PREVENTIVE PROTECTION SYSTEMS FROM
firefly ab
SWEDEN

FIREFLY DIAPER AND HYGIENE SOLUTIONS

Unique fire protection solutions within the nonwoven fabric industry

Statistically 8 out of 10 largest losses in the Hygiene and Tissue industry are caused by fires!

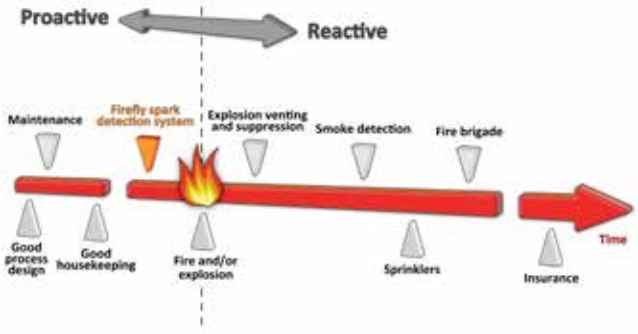
Still it is not the large incidents that are most costly for the industry, the high frequency of smaller incidents is even more costly when adding up the loss of production.

Fire and explosions

Every year, people are injured and even killed as a result of industrial fires and dust explosions. The diaper and hygiene industries worldwide lose millions of dollars per year in damages and production interruptions due to fire or dust explosions.

As opposed to taking action after the event of a fire or dust explosion, it is also possible to implement proactive measures to prevent a fire or explosion to occur in the first place. Intelligent process design and proper housekeeping are examples of vital measures. The installation of a Firefly fire protection system is another.

In the nonwoven fabric manufacturing process there are several high risk zones where fire or dust explosions can occur. Firefly offers a range of fire protection solutions for the process within, baby, feminine and family care.



Risks in the diaper and hygiene industry

Fires in the diaper production process

Many areas in a diaper production plant are exposed to accumulation of dry, highly inflammable cellulose dust and fibre. The smallest outbreak of fire is extremely dangerous and can possibly spread throughout the mill. There are numerous of examples around the world where diaper production plants have been partly or completely destroyed by fires or dust explosions in the production process.

The main causes of fires in this type of process are the mills, refiners or fans that by overloading, feeding problem or mechanical failure can generate ignition sources. These ignition sources can be transported in the duct systems and cause a fire or in worst case a dust explosion further down-streams in the process, such as in the forming section or in the filters.

At the mills it is also a risk that dust on top of the mill or around the mill can ignite and cause a fire in the mill room.

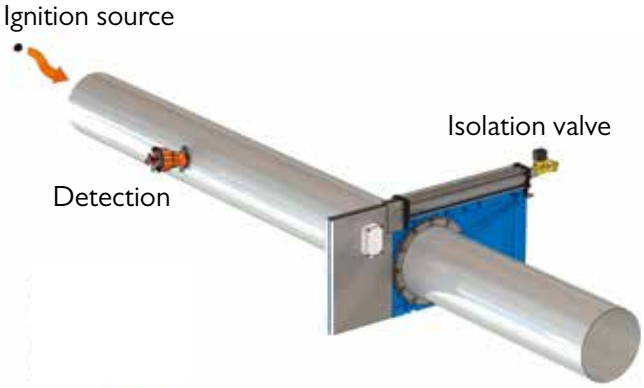
Dangerous scenarios in the process:

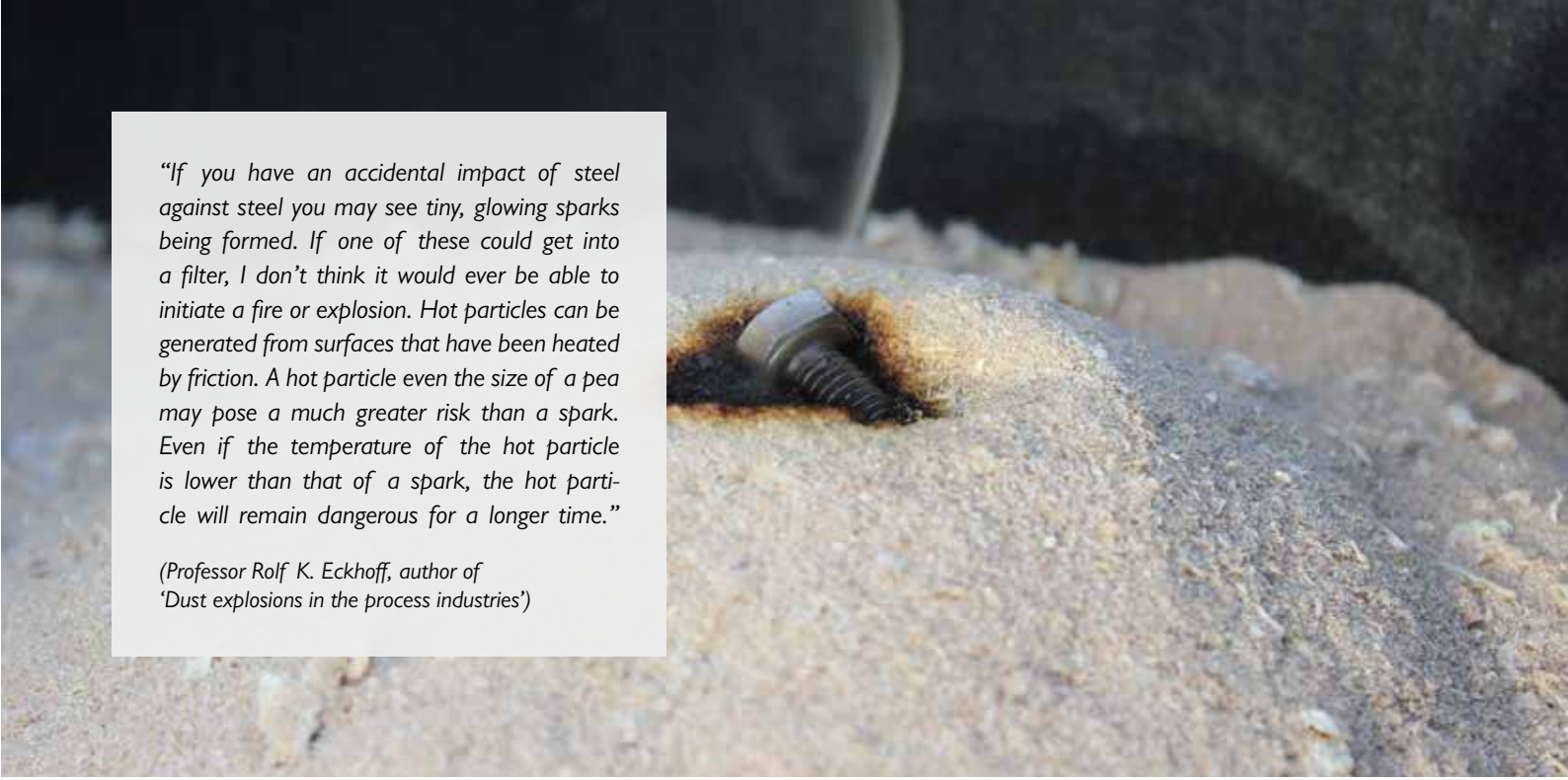
- Friction heat generation
- Overloading/feeding problem
- Material build-up
- Mechanical failure
- Metal pieces in the process

The Principle of Firefly Spark Detection

A spark detection system consists of a detector that identifies dangerous particles (ignition sources) in process flows. Once a particle is detected, it is within milliseconds automatically extinguished before it can create a fire or a dust explosion. The detection and extinguishing functionalities are controlled by a control unit. This proactive way of eliminating ignition sources is why Firefly spark detection systems are called preventive fire protection systems.

The installation of a Firefly spark detection system can save the industry from costly fires and dust explosions. By combining unique and patented technology with over 40 years of experience in the process industry, Firefly offers premium safety solutions that minimize false alarms and keep the industry in production.





"If you have an accidental impact of steel against steel you may see tiny, glowing sparks being formed. If one of these could get into a filter, I don't think it would ever be able to initiate a fire or explosion. Hot particles can be generated from surfaces that have been heated by friction. A hot particle even the size of a pea may pose a much greater risk than a spark. Even if the temperature of the hot particle is lower than that of a spark, the hot particle will remain dangerous for a longer time."

(Professor Rolf K. Eckhoff, author of 'Dust explosions in the process industries')

Ignition temperatures and energies

Different materials have different minimum ignition temperatures (MIT) and different minimum ignition energies (MIE), as can be seen in the table. Only when both the MIT and MIE levels are met or exceeded, ignition can take place. ***To be considered adequate, a spark detection system should detect ignition sources at these levels!***

A hot particle will emit light, visible to the human eye when it has a temperature of about 700°C/1292°F or more*. Particles with a temperature over ~700°C/1292°F are therefore perceived by the human eye as sparks or glowing embers. Particles with a temperature lower than ~700°C/1292°F are perceived by the human eye as 'black' particles. Note that almost all organic material have a lower ignition temperature (MIT) than 700°C/1292°F.

Firefly True-IR spark detectors are designed to detect all dangerous ignition sources such as sparks, hot (black) particles and flames when both the MIT and MIE are met or exceeded.

** ref. Wiens displacement law & Planck's law of radiation*

MINIMUM IGNITION TEMPERATURE AND ENERGY LEVEL

	CLOUD		LAYER		MIN. CLOUD IGNITION ENERGY, J
	°C	°F	°C	°F	
WOOD	470	878	260	500	0,04
WHEAT FLOUR	440	824	440	824	0,06
CELLULOSE	480	896	270	518	0,08
SUGAR	370	698	400	608	0,03
COCOA	510	950	240	464	0,10
ALUMINUM	610	1130	326	619	0,01
COFFEE	720	1328	270	518	0,16

Source: NFPA (National Fire Protection Association)

Firefly spark detectors:

- Designed to detect all potential ignition sources such as sparks, hot (black) particles and flames.
- Only spark detector in the world approved by FM for detection of particles down to 250°C/482°F.
- Insensitive to daylight. Can be located close to plexi glass windows.
- 180° view angle, covers the duct/channel with only one detector.
- Detector lens design with self cleaning effect.

Detection

Firefly´s state of the art True-IR detectors are specially designed for detection of all types of ignition sources such as sparks, flames and hot (black) particles. All Firefly spark detectors works in the True-IR spectral range, which enables detection down to the MIT and MIE of the material and are at the same time completely insensitive to daylight.

Being insensitive to daylight is essential in order to avoid false positives and avoid unnecessary interruption of the process, which could be very costly. This will also make it possible to locate the detectors in an area where there is a plexi glass window or if daylight is present.

The Firefly spark detection system offers premium detection functionality which is unrivalled on the market.

To consider when choosing suitable detector type:

- ☑ *determine the minimum ignition temperature (MIT) and minimum ignition energy (MIE) of the processed material.*
- ☑ *choose the detection technology that will meet the MIT and MIE of that material.*
- ☑ *analyze possible detection disturbance sources and make sure that the chosen detector will not cause false triggering.*

Firefly isolation and diverter valves:

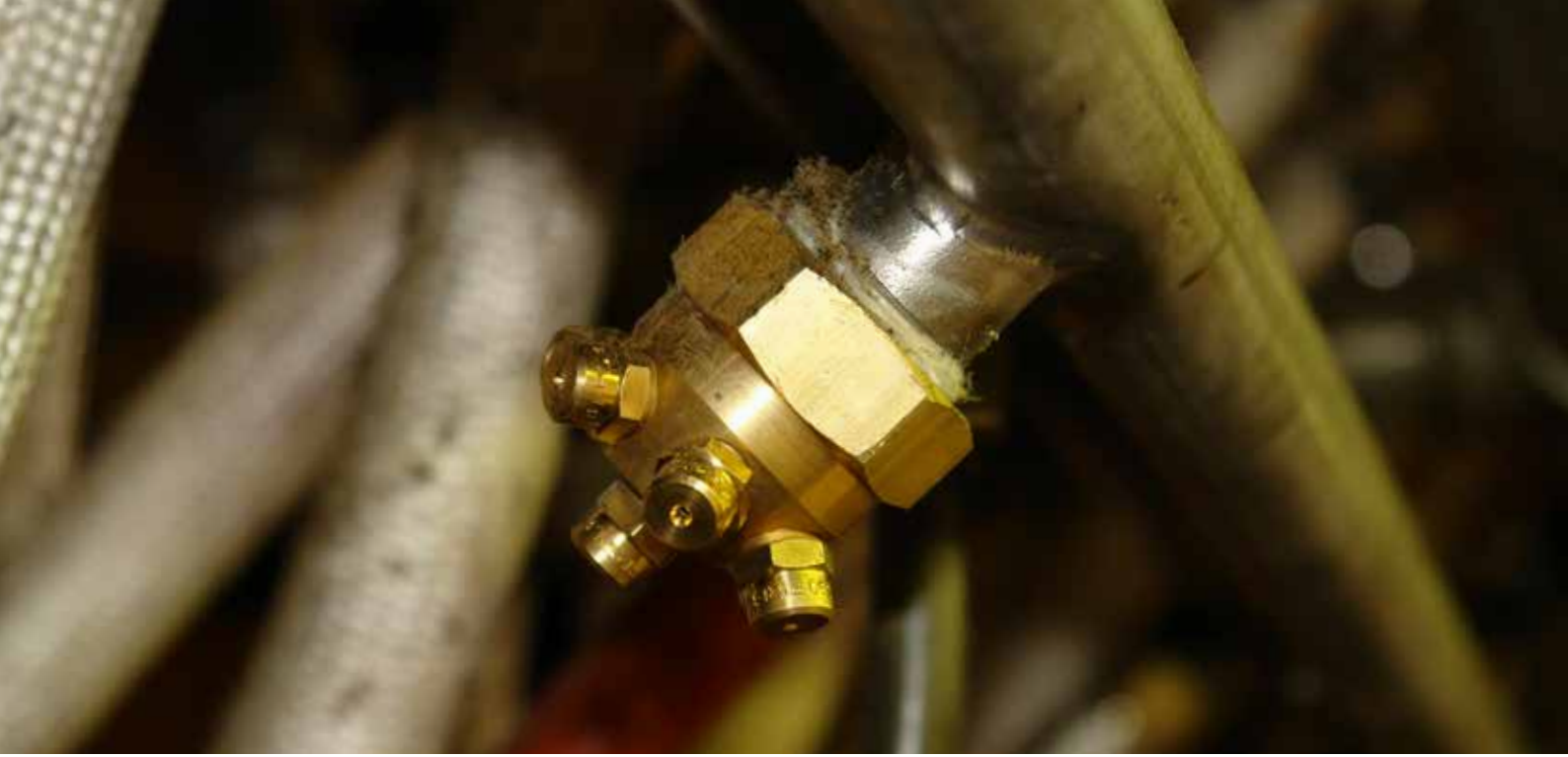
- Ultra fast isolation valves and diverter valves, reaction times from 80mS and up.
- Wide variety of different valves to suit every application.
- High quality with reliable function.

Isolation and diverter valves

Firefly offers a wide variety of methods for extinguishing, isolation or diversion of ignition sources for processes where the use of water is not suitable.

Firefly's ultra-fast isolation and diverter valves are known for their high quality and superb functionality and are available in many types and sizes. CO^2 gas is often used in combination with isolation valves to inert the isolated process volume.

Also other extinguishing methods such as inert gas, foam, steam or other chemical agents can be included in Firefly's system solutions.



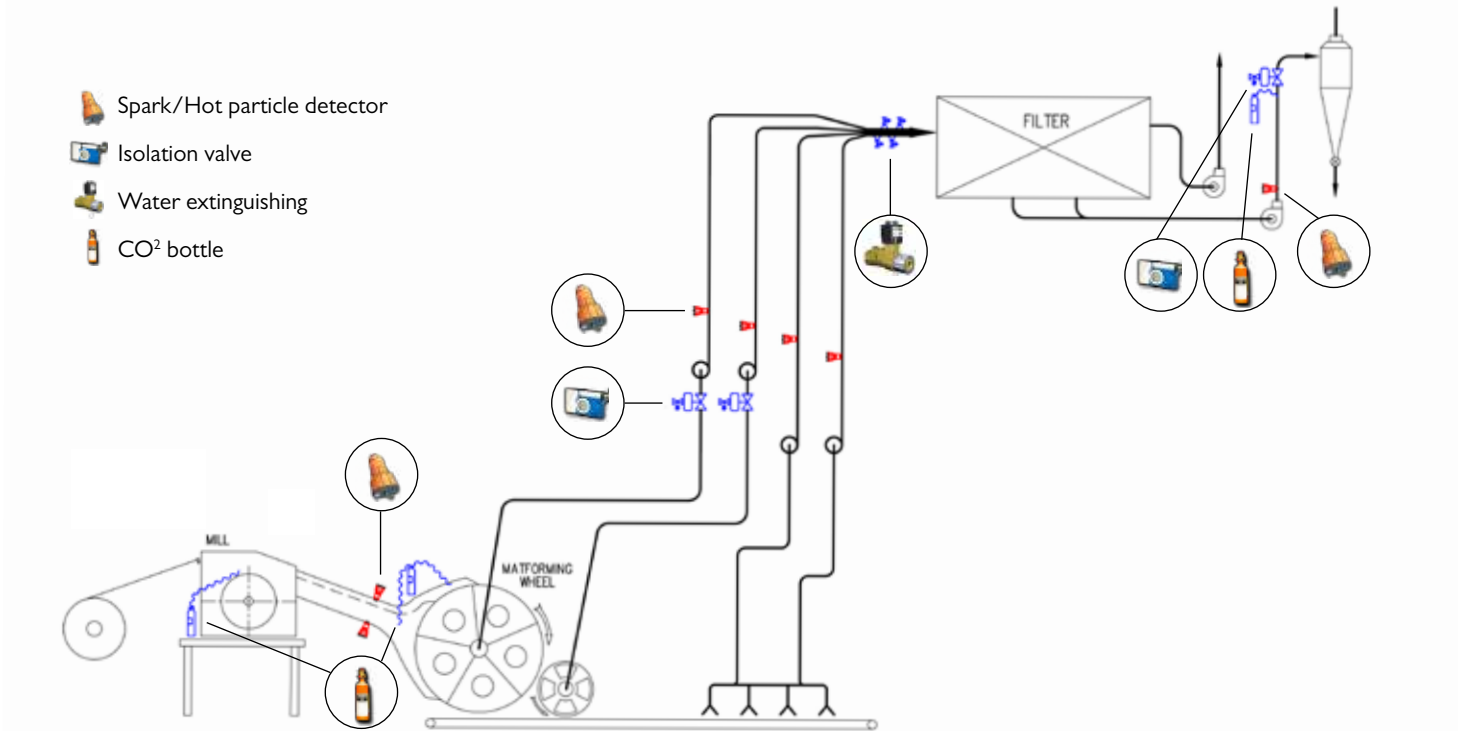
Water mist

Water mist can be used for suppression of flames in a number of different applications where traditional water extinguishing is not suitable. Water mist has proven to be very effective in fighting and controlling fires. It has a remarkable potential for suppressing flames and is causing minimal residual damage.

Water mist systems work by spraying microscopic water droplets onto a fire. This results in efficient suppression using nothing more than water. When the water droplets evaporates into steam it absorbs more energy from the fire than any other extinguishing media. When the water evaporates it will expand 1.700 times which displaces the oxygen and ensures that the combustion cannot be sustained.

Firefly water mist

- Efficient for suppression of flames in machines or in open areas.
- Minimal water usage.
- Minimal effect on machinery.
- Average droplet size approximately 120 micron.
- Pressure 7 – 9 bar, Firefly standard pump and tanks can be used.



Firefly Diaper Line Protection System

The focus of the Firefly solutions for Diaper and Sanitary Napkin Lines is to detect a beginning incident in an early stage and act before a fire or dust explosion has occurred.

The reaction time of the system is very fast, but the key for a successful pro-active system is not only the reaction time. Firefly uses specially developed true IR detectors that will detect sparks and flames as well as hot (black) friction particles. Hot friction particles are often the first indication of a beginning problem in these type of processes.

Also the location of the detectors is critical in order to ensure an optimal function of the system. All Firefly detectors are insensitive to daylight, meaning that they can be located close to plexi-glass windows without causing false positives. Firefly has over 30 years of experience from diaper processes and the Firefly engineers will help you to find the correct location of the equipment.

After an ignition source has been detected, quick action needs to be taken to avoid ignition of the handled material. Firefly has a huge range of isolation valves that can be used in combination with CO^2 gas or other inert gases. Depending on the application, Firefly can also offer solution with diverter valves, to quickly divert the ignition sources out from the process or offer solutions with quick acting water spray systems.

The Firefly solution is supplied as a complete system, including a Firefly control panel. This will ensure quick response times and an optimal function of the system.

Firefly's Quick Suppression System for mill rooms:

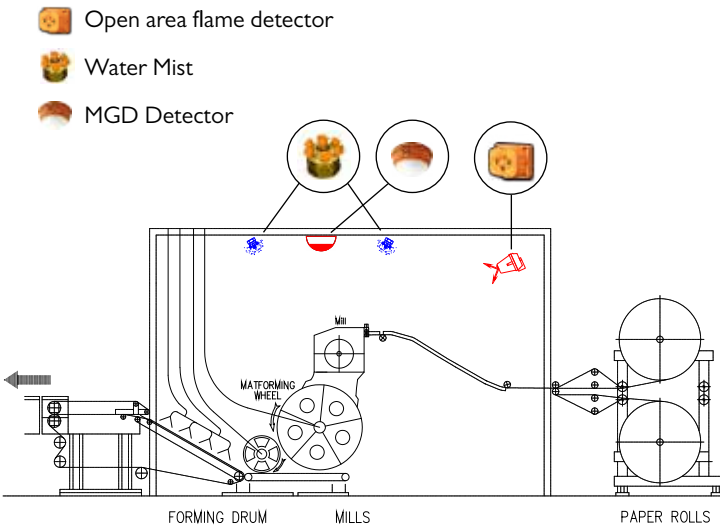
- Extremely fast detection and suppression of flames.
- Optimized for the dusty environment.
- Insensitive to daylight and other common disturbances.
- Non-invasive water mist.

Firefly Quick Suppression System - Mill room

It is well known that the mill itself is one of the main generators of ignition sources. Fires do not only occur inside the process, dust accumulated on top of the mill itself can also ignite, causing a fire in the mill room. Mills are often located inside an enclosure with limited view for operators. A fire can therefore be difficult to notice in time which will give the fire a possibility to spread.

The Firefly Quick Suppression System for mill rooms is based on ultra-fast optical flame detectors that will quickly detect flames around the mills. The detection is combined with a non-invasive, quick acting water mist suppression system. The Firefly water mist is designed to efficiently suppress flames with a minimal usage of water.

The Firefly Quick Suppression System for mill room can be complemented with Firefly MGD (electronic nose), for early detection of combustion gases inside the mill room.



Firefly Quick Suppression System - Filter

Premium filter manufacturers have succeeded to develop filter systems with sharply reduced or even eliminated risk of dust explosions, but the risk of fire still remains. A Firefly Quick Suppression System is designed for ultra-fast detection and suppression of fires in high risk areas, such as filters and mill rooms.

The Firefly Quick Suppression System for filters is based on optical flame detectors that will quickly detect flames inside the filter. The flame detectors are optimized for the dusty environment inside the filter, they have 180 degree view angle in all directions, are highly sensitive to flames, and are insensitive to daylight.

The detection is combined with a non-invasive, quick acting water mist suppression system. The Firefly water mist is designed to efficiently suppress flames with a minimal usage of water.

About Firefly

Firefly is a Swedish company that provides spark detection and industrial fire protection systems to the worldwide process industry. Founded in 1973, Firefly has specialized in creating customized system solutions of the highest technical standards and quality. Firefly owns more than 40 patents, creating a unique portfolio of innovative products and system solutions. In complement to worldwide sales, Firefly also provides its customers with field service, maintenance and guaranteed long-term spare part supply.

The company holds national and international approvals on its products and are certified according to quality standards: ISO 9001:2008, EN ISO/IEC 80079-34 and holds third part certifications through FM, VdS, CSA and ATEX.

Do you have any questions about fire and explosion risks? Contact us! We will be happy to assist you with our knowledge and experience.

Firefly – Keeps you in production

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