FLIR GF306 helps reduce environmental risks at Scottish and Southern Energy Power Distribution

The GF306 has a highly sensitive detector that is specifically designed to visualize SF6 gases.

SF6 gas is a powerful gas that is used in the electricity market as an insulator in substations. Although very effective for its intended use, once it is leaked into the atmosphere, it is very harmful for the environment. That's why preventing these leaks is a main priority, also for the British energy distributor company Scottish and Southern Energy Power Distribution (SSEPD). But not only prevention is important. Once a leak is there, it should be found as quickly as possible so further damage can be avoided. Luckily, SSEPD have found a powerful tool that can support them in this task: thermal imaging cameras from FLIR.

The Scottish and Southern Energy Power Distribution (SSEPD) is responsible for maintaining the electricity networks supplying over 3.7 million homes and businesses across central southern England and north of the Central Belt of Scotland. The company owns one electricity transmission network and two electricity distribution networks, comprising 106,000 substations and 130,000 km of overhead lines and underground cables across one third of the UK. Its first priority is to provide a safe and reliable supply of electricity to the communities it serves in Scotland and England.

As in many electricity distribution networks across Europe, SSEPD uses SF6 gas as an insulator in its substations, more specifically in the switch gears of high voltage power lines. Across its three operated networks, SSE Power Distribution has a total of 11,475 items of switch gear using SF6 gas. Usually, a container is installed around the switch gear, which is then filled with SF6. This way, the container works as an insulator by extinguishing sparks that might come out of the switch gear. The possibility of leaks generally increases as equipment ages. Fugitive emissions can escape through valve fittings and at joints between flanges and porcelain bushings. SF6 can be accidentally released at the time of equipment installation as well as during servicing.

Thermal imaging cameras from FLIR allow SSEPD to detect possible leaks quickly and with high certainty.

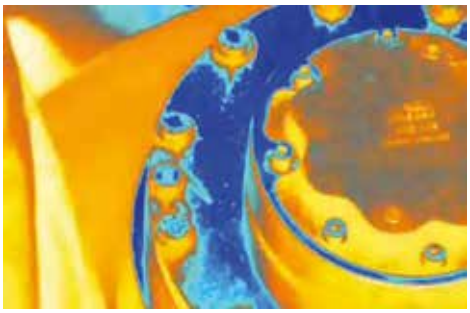
Environmental risk

Next to an economic loss as a result of SF6 leaks, there's also an environmental cost, because SF6 is 22,000 times as powerful as CO_2. "We have a very large fleet of switch gears," comments Tawanda Chitifa, project manager at SSEPD. "Whenever we have a leak in one of these switch gear substations, we run a big environmental risk. As part of an internal R&D project, we investigated ways to better prevent and detect environmental damage because of leaks. The challenge was to be more efficient in handling possible SF6 leaks. Thermal imaging cameras from FLIR have helped us reduce that risk significantly, because they allow us to detect possible leaks quickly and with high certainty."

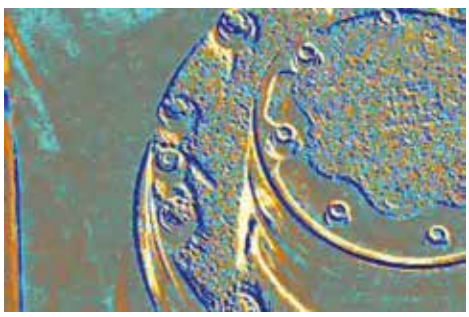
Clearly pinpoint leaks

Conventional leak detection methods include the use of thermocouples or sniffers, a widely used type of temperature sensor for measurement and control. This has proven not to be very effective, according to Tawanda Chitifa. "The problem is that with a sniffer you cannot get close enough to the equipment you are investigating. That is why it is sometimes difficult to pinpoint exactly where an SF6 leak is. You are aware there is a leak somewhere, but it's hard to locate. SF6 gas is also heavier than air. This means that a thermocouple can usually show you where the SF6 gas has dripped down, but not point you to the actual leak source."

Visual



Thermal



High Sensitivity Mode (HSM) - Reference US Patent US7649174

As part of the before mentioned R&D project, SSEPD learned about the existence of thermal imaging cameras that could do a better job in detecting possible leaks. After a thorough selection process, SSEPD decided to purchase two GF306 cameras from FLIR. The GF306 has a highly sensitive detector that is specifically designed to visualize SF6 gases.

"The FLIR cameras allowed us to work in a totally different and more efficient way," says Mr. Chitifa. "With the GF306 camera, you can look at the switch gear equipment from a safe distance, allowing you to cover a wider area. At the same time, the thermal imaging camera allows you to exactly pinpoint where the leak is, up to the actual source. Even very small leaks can be detected clearly. This has proved to be invaluable and saved us a lot of time."

Reducing downtime

Normally, in order to access the switch gear equipment, SSEPD schedules an outage. Mr. Chitifa: "It goes without saying that closing down the equipment results in an economical cost. Every hour of downtime is money lost. With the FLIR GF306, we can significantly reduce downtime, because you can just take the camera out in the field and start your detection routine while the equipment is live."

An important objective of the SSEPD R&D project was to be less dependent of third party suppliers. The company usually relies on third party companies to help them detect the gas leak, repair the equipment, replace it if necessary and do gas refills. The problem is that lead times can sometimes be very long, resulting in lost time and money.

"With the FLIR thermal imaging, we can find the leak ourselves immediately. This saves us a lot of time. At one time, we were able to detect a leak. We made a short video and e-mailed it to our repair company. This way, they could directly start repairs and leave out the detection process, because they already knew exactly where to look."

With the GF306, you can look at the switch gear equipment from a safe distance.

High-end optical gas imager

In December 2013, SSEPD purchased two GF306 cameras. The investment quickly provided return. "We followed training courses organized by FLIR Systems to better learn the benefits and operation of the thermal imaging camera. Already on the first course, we took the camera out in the field and identified a leak on a recently installed high-voltage circuit breaker. Talking about return on investment!"

Users of the GF306 at SSEPD especially value the High Sensitivity Mode (HSM), which is included in all GF-Series optical gas imaging cameras. It is an image subtraction video processing technique that effectively enhances the thermal sensitivity of the camera. The HSM feature subtracts a percentage of individual pixel signals from frames in the video stream from the subsequent frames, thus enhancing the differences between frames, which make leaks stand out more clearly in the resulting images.

"To have the most reliable detection results, we make sure we capture the leak in different image modes: the IR image, the HSM mode and the visual image. This way, we are sure we don't miss out on anything and we can provide a reliable briefing to anyone who needs to repair the leak."

For more information about thermal imaging cameras or about this application, please contact:

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