



OIL AND GAS INDUSTRY

Solutions for extraction, production,
transportation, and refining

FINDING SOLUTIONS TO COMMON INDUSTRY PROBLEMS

The oil and gas industry faces many maintenance challenges. Pipes fail—releasing fugitive emissions or liquid leaks into the environment. Motors, pumps, and valves break down. Invisible oil and gas leaks are difficult and time consuming to detect using traditional inspection methods, especially when there are many components to inspect. If problems aren't discovered early, they could lead to millions of dollars in financial or equipment losses, negative environmental impact, or safety issues for personnel.

FLIR optical gas imaging (OGI) cameras enable inspectors to detect leaks faster and pinpoint the source immediately, leading to prompt repairs, reduced industrial emissions, and greater conformity to regulations. FLIR offers a complete range of thermal imaging, gas detection, and test equipment for diagnosing potential problems before they turn into expensive failures. By using FLIR OGI technology to its full potential, the industry can create a safer and more efficient environment for its staff and clients alike.



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EXTRACTION AND PRODUCTION

Offshore Drilling

Inspect aging offshore platforms with optical gas imaging

The offshore oil and gas industry faces unique challenges. Due to advances in geology and drilling techniques, many older, aging platforms are forced to extend beyond their designed lifespan and continue production. The industry is urged to meet methane emissions reduction targets and measure fugitive methane releases to determine a baseline measurement that future reductions can be assessed against. Through regular thermal imaging inspections, offshore drilling companies can rapidly detect and locate fugitive gas leaks that could cause a potential platform shutdown.

SOLUTIONS



Natural Gas Compliance

Meet regulatory compliance requirements with optical gas imaging

In many parts of the world, government influence on the natural gas industry requires companies to meet federal or local regulations in order to reduce emissions. These regulations necessitate that natural gas companies perform regular inspections for leaks. Various technologies and methods are available to complete routine checks, including toxic vapor analyzers—or “sniffers”. But these solutions can be labor intensive as there are often hundreds if not thousands of components to inspect at numerous locations. FLIR OGI cameras can help natural gas industry professionals inspect locations up to nine times faster than with other technologies, precisely identify the leak location, and successfully maintain regulatory compliance.

SOLUTIONS



To learn more about FLIR solutions for the oil and gas industry, go to www.flir.com/oilandgas/extraction-production



Natural Gas Separators

Inspect sand levels and emissions with thermal imaging

In the fracking process, gas is separated from oil and water and sent to a meter while the oil and water is collected and hauled away by trucks. Through this process, sand can build up in the heating element, causing damage to the separator. If this build-up is not promptly removed, it may result in a catastrophic failure of the unit—which can cost nearly \$100,000. Thermal imaging cameras provide a healthy return on investment by helping maintenance professionals determine which separators require cleaning and which are operating efficiently. Adding thermal imaging to routine inspections also allows companies to easily verify tank pressures and liquid levels, detect leaks from the separator, resolve anomalies to restore compliance, avoid adverse environmental impact, and prevent safety risks to equipment or personnel.

SOLUTIONS



Upstream and Midstream Security

Protect extended and near perimeter security for gas co-locations

Many oil and gas companies manage miles of gas lines within their operations and have an extensive portfolio of real estate. This can be challenging to manage and secure effectively. Using a FLIR thermal security solution, companies can receive early warning of gas flow issues through pipes, perimeter protection, and push the perimeter further away from the fence line. Unique analytics allow companies to expand perimeter protection without a large investment in additional fence and or hardware.

SOLUTIONS





TRANSMISSION AND TRANSPORTATION

Natural Gas Compressors

Locating gas leaks with optical gas imaging or visual borescope inspections

Compressors can fail because of poor packing seals, internal component issues, and extensive wear or thermal stress on components, resulting in downtime or gas leaks. Inspecting a compressor externally can be time consuming and labor intensive, while internal component inspections are challenging without the ability to directly see inside the equipment. Compressors are specifically designated as inspection components in regulations like the US EPA 0000a, so it's important that they are functioning optimally. Incorporating a borescope or OGI camera into a routine maintenance plan can help natural gas companies improve safety, reduce costs, and extend the life of compressors, which in turn will reduce downtime and maintain regulatory compliance.

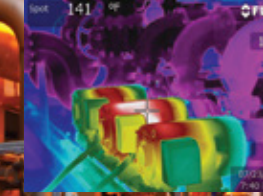
SOLUTIONS



FLIR GFx320



FLIR VS70



Inspecting Motors, Pumps, and Valves

Prevent downtime with thermal imaging

A motor breakdown, pump failure, or valve leak is always a critical issue in the oil and gas supply chain. They can result in pollution, product or energy loss, and shutdown of equipment or a production line. That's why motor, pump, and valve inspections using FLIR thermal imaging technology are a vitally important part of predictive maintenance programs for so many businesses.

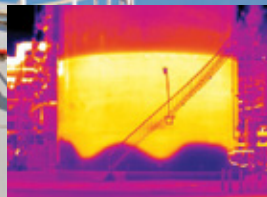
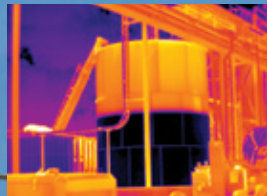
SOLUTIONS



FLIR DM93



FLIR E8-XT



Tank Level Gauging

Using thermal imaging to see liquids, solids, and foam levels inside a tank

Tank level gauging is a necessity for various applications in the oil and gas industry. Maintenance teams need to ensure there is no overflow and to know when to empty the tank. In order to do so, they must determine the tank's current level. If they are recovering fracking fluid, they may need to calculate tank flow rates, which can be dictated by tank capacity. Thermal imaging allows oil and gas companies to gauge tank levels without direct contact; it can also help them distinguish small changes in temperature between liquids or solids of varying densities with specific heat characteristics.

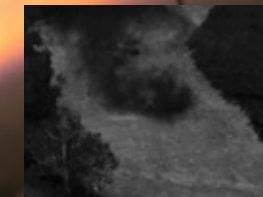
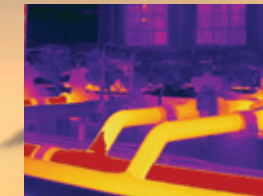
SOLUTIONS



FLIR E75



FLIR ONE® Pro



Pipeline Inspections

Detect gas leaks from pipelines with optical gas imaging

Oil and gas pipelines often stretch long distances carrying a variety of materials. Sometimes the pipes fail, releasing fugitive gas emissions or liquid leaks into the environment. Pipeline leaks often start small, making them challenging to detect until it's too late. Oil and gas companies need the flexibility to clearly identify pipeline leaks using both automated, remote inspections and onsite, live inspections. Companies can easily identify gas emissions day or night using FLIR handheld thermal imagers or drone-mounted payloads – stopping leaks before they become unmanageable.

SOLUTIONS



FLIR GF620



FLIR M210 V2

To learn more about FLIR solutions for the oil and gas industry, go to www.flir.com/oilandgas/transmission-transportation

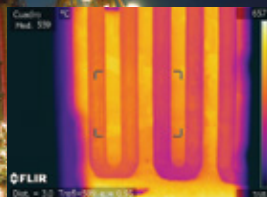


PROCESSING AND REFINING

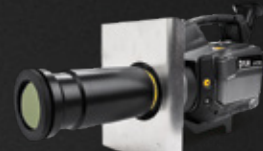
Fired Furnace Inspection

Measure furnace tube metal temperatures through a gas flame

Tubes on a firebox can overheat and rupture, starting an uncontrolled fire and other collateral damage. Refractory damage and improper burner alignment can also cause overheating and breakdown, resulting in downtime and a personnel safety issue — especially near inspection ports and ladders. That's why it's crucial to routinely inspect and assess the condition of the external steel firebox, tubes, and supports using a furnace inspection camera with thermal imaging capabilities. This kind of cameras allows inspectors to look through gas flames and determine whether localized internal coking is occurring, or if it's external scaling. Inspectors can accurately measure the true hot spots and make recommendations to the operations team to reduce the firing rate in the furnace and avoid an unexpected tube rupture.



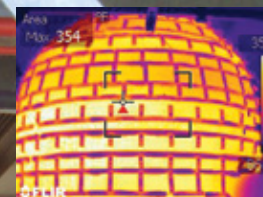
SOLUTIONS



FLIR GF309



FLIR T840



Critical Vessel Monitoring

Automated and continuous monitoring with thermal imaging

Critical vessels (such as gasifiers) can reach temperatures in excess of 500°C internally and must be kept stable in this process. If temperatures are not kept under control the rising heat could result in a hazardous explosion. The vessels are recorded and controlled to ensure the skin (often made of iron) doesn't rise in temperature and become ductile. Thermal imaging technology is an ideal way to continuously monitor critical vessels in order to catch problems before a failure occurs. FLIR technology provides a full picture of potential problems, as well as the areas between thermocouples that are often missed.

SOLUTIONS



FLIR A310ex



Electrical Inspections

Prevent distribution system failure and breakdown with thermal imaging

Electrical distribution boards are typically housed inside cabinet enclosures, making them difficult to inspect for impending failures. When electrical connections and components break down unexpectedly, the result may be unplanned downtime, costly repairs, production loss, and an increased risk of fire. That's why it's important to perform routine checks of electrical distribution systems for signs of overheating, as this may signal a potential failure. Conducting electrical inspections using FLIR thermal technology will help you to pinpoint any stressed elements before failure and break down. Thermal imaging technology can provide key information that the eyes alone cannot detect. This gives them the opportunity to solve electrical issues as part of planned maintenance before it causes a serious and costly problem.



SOLUTIONS



FLIR E95



FLIR DM285



FLIR CM275



Flare Stack Monitoring

Using automated infrared cameras to monitor flare stacks

Flare systems are often a last line of defense in preventing dangerous hydrocarbon pollutants from entering the atmosphere. Various technologies have been used to monitor flares, but they are often ineffective at minimizing smoke from stake combustion — which is an important indicator of burn efficiency. Flaring without the pilot flame releases gas into the air, increasing the risk for explosions and negative environmental impact. Thermal imaging technology can help inspectors recognize the difference between the heat signature of a flare stack flame and the surrounding background (usually the sky or clouds).

SOLUTIONS



FLIR A310



FLIR T540

To learn more about FLIR solutions for the oil and gas industry, go to www.flir.com/oilandgas/processing-refining



SOFTWARE AND MOBILE APPS

FLIR helps you work more efficiently and boost productivity through software suites and mobile applications for Android and iOS devices.

SOFTWARE

FLIR Thermal Studio™ offers the advanced processing capabilities needed to significantly streamline workflow and increase productivity. Use this software to manage thousands of thermal images and videos, as well as to automate report design and composition features so you can create professional reports. Available in more than 20 languages as a standalone Windows application, FLIR Thermal Studio is available for a free trial download at flir.com/thermal-studio.

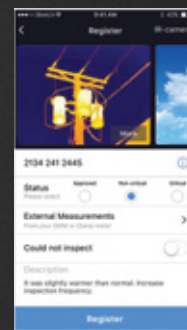


FLIR Tools® for PC or Mac OS is designed to provide an easy way to create inspection reports on your computer. With this free software you can change image settings, add new temperature points, and create standardized reports. Upgrade to FLIR Tools+ Advanced Thermal Analysis software for cutting-edge controls for grouping images, building radiometric panoramas, recording video, and instantly generating comprehensive thermal inspection reports. Learn more at flir.com/tools and flir.com/toolsplus.

APPLICATIONS

FLIR InSite™ Inspection Management Application is a professional workflow tool aimed at streamlining inspections and simplifying data collection and reporting. Use this application to plan and prepare for inspections, collect inspection data, and deliver those results to your team or clients through a secure portal.

The **FLIR Tools mobile app** for Android and iOS offer the same great options as the desktop software, optimized for your smartphone or tablet. The app is available for download from the Apple App and Google Play stores.



THE INFRARED TRAINING CENTER

Thermal Imaging Value

The greater your knowledge of thermal imaging, the greater the dividends for your company and your career. While FLIR cameras can be intuitive to use, only expert training will give you the skills to take full advantage of your investment. That's why the Infrared Training Center (ITC) offers classes for oil and gas industry applications—from free online courses to advanced certification training.

ITC courses include:

- *Optical Gas Imaging Certification Courses (I & II)*
- *0000a Fugitive Emissions Monitoring (U.S. Only)*
- *Level I, Level II, and Level III Thermography*
- *IR Electrical Inspection*
- *IR Mechanical inspection*

ITC courses provide:

- *Industry-leading, high-quality interactive instruction*
- *The most qualified international instructors*
- *The most extensive hands-on laboratories*
- *ISO 9001-registered*
- *Optional online training courses*

Attend classes at our training center, locally at one of our regional classes, or in your facility with our on-site service.

For a complete list of courses and a current schedule, visit infraredtraining.com or call 1-866-TrainIR (866-872-4647).



FLIR Software Development Solutions

FLIR's Software Development Kit (ATLAS SDK) allows companies to use their own Computerized Maintenance Monitoring Systems (CMMS) to support read-out of thermal measurements as well as inclusion of METERLiNK® data, GPS, compass, and other important parameters embedded within the image.



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