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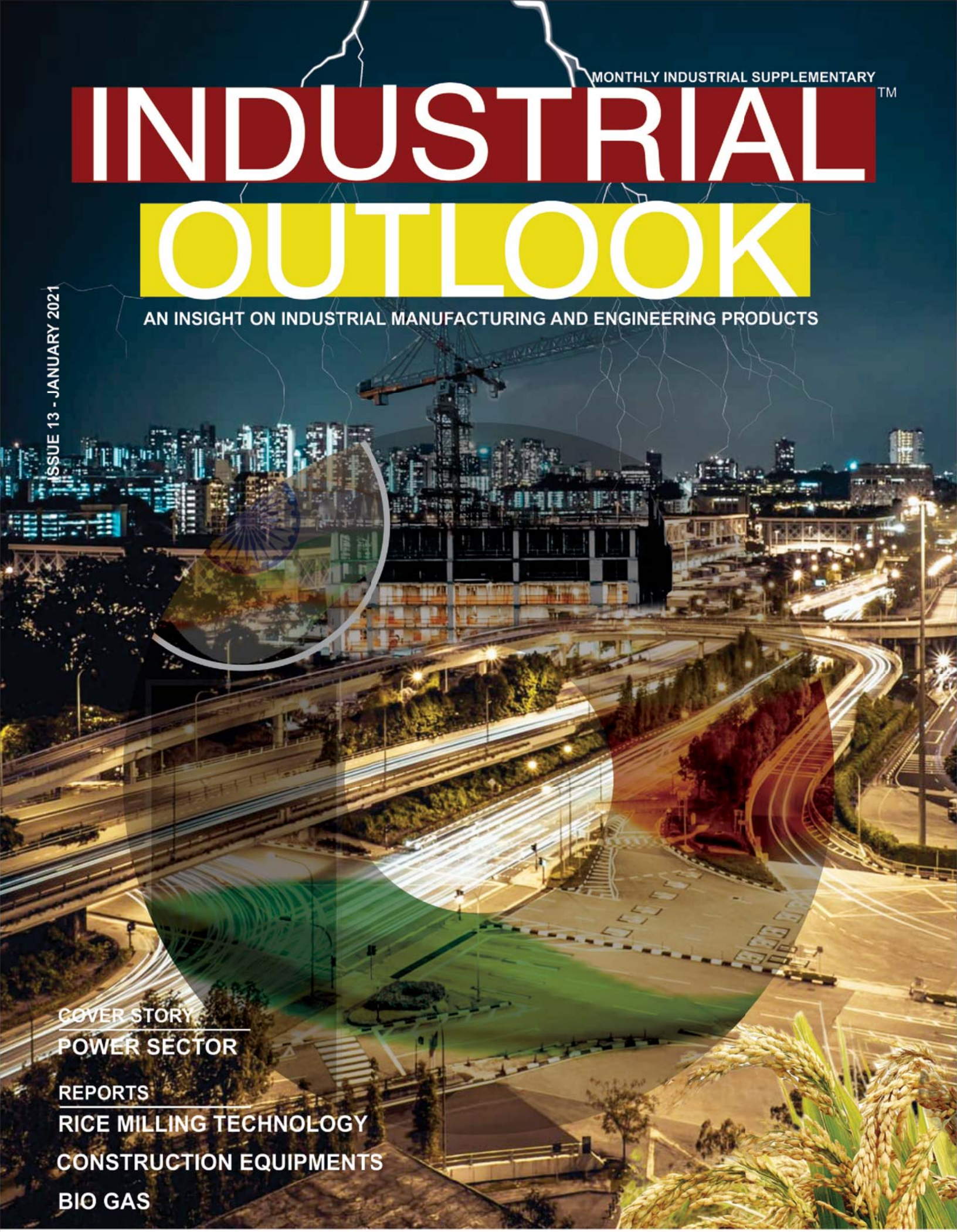

COVER STORY

POWER SECTOR

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WatchDog Transformer: One Solution for Many Issues

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We, the GPRD Cell

Gujarat Power Research and Development (GPRD) Cell is a research center established by the Government of Gujarat for Gujarat Urja Vikas Nigam Limited (GUVNL) and its subsidiary Companies namely GSECL, GETCO, DGVCL, MGVCL, PGVCL and UGVCL. GPRD Cell is working under Gujarat Urja Vikas Ltd (GUVNL) and is funded by the Government of Gujarat through the GUVNL.

The success of the leading companies depends on the strength of their efforts employed towards R&D. Such companies spare and spend a huge amount of funds for the R&D activities. With this concept and considering the future requirements of the power sector of Gujarat, an independent R&D Cell, called GPRD cell has been established.

CURRENT SCENARIO

We know that the Distribution Transformer (DT) is a critical component in the power distribution system for all the utilities. The reliability and quality of power supply, maintenance of SoP of the regulations and consequently to reduce the consumer grievances, service life of the distribution transformer and its performance are the key parameters for reliable and quality power supply. Therefore, monitoring of the key parameters like voltage, current and temperature rise is necessary for evaluating the performance of the distribution transformer and also helps to avoid or reduce disruption due to a sudden unexpected failure. Overloading and rise in oil & winding temperature of the transformer are the major causes of failure in distribution transformers. There is no such monitoring of the above critical electrical operational parameters at the distribution transformer level, in the utility.

LIMITATIONS OF THE PRESENT DT SYSTEM

- No monitoring and controlling of the working and its operating parameters of the distribution transformer once, they are installed in the field.
- Overloading of the distribution transformers by the consumers specifically in agriculture and domestic areas are also not monitored precisely and regularly.
- Bypassing the metering set and hooking directly from LV bushings of DT is the usual practice for power theft in some of the remote and strong headed localities. Such practices are very difficult to monitor and trap which ultimately badly impact the performance and life of the DT.

Looking at the high level of requirements of quality power and best services towards the customer, the GPRD team, after a long R&D activities, has developed WatchDog Transformer (WDT) which addresses the difficulties faced by the DISCOMs.

ABOUT WATCHDOG TRANSFORMER (WDT) & ITS FUNCTIONALITY

The WatchDog Transformer (WDT) is the combination of a distribution transformer (DT) with monitoring and controlling device called WatchDog Device. The WDD is mounted on the LV terminals of DT in such a way that there shall not be direct access to LV terminals of DT. The WatchDog Device is equipped with semi-intelligent IoT base DCU for real-time data acquisition, monitoring & controlling of the parameters of the transformer and the energy meter for accurate energy measurement. The energy exported from the transformers is measured and monitored by WDD. The WDD will keep monitoring the energy exported to the consumers from the transformer and recorded in the energy meter, and all data is available on a web based platform. The WDD is facilitated with short circuit and overcurrent protection. Thus, WDD shall effectively monitor and control without human intervention, the distribution transformer and LT system for overloading, unauthorized and irregular usage, three phases/single phase working hours & monitoring the health parameters of the transformer etc.. A remote monitoring of electrical parameters, top oil temperature will consequently help in reducing the distributor transformer failure.

SOUNDLESS NATURES

- Remote monitoring of health and performance parameters of DT like Loading, Ampere, Voltage, top oil temperature etc.
- Monitoring of Power theft & overloading
- Helps to reduce the failure of Dts
- No human intervention
- WDD is a programmed device to take intelligent decisions locally
- Anytime On/Off without visiting the place of the DT installation as per programming.
- Customize the power scheduled i.e. three phase and single phase
- Energy Audit at DT level
- Increases reliability & efficiency of Power distribution
- Enhanced Total regulation from one place
- Need base control by way of connection / disconnection of the consumer installation
- Reduces operation and maintenance costs

Why WatchDog Transformer?

KEY COMPONENT OF SMART GRID

The development of the smart grid increases the demand for smart and advanced transformers for power systems. The WatchDog Transformer improves the operation efficiency of Grid with smarter components like sensors, intelligent electronic devices, energy meters, contactors, and so on allowing bi-directional communication, control, automation, remote monitoring, and real-time data sharing.

TOOL TO CURB ILLEGAL ACTIVITIES

The direct access of low voltage bushings of the transformer is restricted by the tamperproof metallic enclosure. WatchDog Device and virtual low voltage bushings are provided to the Watchdog Device enclosure. The power

available at virtual bushing of WatchDog Transformers is measured inside of WatchDog Device, therefore, no way left for power theft, unauthorized usage of electricity, unauthorized shifting of location of DT etc.

REDUCES TRANSFORMER FAILURE

It takes local decision to disconnect load on the transformer under overcurrent, short-circuit, unauthorized usage of electricity, excess top oil temperature.

REVENUE IMPROVEMENT AND ITS REALIZATION

Reduced failure improves power availability to utilities valuable customers. Improved availability increases utility business. Reduced transformer reduces operational and maintenance costs. Remote connect/ dis-connect facility ensures revenue recovery and realization.

GOI-KUSUM

Thousands of WatchDog Transformers have been installed successfully in the agriculture sector under the SKY scheme an ambitious scheme of the Government of Gujarat. Now The WatchDog Transformer has been recognized by the Ministry of New and Renewable Energy (MNRE), Government of India. In the Monitoring part of Guidelines for implementation of Component-C of PM KUSUM Scheme on "Solarization of Grid-connected Agricultural Pumps", it is stated that "State may choose to install WatchDog Transformer devices to regulate power supply and monitor non-participating connections on the feeder concerned".

POWER SECTOR'S GEM

WatchDog Transformer increases power supply reliably, reduces transformer failure, reduces energy theft, reduces operational cost, increases revenue realization and ultimately increases the revenue of power distribution utilities. Therefore, the WatchDog Transformer is a Power Sector's Gem.

QUALITY ASSURANCE

For any equipment, we know that quality is a major concern for any tool, for its durability and performance.

In WDT, it has been already focused on its quality, by the usage of rigorously type tested components of WDT. The components are verified, certified and reviewed before their usage in the manufacturing process for the WDT. The best quality's IoT Gateway (Processor & Clock, Power Supply etc.), Three Phase Redundant SMPS, Energy Meter, Operational Logic Controller are used in the WDT. A part of future interoperability for the functionality of WDT, standardization of Data Acquisition is set at every platform.

STRATEGIC ABILITY

GPRD Cell has prepared a strategic design to challenge the prevailing operational limitations. The prosperous plan and manufacturing of WDTs were taken on by the competent and the GPRD's dedicated scientists, who have endlessly shined to modify the Transformers as per stakeholder's need. By using the latest engineering tools & software, the WDT's complex design is prepared by the GPRD Cell for the rapid performance of the transformer.

FIELD STUDY REPORT

Before the sun rises in 2021, Total 2034 units of WDT have been successfully installed and commissioned and working successfully also being monitored successfully through a responsive web platform under the SKY scheme. All the WDTs have found working satisfactorily since more than one year in DISCOM's of Gujarat.

PATENT DETAIL

This Cell has registered a patent application of WDT vide application no. 201821019946 at the patent office of the Government of India.