WATTS UP Quarterly

TAURUS Innovative Technologies

YEAR: 2 ISSUE:7 Jan-Mar 2022

CHAIRMAN'S ADDRESS

Dear Team,

It is a pleasure to note that we have successfully sailed through the third wave of corona as a company and country.

The closure of the financial year seems clear now, without any hurdles. We hope to surpass our highest achieved target this year.

We have launched new products this quarter, like the substation asset testers and GIS asset testers , very crucial in the maintenance of substations. We are happy to note that our demonstrations have been receiving very good appreciation from utility asset owners.

We are also proud to announce the receipt of our first order of Drone patrolling for a line of 215 kms long.

This is a new addition to our Stitam wing. The work for this will start next month.

As we are working hard for closure of this year, the team is also preparing for the next year. Next financial seems very promising and are eagerly waiting for the same.

Thanks and Regards
M N Ravinarayan
Chairman

NECESSITY AND IMPORTANCE OF TECHNICAL AUDIT AND HEALTH AUDIT

To avoid sudden breakdown of health of any human being, "whole body checkup" is considered essential.

As outcome of various tests / checks carried out on body of a person, their deficiency and suspected health problem is brought out in final and detailed report. By doing so, crisis evolved by unnoticed health problem can be avoided and precious life of a person can be saved.

Similar is importance and usefulness of "Technical Audit and Health Assessment" of electrical equipment of substation / switchyard and of power transmission lines.

For genuine and correct assessment of health of equipment, following is essential-

a. Health of equipment is to be assessed CRTICALLY

b. Thorough knowledge of the tests to be carried out is paramount.

c. Knowledge of critical assessment of tests results, to ensure deterioration in value of health parameters

d. Capability of expert to corelate the variation in value of test parameters with probable defect

Hence, need of highly knowledgeable expert having vast experience in field of technical audit hand health assessment is also a key to successful audit. The desired expert needs to have knowledge of

a) Design of equipment

b) Aspects related to "Quality", in manufacturing and installation of equipment.

c) Testing of equipment (field/at site and at factory)

d) Condition monitoring during operation

e) Latest diagnostic techniques of health assessment of all electrical equipment.

The scope and process of Technical Audit and Health Audit

The test results of periodic diagnostic tests (the tests carried in past years) are critically evaluated / assessed by expert who can establish the status of health of the equipment and knowledgeable to notice the deterioration in health of by the variation in value of parameter which is indication of status of health of equipment.

Level of usefulness of outcome of Technical Audit and Health Audit

If the health of assessment is carried out as CRITICAL activity, the reliability is more than 99%. The probable defects and deficiency in health of equipment can be pointed out/ corelated with outcome of report of technical audit and health assessment.

If health of an equipment is critically assessed and is declared fully healthy, its healthiness can be relied upon up to confidence level of 99% and the owner of equipment can be sure that equipment will not fail suddenly and will serve for its designed life or more.

Subjected to health assessment are

A. Electrical equipment of substation (AIS & GIS)

1. Transformers | 2. Circuit Breakers
3. Instrument Transformers (CT's and PT's/CVT's)
4. Lightning Arrestors (LA) | 5. Disconnectors / Isolators

B. Transmission Line Towers

1. Insulators | 2. Fittings
3. Tower parts/ Members | 4. Tower Footing
5. Complete Transmission line

Taurus Powertronics has got vast experience of doing health assessment of all equipment of EHV substation as well as of Transmission lines up to 765 kV (AC) and 800 kV (DC). Taurus Powertronics is one of such rare organization having expert having exceptional vast knowledge and experience in this field. In process of technical audit & health assessment, only critical diagnostic tests are carried out and NOT all routine tests. Taurus Powertronics can take up any technical problem related to performance of electrical equipment.

Prepared by **Mr. B. S Pandey (Ex PGCIL E.D)**

GIM (GAS INSULATION MONITOR)

SF6 gases are widely used gases for GIS substation and the AIS substation circuit breakers. It is one of the best insulation mediums for the circuit breakers. But by using the Sf6 we have to maintain some of the quality and the safety protocols for the smooth operation of the Circuit breakers. Without maintain that we can face below problems

- **Equipment Failure: -**

  A leak in gas-insulated equipment means there is less gas to protect it from the effects of electrical arcs. The results are lost signals, short circuits, malfunctions, and, ultimately, equipment failure that compromise safety and operations. Even a 10% gas loss can permanently damage insulators, shields, arcing contacts, and main contacts. With equipment failure comes repairs and replacements, expensive in terms of both time and money. There could also be property damage, such as fires, and extended power outages resulting from poorly insulated equipment. Leaks also allow moisture to enter gas-insulated equipment. This is a major problem as the presence of water not only decreases insulation, but also combines with SF6 gas to create toxic byproducts that corrode metal and create more leaks

- **EHS (Employee Health and safety):-**

  SF6 is nontoxic and poses no direct risks to people or animals. It fact, this gas is used in medical diagnostics. However, due to its heavier weight, escaped SF6 can settle in low-lying areas and displace the oxygen there. This can cause respiratory problems in personnel working in trenches and pits, especially when breathed in large quantities.

- **Green House Effect**

  Carbon dioxide is the most abundant greenhouse gas (GHG), but it doesn't come close to SF6 in terms of potency. This fluorinated gas can last in the atmosphere for 3,200 years before it is broken down by UV rays, and is 22,800 times more effective than CO2 at trapping infrared radiation in the atmosphere, according to the Environmental Protection Agency. In fact, SF6 has the highest Global Warming Potential (GWP) of any known gases.

Taurus came up with solution package which can avoid all the above problem and give the complete solution for the sf6 gases. GIM (gas insulation Monitoring.)

GIM package consist of below unique products

1. SF6 Gas analyser
2. SF6 Gas Handling Unit
3. Gas Leak Detector

SF6 Gas analyser :-

The Rapidox SF6 6100 Pump Back is a fully-automatic zero-emissions SF6 gas analyser, designed for controlling and monitoring the quality and purity of gas used in high voltage switchgear, circuit breakers and transformers.

Exceptional accuracy and stability are provided when measuring the purity of SF6 gas, through specially selected sensors. The modular configuration allows for up to eight compatible gases to be analysed, simultaneously, using one analyser. The Rapidox is fully compatible with mixtures of SF6 CF4, N2 and air, together with toxic contamination gases such as SO2, HF, H2S and CO. The unit also measures the water content of the gas in dewpoint or ppm to ensure dryness is acceptable. The Rapidox SF6 6100 is housed neatly into a tough Peli transport case supplied with special tongue and groove self sealing couplings, which are compatible with famous brands. Once powered and connected, the Rapidox automatically removes a small quantity of gas from the electrical equipment, controlled with an auto gas pressure sensing function. A vacuum purge cycle and internal gas storage system ensures that no air can contaminate the gas sample and that no SF6 gas is able to escape during the testing period.

Gas Handling Unit: -

The Greenhouse warming potential of SF6 is very high. During its use, it is very essential to limit its emissions in the atmosphere. Herewith introducing SF6 Handling Unit SFX-12 C T 300 to serve / handle large quantity of SF6 Gas. This SFX-12C T300 Unit is equipped with Recovery Unit and 300 Ltr 35 Bar. Cylindrical Storage Tank. Complete unit is assembled on 8" Heavy Duty Wheel base Cart for easy operation in Substation area. This includes initial recovery, evacuation and refilling or transfer of residual gas in empty Cylinder.

SF6 Gas Leak Detector: -

The revolutionary new "Generation X" line of TIF refrigerant leak detectors brings you tomorrow's technology today. We not only changed the way our leak detectors look, but the way to look at leak detectors. Innovative MPC circuitry and Advanced Digital Signal Processing monitor the sensing tip up to 2000 times per second. Automatic reset, true mechanical pump, and visual indicators (TIF XP-1 and TIF RX-1) speed and simplify leak searches. A completely re-designed sensing tip increases sensitivity, improves reliability, and lasts twice as long as its predecessor. This results in fewer comebacks, less hassle, and lower maintenance costs. We are so confident in the design and quality of these detectors.

All Measuring equipment are from The renowned Company like sensotech , Mechfield and the TIF .

Prepared by **Mr. Akash, Manager-Presaless SS**

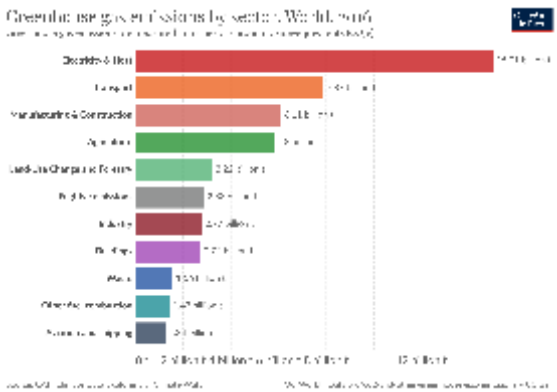
CARBON FOOTPRINT

What is a carbon footprint?

A carbon footprint is a simple way to express the impact from cooking a pot roast to jetting away for the weekend, the choices that you make in your day to day life which leaves a mark on the environment, basically the total amount of greenhouse gas emissions that anything a person, organization, event or product has ever produced. People, products and entire industries have carbon footprints. The larger your footprint, the heavier the strain on the environment.

How does carbon footprint is calculated?

It works by summing up the emissions from all your activities everything from what you eat to what setting you wash your clothes with. It's all measured in CO2e which stands for carbon dioxide equivalent and is a standard unit for measuring carbon footprints. It essentially takes any quantity or type of greenhouse gas and expresses it in the amount of CO2 that would have the equivalent global warming impact. It just allows us to easily compare impacts across different gases.

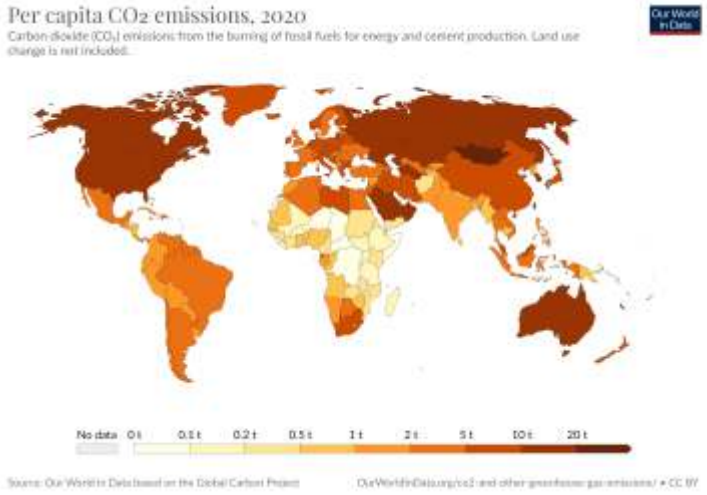


How does carbon affect the climate change?

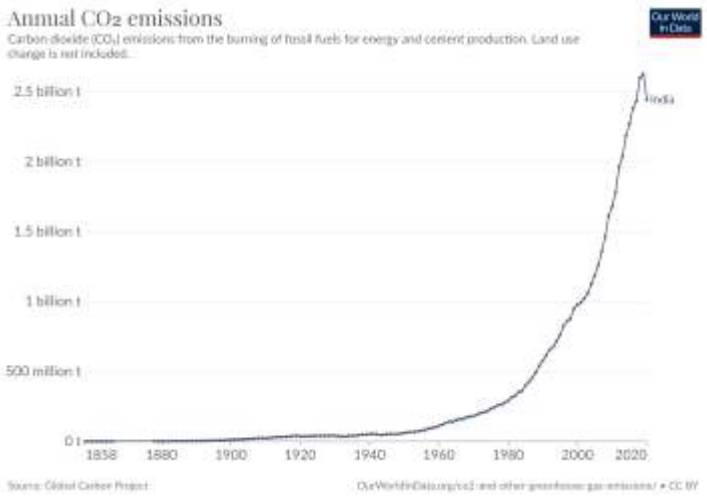
Carbon dioxide traps heat emitted by both the sun and the Earth's surface and releases that heat into our atmosphere. As we burn fossil fuels and cut down forests, high concentrations of greenhouse gases, specifically carbon dioxide, threaten to raise the average surface temperature of the planet to intolerable levels and cause a host of life-threatening impacts.

Atmospheric carbon dioxide levels have risen more than 40 percent since the middle of the 18th century, and climatologists estimate that current levels are as high as they have been in some 14 million years.

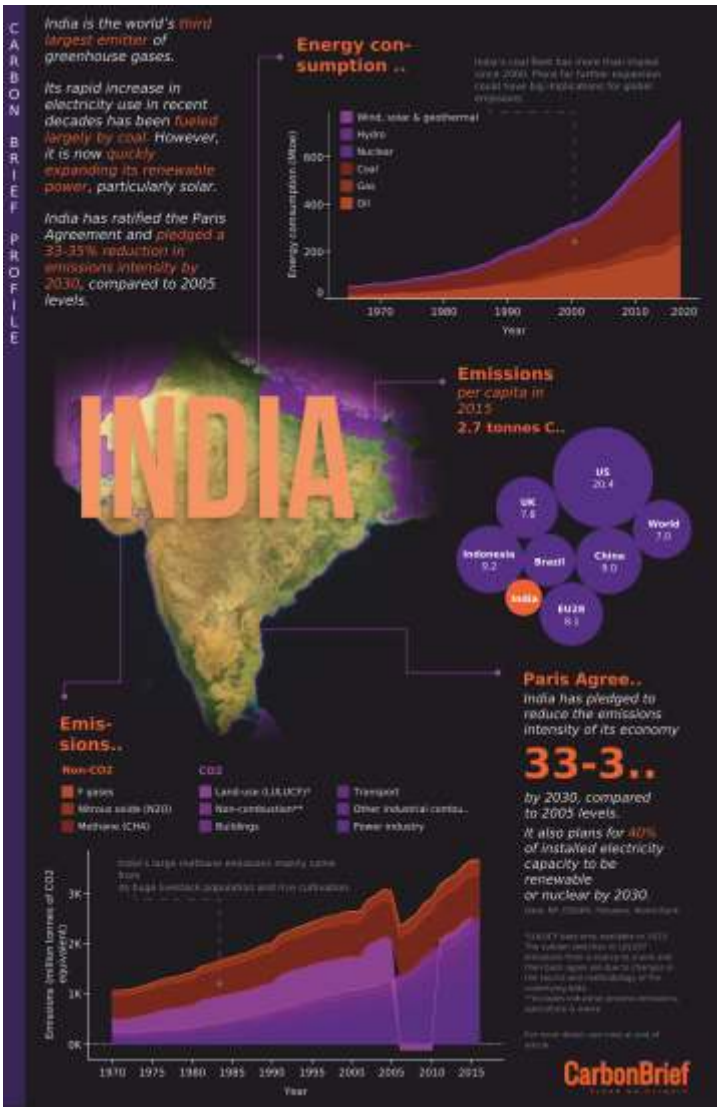
As carbon dioxide levels continue to climb, fuelling further temperature increases, the cumulative effects including increased ocean acidification, rising sea levels, more frequent and intense storms, mass species extinctions, food scarcity and greater economic inequality will be felt worldwide.



To give a perspective of how bad it is, around the world, the average person generates around 4.8 metric tons of carbon dioxide emissions each year. So if the average person worldwide is responsible for emitting the equivalent of nearly five metric tons of carbon dioxide per year, where does it all come from? Truth is, dozens of daily actions and long-term lifestyle choices shape each of our carbon footprints. In India itself, we generate around 2411.73 Mt of CO2.



How do we Indians are dealing with carbon footprint?



India is currently second most populous country in the world, and it contributes approximately 5.3 % of the total global GHG emissions because of which India is the world's third largest emitter of greenhouse gases (GHGs), after China and the US. Coal power plants, rice paddies and cattle are major sources of emissions, which continue to rise steeply, although per-capita emissions remain well below the global average. India is also very vulnerable to climate change, notably due to the melting of the Himalayan glaciers and changes to the monsoon. Major cities in India are witnessing rapid urbanization. The quality of air in the major Indian cities, which affects the climatic conditions as well as health of the community, is a major environmental concern. Higher levels of energy consumption have contributed to the degradation of the environment.

The country has pledged a 33-35% reduction in the "emissions intensity" of its economy by 2030, compared to 2005 levels. India has long put a key emphasis on the need for climate finance and technology transfer from developed to developing countries. Its climate pledge notes: "Our efforts to avoid emissions during our development process are also tied to the availability and level of international financing and technology transfer since India still faces complex developmental challenges."

India's says it will cost at least $2.5tn to implement its climate pledge, around 71% of the combined required spending for all developing country pledges. India received by far the highest level of single-country funding ($725m) approved by multilateral climate funds in absolute terms from 2013 to 2016, according to Carbon Brief analysis. On a wider level, India received on average $2.6bn per year in 2015 and 2016 in climate-related development finance, according to Carbon Brief analysis of Organisation for Economic Co-operation and Development (OECD) data.

What are the some of the ways we Indians can reduce carbon footprint from our everyday life?

- Reduce meat in your diet and avoid wasting food.
- Walk, bike, carpool, use mass transit, or drive a best-in-class vehicle.
- Ensure car tires are properly inflated. Fuel efficiency decreases by 0.2% for each 1 PSI decrease.
- Smaller homes use less energy.
- Whether you hand wash dishes or use a dishwasher, follow recommended practices to decrease water and energy use and reduce emissions.
- Energy consumed by devices in standby mode accounts for 5-10% of residential energy use. Unplug electronic devices when not in use or plug them into a power strip and turn the power strip off.
- Choose energy-efficient lighting and transition away from incandescent light bulbs.
- Reduce what you send to a landfill by recycling, composting, and buying products with minimal packaging.
- Purchase items with a comparatively low carbon footprint. Some manufacturers have begun assessing and publishing their products' carbon footprints.

What's next?

The first step to reducing our environmental impact is to measure our current carbon footprint, this can be done by use of any online carbon footprint calculator present online. Then, we need to learn how can we offset our emissions by contributing to carbon projects that create financial incentives to protect, conserve and restore forest ecosystems while supporting local communities around the world.

Prepared by **Mr. Turjoy Dasgupta, Engineer-Bid & Projects**

LID - LEAKY INSULATOR DETECTOR

The Leaky Insulator Detector (LID) is two piece hand held non-destructive inspection system which utilises AC/ DC Current sensor and Ultrasonic technology for predictive maintenance. The Leaky Insulator Detector (LID) has a Flexible clamp sensor and Ultrasound Receiver. The Flexible AC/DC sensor is specially designed sensor to measures the AC/DC leakage current in HVAC/ HVDC Towers leg (caused due to the leaky insulator).

INTRODUCTION

The weak Insulator leaks current to ground and when the leakage current is measured by Leakage Current Detector at the tower footing, it shows higher readings of leakage current compared to other towers confirming the deterioration of the insulator. The weak insulator also produces arcing sound internally, which can be picked up by Ultrasound Partial Discharge detection method to pin point the leaky insulator.

How deterioration of the Insulators lead to Leakage Current & Ultrasound Partial Discharge:

- The Puncture insulator causes leakage current due to loss of insulation. This will lead to flow the leakage current from the tower leg to ground & can be measured with Tower Leakage Current measurement method as discussed below.
- This puncture is associated with arcing noise internally. Detection of Arcing can be done with Ultrasound Detection method as discussed below.
- Gradually over a period of time arcing will deteriorate the insulators & will fail tripping the line.

Leakage Current Facts:

The Leakage Current is directly proportional to the Degradation of Insulator.

Arcing & Corona: Leakage Current increases with Arcing and Corona

Good Earthing: This helps the leakage current to dissipate quickly

So, the high value of Leakage Current is the primary information of the Tower healthiness.

Advantages of using LID

- Analyzing the leakage current of the tower from the ground by tower leakage current measurement methodology will help O&M team for taking right decision towards pin pointing tentative flash over/shorted insulators.
- Ultrasound measurement methodology uses to pin point the particular string of the tower by taking leakage currents results.
- From ground level leaky Insulators can be identified. No need to climb on tower, no shut down required.
- No skill manpower required, Easy & Simple operating procedure.
- Single Instrument for all type of Transmission Line Insulators (Glass, Porcelain & Polymer).
- Single instrument to locate Leaky Insulators, Corona discharge, Loose hardware Joints & improper addition earthing installation.

LID-UPD

LID-UPD is a testing and monitoring technique prevents an in-services failure of a substation &

Switchyard Equipments and panels. By practising periodic on-line testing to detect problematic component using this method we can achieve reliability based HV asset extension. It is a combination of four sensors i.e. Acoustic, TEV, HFCT & Split core Hall effect Sensor that all together is utilise to locate the predictive faults in Substation assets in online condition.

Introduction

PD is an electrical discharge that occurs across a localized area of the insulation between two conducting electrodes, without completely bridging the gap (see IEC 60270). It can be caused by discontinuities or imperfections in the insulation system. PD activity is an indication of an incipient medium voltage (MV) or high voltage (HV) insulation fault and is widely regarded as the best early warning indicator of electrical insulation deterioration in MV and HV electrical assets within power networks. In general PD occurs in systems operating at voltages of 3 kV and above; however, it should be noted that in some cases PD can also occur at lower voltages (i.e. Variable Speed Drive / Variable Frequency drive motors and LV designs). Typical drivers for implementing PD programmes include; supporting Condition Based Maintenance (CBM), avoiding unplanned, often costly.

How does PD develop?

Once incepted, Partial Discharge can develop into electrical trees and surface tracking, eventually leading to a breakdown between phase and earth or between phases of a 3-phase system. Depending on the discontinuity or imperfection type and location in the insulation system, a failure can take anything from a few hours up to several years to occur.

While some discharges can be extremely dangerous to the health of the insulation system (e.g. discharges within polymeric cables and cable accessories), other types of discharge can be relatively benign (e.g. such as corona into air from sharp, exposed points on HV overhead networks). The key to Partial Discharge testing and monitoring is to be able to differentiate between the different types of PD which can occur and provide a reliable location, enabling remedial repair works to be conducted during scheduled outages prior to failure often causing costly outages and the associated downtime or production loss.

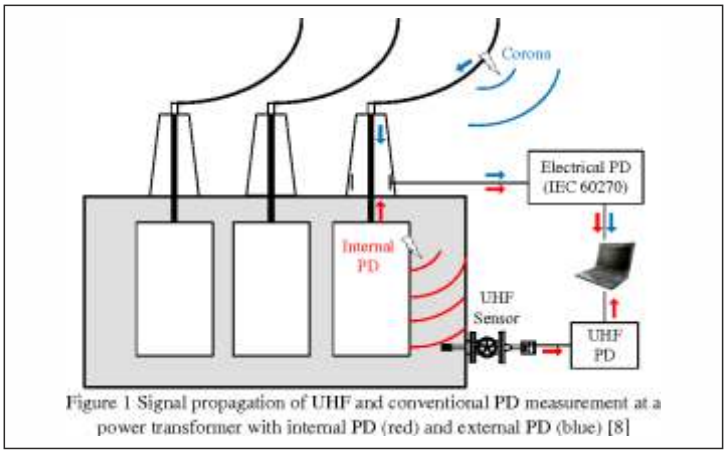


Figure 1 Signal propagation of UHF and conventional PD measurement at a power transformer with internal PD (red) and external PD (blue) [8]

Advantages of PD Monitoring & Leakage Current Measurement

- Measurement of Leakage Current Provide prior Information about healthiness of Transformer & Other substation equipment.
- Since no labor is required to perform the tests, continuous monitoring allows the use of limited resources to finding solutions to problems instead of finding problems.
- Reducing unnecessary maintenance because the monitor will be constantly testing and will have accurate data on which to base decisions.
- Collecting more accurate data as tests are conducted under real operating condition
- Requiring no outage to perform the test, therefore there is no loss of asset productivity.
- No introduction of infant mortality failure patterns via more invasive testing procedures.
- Reduction of forced outages and increased safety of personnel. One will always be aware of conditions and/or problems.
- Correlation of other dynamics such as temperature, humidity and load current to PD activity, which provides additional insight for diagnostics. There will be no need to go to several sources and gather the information.
- Provides the opportunity for remote diagnostics. The expert does not need to come out to the field for basic diagnostics. A site visit by an expert will be the exception and not the rule.
- Evaluation of a piece of equipment is based on its own history and not by comparison to other equipment.
- Easily monitor worsening conditions so one can defer repairs and allow time to plan an outage.

Prepared by **Mr. Amim Shahbaz,** **Senior Engineer-Product**

WELCOME NEW TAURUS COLLEAGUES

Anuj Agrawal
Manager - Presales, Mumbai

BIRTHDAY WISHES THIS QUARTER

Sanjay R	18 Feb	Rama Murthy	13 May
D CHAITANYA	28 Feb	Nijin Paul	19 May
Bikesh Kumar Roy	05 Mar	Zohair Hazan	30 May
Vinaya NS	21 Mar	Papai das	01 Jun
Alex Gerald	22 Mar	Prajitha Kamal	09 Jun
Atish Kumar Biswal	05 Apr	Md Amim Shahbaz	15 Jun
Sanjeev Kumar	24 Apr	Gopal	17 Jun
Arun Maity	25 Apr	Shivaraj TS	20 Jun
Vishwanath D	03 May	Varun Tyagi	21 Jun
MN Ravinarayan	07 May	Sanchit Srivastava	30 Jun

FROM EDITOR'S DESK

Dear Readers,

Let me start by a quote, that "You can always turn things around, don't give up".

Taurus as always introduces and inducts new technologies and services into the ever-growing Taurus basket of achievements.

We have introduced the substation asset testers and GIS asset testers along with the introduction and success of LID.

Not only that Taurus has also taken its initial steps towards the long awaited and anticipated sphere of drones for power.

As we sprint towards the end of this financial year, we take this time to remember the vicissitude of the world this past year. How we delt with the various ever evolving variants of Covid, the financial toll it took on the world economy, the health issues, and the snarling lockdowns.

Taurus were astoundingly resilient, committed, and present for all our partners, clients and the community at all times.

By Zohair Hazan, AD General Manager

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