Fiber Optic DTS Vs Linear Heat Detection Vs Point Sensors: Selecting the Right Fire and Temperature Monitoring Technology

1. Introduction

Fire and thermal monitoring systems are essential for protecting critical infrastructure, industrial assets, and high-risk environments. A range of sensing technologies is available, each with different strengths depending on the application.

Three common approaches are:

- **Point temperature sensors**
- ***Linear Heat Detection***
  - **Digital or Analogue (Traditional LHD)**
  - **Fiber optic Distributed Temperature Sensing (DTS)**

While each sensing technology can play an important role, they differ significantly in capability, coverage, intelligence, and suitability for different risk environments.

This guide compares these technologies and helps identify where each may be most appropriate.

2. Overview of Technologies

Point sensors

Point sensors measure temperature or detect fire conditions at a single location.

Examples include:

- Heat detectors
- Resistance Temperature Detector and thermocouples
- Spot thermal sensors

Strengths:

- Simple and low cost
- Mature technology
- Effective for localised monitoring

Limitations:

- Measures only at discrete points
- Gaps between sensors
- Large assets may require many devices

- Limited event localisation between sensors

Traditional Linear heat detection (LHD)

Traditional LHD uses specialised heat-sensitive cable to detect elevated temperatures continuously along a route.

Depending on technology, LHD may operate by:

- Fixed temperature alarm activation
- Digital or analogue temperature sensing
- Resettable or non-resettable designs

Strengths:

- Continuous linear fire detection
- Suitable for long assets
- Proven fire detection technology

Limitations:

- Typically focused on alarm detection rather than full thermal monitoring
- Lower information density than DTS
- Limited trending and diagnostics compared with DTS
- Some technologies may not provide precise distributed temperature profiling

Optical fiber distributed temperature sensing (DTS)

DTS uses an optical fiber cable as a continuous distributed temperature sensor.

Strengths:

- Continuous temperature measurement
- Full thermal profile along the asset
- Hot spot detection and localisation
- Advanced analytics and alarming
- Monitoring plus fire detection capability

Limitations:

- Higher system complexity than conventional methods
- Higher initial investment in some applications
- Often best justified where monitoring intelligence adds value beyond fire detection alone or for significantly long assets

3. Technology Comparison

Feature	Point sensors	Traditional LHD	DTS
Point detection	Yes	Continuous linear	Continuous distributed
Full temperature profile	No	Limited / technology dependent	Yes
Precise event localisation	Limited	Moderate to good	High
Early hot spot detection	Limited	Moderate	High
Trend analysis	Limited	Limited	Advanced
Large asset coverage	Moderate	Good	Excellent
Multi-function monitoring	Limited	Limited	High
Integration / analytics	Moderate	Moderate	Advanced

4. Where Each Technology Fits

Point sensors are often well suited for:

- Small localised areas
- Buildings and rooms
- Equipment-level monitoring
- Lower complexity applications

Traditional LHD is often well suited for:

- Basic linear fire detection applications
- Cable trays
- Conveyor galleries
- Tunnels
- Areas needing robust fire detection coverage

DTS is often well suited for:

- High-value or critical assets
- Long distributed infrastructure
- Applications needing early warning and diagnostics
- Environments requiring both monitoring and fire detection

Examples:

- Power cables
- Car parks
- Tunnels
- Pipelines
- Conveyor systems
- Battery energy storage
- Large industrial facilities

5. Key Differentiator: Detection vs Monitoring

A useful distinction:

Point sensors and many traditional LHD systems: Primarily provide **detection**
They answer:

- Has an alarm threshold been reached?

DTS: Provides **detection plus continuous monitoring**
It answers:

- What is the temperature?
- Where is the anomaly?
- How is it changing over time?
- Is there an emerging condition before alarm?

That distinction is often critical.

6. When DTS Adds the Most Value

DTS often provides strongest value when applications require:

- Early hot spot identification
- Continuous thermal visibility
- Long asset coverage
- Difficult access for conventional sensors
- Predictive maintenance support
- High consequence risk mitigation
- Integration with broader monitoring systems

7. Conclusion

Point sensors, traditional LHD, and DTS each have important roles.

- Point sensors remain effective for localised applications
- Traditional LHD provides proven continuous fire detection
- DTS extends beyond detection into distributed monitoring, diagnostics, and asset intelligence

Technology selection should be based on risk profile, monitoring objectives, and operational requirements.

8. Further Information

For system design guidance, technical specifications, or application support, please contact fotas@samm.com