

Continuous Partial Discharge Detection

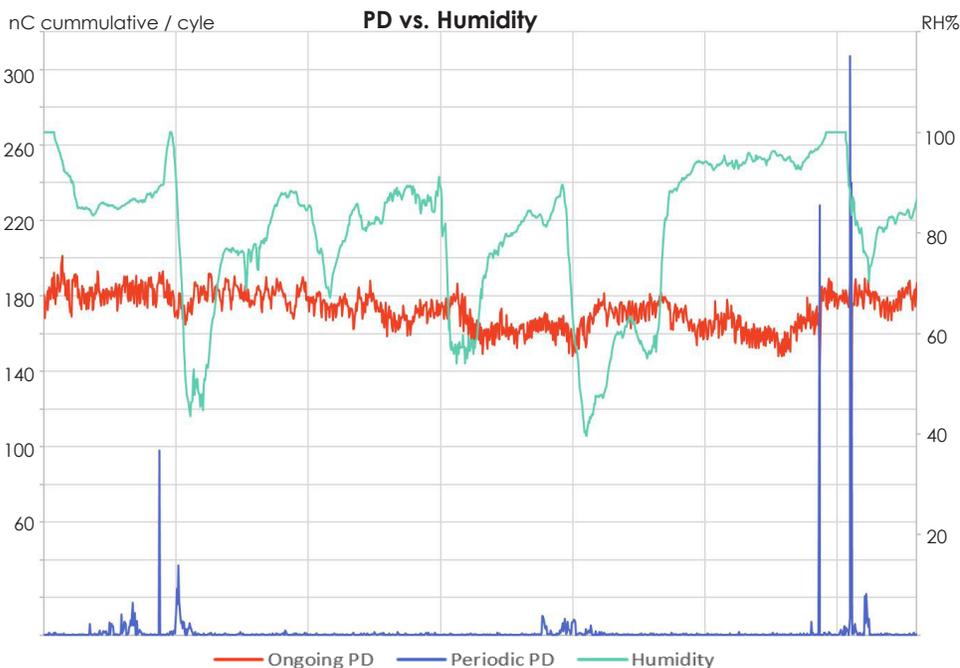
Client: A major USA Utility Company

Challenges: Substations located in environments with a condensing atmosphere (high humidity) are often susceptible to insulation degradation leading to partial discharge (PD) activity. In the present case the client had previously replaced bus duct isolation barriers in an effort to prevent system failures which were causing unplanned downtime and lost revenue. However the issue persisted which prompted them to seek out a continuous monitoring solution. Subsequently, IntelliSAW's Condition Asset Monitoring (CAM) system was deployed which provides 24/7 monitoring of critical contact point temperature, partial discharge events, and humidity levels.

Solutions: IntelliSAW CAM systems were installed throughout the substation in multiple areas to provide real-time, continuous monitoring at the following locations:

- o Feeder cable temperature and partial discharge
- o Bus tie temperature and partial discharge
- o Bus duct ambient temperature and humidity.

The IntelliSAW partial discharge detection system uses UHF radio detection methods over three bands (300MHz, 600MHz, and 1200MHz) which serves to filter out noise from known sources. Moreover, employment of signal analysis algorithms further refine the system output such that extraneous noise within the aforementioned bands is readily rejected allowing for clear reporting of PD events. In addition, the recognized PD is further characterized as internal and/or surface (corona) discharge events. The systems are bussted to a remote terminal unit (RTU) which pushes the data to a cloud server allowing for aggregation of measurement data, email notifications on alarm events, and collection of the data for further analysis.



Results: Data quickly showed the existence of ongoing PD activity, and although a cell tower is in close proximity to the substation, IntelliSAW's noise filtering process effectively eliminated any potential disturbances. Moreover, by bringing in humidity data it was clearly demonstrated that the periodic rise in condensing atmospheric condition was directly cor-related to significant PD event occurrences. As a result it has since been concluded that ongoing PD at the site is coming from the transformer and/or intervening switchgear while the sporadic PD originates in the bus duct when the relative humidity reaches 100%. With this information the customer can take definitive action to mitigate this issue by improving bus duct heating and insulation.