



MARINE



OFFSHORE



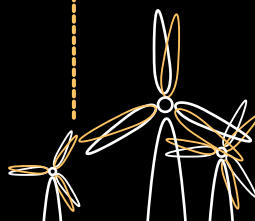
ROLLING
STOCK



INDUSTRY



RENEWABLE
ENERGY



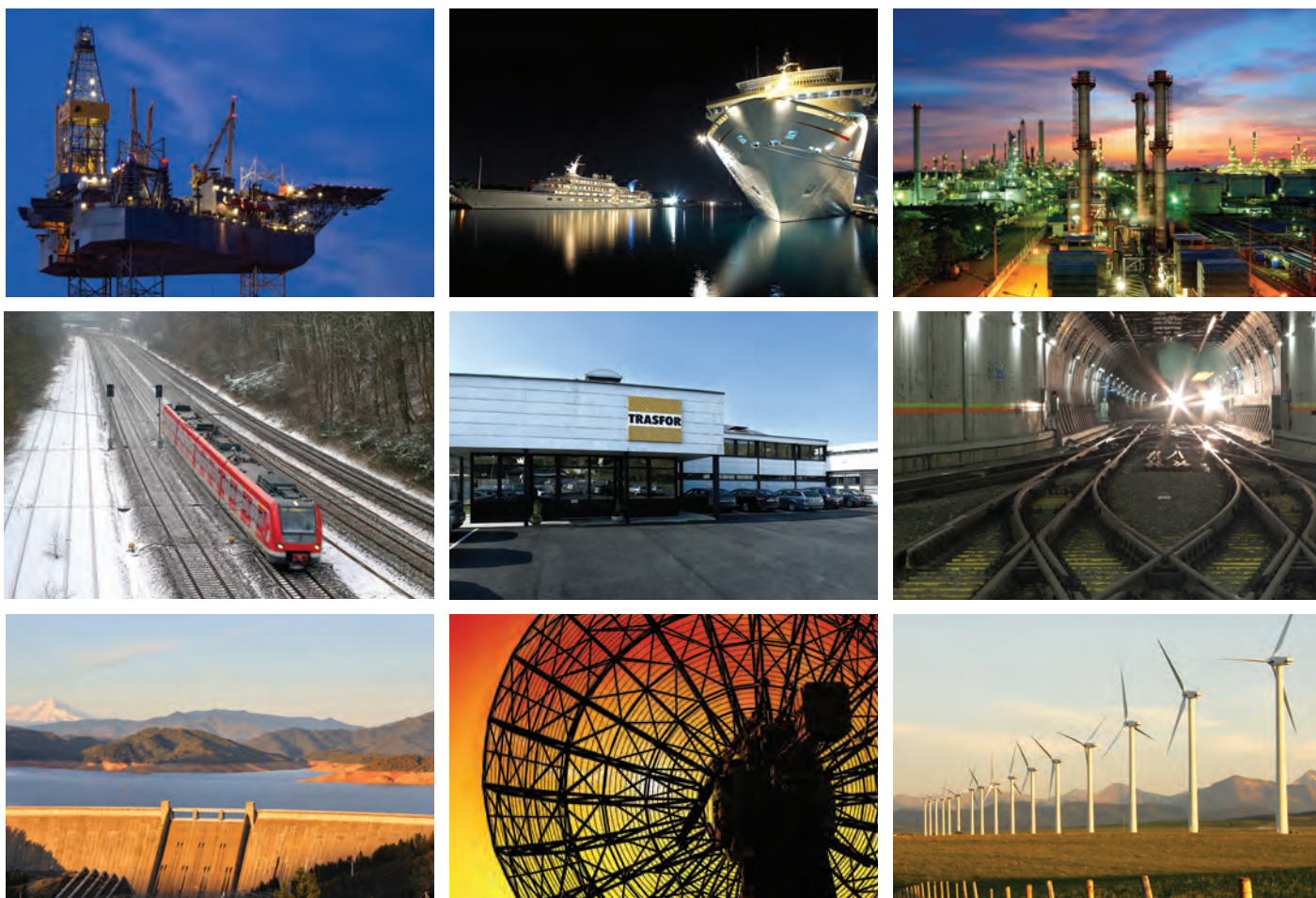
POWER
GENERATION



The future is made of
TRANSFORMATIONS

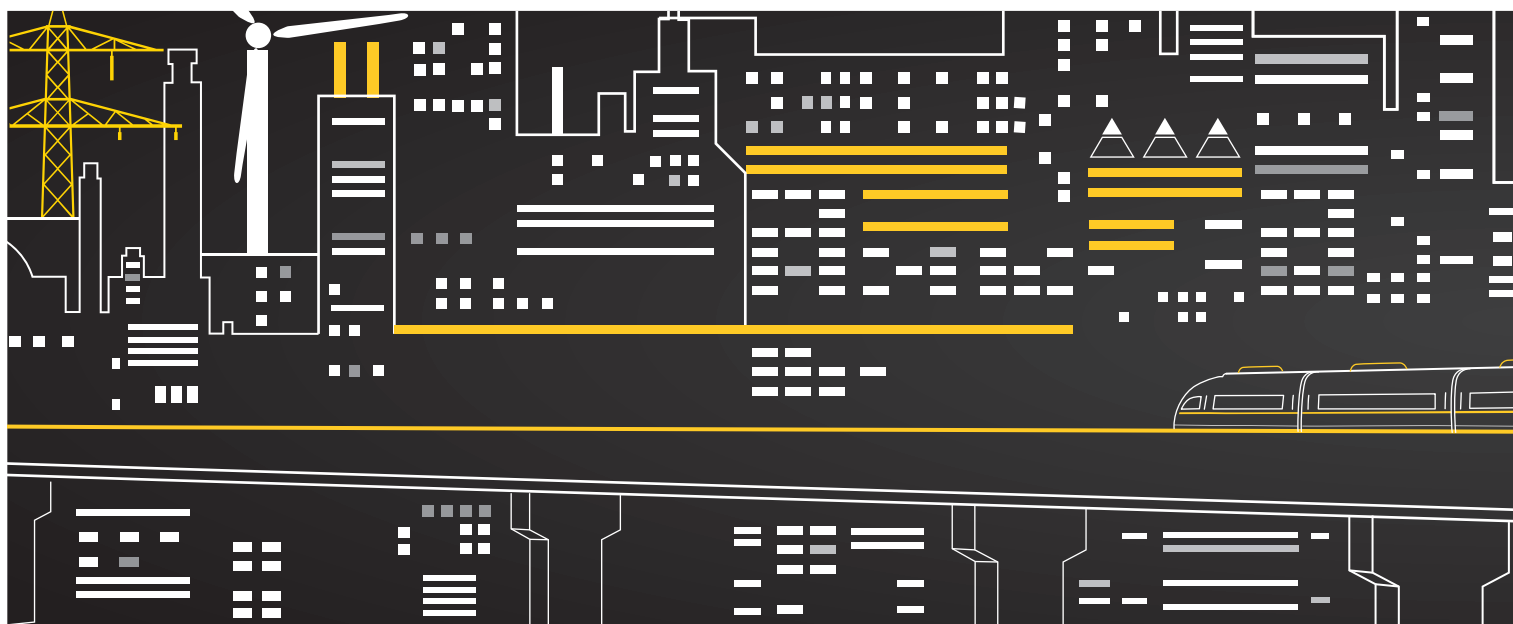
Swiss Quality and Precision





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Milestones

- 1967**

Trasfor SA is registered as a manufacturer of low voltage transformers and reactors for the Swiss market.
- 1976**

Cast resin technology is implemented and used for transformers up to 36 kV insulation class. It signals the beginning of the company's expansion beyond the Swiss border.
- 1980-1989**

Trasfor enters the marine, offshore and rail traction sectors. It is an important moment in the company's growth, increasing customer portfolios, volumes and technology.
- 1990-1999**

ISO Certification 9001.
- 2000-2010**

Trasfor becomes a leader in the marine, offshore and rail traction sectors. The share of revenue from exports reaches 90%. Greater attention is given to high-tech products for special applications.
- 2011**

3 October 2011: **Trasfor** Group is acquired by ABB and expands its transformer business.
Dry-type transformers and inductors complement ABB portfolio and help address fast-growing markets and applications.
- 2012**

Trasfor has added an inline testing area in the low voltage production line to increase productivity capacity.
- 2013**

Trasfor proudly obtains the OHSAS 18001 Certification.



History

Although the name Trasfor was registered at the Chamber of Commerce in Lugano in 1953, Trasfor SA was only founded in 1967. It is the typical story of entrepreneurs entering the competitive arena of a growing market, reinforcing themselves with a spirit of innovation and precise strategies. Throughout the long history of Trasfor, which has not been without its challenges, a number of values can be found that continue to represent its main structure, namely: respect for the environment, constant enhancement of employee skills and sound ethics in business practices and relationships. The company's evolution has been characterised by important moments of change: in 1976, the introduction of cast resin transformers enabled the company to enter the marine business, which over the following years would become a strategic element in its growth. In 1988 a decision was made to enter the first stage of expansion of the production area, and in 1994 ISO 9001 certification was obtained. In 1999, the company was taken over by four executives in a management buyout. This was a very successful operation and enabled Trasfor to significantly improve its international profile. In 2000, the company obtained ISO14000. From 2004, the company began a trend of revenue growth, with annual increases of between 20% and 30%.

The years 2004/2008 were marked by massive investments in buildings and production methods, with the purchase of new and modern machinery, design software, in addition to enhancing its sales network on an international level.



Knowledge, Training and Trust





Employees

Special attention is given to the selection, training and management of our employees in the knowledge that our know-how is our main competitive level. An accurate visual information system allows us to provide all our employees with information on company performance in terms of quality, orders received, safety and suggestions for improvements. By encouraging employees to take an interest in the company's business, we aim to promote a "feel good at work" factor.

The idea behind this is to enable the potential value of every person to be freely expressed as added value in our daily activities. We want to move closer and closer to a culture of Lean Management in order to improve efficiency through flexibility, optimising the company as a system and its value chain. We have been living this culture change for years.

It is a long process, where all members of staff participate, aware of their own role in the change and the additional opportunities it provides in terms of professional development.

Trasfor worldwide

As an international supplier, Trasfor has a wide network of retailers, representatives, agencies and partnerships all over the globe. Strategical presence in trade fairs provide additional opportunity for boosting the company profile and shaping the company according to market development.

To this end, the company participates in several events around the world.

Trasfor is further promoted through its participation in industry conferences, which provide a forum for technical and technological issues with round tables on future applications, new technologies and innovations.

Energy Performance and Economic Efficiency



Production

Personalisation of products is the aim of our customer orientation policy.

Therefore, due to the wide range of products manufactured by Trasfor, an easy classification to its products is difficult.

To simplify the distinction of transformers and reactors produced by the company, we can divide them into two general solutions: Standard and Specials.

Standard solutions

This definition is used to classify all transformers and reactors which have in common large production volumes with few project variables. It is an interesting market characterised by fierce competition. A typical example are transformers employed in the distribution of electricity. This sector is starting to return to the concept of “energy performance” and economic efficiency of use: this means that “capitalisation of losses” is becoming more and more important as a means of increasing productivity and reducing operating losses. In this sense, the design of the transformer plays a key role and enables the use of materials and techniques derived from advanced project engineering.

Special solutions

The products in this field are endless and truly unique in their design. There is no room for economies of scale, but rather an intensification of the concepts of reliability, efficiency, environmental performance and durability, in other words: product specialisation.

These solutions are normally applied to several sectors: marine, both commercial and military offshore, rail traction on board trains, renewable energy and heavy industry. The special solution benefits from a truly global and integrated competence and experience that only Trasfor, through the interaction of different designs, has matured over the years and can now make available to its customers. Electro-mechanical finite element design software analyses and develops appropriate technical solutions with a degree of predictability and reliability that is high enough to render unnecessary the construction of prototypes. In this way, we successfully take care of rail passenger comfort by guaranteeing power to ancillary services, or the safety of ship passengers by guaranteeing power to the propulsion engines, or focusing on the profitability of oil platforms that need to operate continuously without interruption. This is a specialised task that we have learned to perform reliably and timely, providing 24/7 service assistance after sales to deal with emergency situations. For us, it is imperative that our solutions are easy to use, whatever the application.



Products

Cast resin transformers

The product is suitable for use with medium voltages, power ratings up to 25/30 MVA and insulation voltage up to 52 kV. The windings are made with various shapes of aluminum or copper conductor. Each manufacturing stage of the cast coils passes through automated process controls that enable a product with uniform quality that tolerates the most severe thermal and mechanical stresses. The use of “Step Lap” mitred cores enables losses to be significantly reduced, increases the efficiency of the transformer and guarantees low noise levels.

Cast resin

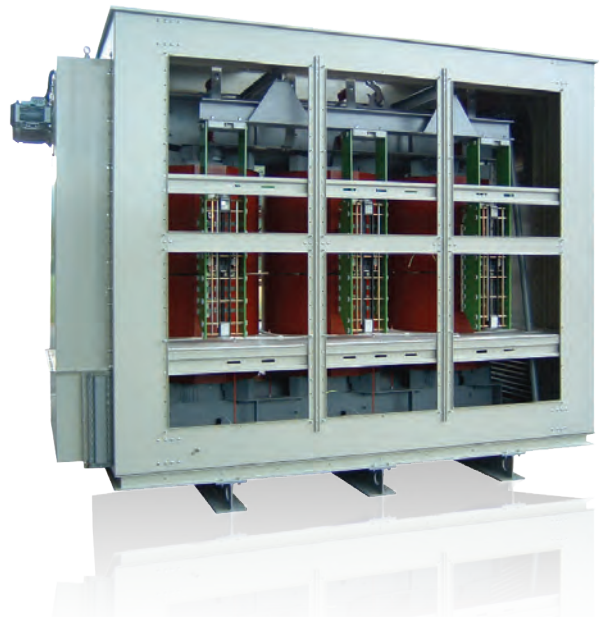
Transformers and inductors up to 25/30 MVA and 52 kV.

Cooling

AN/AF/AFWF/AFAF/ANAF

Enclosure Protection

From IP00 up to IP66.



VPI transformers

This is a solution used to produce low voltage (<1.1 kV) and medium voltage (≤ 24 kV) coils. The windings in copper or aluminium can have different types of insulating materials, depending on the various applications. Transformer power can reach 20/30 MVA. Customised solutions are available for any kind of transformers. Coils or complete products are furthermore protected by immersion in a bath of epoxy resin inside pressurized vacuum autoclave (VPI process).

Dry type

Transformers and inductors up to 25/30 MVA and 24 kV.

Cooling

AN/AF/AFWF/AFAF/ANAF

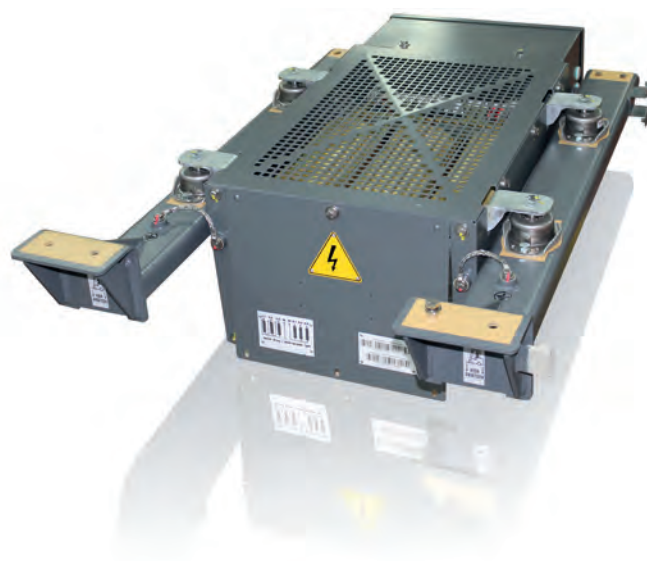
Enclosure Protection

From IP00 up to IP66.



Transformers and reactors for rolling stock

The IRIS standard, the latest to regulate applications in the rail sector, sets out very strict standards for usage in this field. This type of application is characterised by the aggressive environmental conditions, a restrictive MTBF rate (Mean Time Between Failures), the practical exclusion of maintenance and repetitive electro-mechanical stress. In addition, there is the safety aspect regarding the installation position of the units. A positioning that needs to satisfy the required mechanical behavior during freezing, shocks and vibration, and demands the employment of highly competent specialists. Simulations with FEA tools in order to predict the behaviour of the components against shock, vibrations and fatigue stresses are used.



Transformer mounted underfloor

Transformers and inductors up to 15 kV.

Cooling

AN/AF/WF/AFWF/ANAF



VPI iron cored and air cored reactors

Chokes and reactors always need to be calculated, designed and built specifically for each application. There are almost no standard products in this field. Trasfor is able to optimally solve all operational requirements thanks to the experience of its own engineers, an extensive database of applications and specialised proprietary software used for the calculations. The choice of materials used, however, will vary depending on the ultimate purpose of the component and the type of performance and technology to be applied.

Cooling

Inductors up to 50 kA and 36 kV.

Reactors

AN/AF/AFWF/AFAF/ANAF

Enclosure Protection

From IP00 up to IP66.



Transformers and reactors with liquid cooling

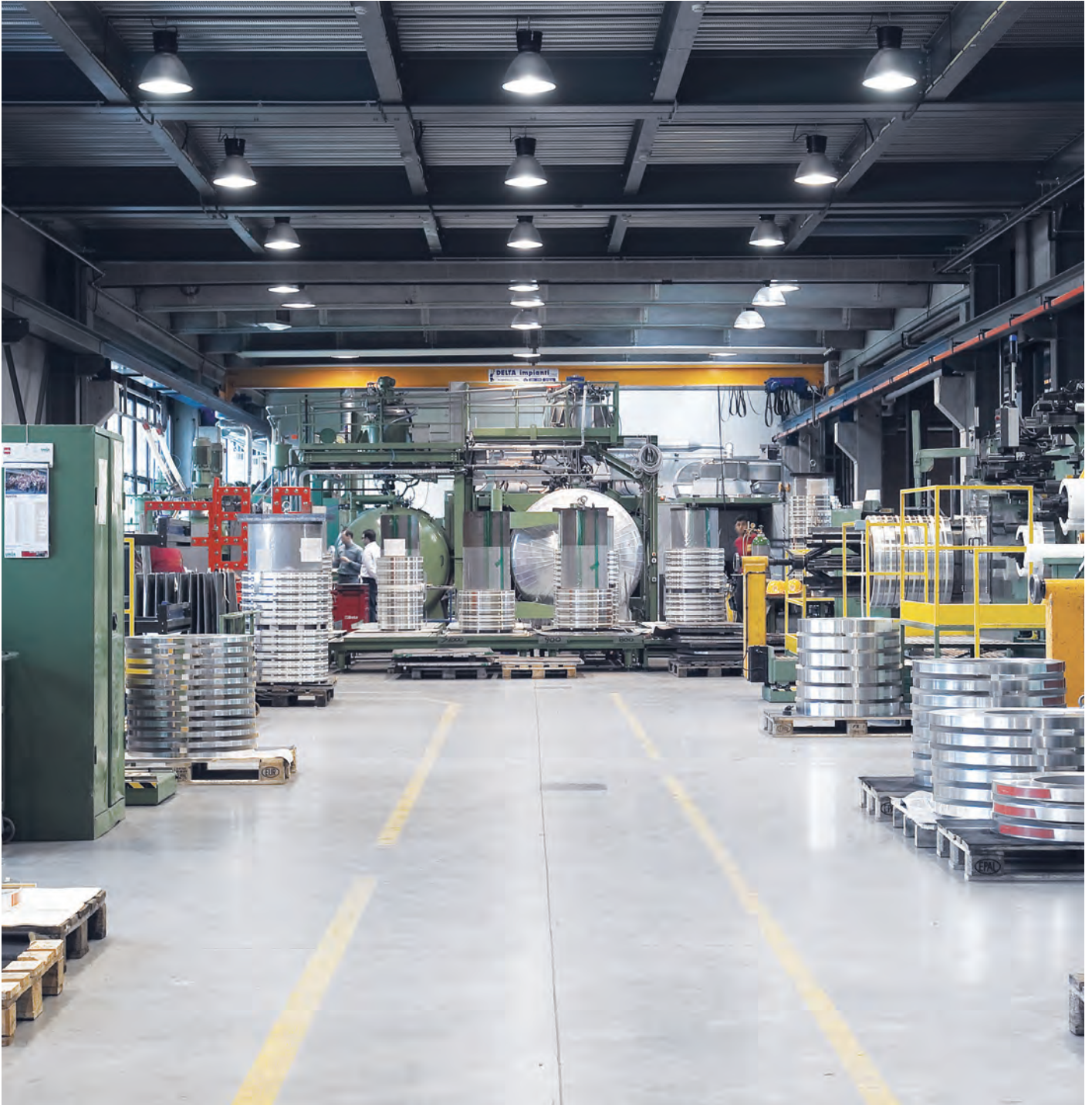
This technical solution is particularly suitable for applications involving high currents or where space is limited. The conductor may be cooled internally with a liquid refrigerant (direct cooling) or simply placed next to dissipating surfaces where the liquid is made to circulate (indirect cooling). This type of cooling system allows heat to be dissipated away from the points of installation and has the advantage of providing compact solutions in protected enclosures, despite the high concentration of power involved.

Water cooled

Transformers and inductors up to 12 kV and 50 kA with water cooled windings.



Materials



The evolution of technology brings constant improvements to the performance of materials available for use in the electrotechnical field. In this sense, Trasfor is committed to constantly keeping abreast of the latest developments in order to improve both the performance and competitiveness of its products. Collaboration with various institutes and universities also provides us with additional valuable information which allows us to test the options offered by the market in the context of applied research and development.

A second, though no less important, source of information is generated by our suppliers. They provide a broad platform of interchange that Trasfor considers particularly important and to which it dedicates valuable training time, through the institution of quality, in order to nourish a culture aimed at achieving common objectives of competitiveness (co-makship).

Maximum Precision,
Absolute Flexibility



Applications



More than 45 years of experience in the research, design and manufacture of transformers and reactors has made Trasfor SA an international industry leader and a primary company in the industrial fabric of the Canton Ticino in Switzerland.

The use of insulation and protection systems, such as cast resin and vacuum pressure impregnation, as well as the various technologies used in the cooling of components, have enabled Trasfor to master all application fields: energy distribution, civil and military marine, offshore, fixed and mobile rail traction as well as in the industry and renewable energy sectors.





Marine



The first electric propulsion applications were introduced in the late 1980s and subsequently developed with the implementation of static converters, which helped to promote the application. The many benefits of this new technology and, in particular, the attention of environmental issues, have also helped to increase the number of such installations and, consequently, boost the confidence of operators in the sector.

Offshore



The critical environmental conditions and high efficiency of this application call for an absolutely dedicated design. Nevertheless, they are usually required to have IP44 class protection and air-forced and water-forced cooling (AFWF); the design also needs to take account of the significant electrical stress and mechanical characteristics involved. The transformers are used to power both the drilling rigs and the thrusters on the platform. Interruption of any of these activities because of a transformer defect would have serious economic repercussions. This is why, in addition to good product performance, we also provide an efficient support service, which is able to intervene and deal with all kinds of emergencies.





Rolling stock

Installation on board trains

This application refers to installations on board locomotives and coaches and includes trains, trams and metro systems. Transformers and reactors are designed in a simulated environment in order to ascertain how they respond to electrical and mechanical stress, which is particularly intense in this kind of application. In fact, the installation conditions, underneath the train or on the roof, expose the unit to harsh weather conditions and constant mechanical stress from shocks and vibration, and make it necessary to perform highly selective testing, such as complete immersion of the unit in water for 96 hours and a corresponding electrical test under the same conditions. Tests on vibrating tables examine the unit's response to shock and vibration. These particular resistance characteristics are made even more critical by the specifications of customers, who demand compact, lightweight and robust designs. IRIS certification, which Trasfor holds, combined with many years of experience in the sector, provides a guarantee of reliability for the required period of time.

Railway substations

These are transformers and reactors for supplying power to overhead lines, as well as the distribution transformers for ancillary services. The power transformers operate in high overload conditions for short but continuously repeated periods. Determining the correct rating is a basic requirement for these components and influences the lifespan of the components.





Chemical industry

For the chemical industry, Trasfor designs power transformers with currents up to 50 kA. The lines used in galvanic treatments or the production of chlorine require complex transformers with multiple converter systems, generally with direct cooling of the windings with compatible fluids. The components used in these applications must have excellent resistance to corrosion, moisture, dust and corrosive agents in general.

Trasfor manufactures excitation transformers in three-phase or single-phase for various types of power plants. They are usually high-power rectification transformers. These installations are characterised by the presence of high harmonic content, which means that additional losses need to be carefully controlled. It is, therefore, necessary to operate in a simulated environment in order to find the correct rating for the transformer.

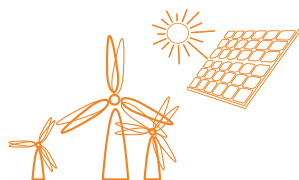
Heavy industry

Trasfor manufactures components that are used to obtain the powerful and high energy conversion that is needed, for example, in the steel industry, paper manufacturing and silicon production. The transformers and reactors used for these applications have particularly robust construction characteristics, from an electrical and mechanical point of view and with regard to corrosion resistance, because of their frequent use in environments with high humidity and pollution and the presence of dust and corrosive agents.

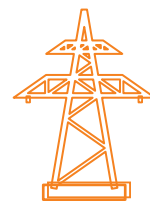




Renewable Energy



Power Generation



Renewable energy is defined as the energy that comes from natural resources, like sunlight, wind, waves and rain. By consequences, the electricity generated from solar or wind solutions is included in the definition.

Wind energy is produced by converting the kinetic energy of wind into other forms of energy while the photovoltaic plants or solar solutions are electrical facilities using the sunlight as electricity generator.

Developments undertaken by Trasfor in recent years have resulted in transformers and inductors being engineered specifically to match the demanding needs of the renewable energy market place.

Trasfor offers generator step-up transformers-up to voltage class 36 KV and power rating 25 MVA - and a comprehensive range of excitation transformers to improve the efficiency and lower the energy consumption of plant equipment for all types of power plant units, from nuclear to coal thermal power plants, from combined cycle to cogeneration plants.

Excitation transformers are used to provide the magnetic field to generators and synchronous motors and are such a critical component of any generator plant that reliability is a key factor in the manufacturer choice.

Trasfor **also** supplies step-down transformers for substations along the transmission lines to decrease the voltage level and provide power to medium and low voltage users.



Research and Development

This is one of the main activities of Trasfor into which we channel significant investments in both simulation systems and experiments in our laboratories. Collaboration with institutes, specialised centres and universities promote the multidisciplinary nature of research and development. The Swiss Confederation provides concrete backing for the developments promoted by our company. Our activities are divided between the pursuit of technical development for our clients and the development of our own projects. The first one is a research activity, with the characteristics of consultation and integration with the customer, and usually includes lead times, while the second one is driven by corporate strategies, both in terms of basic research and applied research for a specific product.

The research environment makes use of advanced development tools, both mechanical:

- Pro/Mechanica-De-featuring
- Pre-processing, preliminary analyses (Static, Dynamic, Shock), simple post-processing

- MSC Patran-Pre processing, detailed post-processing
- MSC Nastran-accurate analyses (Static, Dynamic, Shock, Fatigue) MSC Fatigue-Fatigue analysis and electrical:
 - Comsoi Multiphysics and its modules
 - AC/DC Module-Conductive Media DC
- Shell Conductive Media Dc
- Electrostatics
- 3D Quasi-Statics, Electromagnetic
- 3D Quasi-Statics, Magnetic
- 3D Quasi-Statics, Electric
- 2D Perpendicular and Azimuthal Induction Currents, Vector Potential

In addition to the Heat Transfer Module and its components

- General Heat Transfer (2D and 3D) Stationary and Time-dependent
- Thin Conductive Shell Stationary and Time-dependent
- Weakly Compressible Navier-Stokes (2D and 3D) Stationary and Time-dependent.





Environmental commitment

The demand for energy supplies is constantly growing, and Trasfor is aware that in the context of climate change, one of the key issues to address in the near future is energy efficiency throughout the supply chain. Environmental management is, without doubt, a competitive lever in the medium to long term, both at the level of advanced economies and the competitiveness of the country. We envisage, therefore, a future framework in which the themes of production, environmental protection and energy efficiency will need to be approached in a realistic manner and with scientific rigor for the sustainable development of our planet.

In parallel to studies on how to optimise product efficiency by using components with low environmental impact, Trasfor is committed to preventing pollution by pursuing a number of additional targets, such as:

- Compliance with all laws, rules, directives and ordinances applicable to products and processes on which Trasfor can have influence, assuming legal responsibility.
- Collaboration with national authorities and other organisations to develop regulations and practical guidelines aimed at protecting natural resources and the environment in general.

- Reduction in the consumption of material and energy resources to a minimum.
- Reduction of the production of waste and contamination of air, water and soil.
- Ensure that unavoidable waste is disposed of in an environmentally compatible manner.
- Adoption, whenever possible, of technologies that enable the company to achieve these goals.
- Raising the awareness of all employees of the environmental impact of their activities and the company policy on this.
- The carrying out of routine checks to ensure compliance with this policy and a continuous improvement of the environmental performance of Trasfor.

With this operational plan, and the active participation of all employees, each of whom is attentive and responsible to the impact on the ecosystem of their work, Trasfor has adopted objectives for environmental management in its business strategy at a global level. It is to underline this commitment that we wish to make public this policy of ours, in the same way that we publish transparent reports on our environmental performance in the Trasfor Annual Environmental Report. The documents cited are available to the public at any time upon request.

Service

Worldwide Service, Maintenance, Technical Assistance & Consulting

To consolidate its position, Trasfor has created an additional service tool to offer a complete technical consultancy, ranging from project specific engineering studies to routine inspection and maintenance. Trasfor Service offers a unique world-class service for any type of transformer, starting from commissioning, through scheduled and unscheduled maintenance and immediate intervention. Trasfor's Service team of qualified and certified experts is ready 24/7 to fly all over the world and face any level of emergency situation, reducing to the minimum your down time.

For more in-depth technical analysis, Trasfor Service, through a pool of specialists, electrical mechanical and structural engineers, is able to assist with specific product developments and provide solutions to the most complex technical requests. This is also thanks to the availability of technical equipment for thermographic studies, vibration and shock monitoring. We analyse your installation, and we suggest to you a list of the most important and critical spare parts.

Railways Service Key-Points

- Scheduled Maintenance
- Repair & Reconditioning of components
- On-site survey
- "In-House" technical support
- 24/7 Emergency Support Service
- Spare parts Service

Marine & Offshore Service Key-Points

- Commissioning
- Maintenance
- Onshore & Offshore operations
- 24/7 Emergency Support Service
- Spare parts Service





Advanced Technical Support:

- Advanced FEA tools for Magnetic, Thermal and Mechanical Studies
- Vibration and shock analysis
- On-site thermo-graphic studies
- “In-House” technical support
- Noise level measurement

High-Tech analysis:

- Electrical & Mechanical thermo-graphic studies
- Vibration and shock analysis
- Structural analysis & Dynamic analysis





Quality

- Quality as ISO certification 9001
- Quality as total respect of environment with ISO 14001
- Quality as OHSAS 18001
- Quality for the railway industry as IRIS - International Railways Industry Standard
- Quality of products through UL File E172880 and UL File E216928 certification
- Quality of welding through ISO EN 3834-2 and EN 15085 certification

Quality through entrustment by the following certifying bodies:

ABS - American Bureau of Shipping

BV - Bureau Veritas

Standards: all int. standards such as IEC, BS, CSA, UL, VDE/DIN, ABS, BV, ANSI, DNV, LRS, CCS, RMRS, etc.

Certificate of conformity to GOST R

Trasfor SA

6995 Molinazzo di Monteggio
Ticino - Switzerland

Telephone +41 (0) 58 58 84400

Service +41 (0) 58 58 84500

Fax +41 (0) 58 58 84600

www.trasfor.ch

Head office: infotrasfor@trasfor.ch

Trasfor service: service@trasfor.ch



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