

SERVICE, MAINTENANCE, REPAIR, REFURBISHMENT, RE-MANUFACTURING OF POWER TRANSFORMERS



Energising India since 1969...



**TECHNICAL
ASSOCIATES
LIMITED**

An ISO 9001 : 2015 & ISO 45001 : 2018 Company

**WE TRANSFORM
THE NATION'S POWER**

Ageing assets, rising energy demand, and the critical need to avoid unscheduled outages are posing challenges for utilities and industries around the world. As uninterrupted energy becomes more and more essential for economic progress, ensuring 100% availability of a critical asset like a transformer is central to ensuring high reliability and quality of service.

At the same time, rising commodity prices and volatility have made replacements more expensive than ever before. Fortunately, solutions exist to enhance operational lifecycle of transformers through regular servicing, upgradation, and re-manufacturing –all of which can greatly add to the useful life of the asset – all at a fraction of the replacement cost.

Technical Associates Limited (TAL) – as a nationally reputed, manufacturer of EHV Power Transformers with an expertise of fifty years, is perfectly placed to support customers for such services. These allow utilities and industries to maximise the return on transformer assets by ensuring high reliability, reducing life cycle costs, and ensuring optimised performance while lowering environmental impact.

TAL provides services encompassing the complete life cycle of a transformer, from commissioning to re-manufacturing, for all brands, rating, and applications.

TAL service offerings include:

1. Field Diagnostics & Condition Assessment for live transformer assets
2. Field Service and life enhancement including upgradation of critical components
3. Rating and Capacity Augmentation
4. Factory Repair vis-a-vis Re-Manufacturing

1. Field Diagnostics & Condition Assessment for live transformer assets

TAL's well defined service methodology with Condition Assessment of your equipment at the right moment, may be the best decision from an over-all perspective. TAL's service engineers have several decades of expertise in doing field diagnostics of a Power Transformers in the field. TAL service experts have complete know-how of doing diagnostic assessments in the most challenging climatic and operating conditions.

By using experience, modern diagnostic tools and a vast knowledge bank, TAL service professionals can identify root cause of Transformer failures and plug the same to avoid recurrence in the future. Our deep technical



insights allow us to identify and propose the most effective and economical solution for optimizing and extending the life of the transformer.

These may include:

- Assessment / Replacement of Bushing, where applicable
- Assessment / Replacement of On Load and Off Load Tap changers where applicable
- Introduction of Digital Monitoring System for different functional capabilities
- Introduction of fire and explosion prevention system

2. Field Service and life enhancement including upgradation

The main point of concern in ageing and life expectancy of transformers is the condition of the insulation system, which is typically based on organic products. Organic products in a transformer degrade over a period of time and finally lose the capability to withstand the stresses a transformer might face in daily operations -: short circuits, energizing, vibration, etc. The lifetime of this combination of mineral oil and paper in a transformer is highly dependent on the operating temperature, oxygen content, acidity of the oil and the moisture content in the insulation. Moisture is accumulated within the paper insulation of the transformer and has different sources. Temperature is mainly dependent on the transformer design, the loading, the cooling apparatus, and the ambient temperature. Changing these parameters is not easy and normally involves large investments. Though It is possible to reverse the ageing of mineral oil through oil reclamation, which restores the properties close to the original values, ageing of paper insulation is an irreversible process and is considered a life-limiting process.

TAL provides preventive and curative actions on-site and off-site at factory, to ensure condition-based maintenance and performance continuity. To extend life of your assets, TAL provides:

- a) Development of projects for upgrading of worn-down transformers
- b) Increase of the transformer capacity
- c) Major repair or replacement of active part core components including complete re-winding
- d) Upgrading of cooling system by installing cutting edge maintenance-free solutions
- e) Re-Gasketing and replacement of consumables
- f) Re-processing of MS fabricated parts including treatment of corrosion points, oil leakages, etc.



g) Installation of up-to-date sealing system

h) Oil processing, treatment, drying or replacement

3. Rating / Capacity Augmentation for energy efficiency and life extension

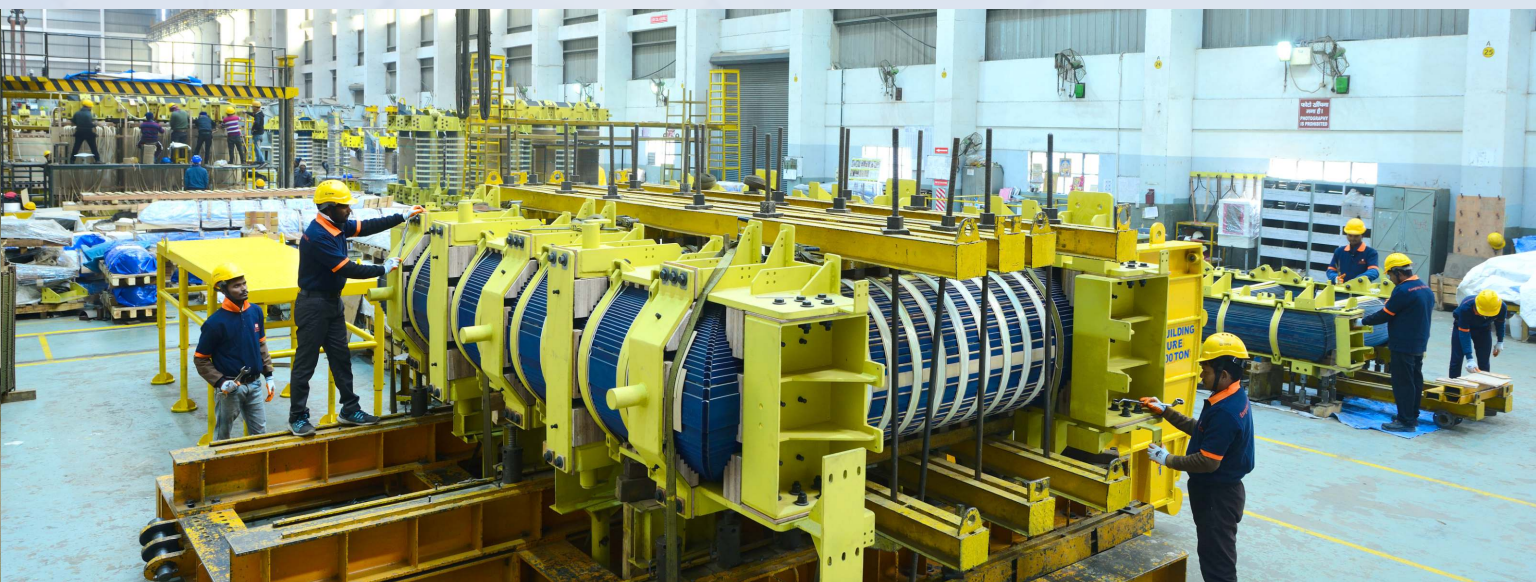
TAL Unique Solutions: A lot of private industrial customers have an existing Transformer of 'X' rating. Over the years their load increases but buying a new Transformer after scrapping the existing one is an expensive proposition.

TAL can re-engineer the existing Transformer and increase its capacity as follows:

- Increase the radiators so that the thermal rating is within limits
- Additionally, TAL will ensure the Short Circuit withstand capability of the higher rating transformer, by using internationally acclaimed and accredited design softwares, used by us
- This privilege and facility of Short Circuit calculation for short circuit worthiness and validation in a repaired Transformer is available with only TAL, and not with any other repairer or re-manufacturer in India
- Besides above, we can also improve the energy efficiency of existing transformers

Other regular solutions include:

- Cooling upgrade
- Bushing upgrade to new technology for risks mitigation and safety improvement
- Ratio and voltage regulation upgrade
- Oil preservation system upgrade
- Instrumentation upgrade from analog to digital



- f) Introduction and upgrading to Digital Monitoring System for better upkeep
- g) Thermally upgraded paper for winding insulation to increase rated power or life time
- h) Increase of MVA rating in terms of power by suitable application and feasibility

4. Factory Repair vis a vis Re-Manufacturing

As critical assets, transformers are at risk without having a service plan in place. Repairing a transformer instead of replacing it can substantially reduce investment costs and provide a faster turnaround than buying a new transformer. Furthermore, a refurbishment or overhaul can be an intermediate action to maximise the asset's technical life when no failure has occurred and the ageing of the active part has reached a stage where the transformer's continued reliability is uncertain.

An economical alternative to buying new transformer is "Health Assessment, preventive care, factory repair and re-manufacturing solution". This will help to mitigate unexpected events of failures, that can interrupt production causing loss of revenue, and increased repair cost. TAL Transformer Service team can help increase reliability and performance by proper assessment of the transformer and propose a cost-effective repair and service plan.

4a. Re-manufacturing vs. Repair

Repairing a transformer simply means the unit will be returned to its original electrical, mechanical, and thermal design and will perform within the limits of the design as considered by the OEM. This can include, but is not limited to, re-winding of the coils, re-insulating the core, tap changer work, bushing replacement, re-gasketing, cooler refurbishment, relay installation, and control cabinet work.

Re-manufacturing a transformer means a change/upgrade to a unit's electrical, mechanical, and thermal design. This may include, but is not limited to, re-designing the coils to increase MVA, KV and/or improve short circuit strength, core modifications to address heating issues or to improve cooling, oil property enhancement, re-design for sustainability, tap changer upgrade/retrofit, etc.



4b. Process of Repair / Refurbishment/ Re-Manufacturing

Upon receipt of the transformer in the factory, a visual and electrical inspection will be performed jointly with the customer. The Active Part (Core Coil Assembly) is un-tanked and inspected., to identify which rehabilitation actions must be taken and which all commodity, component, consumable require replacement / refurbishment / re-manufacturing. In case it is required, the transformer is also referred to our engineering team to replicate the original scheme, or even go in for re-design for performance upgradation.

By finalisation of the Bill of Material and Bill of Quantity, the final cost of repair is arrived at with a tentative delivery date. The entire repair/re-manufacturing operation is performed under the same, rigorous process & quality checks which govern new transformers manufactured by TAL.

Following upgrade or service of critical parts, accessories, and other auxiliary equipment, the active part is dried and replaced in the tank, which is refilled with oil, and a high-voltage test is performed. After the factory acceptance test, the newly revitalised transformer is ready to be delivered back to its owner.

TAL Unique Solution: When a damaged transformer is received for repair, TAL engineers study the reasons for the failure by checking the Short Circuit and Impulse withstand capability of the original design. As and when required, TAL redesigns the same transformer, using its advanced internationally proven design software. In such a case the repaired Transformer is sturdier than the original design.

WHY TAL for Repair / Refurbishment / Re-Manufacturing?

- Greater than 50 years of expertise
- TAL repairs / refurbishes / re-manufactures from 66 kV to 400 kV & 20 MVA to 315 MVA
- Dedicated internationally accredited software for optimised and energy efficient designing, short circuit proof solutions and engineering as well as for ensuring linearity and continued through put at manufacturing
- Established quality plans with strict quality control of materials
- Environmental control for critical processes
- Extremely high standards of workmanship
- Drying of the transformer using Low Frequency Heating (LFH) and in Vapour Phase Drying Plants
- Dedicated bay for repair and re-manufacturing facilities
- Geographical proximity: Only EHV Transformer repair/remanufacturing facility in North India to cater to entire Northern India, Nepal, Bhutan, Bangladesh, etc.



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