FIREFLY SPARK DETECTION

Higher safety with patented technology

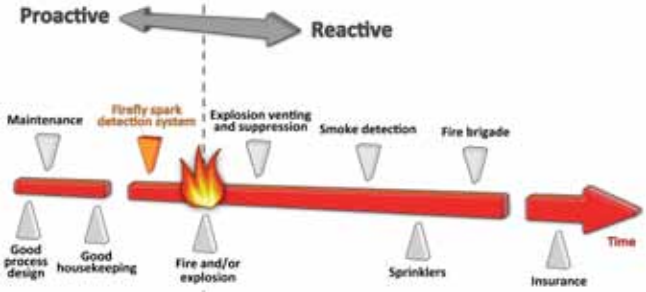
Examples of process industries exposed to fire and explosion hazards:

- *Woodworking*
- *Wood panel*
- *Solid biofuels (pellets)*
- *Heat & Power plants*
- *Pulp & Paper*
- *Tissue*
- *Hygiene (diaper)*
- *Food (chocolate, sugar, cereal), etc.*

Fire & Explosions

Every year, people are injured and even killed as a result of industrial fires and dust explosions. Process industries worldwide lose millions 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 spark detection system is another.



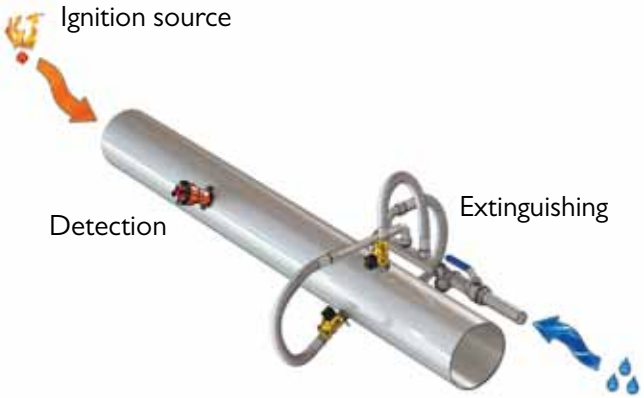
"As I have produced MDF and Particle Board for many years, I am well aware of the fire risks involved in these processes. Firefly has delivered high quality fire protection systems with state-of-the-art technology for many years. I have therefore chosen to protect all Metro Group production lines with Firefly systems. This has for sure saved us costly production downtime and fire damages."

Mr. Piya Piyasombatkul,
President Metro Group, Thailand

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 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 40 years of experience in the process industry, Firefly offers premium safety solutions that minimize false alarms and keep the industries in production.



Risk Assessment

Scientific research shows at which temperatures and energy levels different combustible materials can ignite. To be considered adequate, a spark detection system should detect ignition sources at these levels.

Ignition temperatures & energies

Different materials have different minimum ignition temperatures (MIT) and different minimum ignition energies (MIE). Only when both the MIT and MIE levels are met or exceeded, ignition can take place.

The expression 'spark detection systems' may be misleading; one would believe that sparks are the only cause of industrial fires and explosions. An impact spark can have a very high temperature; it can very well be 1000°C. But, an impact spark normally contains a very low amount of energy and is therefore not likely to cause an ignition.

In many cases, a piece of overheated material from the process most often contains more energy. This overheated material is therefore much more likely to cause an ignition compared to an impact spark.

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)

Examples of process equipment that can cause generation of ignition sources in industrial processes:

- *Mill*
- *Fan*
- *Sander*
- *Dryer*
- *Saw*
- *Planer, etc.*

Dangerous scenarios:

- *Friction heat generation*
- *Over-drying of material*
- *Material build-up*
- *Breakdown of equipment*
- *Metal pieces in the process, etc.*

Could a single mechanical spark cause ignition of a wood dust cloud in a filter in an ordinary industrial application?

"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."

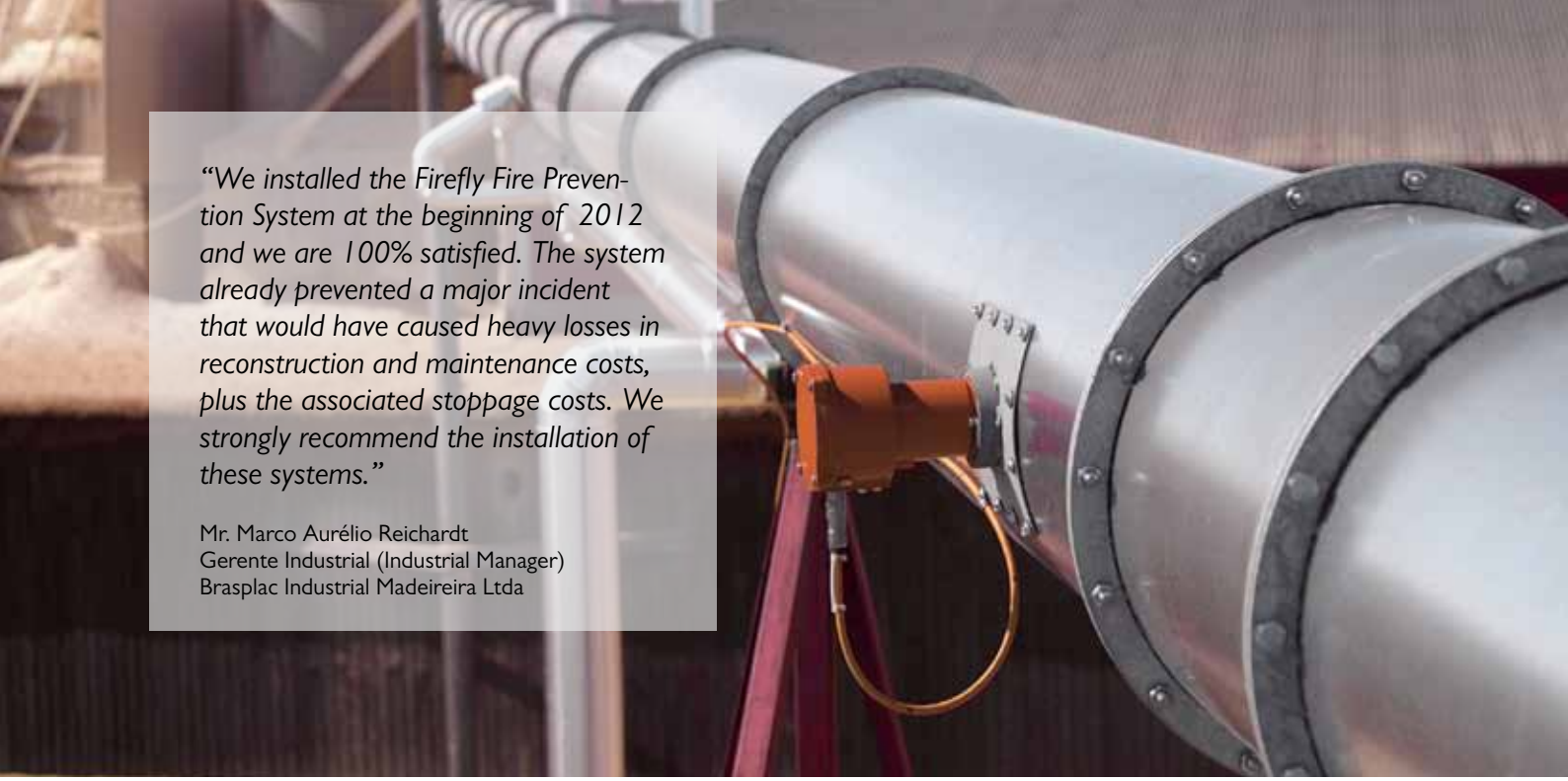
(Professor Rolf K. Eckhoff, author of 'Dust explosions in the process industries')

Hot black particles

A hot particle will emit light, visible to the human eye when it has a temperature of about 700°C or more*. All particles below this temperature are perceived by the human eye as 'black' particles. As previously shown, most combustible materials can ignite at much lower temperatures than 700°C.

Note that many fire problems in industrial processes are friction-related, i.e. initially creating hot black particles and not visible sparks.

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



"We installed the Firefly Fire Prevention System at the beginning of 2012 and we are 100% satisfied. The system already prevented a major incident that would have caused heavy losses in reconstruction and maintenance costs, plus the associated stoppage costs. We strongly recommend the installation of these systems."

Mr. Marco Aurélio Reichardt
Gerente Industrial (Industrial Manager)
Brasplac Industrial Madeireira Ltda

Detection

All Firefly detectors are insensitive to daylight. Besides detecting down to the relevant temperature and energy levels, avoiding false alarms is a crucial aspect in the detection functionality of a spark detection system. Because each daylight detection results in the injection of unnecessary water into the process, secondary losses and often also costly production downtime are the unwanted results.

By detecting down to the relevant minimum ignition temperature and energy for different combustible material, and being insensitive to daylight, a Firefly spark detection system offers a 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.*

Why Firefly - Detection

TrueDetect technology™

Firefly's TrueDetect technology™ enables detection down to the right ignition temperatures and energy levels for different materials without being sensitive to daylight.

A Firefly True IR detector is based on led sulphide cells (PbS) and is therefore insensitive to daylight. Conventional spark detectors are based on silicone photodiodes (Si) and will therefore detect visible light and near infrared radiation (i.e. temperatures from about 650°C or higher).

Multi-checkpoint technology™

As the only supplier in the world, Firefly equips all its True IR detectors with the patented Multi-checkpoint technology™ to ensure detection quickness and reliability. Using a derivative measuring principle, Firefly True IR detectors can detect dangerous particles at transport speeds up to 50m/sec.

Water Extinguishing

Process industries generally handle large material flows; from hundreds of kilos up to hundreds of tons per hour. High flows of compact material demand a powerful extinguishing which is able to fully penetrate these flows.

Water is the most common method of extinguishing. However, dangerous particles can also be eliminated by means of mechanical diversion, isolation, steam or gas in applications where water is not suitable for use in the process.

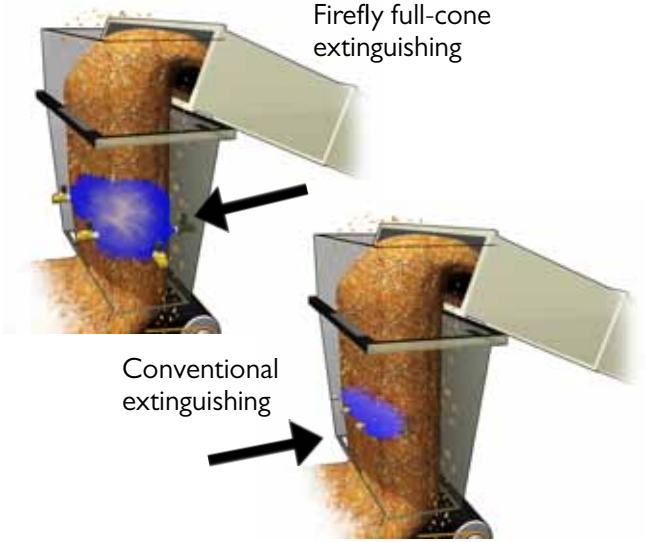
If you use water extinguishing to protect your process from fires and dust explosions:

- ☑ *require extinguishing from different directions in order to secure full coverage of the entire cross-section of a duct or chute.*
- ☑ *extinguishing needs to be powerful enough to penetrate also large and compact material flows.*
- ☑ *extinguishing needs to react within milliseconds after detection.*

Why Firefly – Water Extinguishing

PowerImpact extinguishing™
Firefly provides high-speed and powerful full-cone extinguishing with a unique nozzle design and placement from different directions aimed to penetrate and cover the entire material flow inside a pneumatic conveying system or chute.

Conventional extinguishing systems use hollow-cone spray nozzles with relatively small water droplets, often installed only from one direction. Consequently, conventional extinguishing provides less ability to penetrate the entire material flow and can leave uncovered areas inside a pneumatic conveying system or chute.



Other Extinguishing Methods

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. CO2 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.

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 customer adapted 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.

The company is noted on the OMX/NASDAQ First North Exchange in Stockholm, Sweden and holds national and international approvals on its products. In complement to worldwide sales, Firefly also provides its customers with field service, maintenance and guaranteed long-term spare part supply.

Do you have a question about the fire and explosion risk in your plant? Contact us! We will be happy to assist you with our knowledge and experience.

Firefly – Keeps you in production

ISO 9001
ISO 14001

Phone +46 (0)8 449 25 00, Fax +46 (0)8 449 25 01
Firefly AB, Textilgatan 31, 120 30 Stockholm, Sweden
info@firefly.se www.firefly.se

PREVENTIVE PROTECTION SYSTEMS FROM
firefly ab
SWEDEN