

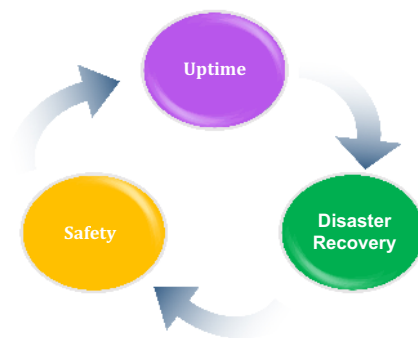
AUMSRI

ASSET UPTIME MANAGEMENT &
SPECIALIZED REFURBISHMENT OF INFRASTRUCTURE

Diagnostic Services for Steady Power Flow



**TRANSMISSION TOWER HEALTH ASSESSMENT (TTHA)
IN ONLINE CONDITION “NO SHUTDOWN REQUIRED”**



Transmission Tower Health Assessment in online condition “No Shutdown Required”

Sl.No	Activity	Description
01	Tower Leakage current measurement	Measuring the Leakage current of Tower body using advanced CT.
02	Leaking Insulator Detection	Checking Insulators for possible deterioration using advanced LID equipment. Audio and Video methodology is using to detect leaking insulator
03	Hot Spot Detection	Detecting Hot Spots on jumper joints & tower components
04	Corona Detection	Detecting Corona on Insulator Strings on each tower
05	Transmission Line - Inspection	Inspecting various objects/ components on tower and the line such as Tower Stub Condition, Earthing, Missing nut bolts, Step Bolts, Anti-Climbing guard, Tower members, Danger Board, Phase plate, Number plate. Condition of Armouring, Vibration Damper; Arcing horn, Spacer, Bird Guard, Split pin, Insulator – Broken, Contaminated, Flash over; polluted condition of conductor H/w and Earthwire H/w. * Optionally available with additional cost structures rust treatment and refurbishment of tower structure
06	GPS Mapping	Capturing Geo location and creating map with photos
07	Tower Footing Impedance	Checking Resistance & Impedance of Tower footing as per IEEE guidelines.
08	Executive Report	Comparative study of all the line and executive summary report

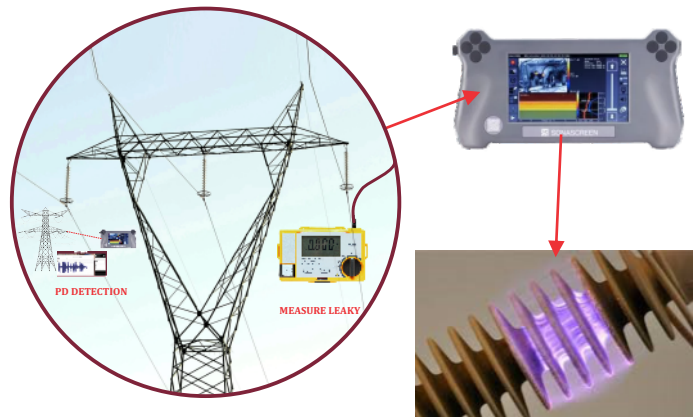
1. Tower Leakage Current Measurement

Innovative Flexible CT been using to measure leakage of the tower. High leakage tower are suspecting for the leaky insulator.



This method will reduce the Risk, time and cost of traditional hot line testing.

This Leakage Current Measurement is a quick, safe and effective method of identifying towers having weak insulators. Flexible AC/DC Clamp meter from reputed Japanese company MULTI is used to measure the leakage current of the tower body.

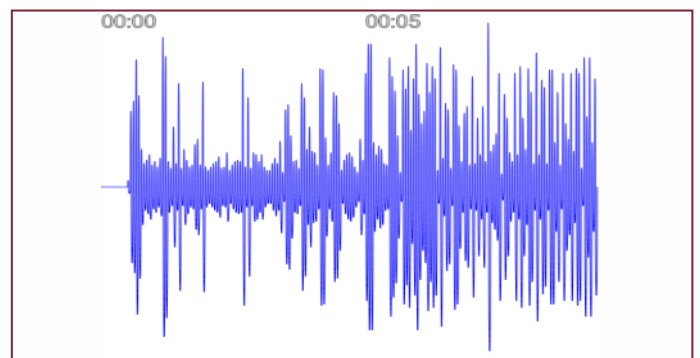


2. Leaking Insulator Detection

Audio and video acoustic leak detection method is using to detect leaky insulator of the tower.

Leaky insulator Emitting extra high frequency. The noise emitted is at very high frequency hence not audible to human ear. A new technique Audio and Video scanning is being used in detecting damaged, cracked or Punctured Insulators in Transmission Line and in Substation.

Using this Hi-tech ultrasound equipment, we Taurus Powertronics inspect Transmission Line insulators for any suspected abnormality.

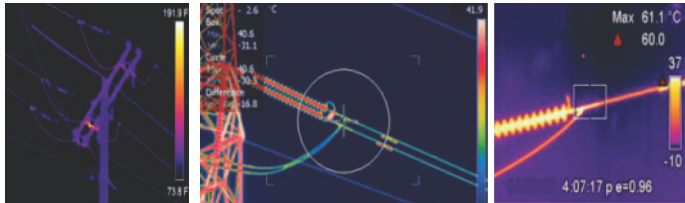


3. Hot Spot Detection

The main reason for developing hot spots in the system is loose joints. This happens due to poor workmanship, constant vibration or wear & tear of material.

A loose joint causes more resistance to the current flow and hence get heated up. With the rising temperature the spot becomes hotspot and if not attended reaches to a breakdown point.

Hot spot is not visible to naked eyes unless it becomes too hot. We Taurus Powertronics provide Hot Spot detection service using latest IR Thermovision camera.



As seen in above pictures Thermovision Scanning is done for dead-end joints and Mid-span joints. Both digital and thermal images are provided in the report for easy mapping and comparison. Tower Number, Phase, Side are clearly mentioned in the report for easy identification of the joints, so that remedial action can be taken without any confusion.

4. Corona Detection

Corona, the partial discharge is formed due to ionization of air where electric field exceeds a critical value and it produces ozone and Nitrogen oxide which are corrosive chemicals. During high humidity this oxide creates Nitric Acid which is very corrosive and works like slow poison for the system. Corona damages the area around it and also creates radio interference. It emits UV rays and makes audio noise. Insulators and conductor get damaged due to Corona.

Corona on the insulator is very dangerous because the Nitric Acid which is created during high humidity starts damaging the insulator. Unless the intensity of corona is very high it cannot be seen with naked eyes. Early detection of corona and the subsequent preventive action will help to maintain the required uptime.

Corona on the Insulator can be removed by cleaning the insulators thoroughly. Corona detection can also be done before and after cleaning of insulator as quality check.

Ultra High sensitive Daytime Corona Camera is used to capture corona even during broad day light.



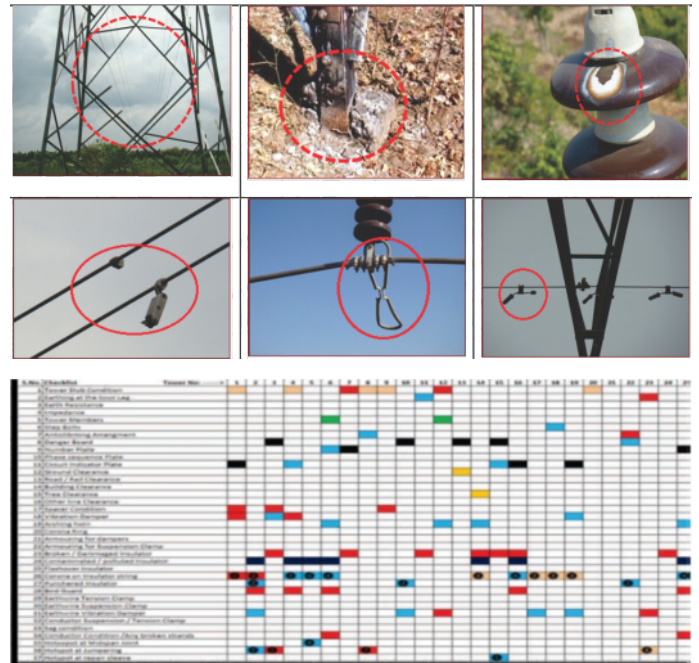
5. Transmission Line - Inspection

Visual Inspection of the Transmission line is done from the ground using binocular. A HD Digital camera is used to capture all components of tower from top to the bottom. Apart from tower components, conductor and it's components too are observed for any possible defects.

Following items are covered in visual inspection.

Tower Stub Condition, Bottom earth wire, Missing nut bolts, Clearance with Ground, tree, road, Railway track, Telephone and other transmission lines. Condition of Armoring, Vibration Damper, Arcing horn, Spacer, Bird Guard, Mid-span joint, Repair Sleeve. Condition of the Insulator like Broken disk, Contaminated, Flash Over, polluted disks. Condition of Conductor H/w and Earthwire H/w.

Tower parts with abnormal conditions are highlighted in the report and photos are printed for the same.



6. GPS Mapping

The real world Geographical Location plays very important role mainly in navigating or to reach the exact location at the earliest.

During any breakdown, men and machinery must reach the exact location as early as possible to carry out the restoration work. But sometimes they reach a wrong spot due to miscommunication or inability in explaining the exact location by the coordinating staff. Relays and Fault locator indicate the distance of the fault in terms of Line Length. The distance by road or aerial distance to the fault location is always different. The physical location is identified by totalling the span lengths in the available "Tower Schedule" at substation. If this "Tower Schedule" is updated with Geo positions, it is much easier to identify the exact location indicated by relay and fault locator.

Now, with the usage of smart phones becoming quite common, if the Geo Location is communicated, the restoration staff can reach the site quickly and easily.

The very popular mapping tool, "Google Maps" allows you to make your own map using details. Wherein the geo location of each tower is feed in and lines are drawn between these towers. This kind of ready map is very helpful in understanding the terrain and also it is

easy to explain the staff about the route of the line and surrounding area. The basic requirement to do so is to capture Geo Location of each tower in the line.

The day is not too far when we will be able to see real-time pictures of the place by providing it's Geo Locations.



8. Executive Summary

Executive summary of the entire test will be prepared under the leadership of experienced team head.

All the data captured during inspection of the tower will be carefully studied and assessed by the team.

Detail report will be generated with fact reading which will be excellent data to improve the performance of the network.

Our recommendation will also be the part of report.

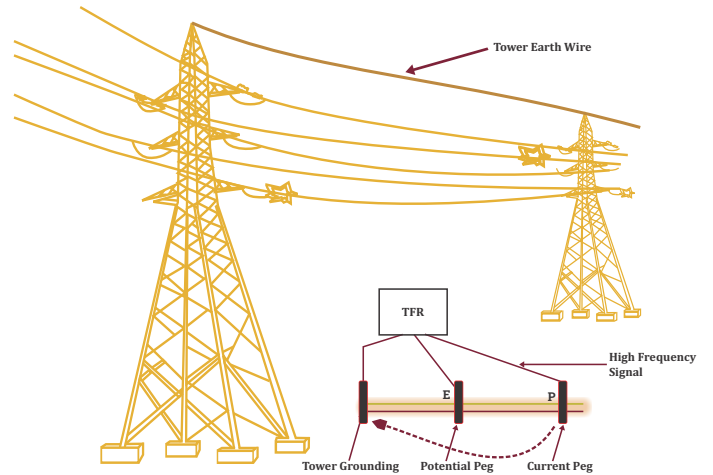
All this health assessment will be carried out in online condition no shutdown is required

7. Tower Footing Resistance & Impedance Measurement

The high energy generated during a lightning stroke or heavy surges must be discharged immediately through tower body. The earthing provided to Tower legs should provide least resistive path to dissipate this high energy as quickly as possible. It is possible that sometimes the earthing provided is not proper and can prove Disastrous during heavy surges or lightning.

We Taurus carry out measuring of Tower Footing Earth Resistance, Impedance & Inductance without removing the top earth-wire but the towers are virtually isolated from each other by injecting high frequency.

The entire procedure is carried out as per IEEE standard



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