OPERATIONAL BENEFITS OF FIBRE OPTICS TECHNOLOGY FOR FIRE DETECTION

HOW EARLY DETECTION AND LOWER TOTAL COST OF OWNERSHIP (TCO) ARE BENEFITING THE MINING INDUSTRY

CONVENTIONAL FIRE DETECTION AND EARLY WARNING

Traditionally the implementation of fire detection systems has been seen through the prism of mandatory regulatory compliance. A mine site needs to either:

- Comply with a state or federal regulation to safeguard employees and maintain its operating license and / or,
- Has identified fire as a business risk worthy of detection and suppression systems to safeguard its operation and equipment loss.

In either case, mining sites typically see fire safety as a defensive strategy or in other words a cost to the business, not a profit-making endeavour or strategy to safeguard operations. A phrase frequently heard around this belief is "will a fire safety system give me extra production throughout"?

These beliefs are understandable as conventional fire detection systems, even with the latest releases, are broadly based on time-worn stand-alone solutions, which send alarms and activate fire suppression systems "after" the fire has started.

However, new technologies have emerged to offer a more comprehensive and reliable solution not only to detect fires but also to prevent them. A better outcome would be to detect an emerging fire event before it takes hold to eliminate or minimise the risk to life, damage to equipment, production loss, heavy fines, loss of operating license or even the shutdown of the whole operation. The good news is that the technology has evolved and is now available to prevent all these risks.

The fibre optics technology offers an early detection system that is critical for avoiding potential fire events. For example, smouldering coal takes on average 16 to 24 minutes to

erupt into a flame which could set off a fire or even an explosion. Identifying abnormal heat conditions early can make the difference between having a dangerous fire or preventing the fire before it happens.

The fibre-optic temperature sensing detects smouldering coal ahead of any conventional gas or infrared detectors which is a great advantage for mining companies to prevent accidents, safeguard people, equipment and operations. The technology also offers one of the lowest Total Cost of Ownership (TCO) in the long run with no maintenance needed, which is a critical aspect for the industry as detailed below.

AN OVERVIEW OF TOTAL COST OF OWNERSHIP (TCO)

In traditional fire detection systems, the Total Cost of Ownership (TCO) includes many different aspects that make these **systems costly to install and maintain in the long run**. The conventional systems require many devices, sometimes hundreds of them, to be placed throughout the mine in order to safeguard the site.

Another aspect is that those systems need to be tested frequently to **make sure they are compliant with the hazardous classification** (gas or dust explosion rating) which can disturb production and represent a significant cost for the whole site. Ensuring the equipment is immune to electro-magnetic interference and suitable to operate on a variety of environmental conditions such as high winds, corrosive atmospheres, high vibration, physical impact and so on can represent another challenge for gas and smoke detectors.

The supply of a multitude of devices to cater for every type of fire scenario and

their respective **installation** – with a multitude of power, signal, network cables – along with the **maintenance** of various equipment, spares, schedule calibration and **expertise**, is a significant pain point for customers. Miners in most cases spend a lot of resources firstly to install all of these systems and devices, then also running and maintaining them over time.

What if we can now have a system that does all of this with higher accuracy, real time monitoring, no other devices required rather than the cable and with no regular maintenance over time?

The fibre optics-based system performs all of that with a single cable that has a long-life span and the highest levels of accuracy in the industry. All those aspects, if compared, reveal that the Total Cost of Ownership (TCO) is significantly lower for the fibre optics system in the long run as it does not require multiple devices, intrusive installation or regular maintenance after installed.

In addition to that, no more disruption to your mining production will be needed to undertake maintenance or equipment calibration. The Distributed Temperature Sensing system is totally integrated to your plant SCADA system for a faster decision-making process and better user experience.

FIBRE OPTIC BASED LINEAR DETECTION SOLUTION FOR MINING

The fibre optic based linear heat detection system will provide both:

- A predictive approach to minimise the fire risk and
- The lowest Total Cost of Ownership (TCO).

This is achieved by the following key features and benefits of the system.

1 TOTAL SITE FIRE DETECTION:

- **Heat measurement wherever the cable is located**, no need to estimate where a fire risk is the highest, just run the 4 mm diameter stainless steel reinforced cable through the area,
- Captures all potential fire hot spots via three detection methods, conduction across a surface, convection through air, and infra-red radiation flame detection,
- **The system is analogous to having thousands of temperature sensors** in the field.

2 EARLY WARNING:

- Of **abnormal heat build-up before a fire starts**. The fibre cable detects an abnormal heat build-up on equipment, or smouldering product and produces an alarm set at any temperature based on the equipment operation or product type,
- Of equipment overheating or potential product fire, allows for prompt maintenance of the equipment, or cleaning to be performed. Avoiding unscheduled plant downtime and costs associated with the disruption to production,
- Of even the smallest temperature change with the highest possible accuracy. Early detection is ensured through an extremely low signal to noise (SNR) ratio in this laser-based temperature measurement.

3 FIRE EVENT MANAGEMENT:

- Remote centralised monitoring of a fire event allows for;
  » **Safe evacuation of people**,
  » **Coordinated fire-fighting** and automatic suppression systems. Fire-fighting crew knows exactly where the fire is located to within a metre, not just a "zone alarm",
- During a fire event the fibre cable will

continue sending heat locations, where its moving to and its temperature and size information, because the fibre cable is rated to operate for up to 2 hours at 750° C and

- Incident reporting: in order to accurately report to the regulatory authorities the circumstances of the fire, the system provides a full history before, during and after fire event. This allows mining companies to have **comprehensive data and draw relevant insights** to prevent future fire incidents.

4 LOWEST TCO

- **Minimal system design & installation costs for any late changes.** If in doubt about the fire risk in a certain area, it is relatively inexpensive to just run the cable in the area as the sensors do the whole coverage without worrying about the cost versus benefit factor,
- No field devices, power, signal, or network cable required since the **cable is the sensor**,
- **No equipment calibration required** post-commissioning,
- No spare parts required and,
- **Fibre cable rated for 40-year life**.

5 COMPLIANCE STANDARDS & INSURERS NOT MATCHED BY CONVENTIONAL FIRE DETECTION

- Fire detection certifications - Vds, FMGlobal, UL, EN54-22. Which **help to minimise insurance premiums**,
- Highest hazardous area ratings due to the

extremely low power laser utilised,

- **Not susceptible to interference from electromagnetic interference**, due to compliance with EMI standards,
- **High reliability** of operation when needed for activating fire suppression or equipment shutdown, due to its SIL2 (Safety Integrity Level) rating in accordance with AS61508/61511 for functional safety compliance, and
- **Cyber security** provided by VxWorks for real-time operating systems.

Fibre Optics Technology allows you to say no more to hundreds of devices installed on your plant as well as endless and costly maintenance or calibration. The system unites the best of real time monitoring technology in a fully integrated and reliable system without regular maintenance: the fibre cable does it all.

Contact **Advanced Photonics Australia** for more information. Our experienced team will provide the right support on each product application and answer any questions you might have. Contact us via email at **enquiries@apapl.com.au,** phone **+61 480 268 855** and visit our website **www.apapl.com.au.**