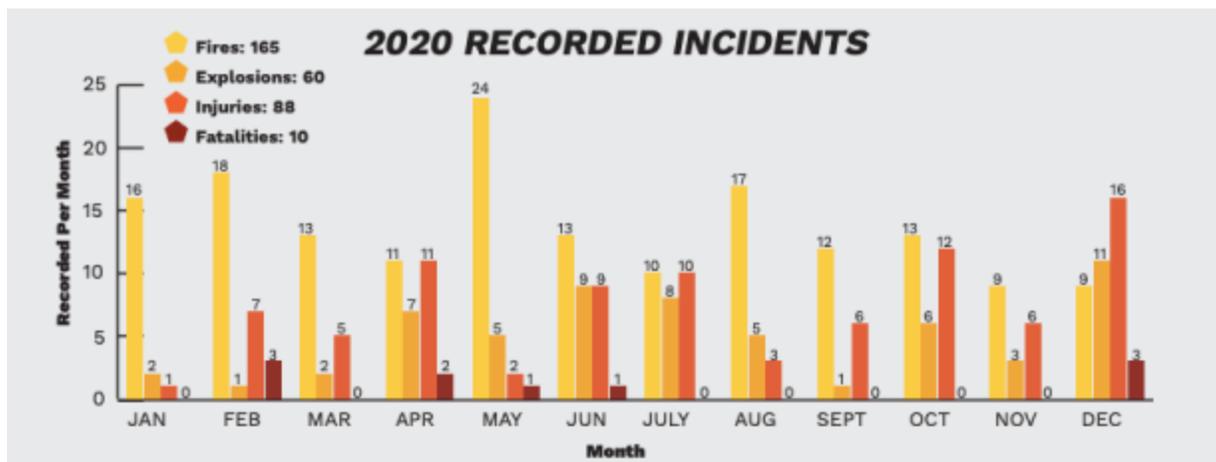


# Aggregating Combustible Dust Incidents From Around the World

For the fifth year in a row, the team at Dust Safety Science has compiled and analyzed combustible dust incidents from around the world. As of December 31, 2020, they captured almost 1000 incidents in their [incident reports](#) along with a detailed analysis of the materials, industries and equipment involved.

Dust Safety Science aggregates their reports twice a year, and this most recent report includes all incidents they've captured from January 1, 2020, to December 31, 2020. These are broken into fires and explosions occurring both in North America and internationally throughout the world.



The following table compares the number of incidents, injuries and fatalities entered into the database since we started recording.

	UNITED STATES					CANADA					INTERNATIONAL			
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2017	2018 <sup>†</sup>	2019	2020
Fires	--	117	158	175	116	--	15	17	22	14	37	38	53	35
Explosions	31	28	37	37	26	2	4	4	1	7	36	27	37	27
Injuries	22	52	40	42	35	0	9	1	4	2	102	73	72	51
Fatalities	3	6	2	1	1	0	0	0	0	0	7	21	7	9

<sup>†</sup> A fatal grain dust explosion at a pet food facility in Treviglio, Italy on April 1, 2018 was added to the incident data from the last report.

## Loss History – United States

Loss history from dust explosions in the United States over the last five years is given in the following table. This data has been collected in the incident database and reported in the combustible dust incident reports, 2016 to 2020.

YEAR	EXP./YEAR	INJ./YEAR	FAT./YEAR
2016	31	22	3
2017	28	43	6
2018	37	30	2
2019	37	27	1
2020	26	23	1
5 year average	31.8	29.0	2.6

This data gives an average of 31.8 dust explosions per year, 29 injuries and 2.6 fatalities over the last four years. Note that dust fires are excluded in this analysis.

## 2020 Global Loss Overview

In 2020, 70% of the fatalities recorded occurred due to dust explosions. Of the injuries, 73% occurred due to explosions and 27% occurred due to fires.

Some of the more severe incidents include:

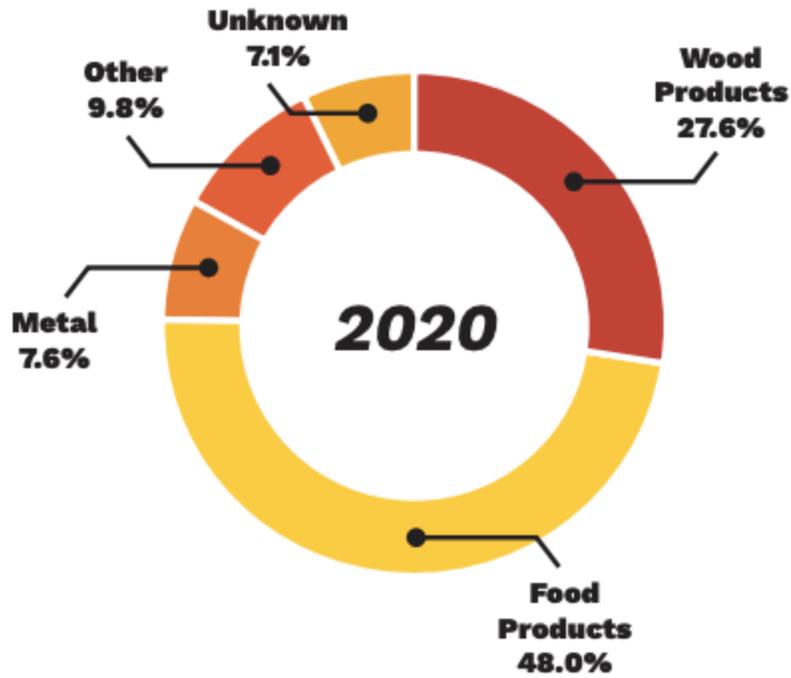
- [Five injured in food recycling dust explosion](#) (Rose Hill, NC)
- [One killed, three injured in dryer explosion](#) (Belle, WV)
- [One killed, four injured in feed plant explosion](#) (Shanxi, China)
- [One killed, four injured in dried sludge explosion](#) (Bristol, UK)

Limited information has been available for damages from dust explosions and fires. From the information that is available the following incidents resulted in more than \$1,000,000 in losses:

- [Wood chipping fire causes \\$2M in damages](#) (Ramseur, NC)
- [Paper products fire causes \\$2M in damages](#) (Mooresville, NC)
- [Sawmill destroyed by fire](#) (Cap-Pelé, New Brunswick)
- [Food plant fire causes \\$3M in damages](#) (Sibley, IA)

## Materials Involved

In reviewing the global incident data, food and wood products made up over 75% of the combustible dust fires and explosions recorded.



**2020 DETAILED ANALYSIS**

Wood	27.6%	Sulfur	1.3%
Food	48.0%	Plastic	0.9%
Metal	7.6%	Other	4.0%
Coal	1.8%	Unknown	7.1%
Paper	1.8%		

These materials also resulted in 57% of the injuries and 40% of the fatalities. A breakdown of the fires, explosions, injuries and fatalities for each type of material is given as follows:

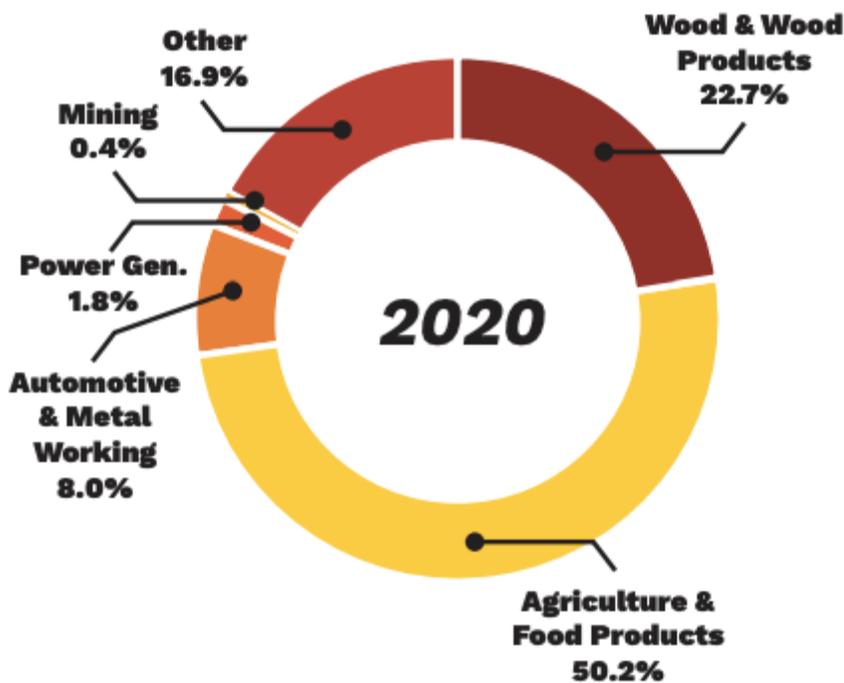
	<b>FIRES</b>	<b>EXP.</b>	<b>INJ.</b>	<b>FAT.</b>
<b>WOOD</b>	47	15	18	3
<b>FOOD</b>	80	28	32	1
<b>METAL</b>	10	7	13	1
<b>COAL</b>	4	0	0	0
<b>PAPER</b>	3	1	0	0
<b>PLASTIC</b>	1	1	1	0
<b>SULFUR</b>	2	1	5	0
<b>TEXTILE</b>	0	0	0	0
<b>OTHER</b>	4	5	13	5
<b>UNKNOWN</b>	14	2	6	0
<b>TOTAL</b>	<b>165</b>	<b>60</b>	<b>88</b>	<b>10</b>

The one fatality from metal dust and two injuries involved aluminum alkyl, while three of the injuries involved titanium. The other injuries from metal dusts involved four incidents where the type of metal was not specified.

Two fatalities occurred in an explosion where unspecified raw materials were being added to a reactor, one fatality occurred when smashing unspecified chemicals in a tank, four fatalities occurred during a dried sludge explosion and one occurred in a bleach powder drier explosion.

## Industries Involved

As shown in the historical data, wood processing, wood products, agricultural activity and food production make up a large portion of the overall fire and explosion incidents. Since 2017, wood and wood products have ranged from 21% to 28% of the incidents, while agricultural activity and food production has ranged from 33% to 44%.



#### 2020 DETAILED ANALYSIS

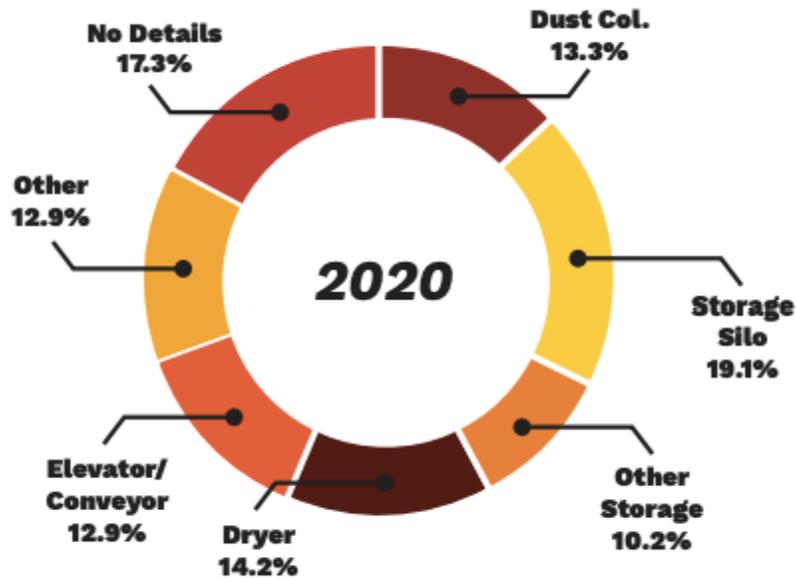
Wood & Wood Pro.	22.7%	Mining	0.4%
Agriculture	32.9%	Pulp & Paper	3.1%
Food Processing	17.3%	Schools and Edu.	1.3%
Metal Working	4.4%	Ethanol	0.9%
Automotive	3.6%	Other	11.6%
Power Generation	1.8%		

As shown in the detailed incident breakdown, the “other” category includes pulp & paper, high schools, and educational facilities. Industries not broken out in the detailed breakdown include incidents in metal recycling, rail maintenance, display stand manufacturing, jewelry, surfactant manufacturing, plastic bottle manufacturing, chemical processing, phosphate production, waste treatment, composites manufacturing, and textiles.

Combined, the overall “other” category of industries makes up 28% of the injuries and 50% of the fatalities reported in 2020. Wood and wood products, agriculture and food processing, and automotive and metalworking make up 19%, 43% and 8% of the injuries, respectively. Wood and wood products, and agriculture and food processing make up 30% and 20% of the fatalities, respectively.

## Equipment & Causes

In 2020, storage silos demonstrated the highest percentage of combustible dust incidents with 30 fires and 13 explosions reported. This is a higher percentage than the 2017 and 2018 reports which found that dust collection systems had the highest percentage of incidents. In 2020, only 13% of the fires and explosions occurred in dust collection systems.



As demonstrated in previous reports storage silos had the largest number of injuries. This is followed by other storage (e.g., small bins, hoppers and storage buildings), dust collection systems, dryers and elevators. The breakdown between fires, explosions, injuries and fatalities for different pieces of equipment are summarized in the following table for 2020:

	FIRES	EXP.	INJ.	FAT.
DUST COLLECTOR	27	3	4	0
STORAGE SILO	30	13	24	1
OTHER STORAGE	17	6	8	0
DRYER	23	9	5	1
ELEV./CONV.	22	7	3	0
OTHER	19	10	19	3
NO DETAILS	27	12	25	5
<b>TOTAL</b>	<b>165</b>	<b>60</b>	<b>88</b>	<b>10</b>

Although equipment labeled under “Other” only had 13% of the total incidents, these incidents resulted in 22% of the injuries and 30% of the fatalities. Some of these included a spark that ignited varnish vapours and sawdust while doing maintenance on a staining machine, an explosion and fire in the ducting and mill of a pellet manufacturing process, an explosion of a combination of titanium and calcium powder in a chemical processing unit, a dust fire and a dust explosion occurring while using a welding machine in a dusty area, an explosion in a raw material feed tank into a reactor, and an explosion in a plastic extruder system.

For more information or to download a copy of the report, visit [www.dustsafetyscience.com/2020-report](http://www.dustsafetyscience.com/2020-report).

### **Disclaimer**

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