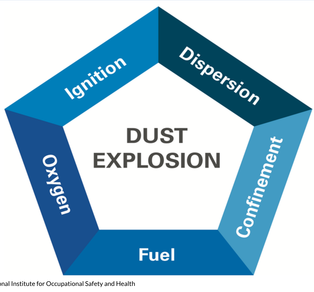
Loss Control Perspectives

Combustible Dust



National Institute for Occupational Safety and Health

HOW DOES DUST COMBUST?

1. Dust is explosive & airborne
2. Concentration of dust is within explosive range
3. Distribution of particle size (ease of ignition)
4. Atmosphere supports combustion
5. Ignition source is present

TYPES OF COMBUSTIBLE DUST

Agricultural Products
Sugars, Starches, Milks, etc.

Agricultural Dusts
Flours, Hops, Gluten, Cotton, etc.

Carbonaceous Dusts
Charcoal, Cellulose, Corn, etc.

Chemical Dusts
Lactose, Sulfur, Calcium, Acetate, etc.

Metal Dusts
Aluminum, Zinc, Bronze, etc.

Plastic Dusts
Epoxy Resin, Poly Ethylene, etc.

DID YOU KNOW?

Grain dust is 9 times more combustible than coal dust!

FUGITIVE DUST & SECONDARY EXPLOSIONS

Fugitive dust is dust that is created and accumulated within a facility. It often becomes trapped in unnoticeable places such as overhead beams and above ceilings.

During a primary explosion, fugitive dust can ignite and produce secondary explosions

It is oftentimes the secondary explosion that is the most destructive.

FAMOUS CASES

1785 — Giacomelli Bakery Explosion, 1st recorded dust explosion
2 injuries

1878 — Washburn A Grain Mill Explosion
18 deaths

1977 — Westwego Grain Explosion
36 deaths

2003 — West Pharmaceuticals Fire (Plastics)
6 deaths

2008 — Imperial Sugar Explosion
14 deaths

NFPA STANDARDS

61 — Standard for the Prevention of Fires & Dust Explosions in the Agricultural and Food Processing Industries

652 — Standard on the Fundamentals of Combustible Dust

654 — Standard for the Prevention of Fire & Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Solids

664 — Standard for the Prevention of Fires & Explosions in Wood Processing & Woodworking Facilities

The Chemical Safety Board (CSB) concluded that between 1980 and 2005 there were 281 Combustible Dust Incidents (excluding grain facilities). These resulted in:

119 deaths

718 injuries

OSHA's Grain Handling Study reported that in the last 35 years there were over 500 explosions linked to grain handling dusts. These resulted in:

180 deaths

675 injuries

GOOD HOUSEKEEPING

At the heart of combustible dust safety lies housekeeping. Most combustible dust-related incidents are caused by accumulations of dust over an acceptably safe level. Below are several engineered & human element solutions to prevent combustible dust accidents.

Dust layers as thin as 1/32 of an inch are hazardous.

Safe cleaning of dust is integral to preventing accumulations and explosions.

Eliminating smoking & other human element solutions are effective, and low-cost.

Fugitive dust accumulates in high, and hard-to-reach places (including on high equipment and beams) and also needs to be collected.

Utilizing dust collection &ventilation systems are key (many are designed for exteriors).

Heat sources should always be separated to prevent ignition.

Proper use of cartridge actuated tools can help ignition prevention.

Sources:
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