APRIL 2025

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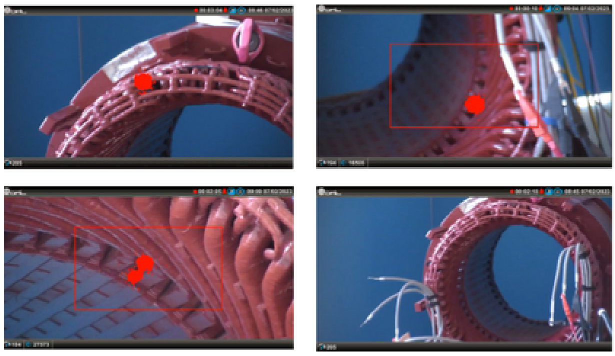
OFIL SYSTEMS

NEWSLETTER

CWIEME BERLIN | **3-5 JUNE 2025** MESSE BERLIN

Meet Us at CWIEME Berlin!
Discover OFIL's cutting-edge UV solution for visual pinpointing of partial discharge (PD), enabling precise localization on stator coils.
Learn how our technology enhances PD detection in motor, EV motor, and generator insulation systems.

📍**Visit us at Stand 27A52 at the CWIEME Exhibition – we look forward to meeting you!**



In this newsletter:

Previous Newsletter

Upcoming Training in the U.S.

OFIL Academy is excited to announce the next Master Corona PD Detection Training course! For electrical utilities, grid reliability is everything. Detecting and analyzing Corona Partial Discharge (PD) early can prevent costly failures and extend asset lifespan.

📍 **Location: Nashville, Tennessee**
📅 **Date: May 6th – 8th**

Gain industry-recognized UVographer Certification and take your expertise to the next level!

Registration on our website

Transmission and Distribution Line Inspection Drone Solution

As demands on utility infrastructure monitoring increase, power companies are under growing pressure to inspect high-voltage transmission and distribution lines with speed, precision, and safety. These inspections often span vast, remote, and challenging environments. Traditionally, this has included aerial methods such as helicopters, which, while effective in certain scenarios, can be costly, require extensive coordination, and introduce operational risks.

To address these challenges, RMUS, a global leader in uncrewed systems, has partnered with OFIL and Real Time Robotics to deliver a comprehensive drone-based inspection solution. This integrated platform enables the simultaneous capture of infrared thermal data, ultraviolet corona PD activity, and high-resolution imagery during a single flight. It offers utilities a streamlined inspection option that complements existing strategies.

RMUS developed this system with direct input from utility professionals, focusing on real-world needs:

1. **High Operational Costs**: Traditional aerial inspections can cost thousands of dollars per hour, which adds up quickly for recurring maintenance efforts.
2. **Sensor Integration Challenges**: Deploying multiple sensors such as thermal, UV, and visual can be complex when managed across separate platforms.
3. **System Complexity:** Utility teams often prefer easy-to-operate systems over those that require heavy technical setup and integration.
4. **Rapid Results:** Utilities need fast access to actionable data with minimal post-processing or delays.
5. **Compliance Standards**: More utilities are adopting platforms that avoid non-NDAA compliant components to meet internal cybersecurity and procurement policies.

The Solution: Compact, Capable, and Compliant

At the core of this solution is the Real Time Robotics HERA, a foldable, high-performance drone designed for portability and capability. Compact enough to fit in a backpack, the HERA can carry advanced payloads such as the OFIL micROM and the HERASight LR sensor suite; an integrated high-resolution camera, radiometric thermal camera, and laser range finder. It offers flight times of up to 50 minutes.

The HERA uses only NDAA-compliant components, aligning with modern security and sourcing requirements.

Operators can adjust sensor settings in real time during flight, enabling responsive data collection. With a transmission range of up to six miles, the drone can be used effectively in both remote and urban utility environments.
What sets this platform apart is the onboard Nvidia Jetson Xavier NX processor, which enables real-time AI processing. Utilities can deploy custom anomaly detection models directly on the drone and train these models using internal inspection data. RMUS provides support for tailoring and integrating these models based on each utility's specific needs.

Featured Sensors Include:

- **Teledyne FLIR Boson**: 640 x 512 radiometric thermal imaging for detecting heat anomalies.
- **OFIL micROM**: A compact ultraviolet camera designed for detecting corona partial discharge and arcing.
- **Sony ILX-LR1**: A 61MP high-resolution visual camera for detailed documentation and component condition analysis.

How It Works
The drone can be operated manually or autonomously using pre-programmed flight paths. As it follows the transmission or distribution route, video feeds from the thermal, ultraviolet, and visual sensors are streamed live to the operator and can also be viewed by remote teams.

During the flight, onboard AI models review incoming data and flag anomalies such as temperature variations or corona activity. These detections are displayed immediately on the operator interface, enabling fast and informed responses.

After the flight, all collected data is uploaded into OFIL's Gridnostic software, a GIS-based inspection and analysis platform developed based on EPRI guidelines. Gridnostic allows utility teams to assess anomalies based on severity, organize data by location, and generate clear reports to support timely maintenance planning.

Supporting Compliance with IEEE Std 1808-2024: Gridnostic for Smarter Transmission Line Data Management

As electrical utilities face mounting regulatory pressures, aging infrastructure, and rising demands for grid reliability, the ability to collect, manage, and analyze inspection and maintenance data becomes a core operational priority. The **IEEE Std 1808-2024, Guide for Collecting and Managing Transmission Line Inspection and Maintenance Data**, addresses these challenges by offering a comprehensive framework for designing and implementing modern, computer-based data management systems.

OFIL Systems' Gridnostic platform is designed to support utilities in meeting the expectations outlined in the standard. By providing a comprehensive digital environment for organizing, analyzing, and sharing multi-sensor inspection data, Gridnostic enables utilities to operationalize IEEE 1808-2024 compliance—transforming inspection insights into actionable decisions.

IEEE Std 1808-2024

IEEE Std 1808-2024 is designed to help utilities transition from fragmented, paper-based inspection processes to efficient, computer-based data systems. Its scope includes the collection, validation, structuring, analysis, and long-term management of inspection data from transmission lines and associated assets. The guide provides a roadmap for implementing solutions that ensure data integrity, usability across departments, compatibility with GIS and enterprise systems, and compliance with regulatory standards.

The guide aims to transform inspection data into a strategic asset—enabling utilities to perform risk-based maintenance, improve grid reliability, and make better, data-driven decisions.

What is Gridnostic?

Gridnostic is OFIL Systems' intelligent inspection data management platform. It supports RGB, thermal, and UV imaging inputs, using artificial intelligence and expert-driven diagnostics to identify, assess, and prioritize issues across transmission infrastructure. Built on real-world utility experience, Gridnostic combines advanced analytics, GIS mapping, AI Copilots, and EPRI-based severity assessments into a seamless workflow—from data collection to insight generation and reporting.

This product was developed based on research and guidelines from the Electric Power Research Institute

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Structured Data Collection and AI-Based Analysis

One of the cornerstones of IEEE 1808-2024 is the importance of structured data entry and AI-enhanced analytics. The guide calls for systems that reduce human error, improve repeatability, and support consistent decision-making.

After images and videos are uploaded to Gridnostic, the AI Copilot automatically detects anomalies such as corona discharges and thermal hotspots. These are then reviewed and assessed using the Severity Diagnostic Tool, which converts qualitative imagery into quantified severity scores. This scoring mechanism reduces human subjectivity and allows utilities to prioritize repairs based on risk rather than opinion—exactly the type of decision support envisioned by the IEEE standard.

Geospatial Intelligence and Impact-Based Severity Scoring

IEEE 1808-2024 underscores the need for context-aware data to drive informed, risk-based decisions. Gridnostic leverages GIS mapping and infrastructure metadata to deliver location-specific insights for each inspection finding. By incorporating factors such as asset criticality, network configuration, and surrounding risk conditions, the platform dynamically adjusts severity scores to reflect both the condition of the asset and its broader operational context. This enables utilities to prioritize maintenance and mitigation efforts based on real-world impact and strategic importance.

Multi-Sensor Data Fusion and GIS Compatibility

The IEEE guide outlines the value of integrating data from various inspection tools—UV, IR, RGB, LiDAR—and ensuring compatibility with GIS platforms. Gridnostic is purpose-built to accommodate these needs. It fuses multi-sensor inputs into a unified platform and overlays inspection data onto interactive geospatial map layers and substation diagrams. This GIS integration enhances spatial understanding of asset conditions and supports better planning, visualization, and routing—helping utilities make smarter decisions faster.

Long-Term Data Retention and Trend Analysis
IEEE 1808-2024 also calls for systems capable of storing historical data and using it for trend analysis and predictive maintenance. Gridnostic offers full asset histories, enabling users to track fault development over time and assess the effectiveness of past repairs.

Knowledge Retention in the Face of Workforce Transitions
IEEE Std 1808-2024 highlights the urgent need to preserve institutional knowledge as experienced utility personnel retire at an accelerating rate. This shift creates a gap in diagnostic consistency and decision-making expertise.
Gridnostic addresses this challenge through its structured, EPRI-based severity assessment framework. By guiding users through a standardized evaluation process, the platform ensures consistent interpretation of inspection data—regardless of the technician's experience level. This approach safeguards the quality of asset assessments while supporting long-term continuity of knowledge across teams and generations.

Conclusion: From Compliance to Competitive Advantage
IEEE Std 1808-2024 sets a clear direction for advancing how electric utilities handle inspection and maintenance data. OFIL Systems' Gridnostic aligns seamlessly with this standard, offering the capabilities needed to collect structured data, apply AI-driven diagnostics, integrate geospatial and infrastructure context, and support long-term asset management strategies.

Adopting Gridnostic enables utilities to move beyond baseline compliance—embracing a smarter, more responsive approach to infrastructure management. The result is greater operational efficiency, improved grid reliability, and the ability to transform inspection data into a strategic asset.

Watch our webinar: Unlocking Grid Resilience: Enhancing Electrical Asset Health with Gridnostic

Go to Webinar

Improving Transformer Reliability with UV Technology

Transformers are mission-critical assets in the power grid, responsible for adjusting voltage levels for efficient power transmission and distribution. These high-value components are built to last for decades, but any failure can have serious implications—from power outages to major financial losses. In recent years, the urgency to maintain transformer reliability has grown even more pressing due to extremely long lead times for new units, often exceeding a year. For utilities and manufacturers alike, preventing transformer failure has become a top operational priority.

A key contributor to transformer failure is partial discharge (PD), a localized electrical discharge that can occur under high voltage conditions. One of the most common forms of PD in transformers is corona discharge, especially on external components such as bushings.

UV imaging technology offers a powerful way to identify and pinpoint these partial discharges early and visually, allowing for smarter design, better manufacturing quality, and more proactive field maintenance.

Applying UV Technology in Transformer Design, Testing & Manufacturing

In the early stages of transformer development, UV cameras are used during high-voltage design evaluations to uncover areas prone to corona PD activity. Components such as bushings and terminal connections are scanned during energization tests to reveal any points where the electric field causes discharges. This visual feedback enables engineers to modify component geometry or shielding early on, preventing future issues from emerging in the field.

UV imaging plays a particularly important role during high-potential (Hi-Pot) testing in manufacturing, where transformers are energized at 1.5 to 2 times their nominal voltage to verify insulation performance.

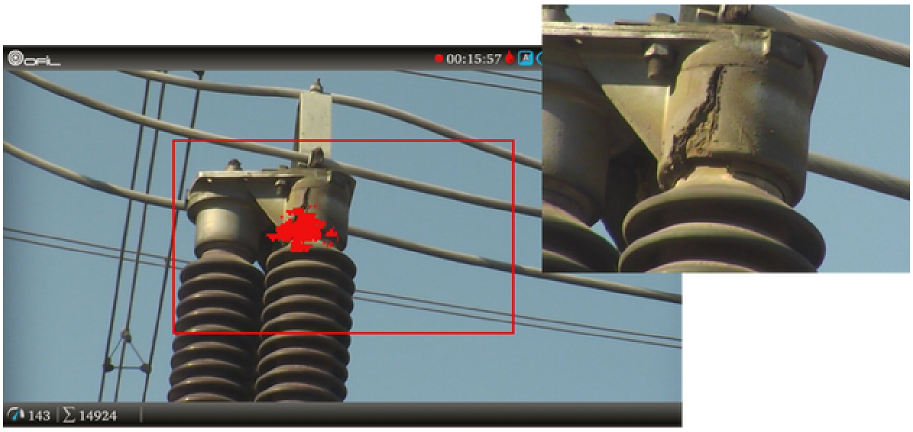
During these tests, UV cameras are used to scan external components—most critically the bushings, which are the primary interface between internal and external voltage systems. The detection of any corona activity during this process indicates the need for design refinement or corrective action, whether it's a sharp edge, a contaminated surface, or an incorrectly installed connection.

By integrating UV inspection into factory acceptance testing, manufacturers ensure the transformer is free from PD sources before it leaves the plant. This improves QA processes, reduces rework, and delivers more robust equipment to the customer—essential in an industry where equipment replacement is costly and slow.

Preventing Failures in the Field – UV Inspections for In-Service Transformers

Once transformers are installed and energized at substations, they operate under real-world stresses: environmental pollution, moisture, temperature variation, and aging insulation. In this setting, bushings remain one of the most vulnerable components. Corona discharges often develop on bushings due to surface contamination, weathering, or wear.

A particularly common source of discharge is the interface between the bushing and its metallic cap, where gaps, misalignment, or deterioration can allow electric fields to concentrate and trigger surface discharges. Without early detection, these localized events can lead to insulation breakdown or even catastrophic failure over time.



Utilities increasingly include UV imaging in their periodic inspection routines to detect corona discharges on transformers. A UV inspection allows maintenance teams to identify corona activity before it escalates into failure. These inspection results are especially valuable for planning targeted interventions—cleaning specific bushings, tightening connectors, or replacing degraded parts—without the guesswork or downtime of more invasive testing.

UV technology is also used after maintenance actions to verify that the issue has been fully resolved. For example, after cleaning a bushing, adjusting a connection, or reinstalling a corona ring, a follow-up UV scan can confirm that no discharge remains at rated voltage.

In highly polluted or coastal environments, utilities have even used UV inspections to optimize insulator washing cycles—prioritizing only the bushings and components with visible corona activity. This condition-based approach has saved some companies millions in unnecessary cleaning and reduced the risk of flashovers caused by postponed maintenance.

Conclusion

Once transformers are installed and energized at substations, they operate under real-world stresses: environmental pollution, moisture, temperature variation, and aging insulation. In this setting, bushings remain one of the most vulnerable components. Corona discharges often develop on bushings due to surface contamination, weathering, or wear.