U.S. facilities at risk for combustible dust explosions. Simply put, there's a lot of stake.

NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, contains comprehensive guidance on the control of dusts to prevent explosions. Following are some of its recommendations:

- **Minimize the escape of dust from process equipment or ventilation systems;**
- **Use dust collection systems and filters;**
- **Utilize surfaces that minimize dust accumulation and facilitate cleaning;**
- **Provide access to all hidden areas to permit inspection;**
- **Inspect for dust residues in open and hidden areas, at regular intervals;**
- **Clean dust residues at regular intervals;**
- **Use cleaning methods that do not generate dust clouds, if ignition sources are present;**
- **Only use vacuum cleaners approved for dust collection;**
- **Locate relief valves away from dust hazard areas; and**
- **Develop and implement a hazardous dust inspection, testing, housekeeping, and control program (preferably in writing, with established frequency and methods)**

Metal Finishing

Date: Friday, May 01, 2009
Location: NEW YORK, NY
Circulation (DMA): 24,570 (N/A)
Type (Frequency): Magazine (13Y)
Page: 37,38,39
Keyword: Nilfisk-CFM

ORGANIC finishing

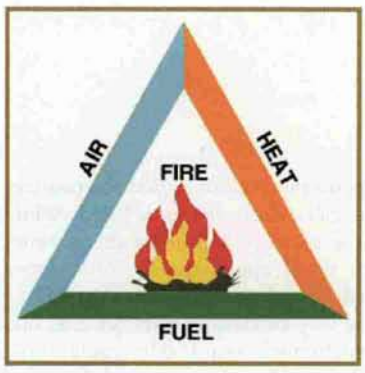

Figure 3: The fire triangle. An ignitable material, an ignition source, and oxygen are all it takes for a potential explosion at your facility. Most manufacturing plants have all three.

turers' maintenance plans are also under the microscope. If workers need to collect flammable or explosive chemicals, a wet-model EXP vacuum should be considered. These units are also available in both electric and air-operated versions.

CONCLUSIONS

Unfortunately, the Savannah sugar plant was not the first or last industrial workplace blast; the U.S. Chemical and Safety Hazard Board estimates there are, on average, 10 explosions, five fatalities, and 29 injuries per year as a result of combustible, dust-related incidents.[3] On Feb. 3, 2009, nearly a year to the day of the sugar blast in Georgia, a power plant in suburban Milwaukee joined the growing list of companies making headlines for falling victim to combustible-dust blasts. Although there were no fatalities, six workers were seriously injured and countless fines are likely to follow.

Purchasing a high-quality, certified, explosion-proof or intrinsically safe vacuum is a solid first step in preventing a combustible dust-related explosion, and picking the right vacuum often raises a lot of questions, especially when it comes to disaster prevention. As with all investments, pre-sale research is key. Plant managers should not hesitate to ask the vacuum manufacturer for an on-site analysis of their vacuum needs in order to recommend what type of EXP vacuum, hose, and accessories are needed for the application.

With the right equipment, the vacuum can be used to meet OSHA requirements, collecting dust from the floor, booth walls, and even overhead pipes and vents. And, naturally, every manufacturer will be responsive to your needs before you buy, so look for a company that will still be there after the "dust settles." Excellent post-sale support and training will make things easier when it is time to purchase replacement parts and filters or service the vacuum.

If used consistently and in conjunction with a comprehensive maintenance plan, a facility's investment in an EXP vacuum will result in much more than just a clean plant. It will increase productivity, protect your employees, and keep your facility out of the headlines.

REFERENCES

1. "Is enough being done to stop explosive dust?" ***60 Minutes***, CBS News. June 8, 2008.
2. Occupational Health and Safety Administration. ***Spray Finishing Using Flammable and Combustible Material.*** (1910.107(l)(4)(i),
3. U.S. Chemical Safety and Hazard Investigation Board. ***Investigation Report: Combustible Dust Hazard Study.*** Jan. 2, 2008.

BIO

Paul R. Miller is vice president and general manager of Nilfisk CFM. He has more than 20 years of experience in the industrial vacuum cleaner industry, serving in various capacities throughout his tenure with the company. As a former sales representative, product manager, and director of operations, Miller has seen firsthand the unique maintenance challenges manufacturers face, developing effective and efficient solutions for their dust and debris problems. Miller holds a bachelor's of science degree from Elizabethtown College, Elizabethtown, Pa.