

**SIEMENS***Ingenuity for life*

Customer Services for Transformers

Our organisation and portfolio

Our Organization

Nowadays, over 70 % of the transformer population has been in operation since more than 25 years. The average life of transformers in operation is exceeding the design-life in an increasing number of cases. The majority of redundancies have been utilized for normal operation, and spare capacities are often completely used-up. Today, load requirements, environmental constraints and sustainability objectives are in conflict with budget restrictions and long replacement lead-times.

This is why extending the assets lifecycle and maintaining your transformers at maximum operational level is our prime objective. For that we apply the most effective set of solutions independently of the original manufacturer, and the age of the equipment.

To provide the highest value to our customers:

- We leverage our 100+ years' experience and expertise of designing and delivering transformers for all kind of applications
- We are close to our customers and are present in 100+ countries
- We use our factories network consisting of 11 reputed global factories

- We apply Innovative products and solutions such as condition assessment manager and service Programs

Our Portfolio

Your transformers must do one thing first and foremost – they must operate reliably and without interruption. Our service concept is designed to prevent unplanned downtimes and optimize planned maintenance measures.

Our portfolio is designed to meet four major customer needs:

Transparency: This refers to collecting all operation data and carrying out the condition assessment of your assets.

Availability: We provide solutions to increase the availability, and so with utilization of your transformers by reducing the failure risks and minimizing potential outage costs.

Operations Management: Even in the case of failure-free and smooth operations, there are several solutions to increase the operations efficiency. Here we support you with guidance and consulting to apply efficient operations.

Performance: We apply different service measures to counteract the ongoing aging processes of your transformers to achieve a lifecycle extension.

Transparency

The main scope of our transparency portfolio elements is to assess the condition of single units (or complete fleets of transformers) and detect abnormalities and potential risks. We help you detect suspicious and/or critical units and conduct the needed services so that failures and the corresponding outage costs are avoided.

The elements in this category are as follow:

SITRAM DIAG Level 1: Visual inspection, analysis of insulation liquid, determination of relative oil humidity via oil sample, and thermograph scans

SITRAM DIAG Level 2: Electrical tests of the transformers such as winding & insulation resistance, phase angle, SFRA & C-tan delta, impedance, losses, and bushing tests (Tan Delta & capacity)

Online monitoring:

- Dissolved gas analysis sensors
- Bushing monitoring
- Temperature measurements
- Transformer Diagnostic and Condition manager SITRAM®TDCM
- SITRAM®CAM: all operations data (collected via the products above) are integrated to the Condition Assessments Manager (CAM) for analysis and evaluation

Assets audits and remote services:

Based on the analysis and results of our condition assessment solutions we can support you on all questions around your assets by making concrete recommendations in order to extend the assets lifetime and im-

Our comprehensive offering for transformer services

prove the availability and performance of your assets.

Availability

We developed a broad range of service solutions to increase the availability and, so with, the utilization of your assets:

Spare parts & accessories: Upon request and / or based on the condition assessments results we may advise you on what accessories will best fit the needs for your transformers.

Those could be Bushings of various sizes and types, Buchholz relays, temperature sensors, oil flow alarm and oil level indicators, just to name a few.

In order to provide the best solution for you, we will verify alternative products and thrive for technical improvements with additional state-of-the art functionalities.

This we feel is an indispensable service in case that the original spare part is no longer available.

24/7 Customer support: Provision of 24/7 helpdesk with transformers expert support via Phone or Email.

Repair services: One of our technological highlights is the complete repair "as good as new", and the modifications of transformers, regardless of their age or manufacturer.

This is performed in our own, and other certified workshops as well as on-site with our new completely equipped workshops and fully operational High-Voltage-Test Systems.

This serves to assess the precise failure and to prove the efficiency of the repair. The full backing from our experienced engineering is guaranteeing prime performance and quality in project management and execution.

Emergency services

In case of emergency we will mobilize all our resources and expert to support you bring your transformers back into service and carry out a root-cause-analysis to prevent such cases in future.

Operations management

To guarantee an efficient operations management, we provide the following offerings:

Training programs: We offer a broad range of customized and general training to help you bring your expertise to the next level and to keep you updated on all recent technology topics.

We cover all topics around transformers services such as transformer components, transformer life-extension, maintenance, online monitoring, just to name few.

Our trainings are flexible and can be provided in your office, on-site close to the transformers, or in one of our factories.

Assets management and consulting:

What's the best way to optimally use and maintain your transformers? We provide you with solid consulting on this question. Ideally, we'll include your entire fleet of transformers in the process, regardless of their age or manufacturer.

This will give you a solid basis for decision-making related to replacement investments, repairs, or maintaining value. The health of your transformers can be precisely evaluated using the most modern, risk-free diagnostic methods, and some procedures can even be performed during ongoing operation.

On the basis of a detailed survey, we prepare and suggest an action plan that includes recommendations for preventive, corrective and curative service interventions or replacement investments if applicable for each transformer, depending on its individual condition and operational importance.

Relocation: When it comes to installing new transformers, or changing the locations of already existing units, we make use of the decades of experience of our technical experts and engineers.

We manage the complete process of dismantlement, transport preparation, storage and handling of delicate com-

ponents, and assembly until the complete reconstruction of transformers.

Performance

We'll get your transformers back in top form – and without service interruptions. With our offering we reduce failure risks by counteracting the ongoing aging process that is taking place inside your transformers

SITRAM®REG: SITRAM REG is a modified reclamation process based on the IEC 60422 standard. Oil is circulated continuously through regeneration columns in the plant.

Highly effective adsorption agents (activated fuller's earth) absorb the soluble and insoluble polar impurities, degradation products as soon as corrosive sulphur compounds. The cleaned oil flows back into the transformer. This process cycle is carried in dependence of the size of the transformer and the condition of the insulating oil for several days up to weeks. SITRAM REG is carried out without interrupting transformer operation.

SITRAM REG technology applies only natural fuller's earth mixture has high catalytic properties and is highly reactive with all kinds of corrosive sulphur compounds.

SITRAM®DRY: The SITRAM DRY online (during normal operation) oil dehydration system removes moisture from the insulation through disturbing the moisture equilibrium between the insulating oil and the paper insulation so that moisture diffuses from the wet insulating paper to the dried insulating oil, slowly removing the moisture from the solid insulation.

The system has a modular construction and is well-suited for transformers of varying ages, manufacturers and ratings (from distribution to generator step-up transformers)

Our stationary and continuous oil drying systems as well as regeneration of the oil filling are internationally-recognized technologies and round out our offerings for improving cooling efficiency sealing. These can easily be integrated as retrofit solutions.

Service long Term Programs (LTP)

Siemens developed a technically advanced and cost effective Long Term Service Program to mitigate all operations risks and improve the assets utilization. Our long term program includes a broad range of products and is designed to help you plan the long-term maintenance operations of your transformers, with agreed terms and pricing structure. A Siemens LTP provides the following benefits:

- Comprehensive coverage from single unit to complete fleet
- Higher availability and reliability
- Simplified and flexible contract handling
- Predictable service costs
- Life time extension
- Rapid response times
- 24/7 Emergency service

Long Term Program – Basic

The basic level provides the following on-site condition assessment and customer support services:

- 24/7 Customer Support
- SITRAM DIAG Level 1
- SITRAM DIAG Level 2

Long Term Program - Advanced:

In addition to all features and benefits of the LTP basic, the advanced level contains the following products and services:

Online monitoring:

We provide our digital products to enable the real-time evaluation of complete fleets and to make the detection of suspicious and critical units easy. This includes:

- Dissolved gas analysis sensors
- Bushing monitoring
- Temperature measurements
- Transformer Diagnostic and Condition manager SITRAM®TDCM
- Our Condition Assessments Manager (CAM) for further data evaluation

Digital services

Based on the assessments done by our m digital products and applications, detailed reports are regularly generated and verified by our transformer specialists. For transformers with critical health conditions, preventive maintenance and customized life-time-extension programs will be recommended. Therefore, the operational risks will significantly be reduced.

Additional service options

The LTP contract set-up is structured in a way that any extra and further services such as spare parts delivery and oil regeneration can be ordered based on the agreed LTP terms and conditions.

This flexible contract set-up allows an easy integration of our major portfolio elements into the service program

Field and Maintenance Services	Repair and Emergency Services	Spare Part Services	Modernization and Retrofit Services	Digital Services	Training Services	Support and Consulting Services	Service Programs
Supervision	Repair Services	Spare Parts	Modernization and Retrofit	Monitoring & Diagnostics	Product Training	24/7 customer support	
Erection and Commissioning	Emergency Services	Strategic Spare Part Program	Refurbishment	Remote Services	Customized Training	On-site Condition Assessment	
Project Management		Spare Part Management	Upgrade & Update	Asset Management	On-site Training	Asset Audits	
Preventive Maintenance		Obsolescence Management	Extension	Cyber Security	Certification & Qualification	Asset Consulting	

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The information in this document contains general descriptions of the technical options available, which may not apply in all cases. The required technical options should therefore be specified in the contract.

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