KONICA MINOLTA

Enhanced OGI Improves Compressor Safety & Maintenance Coordination

Introduction

Based on our studies at compressor stations with Oil and Gas operators, we confirmed the benefit and importance of clear images for safe and stable operations jointly.

Most compressor machinery tends to be installed inside of buildings to prevent noise to the surrounding areas and the local communities. Ironically, this can increase the risk of a buildup of gases inside the building housing the equipment. As a result if not detected in time, fugitive gas leaks can place employees and the compressor in a hazardous situation. The high temperatures and high pressures also magnify the enormity of a potential accident.

Oil & Gas operators have also mentioned to us that their compressor stations encounter roughly 20 to 30 days of unplanned shutdowns annually. Unexpected shutdowns are among the significant factors of a decrease in natural gas transmission's productive capacity utilization. The continuing transmission of natural gas is crucial and must be maintained by any means necessary, and without sacrificing on safety.

Thesis Question

We have frequently heard from the oil and gas industry the urgency of detecting leaks much earlier.

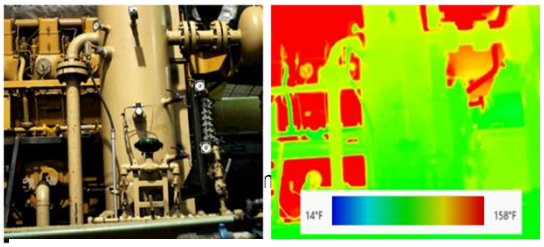

Fig 1. Target Equipment: Gas Scrubber

The actual inspection work itself is difficult due to the effect of thermal noise with current OGI cameras at an active facility. Compressor equipment is especially highly heated, and that heat in the vicinity can mask possible fugitive emissions.

Until now, gas leak inspectors have suffered from a lack of a capability to effectively inspect hot compressor machinery with current OGI. A certified OGI inspector at an oil & gas facility on the right took the image here (Fig. 2). Within that image frame, there was a tiny leak at the pressure gauge of the Gas Scrubber. However, the inspector mentioned he would have missed it with current OGI.

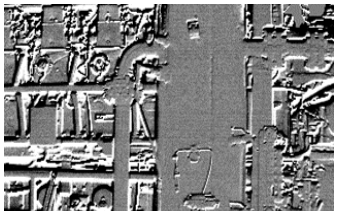
Fig 2. HSM (High Sensitivity Mode) Image of Current OGI taken by Certified Inspector

On the other hand, our technology could detect the tiny leak, even in such a hot environment; with the High Sensitivity Mode easily displaying the leak (Fig. 3a).

Fig 3a. Our High Sensitivity Mode

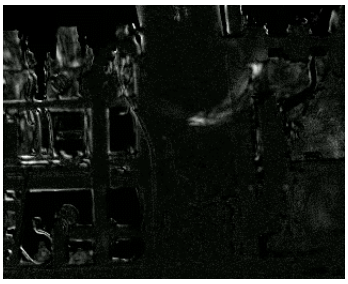

Fig 3b. Our Gas Enhanced Mode

Furthermore, had there been more heat disruption in the area, it would allow the inspector to focus in on our Gas Enhanced Mode (Fig. 3b), which is better capable of highlighting the leak and displaying the release source.

Why Is It Important?

When we returned to the operator's site three weeks later, we noticed the once small leak, which would be missed by current OGI used at the site, had significantly grown in such a short time frame (Fig. 4).

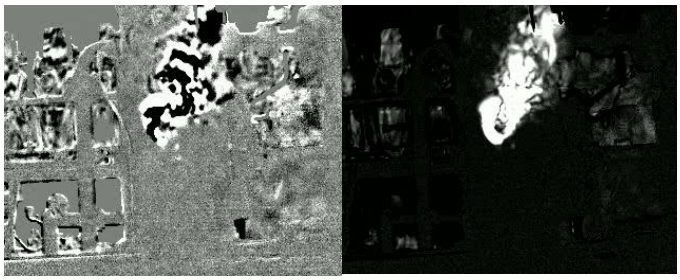

Fig 4. Images after 3 weeks had passed

This is an example of a leaks progression during a monthly inspection program. However, if a quarterly inspection program is being followed by regulation, you have the potential for these leaks to become a significant hazard.

Insights

With similar components (seals, gaskets, etc.) being used in similar operating temperatures, you can predict component failures will occur in similar time frames.

A small leak can be remediated safely at an earlier stage when detected early. You can execute immediate repairs, and a repair plan is put in place, along with a shorter planned shutdown.

It is worth keeping in mind that the case in these images is just one example, and we have observed other cases in which the leak condition had not changed.

In any case, the object is to predict the future from the facts of the past and present and take appropriate measures.

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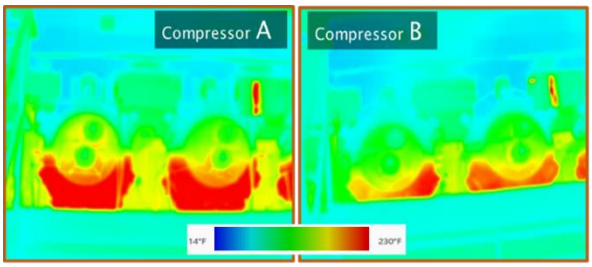
Additional Discovery

Unexpected issues and failures are not just limited to gas leaks. Notice the difference in the heat distribution among a compressor leak inspection. Fig. 5 shows the difference between two compressors.

The equipment temperature of each cylinder is usually monitored at a site control room remotely. We recorded those temperatures at the bottom of Fig. 5.



Cy1	Cy3	Cy5	
257	256	246	F

Cy1	Cy3	Cy5	
253	248	248	F

Fig 5. The difference in the heat distribution and the values of thermal sensors which were monitored at the control room.

Even though we observed asymmetry with our OGI, there was no apparent difference among the monitored temperature values.

The site superintendent mentioned that the thermal asymmetry indicates something wrong inside of the cylinder and may cause a future failure. This signifies the importance of the thermal image over simple temperature sensors, which may not show "the whole picture."

Conclusion

Our collaborative study provided us with valuable information for quickly detecting small leaks. The imaging allowed for easy identification of the leak, thermal distribution of compressor engines was analyzed and compared & maintenance benefited with better planning and coordination.

Early awareness of problems is crucial to ensuring effective and planned maintenance to avoid additional and more significant problems "down the road."

Minor repairs & maintenance can be arranged for each potential shutdown before it becomes a significant interruption to production. Scheduling repairs at the most cost-effective time and day, with a suitable workforce available, allows for the impact of maintenance on production work to be minimized.

With new technology and new features, operators have the capability of keeping both their employees and facilities safe; minimizing economic loss with efficient maintenance as well as assuring environmental compliance and keeping surrounding community's minds at ease.

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Product Info: Konica Minolta Inspection Support Solution

Our camera, also known by its model name GMP 01 is controlled by the included tablet, from which all of the displays are viewable, and the inspections can be played back on.

Fig 6. Configuration of GMP 01

The GMP 01 has been tested by a third party and deemed as meeting the requirements of the NSPS OOOOa. And it is certified as an approved instrument monitoring method (AIMM) by the CDPHE, Colorado Department of Public Health & Environment, as well.

It is also worth mentioning that when using our camera systems tablet, multiple image modes are simultaneously available to the inspector, literally “at their fingertips”.

However, our solution is not just limited to the camera and tablet but our cloud service (officially called the Inspection Data Manager), which serves the purpose of storing and managing all of the inspection data that accumulates over time.

Our Inspection Data Manager allows you to access past inspection records, analyze and predict future system issues, and construct a planned timeline for maintenance in order to avoid future system problems. The Inspection Data Manager offers two display modes:

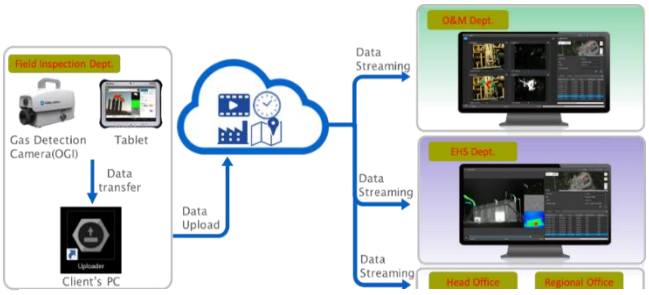

Fig 7. Configuration of Inspection Data Manager

The first is very similar to the tablet, with a main display window as well as the three smaller windows available for viewing. The second offers a comparison mode where several videos can be played simultaneously and compared to different pieces of equipment from different times.

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