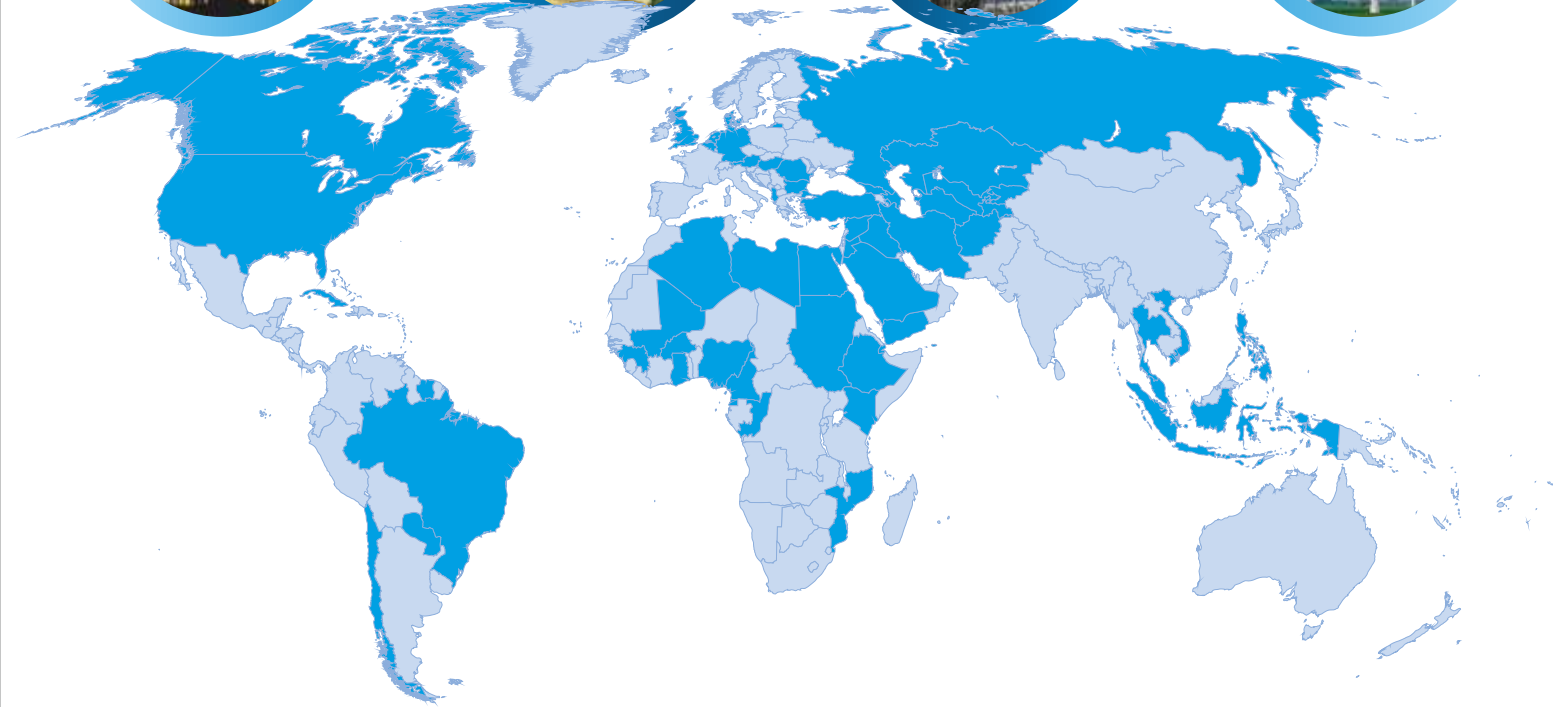


ELTAS

Transformatör Sanayi ve Ticaret A.Ş.

Where the Energy Exist
in 4 continents at 57 countries



ELTAS

Transformatör Sanayi ve Ticaret A.Ş.

Head Quarter:

A.O.S.B. 10046 Sokak No: 4 Çiğli, İZMİR / TÜRKİYE

Production Plants:

Çoraklar Mah. Sadrettin İşçimenler Bulv. No: 5 ALOSBI Aliğa, İZMİR / TÜRKİYE

T: + 90 232 398 15 00 | F: + 90 232 376 77 64

www.eltas.com.tr



Large Power Transformers

www.eltas.com.tr

We as **E**
X
P
E
R
T

L
O
Y
A
L

T
R
U
S
T
W
O
R
T
H
Y

A
C
C
E
S
S
I
B
L
E

S
W
I
F
T

Team are;

- Do our best
- Never compromise on quality
- Sustained developing
- Creative and innovative
- Hardworking, devoted, well-informed
- Honest, fair, transparent
- Customer-oriented
- Environment friendly



ELTAS has been building transformers, which are used all over the world for 37 years. The business started with producing oil immersed distribution transformers, then was to grow steadily as medium power, cast resin transformers and large power transformers.

ELTAS strengths are unique engineering and design features and flexibility to meet all the customer requirements on time. Each power transformer is designed according to its required specification and suitable to its application area.

Product Types:

- Power transformer (up to 250 MVA 420 kV)
- Generator step up transformers
- Auto transformers
- Multi winding auto and separate winding transformers
- Shunt reactors (up to 50 MVAR)

Special Transformers:

- Furnace transformers
- Earthing and auxiliary transformers
- Package and mobile substation
- Converter HVDC transformers
- Monophase railway transformers
- Serial reactors



37 years of expertise and experience combined with the new production facilities, located at Aliağa, İzmir within 60.000 m² opened area including the latest equipment provides excellent processes of Eltas. This leads to continuous improvements in the area of quality and reliability of the end-product.



Core

Our transformers are designed according to “core type” design. Cores are slit and cut to length without burr by well-known Georg Machines in house.

The cores are made of high quality cold - rolled grain oriented silicon steel laminations, which are coated with carlite. Thickness of silicon steel may vary from 0,18 mm to 0,30 mm.

Cores are semi automatically stacked with core stackin.



Winding

The horizontal and vertical coil winders are used at production. All windings are of the circular type, since this type has the highest resistance against short circuits. Depending on the specific design criteria, layer, helical, disc, partly interleaved or fully interleaved windings are also used.



Vapour Phase Drying

Every drying process of a transformer is mainly influenced by weight, structure and moisture content of insulation. The most important issue is to be dried the transformer without aging insulation. Micavac Vapor Drying Plant with Kerosene provides it in a perfect manner.





Tank

Tank is completely designed by 3-D CAD on computer, which determines the optimum size and the number and location of needed supports, which makes handling, assembly and installation easier for customer. All welds are tested, ensuring 100% leak proof seams and maximum mechanical strength.



Cooling system

- All transformers are equipped with detachable panel radiators, which are connected to top and bottom headers.
- Most commonly natural air/ forced air cooling is used to accelerate the cooling process (ONAN / ONAF).
- Other cooling methods such as forced oil / forced air (OFAF), Directed oil / forced air (ODAF), forced oil / forced water (OFWF), directed oil / forced water (ODWF) are also available if required.



Eltas High Voltage Test Laboratory is subjected to perform routine, type & special tests on transformers & shunt reactors up to 250 MVA 420 kV, according to IEC, IEEE, ANSI standards, domestic & foreign customer specifications.

Test laboratory has an area of 1000 m², active test area is 600 m². Transportation of transformers are done by air cushion to the test room. The test room has been designed as a faraday cage for Determination of Sound Level & Measurement of Partial Discharge to provide the background noise level as low as possible. There is an overhead crane with 3 hoists inside of the test room for mounting auxiliary equipment. Grounding resistance of test room is lower than 0,5 Ω .

Some major test equipment located in test laboratory are;

- HAEFELY TMS580 transformer measuring system
- HAEFELY PD detector
- Dr. Strauss digital recorder
- 2500 kVA voltage regulating transformer
- 50 MVar variable capacitor bank
- 350 kV, 1050 kVA 3 A AC series resonant system
- 2400 kV, 240 kJ 12 stages lightning impulse generator
- 1MW, 2MVA 0-150 Hz, 0-400 V output converter system

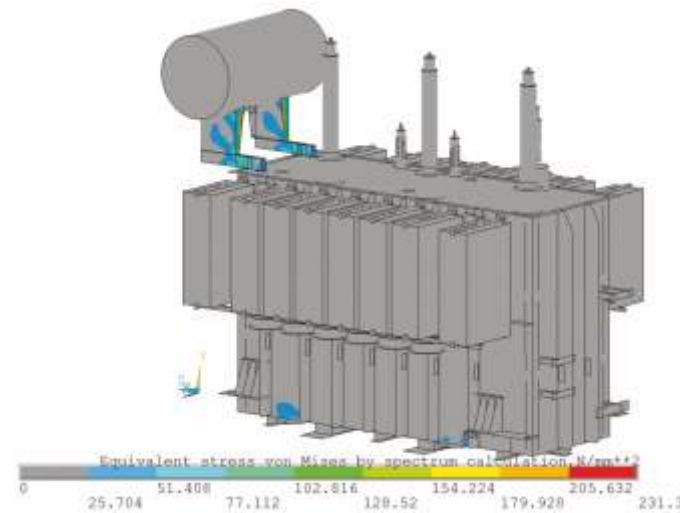


ELTAS works to international standards, whereby our strength lies in the engineering approach to design transformers based on the customer's specific requirements and flexibility to meet wishes on time and accurate way.

We thereby use engineering tools equipped with fully integrated design software which has been developed both in-house and externally.

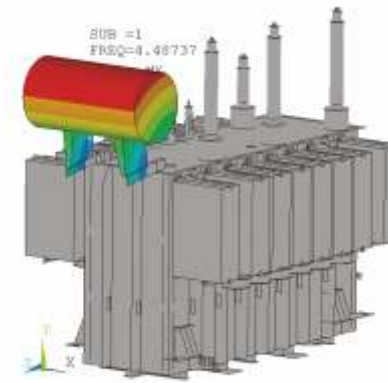
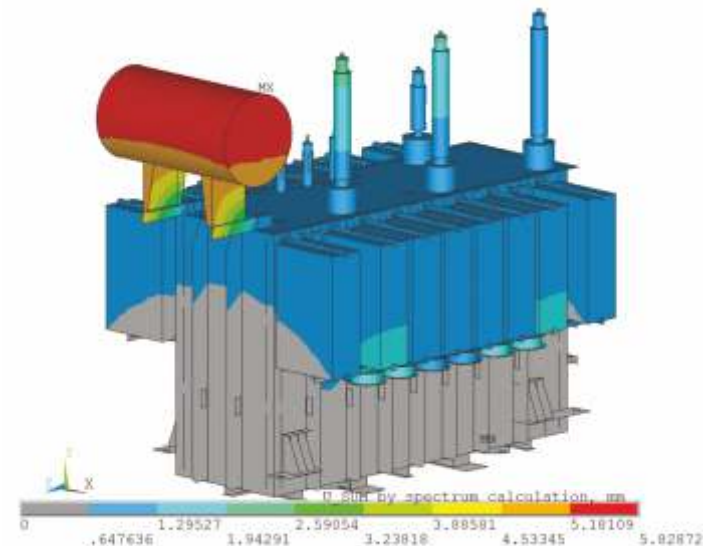
Benefits of engineering tools, we use:

- Reliable design
- **Electrical stresses within safe limits**
- Optimized insulation structure
- **Low risk of failure**
- Long lifetime
- **Optimized tank design**
- Lower tank weight
- **Lower noise**
- Increased reliability



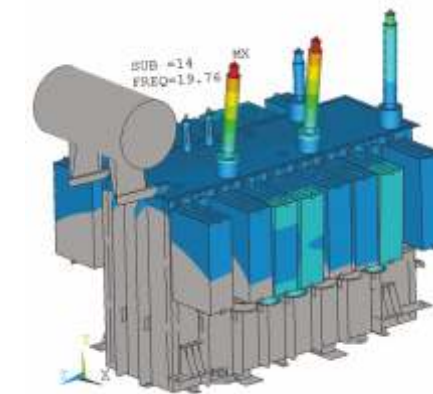
Special Software in House are:

- The calculation of two-dimensional plane or axis symmetric electrostatic field.
- The calculation of impulse stresses on main and longitudinal insulations of Transformers. It is intended for definition of impulse voltages between any points of windings.
- The calculation of transformer tanks, yoke beams and pressing rings for mechanical strength at short circuit, pressing, lifting, vacuuming and transportation modes.
- The calculation of electrodynamic stability of transformer windings at short circuit.



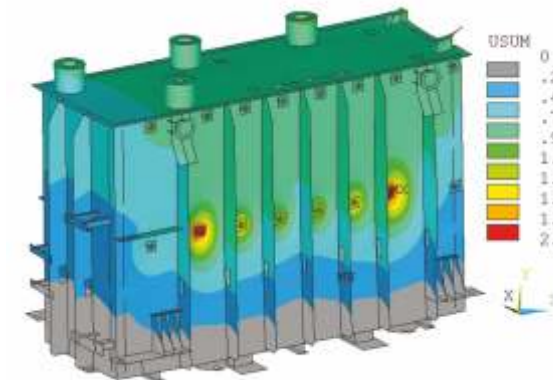
3-D CAD Package

It is used for design mechanical form of transformer tank, coolers and active part. It reduces lead time and increases accuracy.



Simulation (by Ansys Fea)

It is used for mechanical analysis. The vibration levels on the end panel of a transformer tank are calculated and compared with the measured values.



In order to meet the demand of energy sector, The ELTAS R&D activities plays important role to ensure reliability of product and to improve techniques:

- Design optimization (considering of design relation to labor and material costs)
- loss evaluation and noise level
- distribution of voltage stresses under impulse lightning and switching surge conditions,
- behavior during short circuit conditions, both transient electrodynamics and continuous thermal withstand analysis of those areas where high electrical stresses can occur,
- optimization of the insulation structure design,
- calculation of stray losses and thermal effects.

Some studies are made with international working groups such as TUBITAK , CIGRE, IEEE and transformers are tested at international laboratories when needed.

One of Eltaş's principles is to provide customers with transformers a long service life. Preventive measures are taken for transformer's durability are carried out on-site under appropriate conditions.

Transformers are dispatched with complete or partial assembly according to their dimensions and transportation conditions.

Particularly big power transformers are dispatched with their insulators, conservator, radiators and other small accessories disassembled. Many transformers are dispatched without oil and filled with nitrogen gas. Transformer oils are transported in specially processed barrels or tanks.



Weights and dimensions of big power transformers require very diligent planning in terms of assembly and transportation. ELTAŞ A.S. has vast experience in transportation of all kinds of transformers to various locations throughout the world and their on-site assembly. It guarantees speed and efficiency in assembly and commissioning works with its qualified engineers and high-quality equipment.

Our field service capabilities include all types of oil handling, servicing, reconditioning, maintenance, testing, rigging and heavy hauling.

Transformer service Even after the transformer has left the factory, customers can still rely on the support of our experts. We handle the transport and gladly carry out installation and commissioning on request. We also offer our customers many different services to ensure reliable, fault-free operation throughout the entire lifecycle of our transformers. Our professionals from the Transformer Academy provide training courses on every aspect of our transformers, while our Transformer Lifecycle Management takes care of all problems and questions that arise during operation, from oil analysis and fault diagnosis, online monitoring, maintenance, and repair to fast and reliable procurement of spares, as well as repairs and retrofits.



On-site services that we provide for newly installed transformers are as follows;

- Assembly and starting
- **Insulation resistance test (Megger)**
- Conversion ratio test
- **Windy resistance test**
- Dobble AC isolation test
- **SFRA**
- Tightness under pressure test
- **Discharge and filling of transformer oil under vacuum**
- Dielectric strength test of oil
- **Power factor of oil**
- Measurement of water in oil
- **Gas analysis of oil**
- Functional tests of protection elements
- **General checking of transformers**
- Elimination of oil leaks and provision of permanent solutions
- **Maintenance of low voltage and high voltage insulators, improvement of connections and replacement of insulators when necessary**
- Functional tests of protection elements and replacement of defective elements with modernized protection elements
- **Electrical tests of transformers**
- Sampling of transformer oil and oil analysis
- **Discharge of transformer oil on-site with modernized systems**
- Replacement of transformer oil
- **Replacement of necessary seals**
- Modernization or replacement of available control panel
- **Replacement and capacity increase of cooling system**
- Provision of automated voltage regulator panel and its adaptation to available system
- **Provision of parallel operation panel and parallel operation of transformers**
- Tap changer maintenance.
- **Adaptation of online monitoring modules to the transformer**



On-site services that we provide during maintenance are as follows;

- Assembly, vacuum oil fill & testing
- **Bushing & cooler changeouts**
- Relocation
- **Regasketing, leak repair**
- Oil filtration & refurbishment
- **Load tap changer maintenance**
- Condition assessment
- **Monitoring systems**
- Spare parts management

Our transformer repair services are as follows;

- Coil replacement
- **Core replacement**
- Repair or replacement of mechanical accessories
- **Conservator replacement**
- Drying in kerosene vapor spraying vacuum furnaces
- **Isolation renewal**