



Cutting the Cost of Monitoring Industrial Machines

5G Connectivity enabling Manufacturers to deploy new streamlined IoT solution to detect critical rise in the temperature of equipment

Summary



- Thermographic cameras can continuously monitor electrical and mechanical systems to detect unusual heat generation and proactively prevent equipment failure
- With wireless IoT connectivity, a thermographic system can alert maintenance engineers to potential problems in difficult to access areas
- As online thermography had been too costly for most production environments, Calumino and ERIKS have developed a low cost and easy-to-deploy online thermographic solution
- Manufacturers are beginning to use the system, which employs 5G connectivity, to support predictive maintenance across indoor and outdoor environments
- With the integration of 5G wireless technology, these systems can now transmit data efficiently, even in challenging environments, ensuring maintenance engineers are alerted to potential problems in real-time
- ERIKS says the system has been well received by pharmaceutical, food and beverage, petrochemical, utilities and building product manufacturers

In a manufacturing or industrial plant, an abnormal build-up of heat is a strong indication that something is wrong. One way to detect excessively hot electrical connections or components is to use expensive handheld infrared cameras to capture images (called thermograms) that show surface

heat variations. Similarly, thermograms can also detect the heat created by excessive friction in mechanical systems.

Ideally, these thermal systems would be connected to a monitoring system that can alert engineers of the

need for maintenance before any damage is done to equipment or the production process. But IoT wireless connectivity of thermal images is not commonplace because the permanent installation of thermographic cameras has been too expensive and complex for most production environments. “Excessive equipment costs, complicated telemetry environments and data size with its integration have all combined to block thermography becoming commonplace, like accelerometers are to monitor machine vibration,” explains Marek Steffanson, CEO and founder of infra-red solution provider Calumino, which is based in Australia.

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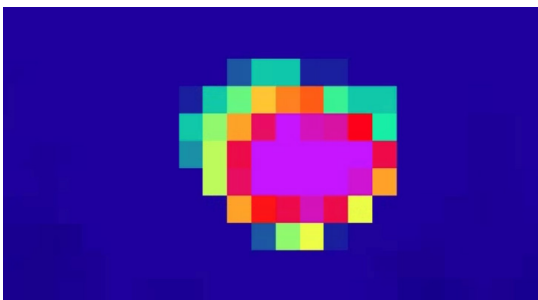
David Manning-Ohren - Technical Manager for ERIKS Smart Asset Management

At the same time, traditional switchgear and interlocked control gear, which are used to protect, control and isolate electrical equipment, are very difficult to monitor using thermal imaging cameras. “The only solution, up to now, has been the fitting of infra-red inspection windows or grilles,” says David Manning-Ohren. “This had meant cutting into what

may have been an enclosure design to withstand an arc-flash incident, in which case the risk in doing the modification had to be balanced against the risk of not doing the survey. Arc-flash would most likely occur when energising circuits and hence the switchgear would be most exposed to an incident.”

To address these challenges, Calumino has teamed up with ERIKS, a specialised industrial service provider, based in the Netherlands and operating in 15 countries. Having performed thermographic surveys for its customers since the mid-1980s, ERIKS was looking for a cost-effective and scalable solution to enable continuous monitoring of industrial machinery.

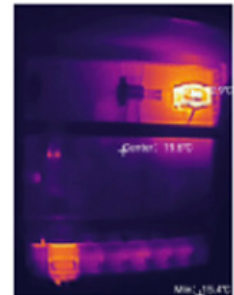
“Following a presentation of Calumino’s product, ERIKS instantly purchased one of the evaluation kits and validated the performance of the device along with what was required as a production device for deployment within an electrical enclosure,” recalls David Manning-Ohren, Technical Manager for ERIKS Smart Asset Management, Category 3 Thermographer, PCN infrared thermography examiner for BINDT and committee member of the BSI condition monitoring standards’ committee. The two companies then joined forces to develop a safe, unobtrusive technology that can check all is well within an electrical enclosure without modifying its construction.



Calumino Thermal Sensor (CTS) thermal image



Visual reference



Handheld thermographic camera thermal image

Installation 1: 240/24V transformer, top of right cabinet



Visual reference.
Note: cabinet shown as open

Developing a system that is easy to deploy and scale

While Calumino had already developed small low-resolution industrial thermal sensors, ERIKS helped it make these products easy to mount and manoeuvre, easy to wire and easy to programme on-site or off-site. The new Calumino Industrial Monitoring Sensor has only four connections on a plug and socket. It employs a 5V power supply and a Modbus¹ output, while the nanotech-based sensor is only a small component. The whole enclosure measures 12cm x 12cm. “Because the device is so easy to mount, it doesn’t compromise the mechanical strength of the electrical enclosure” of the equipment it is monitoring, explains David Manning-Ohren.

Despite its relative simplicity and small size, Calumino and ERIKS say the new system doesn’t compromise on performance. It is designed to enable industrial companies to “monitor thermal behaviour, trends and accurate absolute temperatures and relative changes within switchboards.” With the integration of 5G wireless technology, these systems can now transmit data efficiently, even in challenging environments, ensuring maintenance engineers are alerted to potential problems in real-time. The integration of 5G connectivity has also unlocked the potential use of the data collected,

allowing for advanced analytics and real-time monitoring to gain deeper insights and make more informed decisions. In manufacturing plants, even a small equipment failure can result in missed deadlines, and strained customer relationships.

The new Calumino sensor is integrated with the ERIKS online smart asset management (SAM) platform and 5G modules. These modules enable the solution to use an industrial plant’s 5G network to transmit data from the thermographic system to the SAM platform, either as a continuous stream of small packets or via periodic transfers of full images. This integration ensures that the system can operate efficiently with low bandwidth and maintain excellent coverage in various environments.

On deploying the system, the maintenance engineers set an area or areas of interest to monitor. Inside the

Because the device is so easy to mount, it doesn’t compromise the mechanical strength of the electrical enclosure

David Manning-Ohren - Technical Manager for ERIKS Smart Asset Management

¹ Modbus is a widely-deployed data communication protocol that allows devices to communicate with each other using a client/server model.

device, an embedded algorithm can detect anomalies early, taking into account any change in load or ambient temperature, to eliminate false positives and negatives as practically as possible. Thermographic data from each area is streamed via the Modbus protocol to the SAM platform.

This integrated solution has been deployed by multiple manufacturers. “Within the ERIKS customer base, this has been well received by pharmaceutical, food and beverage, petrochemical, utilities and building product manufacturers,” says David Manning-Ohren. Offering a seamless, true wireless data monitoring system for both legacy and modern industrial systems.

“With less than 1,000 pixels the device could easily be dismissed as too low resolution when compared even to a low-end thermographic camera, but when it can be supplied, fitted, commissioned and scaled for the same price as a thermal imaging window, and with our sensors having industry leading sensitivity and accuracy then you need to change that mindset,” says Marek Steffanson of Calumino. “Will this device detect a defect? Yes. Will it diagnose the exact cause? Potentially. Is it reasonable and practicable to deploy this device to monitor captive electrical components? Definitely.”

For ERIKS, the Calumino Industrial Monitoring Sensor is a “fantastic addition to our suite of Smart Asset Management solutions,” concludes David

Manning-Ohren. “It complements our periodic thermographic surveys, giving our customers extra piece of mind on their captive or remote applications.”

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