



## Active Repair of Distribution Transformers A Novel Concept to Reduce DISCOM Losses – Field Pilot

The high monetary value of a transformer has placed the transformer life-time optimization into the focus of asset management. Distribution Transformers (DTs) are key assets for any distribution network. Their reliable and efficient operations is important for strong economic standing of the DISCOMs. Many DISCOMs follow DT energy audit, but that focuses on AT&C losses external to the DT. This paper focuses on Technical losses internal to the DTs and how best it can be reduced. DT technical losses usually gets measured only at the repair facility during the breakdown event. In old legacy DTs, these technical losses stand highly deviated from original manufacturing specs, adding to the financial losses of the DISCOMs. This paper presents a technical loss reduction technique called 'active repair' using winding compensation only, with no change to the core. Active repair was conducted on two Aluminum wound legacy DTs with high technical losses, one failed DT of 100 kVA and other functional DT of 200 kVA, with winding compensation carried out through copper winding replacement. Results demonstrated significant technical loss reduction to near manufacturing specs, with business viability to the DISCOMs. Active repair can be further developed as an easy replicable DT repair technique, and DISCOMs can selectively apply it to high technical loss making legacy DTs that will yield shorter payback period. Existing DT repairers can be incentivized to undertake active repairs through performance tied improved repair contract or service level agreements (SLAs) with further extension to provide integrated DT managed services for improved reliability and life cycle management.

### Current Scenario of Distribution Transformer and its losses in India

In India, power distribution companies (DISCOMs) are having high 24.96% Aggregate Technical & Commercial (AT&C) losses, with high 22% T&D losses<sup>(1)</sup>. Of these, the Technical losses are estimated to be around 9-12%. These losses are fairly high as compared to other countries and continue pressing financial sustenance of the DISCOMs. Distribution Transformer (DT) forms one of the important and high capex asset for DISCOMs. It is estimated that the average overall technical losses in DTs with these DISCOMs could be as high as 3%, compared to 0.5% ideal value. This makes DT one of the key intervention areas for the DISCOMs to bring down their overall network Technical losses.

There are many reform programs initiated by the Government of India to modernize and improve the distribution network, utility processes and overall financial sustenance of DISCOMs. These programs have yielded some positive results in distribution loss reduction but at lower speed.

### Challenges of measuring technical losses

One major challenge with DTs is inherent difficulty in measurement of the Technical losses within while the DT is functional on the network. Usually DTs have secondary side meters for energy auditing. For measurement of technical losses, it will require to have metering also on the primary high side of the DT, which in turn will require mounting new CTs and PTs with right accuracy levels