



SCAN FOR WEBSITE

# DISTRIBUTED OPTICAL FIBER SENSING SYSTEM

INTRODUCING : DAS | DTS | DSS



JMV LPS LIMITED

# Company Overview

**JMV LPS Limited** is a leading Indian OEM specializing in intelligent IoT-based monitoring systems and smart infrastructure solutions. Established in 2008 and headquartered in Noida, the company offers a comprehensive range of products, including lightning and surge protection systems, maintenance-free earthing solutions, and IoT-enabled monitoring technologies. JMV caters to critical sectors such as railways, defense, smart cities, and energy, serving prestigious clients like Indian Railways, NTPC, and L&T. Backed by advanced manufacturing facilities and a strong focus on innovation, JMV is committed to delivering reliable, standards-compliant solutions that safeguard lives and critical infrastructure.

## Why Choose JMV?

- ✓ In-House Manufacturing (Both Hardware and Software)
- ✓ Indigenous Technology
- ✓ Customizability
- ✓ Standards-Compliant
- ✓ Advanced R&D Capabilities

At JMV LPS Ltd., innovation drives our commitment to delivering cutting-edge solutions that protect your investments against natural uncertainties.

## Clientele





# DISTRIBUTED ACOUSTIC SENSING (DAS)

JMV LPS Ltd. introduces an advanced Intrusion Detection System (IDS) powered by Distributed Acoustic Sensing (DAS) technologies—designed for real-time, intelligent monitoring of critical infrastructure such as pipelines, railways, solar farms, airports and border areas. Using fibre optic cables as continuous sensors, DAS detects acoustic disturbances like vibrations and pressure changes. These technologies provide high-precision alerts across the entire fibre length, enabling early identification of threats such as intrusions, digging, or overheating.

## Significance

The deployment of an advanced Intrusion Detection System (IDS) using DAS technology significantly enhances security infrastructure by:



### Real-Time Detection

Achieve instantaneous identification of potential security threats within the monitored area



### Minimize False Positives/Negatives Alarms

Implement algorithms and protocols to reduce false alarms without compromising detection accuracy.



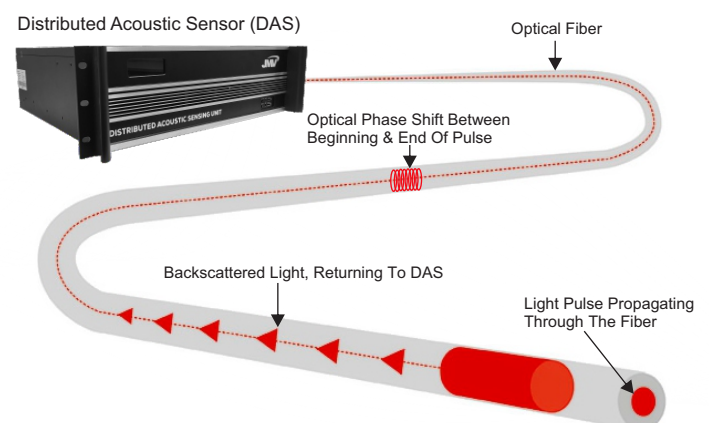
### Seamless Integration

Ensure compatibility with existing infrastructure for a cohesive and efficient security network.

## Product Technology

**The technology is based on Rayleigh Back scattering phenomenon in which:**

- The laser pulses are periodically sent down an optic fibre cable, looking for Backscatter to perform acoustic sensing.
- The signature of the backscatter changes with change in pressure/vibration/acoustic energy.
- The entire length of the fibre optic cable acts like a sensor and every meter act like an independent microphone.
- The system calculates the exact location of each backscatter event by knowing the speed of light and the time it takes for the back scattered light to return to the source.
- This precise localization allows for quick response and accurate identification of potential hazards.



## Major Components:

- The three main components of this completely indigenous Intrusion Detection System are:
- Distributed Acoustic Sensing (DAS) Unit – This DAS unit is being manufactured in India by JMV.
- Optical Fiber – It utilises 6 fiber cable which is easily available in India.
- Software – The software for user interface is also a JMV product.



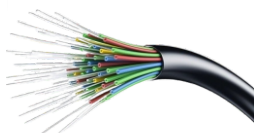
DAS Unit



Network Management Software



Display



Optical Fiber Cable



Remote Alarm Unit



IP Based Hooter



Reset Unit

## Working Principle

### • Optical Fiber Deployment:

Lay out optical fibers along the defense perimeter or critical areas.

### • Laser Pulse Emission:

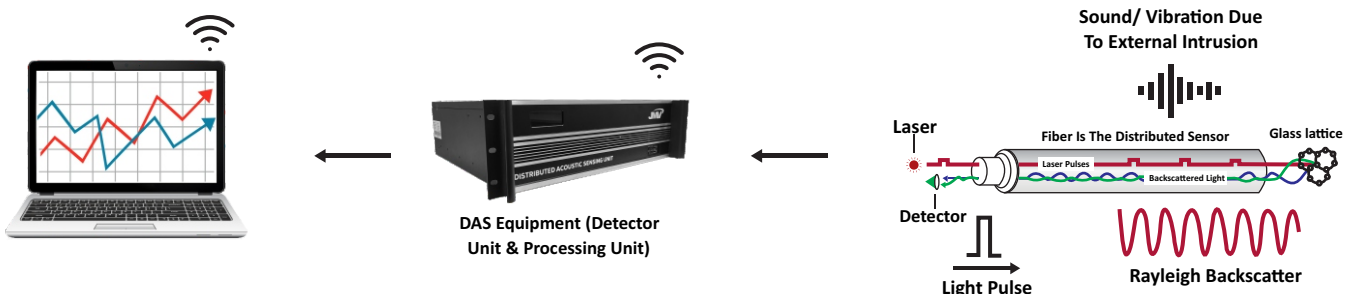
Emit laser pulses along the fibers, creating a baseline for acoustic signal detection.

### • Acoustic Signal Detection:

Monitor changes in the reflected light caused by acoustic signals (vibrations) interacting with the fibers.

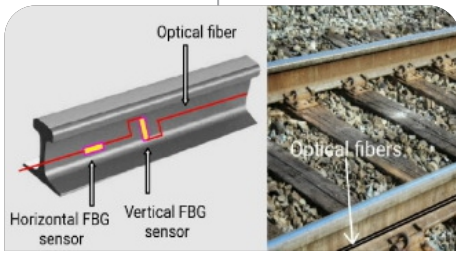
### • Data Processing and Analysis:

Employ advanced algorithms to process and analyze the collected data, identifying potential intrusion events.





## RAILWAYS



### Optical Fibre Cut loss

- Real-Time Data and Alerts
- Detection of Rail Defects
- Cable cuts and stress



### Intrusion Detection

- Detecting Animal Movements like elephants, tigers etc.
- Manual/Machine Digging Activities on Track



### Tunnel Monitoring

- Seismic Monitoring
- Digging, tampering activities

## AIRPORTS



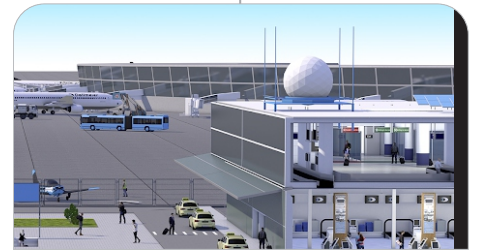
### Perimeter Security

- Fence Line Monitoring
- Digging near the perimeter
- Tampering with the infrastructure



### Runway Incursion Detection

- People or Vehicles crossing or approaching the runway
- Runway and Taxiway Maintenance
- Prevention of Aircraft Collisions



### Infrastructure Monitoring

- Infra Health Monitoring such as: Control Towers, Runways & Taxiways.
- Real-time surveillance
- Seismic Activity Detection

## DEFENCE



### Tunnel Detection

- Tunneling Activity Profiling
- Vibrations cause by digging, drilling, or blasting.
- Tunnel Mapping and Localization



### Perimeter Security for Military Bases

- Real-Time Intrusion Detection
- Unauthorized Personnel or Vehicles detection



### Border Surveillance

- Real-Time Monitoring and Alerts
- Real-Time Unauthorized Crossings & Intrusion Alerts
- Activity Classification such as pedestrian movement, vehicle traffic

## POWER & TELECOM NETWORK SECURITY



### Power Grid Infrastructure Monitoring

- Detects digging, excavation, and intrusions
- Protects substations and high-voltage lines
- Theft Detection



### Telecom Network Protection

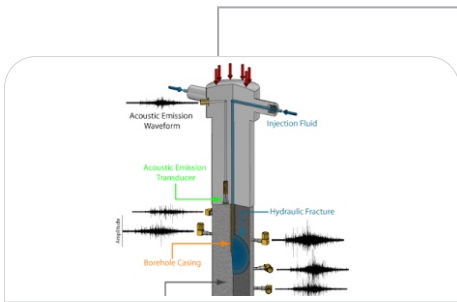
- Monitors for cable cuts & tampering
- Detects suspicious vibrations in real time
- Secures critical communication lines



### Data Center Security

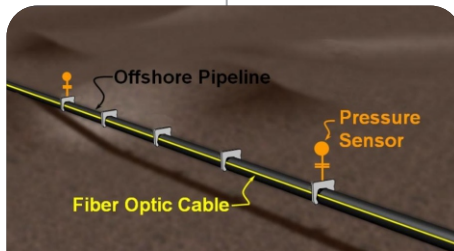
- Senses underground activity near data routes
- Flags unauthorized access & vibration alerts

## OIL AND GAS INDUSTRIES



### Hydraulic Fracturing (Fracking) Monitoring

- Microseismic Monitoring
- Pressure and Flow Monitoring
- Fracture Mapping



### Pipeline Monitoring for Leakage Detection

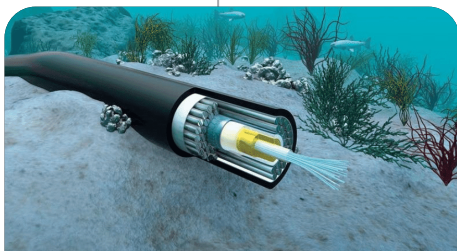
- Leakage Detection
- Pressure Detection
- Real-time, continuous monitoring over long distances



### Pump and Compressor Monitoring

- Bearing and Motor Health
- Vibration Signatures
- Noise Emission Analysis

## MARITIME & COASTAL SECURITY



### Underwater Cable Protection

- Monitors subsea cables in real-time
- Detects anchors, divers & tampering
- Protects telecom & power infrastructure



### Harbor & Port Security

- Tracks unauthorized vessel movements
- Detects diver activity in restricted zones
- Enhances defense against smuggling /infiltration



### Offshore Wind Farm Safety

- Monitors collisions & structural threats
- Detects tampering or mechanical issues
- Secures underwater assets



## METRO & ROADWAY



### Track Health Monitoring

- Identifies wear & tear over time
- Monitors cracks, rockfall or flooding
- Ensures safe & smooth operations
- Detects abnormal vibrations, misalignments and theft detection



### Security & Intrusion Detection

- Detect threats via vibration signatures
- Monitors for unauthorized tunnel entry
- Prevent sabotage or accidents
- Senses track walking, tampering, trespassing and alerts on theft.



### Traffic Intelligence & Analysis

- Monitors acoustic vehicle signals
- Classifies vehicle types & traffic flow
- Helps manage congestion & incidents
- Supports data-driven traffic control strategies

## ENVIRONMENTAL MONITORING & WILDLIFE CONSERVATION



### Wildlife Poaching Prevention

- Detects human/vehicle movement
- Distinguishes intruders from wildlife
- Aids anti-poaching patrols

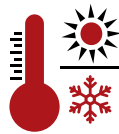
# DISTRIBUTED TEMPERATURE SENSING (DTS)

Distributed Temperature Sensing (DTS) is an advanced fiber optic sensing system that measures temperature along the entire length of an optical fiber. Based on the principle of Raman backscattering, it converts the optical fiber into a continuous temperature sensor with spatial resolution as precise as one meter. Unlike traditional point sensors, DTS can monitor thousands of points over several kilometers, providing unmatched thermal visibility for critical infrastructures.

## Significance



Early Fire Detection



Temperature Profiling

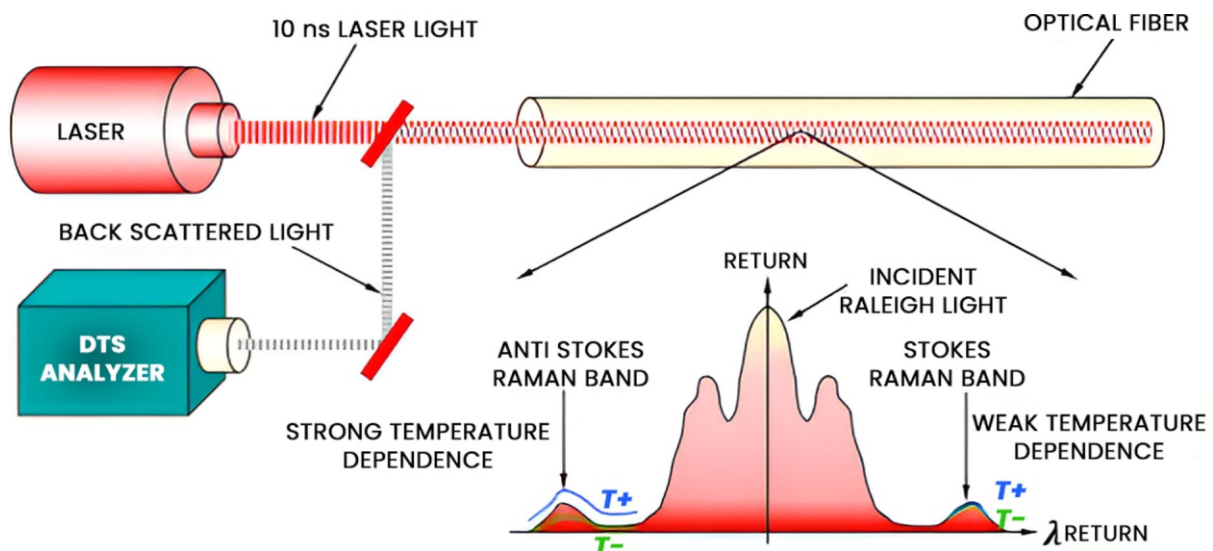


Seamless Integration

## Product Technology

**The technology is based on Raman Back scattering phenomenon in which:**

- The laser pulses are periodically sent down an optical fiber, looking for backscatter to perform temperature sensing.
- The intensity of the backscattered Anti-Stokes light changes with variations in temperature along the fiber.
- The entire length of the fiber optic cable acts like a sensor, with every meter functioning as an independent thermometer.
- The system calculates the exact temperature and location of each event by measuring the time delay and intensity of the returned backscatter.
- This precise thermal mapping allows for early detection of heat anomalies and enhances safety in critical environments.





# Key Applications



## Fire Detection:

In tunnels, forest, cable trays, factories, and oil depots DTS enables rapid fire detection by identifying abnormal heat rise. Its passive nature makes it safe for use in flammable and explosive environments.

## Oil & Gas Pipelines:

DTS helps in detecting leakage by identifying cooling/heating patterns. It is ideal for long-distance pipelines where physical inspections are limited.



## Gas Lift Optimization:

DTS accurately profiles temperature along tubing strings, optimizing gas injection and identifying breakthrough of unwanted fluids.

## Transformer and Cable Health Monitoring:

Enhances reliability and prevents overheating by monitoring temperature in transformers, cables, and busbars across substations, metros, tunnels, power networks, industrial sites, data centers, and oil & gas facilities.



## OHE Monitoring:

Distributed sensing through OPGW (Optical Ground Wire) enables real-time temperature profiling and health assessment of Overhead Electrification systems to detect abnormal heating, faults, or line stress.

## Data Centers:

It plays a key role in ensuring server safety and cooling efficiency by monitoring heat hotspots.



# DISTRIBUTED STRAIN SENSING (DSS)

Distributed Strain Sensing (DSS) is a high-performance optical sensing system that utilizes Brillouin backscattering to detect strain and mechanical deformation along the entire fiber length. DSS enables infrastructure operators to evaluate the structural integrity of large civil and industrial assets with high accuracy and reliability. It is used extensively in geotechnical monitoring, civil construction, and the energy sector.

## Significance



Long-Distance Coverage



Pin Point Accuracy

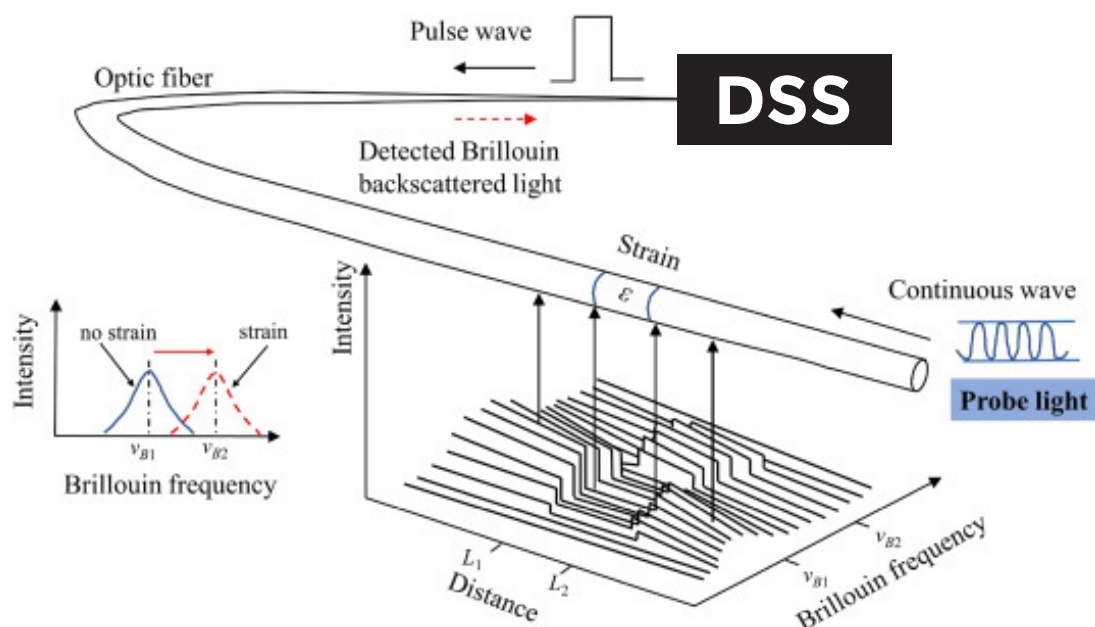


Ideal for Critical Infrastructure

## Product Technology of DSS

The technology is based on Brillouin Back scattering phenomenon in which:

- The laser pulses are periodically sent through an optical fiber embedded in or bonded to a structure to monitor mechanical strain.
- Strain alters the frequency of the Brillouin backscattered signal as it travels through the fiber.
- The entire length of the fiber acts as a continuous strain gauge, with every meter responding independently to elongation, compression, or bending.
- The system determines the exact strain location by analyzing the time delay and frequency shift of the backscattered light.
- This accurate strain profiling enables real-time detection of structural stress, helping prevent failures and ensuring infrastructure integrity.





# Key Applications

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## **Bridges & Infrastructure:**

DSS is used to detect stress buildup and displacement in bridge decks, beams, and suspension cables, allowing preventive action before failure.

## **Tunnels & Subways:**

Tracks deformation caused by earth pressure or excavation activities ensuring safety during and after construction.

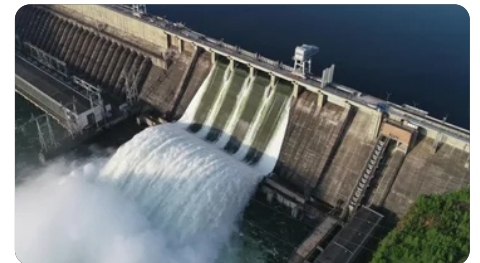


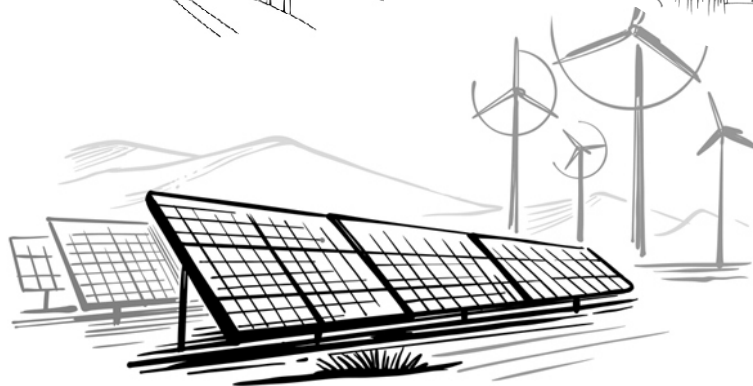
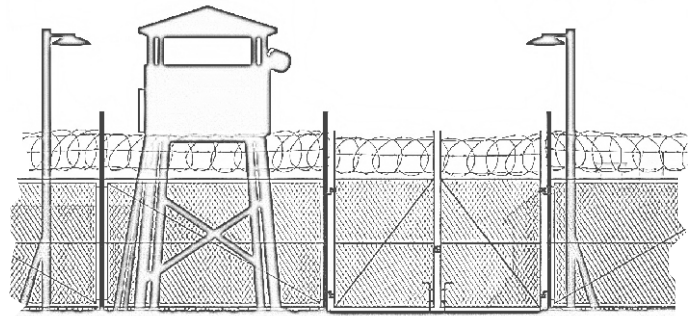
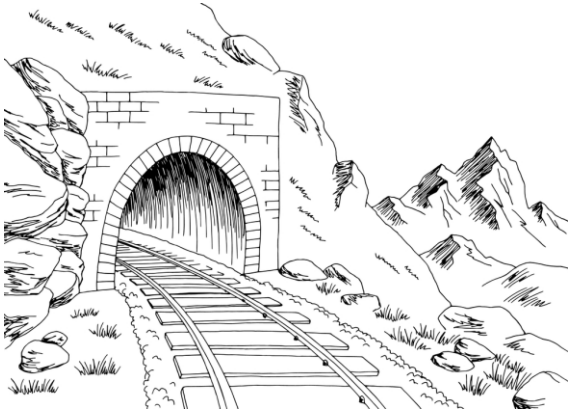
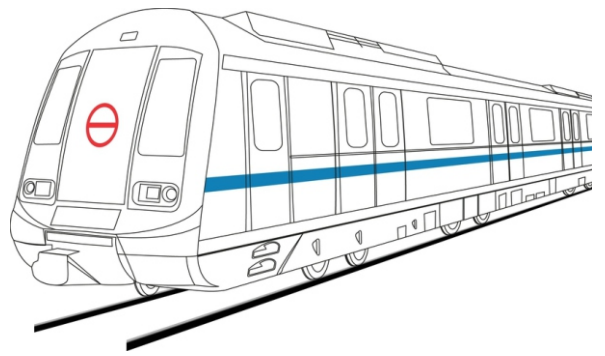
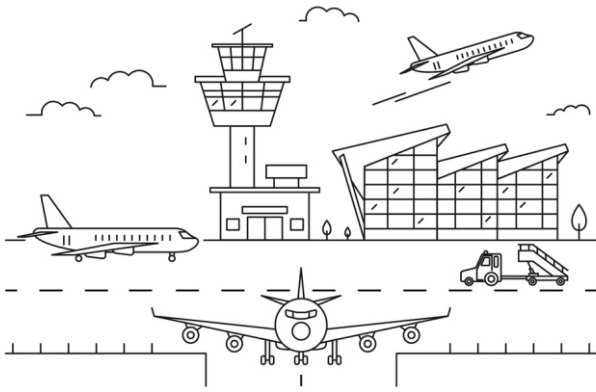
## **Oil Wells & Boreholes:**

DSS provides valuable insights into casing deformation and stress development during drilling, fracking, and production.

## **Dams & Levees:**

Monitors movement and pressure-related stress in concrete or earthen structures to detect early signs of potential breaches.





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