

# Q&A on Mitigating Conveyor Explosions and Fires

Part II

## What are the Potential Sources of Fire at My Mill?

### The Short Answer

Friction and hot processes are the most common source of fires. You must conduct a fire assessment for an accurate picture of all your risks.

### The Long Answer

As required by NFPA 652 4.1, **the owner/operator of a facility is responsible for performing a dust hazard analysis** in order to answer this question. In their analysis, they must 1) Determine the combustibility and explosibility of materials present at their facility; 2) identify what hazards exist in regard to fires, flash fires, and explosions; 3) manage the hazards they identify; and 4) communicate the hazards to personnel whom the hazard would affect. Really, there is no way of knowing what risks exists at your operation by reading any article. There are too many variables to consider.

**We can, however, provide you some guidance.** Friction, for example, is one of the most common sources of fire. So, you will want to analyze which processes possess high friction loads. The more friction, the more heat, and where dust is present, the greater the risk of fire or deflagration.

**Friction will start a fire** in one of two ways: with sparks or hot, black particles. Friction sparks occur when metal parts smack or rub each other. (Friction isn't the only source of sparks, of course. The material being handled may emit sparks, for example, as quartz does. Sparks may come from other sources, too, such as a shortage in an electrical system.) The hot, black particles that friction creates are simply particles below 1290°F (700°C) that don't emit visible light. Although cooler than sparks, these particles can contain enough energy to ignite materials, many of which can ignite at temperatures much lower than 1290°F, like sawdust.

**Hot processes are another common source of fires.** Incinerators, boilers, dryers, pelletizers, and other hot systems are potential sources of fire because of the energy present.

**The characteristics of the material being conveyed also play into the risk of fire and explosion.** Wet cake (spent corn materials left over from the ethanol-making process) has virtually no chance of catching fire due to its water content. Dry sawdust, on the other hand, has a very low combustibility temperature and little moisture (typically less than 12%), so the risk is greater.

# Superior Engineering Superior Performance

**BIOMASS**  
engineering &  
equipment



Because dry wood can so easily catch fire, mills often install fire suppression systems on conveyors that handle it. **But even if a material contains a good deal of moisture, it is not a guarantee that it will not ignite.** An engineered wood manufacturer in the United States, for example, experienced a fire in multiple conveyors that handled green wood chips (40-60% moisture). The fire started when a bearing in one of the conveyors went bad and began throwing sparks. The sparks landed on the conveyor belt, where the chips ignited. Unfortunately, the conveyor had a tin hood, so crews were not able to get water onto chips to extinguish the flames. As a result, the fire grew so hot that the conveyor buckled. When that happened, the fire spread to a second conveyor. In the end, the company lost two or three conveyors coming out of the chipping area and had to suspend production for several days.

Again, you will have to conduct an analysis to determine the fire hazards that exist at your mill and the steps are required to address them. **Doing so is not only smart, it's required.** If you neglect to do you, you invite catastrophic damage to your business.

## Am I at Risk for Explosions?

*1m<sup>3</sup> Vessel Test Data from Forschungsbericht Staubexplosionen — Agricultural Dusts*

Material	Mass Medium Diameter ( $\mu\text{m}$ )	Minimum Flammable Concentration ( $\text{g}/\text{m}^3$ )	$P_{max}$ (bar)	$K_{St}$ (bar-m/s)	Dust Hazard Class
Cellulose	33	60	9.7	229	2
Cellulose Pulp	42	30	9.9	62	1
Cork	42	30	9.6	202	2
Wood Flour	29	—	10.5	205	2

Source: Table F.1(a) NFPA 652

### The Short Answer

While less common than fires, explosions still pose significant risk. To determine your risk, you must conduct a dust hazard analysis.

### The Long Answer

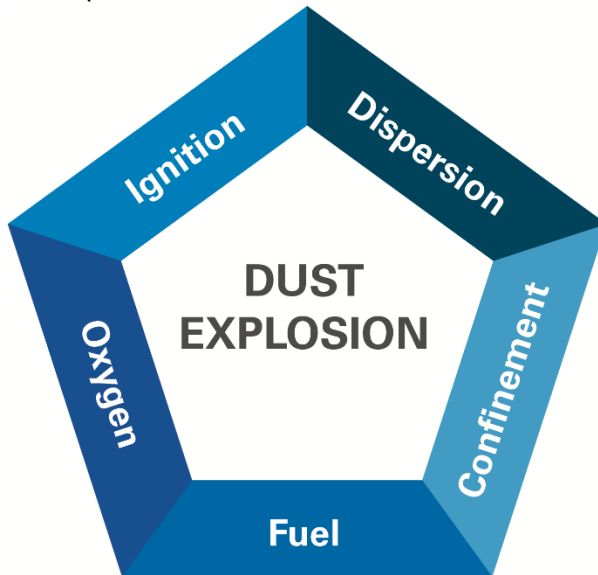
**Explosions are less common than fires and flash fires because additional conditions are required for them to occur.** Fuel, oxygen, and an ignition source are required to start a fire. A flash fire occurs when

# Superior Engineering Superior Performance

**BIOMASS**  
engineering &  
equipment



the dust disperses after the initial ignition. For an explosion to occur, the dust cloud must be confined so that pressure can will build. There are also different temperatures and pressures necessary to start a fire and explosion in the same material.



risk for an explosion.

As confinement is required for an explosion to occur, **indoor or otherwise confined areas in which dust gets kicked up are at risk for explosions.**

What's more, for companies that work with wood, NFPA 664 4.1.3.1 states that a deflagration hazard exists if the average wood dust on upward-facing surfaces exceeds 1/8". The dust need not even be in the air.

As with determining your fist of fire, **the only way to understand what explosion risks exist at your operation is to perform a dust hazard analysis.** In general, though, if you have fine dust particles in the air, piles of dust around your facility, or otherwise transfer dusty material, you are likely at

## What Solutions does Biomass Engineering & Equipment Offer for Fires and Explosions?

BE&E is committed to your safety. **That's why we joined the NFPA and why we offer solutions for mitigating fires, flash fires, and explosions** in our conveyors and other material handling equipment.

We offer deluge systems, spark detection, and explosion mitigation systems—such as vents that open at 0.1 bar-g, as required by NFPA 68 6.3.5.4.1(3)— for our equipment.

Get your mill up to code with SMART solutions from Biomass Engineering & Equipment. [Contact us today to discuss your safety concerns.](#)