

ON-LINE SUBSTATION PARTIAL DISCHARGE SURVEY



High-voltage equipment is exposed to electrical, mechanical and thermal stresses as well as environmental conditions that can act to accelerate the deterioration of insulation, and hence electrical integrity, eventually leading to failure. Detection and measurement of partial discharge (PD) phenomena, a symptom of insulation deterioration, can provide early warning. Different on-line techniques to detect PD include dissolved gas analysis (DGA), acoustic emission and radio frequency interference (RFI).

Well-established as an on-line, non-invasive, early-stage assessment technique, RFI scanning can quickly and accurately document problem areas before they may begin generating heat and be detected with thermography. Equipment identified as having above normal RFI levels can then be investigated in greater detail using more focused on-line (partial discharge, infrared, acoustic, ultrasonic, UV, etc.) and off-line testing techniques.

RFI surveying works particularly well in detecting PD generated in both passive and active substation equipment such as insulators and instrument transformers where no non-invasive, on-line methods presently exist.

Apparatus supported include:

- Insulators
- Arresters
- Instrument transformers (CTs, VTs, CVTs)
- Cable terminations
- Disconnectors
- Circuit breakers
- Transformers

Let Doble Power Services carry out a full suite of on-line surveys to ascertain the health of your substation and plant equipment. Doble also offers consulting and training services for PD surveyor professionals and predictive maintenance programs worldwide.

BENEFITS OF RFI SURVEYING

- Complete substations can be surveyed in short amount of time
- Non-invasive, conducted while facility is fully operational
- Rate and severity of discharge can be monitored and trended
- New substations can be given a clean bill of health as part of commission process
- Assessment of remedial, renovation or upgrade works

RFI TESTING

RFI inspections from Doble Power Services provide clients with the convenience and quality of a testing program established utilizing industry best practices. Doble's certified engineers bring decades of experience in predictive maintenance techniques from utility, power plant and industrial applications. Doble can support periodic inspections up to larger programs requiring full-time staff placement. Doble offers a complete solution including:

- Partial discharge
- Infrared
- Acoustic
- Moisture in oil

RFI CONSULTING

Thinking about incorporating RFI surveying into your existing testing programs?

Not sure how your current programs stack up against industry best practices?

Program development services from Doble Power Services are a great place to start. Doble can assist organizations at any stage of their program to form a roadmap for the development or improvement of an existing program including:

- Applications
- Safety practices
- Routes & scheduling
- Analysis & reporting
- Performance & metrics

RFI TRAINING

The right training provides the foundation necessary for the success of any predictive maintenance program. Our classes are led by Doble instructors who together have decades of experience and knowledge in the industry.

TYPES OF PARTIAL DISCHARGES

External:

- Surface discharges caused by pollution on insulator surfaces
- Leakage currents on insulator surfaces
- Insulator damage
- Loose connections
- Corona discharges

Internal:

- Insulation voids
- Poor conductor-insulation interfaces
- Poor insulator-insulator interfaces

CASE STUDY

Doble PDS 100 detects and locates sources of PD in a substation

A RFI survey was carried out on an entire 400 kV substation, and measurements of RFI were recorded at various survey locations for future trending. During the survey, a strong source of PD was triangulated to bus coupler isolator. Figure 1 illustrates measurements of RFI emissions taken at the suspect apparatus (trace in RED) and compared with the baseline measurement (trace in BLUE) for that section of the substation. Uplifts of 60 dB and 30 dB are evident at spot frequencies 400 MHz and 1000 MHz respectively, providing evidence that this apparatus is exhibiting significant signs of deterioration and that a fault condition exists.

Why Doble Power Services?

Extensive Global Experience

Doble has more than 40 consulting engineers each with extensive experience in power systems engineering applications.

Independent Expert Opinion

Trust Doble's expert consulting & testing services for unbiased diagnosis and assessment of critical assets.

Doble Peer Review Process

When you hire Doble, you are hiring the shared experience of our entire engineering team. Each Doble field service report is reviewed by at least one other consulting engineer.

Doble KnowledgeBase

Provides valuable benchmark data for use in evaluating test results on your equipment.



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Doble is an ISO 9001:2008 Certified Company.
Doble is an ESCO Technologies Company.
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