

Automated vs. Manual Thermal Monitoring Return on Investment

A comparison and analysis of the financial benefits of implementing automated thermal monitoring solutions on utility systems.

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The efficient monitoring of utility systems is crucial for ensuring reliable and cost-effective operations. It helps identify potential issues, ensure safety, and increase efficiency of operations. The choice between manual and automated thermal monitoring methods can

greatly impact the return on investment for utilities. This whitepaper compares and analyzes the financial benefits of implementing automated thermal monitoring solutions versus traditional manual methods.

Comparing Automated and Manual Thermal Monitoring

Utilities have long used manual monitoring conducted by a skilled thermographer to detect hotspots in their electrical system. However, automated thermal monitoring systems have become increasingly popular in recent years, as they offer several advantages over manual monitoring. While manual monitoring can provide accurate results, it is a time-consuming and labor-intensive process that requires skilled personnel to operate. Automated systems, on the other hand, can continuously monitor the system and provide real-time data, without missing transitory events. This enables operators to detect and respond to potential issues more quickly, reducing the risk of equipment failure, downtime, and other costly issues.

Manual Thermal Monitoring

Manual thermal monitoring is a technique that has been used for many years to detect issues in electrical systems. In this method, thermographers use thermal imaging cameras

to capture snapshots of the system at specific intervals. These snapshots are then analyzed to identify areas of concern.

One of the challenges of manual thermal monitoring is that it requires the operator to be in the right place at the right time. This means that potential issues may be missed if the operator is not present when a problem arises. In addition, load conditions, temperature, wind, and humidity can all affect the readings, making it difficult to accurately detect problems within electrical systems.

Distance from the object can also affect the accuracy of the data collected through manual thermal monitoring. The further the object is from the camera, the less accurate the readings may be. This is because the camera may not be able to capture fine details, making it difficult to accurately identify problems.

When looking at snapshots, it is crucial for one to ask:

- Was the snapshot taken from the same place each time?
- What was the weather and system load when the snapshot was taken ?
- Is the thermographer interpreting the data the same way each time?

Despite these limitations, manual thermal monitoring can still be a useful technique for detecting problems in electrical systems. However, as systems become more complex and the demand for electricity increases, automated thermal monitoring systems are becoming a more attractive option, as they offer continuous monitoring, real-time data, and greater accuracy and consistency in data collection.

Automated Thermal Monitoring

On the other hand, automated thermal monitoring systems offer several advantages over manual thermal monitoring techniques. Unlike manual monitoring, which relies on snapshots of the system taken at specific intervals, automated thermal monitoring provides a continuous flow of information that can be correlated with weather conditions and system load. This helps to provide thermographers with a more accurate view of the system that can be used for trend analysis and input to a condition-based maintenance program.

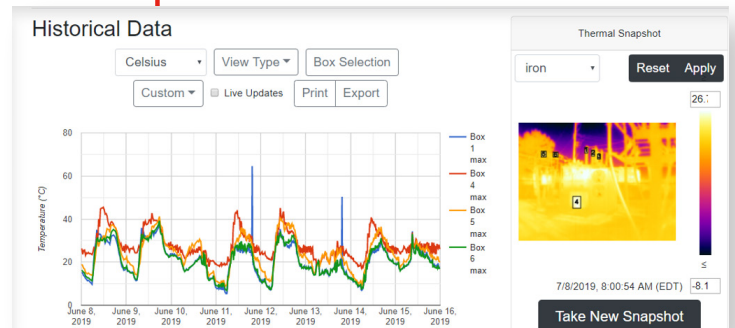
A key advantage of automated thermal monitoring systems is their ability to provide real-time data. This allows operators to detect potential issues more quickly and take appropriate action before they become more serious and costly. The thermal sensors used in these systems continuously cycle through pre-programmed stops to take temperature measurements from multiple points of interest, providing a more comprehensive view of the system.

Automated thermal monitoring systems can also be used for trend analysis. By collecting and analyzing data over time, operators can identify patterns and trends that may indicate

potential issues. This allows operators to take a proactive approach to maintenance, addressing issues before they become more serious.

Thermal data from the sensors can be provided to operators in real time in the following ways:

- Thermal analytics are programmed to determine if monitored points go out of range. Operators are immediately notified via SCADA alarm or email so action can be taken
- Points can be tracked in the SCADA system as analogue points so they can be monitored in real time
- Measurement points are stored in a database so they can be further analyzed in a trend analysis tool for condition-based maintenance
- Real-time thermal video can be viewed remotely



Temperature data can be analyzed over time, operators can identify patterns and trends that may indicate potential problems.

Automated thermal monitoring systems offer several advantages over manual monitoring, including real-time data, trend analysis, and condition-based maintenance. As the demand for electricity increases and systems become more complex, automated thermal monitoring

is becoming a more attractive option for utilities looking to improve system reliability and reduce costs.

Return on Investment Analysis:

Return on Investment (ROI) analysis is an important tool used to compare the costs and benefits of different approaches or solutions. In the case of manual versus automated thermal inspection, ROI analysis can be used to determine which approach offers the best value for money.

Let's analyze the various costs associated with manual versus automated thermal inspection to determine the return on investment for each approach, making the following assumptions:

- Costs and frequency of manual inspections is estimated
- Estimated one day required to inspect the substation
- Automated thermal asset monitoring system can monitor four transformer bays

Manual Thermal Inspection Cost			
	Cost per Day	No. of Days	Annual Cost
Onsite Thermographer / day	2,000	4	8,000
Utility cost to escort	1,000	4	4,000
Thermography report	1,000	4	4,000
Annual Cost (4 Inspections)			16,000

Thermal Asset Monitoring System Cost			
	Cost	Qty	Total
Asset Monitoring System Cost	50,000	1	50,000
Installation	2,000	1	2,000
Annual Cost (4 Inspections)			52,000
ROI (Years)			3.3

	Variable
	Calculated

Based on the calculation, the return on investment in automated thermal monitoring systems is realized in approximately three years.

Additional Advantages of Automated Thermal Monitoring:

Automated thermal monitoring offers a breadth of advantages, including:

- The monitoring system pays for itself after the ROI period
- Data is more accurate and is collected in real time
- Reduced trips to inspect remote substations
- Real time thermal substation visualization
- Part of a condition-based maintenance program to reduce O&M costs and improve reliability

Overall, the advantages of automated thermal monitoring are significant, and can lead to improved system reliability, reduced downtime, and lower maintenance costs.

Summary

Advances in thermal monitoring have given utilities access to technology to automate inspections in remote substations. The technology provides non-invasive, continuous, remote monitoring of operating temperatures in high value assets allowing utilities to detect problems before failures occur and reduce unplanned outages. While manual thermal monitoring provides results, automated inspections are safer and increase reliability, reduce outages and provide economic benefits to customers and stakeholders.

About Systems With Intelligence

Systems With Intelligence Inc. is a global provider of Touchless™ Monitoring Solutions for electric utility applications. SWI systems collect and analyze the data that allows utilities to increase safety and reliability while reducing operating costs. Coupling thermal monitoring and visual imaging technology with advanced analytic algorithms, Systems With Intelligence solutions automate remote site monitoring.

Systems With Intelligence products are engineered to operate in the harshest environments, withstand high levels of electromagnetic interference, static discharge and voltage surges found in industrial applications to ensure uninterrupted operation. Providing a monitoring system that operates reliably and connects seamlessly allows customers to remain focused on their operations.

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