PREVENTIVE PROTECTION SYSTEMS FROM

firefly ab

SWEDEN

One of the world leading suppliers of Spark Detection

HOW TO PREVENT FIRES IN THE PANEL & ENGINEERED LUMBER INDUSTRY

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HYGIENE

TISSUE

PULP & PAPER

FIREFLY AB IN BRIEF

- Firefly AB – a Swedish company founded in 1973
- A leading supplier of spark detection systems
- Focus on development and design of spark detection systems and preventive fire protection systems for 40 years
- Listed on the NASDAQ/OMX stock exchange in Stockholm
- Head office in Stockholm with agents and distributors worldwide (FNA, Inc. in North America)

INDUSTRY APPLICATIONS

Spark detection systems

Guard Concepts - Spot Protection Systems

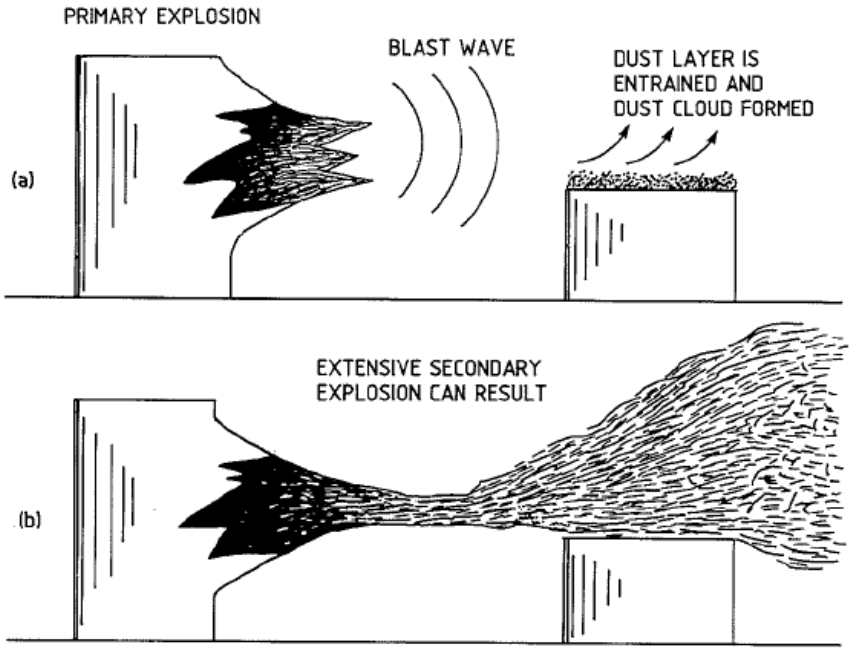
Complete systems with detection, extinguishing and control

FIRE RISKS

In the Panel & Engineered Lumber Industry

DUST EXPLOSION

WHAT IS A SECONDARY DUST EXPLOSION



FIRE RISKS

Still it is not the large incidents that are most costly for the industry;

The *high frequency of smaller incidents* is even more costly to the industry when adding up the loss production.

GOOD PROCESS DESIGN

- Minimizing the risk of leakages of dust and fines
- High quality equipment
- Consider distance between fans and inlet for filter

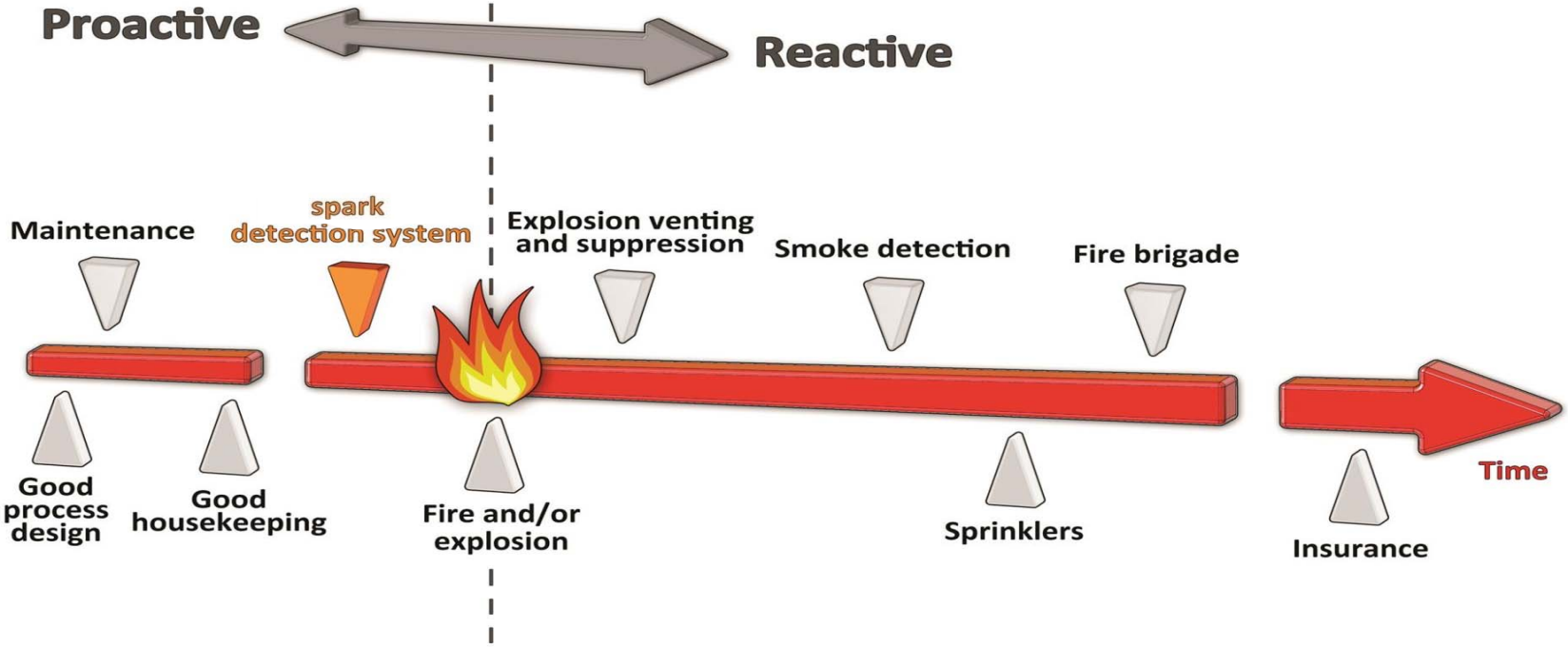
GOOD MAINTENANCE

- Failure in machinery or unbalanced air flow systems will increase the risk for fires and dust explosion
- Performing routine actions to keep the devices in a good condition will not only benefit the production rates
  – It will also lower the risk for fires to start.

GOOD HOUSEKEEPING

- Make sure you have proper housekeeping procedures
- Make sure accessible areas are kept accessible
- Take care of material blocking etc. in an early stage
- Know your process and which parts where dust accumulations can occur
- Minimizing dust accumulations = Minimizing the risk for secondary explosions!

APPLICATION AND SOLUTIONS



SPARK DETECTION

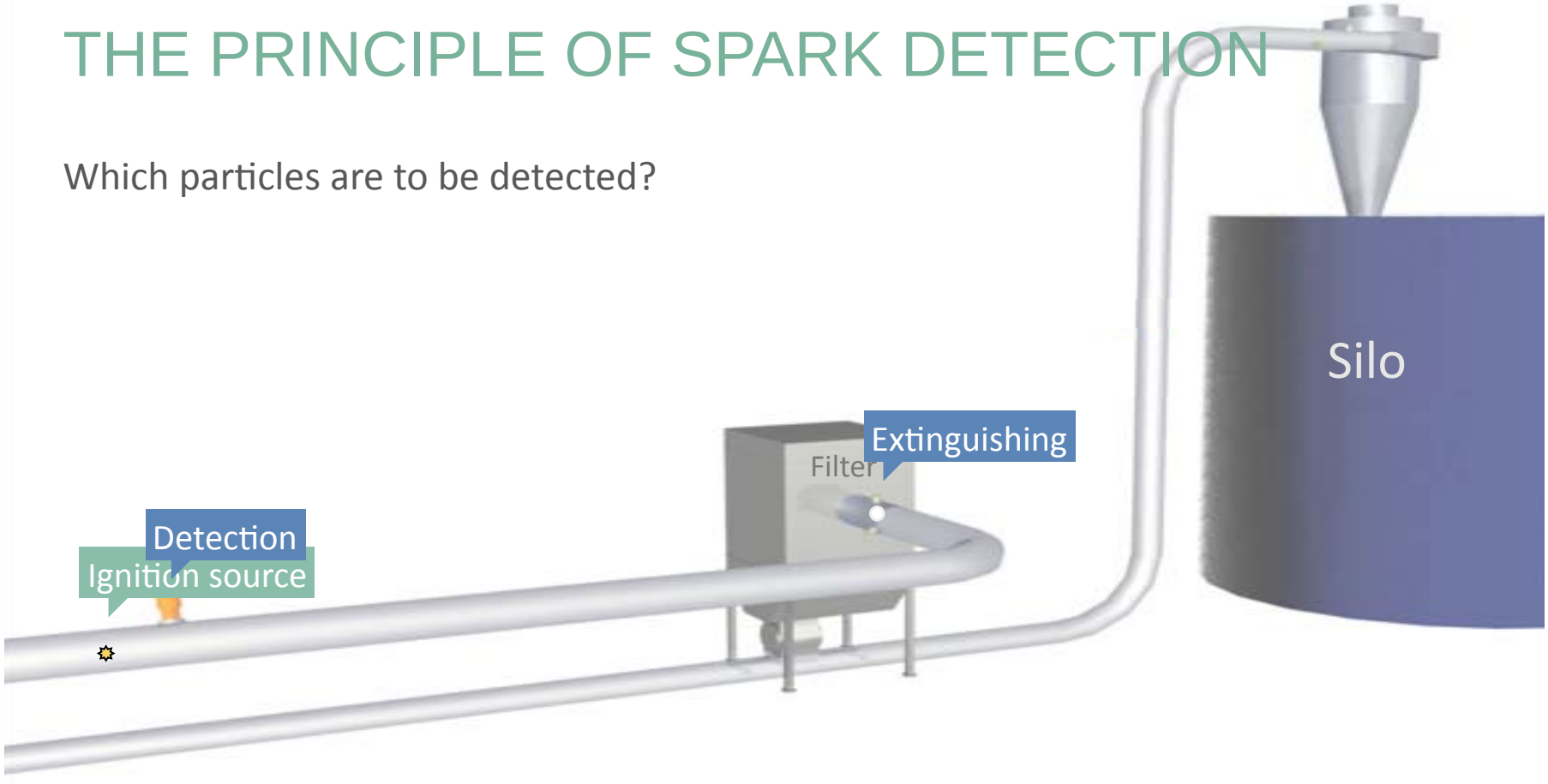
Principle function of the Spark Detection System

EXAMPLE

FILTER WITHOUT PROTECTION

THE PRINCIPLE OF SPARK DETECTION

Which particles are to be detected?



TWO VERY IMPORTANT FACTORS IS KNOWING AND UNDERSTANDING:

Ignition source

- What is the Minimum Ignition Temperature (MIT)
- What is the Minimum Ignition Energy (MIE)

In the risk analysis of the plant, the MIT and the MIE of the handled material must be tested and verified prior to selecting an appropriate fire prevention system.

WHICH PARTICLES ARE DANGEROUS?

The particle must have:

Enough temperature (MIT for dust cloud) 470°C = 878°F

Enough energy (MIE)

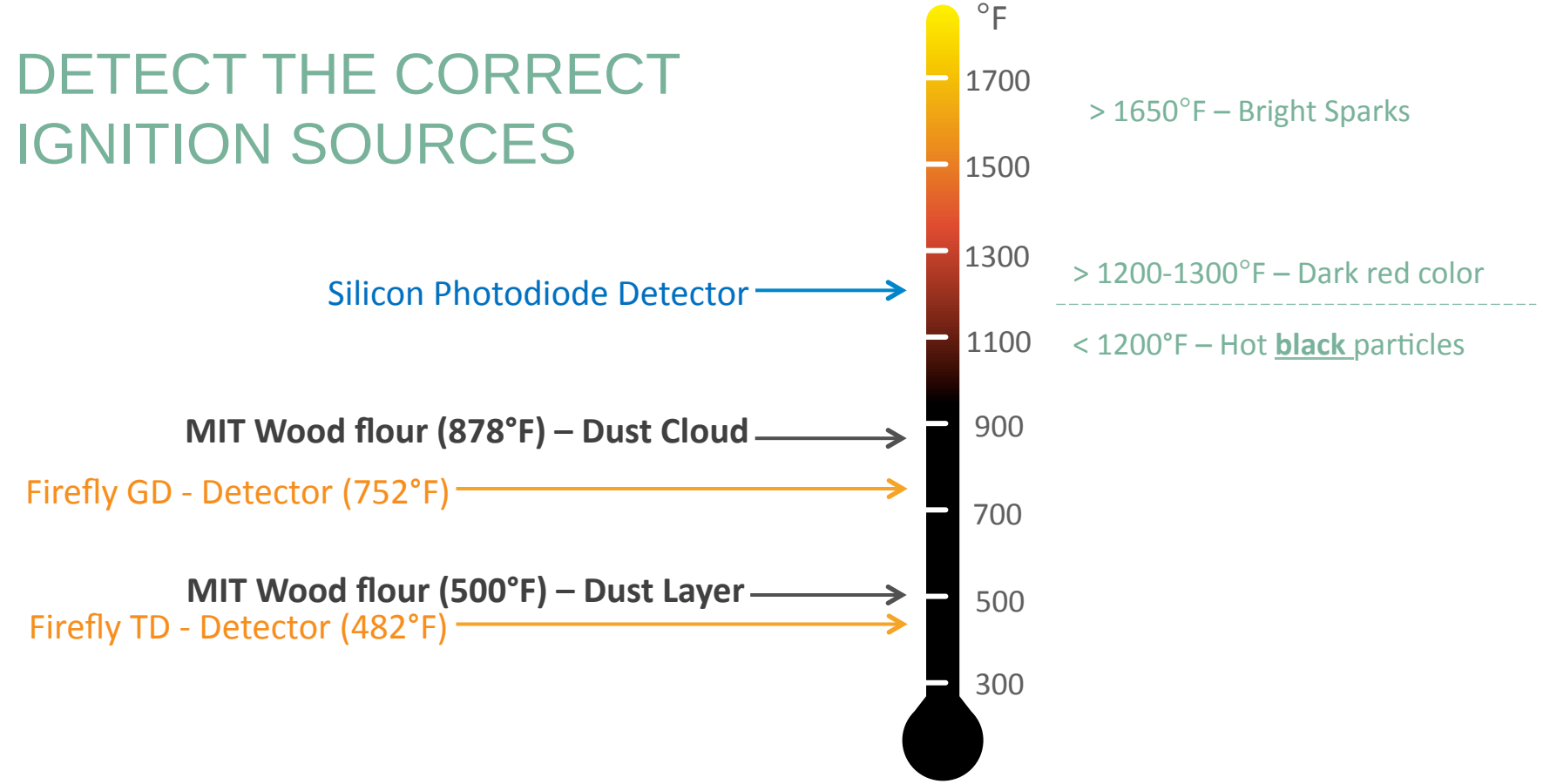
Note that the MIT for dust layer is lower 260°C = 500°F

TABLE 5-9A. Explosion Characteristics of Various Dusts

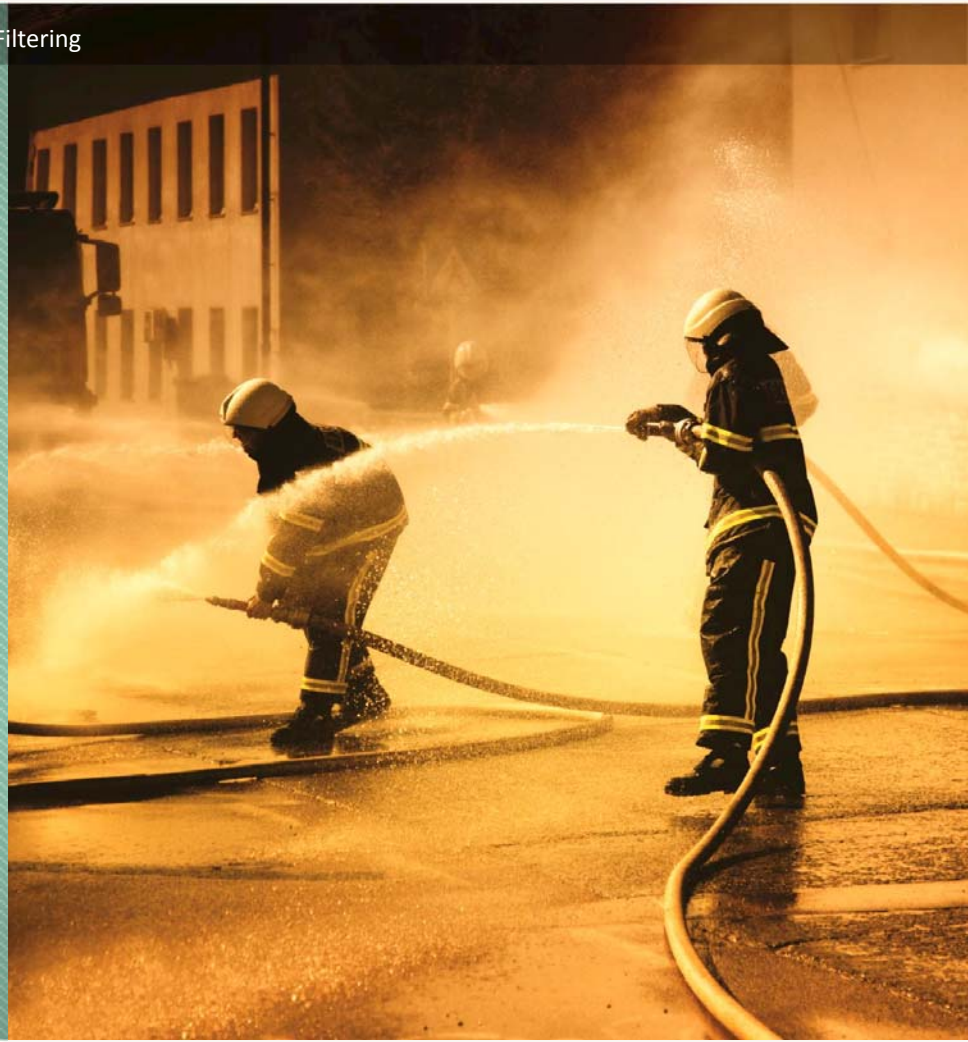
(Compiled from the following reports of the U.S. Department of Interior, Bureau of Mines: RI 6753, The Explosibility of Agricultural Dusts; RI 6516, Explosibility of Metal Powders; RI 5971, Explosibility of Dusts Used in the Plastics Industry; RI 6597, Explosibility of Carbonaceous Dusts; RI 7132, Dust Explosibility of Chemicals, Drugs, Dyes and Pesticides; and RI 7208, Explosibility of Miscellaneous Dusts.)

Type of Dust	Explosibility Index	Ignition Sensitivity	Explosion Severity	Maximum Explosion Pressure psig*	Max Rate of Pressure Rise psi/sec*	Ignition Temperature† Cloud °C	Ignition Temperature† Layer °C	Min Cloud Ignition Energy joules	Min Explosion Conc oz/cu ft‡	Limiting Oxygen Percentage§ (Spark Ignition)
Agricultural Dusts										
Cellulose	2.8	1.0	2.8	130	4,500	480	270	0.080	0.055	C13
Cellulose, alpha	>10	2.7	4.0	117	8,000	410	300	0.040	0.045	—
Cocoa, natural 19% fat	0.6	0.5	1.1	68	1,200	510	240	0.10	0.075	—
Coffee, fully roasted	<0.1	0.2	0.1	38	150	720	270	0.16	0.085	C17
Corn	6.9	2.3	3.0	113	6,000	400	250	0.04	0.055	—
Cornstarch commercial product	9.5	2.8	3.4	106	7,500	400	—	0.04	0.045	—
Cork dust	>10	3.6	3.3	96	7,500	460	210	0.035	0.035	—
Cotton linter, raw	<0.1	<0.1	<0.1	73	400	520	—	1.92	0.50	C21
Cube root, South American	6.5	2.7	2.4	69	2,100	470	230	0.04	0.04	—
Grain dust, winter wheat, corn, oats	9.2	2.8	3.3	131	7,000	430	230	0.03	0.055	—
Lycopodium	16.4	4.2	3.9	75	3,100	480	310	0.04	0.025	C13
Milk, skimmed	1.4	1.6	0.9	95	2,300	490	200	0.05	0.05	N15
Rice	0.3	0.5	0.5	47	700	510	450	0.10	0.085	—
Soy flour	0.7	0.6	1.1	94	800	550	340	0.10	0.06	C15
Sugar, powdered	9.6	4.0	2.4	109	5,000	370	400‡	0.03	0.045	—
Wheat flour	4.1	1.5	2.7	97	2,800	440	440	0.06	0.05	—
Wheat starch, edible	17.7	5.2	3.4	100	6,500	470	260	0.040	0.045	C12
Wood flour, white pine	9.9	3.1	3.2	113	5,500				0.035	—

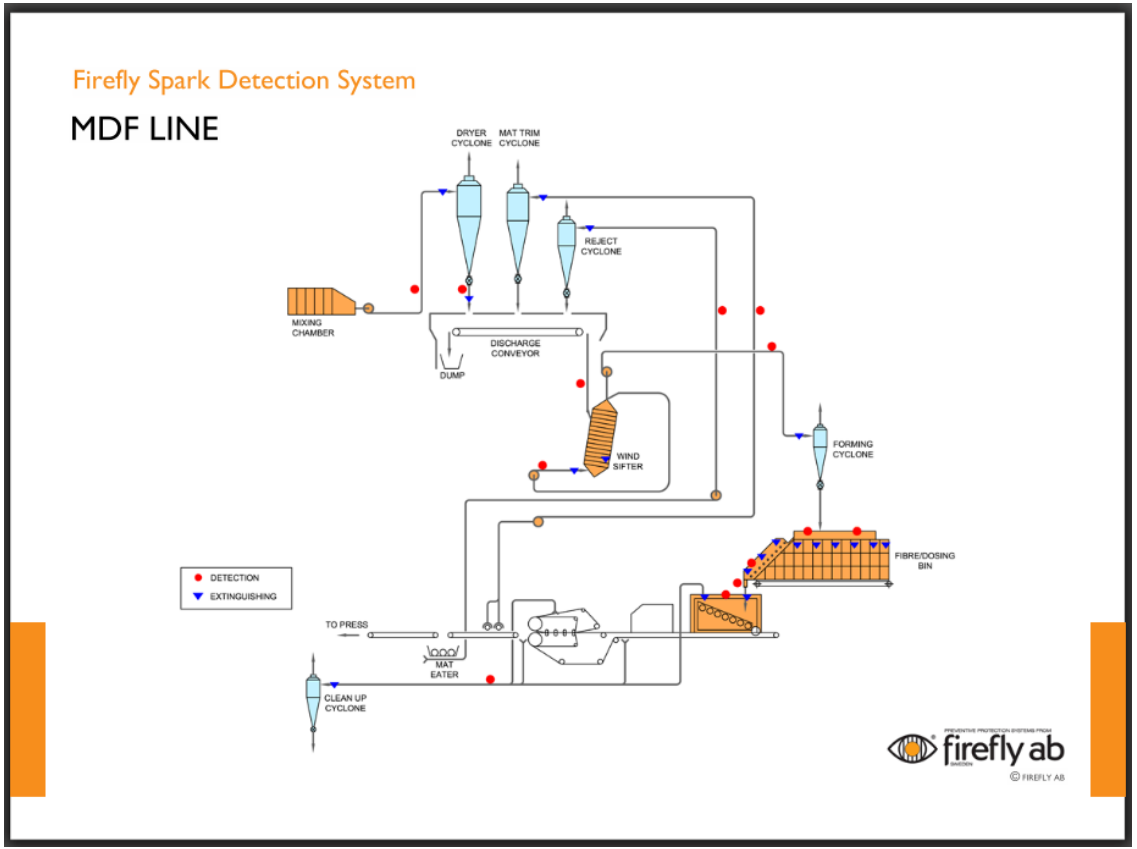
DETECT THE CORRECT IGNITION SOURCES



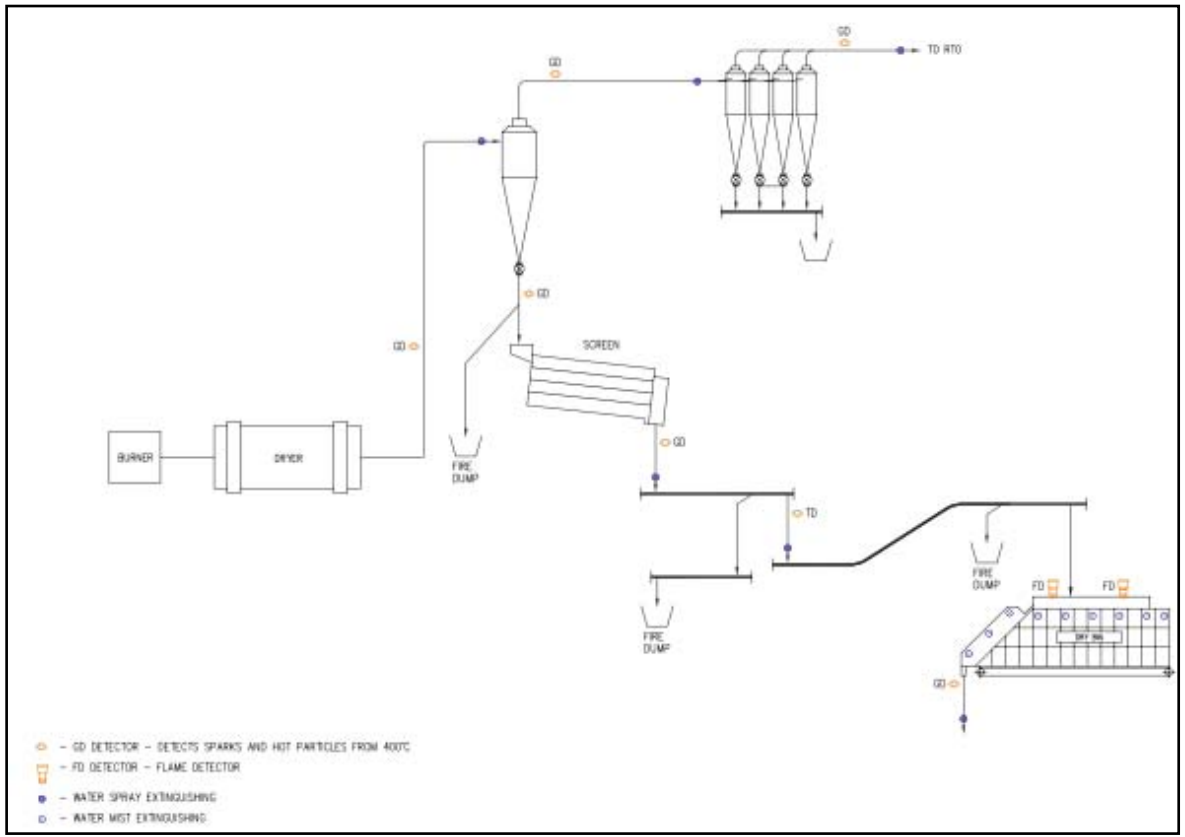
APPLICATIONS & SOLUTIONS



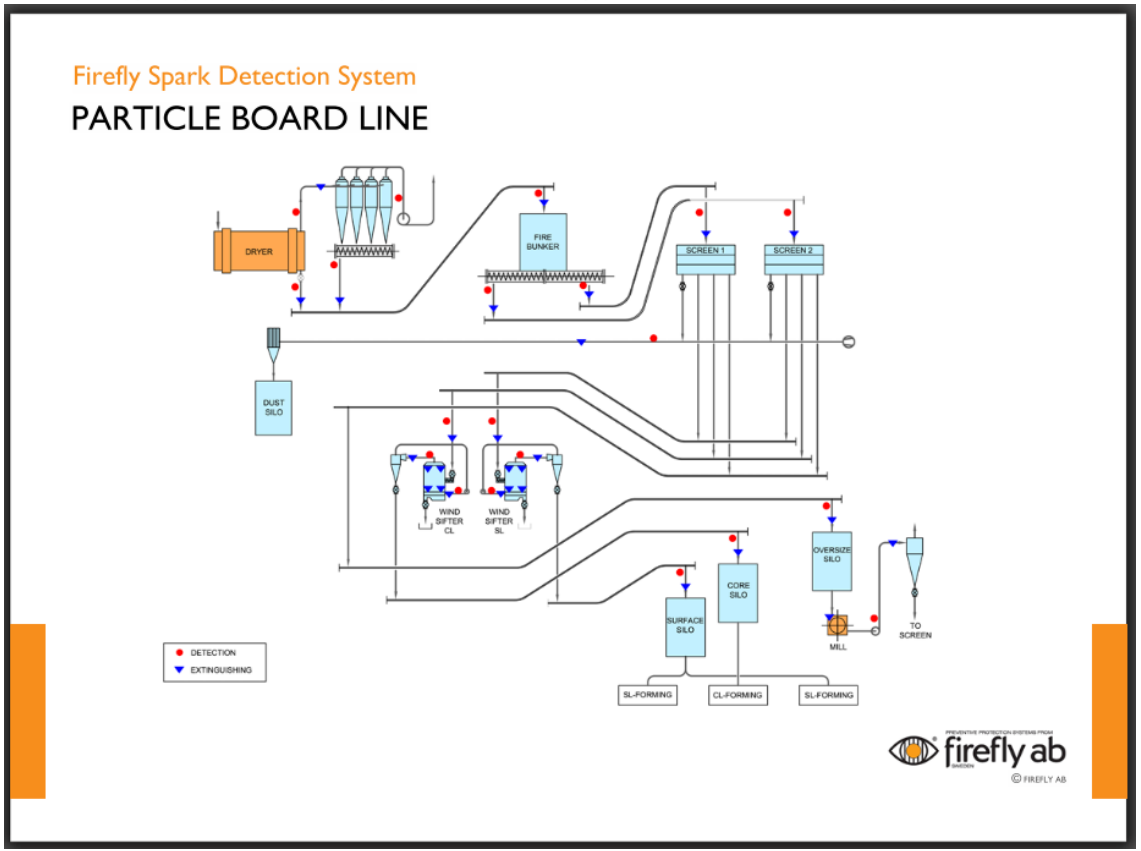
SOLUTIONS FOR MDF LINES



SOLUTIONS FOR OSB LINES

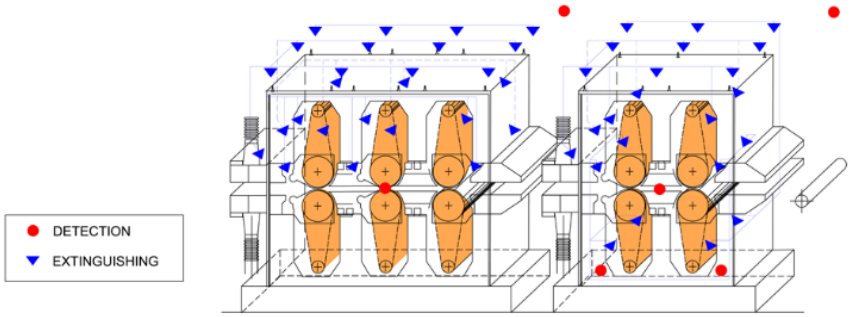


SOLUTIONS FOR PARTICLE



SOLUTIONS FOR SANDERS

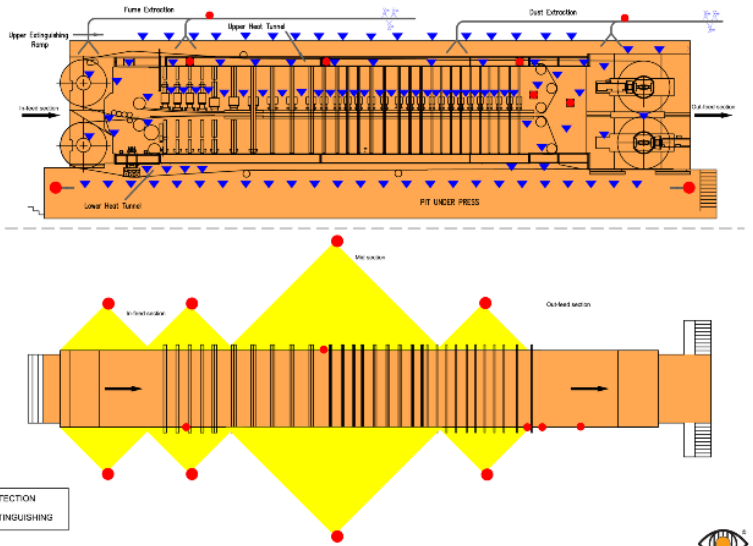
FIREFLY SANDERGUARD™



SOLUTIONS FOR CONTINUOUS

FIREFLY PRESSGUARD™

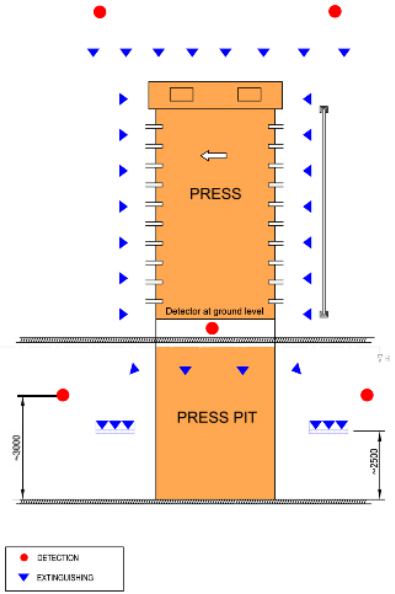
Continuous press

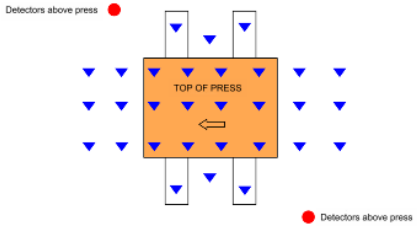


SOLUTIONS FOR MULTIOPENING

FIREFLY PRESSGUARD™

Multiopening press





SEVERAL VARIOUS EXTINGUISHING METHODS

- Full Cone Water extinguishing
- Water mist
- Steam
- Diverting / Isolation of ignition sources
- CO2 / Inert gas
- Etc …..

RESEARCH SHOWS THAT DETECTING ONLY SPARKS HAS LESS EFFECT THAN FIRST THOUGHT. YOU NEED TO DETECT **BOTH** SPARKS AND DARK / HOT PARTICLES IN YOUR PROCESS TO MINIMIZE FIRES AND DUST EXPLOSIONS.

* Proc. Rolf Eckhoff, “Dust explosions in the process industries” (2nd edition)

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Thank You !

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