

GANZ

Ganz Transformers and Electric Rotating Machines Ltd.



ganzelectric.com





TRADITION
FOR
INNOVATION

Dear customers,

Ganz is one of the greatest names in T&D business worldwide. The history of our company dates back more than 140 years. We are proud of the fact that the equipment manufactured in our plants can be found in almost every country of the world.

Ganz is a specialist, providing high quality products and unique solutions for our customers. We produce our unique products with today's modern design and technological solutions.

Ganz manufactures unique high-voltage electrical equipment – transformers, motors and generators – as well as providing related services.

Customer focus and flexibility towards our customers during the execution of the projects is how we differentiate ourselves compared to other manufacturers.

The aim of the company is to grow further in the coming years and be one of the key suppliers for the European market.

Tradition for innovation is our company motto and Ganz is ready to support our clients with the nowadays challenges.

JAN PRINS

Chief Executive Officer of Ganz



HISTORY

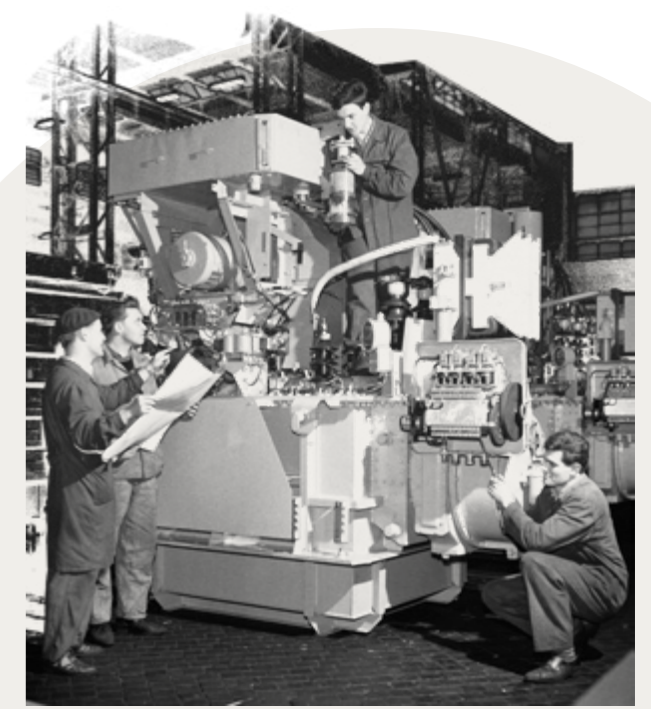
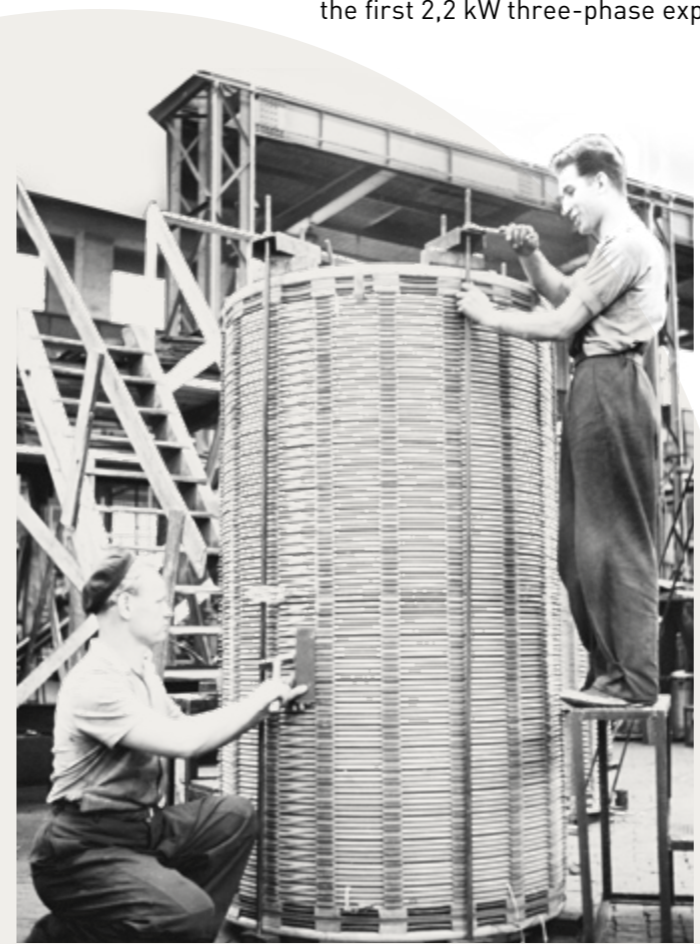


Abraham Ganz (iron manufacturer, machine and technical engineer) was born into a Swiss alvinist family in Unter-Embrach in 1814. In 1843, while he was working in the foundry, the cast splashed out. He became blind in one of his eyes. According to some sources he said then: "One eye is lost, but the casting was successful."

Abraham Ganz founded his own company in 1844 in Buda, which very soon became a world-renowned Hungarian centre of high-power industrial products. Despite his early death in 1867 the company remained one of the strongest manufacturing enterprise in Austria-Hungary. Many famous engineers worked at Ganz Works inter alia Károly Zipernowsky, Ottó Bláthy, Miksa Déri, András Mechwart, Kálmán Kandó, Donát Bánki.

The first transformer in the world was exhibited in 1885 in Budapest, thanks to which the economical, efficient transmission and distribution of electricity over long distances has been solved. The success of the patent is shown by the fact that Edison's company was initially supplied with transformers by Ganz. The first devices were used for lighting hotels in Lucerne, theatre in Milan, and the first large power plant using this system was ordered from Ganz by the city of Rome.

Kálmán Kandó was asked by Ganz to carry out introducing domestic production of induction motors. Utilizing his previous experience, he achieved the production of three-phase induction motors in a few months. In 1894, according to Kandó's plans, the first 2,2 kW three-phase experimental motor was manufactured.

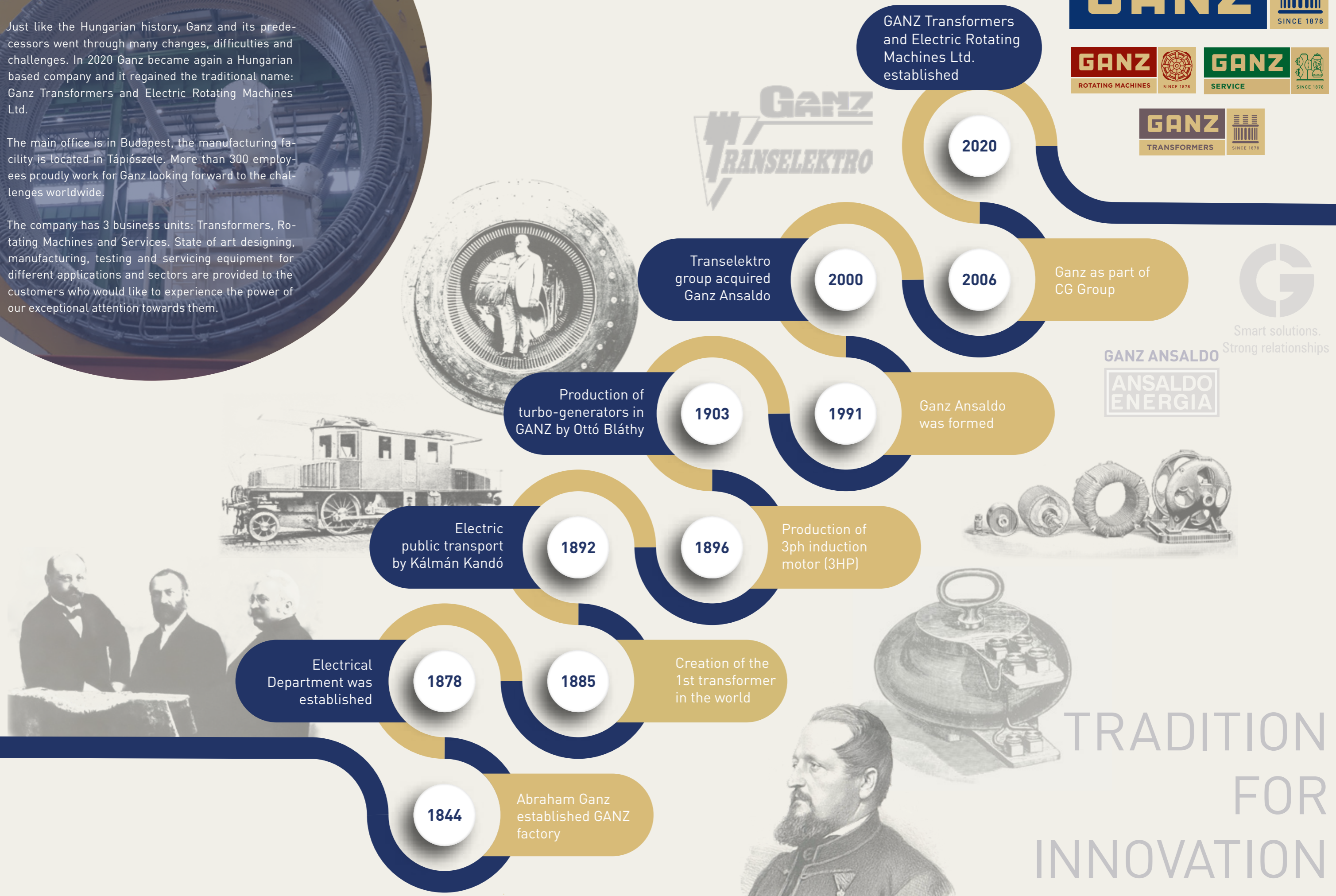
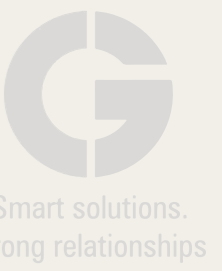
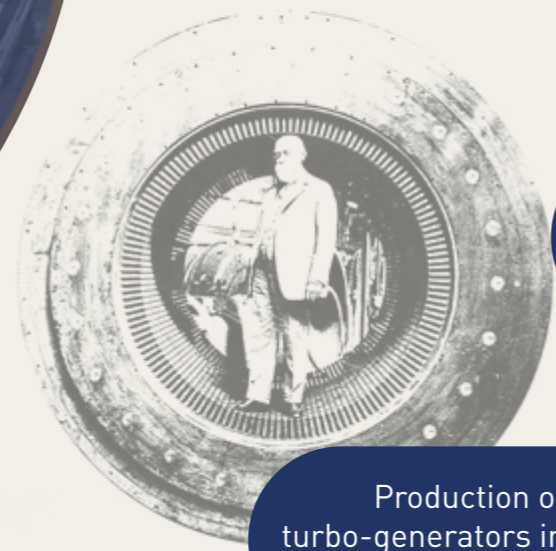


Nowadays

Just like the Hungarian history, Ganz and its predecessors went through many changes, difficulties and challenges. In 2020 Ganz became again a Hungarian based company and it regained the traditional name: Ganz Transformers and Electric Rotating Machines Ltd.

The main office is in Budapest, the manufacturing facility is located in Tápiószéle. More than 300 employees proudly work for Ganz looking forward to the challenges worldwide.

The company has 3 business units: Transformers, Rotating Machines and Services. State of art designing, manufacturing, testing and servicing equipment for different applications and sectors are provided to the customers who would like to experience the power of our exceptional attention towards them.



TRADITION FOR INNOVATION



POWER TRANSFORMERS



Introduction

The power transformer business unit has a history of 140 years which starts with the well-know historical first closed magnetic circuit in 1885. The first oil cooled transformer production started in 1900.

The business unit is specilized in designing, manufacturing and testing transformers for several applications in a wide range of powers from 20 to 600 MVA on 52-800 kV voltage levels (1000 MVA for autotransformers). The power transformer business unit has experienced electrical, mechanical, test engineers and well-qualified technicians at the manufacturing site in Tápiószele. Our customers can experience high and focused attention from the tender phase to the commissioning and site tests.

The manufacturing area extends over 11 000 m² with 240 tons of maximum crane capacity. The factory annual capacity is 12 000 MVA. On the facility site 200 people prepare the transformers according to ISO 9001, ISO 14001 and ISO 45001.

Every transformer is individually designed to its specific requirements and applications. The following specially-developed methods are used to further endure the reliability of the product:

- ⊕ optimization of design in relation to labour and material costs, loss evaluation and sound level,
- ⊕ distribution of voltage stresses during lightning impulse and switching surge conditions,
- ⊕ behaviour during short-circuit conditions,
- ⊕ analysis of those areas where high electrical stresses can occur,
- ⊕ calculations of stray losses and thermal effects.



Renewables

The international energy landscape is evolving from one dominated by increasingly scarce fossil fuels with their devastating effects on Planet Earth to one in which organizations are constantly hunting for alternative forms of energy. Ganz is one of those who want to contribute to the greener future.

Ganz provides power transformers with high quality, helping its customers use electrical power effectively and increase industrial productivity with sustainability.

Alternative energy sources such as wind, the sun, biomass and others are increasingly being afforded the scrutiny they deserve. Ganz is part of this process, developing smart solutions and offering creative leadership in the field.



Year Milestone

Year	Milestone
1950	First transformer on 245 kV
1967	First transformer on 420 kV
1978	First transformer on 750 kV
2002	First transformer in the world for 123 kV with ester liquid
2008	Beginning of manufacturing mobile transformers
2009-2011	765 kV transformer export to Indian market
2019	Refurbishment of our 40 years old 750 kV transformers
2021	250 MVA, 400 kV autotransformers in MAVIR Substations



PRODUCTION RANGE

POWER	20 - 600 MVA
VOLTAGE	52 - 800 kV
FREQUENCY	16,7 - 60 Hz
ANNUAL CAPACITY	12 000 MVA



Capabilities

Tailor-made designs for renewables:

Ganz transformers have good experience in tailor-made designs with various fields of use (wind and solar farms, hydro and biomass plants), where the projects have challenging requirements.

Power transformers with low noise level:

Ganz can fulfil the most extreme noise requirements of German and Scandinavian markets as well.

Power transformers with low losses:

Ganz transformers can easily fulfil the Ecodesign requirements (Tier2 from 2021)

Biofluid immersed power transformers:

Biodegradable oils are used to provide safe solutions for special requirements of fire protection, environmental safety, space limitations and cost savings.

Ganz was the pioneer for manufacturing synthetic ester filled transformer to the Scandinavian market, and Ganz has the design rules for the natural esters as well.

Hybrid insulation system:

Using higher thermal class insulation results in improvement in performance and total reliability. It allows more in-built power in same size and weight, or more compact units for the same power level.

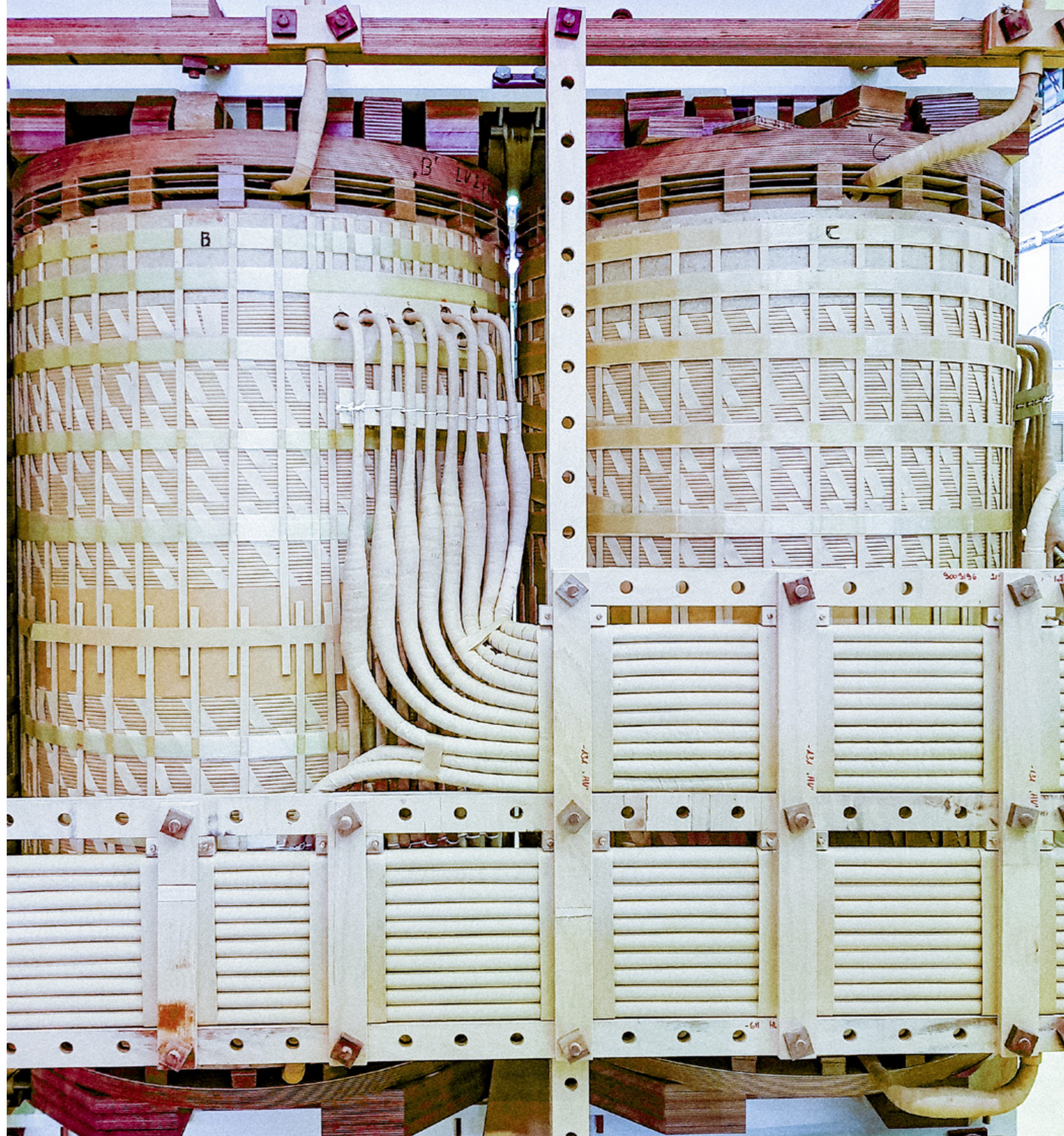
Short-circuit withstand ability:

Ganz has proven manufacturing and design technology for short-circuit withstand ability, and excellent record for short-circuit tests.

Monitoring systems:

Ganz provides customized management tools that monitor the operating conditions of transformers in order to maximize the performance and provide real-time information on desired system status points.

In addition, Ganz also offers a full range of after-sales services (installation, maintenance, refurbishment and repairs of products worldwide).





Special applications

Trackside power transformers

Trackside transformers are used to provide single-phase supplies for train overhead systems.

Transformer for mobile substation

Typical applications:

Emergency substation in case of defects, repairs and maintenance, reduction of network redundancy
Intermediate solution in a rapidly or unpredictably growing infrastructure, wind parks, business parks, etc.

Standby station for projects in oil & gas exploration, mining, etc.

Total Cost of Ownership

Ganz advocates high efficiencies by using the Total Cost of Ownership (TCO) method. This combines minimum investments and maximum energy efficiency for the least ownership cost. TCO main factors:

- Purchase price,
- Cost of no load and load losses,
- Cost of commissioning,
- Lifetime and reliability,
- Maintenance cost



Transformer Test Bay

The test laboratory is located in the building of the transformer factory in a separate hall and extends over 1000 m², enabling three transformers to be tested at the same time.

Two independent three-phase test systems, high voltage AC test equipment and impulse voltage generators for LI and SI tests are available.

All routine, type and special tests according to IEC and IEEE standards can be performed on the full product range of Ganz transformer factory (up to 600 MVA and 800 kV).





ROTATING MACHINES

Ganz manufactures a wide range of medium and high voltage motors and synchronous generators. The scope of electric rotating machines' supply covers the full sphere of design & engineering as per the customer request, up to the local installation and commissioning supervision.

The company is specializing in the design, manufacture and testing of MV & HV asynchronous motors from 500 kW to 20 MW and synchronous generators from 1000 kVA to 70 MVA.

The electric motor range includes safe and hazardous area motors, energy efficient motors as well as motors for special applications.

2-pole synchronous generators for steam or gas turbines of power stations can be supplied from 20 MVA to 60 MVA for 50 Hz and from 23 MVA to 65 MVA for 60 Hz networks.

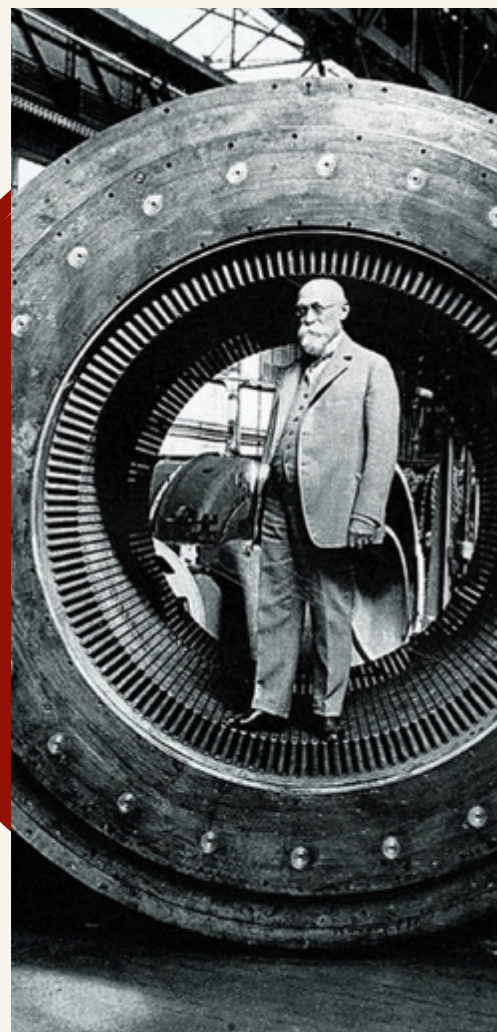
Ganz four- and higher pole synchronous generators operate at diesel- and hydro power stations, transformer test rooms.

The design and manufacturing range begins at frame 500 mm and goes up to 800 mm of series motors and generators, 900–1250 mm for high output standard rotating equipment, and even bigger frames' design and manufacturing can happen at tailor-made outputs or frame sizes.

The manufacturing area extends over 12 500 m² with a maximum crane capacity of 100 T. Special, bigger size of manufacturing tools as 50 t dynamic balance machine, VPI tank and furnace, cutting machines, presses are available, which make our company able to design and manufacture the bigger size of electric equipment. Factory annual capacity is 400 MW.

All rotating equipment are individually routine tested. Type and special tests are also performed as per the manufacturing schedule.

Ganz manufactures according to ISO 9001, ISO 14001 and ISO 45001.










Induction motors

-  Our motors are supplied in compliance with the applicable IEC Standards. In particular, they comply with the following standards:
 - BS 4999 (U. K.)
 - VDE 0530 – Teil 1 (Germany)
-  Upon request, motors complying with the US NEMA Standards MG.1. may also be supplied.
-  Output ratings, main fixing and coupling dimensions (frame size etc.) of motors comply with IEC Publication 72-2.
-  Our standard constructions and mounting arrangements are IM B3 or IM V1 (IM 1001 or IM 3011) according to IEC 60034-7.
-  Upon request, other versions are available for example IM B20 or IM B35 and others.

We produce motors for potentially explosive atmosphere with the following degrees of protection:

-  Increased safety motors: EExeb, Eexec
-  Pressurised motors: EExp

Special application

-  Synchronized asynchronous motors
-  Pole changing asynchronous motors
-  Asynchronous generator



Synchronous Generators

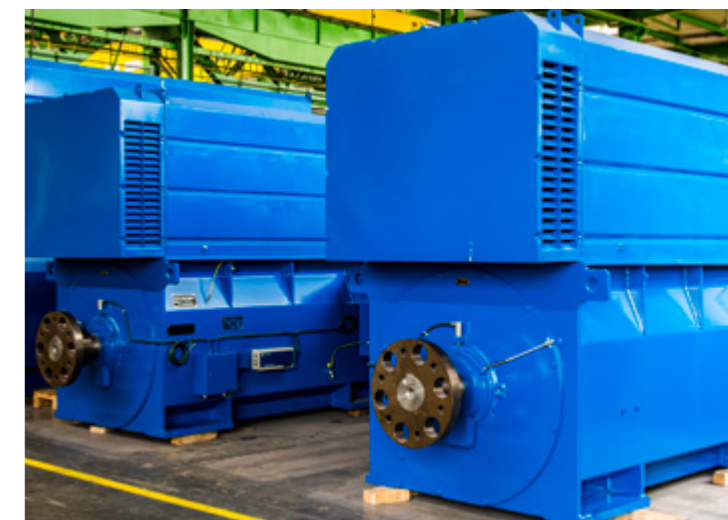
The Synchronous Generator designs are created using latest technology and optimized using FEM/Flux plotting techniques to deliver the highest level of performance.

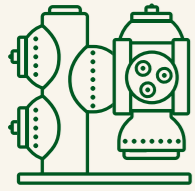
Our generators are self-excited and self-regulating. Brushless or static type excitation power is provided by a stationary-field exciter whose rotor is mounted on the generator shaft. The excitation unit with the automatic voltage regulation system is accommodated either in the generator itself or in a separate panel.

Generator output and speed are matched to the requirements of the prime movers. The generators are designed for a power factor of 0.8 lagging as standard, which are mechanically adequate for the active-power component of their kVA rating. The operational safety and strength of the generators is verified at works by a two-minute over speed test at 1,2 times the rated speed.

The generators are available for 50 Hz or 60 Hz for rated voltage between 400 V and 15 000 V. Using a reference value setter, the generator voltage can be adjusted within a range of +/- 5% of the rated voltage. This set value is maintained by the AVR. Other frequencies & voltage adjustment ranges are available on request.

Ganz's horizontal – or vertical outline synchronous generators operate at diesel- and hydro power stations, GTG two pole turbo generator series operate at steam- and gas turbine of power stations.





SERVICES



Service Division

Ganz Service Division maintains, refurbishes and repairs transformers, motor, generators, air- and gas-insulated switchgear (AIS and GIS) and substations worldwide. As a total solution provider, we also deliver lifetime extension programs supported by condition-based monitoring systems, as well as numerous accessories and spare parts for all equipment.

Furthermore, we know that every customer has different, specific requirements, so we offer flexible, customized service solutions. Through our extensive global network, our services will help you get the most out of your assets, to increase reliability and optimize productivity.

From advice on the right equipment you need, through installation, testing and commissioning, to standard or customized repair, maintenance and refurbishment, ending with spare parts delivery, Ganz Service Division works alongside you as your full service specialist.



Portfolio of services

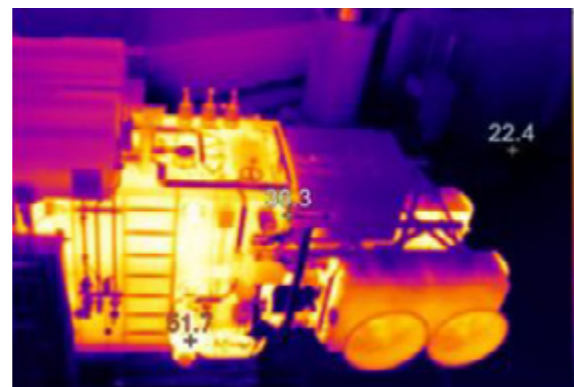
- Testing and advice
- Installation and commissioning
- Maintenance
- Repair
- Refurbishment
- Spare parts availability
- Condition monitoring
- On-site oil-treatment and oil refills





On-site diagnostics and evaluations for transformers

- Voltage ratio and vector group
- Winding and insulation resistance measurement
- Capacitance and $\tan\delta$ measurement
- Vibration and Insulation diagnostic (RVM, FDS)
- SFRA
- OLTC and bushing diagnostic
- Impedance and noise measurement
- Check of auxiliaries
- Check of insulation liquid acc. to IEC 60422
- Oil sampling, Dissolved Gas Analysis (DGA)
- Current- and voltage transformers inspection
- Recording of a thermovision heat map
- Development of a proposal for regular inspections, maintenance, renovation and repair of the transformer for long-term safe operation



On-site diagnostics and evaluations for Rotating Machines

- Vibration diagnostic
- On-line balancing
- Insulation resistance measurement of stator
- Measurement of ohmic resistance and impedance of stator and rotor
- Alignment checking and setting of the machine group with measuring instrument
- „Soft foot” measurement
- Excentricity measurement of slip-rings and commutator with measuring instrument
- Capacitance, tangent delta and PD measurement
- High voltage test measurements



On-site diagnostics and evaluations AIS and GIS

- Insulation resistance and PD measurement
- Current- and voltage transformers inspection
- SF6 charge, recovery, moisture content, SO2 content measurement, SF6 leak detection
- Circuit breaker displacement-time diagram
- Measuring the switching current and time of disconnectors and earthers
- Recording a thermal imaging heat map from LCC cabinets
- Inspection of locking circuit
- Drive maintenance
- Installation of retrofit moisture filters
- Touch protection inspection on auxiliary equipment
- High voltage test measurements



Spare parts for transformers and rotating machines

- Purchase and replacement of accessories
- Replacement of discontinued models

Transportation

Transformers can be transported completely filled with or without oil in the main tank, depending on the size.

Delivery both on road and rail is possible, because the factory in Tápiószéle has direct railway connection.

Depending on transportation considerations Ganz transformers may be shipped either with or without bushings, radiators, fans and conservators.

In case of transportation without oil, in order to avoid the moisture absorption by the active part, the tank is filled with dry air at a positive pressure maintained by a proper equipment.

For lifting of the transformers completely assembled they are provided with four lifting hooks welded onto the lifting ribs on the tank wall. For lower lifting there are four jacking pads at the sides of the transformer tank. In order to control the transport stresses of the transformers, depending on their size and way of transportation, transformers are equipped with three-dimension impact recorder.



CONTACT US:



info@ganzelectric.com



www.ganzelectric.com



H-1095 Budapest, Soroksári street 30-34.
Haller Gardens Office "C" Building, 5. floor



Gabor Godla



Tamas Enyedi



Lajos Harai



Adam Pallaghy

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