2020 MID-YEAR

COMBUSTIBLE DUST INCIDENT REPORT

DUST SAFETY SCIENCE

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MEET THE PROFESSIONALS

DUST SAFETY MEMBER COMPANIES, REPORT SPONSORS AND PARTNERS

MEMBER COMPANIES

NPAK Industry Support & ATEX
4T Industrial Products
BOSS Products LLC
delfin industrial corporation
Nederman
GV Technology Fire and Explosion Protection
IEP Technologies Hoerbiger Safety Solutions
FireRover Detect | Extinguish | Protect
Pembe Safety is for life.
SINTROL Measuring Matters
Sigma-HSE Health, Safety and Environment
Element 6
Preventive Protection Systems from firefly ab Sweden
HallamICS An Employee Owned Company
MASTERDUCT Connecting Values
CST
DEKRA
Fagus GreCon
camfil Air Pollution Control
SpaceVac International
Donaldson Torit
BakerRisk
InDust, LLC. Industrial Powder & Bulk Solutions
Jensen Hughes Advancing the Science of Safety
CTI Conversion Technology Inc. Environmental & Safety Consulting Engineers
Parker
Fire & Risk Alliance
Fauske & Associates, LLC World Leader in Nuclear and Chemical Process Safety
Fike
Osprey Corporation
ExNB Notified Body
XP Products
IMPERIAL Systems
Chief Engineering

ADDITIONAL REPORT SPONSORS

SMS Safety Management Services
TFT-Pneumatic
Dust Safety Academy

PARTNERS

GEAPS Exchange Minneapolis • 2020
HES Hazardous Engineering Solutions
NGFA
Powder & Bulk Solids
Safe Dust Explosion
manufacturing Safety Alliance of BC
PBE The Authority Since 1987 Powder and Bulk Engineering
Canadian Biomass
CFI Canadian Forest Industries
Dalhousie University
RISE Research Institutes of Sweden

LETTER FROM THE AUTHOR

DR. CHRIS CLONEY

Managing Director, DustEx Research Ltd.

Change is the only thing that is constant...

I would be remiss if I didn't start by mentioning how much the world has changed since our last report, only six months ago. Covid-19, the global shutdown, demonstrations against systemic racism, wild-fires, hurricanes, and much more have had an immense impact on all of us in the combustible dust community, the industries we serve, our families, and our friends.

The only thing I can say is that I hope each of you reading this remains healthy and well as we get through this together.

"My new normal is to continually get used to new normals"

- Unknown

It is too early to tell, but we are seeing some trends in the incident reporting that might be fallout from the global pandemic. First, the number of dust explosions in the United States is down 30% of what we have typically seen in the first half of the year over the last five years. Secondly, dust collector fires also appear to be down significantly across the globe.

We will have to wait to see if this trend continues throughout 2020 or if we will see a rebound effect with more incidents happening as we start back up. My sincere wish is that we do not.

However, past history has shown that devastating loss incidents often occur during start-up, abnormal working conditions or with reduced facility crew. We will have to be very vigilant to avoid these incidents in the months ahead. I hope this incident reporting and our projects at Dust Safety Science help make that a reality.

Closing out, I want to say that my team and I are honoured to be mentioned directly in the most recent US Chemical Safety Board effort on combustible dust (see page 20 and 30 in the Dust Hazard Learning Review, press release here). Among other things, the report calls for a global multi-stakeholder platform for sharing and learning, and a world-class annual conference on combustible dust. My hope is that we can integrate these ideas into our work and you will see many improvements through the Dust Safety Academy and Dust Safety Conference in the upcoming months to that end.

As always, if you have any feedback on our work or have questions about combustible dust, my contact information is below. I am here to help, as is the rest of my team.

Stay Safe,

Chris

P.S. Have feedback on the incident reporting? Email me at chris@dustsafetyscience.com.

INCIDENT DATA OVERVIEW

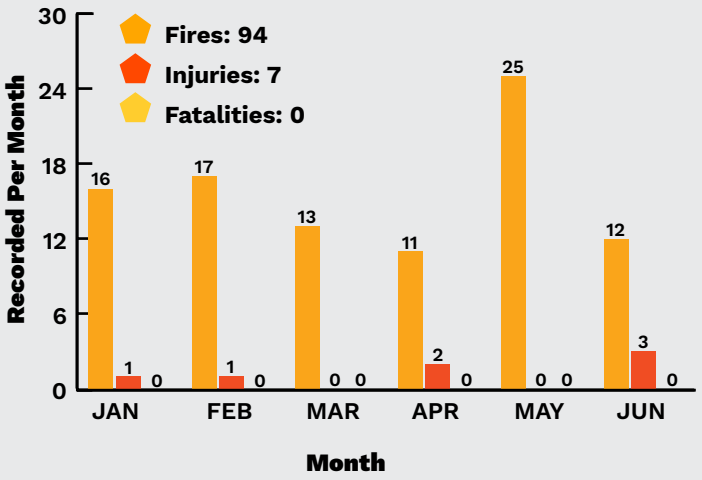
	UNITED STATES					CANADA					INTERNATIONAL			
	2016	2017	2018	2019	2020 (JAN-JUNE)	2016	2017	2018	2019	2020 (JAN-JUNE)	2017	2018†	2019	2020 (JAN-JUNE)
Fires	--	117	158	175	67	--	15	17	22	7	37	38	53	20
Explosions	31	28	37	37	11	2	4	4	1	2	36	27	37	13
Injuries	22	52	40	42	17	0	9	1	4	0	102	73	72	12
Fatalities	3	6	2	1	0	0	0	0	0	0	7	21	7	4

† 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.

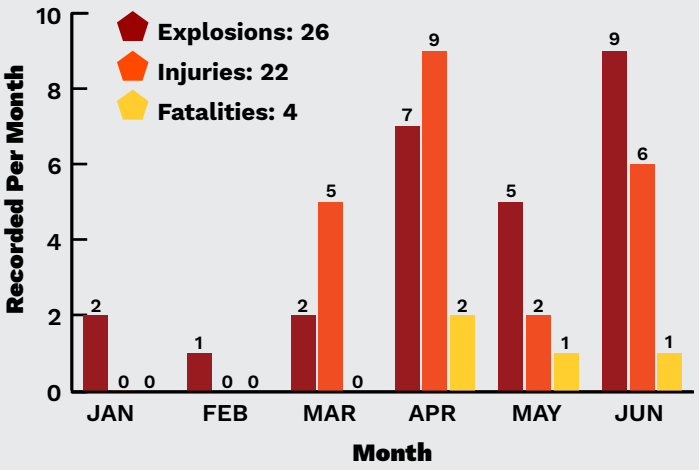
2020 RECORDED INCIDENTS

(January - June)

Fire Incidents Worldwide



Explosions Incidents Worldwide



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 2016 to 2020 combustible dust incident reports.

YEAR	EXP./YEAR	INJ./YEAR	FAT./YEAR
2016 (entire year)	31	22	3
2017 (entire year)	28	43	6
2018 (entire year)	37	30	2
2019 (entire year)	37	27	1
2020 (projected)	22	22	0

This data gives an average of 31 dust explosions per year, 29 injuries and 2.4 fatalities over the last four years. Note that dust fires are excluded in this analysis.

2020 GLOBAL LOSS OVERVIEW

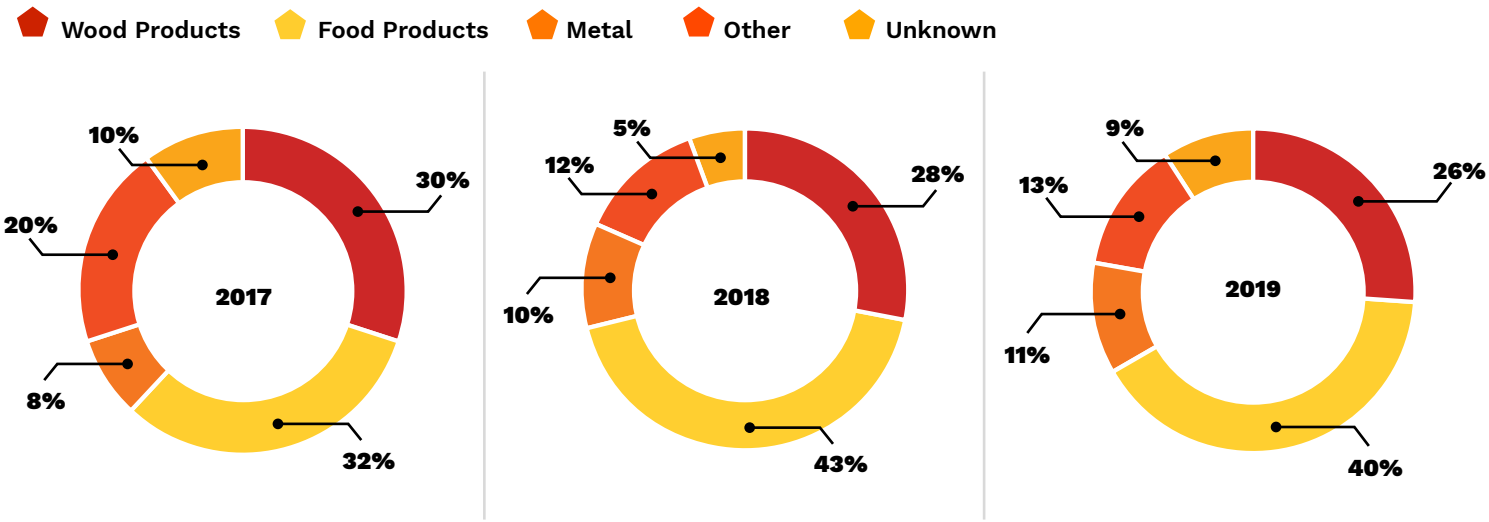
In the first half of 2020, all of the fatalities recorded occurred due to dust explosions. Of the injuries, 76% occurred due to explosions and 24% occurred due to fires. Some of the more severe incidents include:

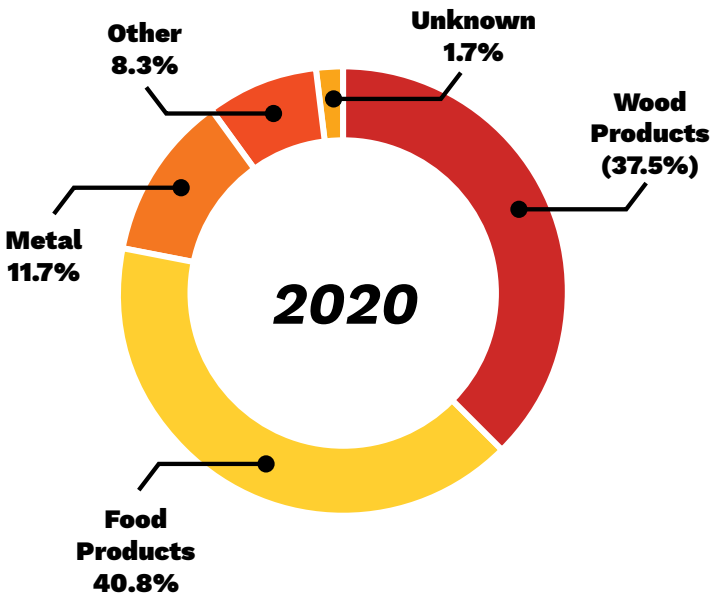
Five injured in food recycling dust explosion (Rose Hill, NC)
Three injured in auto. manufacturing fire (Moscow, TN)
One killed in chem. powder explosion (Battamban, Cambodia)
Two killed, three injured in reactor explosion (Mumbai, India)

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)

MATERIALS INVOLVED





2020 DETAILED ANALYSIS

Wood	37.5%	Plastic	0.8%
Food	40.8%	Sulfur	0.8%
Metal	11.7%	Other	1.7%
Coal	2.5%	Unknown	1.7%
Paper	2.5%		

DISCUSSION POINTS

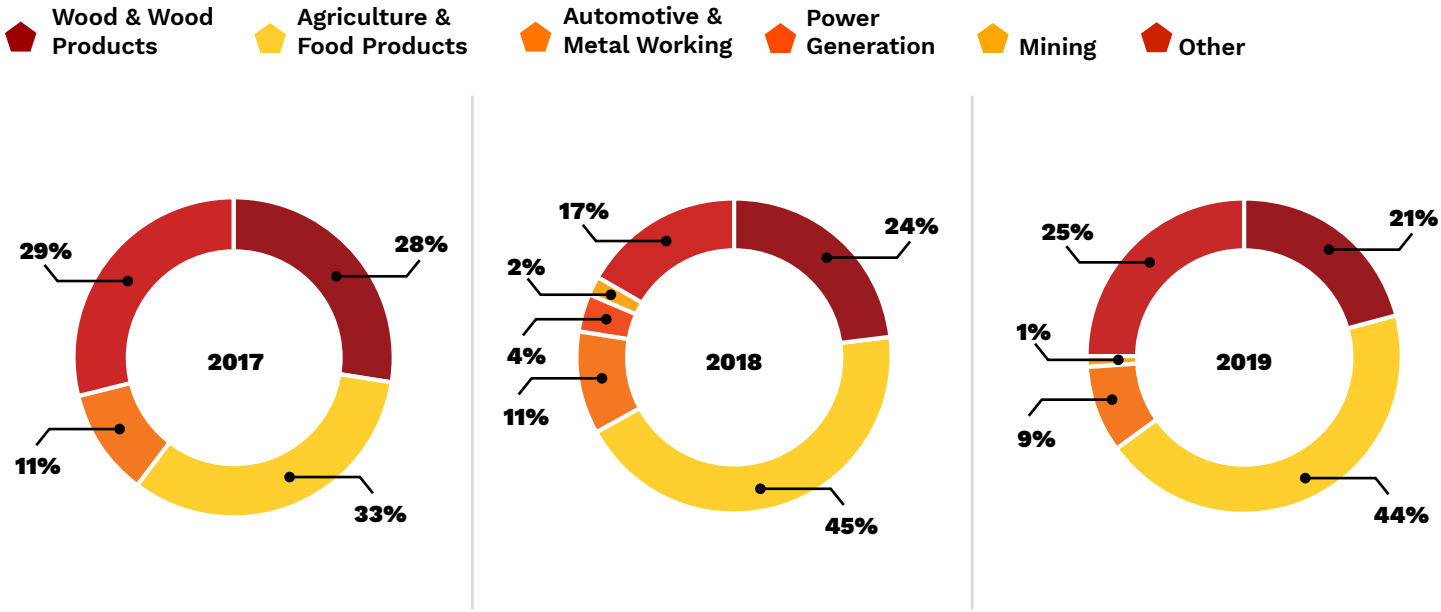
In reviewing the global incident data, food and wood products made up over 75% of the combustible dust fires and explosions recorded. These materials also resulted in 59% of the injuries. A breakdown of the fires, explosions, injuries and fatalities for each type of material is given as follows:

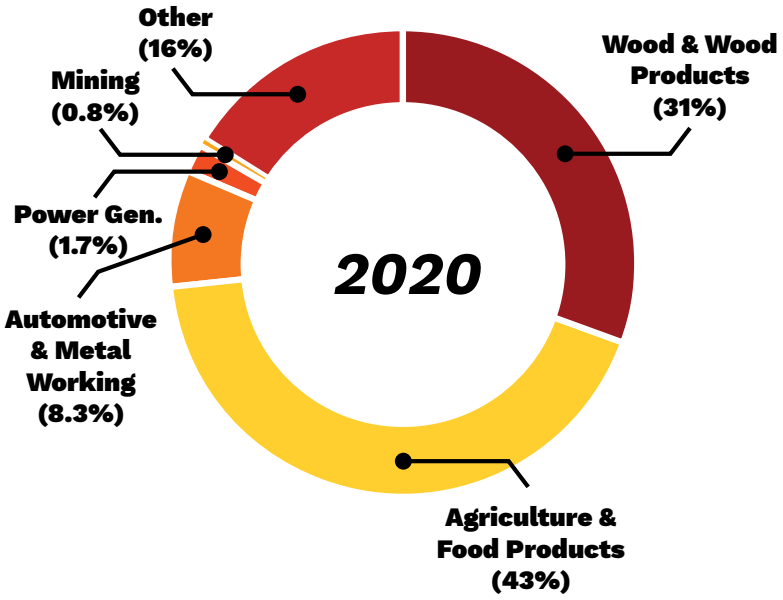
	FIRES	EXP.	INJ.	FAT.
WOOD	34	11	6	0
FOOD	41	8	11	0
METAL	10	4	9	1
COAL	3	0	0	0
PAPER	3	0	0	0
PLASTIC	0	1	0	0
SULFUR	1	0	0	0
OTHER	0	2	3	3
UNKNOWN	2	0	0	0
TOTAL	94	26	29	4

The one fatality from metal dust involved aluminum alkyl while three of the injuries involved a mixture of titanium and calcium. The other injuries from metal dusts involved two 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 and one fatally occured when smashing unspecified chemicals in a tank.

INDUSTRIES INVOLVED





2020 DETAILED ANALYSIS

Wood & Wood Pro.	30.8%	Power Generation	1.7%
Agriculture	30.8%	Mining	0.8%
Food Processing	11.7%	Pulp & Paper	4.2%
Metal Working	5.8%	Schools and Edu.	1.7%
Automotive	2.5%	Other	10.0%

DISCUSSION POINTS

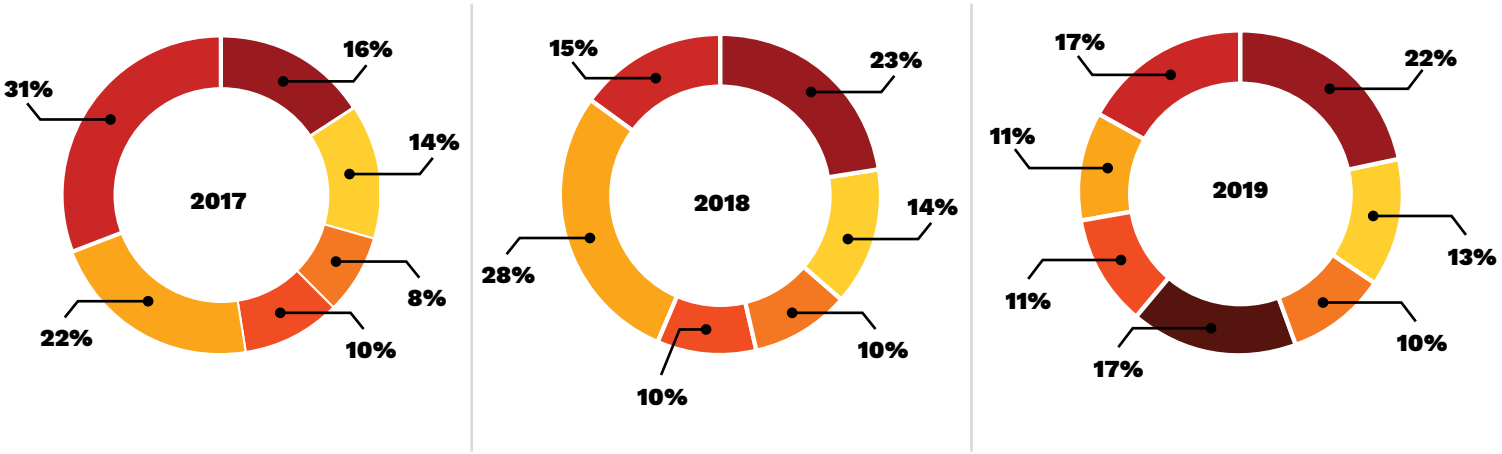
As shown in the historical data, wood processing, wood products, agricultural activity and food production make up a large portion of the overall fire and explosion incidents. Since 2017 wood and wood products have ranged from 21% to 31% of the incidents, while agricultural activity and food production has ranged from 33% to 45%.

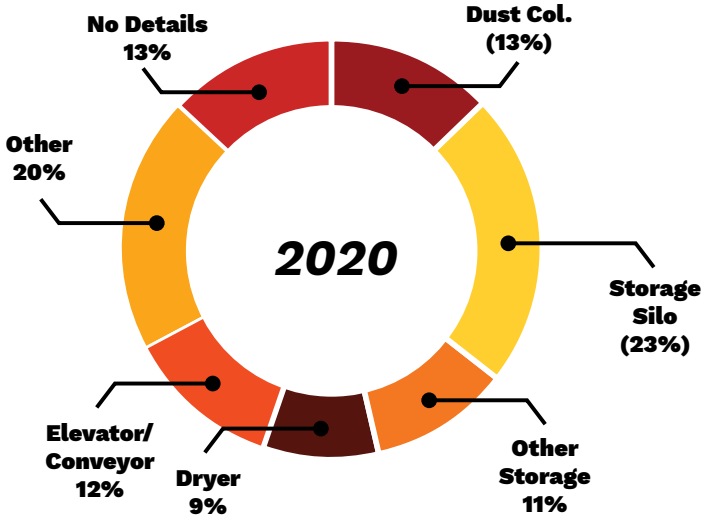
As shown in the detailed incident breakdown, the “other” category includes pulp & paper, high schools, and educational facilities. Industries not broken out in the detailed breakdown and listed under other, include incidents in metal recycling, rail maintenance, display stand manufacturing, jewelry,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

Combined, the overall “other” category of industries makes up 24% of the injuries and 75% of the fatalities reported in the first half of 2020. Wood and wood products, agriculture and food processing, and automotive and metal working make up 17%, 38% and 21% of the injuries, respectively. Agricultural industries make up 25% of the fatalities recorded with the chemical powder explosion at a logan (fruit) farm in Cambodia.

EQUIPMENT & CAUSES

Dust Collector · Storage Silo · Other Storage · Dryer · Elevator/Conveyor · Other · No Details





DISCUSSION POINTS

In the first half of 2020, storage silos demonstrated the highest percentage of combustible dust incidents with 22 fires and 6 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 occur. In the first half of 2020 only 13% of the fires and explosions occurred in dust collection systems.

The impact of storage silo incidents on injuries is a trend seen in previous reports and these incidents continue to be a leading cause of concern. This is followed by dust collection systems and then by equipment listed under the "Other" category. The breakdown between fires, explosions, injuries and fatalities for different pieces of equipment are summarized the following table for 2020:

	FIRES	EXP.	INJ.	FAT.
DUST COLLECTOR	12	3	3	0
STORAGE SILO	22	6	6	0
OTHER STORAGE	11	2	0	0
DRYER	9	2	0	0
ELEV./CONV.	12	2	0	0
OTHER	15	9	17	3
NO DETAILS	13	2	3	1
TOTAL	94	26	29	4

Although equipment labeled under "Other" only had 11% of the total incidents, these incidents resulted in 59% of the injuries and 75% 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, separate dust fire and dust explosion incidents occurring while using welding machines in dusty areas, and an explosion in a raw material feed tank into a reactor.

2020 OSHA CITATIONS

ISSUE DATE	INDUSTRIAL ACTIVITY	STATE	VIOLATIONS	INT. PEN.	CUR. PEN.	INSPECTION	STATUS	CITATION LINK
Jan 24	Food (Health) Supplement Stores	NJ	12	$46,268	$46,268	1418803.015	Pending	More Info
Jan 24	Health	NJ	12	$46,268	$46,268	1418803.015	Pending	More Info
Jan 24	Clay Building Material and Refractories Manufacturing	AL	5	$32,116	$20,875	1419821.015	Closed	More Info
Jan 29	Corrugated and Solid Fiber Box Manufacturing	MA	3	$8,202	$5,400	1420273.015	Pending	More Info
Feb 3	Custom Compounding of Purchased Resins	IL	3	$10,795	$6,477	1432893.015	Pending	More Info
Feb 7	Nonupholstered Wood Household Furniture Manufacturing	PA	3	$9,253	$6,477	1423279.015	Pending	More Info
Feb 20	All Other Miscellaneous Food Manufacturing	NY	5	$12,183	$7,919	1444328.015	Closed	More Info
Mar 18	Plastics Material and Resin Manufacturing	OH	2	$17,812	$17,812	1438470.015	Under Contest	More Info
Mar 23	Other Millwork (including Flooring)	WI	3	$22,859	$11,429	1448694.015	Pending	More Info
Mar 31	Mushroom Production	PA	1	$8,848	$7,000	1461015.015	Closed	More Info
Apr 6	Motorcycle, Bicycle, and Parts Manufacturing	WV	1	$6,940	$6,940	1456419.015	Under Contest	More Info
Apr 7	General Warehousing and Storage	GA	2	$18,892	$9,446	1436889.015	Penalty Plan	More Info
Apr 16	All Other Miscellaneous Wood Product Manufacturing	ME	2	$7,712	$3,856	1439879.015	Penalty Plan	More Info
Apr 22	Other Grocery and Related Products Merchant Wholesalers	NJ	10	$72,868	$51,000	1440107.015	Pending	More Info
May 7	Dried and Dehydrated Food Manufacturing	IL	2	$22,554	$11,000	1448575.015	Pending	More Info
May 8	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	PA	4	$18,352	$10,000	1444579.015	Pending	More Info
Jun 8	All Other Miscellaneous Chemical Product and Preparation Manufacturing	WV	1	$8,675	$8,675	1452323.015	Pending	More Info
Jun 9	Wood Kitchen Cabinet and Countertop Manufacturing	WI	1	$3,277	$3,277	1463075.015	Under Contest	More Info

Inspections Resulting In Citations: **18**
Total Citations: **72**

Total Initial Penalties: **$373,874**
Total Current Penalties: **$280,119**

Initial Penalty/Citation: **$5,193**
Initial Penalty/Inspection: **$20,771**

***Information was collected from OSHA Data & Statistics by searching for "dust" within inspection details from citations made using the General Dusty Clause.**

FEATURED SPONSORS

GRAIN DRYER EXPLOSION AT PET FOOD MANUFACTURERS IN TREVIGLIO, ITALY

APRIL 1, 2018
Two Fatalities

BACKGROUND

The company involved in this explosion is a pet food producer located in Treviglio, Italy. It was founded in 1966 and uses byproducts from poultry slaughtering for the production of pet food. At the time of the explosion, residents near the facility reported a burning odor. Three technicians went to investigate. Two would never return.

INCIDENT DESCRIPTION

When the technicians entered the facility they determined that flour was burning in one of the dryers. Two of the technicians climbed onto a metal pedestal near the dryer while a third headed toward the factory. Suddenly the tank exploded, killing the two men on the pedestal. It took firefighters more than two hours to secure the plant with carbon dioxide.

OUTCOME

Little information is available about the type and extent of the injuries the workers received, other than that they were fatal.

In many cases the fatal injuries in situations like this occur from the workers being thrown from the platform during the explosion. However, direct impact from the pressure wave from vessel rupture or the resulting fireball is possible as well.

Incident Database: Grain Dryer Explosion at Italian Pet Food Manufacturer Kills Two Men

HOT WORK EXPLOSION AT FOOD WASTE RECYCLING PLANT IN ROSE HILL, NORTH CAROLINA

MARCH 11, 2020
Five Injuries

BACKGROUND

The company involved is a food waste recycling company that creates animal feed products. It was founded in 1949 and has outlets throughout the eastern United States. At the time of the explosion contractors were on site and believed to have been performing hot work activities.

INCIDENT DESCRIPTION

The explosion happened in the plant's finished product area, which was described as a "dusty area" by company representatives. It was also suggested that hot work permits had not been issued prior to welding and cutting equipment in the area.

During the hot work activities an explosion occurred. Little information is available on the extent of equipment or structural damage from the explosion inside the facility.

OUTCOME

Five workers were injured during the explosion, resulting in three medical helicopters being brought in. They were airlifted to a regional burn center, some of them with third-degree burns. It is unclear how many of those injured were part of the external contracting team.

Incident Database: Welding in Dusty Area of Food Recycling Plant Causes Explosion

METAL DUST EXPLOSION AT A STEEL MANUFACTURER IN PLUM BOROUGH, PENNSYLVANIA

APRIL 4, 2020
Three Injuries

BACKGROUND

The company involved is a steel manufacturer that specializes in the treatment of liquid steel. It has sales and/or production sites in the US, Mexico, Europe, the Middle East, Africa, and Asia. The company's product line includes calcium bearings, aluminum rods, carbon, sulphur, iron, lead, bismuth, and other types of cored wires.

INCIDENT DESCRIPTION

On April 4th, 2020 an explosion and fire was reported at the steel manufacturing company.

According to the Unity Volunteer Fire Department, workers inside the facility were dealing with a combination of titanium and calcium powder. A machine with both of these chemicals inside caught fire and exploded.

About a dozen people were inside of the facility at the time and evacuated. They called Allegheny County Dispatch to report the incident as well as the type of chemicals involved so firefighters could be aware of the hazards.

The machine's suppressor system helped to prevent the spread of the fire. Fire crews had the fire contained in about 45 minutes.

OUTCOME

Three workers were taken to the hospital with non-life threatening inhalation-related injuries. An OSHA investigation search turned up previous violations involving combustible dust from 2017.

Incident Database: Explosion and Fire at Steel Manufacturer Leaves Three Injured

METAL DUST EXPLOSION AT A CHEMICAL PROCESSING LAB IN SEOSAN, SOUTH KOREA

MAY 19 , 2020
One Fatality and Two Injuries

BACKGROUND

The company involved is a chemical company headquartered in Seoul, South Korea. It was founded in 1947, has 62 locations across the globe, and specializes in the production of petrochemicals and ABS, a plastic used in the manufacturing of automobiles, home appliances, and IT devices.

INCIDENT DESCRIPTION

On May 19, 2020, an explosion and fire was reported at a chemical research lab in Seosan, South Korea.

One person was killed and two others injured when the explosion occurred in the site's packing room at about 2:20 p.m. According to one source, ignition took place when air contacted aluminum alkyl, a pyrophoric fine powder material, while another source claimed that the powder exploded due to high pressure as it was being transported.

Crews managed to put out the flames by 3:30 p.m. The facility was shut down so the company could investigate the incident.

The deceased person was identified as a 39-year-old researcher. The other two workers suffered second-degree burns and were taken to an area hospital for treatment.

OUTCOME

No further information is available on the follow up after this incident.

Incident Database: One Killed and Two Injured in Explosion at South Korean Chemical Lab

WOOD DUST EXPLOSION AT PELLET PLANT IN JAFFREY, NEW HAMPSHIRE

JUNE 23, 2020
One Injury

BACKGROUND

The company in the incident is reported as a wood pellet production company. It was founded in 1992 in Massachusetts and moved to New Hampshire in 1995.

INCIDENT DESCRIPTION

On June 23, 2020, a dust explosion and fire was reported at the wood pellet plant in Jaffrey, New Hampshire.

First responders arrived at the plant at around 9:30 p.m. They found heavy smoke conditions in the pellet mill manufacturing area and determined that fire was in two areas of the mill. Although the pellet conveyor system had been severely damaged, all employees had been evacuated and accounted for.

After the flames were extinguished, fire crews found several smaller fires in the roof's steel beams. They had ignited due to an accumulation of wood dust. Firefighters remained on scene for approximately two and a half hours.

The Peterborough Fire Chief said that combustible wood dust had apparently caught fire during the pellet-making process, injuring one employee who had to be treated for minor injuries at a local hospital.

Continued on next page....

The Jaffrey Fire Chief stated that the facility was shut down to carry out cleaning and repairs. The cause of the fire is under investigation.

PREVIOUS INCIDENTS & CITATIONS

This facility also experienced dust fires on May 12, 2019 and October 23, 2011. The earlier fire required response from more than 100 firefighters.

On March 13, 2013, an OSHA violation was reported for multiple alleged combustible dust-related citations, four months after the company agreed to pay $100,000 to settle violations stemming from the October 2011 fire.

Incident Database: Dust Explosion at Wood Pellet Plant Leaves One Employee Injured

FEATURED SPONSOR

HYBRID MIXTURE EXPLOSION AT WOODWORKING SHOP IN NAPANEE, INDIANA

JUNE 1, 2020
Two Injuries

BACKGROUND

The company is reported as a wood component manufacturer specializing in hardwood parts for cabinet manufacturers and high-end furniture components. The company was founded in 2000, is located in Nappanee, Indiana, and employs over 100 people.

INCIDENT DESCRIPTION

On June 1, 2020, an explosion and flash fire was reported at the woodworking shop in Napanee, Indiana.

Employees were doing maintenance work on a staining machine at around 6:30 a.m. when a spark allegedly ignited varnish vapors and sawdust, causing the explosion and flash fire.

When firefighters responded, they found heavy smoke in the building but managed to extinguish the fire quickly. It took around an hour to ventilate smoke from the premises and assess the damage. The staining machine and parts of the building and dust collector system were damaged.

OUTCOME

The Nappanee Fire Chief said that two employees were taken to the hospital for medical treatment, but he didn't know the extent of their injuries.

Incident Database: Staining Machine Ignites Dust Fire at Indiana Woodworking Shop

DSS082:
COMBUSTIBLE DUST SAFETY IN BRAZIL AND 2020 CONFERENCE REVIEW WITH MONICA REMONATO

Have you listened to the Dust Safety Science podcast yet?

Below is a copy of the show notes from a past episode to give you an idea of what is typically covered. We regularly feature interviews with combustible dust experts around the world, how the most recent research is integrated into industry application and the latest developments in best practice, engineering guidance and regulation.

Check out some of our recent episodes listed on page 18 and page 22 or visit the podcast homepage to learn more.

INTRODUCTION

In this episode of the DustSafetyScience Podcast, we talk to Monica Remonato from Remonato Fire Protection Engineering in Curitiba, Paraná, South Brazil, about her experience with industries handling combustible dust in Brazil.

Monica has over 20 years experience as a fire protection engineer. She started out as a civil engineer and moved temporarily to the U.S. to learn more about fire protection. She returned to Brazil four years later and opened her own company because one of her U.S. customers bought a large operation there and needed someone who was fluent in Portuguese as well as the NFPA standards and FM Global guidance.

In recent years, Monica has been focusing on combustible dust safety in Brazil because the knowledge there is comparatively scarce. After attending the 2020 Digital Dust Safety Conference, she shared her new knowledge with others and applied the lessons learned to projects she has been working on.
In this interview, she answers the following questions:

- What made you want to attend the Digital Dust Safety Conference?
- How are you implementing fire and explosion safety solutions in your current projects?
- How is this training being received?
- Are there any other challenges that you see in your work?

WHAT MADE YOU WANT TO ATTEND THE DIGITAL DUST SAFETY CONFERENCE?

“I needed to learn more,” Monica said. “We don’t have a lot of this information back in Brazil.”

When she worked with clients in Brazil, they would often ask her which supplier had the best product for a given application. When she realized that leading dust safety equipment suppliers would be presenting at the conference, she jumped at the opportunity to learn from them.

“I was so amazed at the knowledge that these guys shared,” she said. She also appreciated the fact that she could watch replays of all the presentations and interact with the presenters in the forums. If she had questions about the dust safety equipment that the suppliers sold, it was so easy to get the answers she needed to advise her clients.

HOW ARE YOU IMPLEMENTING FIRE AND EXPLOSION SAFETY SOLUTIONS IN YOUR CURRENT PROJECTS?

Monica is currently working on large projects that involve multiple silos, dust collectors, and conveyors. She began one project in September 2019 and, after attending the conference, immediately started applying the lessons learned.

“The customer almost killed me after the conference, because I changed a lot of stuff,” she laughed. “When they asked me why, I could answer all their questions with what I learned from the event.”

She said that there are problems with combustible dust awareness in Brazil. “Every time I talk about combustible dust and how to prevent it, it’s challenging. We need to educate the engineers, followed by their chief, and then the chief of the chief! It can take a long way to get the purchase order approved, but we keep going. We never give up.”

HOW IS THIS TRAINING BEING RECEIVED?

According to Monica, the standards in Brazil are basically a translation of NFPA 654 and NFPA 68. What makes education challenging is that people don’t want to read dense scientific texts.

To help them understand both the risks and the solutions, she shows them YouTube videos. This strategy is supported by Dr. Chris Bloore, who noted in Episode #40 that people don’t believe something until they see it. Live tests and videos can have an impact that texts alone can’t always achieve.

Monica said that she knows people in Brazil who want to learn about combustible dust, but the training needs to take a ‘baby steps’ approach that includes the fundamentals.

“When they better understand their risk, they’re going to look for more information and make an effort to learn English or at least Google translate the information. But they’ve got to have the kick-off. This is what happened to me. This is what happened to other engineers that I know too.”

ARE THERE ANY OTHER CHALLENGES THAT YOU SEE IN YOUR WORK?

Monica admitted that pricing is often an issue when buying dust safety equipment in Brazil.

“The taxes are really high. We don’t have a Brazilian industry that can make this spark detector or that fire suppression system. I don’t know why the taxes are so high. So this is the real challenge: the price.”

She expressed hope that as awareness increases, some vendors will start manufacturing in Brazil and, hopefully, make their equipment more affordable in that country.

CONCLUSION

When asked about her future plans, Monica confirmed that she would continue to try and improve safety in Brazilian industries handling combustible dust. “I will never stop studying and I will spread knowledge as much as I can. I understand the equipment options better and will continue to make the right recommendations in a way they understand.”

CHECK OUT SOME OF OUR MOST POPULAR PODCAST EPISODES LAST YEAR

- **DSS084: Are Explosion Isolation Flap Valves Safe? Recent Test Results from Fike with Jim Vingerhoets**
- **DSS081: What is Reduced Explosion Pressure (Pred) with Burke Desautels**
- **DSS075: Considerations for Performing a Remote Dust Hazard Analysis with Dr. Chris Bloore**
- **DSS040: How to Run Effective Dust Explosion Training Sessions With Dr. Chris Bloore**

FEATURED PODCAST EPISODE

DSS078:

CASE STUDY – GRAIN DUST EXPLOSION IN A MILLING FACILITY WITH DR. SUZANNE SMYTH

Listen To The Episode

NOT SURE HOW COMBUSTIBLE DUST SAFETY APPLIES TO YOU?

Last year we started a series of podcast episodes focused on detailed case studies from previous dust fire and explosion incidents. Below is a copy of an interview we did with Dr. Suzanne Smyth about a grain dust explosion at a milling facility.

See the list of all case study episodes given on page 22 or visit the podcast homepage to see what other episodes we have recorded (over 100 episodes to date!).

INTRODUCTION

In this episode of the DustSafetyScience Podcast, we talk to Dr. Suzanne Smyth about a case study involving a grain dust explosion in a milling facility.

Suzanne is the managing engineer with Exponent's Thermal Sciences Practice, based in Chicago, Illinois. She is a professional engineer, certified fire investigator and certified vehicle fire investigator. The case study that she discusses in this episode is covered in "Lessons learned from a milling explosion", an article that she co-authored with Brenton Cox. Todd Hetrick and Dr. Russell Ogle, who is a previous guest on the podcast.

During the interview, she answered the following questions:

- What made you want to publish this incident as a case study?
- What were the processing operations at this mill?
- What caused the explosion?
- Why didn't the dust collector properly vent outside?
- Why wasn't isolation present?

WHAT MADE YOU WANT TO PUBLISH THIS INCIDENT AS A CASE STUDY?

Suzanne found this mill explosion investigation to be significant because the explosion caused a lot of damage but there was no evidence of fugitive dust being involved.

"While fugitive dust is important and can certainly cause large secondary explosions that result in significant damage, this was not one of those instances," she said. "So it was interesting in that we were able to get these high levels of damage without any additional explosions outside the equipment."

WHAT WERE THE PROCESSING OPERATIONS AT THIS MILL?

The facility had two lines that milled wheat. The tempered wheat would come in, be diverted to these lines, and make its way to one of four sets of roller mills. There was also a hammer mill and an attrition mill. This area produced a wide variety of flour grades.

Each mill had its own cyclone up on the roof. The products would come down into a sifter (each line had one) that would size the particles and divert them either back into the process or into the finished product hoppers in the basement. A single large filter pulled off of all the cyclones on the roof while a different filter pulled off from the inlet temper bin area.

"They could route things all over the place depending

on what specific product they were making," Suzanne explained. "All of the controls for diverting the flow were manual. So slide gates and diverter valves, certainly the motors on the mills and that type [of] thing had a more complicated control panel system. But everything else as far as controlling flow was manual."

WHAT CAUSED THE EXPLOSION?

The chain of events leading to the explosion started the night before the incident. The miller on duty heard the belt squealing on the attrition mill and determined that it had choked, so he shut down the line, opened the mill up, and started cleaning out the choke.

When the shift changed, he left and the next miller continued with the cleaning process. Once he decided that it was sufficiently clean, he reassembled everything and went to turn the attrition mill back on.

At that time, someone else looked through a sight glass on the first floor and saw a flame traveling up the chute from the attrition mill, toward the cyclones. The explosion immediately followed.

Suzanne pointed out that when the attrition mill becomes choked, it imparts a lot of mechanical energy into the grain and heats it up. "They smelled an odor of burning. They had seen some discoloration. I don't recall if they saw glowing or smoldering but they say they saw things that could indicate that heat was being transferred into the grain here."

She added that the attrition mill was bulky and incredibly difficult to take apart and clean, especially if only one person was doing it.

"So given that we saw or we had this indication of flame moving out through the chute from the attrition mill, a possibility is that they didn't get to a hot spot, that there was a smolder or an ember or something in that attrition mill that didn't get cleaned out. And then when they energized it back and allowed fresh air to flow over it, that ember could get conveyed up into the cyclone and eventually the filter system."

The investigation revealed discoloration and charring on the sifter as well as the filter system.

"We saw it on two of the cyclones: the attrition mill cyclone and one of the roller mill cyclones. There was some charred material product in the attrition mill cyclone, in the filter and in the cleaning house filter, which draws off the inlet bin."

The distance between the attrition mill and the filter was significant. The mill was in the basement and the cyclone was on the roof, so the flame shot up five storeys to propagate.

"Then you've got the width of the building between all the different cyclones," Suzanne added. "Then it comes back down. The filter is spanning the third floor. It's between the second and third floors and so it's got to come down another two, three stories from the cyclone. So there's quite a bit of distance where this flame was able to propagate and speed up and kick up some more dust as it made its way."

The filter itself had an explosion vent positioned at the exterior walls. It was sized appropriately based on the codes. However, the inspection door was blown off and there was evidence that flames had shot out. The floor was charred and one worker suffered burn injuries. Fortunately, he was able to eventually return to work.

WHY DIDN'T THE DUST COLLECTOR PROPERLY VENT OUTSIDE?

Suzanne pointed out that the system was sized for an event in the filter. When an event occurs away from the filter, the propagation can speed up and increase turbulence and pressure as it travels toward the filter.

"Then your initial pressure, if you're doing the calculation in that filter, is going to be higher than normal, which is going to result in a much higher final pressure. After all, the dust within the filter can get involved. That was why, even though the explosion venting was up to code and sized appropriately, it was unable to fully vent this incident. It wasn't sized for this incident."

WHY WASN'T ISOLATION PRESENT?

Suzanne acknowledged that isolation is important, but there were a lot of challenges involved in choosing an isolation or suppression technology for a food processing facility.

"Having a chemical suppressant enter into the food

stream is not ideal. Even water can be really difficult and cause mold issues. So there are various choices to be made in that area." Further discussion also centered around difficulties with the strength of the ductwork and not being able to support other isolation options.

For her, the big takeaway was the need to find ways to minimize the likelihood of ignition events in cases where isolation is difficult. In this facility, there was no system to alert the miller of a flow blockage other than hearing the belts whine during routine checks. She recommended the use of flow or pressure sensors to detect blockages and alert the operators to a situation where the mills may be inputting too much heat to the product.

CONCLUSION

Given that this explosion occurred when the attrition mill was turned back on, there is a natural concern about all of the industrial equipment that is currently dormant due to the pandemic. Could something happen once the crisis passed and they are turned back on?

Suzanne recommended treating the reactivation like a startup. "Go through the checklist, go through the procedures. Think ahead about what each piece of equipment is going to be doing. A lot of these incidents do happen during start up or shut down or process upsets. It's so important, especially now when places may be shut down unexpectedly, that the startups are done in a really thoughtful and systematic and logical way."

See links to all of the resources mentioned in this episode on the podcast page: DSS078: Case Study – Grain Dust Explosion in a Milling Facility with Dr. Suzanne Smyth

WANT MORE CASE STUDIES? CHECK OUT OUR FULL LIST OF CASE STUDY EPISODES BELOW.

- **DSS086: Lessons learned from a corn milling explosion with Ric Smith**
- **DSS078: Case Study – Grain Dust Explosion in a Milling Facility with Dr. Suzanne Smyth**
- **DSS076: Case Study – Nylon Flock Explosion in the Textile Industry**
- **DSS074: Case Study – Insufficient Venting During Sawdust Silo Explosion Leads to Fatality**
- **DSS071: Case Study – Metal Dust Explosion in a 3D Printing Application in 2013**
- **DSS069: Case Study – Dust Explosion in a Fish Meal Factory in Norway in 1975**

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Email: info@atindustrialproducts.com

AT Industrial Products has been keeping workers and processing equipment safe from combustible metal dust fires for 20 years. Specializing in wet dust collection equipment for the capture and containment of combustible metal dusts generated by sanding, grinding, sawing, cutting and deburring.

Baker Engineering and Risk Consultants, Inc.

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BakerRisk® provides its clients with cost-effective solutions to manage their risk exposures. For over 30 years, clients have benefited from the knowledge and experience of its professionals, its innovative research programs, and its customized engineering analyses. BakerRisk is a leader in the provision of dust hazard analysis (DHAs), incident investigation and strategic management of catastrophic industrial hazards in the particulate solids handling industries.

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Boss Products is your single source for EcoMAXX® and EcoMAXX®/VigilEX® Fire and Explosion Protection Solutions. ATEX Certified & FM Approved products that comply to NFPA Standards. Headquartered in Schertz, TX, Boss Products serves North and Latin America through a vast network of highly trained local distributors.

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Camfil APC

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Email: filterman@camfil.com

Camfil APC offers the most technologically advanced dust, mist and fume collectors available – backed by dependable service support and decades of experience. We are a subsidiary of Camfil, the largest air filter manufacturer in the world and our collectors meet EPA particle emission requirements.

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Phone: (901) 574-3403
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Chief Engineering offers a full suite of mechanical, electrical, plumbing, structural and management services, with specialties in process & bulk handling, central vacuum, pneumatic conveying, and dust collection systems.

Conversion Technologies

2190 N Norcross Tucker Rd,
Suite 202 Norcross, GA 30071

Phone: (770) 263-6330
Email: cti@conversiontechnology.com

Conversion Technology Inc. (CTI) is an expert in combustible dust safety. Our engineers are available to conduct Dust Hazard Analyses and code compliance reviews to provide risk-based, real-world solutions.

CST Industries

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Phone: 844-44-TANKS
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As the world's largest bolted tank manufacturer, CST can provide comprehensive dust explosion solutions for compliance with the new regulation for Combustible Dust, NFPA 652. For more information on CST's combustible dust testing, call 844-44-TANKS.

CV Technology

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Jupiter, FL 33478

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CV Technology specializes in explosion protection solutions for the prevention and mitigation of explosion hazards related to combustible dust. Located in Jupiter, Florida, CV Technology manufacturers various explosion mitigation products including explosion vents, isolation valves, flameless vents, and chemical suppression equipment.

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DEKRA Process Safety

113 Campus Drive
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DEKRA Process Safety helps clients reduce exposures and injuries, save lives, preserve assets, protect their reputations, and enhance performance. Our value-adding, practical approach integrates specialist process safety management, engineering and testing.

Delfin Industrial Corporation

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Phone: +1 877 205 9015
Email: sales@delfinindustrial.com

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From dust hazard analysis to hood and system designs, Element6 Solutions specializes in all aspects of dust collection. Whether you are implementing a new dust collection system or retrofitting an existing system, Element6's experts can solve your dust issues.

ExNB Certification Institute

Kozak Sqr 13-16
H-1154 Budapest, Hungary

Phone: +36 30 966 0223
Email: info@exnb.eu

ExNB Certification Institute provides assessment and certification of electrical & non-electrical equipment according to ATEX and Fire Protection regulations for gas and dust hazardous areas worldwide. ExNB operates its EC-approved ExAM personnel competency assessment system based on ISO/IEC 17024.

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Charlotte, North Carolina 28217

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The GreCon spark extinguishing system is used for preventive fire protection. A spark extinguishing system can detect and eliminate ignition sources before a fire or dust explosion occurs. These systems can be used in filter components, conveyor belts and many other parts of production facilities.

Fauske & Associates LLC

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Burr Ridge, IL 60527

Phone: +1 630 323 8750
Email: info@fauske.com

Fauske & Associates provide expert safety testing, engineering, and training programs. Dust Hazards Analysis includes combustible dust explosion and fire hazards testing, onsite assessments, OSHA/ NFPA compliance, audit preparation, electrostatic hazards, ignition source evaluation and vent sizing calculations.

Fike®

704 SW 10th Street
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Phone: +1 816-229-3405
Email: industrialprotection@fike.com

Fike® is a globally recognized manufacturer and supplier of explosion protection systems, fire protection systems and pressure relief devices. With offices around the world, the variety of explosion protection equipment we offer and the personalized customer service we provide, ensures that our solutions protect our customers and their facilities.

Firefly AB

Heliosagatan 3
Stockholm, Sweden, 120 30

Phone: +46 8 449 25 00
Email: info@firefly.se

Firefly is a Swedish supplier of fire protection systems to the process industry worldwide. For over 45 years, Firefly has specialized in creating tailor-made systems of the highest technical standard, covering everything from spark detection and water spray extinguishing to flame detection and water mist suppression.

Fire Rover

3265 Bermuda St
Ferndale, MI 48220 USA

Phone: 1-844-417-6837
Email: rfogelman@firerover.com

The patented Fire Rover solution is a comprehensive first line of defense against fire hazards for in-door and outdoor industrial operations. Since 2015, the Fire Rover solution has stopped thousand's fires from becoming major fire incidents in both US and Canada.

DSS MEMBER COMPANIES

Fire & Risk Alliance

7640 Standish Pl
Rockville, MD 20855

Phone: 877-961-4118
Mobile: 978-846-1592
Email: mhodapp@fireriskalliance.com

Fire & Risk Alliance is a leader in fire and risk engineering with a staff of highly trained engineers and scientists that excel at serving our clients throughout the world. Our experience, engagement in the industry, and research allows us to deliver innovative and optimized safety solutions.

Hallam-ICS

3801 Lake Boone Trail, Suite 100
Raleigh, North Carolina 27607

Phone: +1 919-410-3769
Email: cgiusto@hallam-ics.com

Hallam-ICS is a leader in industrial safety services, and provides combustible dust safety consultation, compliance reviews, and detailed design of system upgrades. Their team excels at designing and implementing complete, effective solutions to mitigate combustible dust hazards.

IEP Technologies

417-1 South Street
Marlborough, MA 01752

Phone: +1 855 793 8407
Email: info.IEP.us@hoerbiger.com

IEP Technologies™ is the worldwide leader in providing explosion protection systems and services. For over 60 years we have offered protection solutions that can suppress, isolate and vent combustible dust or vapor explosions in process industries. IEP Technologies operates globally with locations in the U.S., UK, EU, Latin America and Asia designing and servicing systems with a dedicated team of application engineers, regional sales managers and field engineers.

Imperial Systems, Inc.

7320 W. Market St.
Mercer, PA 16137 USA

Phone: +1 724-662-2801
Email: info@isystemsweb.com

Imperial Systems manufactures dust and fume collection equipment for a variety of industries. Our focus is to improve the health, safety, and quality of people's lives by building the best dust and fume collectors on Earth. We manufacture the CMAXX Dust and Fume Collector, Shadow Compact Fume Extractor, BRF Baghouse, Rhino Drum, and many other safety and fire prevention devices.

InDust, LLC.

202 Lakewood Drive
Williamsburg, Virginia 23185

Phone: +1 (757) 208-0587
Email: garmbruster@industllc.com

InDust is the North American distributor for Sintrol Dust Monitors and provides a solution to industries wanting to prevent fires and explosions in hazardous dust environments. Choosing to protect your facility and employees while receiving a great return on your investment is an easy decision as is the process of getting started with Sintrol Continuous Dust Monitoring. Commissioning of the device is available along with training and maintenance support.

DSS MEMBER COMPANIES

JENSEN HUGHES

3610 Commerce Drive, Suite 817
Baltimore, MD 21227-1640

Phone: +1 844-900-DUST (3878)
Email: dust@jensenhughes.com

JENSEN HUGHES is your partner in combustible dust hazard protection. Our expert team of engineers and consultants provides unbiased dust testing, comprehensive dust hazard analysis, employee training and related services to ensure your facility is suitably protected in a cost-effective manner.

Masterduct, Inc.

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Houston, Tx 77040

Phone: (713) 462-5779
Email: info@masterduct.com

MASTERDUCT specializes in providing high-quality, flexible, abrasive-resistant and heat tolerant hoses as a solution to just about any need. These include anti-static/electrically conductive hoses for combustible dusts in automotive, agriculture, plastics, woodworking, and dust collection applications.

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Since 1944, Nederman has delivered solutions for filtering, cleaning and recycling air to make industrial environments more efficient, safe and sustainable. Nederman protects people, planet and products from harmful effects of industrial processes that include harmful dust, smoke and fumes.

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Osprey is a market leader in process air filtration and recycling systems. Our technology has been applied across multiple industries such as soft disposables, tissue, paper, agriculture, fiberglass, and plastics. Our mission is to create innovative engineered solutions that allow our customers to compete and thrive in a global economy.

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With nearly 50 years of filtration engineering and manufacturing expertise we offer a wide range of the best quality products and services. Our experts have in-depth customer knowledge and service capabilities which help you improve your operation. You need to achieve your operating goals and we are here to provide you with answers, a quick response, and assistance beyond delivery.

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59929 Brilon, Germany

Phone: +49 2961 7405-0
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REMBE® is a specialist in explosion safety and pressure relief. As an independent German company, they supply safety systems for industrial plants. REMBE takes a comprehensive approach, primarily developing its own products and providing consultancy and engineering services to customers around the world.

Sigma-HSE

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International Process Safety company with ISO/IEC 17025 testing. We provide fire and explosion data for example, 20L, MEC, MIE, LIT, LOC, Electrostatic data and ARC, DSC for thermal screening. Our Process Safety Engineers offer ATEX, Seveso, HAZOP, QRA, SIL, LOPA, and cost-effective solutions.

SINTROL Dust Monitors

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Phone: +358 50 463 5452
Email: info@sintrolproducts.com

Sintrol manufactures high quality, low maintenance dust monitors for the detection and monitoring of dust concentration. Historically the most common applications for Sintrol dust monitors have been inline industrial dust measurement solutions for process control, filtration leak detection and emissions monitoring.

SpaceVac International

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SpaceVac is the world's leading high-level cleaning system – enabling operators to remove high-level dust from inaccessible areas from the safety of the ground floor. SpaceVac's innovative cleaning technology can be brought into hazardous and explosive atmospheres using our ATEX certified conductive cleaning system.

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The XP Products Explosion Proof Drum Kit is an innovative alternative to traditional rotary valves for providing a means of explosion isolation. In addition, XP Products DHA services group specializes in protecting your facility from the effects of combustible dust explosions.

CASE STUDIES & UPCOMING EVENTS

IEP Technologies

Design Considerations When Retrofitting Plants With Explosion Protection

TFT Pneumatic

Sugar Mill: Sparkless Grinders, Certified Cold Work for Dust Explosive Atmospheres

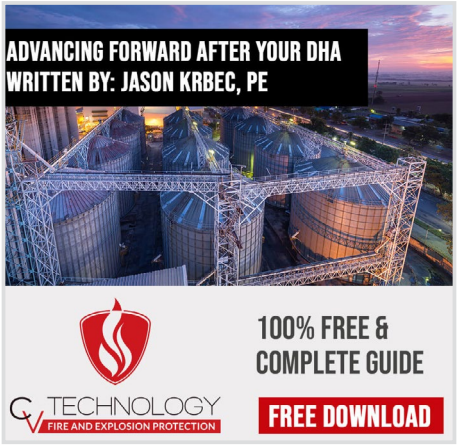
Fire & Risk Alliance

Risk-Based Solution for Aerospace Additive Manufacturing

CST Industries

CST Helps Iconic Candy Company Mitigate Dust Danger

CV Technology



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CDI DATA UNITED STATES

WOOD & WOOD PRODUCTS

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 7	Everite Door Company	Everett, PA	Fire	Wood Dust	0	0	Silo	No Details	
Jan 13	German Pellets	Port Arthur, TX	Fire	Wood Dust	0	0	Silo	No Details	
Jan 30	Arauco	Grayling, MI	Explosion	Paper Dust	0	0	Dryer	No Details	
Feb 20	May Furniture	Ramseur, NC	Fire	Wood Dust	0	0	Wood Chipper	$2 Million	
Feb 21	Equustock	Kingsbury, NY	Fire	Wood Dust	0	0	Unknown	No Details	
Feb 25	Maine Wood Concepts	New Vineyard, ME	Fire	Wood Dust	0	0	Silo	No Details	
Mar 8	Enviva Holdings	Greenwood, SC	Fire	Wood Dust	0	0	Silo	No Details	
Mar 12	Havco Wood Products	Scott City, MO	Fire	Wood Dust	0	0	Silo	No Details	
Mar 13	Unknown	White Marsh, MD	Fire	Wood Dust	0	0	Dust Collector	No Details	
Apr 12	Agri Wood Products Inc.	Waco, TX	Fire	Wood Dust	0	0	Storage Shed	No Details	
Apr 13	Swanson Bark & Wood Products	Longview, WA	Fire	Wood Dust	0	0	Unknown	No Details	
May 4	Columbia Forest Products	Presque Isle, ME	Fire	Wood Dust	0	0	Wood Chipper	No Details	
May 8	Swanson Group	Springfield, OR	Fire	Wood Dust	0	0	Chip Storage Unit	No Details	
May 12	Crossville Hardwoods	Crossville, TN	Fire	Wood Dust	0	0	Hopper	No Details	
May 14	Fletcher Trucking	Brainerd, MN	Fire	Wood Dust	0	0	Dust Collector	No Details	
May 15	Crossville Hardwoods	Crossville, TN	Fire	Wood Dust	0	0	Hopper	No Details	
May 25	Bear Mountain Forest Products	Cascade Locks, OR	Fire	Wood Dust	0	0	Sawdust Storage Shed	No Details	
May 29	Griffin Lumber Sawmill	Cordele, GA	Fire	Wood Dust	0	0	Unknown	No Details	
Jun 1	Quality Hardwood Sales Inc.	Nappanee, IN	Explosion	Wood Dust	2	0	Staining Machine	No Details	
Jun 23	New England Wood Pellet	Jaffrey, NH	Explosion	Wood Dust	1	0	Pellet Man. Machine	No Details	

INCIDENT SUMMARY - INCIDENTS: 20 | FIRES: 17 | EXPLOSIONS: 3 | INJURIES: 3 | FATALITIES: 0

AUTOMOTIVE & METAL WORKING

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 8	Iowa Spring Man. Inc.	Adel, IA	Fire	Metal Dust	0	0	Dust Collector	No Details	
Feb 14	Metal Technologies Casting	Auburn, IN	Fire	Metal Dust	0	0	Conveyor Belt	No Details	
Feb 19	Polaris Industries Inc.	Huntsville, AL	Fire	Metal Dust	0	0	Air Filter	No Details	
Apr 4	Affival Inc.	Plum Borough, PA	Explosion	Titanium and Calcium	3	0	Chemical Processing Machine	No Details	
Apr 14	U.S. Steel	Gary, IN	Fire	Magnesium Dust	0	0	Unknown	No Details	
May 12	Metal Standard Corporation	Holland, MI	Fire	Metal Dust	0	0	Dust Collector	No Details	
May 18	ARE Inc.	Massillon, OH	Fire	Unknown	0	0	Dust Collector	No Details	
Jun 4	TeckLane Manufacturing	Springdale, PA	Fire	Metal Dust	0	0	Forklift	No Details	
Jun 11	Troxel	Moscow, TN	Fire	Metal Dust	3	0	Ventilation System	No Details	

INCIDENT SUMMARY - INCIDENTS: 9 | FIRES: 8 | EXPLOSIONS: 1 | INJURIES: 6 | FATALITIES: 0

AGRICULTURE

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 2	Aurora Cooperative (Sedan)	Edgar, NE	Fire	Grain Dust	0	0	Grain Bin	No Details	
Jan 4	Unknown	Farmington, NY	Fire	Grain Dust	1	0	Silo	No Details	
Jan 6	Unknown	Roscoe, IL	Fire	Grain Dust	0	0	Silo	No Details	
Jan 8	United Quality Cooperative	Ross, ND	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Jan 24	Border Ag and Energy	Bottineau, ND	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Jan 30	Colson Farms	Blunt, SD	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Feb 4	Farmers Grain and Feed	Addison, WI	Fire	Grain Dust	0	0	Grain Dryer	$190,000	
Feb 8	Sanderson Farms	Adel, GA	Fire	Grain Dust	0	0	Grain Bin	No Details	
Feb 12	ADM Grain	Clinton, IA	Fire	Grain Dust	0	0	Unknown	No Details	
Feb 12	Bengston‚Äôs Farmer‚Äôs Market	Robertsdale, AL	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Feb 15	Comley‚Äôs Country Creamery	Mexico, NY	Explosion	Grain Dust	0	0	Silo	$10,000	
Feb 19	Bunge North America	Red Oak, IA	Fire	Grain Dust	0	0	Processing Stacks	No Details	
Feb 24	The Andersons	Kearney, NE	Fire	Grain Dust	0	0	Grain Elevator	No Details	
Mar 8	Agtegra Cooperative	Bowdle, SD	Fire	Grain Dust	0	0	Grain Bin	No Details	
Mar 30	Bluegrass Farms of Ohio Inc.	Jeffersonville, OH	Fire	Grain Dust	0	0	Grain Bin	No Details	
Mar 31	Unknown	Chicago, IL	Fire	Grain Dust	0	0	Silo	No Details	
Apr 14	Unknown	Waterford, VA	Fire	Grain Dust	2	0	Grinder	$300,000	
Apr 16	ADM	Ottawa Lake, MI	Fire	Grain Dust	0	0	Silo	No Details	
Apr 22	Nevada Grain (Mennel Milling Company)	Nevada, OH	Explosion	Grain Dust	0	0	Grain Bin	No Details	
May 8	Schreiberdale Holsteins	Perry, NY	Fire	Corn Silage	0	0	Silo	$10,000	
May 19	CHS, Inc.	Kalispell, MT	Fire	Grain Dust	0	0	Grain Elevator	No Details	
May 25	Prestage Farms	Clinton, NC	Fire	Wood Dust	0	0	Silo	No Details	
Jun 7	Unknown	Denis, IA	Fire	Grain Dust	0	0	Grain Bin	No Details	
Jun 11	Unknown	Liberal, KS	Explosion	Grain Dust	0	0	Grain Elevator	No Details	
Jun 12	Conserv FS, Inc.	Creston, IL	Fire	Grain Dust	0	0	Warehouse	No Details	
Jun 25	AGP Grain Marketing	Lincoln, Ne	Fire	Grain Dust	0	0	Grain Elevator	No Details	

INCIDENT SUMMARY - INCIDENTS: 26 | FIRES: 23 | EXPLOSIONS: 3 | INJURIES: 3 | FATALITIES: 0

FOOD PROCESSING

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 13	CHS, Inc.	Grandin, North Dakota	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Feb 15	Melick Aquafeed	Catawissa, PA	Fire	Fish Meal	0	0	Unknown	No Details	
Mar 5	C&H Sugar	Crockett, CA	Fire	Sugar Dust	0	0	Conveyor Belt	No Details	
Mar 11	Valley Proteins	Rose Hill, NC	Explosion	Grain Dust	5	0	Welding Equipment	No Details	
Mar 23	Hubbard Feeds	Atlantic, IA	Fire	Grain Dust	0	0	Grain Elevator	No Details	

CDI DATA UNITED STATES

FOOD PROCESSING CONTINUED

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Apr 24	Natural Blend	Farmville, NC	Fire	Unknown	0	0	Dust Collector	No Details	
May 12	Michigan Sugar	Caro, MI	Explosion	Wood Dust	0	0	Pulp Pellet Bin	No Details	
May 22	Bunge North America	Decatur, AL	Fire	Grain Dust	0	0	Silo	No Details	
May 26	Smithfield Foods	Laurinburg, NC	Fire	Grain Dust	0	0	Dust Hopper	No Details	
Jun 3	J.M. Smucker	Lexington, KY	Fire	Peanut Dust	0	0	Unknown	No Details	

INCIDENT SUMMARY - INCIDENTS: 10 | FIRES: 8 | EXPLOSIONS: 2 | INJURIES: 5 | FATALITIES: 0

PULP & PAPER

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Feb 19	ND Paper	Old Town, ME	Fire	Wood Dust	0	0	Chip Bin	No Details	
Mar 30	Procter & Gamble	Oxnard, CA	Fire	Paper Dust	0	0	Ducting	No Details	
Apr 16	Cascades	Clarks Summit, PA	Fire	Paper Dust	0	0	Unknown	No Details	
Apr 17	Domtar	Rothschild, WI	Fire	Wood Dust	0	0	Debarking Equipment	No Details	
Jun 12	WestRock	Mooresville, NC	Fire	Paper Dust	0	0	Cardboard Processing Machine	$2 Million	

INCIDENT SUMMARY - INCIDENTS: 5 | FIRES: 5 | EXPLOSIONS: 0 | INJURIES: 0 | FATALITIES: 0

SCHOOLS & EDUCATION

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Mar 5	Montgomery Area High School	Montgomery, Pennsylvania	Fire	Wood Dust	0	0	Dust Collector	No Details	

INCIDENT SUMMARY - INCIDENTS: 1 | FIRES: 1 | EXPLOSIONS: 0 | INJURIES: 0 | FATALITIES: 0

OTHER

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 28	TrinityRail	Jonesboro, AR	Fire	Unknown	0	0	Dust Collector	No Details	
Apr 14	American Zinc Recycling	Palmerton, PA	Fire	Metal Dust	0	0	Conveyor Belt	No Details	
May 6	Testrite Visual	Hackensack, NJ	Fire	Unknown	0	0	Dust Collector	No Details	
May 8	A Bead Source	Portland, OR	Fire	Bark Dust	0	0	Unknown	No Details	
May 18	General Iron Industries Inc.	Chicago, IL	Explosion	Metal Dust	0	0	Regenerative Thermal Oxidizer	No Details	
May 31	Patrick Industries	Elkhart, IN	Fire	Wood Dust	0	0	Heating Unit	No Details	
Jun 17	Fiberon	New London, NC	Explosion	Unknown	0	0	Dust Collector	No Details	

INCIDENT SUMMARY - INCIDENTS: 7 | FIRES: 5 | EXPLOSIONS: 2 | INJURIES: 0 | FATALITIES: 0

There were no reported incidents in the Power Generation & Coal Handling industry.

WOOD & WOOD PRODUCTS

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Feb 27	Calgary Pallet Inc.	Calgary, AB	Fire	Wood Dust	0	0	Dust Collector	No Details	
Apr 15	Cap-Pele Sawmill Ltd.	Cap-Pelé, NB	Fire	Wood Dust	0	0	Unknown	$2 Million	
May 11	Pinnacle Renewable Energy	Coldstream, BC	Explosion	Wood Dust	0	0	Dryer	No Details	
May 25	W.F. Tompkins and Sons	Bath, NB	Fire	Wood Dust	0	0	Unknown	No Details	
Jun 26	Greenwood Forest Products	Penticton, British Columbia	Fire	Wood Dust	0	0	Hopper	No Details	

INCIDENT SUMMARY - INCIDENTS: 5 | FIRES: 4 | EXPLOSIONS: 1 | INJURIES: 0 | FATALITIES: 0

AUTOMOTIVE & METAL WORKING

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT.	EQUIPMENT	DAMAGES	LINK
Jun 12	Gerdau Steel	Whitby, ON	Fire	Metal Dust	0	0	Berm	No Details	

INCIDENT SUMMARY - INCIDENTS: 1 | FIRES: 1 | EXPLOSIONS: 0 | INJURIES: 0 | FATALITIES: 0

AGRICULTURE

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 23	Viterra	Vancouver, BC	Fire	Grain Dust	0	0	Grain Elevator	No Details	
May 28	Sebringville Feed Mill	Sebringville, ON	Fire	Grain Dust	0	0	Unknown	No Details	
Jun 14	Richardson International	Thunder Bay, ON	Explosion	Grain Dust	0	0	Dust Filtration System	No Details	

INCIDENT SUMMARY - INCIDENTS: 3 | FIRES: 2 | EXPLOSIONS: 1 | INJURIES: 0 | FATALITIES: 0

There were no reported incidents in the Food Processing, Power Generation & Coal Handling, Pulp & Paper, or Schools & Education industries.

CDI DATA INTERNATIONAL

WOOD & WOOD PRODUCTS

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 2	Unknown	Schleedorf, Austria	Explosion	Wood Dust	0	0	Silo	No Details	
Jan 12	Unknown	Ans, Denmark	Fire	Wood Dust	0	0	Silo	No Details	
Jan 12	Kronospan	Chirk, UK	Fire	Wood Dust	0	0	Unknown	No Details	
Feb 1	Edge Renewables Ltd	Much Wenlock, UK	Fire	Wood Dust	0	0	Boiler	No Details	
Apr 2	Wacker	Ennest, Germany	Explosion	Wood Dust	0	0	Wood Chip Bin	No Details	
Apr 19	Unknown	Freyburg, Germany	Explosion	Wood Dust	2	0	Silo	No Details	
May 6	Unknown	Rheinau, Germany	Explosion	Wood Dust	0	0	Wood Chipper	No Details	
May 13	Vastern Timber	Studley, UK	Fire	Wood Dust	0	0	Dust Collector	No Details	
May 18	Unknown	Carterton, New Zealand	Fire	Wood Dust	0	0	Silo	No Details	
May 20	Kiwi Lumber	Waingawa, New Zealand	Fire	Wood Dust	0	0	Silo	No Details	
Jun 10	Unknown	Herbrechtingen, Germany	Explosion	Sawdust	0	0	Conveyor Belt	No Details	
Jun 29	Svilosa AD	Svishtov, Bulgaria	Explosion	Wood Dust	0	0	Sodium Hydroxide Tank	No Details	

INCIDENT SUMMARY - INCIDENTS: 12 | FIRES: 6 | EXPLOSIONS: 6 | INJURIES: 2 | FATALITIES: 0

AGRICULTURE

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 1	Unknown	Wellington, New Zealand	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Mar 9	Unknown	Devonport, Australia	Fire	Grain Dust	0	0	Silo	No Details	
Mar 11	ADM do Brasil	Uberlandia, Brazil	Fire	Grain Dust	0	0	Grain Dryer	No Details	
Mar 28	Royal Portbury Dock	Bristol, UK	Fire	Grain Dust	0	0	Loading Equipment	No Details	
Apr 11	Terminal 6	Puerto San Martin, Argentina	Fire	Grain Dust	0	0	Sleeve Filter	No Details	
May 9	Unknown	Yeovil, UK	Fire	Grain Dust	0	0	Grain Hopper	No Details	
May 23	Grain Market	Ballabhgarh, India	Fire	Grain Dust	0	0	Wheat Bags	No Details	
Jun 13	Unknown	Ratanak Mondol, Cambodia	Explosion	Chemical Powder	0	1	Tank	No Details	

INCIDENT SUMMARY - INCIDENTS: 8 | FIRES: 7 | EXPLOSIONS: 1 | INJURIES: 0 | FATALITIES: 1

FOOD PROCESSING

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Jan 23	Muntons PLC	Stowmarket, UK	Fire	Malt Dust	0	0	Dryer	No Details	
Mar 15	Hemavati Cooperative Sugar Factory	Channarayapatna, India	Explosion	Sugar Dust	0	0	Dust Collector	No Details	
Apr 8	Denkavit	Voorthuizen, Netherlands	Explosion	Grain Dust	0	0	Silo	No Details	
Jun 19	ADM UK	Erith, UK	Explosion	Grain Dust	3	0	Silo	No Details	

INCIDENT SUMMARY - INCIDENTS: 4 | FIRES: 1 | EXPLOSIONS: 3 | INJURIES: 3 | FATALITIES: 0

POWER GENERATION & COAL HANDLING

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
May 24	Yermarus Thermal Power Station	Yermarus, India	Fire	Coal Dust	0	0	Conveyor Belt	No Details	
Jun 7	Chhattisgarh State Power Generation Company	Korba, India	Fire	Coal Dust	0	0	Conveyor Belt	No Details	
Jun 20	Deepika Mine	Korba, India	Fire	Coal Dust	0	0	Conveyor Belt	Millions of rupees	

INCIDENT SUMMARY - INCIDENTS: 3 | FIRES: 3 | EXPLOSIONS: 0 | INJURIES: 0 | FATALITIES: 0

SCHOOLS AND EDUCTIONAL FACILITIES

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Feb 28	Clayesmore School	Iwerne Minster, UK	Fire	Wood Dust	0	0	Silo	No Details	

INCIDENT SUMMARY - INCIDENTS: 1 | FIRES: 1 | EXPLOSIONS: 0 | INJURIES: 0 | FATALITIES: 0

OTHER

DATE	COMPANY	LOCATION	TYPE	FUEL	INJ.	FAT	EQUIPMENT	DAMAGES	LINK
Feb 17	Goyal Enterprises	Chandigarh, India	Fire	Wood Dust	1	0	Welding Equipment	No Details	
Apr 6	Unknown	Bissendorf, Germany	Explosion	Metal Dust	1	0	Unknown	No Details	
Apr 13	Galaxy Surfactants	Mumbai, India	Explosion	Powdered Chemicals	3	2	Feed Tank	No Details	
May 19	LG Chem Ltd.	Seosan, South Korea	Explosion	Aluminum Alkyl	2	1	Unknown	No Details	
Jun 10	Foskor	Richards Bay, South Africa	Fire	Sulphur Dust	0	0	Conveyor System	Millions of rands	

INCIDENT SUMMARY - INCIDENTS: 5 | FIRES: 2 | EXPLOSIONS: 3 | INJURIES: 7 | FATALITIES: 3

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