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www.ofilsystems.com
solution@ofilsystems.com

OFIL SYSTEMS

NEWSLETTER

In this newsletter:

Rotating Machines - At **CWIEME Berlin**, OFIL showcased its PD detection tech and vision, while OFIL Academy launched a new **On-Line training course** by Dr. Nancy Frost on PD diagnostics in rotating machines.

How the UV EYE Family Powers Diverse Industry Applications: **Continuous Substation Monitoring, Robotic Inspections, Vehicle-Mounted Inspection and Rail Inspections.**

Detecting Contamination and Preventing Insulator Flashovers: Why UV Imaging Is a Critical Tool for Utilities.

IEEE-EIC 2025: OFIL Unveils New Research on **PD Mechanisms and Material Aging.**

Previous Newsletters

Upcoming Electrical Utilities CITI Training in the U.S.

OFIL ACADEMY

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: USA**
📅 **Date: September 2025**

Registration on our website

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

CWIEME BERLIN | 3-5 JUNE 2025 MESSE BERLIN

At CWIEME Berlin 2025, OFIL successfully showcased its advanced partial discharge (PD) detection technologies at booth 27A52. A key highlight was the presentation titled “Precision PD Pinpointing for Quality Excellence,” delivered by Sheyna Reizes, OFIL's VP of Product, in the Innovation Zone.
In her session, Reizes explored how OFIL’s ultraviolet (UV)-based inspection solutions enhance the reliability of electric motors and high-voltage systems across R&D, production, and maintenance phases. She also presented OFIL’s latest innovations and shared the company’s vision for the future of PD detection and predictive maintenance.

Partial Discharge detection in rotating machines
New On-Line CITI Course

OFIL ACADEMY

CITI training course focused on Partial Discharge detection in rotating machines, taught by industry expert Dr. Nancy Frost. With a distinguished career spanning high-voltage testing, dielectric materials, and insulation systems, Dr. Frost brings a wealth of knowledge from leading organizations. This course is designed to equip professionals in rotating machines repair & manufacturing, power generation, and electric vehicles with critical insights into PD theory, failure mechanisms, and hands-on detection techniques, helping them enhance the efficiency and reliability of motors and generators.

The comprehensive curriculum covers insulation systems, high-voltage testing, and imaging technologies, including UV camera applications for electrical fault detection. Participants will engage case studies, and practical sessions to gain actionable expertise in PD detection and machine diagnostics. Ideal for engineers, technicians, manufacturers, and service professionals, this course provides essential skills to mitigate failures, reduce maintenance costs, and ensure operational uptime.

📍 **Location**: On-Line
📅 **Date**: September 15–19 (~4 hours per day)

Registration on our website

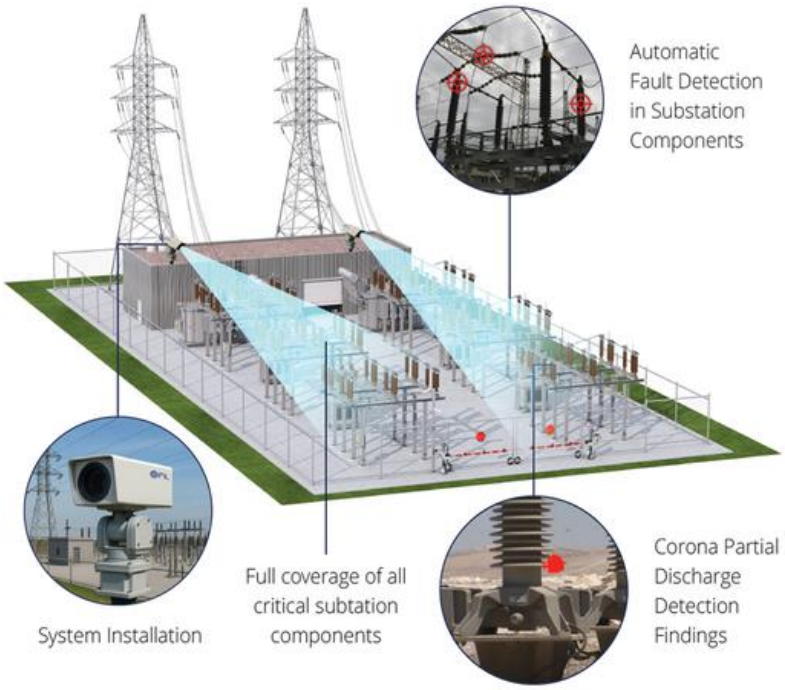
How the UV EYE Family Powers Diverse Industry Applications

The DayCor® UV EYE family includes three solar-blind UV camera cores: UV Eye, UV Eyelite, and UV EyeScope - each offering a unique balance of optical performance, size, and integration flexibility. All models are designed to detect and visualize corona PD and arcing activity with high sensitivity and precision, even in demanding environments. With robust IP65-rated protection and a developer-friendly API, the UV EYE family is used across a wide range of field-proven applications:

Continuous Substation Monitoring

UV EYEs are deployed in substations as part of either fixed installations or PTZ-mounted systems, providing continuous, real-time monitoring of critical high-voltage components. These installations are designed for long-term, unattended operation in outdoor or high-stress environments and serve as a key enabler of predictive maintenance strategies.

By automatically scanning transformer bushings, insulators, conductors, busbars, and other substation assets, UV EYEs support early detection of corona activity and arcing—conditions that indicate emerging faults. The collected data is stored and managed through Video Management Systems (VMS), typically ONVIF-compatible, allowing seamless integration into existing infrastructure and inspection workflows.

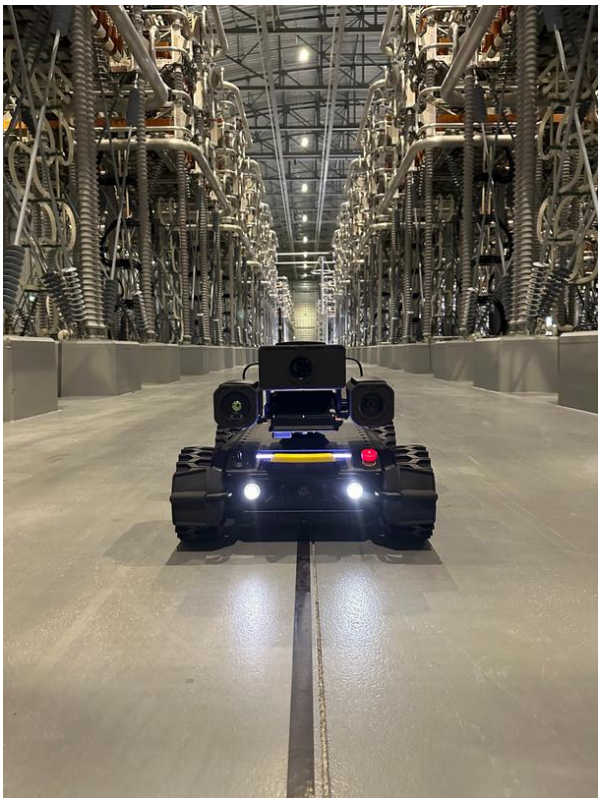


UV EYEs can be combined with thermal and RGB sensors to provide a comprehensive, multi-spectral view of substation health. This layered inspection approach improves diagnostic accuracy and helps utilities correlate visual, thermal, and UV indicators of asset degradation.
Automated reporting converts inspection data into actionable insights, enabling maintenance teams to respond faster and plan interventions based on real conditions rather than calendar intervals. This reduces unnecessary fieldwork while ensuring that emerging issues are addressed before they lead to failures.
By continuously monitoring corona-related anomalies and trending their development over time, utilities gain a powerful tool for managing risk, optimizing asset performance, and maintaining high levels of grid reliability.

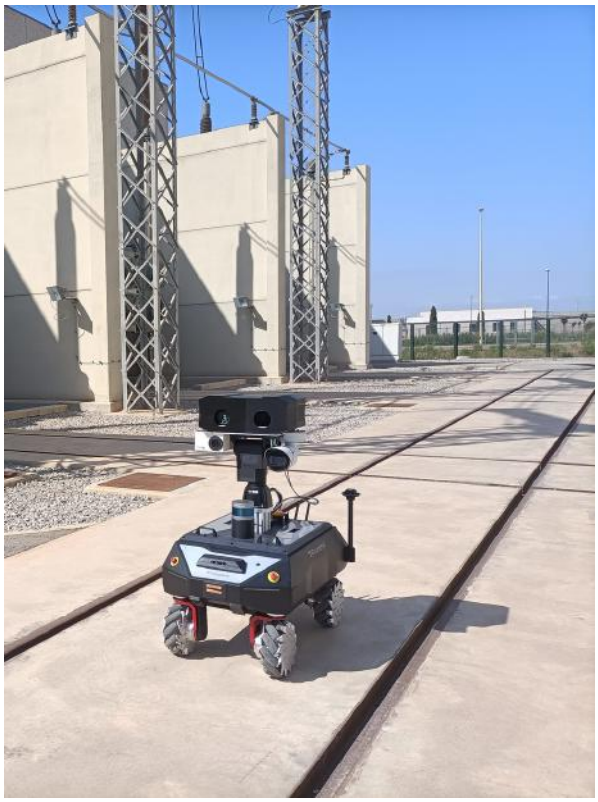
Robotic Inspections

UV EYEs are integrated into robotic platforms that perform autonomous or remote-controlled inspections in substations and HVDC converter stations. These robots carry out routine patrols or targeted diagnostics with high precision, minimizing the need for manual intervention in high-voltage environments.
Whether following pre-programmed routes or controlled in real time, the system provides live corona visualization, enabling immediate assessment of electrical components. UV EYEs can also be paired with thermal and RGB cameras, supporting a multi-layered inspection approach. This allows utilities to detect issues early, reduce maintenance frequency, and ensure stable, uninterrupted operation. Designed for seamless compatibility with a wide range of robotic systems, UV EYEs enhance the automation and reliability of substation monitoring - particularly in high-risk, high-demand installations such as HVDC systems.

OFIL UV camera integrated on Ross Robotics autonomous platform for HVDC hall inspection



Robotnik robot with OFIL UV camera, deployed by BCB for substation inspection



Vehicle-Mounted Power Line Inspection

UV EYEs can be mounted either on a pan-tilt-zoom (PTZ) system or fixed directly to inspection vehicles that patrol transmission and distribution lines. These vehicles are often purpose-built or retrofitted specifically for utility inspection tasks, allowing for continuous and systematic scanning of overhead infrastructure.

This setup is highly efficient for utilities, enabling large sections of the grid to be inspected quickly. The system can operate as a standalone UV inspection tool or be integrated with thermal and RGB sensors, creating a powerful multi-sensor platform. This combination enhances detection accuracy, improves fault classification, and accelerates decision-making.

Vehicle-mounted inspections are particularly well-suited for routine patrols, emergency response after storms, and verification of asset condition in remote or difficult-to-access areas, saving time, reducing operational risk, and supporting more effective maintenance planning.

Train-Mounted Rail Inspections

Installed on high-speed railway inspection cars, UV EYEs are used to monitor railways overhead lines in real time. Positioned on the roof of laboratory or passenger railcars, they provide clear visibility of insulators, conductors, and supporting hardware along the track.

These systems are specifically designed to detect corona partial discharge activity while the train is in motion - capturing critical data without disrupting rail operations. By identifying PD-related anomalies on overhead line components, UV EYEs help operators locate developing issues before they escalate into failures.

The system can operate independently or feed data to onboard analytics tools for post-run analysis. This capability enables maintenance teams to schedule targeted interventions, improve network uptime, and reduce reliance on manual inspections across large rail corridors.

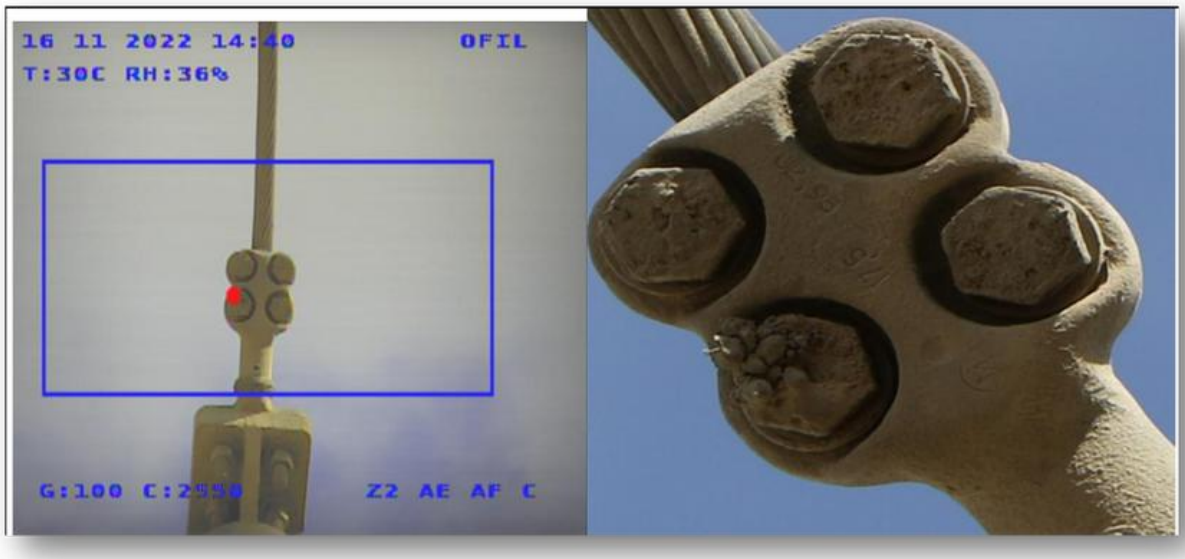
Detecting Contamination and Preventing Insulator Flashovers: Why UV Imaging Is a Critical Tool for Utilities

As grid infrastructure ages and environmental conditions become more challenging, electrical utilities and industrial companies operating substations in polluted environments—such as mines, cement plants, and chemical facilities - face a growing threat: contamination-induced flashovers. These incidents, caused by pollution buildup on insulators, can lead to power outages, costly equipment failures, and even fire hazards.
Despite widespread use of infrared (IR) thermography for condition monitoring, IR alone may not be sufficient for early contamination detection. Ultraviolet (UV) imaging, by contrast, offers a powerful complementary tool, enabling utilities to see what thermal imaging can miss.

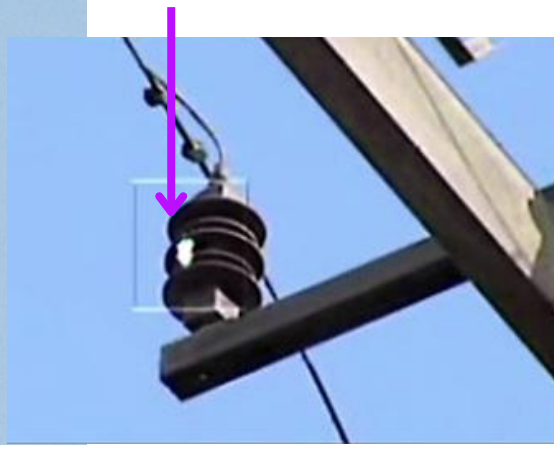
The Contamination Challenge
Outdoor insulators are continuously exposed to contaminants like salt, dust, industrial emissions, and agricultural residue. Under humid conditions (fog, dew, drizzle), these pollutants form conductive films across the insulator surface. This can lead to partial discharges and dry band arcing, which may ultimately result in a full flashover.

Major pollution sources include:

- Coastal Pollution: Salt spray and sand contribute to conductivity during high humidity and fog.
- Industrial Pollution: Emissions from industries deposit materials that become conductive when wet.
- Cement plants and rock dust from milling processes.
- Chemical pollutants such as sulfur dioxide, hydrogen sulfide, and nitrogen oxide.



Industrial Pollution on Hardware in Cement Factory

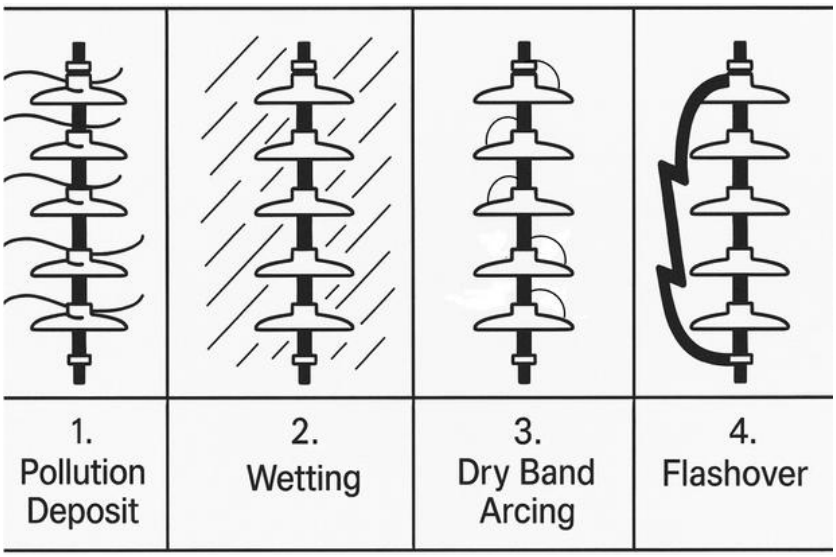


PD due to contamination pinpointed by UV Camera

Routine washing and manual inspections are costly, labor-intensive, and often reactive rather than preventative. As utilities transition toward condition-based maintenance, early and accurate detection of contamination becomes critical.

Understanding the Insulator Flashover Process

1. A pollution layer accumulates on the insulator
2. Under wet conditions, the pollution layer becomes conductive
3. Surface leakage current begins to flow, generating heat and partially drying the layer
   - Drying causes non-uniform "dry bands" that disrupt the flow of current
   - Voltage stress across dry bands causes air breakdown, producing arcs
   - Surges occur with each arc over the dry bands.
4. If the remaining moist areas have low resistance, arcing continues, resistance drops further, current increases, and a complete insulator flashover occurs



The Solution: UV Cameras for Early Detection

UV cameras are uniquely capable of detecting corona partial discharge and arcing activity that signals contamination and electrical stress.

Key advantages:

- **Early Warning of Dry Band Arcing**

UV imaging reveals corona discharges triggered by uneven electric fields caused by contamination - an early sign of impending failure.

- **Remote and Real-Time Inspection**

UV cameras enable inspections from a distance using handheld devices, vehicle-mounted units, or drones - without the need to shut down equipment.

Washing Methods and the Role of UV Cameras

Effective maintenance involves both visual assessment and targeted cleaning. Common washing methods include cold washing, typically performed when the system is de-energized, and hot washing, which can be done while the system remains energized.

UV cameras enhance the effectiveness of these methods by supporting inspections before, during, and after the washing process.

Before washing, UV imaging helps identify the specific contaminated areas, allowing maintenance teams to focus only on the affected zones rather than the entire installation. During washing, it enables real-time monitoring to ensure that discharges are being eliminated as cleaning progresses. After washing, UV inspection verifies that all contamination has been successfully removed and no corona activity remains.

This process ensures efficient cleaning, reduces unnecessary labor and water use, and helps confirm that contamination-related risks have been properly addressed.

Click to watch

Click to watch

Conclusion

UV imaging is no longer optional. As environmental conditions become more extreme and regulatory pressures increase, utilities need better tools to predict and prevent contamination-related failures. UV cameras provide an early warning system that infrared technology cannot, making them indispensable for modern substation and transmission line maintenance.

IEEE-EIC 2025: OFIL Unveils New Research on PD Mechanisms and Material Aging

OFIL is proud to announce our significant contribution to the 2025 IEEE Electrical Insulation Conference (EIC), which will be held from June 8th to June 16th, 2025. This prestigious event will feature our latest research paper titled "Aging of Components due to Partial Discharge Degradation Mechanisms". The paper, authored by Nancy Frost, PhD, Eran Frisch, and Sheyna Reizes, delves into the critical issue of partial discharge and its impact on dielectric materials.

Paper Overview

Our research investigates the effects of partial discharges on dielectric materials, focusing on both chemical and mechanical degradation mechanisms. The study highlights how PD activity leads to molecular bond breaking, microscopic mechanical cracks, and chemical interactions that accelerate material aging. By understanding these mechanisms, we aim to provide insights into improving the longevity and reliability of electrical insulation systems. The paper also explores the impact of environmental factors, such as moisture and contaminants, on PD-induced degradation.

Oral Presentation

We are excited to share that our team will be giving an oral presentation at the conference. This presentation will provide an in-depth look at our findings and offer attendees the opportunity to engage with our experts. The session will cover key sections of the paper, including the theory of partial discharge, aging of dielectrics, and detailed case studies on degradation mechanisms in various electrical components.

Meet the Authors

Nancy Frost, PhD: Nancy is a renowned expert in the field of electrical insulation and partial discharge. She holds a PhD from Clarkson University and has extensive experience in accelerated aging of outdoor insulators. Nancy's work has been instrumental in understanding the chemical and mechanical effects of PD on dielectric materials. She is the founder of Frosty's Zap Lab LLC in Albany, NY, USA.

Eran Frisch: Eran is serving as the CTO at OFIL. With a strong background in physics and electro-optics engineering, Eran has been pivotal in advancing our understanding of PD and its impact on electrical insulation systems. His expertise and dedication have significantly contributed to the development of innovative solutions for PD detection and mitigation.

Sheyna Reizes: Sheyna is serving as VP Product at OFIL. Her work focuses on the practical applications of PD research, ensuring that our findings translate into real-world solutions. Sheyna's contributions have been vital in bridging the gap between theoretical research and practical implementation.

We invite all attendees of the IEEE-EIC Conference to join our presentation and engage with our team. This is a unique opportunity to learn from leading experts in the field and gain valuable insights into the latest advancements in electrical insulation and partial discharge research.

For more information about the conference and our presentation schedule, please visit the IEEE-EIC Conference website or contact us directly.

We look forward to seeing you there!