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Cheat Sheet



What are the main advantages of an acoustic imaging camera?

Acoustic imaging cameras offer several advantages in various applications. The main advantage lies in their ability to visualize and analyse sound in a spatial context. Below are some key advantages:

1 Visualization of Sound Sources

Identification: Acoustic cameras allow users to visually identify and locate sound sources in a given environment. This is particularly valuable in industrial settings, research, and troubleshooting scenarios where pinpointing the exact source of a sound is crucial.

2 Non-Intrusive Inspection

Non-Contact: Acoustic imaging is a non-intrusive method of inspection. It doesn't require physical contact with the source, making it suitable for analysing objects in motion or situations where physical access is limited.

3 Real-Time Monitoring

Dynamic Analysis: Acoustic cameras can provide real-time feedback, making them useful for dynamic situations. This is important in applications like quality control in manufacturing, where real-time analysis of acoustic signatures can help detect defects or irregularities.

4 Comprehensive Analysis

Frequency and Intensity Mapping: These cameras can provide detailed frequency and intensity mapping of sound sources. This comprehensive analysis helps in understanding not only where the sound is coming from but also its characteristics.

5 Versatility Across Industries

Applications in Various Fields: Acoustic imaging cameras find applications in diverse fields such as industrial maintenance, automotive testing, environmental noise monitoring, and even medical imaging. Their versatility makes them valuable tools in multiple industries.

6 Localization for Noise Control

Noise Mitigation: By precisely identifying the location of noise sources, acoustic cameras aid in the development of effective noise control measures. This is beneficial for industries aiming to reduce environmental noise impact.

7 Research and Development

Noise Mitigation: Acoustic imaging is used in R&D for developing products with optimal acoustic characteristics, such as designing quieter appliances or improving the sound quality of products.

8 Quality Control

Production Quality Assurance: In manufacturing, acoustic imaging can be employed for quality control, helping to identify issues or defects related to sound early in the production process.

9 Environmental Impact Assessment

Noise Pollution Studies: Acoustic cameras contribute to environmental impact assessments by aiding in the monitoring and analysis of noise pollution in urban areas or near industrial facilities.



It's important to note that the effectiveness of acoustic imaging cameras depends on factors such as the specific technology used, the application, and the expertise of the user.

What is Partial Discharge

Partial discharge (PD) refers to localised electrical discharges that only partially bridge the insulation between conductors in electrical systems. These discharges can occur within the insulation materials

Key points about partial discharge:

1 Insulation Breakdown

Partial discharge is a phenomenon that occurs when there is a breakdown of insulation in localized areas within the electrical system. It involves the ionization of a small portion of the insulation material.

2 Detectable Signals

While partial discharges themselves may not be directly visible, they emit signals that can be detected using specialized equipment. Monitoring and detecting partial discharge activity are crucial for preventing electrical failures and ensuring the reliability of high-voltage equipment.

3 Causes

Partial discharge can be caused by a variety of factors, including aging of insulation materials, manufacturing defects, contamination, or mechanical stress on the insulation. The presence of partial discharges may indicate that the insulation is under stress or deteriorating.

4 Equipment at Risk

High-voltage equipment such as transformers, switchgear, cables, and other power system components are susceptible to partial discharge. Over time, repeated partial discharge events can lead to insulation degradation and eventually result in complete failure of the equipment.

5 Monitoring and Testing

Regular monitoring and testing of electrical equipment for partial discharge activity are important for predictive maintenance. By detecting and addressing partial discharges early on, it is possible to prevent more severe failures and extend the lifespan of the equipment.

6 Mitigation

Various measures can be taken to mitigate the risk of partial discharge, including improving insulation design, using high-quality materials, and implementing effective maintenance practices.



Understanding and managing partial discharge is crucial in the field of electrical engineering to ensure the reliability and safety of electrical power systems. Advanced diagnostic techniques and technologies are employed to detect and analyse partial discharge activity, allowing for proactive maintenance and minimizing the risk of equipment failure.

What types of Partial Discharge can an acoustic imager detect?

Acoustic imaging is a valuable technique for detecting partial discharges (PD) in electrical systems. Partial discharges are localized breakdowns in the insulation of high-voltage equipment and can lead to the deterioration of the insulation over time. Acoustic

imaging can identify these discharges by detecting the ultrasonic waves generated during the PD events. Various types of partial discharges can be detected using acoustic imaging:

1 Surface Partial Discharges

Description: These discharges occur on the surface of insulating materials and are often associated with the presence of contaminants or imperfections.

Detection: Acoustic imaging can capture the ultrasonic signals produced by surface PD events.

2 Internal Partial Discharges

Description: Internal partial discharges occur within the bulk of the insulation material.

Detection: Acoustic imaging can detect ultrasonic waves generated when discharges take place inside the insulation. The imaging helps locate the source of the discharge.

3 Corona Discharges

Description: Corona discharges happen in localized regions of high electric field strength. These discharges are often associated with sharp edges, high voltage gradients, or conductor defects.

Detection: Acoustic imaging can capture the acoustic signals generated by corona discharges.

4 Arcing Partial Discharges

Description: Arcing PDs occur when a partial discharge escalates into a sustained arc. This can cause severe damage to the insulation.

Detection: Acoustic imaging is effective in capturing the ultrasonic emissions associated with arcing PDs.

5 Cavity PDs

Description: Cavity PDs occur in voids or air-filled pockets within the insulation material.

Detection: Acoustic imaging can identify ultrasonic signals produced when discharges take place in these cavities.

6 High-Frequency PDs

Description: High-frequency PDs occur at higher frequencies and can be challenging to detect using conventional methods.

Detection: Acoustic imaging can be sensitive to high-frequency ultrasonic emissions, making it useful for detecting high-frequency PDs.

7 Inception PDs

Description: Inception PDs are early-stage discharges that can develop into more severe PD events if not addressed.

Detection: Acoustic imaging can be used for early detection of inception PDs, allowing for preventive maintenance.

! The ability of an acoustic camera to detect and locate partial discharges makes it a valuable tool for condition monitoring and predictive maintenance in electrical systems. It allows for the identification of potential insulation issues before they escalate, helping to prevent unplanned downtime and costly equipment failures.

Why is measuring partial discharge so important?

Measuring partial discharge (PD) is crucial in the field of electrical engineering and high-voltage equipment for several important reasons:

1 Early Detection of Insulation Issues

PD measurements help in the early identification of potential insulation problems in high-voltage equipment. Early detection allows for proactive maintenance and corrective actions before serious damage occurs.

2 Prevention of Catastrophic Failures

PDs, if left undetected and unaddressed, can lead to the deterioration of insulation over time. This deterioration may eventually result in catastrophic failures, breakdowns, and expensive damage to electrical equipment. By measuring PD, it's possible to address issues before they escalate.

3 Predictive Maintenance

PD measurements contribute to predictive maintenance strategies. Regular monitoring allows maintenance personnel to schedule interventions based on the condition of the equipment, optimizing maintenance efforts and reducing the likelihood of unplanned downtime.

4 Improved Equipment Reliability

Identifying and mitigating partial discharge can enhance the overall reliability of electrical equipment. By addressing insulation issues promptly, the risk of unexpected failures is minimized, leading to improved system reliability.

5 Extension of Equipment Lifespan

Early detection and mitigation of PDs can contribute to extending the lifespan of high-voltage equipment. Proactive maintenance helps prevent conditions that could lead to premature aging and failure.

6 Safety Assurance

Monitoring partial discharge is essential for ensuring the safety of electrical systems. Unchecked PDs may lead to insulation breakdowns, posing safety hazards for personnel and risking damage to surrounding equipment.

7 Compliance with Standards

Many industries and regulatory bodies have standards and guidelines related to partial discharge testing and monitoring. Adhering to these standards helps ensure that electrical installations meet safety and reliability requirements.

8 Diagnostic Information

PD measurements provide valuable diagnostic information about the condition of insulation systems. Analysing the characteristics of PDs can help identify the nature of insulation defects, whether they are due to surface discharges, corona, internal voids, or other factors.

9 Optimization of Insulation Design

PD measurements contribute to the optimization of insulation design for new equipment. Understanding the behaviour of insulation under different conditions helps engineers design more robust and reliable systems.

10 Environmental Impact

By addressing partial discharges and preventing equipment failures, the environmental impact is reduced. Unplanned downtime, repairs, and replacements often have associated environmental costs, and preventive measures can mitigate these.

! In summary, measuring partial discharge is an essential aspect of maintaining the health and reliability of high-voltage electrical systems. It allows for proactive management, reduces the risk of failures, and supports the overall safety and efficiency of electrical installations.

What is the most important feature on an acoustic imaging camera?

The importance of features on an acoustic imaging camera can depend on the specific application and user requirements. However, several key features are

generally considered crucial for effective and accurate acoustic imaging. Here are some important features to consider:

1 High Spatial Resolution

High spatial resolution enables the camera to capture detailed images, making it easier to identify and locate sources of acoustic emissions. This is particularly important when dealing with complex environments or when precise localization is required.

2 High Sensitivity

Sensitivity determines the camera's ability to detect low-level acoustic signals. A highly sensitive camera can identify faint sounds, including those associated with early-stage partial discharges or other subtle sources of acoustic emissions.

3 Wide Frequency Range

An acoustic imaging camera with a wide frequency range is versatile and can capture various types of acoustic events. Different applications may involve ultrasonic frequencies, audible ranges, or even infrasound, so having flexibility in the frequency range is advantageous.

4 Real-time Imaging

Real-time imaging capability allows users to observe and analyse acoustic events as they happen. This feature is essential in dynamic situations, such as industrial processes or troubleshooting scenarios.

5 Data Storage and Analysis Software

Effective data storage and analysis software are crucial for processing and interpreting the collected acoustic data. User-friendly software with advanced analysis tools can enhance the camera's utility and facilitate comprehensive assessments.

6 Portability and Ergonomics

Portability and user-friendly design are important for practical use in various environments. A portable and ergonomically designed camera is more versatile and user-friendly, especially when conducting on-site inspections.

7 Integration with Other Technologies

Integration capabilities with other monitoring technologies or diagnostic tools can enhance the overall effectiveness of the acoustic imaging system. This might include integration with vibration analysis tools, thermal imaging, or other condition monitoring equipment.

8 Durability and Robustness

The camera should be robust and durable to withstand different environmental conditions. This is particularly important for applications in industrial settings or field inspections where the equipment might be exposed to harsh conditions.

9 Battery Life

For portable or field applications, a sufficient battery life is essential to ensure that the camera remains operational for extended periods without frequent recharging.

10 Cost-effectiveness

While ensuring high performance, the cost-effectiveness of the acoustic imaging camera is an important consideration. It should offer a good balance between features, performance, and affordability.

11 User Interface

An intuitive and user-friendly interface facilitates ease of use and efficient operation. Clear controls and a well-designed interface contribute to the overall user experience.

! When selecting an acoustic imaging camera, it's crucial to assess these features based on the specific requirements of the intended applications, whether it's for industrial inspections, research, or other purposes. Additionally, staying informed about technological advancements in acoustic imaging is essential as new features and improvements are continually being developed.

Why is gas leak measurement so important?

Gas leak measurement is important for several reasons:

1 Safety

Gas leaks can pose serious safety risks, as many gases are flammable, toxic, or both. Detecting and addressing leaks promptly helps prevent accidents, explosions, fires, and adverse health effects.

2 Environmental Impact

Some gases contribute to environmental pollution and climate change. Methane, for example, is a potent greenhouse gas. Identifying and fixing leaks can help reduce the release of these harmful substances into the atmosphere.

3 Resource Conservation

Gas leaks result in the loss of valuable resources. Whether it's natural gas in industrial processes or refrigerants in HVAC systems, detecting and fixing leaks helps conserve resources and reduce economic losses.

4 Compliance with Regulations

Many industries and regions have strict regulations regarding gas emissions. Detecting and addressing leaks is essential for compliance with environmental and safety regulations, helping businesses avoid legal consequences and fines.

5 Energy Efficiency

Unintended leaks contribute to energy waste. For instance, a leaking compressed air system or a steam trap can lead to increased energy consumption. Identifying and repairing these leaks can enhance overall energy efficiency.

6 Early Detection

Acoustic imaging cameras allow for the early detection of gas leaks, often before they become visible or noticeable through traditional means. This early detection is crucial for preventing larger incidents and minimizing potential damage.

7 Cost Savings

Prompt identification and repair of gas leaks can lead to significant cost savings. By preventing accidents, minimizing resource losses, and improving energy efficiency, businesses can reduce operational costs and increase their overall profitability.

8 Public Perception

Companies that prioritise safety and environmental responsibility are often viewed more favourably by the public. Demonstrating a commitment to identifying and addressing gas leaks contributes to a positive public image and can enhance relationships with customers, employees, and the community.

! Acoustic imaging cameras are valuable tools for gas leak detection because they allow for non-intrusive, real-time monitoring of large areas. They use sound waves to detect the ultrasonic noise produced by gas leaks, providing a visual representation of the leak source. This technology enhances the efficiency and effectiveness of gas leak detection efforts.

What is "phase resolved" partial discharge (PRPD)?

Phase-Resolved Partial Discharge (PRPD) is a technique used in the field of electrical engineering to analyse and diagnose partial discharge (PD) activity in high-voltage insulation systems, such as those found in power cables, transformers, and switchgear. Partial discharge refers to localized breakdowns or discharges within an insulation system that do not bridge the entire insulation space but can still lead to the deterioration of the insulation over time.

Key aspects of Phase-Resolved Partial Discharge analysis include:

1 Phase Angle Analysis

PRPD analysis involves plotting the occurrence of partial discharges against the phase angle of the applied voltage. This results in a PRPD pattern, which is a graphical representation that can reveal patterns or clusters of partial discharge events occurring at specific phases

2 Localisation of PD Sources

By analysing the PRPD patterns, it is possible to localise the sources of partial discharges within the insulation system. Different types of defects or insulation breakdowns may produce distinct patterns, helping engineers identify the nature and location of potential issues.

3 Quantitative Analysis

PRPD analysis can provide quantitative information about the severity of partial discharge activity. This information is useful for assessing the condition of the insulation and making informed decisions about maintenance or replacement.

4 Monitoring and Diagnosis

Continuous monitoring of partial discharge activity using PRPD analysis allows for the early detection of insulation problems. This proactive approach can help prevent catastrophic failures and extend the lifespan of high-voltage equipment.

! Overall, Phase-Resolved Partial Discharge analysis is a powerful tool for assessing the health of electrical insulation systems, enabling engineers to take preventive measures and ensure the reliable operation of high-voltage equipment.