TELEDYNE FLIR

WHITE PAPER
Optical Gas Imaging

AERIAL OPTICAL GAS IMAGING SPOTS LEAKS SAFER & MORE EFFICIENTLY

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Natural gas processing plants, upstream production facilities, compressor stations, and pipelines are critical elements of the natural gas supply chain. These facilities store, process, and transport natural gas through a wide array of equipment over large areas that are difficult to manage efficiently. An important task is finding and limiting—or even eliminating—natural gas leaks from equipment, pipes, and fittings. This not only ensures the safety of employees but also reduces methane emissions that are harmful to the environment. While monitoring gas emissions efficiently across vast gas fields can be challenging, a new, innovative combination of unmanned drones (UAVs) and optical gas imaging technology is proving very useful.

MAKING SAFETY A PRIORITY

Surveying for and repairing natural gas leaks can present a significant health and safety risk for maintenance professionals, despite the many safety measures inspectors and work crews take. Traditional Leak Detection and Repair (LDAR) equipment often requires operators to be close to leaking components or even within the leaking gas cloud. Donning a respirator and other protective equipment takes time and restricts an operator's ability to move safely. This can all raise the potential for unsafe work practices or injuries while also limiting the capabilities to reach components that may be high off the ground or in hard to access areas. By using optical gas imaging (OGI) cameras to survey for gas leaks, users can spot dangerous leaks from components while working at safe distances; now, with the new aerial solutions in the market, they can get even further away.

TIME EQUALS MONEY

While handheld OGI cameras resolve many of the safety issues that come with LDAR and increase efficiency, it can still take a lot of time to cover large gas production facilities that don't provide an easy way to get between the various locations within a system: operators may have to scan an area, drive to the next location, and then start the process over—costing time and money. With new aerial OGI technology, a technician scanning for leaks can cover more facilities or locations in a fraction of the time when compared to handheld operation. An aerial OGI operator can scan 4 or 5 facilities in one flight (depending on a variety of

Figure 1: Aerial view of a pipeline leak using FLIR OGI technology.

factors), a task that may take half or a full day.

HOW DO YOU GET THERE?

While the facilities in a system may look close on a map, an LDAR professional may find themselves taking long drives down multiple roads to get between inspection sites—making for a very long and inefficient day. With an aerial OGI solution, operators can dramatically streamline their processes for LDAR by scanning one, after another, after another… all during a single, 20-minute flight. Many UAV software platforms allow the user to simply enter asset in the software, and the UAV autonomously flies to the location and records data. This ensures none of the required inspection components are overlooked and potentially could allow the flight to meet regulatory requirements such as the U.S. EPA 0000a.

In addition to the challenge of unconventional roadways between facilities, LDAR professionals may have difficulty accessing some sites due to location and land rights. Using an aerial solution will greatly reduce the time and effort to reach a location that is often challenging, or impossible, without considerable work.

Finally, there's the simple issue of terrain: many pipelines are in areas that are inaccessible by trucks or even 4-wheelers, creating extreme challenges in inspecting for leaks. Impediments such as rivers, railways, or other obstacles also make aerial OGI more attractive, as you can simply take off from a safe location and quickly reach your site.

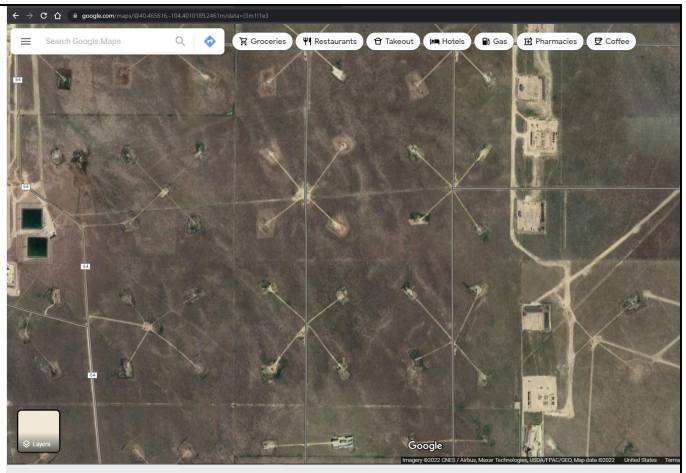

Figure 2: Aerial view of multiple facilities in Colorado (image courtesy of Google Maps). All these facilities would need to be inspected on a regular basis with OGI to meet regulatory requirements. An aerial OGI solution would allow an operator to insect much more efficiently.

A BETTER SOLUTION

While there are many drone options on the market, many of these are not dedicated aerial OGI technologies or drones geared for the oil and gas industry. The Workswell GIS-320 aerial OGI solution was built solely for the purpose of gas detection from the sky. Integrated with OGI technology from Teledyne FLIR, including the same cooled infrared detector as in the industry-leading FLIR GF320 and GFx320, the GIS-320 was made for the oil and gas industry needs, including U.S. EPA 0000a compliance. With common features like FLIR's patented High Sensitivity Mode (HSM) image enhancement feature and communications protocol designed specifically for the professional drone operator, the GIS-320 is a valuable addition to an operations LDAR program. When you pair this payload with Vision Aerial's Vector hexacopter, oil and gas operators have the most reliable and highest performance aerial OGI solution in the market. With long flight times, the ability to hot swap batteries, and pre-defined, autonomous mission plans, this system will greatly increase efficiency for LDAR operators. Vision Aerial systems are also designed and manufactured in the United States and feature best practices for data security. One LDAR lead for a mid-continent gas operator praised the system, stating, "We have tried multiple solutions to date and this OGI solution is the only one that meets our needs."

Figure 3: Vision Aerial Vector with GIS-320 OGI payload

COOLED DETECTOR MAKES THE SMALLEST LEAKS VISIBLE

FLIR OGI cameras can visualize and pinpoint gas leaks that are invisible to the naked eye. Optical gas imaging makes it easy to continuously scan installations that are in remote areas or in zones that are difficult to access. The Workswell GIS-320 with Thermal by FLIR contains a cooled indium antimonide (InSb) detector that produces thermal images of 320 × 240 pixels. With its low F-number (quantitative measure of lens speed) and high sensitivity, the GIS-320 detects the smallest of leaks and even

Figure 4: Leaking tank on a well pad identified using FLIR OGI technology

meets the U.S. EPA's OOOOa sensitivity standards. Switching the camera imaging mode to HSM further enhances the detection level of the camera so that the smallest gas leaks can be detected. All in all, the GIS-320 is very easy to control from a safe distance while covering large areas quickly.

CONCLUSION

Whether you are looking to increase worker safety, meet regulatory requirement or just reduce emissions as better environmental stewards, the applications that require optical gas imaging technology are vast in the oil and gas industry. Many of these are spread out over a small area making it challenging to access via truck easily and quickly. Using a Workswell GIS-320 with Thermal by FLIR and a Vision Aerial Vector hexacopter will provide operators a unique ability to be more efficient in their inspection requirements and more effective in creating safer work environments and reducing emission.

For more information on the GIS-320, visit www.flir.com/products/gis320

For more information on the Vector, visit visionaerial.com/vector

GIS-320 from Workswell with Thermal by FLIR

For more information about thermal imaging cameras or about this application please visit: www.flir.com/ogi

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