

CORONA INSPECTION COMPLIMENTS IR INSPECTION

We are familiar with Infrared (IR) technology for detecting overheating of equipment. At the other end of the spectrum is ultraviolet (UV) which detects high voltage discharges, often referred to as "corona discharge". Both IR and UV are invisible and a purpose designed IR or UV camera is required to observe the effects.

Ofil UVollé compact corona camera



Infrared and Ultraviolet inspection technologies are being used to assess the condition of operating electrical components and installations. Infrared thermography detects temperature changes and is proportional to the square of the current drawn. In the absence of current no heat develops, regardless of voltage.

DIRECTLY PROPORTIONAL TO VOLTAGE

Ultraviolet detects electrical discharges and is directly proportional to voltage. Partial discharge, corona and arcing occurs whenever voltage is present, regardless of current.

Both technologies are complementary and are classified as NDT – Non Destructive Testing equipment. Together they cover a wider spectral range and provide enough information to obtain a clear assessment of the condition of electrical assets. As such, both technologies are required to perform comprehensive surveys.

Unlike IR which is affected by solar radiation and emissivity of the material, UV detection is effective under all lighting and weather conditions.

CORONA DISCHARGE ON HV ASSETS

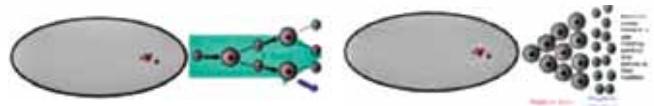
Corona discharge is associated with high voltage equipment such as electrical transmission lines, transformer insulators and bushings, switchgear, motors and the like.

Corona can be a sign of a defect, contamination, malfunction or bad design of electrical equipment.

Being able to pinpoint corona discharge and address potential equipment failure is important and can contribute significantly to the reliable operation of electrical apparatus.

WHAT IS CORONA DISCHARGE?

Corona discharge is a luminous partial discharge from conductors and insulators due to ionization of the air, where the electrical field exceeds a critical value.



A high local electric field ionizes the air and causes a discharge. This process is accompanied by excitation of Nitrogen molecules, leading to emission of UV radiation. Build-up of ionization occurs only if electron is going fast enough, i.e. if electric field exceeds a critical value.

A problem or defect in a component creating a local high electric field will show corona activity. Some molecules are not ionized but excited – emitting photons on relaxation.

Utilities are typically made aware of corona by complaints of faulty radio or television signals. Because corona is invisible in daylight to the naked eye, maintenance crews will investigate by aiming devices such as a corona camera or radio antenna at suspected areas, to track corona.

Corona discharge generates negligible heat and therefore is not detected with thermal (IR) cameras.

ENVIRONMENTAL DISTURBING EFFECTS

Corona discharge has the following damaging and environmental disturbing effects:

- Generation of corrosive materials, like ozone and nitrogen oxides that yields nitric acid under conditions of high humidity. These corrosive materials shorten the life span of high voltage lines and substations components.
- Corona causes damage to HV insulators, especially non-ceramic (NCI) insulators.
- Radio interference (RI/ RFI) mainly to AM transmissions.
- Audio noise. Radio interference and audio noise may raise customer complaints.

Corona inspections can direct maintenance engineers to the exact location of the failure and cut both direct and indirect costs of unnecessary washing, replacements and unplanned shutdowns therefore reducing the aging processes and extending the lifetime of the assets.

CORONA DETECTION ON THE DISTRIBUTION NETWORK

Electrical distribution systems need to meet customers' demands for continuous energy supply taking into consideration peak loads. Design, installation, operation and maintenance are the basic engineering considerations for a typical power system.

Material degradation due to corona discharges influences the electrical and mechanical performance of the power grid. It has been proven that partial discharge processes induce loss of hydrophobicity, increase leakage currents, lead to arcing, tracking, erosion and eventually to flashover. Arcing is often the cause of

audio noise and radio interference complaints and can indicate defective components. In particular, discharge detection can assist in preventing timber pole fires.

DETECTION OVER LONG DISTANCES

Unlike other forms of discharge detection, corona cameras can operate over large distances, typically from 0.5m to infinity. It is not necessary to be close to the discharge to detect it and all cameras have optical and digital zoom.

RANGE OF OFIL DAYCOR CORONA CAMERAS

Pacific Test Equipment announces the introduction of Ofil DayCor Corona cameras. The range comprises three portable models plus three special models for mounting on vehicles, electric railways and helicopters.

MERGING OF UV AND VISIBLE IMAGES

To accurately determine the source of a discharge it is essential to be able to merge the visible image with the UV image. All Ofil cameras include image merge.



Merging the visible image with the Corona image.



Visible image – no discharge evident



UV image – discharge visible but where is it coming from?



Merged visible & UV image shows clearly where the problem is



Ofil Luminair hand-held corona camera

COMPACT HAND-HELD CAMERAS

Simple single hand operation: turn-on, aim, shoot & store video clips and still pictures. UV and visible images are merged to show the exact emitting source of the discharge.

All hand-held models have colour daylight visible LCD, zoom, GPS, temperature & humidity measurement and are weatherproof to IP54. Weight is between 1.4 and 2.2kg.



Typical HV Discharges detected with an Ofil Corona Camera



Ofil ROM Corona Camera for aerial surveillance



For more information about these products or others on our website please contact:



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