



### Compressors, Pumps, & Reactors



Laser Based – Open Path Gas Detectors are **positioned around high failure frequency equipment** to protect personnel.

**Problem: High Hazard Rank Application**

Due to frequency of occurrence & severity of harm

**Challenge: Detection of Small Seal Leaks**

Most Acid Gas E-Chem's have T90 Res. >30 seconds

**Opportunity: Have Early Warning of Failure**

Used for passive Leak Detection & Repair (LDAR)

**Solution: Find & Fix Leaks While Still Small**

Is with Laser Based – Open Path Gas Detection

### Heat Exchangers – Fin-Fan/Plenum

**Problem: Mechanical Probability of Failure**

Exchanger failure likely 3.9 in 1,000 times<sup>1</sup>

**Challenge: Surviving in Harsh Environment**

High temps/airflows harm E-Chem's/Cat. Bead's

**Opportunity: Protect the 'Inaccessible'**

Hardware is mounted in accessible areas

**Solution: Detect the 'Undetectable'**

With Laser Based – Open Path Gas Detection

Reference<sup>1</sup>: Shell & Tube - DNV GL Failure Frequency Guide



Laser Based – Open Path Gas Detection is **positioned over Fin-Fan Louvers**. Due to high air velocity and the obstructions caused by the Shell & Tube Exchanger, **the air flow is sufficiently turbulent that often leak will be detection on each of the paths.**

### Process Unit Perimeter Monitoring



Paths oriented around the process unit have been **proven to be effective in detecting fugitive plumes** from even small releases.

**Problem: Warn Adjacent Areas of a Leak**

Lethal plumes of gas extend beyond area of release

**Challenge: Sufficient Detector Coverage**

Large perimeter stresses the projects feasibility

**Opportunity: Capital and Operational Costs**

Reduce the device count, infrastructure, & cabling

**Solution: Most Economical Option Available**

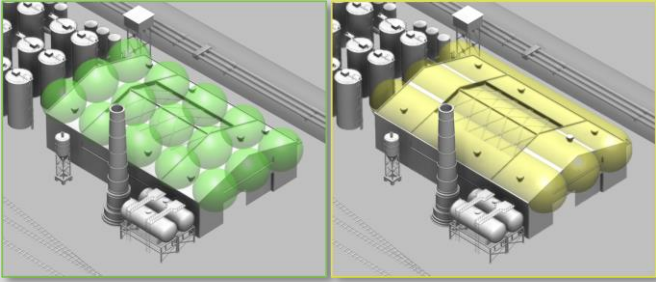
Is with Laser Based – Open Path Gas Detection

# Geographic Area Coverage

**Traditional – Fixed Point Gas Detectors**

vs.

**Laser Based – Open Path Gas Detectors**



Laser Based – Open Path Gas Detection is the most economically viable option to minimize both the **Total Install Cost + Total Operational Cost (TIC-TOC)** in High Hazard Rank Applications.

**Definition:** The fraction of the geometric area or volume of a defined monitored process area that would be detected.

**Exceed your Area Coverage Requirements**  
With Laser Based – Open Path Gas Detection

**Increasing the Probability of Detection**  
Offers the greatest Risk Reduction Factor return<sup>1</sup>

**To Mitigate Risk in a Grade A Hazard Rank**  
You will need 90% Geographic Area Coverage<sup>1</sup>

**Laser Based – Open Path Gas Detection**  
Easiest & most economical way to Mitigate Risk

<sup>1</sup>: As stated in ISA-TR84

# Safety Availability

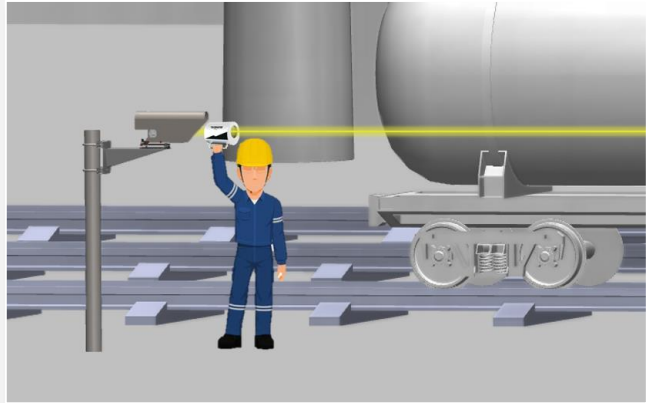
**Surpass Safety Availability Requirements**  
With Laser Based – Open Path Gas Detection

**Survive & Continue to Detect after a Leak**  
Lifespan/performance not effected by exposure

**Smart Fail-Safe Device + SIL2 Suitable**  
Only outputs gas concentrations if ‘fully functional’

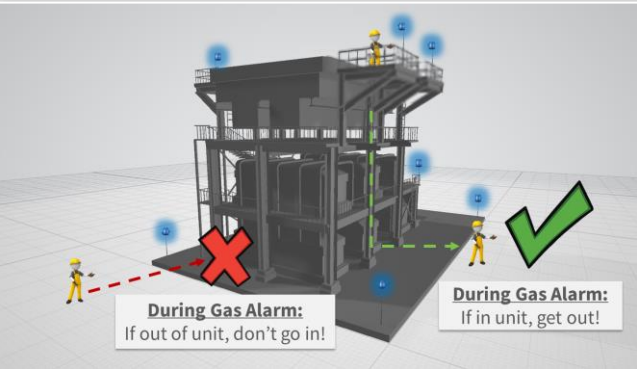
**Eliminate your Maintenance Burden**  
No Calibration and easily perform Functional Tests

**Definition:** The availability of the FGS function designed to automatically mitigate the consequences of hazards.



To perform **Function Test**, simply hold the **Response Cell** in the Laser Beam to ‘Bump’, ‘Challenge’, or ‘Verify a Response’.

# Mitigation Action Effectiveness



**During a Release:** Prevent personnel from entering the area or evacuate personnel from that area.

**Definition:** The confidence that the final element(s) actions will successfully mitigate the consequence of the hazard.

**Alarm Faster and at Lower Concentrations**  
With Laser Based – Open Path Gas Detection

**Confidently Detect Incipient Level Leaks**  
Lowest Actionable Concentrations clearly stated

**Gain an Instantaneous Response to a Leak**  
New and independent sample every second

**Importance of Timely Personnel Evacuation**  
Rapid recovery actions prevent escalating event