

# SIEMENS

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*Ingenuity for life*

## Customer Services for Transformers

# Repair & Retrofit



Repair Services



Modernization & Retrofit

- Increase the existing capacity for transformers of all performance classes up to 800 kV/ 1.200 MVA
- Get everything from a single source, with a single contact for transformers of all manufacturers and performance classes, from disassembly to commissioning

### Introduction

Transformers are cost-intensive products that require long-term planning. Increasing lifecycles go hand in hand with higher financial and organizational risks.

Apart from possible transformer failure itself, delivery times that can often take years pose enormous problems for electricity providers and industrial consumers.

In Europe alone, 60 percent of the installed transformers have been in operation for over 25 years. Moreover, the average life expectancy of a transformer is 25 to 30 years in normal operation. Under these conditions, it is essential to guarantee ongoing reliable operation of the installed base.

If desired, Customer Services work together with the customer to examine the transformer's condition in order to subsequently develop the best possible repair strategy.

Repair & Retrofit offers a solution that is both technically and economically efficient.

### Features

Through repairs, a transformer is restored to its original condition in all respects (current, voltage and impedance).

Retrofitting, on the other hand, involves, e.g., providing the core with

the new windings and then installing it in the existing housing.

This can not only increase performance, but it also allows adjusting the voltage ratio to new requirements.

### Benefits

- Extend the lifetime of ageing transformers
- Obtain an economically attractive and technically sustainable solution that meets the highest ecological standards
- Avoid future bottlenecks in transformer availability
- Adapt existing transformers to new grid conditions

### Scope of work / deliverable

The end result is a fully retrofitted transformer whose performance is guaranteed even under the harshest industrial conditions.

### Technical Details

#### On-site repair

Vast distances or poor transportation connections sometimes make it necessary to perform repairs on site. Siemens has developed a mobile repair facility for this purpose. The container-sized module provides all necessary equipment for analyzing a transformer's condition, improving performance and conducting electrical tests.



# TLM –Transformer Lifecycle Management

## New life for aged transformers

### Inspection and assessment

Customer Services examine the condition of a transformer on the basis of its behavior and any errors that may occur. If necessary, paper samples are taken to determine the degree of polymerization (DP).

### Treating the insulating oil

The condition of the transformer oil has an enormous effect on winding ageing and the electrical efficiency of the overall system. Siemens offers a wide range of services for analyzing, cleaning and regenerating the transformer oil:

- Analysis
- Gas chromatography, physiochemical tests, F2AL determination
- Filtration
- Filling in a vacuum
- Regeneration with SITRAM REG and degasification
- Inhibition/passivation through additives
- Stationary drying with SITRAM DRY

### On-site maintenance and repair

The repair module is equipped for all typical maintenance and repair tasks.

- Maintenance of tap changers
- Continuous drying of the core-and-coil assembly during operation
- Seal replacement
- Fixing of leaks
- Modification and/ or repair of the cooling system
- Painting
- Replacement of windings and the core
- Mounting the core-and-coil assembly after replacing the entire insulation
- Drying/ pressing the core-and-coil assembly

### Electrical tests

With the mobile test bay, we can test single-phase and three-phase transformers for all performance and voltage classes.

**In-shop repairs – everything at hand**  
We operate our repair shops tailored to the specific needs of the repair business.

Our equipment includes horizontal and vertical winding machines, vapor phase oven technology, test bays for type and special-purpose testing.

A new shop with state-of-the-art equipment was added in 2011 in Nuremberg in the heart of Europe (including a 500-ton heavy-lift crane and a new vapotherm furnace).

**Global repair workshop network**  
Due to the global network of Siemens repair workshops, we can provide the right repair or retrofit facility within reach of nearly all transformer operations. If you wish, you can rely entirely on the experience of our logistics experts when planning and carrying out your shipment. We pick up transformers on your premises and guarantee safe round-trip transport.

### Unique synergies

Once the transformer arrives in the shop, it undergoes a detailed analysis. We check and, if necessary, adjust the range of services specified in the order. Due to our proximity to in-house transformer production plants, we can quickly resolve complex problems. After the transformer has been repaired or retrofitted, it moves on to the test bay, where we subject it to the same strict quality controls required for new equipment.

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Subject to change without prior notice. The information in this document contains general descriptions of the technical options available, which may not apply in all cases.

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