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2015: A YEAR MARKED BY ECO DESIGN PRODUCTION

GBE HAS FULLY WELCOMED THE EUROPEAN TARGET FOR IMPROVED ENERGY EFFICIENCY

One year after the entry into force of the new Eco Design legislation (July 1, 2015), the results are thrilling: throughout Europe, the Directive set has been well assimilated by all transformer manufacturers with the common goal of improved energy efficiency and general environmental compatibility with the commitment to progressively reduce CO₂ emissions.

The GBE vision has always been to be ahead of the times in terms of environmental respect. Values such as environmental protection and the preservation of environmental resources have prompted the company to design resin and oil transformers with low losses, even lower than the Eco standard to ensure, even before the latter entered into force.

As early as 2014, in fact, GBE had begun manufacturing amorphous core transformers with performance characteristics highly superior to the "TIER 1" and "TIER 2" series provided by European Regulation. Furthermore, GBE has always based its bid preparation on different design solutions in order to ensure a competitive price considering the capitalization of losses, or by comparing the cost of the transformer and

the cost of energy consumed by the same, in many cases obtaining yields that are already close to the efficiency currently required by the European Directive.

The second phase (which will begin in 2021) will surely be much more challenging for all manufacturers, as it will require a change to construction design and also to some materials used. Especially because, in July 2017, the European Commission will examine the actual values of loss and efficiency to guarantee for Phase 2, according to an analysis of data related to units placed in service after July 1, 2015.

The Directive can however be further improved: during its study and preparation, generalizations were made that do not always fit to the actual constructive circumstances. For some types of transformers and for some classes of voltage, the efficiency demands are somewhat restrictive, while a possible adjustment of the degree of optimization of the constructive design is permitted for other types. For example, no difference of efficiency for transformers with different short-circuit impedance is prescribed.

Despite this, GBE always guarantees the best possible performance.



The GBE vision has always been to be ahead of the times in terms of environmental respect

GBE ENDS YEAR WITH +18% TURNOVER

2015 was a very difficult year for all European transformer manufacturers and especially for those in Italy. The introduction of the Eco Design Directive has led to an increased demand of low loss sheets, namely high-permeability material, with consequent difficulties by suppliers themselves to meet demands. Due to a lack of availability of the sheets in Europe, price increases quickly occurred, with an anti-



dumping duty then imposed by the EU, also forcing an increase of 30% on finished transformers. Nevertheless, 2015 was a year of growth for GBE: after the first difficult months due to a slight stagnation of the market, an increase

in demand in the third quarter was then verified. With respect to the previous year, revenue increased by 18% and the total production of transformers reached about 3,000 units.

NEW AMORPHOUS CORE TRANSFORMERS PRODUCTION

FOR 2015, GBE HAS IMPLEMENTED A NEW MANUFACTURING LINE FOR AMORPHOUS CORE TRANSFORMERS, AVAILABLE IN OIL AND CAST RESIN WITH INSULATION CLASS 12 kV AND 24 kV

Eco-save is an increasingly strategic goal for operators in many different sectors: enhancement in this direction is due to the need to reduce operating costs, the introduction of new legislations and an environmental sensitivity that, in today's different markets, give "green" companies a competitive edge in terms of image.

GBE's answer to this challenge is a new transformer line manufactured with an amorphous core, available in a wide range of solutions to satisfy the most various design requirements: dry or oil insulated, with power up to 2500 kVA. GBE has already supplied these transformers to several installations in North Europe, particularly cast resin amorphous core transformers. This shows the company's ability to properly react to new market requirements with reliable and flexible technological solutions.

GBE indeed believes in amorphous transformer technology, confident that this solution will become continuously more successful in the future, thanks to the possibility of achieving considerable energy savings: no-load losses are actually three times lower than those of an Eco Design transformer.

Benefits are of course doubled: on one hand, operating costs are remarkably reduced and, on the other hand, it considerably contributes to



environmental conservation.

As for savings, the convenience of amorphous transformers with respect to traditional ones is rapidly calculated with this formula:

$(\text{No-load Losses (kW)} + \text{Load Losses (kW)} \times \text{Load Factor}^2) \times 365 \times 24 \text{ (h)} \times \text{Cost of Electricity (€/kWh)}$

In the short term, the major initial cost are written off and, in the long run, the benefits will be an important reduction of power consumption costs.



ASSEMBLING AN OIL AMORPHOUS TRANSFORMER



01 | AMORPHOUS CORE ASSEMBLY BENCH



02 | ACTIVE PART FINISHING



03 | TANKING



04 | FINISHED PRODUCT

NAVAL INSTALLATIONS, ONSHORE AND OFFSHORE

RELIABILITY TAILORED FOR THE MOST DIVERSE
MARINE APPLICATIONS



OFWF TRANSFORMERS AND REACTORS



The versatility of oil makes it suitable for special applications and even compact solutions. It guarantees almost adiabatic systems with limited energy and heat losses in the room where the machine is installed. Thanks to the ongoing specialisation pursued by the Research&Development Department, GBE manufactures Oil Forced Water Forced (OFWF) type transformers and reactors. This type of transformer or reactor does not feature any heat-dissipating elements such as fins or radiators. Hence it features the advantage of a compact layout, reducing not only the overall dimensions, but also the weight. This system can be used for both distribution and power transformers. The tank of the electrical machine is in fact equipped with an oil/water heat exchanger that can be either with plate or tube bundle fitted outside of the same. The heat exchanger, connected to a hydraulic circuit within which the cooling water circulates, ensures that the oil contained inside the tank is kept at a normalized temperature for correct machine operation. The heat exchanger is also equipped with a pump that enables forced oil circulation. These types of machines are used in places where it is not convenient and practical to dissipate heat in conventional ways within the room. This OFWF cooling solution proposed by GBE is used very often in marine environments, inside buildings and facilities, where there are other machines installed and the heat output is very high.

Electrical plants and water clash against each other, this is obvious. And yet, it is right in the sea that we find the most significant and important installations, for the technical challenge they entail.

Highly humid and salty environments are very demanding in terms of design and manufacture: GBE has extensive know-how thanks to years of experience in this specialised field. GBE has brought its efficient, reliable technological solutions to the international sector for installation on ships, offshore platforms and coastal plants. Three different areas, with specific technical and environmental issues, where GBE operates with its same strengths as always: the ability to meet all installation requirements thanks to a full range of cast resin and oil transformers. The key point for marine applications is to understand the distinctive characteristics of the transformer to be installed, a technically complicated issue that results directly from the installation environment. GBE onshore and offshore platform transformers are designed and manufactured in order to withstand the severe climatic conditions typically characterised by very high salinity and highly humid environments.



MANUFACTURED
IN ORDER TO WITHSTAND
SEVERE CLIMATIC
CONDITIONS

As for transformers for vessels, GBE supplies propulsion, thrusters, auxiliary and distribution transformers. These are tailored to the specific requirements of the installation: high temperatures, reduced spaces, high vibrations.

For particularly complex projects in terms of temperature, the heat can be dissipated either channelling the air (natural or forced) or by air/water heat exchangers.

All transformers for vessels are designed to guarantee a long-lasting performance despite the presence of high vibrations and to withstand the maximum tilt angle required by the ship.

GBE marine transformers are manufactured with special attention to their environment impact, ensuring solutions that prevent contamination in the area surrounding the plant.

All GBE marine transformers and their components comply with the most demanding and

restricting standards dictated by the international certification authorities (RINA, DNV, ABS, BV, LRS, etc.) as a guarantee of a reliable product even in the most severe conditions.

SCOTT-T TRANSFORMERS WITH CUSTOMISED LAYOUT

A CUSTOMISED SUPPLY FOR ONE OF THE MOST INNOVATIVE OIL RIGS IN EUROPE



GBE, a company capable of developing customized solutions covering all kinds of products, satisfying any installation needs and also managing machining processes internally, has once again played a strategic role in one of its recent supplies.

GBE has produced and installed a special product for the Tempa Rossa plant: a Scott-T transformer for an oil plant which is going to be one of the most advanced in Europe: it is being constructed in the Basilicata Region in Italy and, once completed, it will be comprised of 8 oil wells (6 of which have already been drilled), a processing centre and all the other supporting facilities and services, with a total daily capacity of approximately 50,000 barrels of oil, 230,000

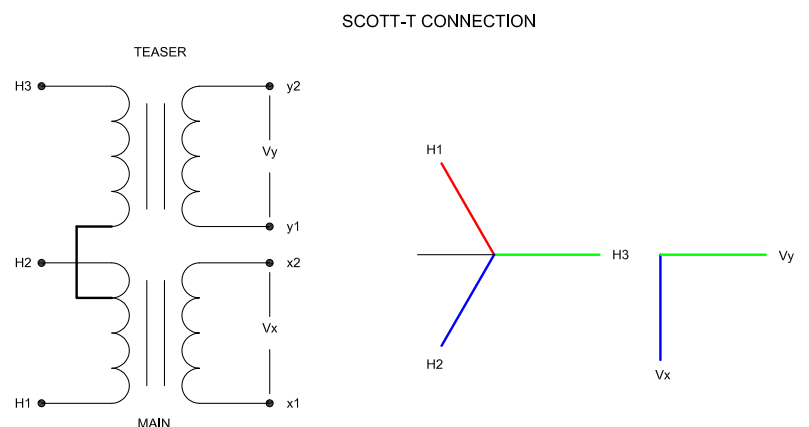
m³ of natural gas, 240 tons of GPL and 80 tons of sulphur.

GBE HAS BEEN SELECTED AS SUPPLIER, THANKS TO THE COMPANY'S CAPACITY TO CREATE CUSTOMISED SOLUTIONS

This project is also innovative in terms of its reduced environmental impact, for which GBE has been selected as supplier, thanks to the company's capacity

to create customised solutions, to its significant know-how and to its technical resources and facilities, capable of managing all production phases internally.

As is well known, Scott-T transformers are used to detect two-phase voltage from a three-phase source. Its main advantage is the possibility of obtaining a balanced load on the three-phase side with a balanced two-phase load. Initially, it was used only to power induction motors, but today it is used also in industrial furnaces or heating plants. An even more recent application is in traction substations.



The Scott connection is composed of two special single-phase transformers (called "Main" and "Teaser") connected to one another; in this way, if the system is powered with a three-phase power supply (with a 120 degree phase displacement), two-phase output is obtained (with a 90 degree phase displacement).

Usually, the two transformers are installed in a single box, one next to the other, and the box, in this case has been produced by the new GBE internal Machining department for which the Italian company has built a third facility, launched two years ago, that operates at full capacity supervising all production phases from cutting sheet metal to assembly and coating.

Backed also by its success with Tempa Rossa, GBE has already been appointed to construct Scott-T transformers for several top international oil companies, for the Novoport Yamal plants (Yamal peninsula) and UMM WU'AL DAP/NPK (Ras Al Khair, KSA).

HIGHER ENERGY EFFICIENCY WITH THE NEW **GBE VOLT**



In most countries in Europe (and around the world), the voltage of power lines for the distribution of energy varies by more than +/- 10%, no longer guaranteeing the maximum limit as required by EN50160. This is caused by a number of factors, in particular the increasing diffusion of renewable energy plants, accidental voltage drops, more frequent peaks in energy consumption throughout

the day and the continued expansion of the grid itself.

Many problems arise from these changes: equipment failure, machinery overloading, insulation damage, and a drastic increase in the overall losses in the grid, the distribution system and all other electrical components.

In response to this final issue, GBE has created a new VOLT, Voltage Op-

THE ECONOMIC AND COMPACT SOLUTION TO TAP THE GRID VOLTAGE, OPTIMISING THE TRANSFORMER PERFORMANCE AND REDUCE THE LOSSES

NEW GENERAL CATALOGUE 2016

THE NEW POINT OF REFERENCE FOR
INTERNATIONAL CLIENTS SEEKING STANDARD
AND CUSTOMISED SOLUTIONS



This year, GBE has produced a new catalogue, in which great emphasis is placed on compliance with the new Eco Design Directive, but especially to new achievements by the company. The catalogue is divided into six chapters.

The introductory section highlights the different types of products in the three production plants and the adopted organisational model which allows an effective organization, a prerequisite for the response speed and flexibility that characterises all corporate functions, from sales to production and all the way to assistance. An explanation is also provided of the complex and continuous tests conducted within testing rooms to verify compliance with the provisions of standards and required by customers.

The other chapters describe the five types of products that GBE is able to produce.

As is well known, the Company in fact not only produces insulated transformers in resin and in oil even up to power degrees of 30 MVA - 52 KV in resin and 50 MVA - 145 KV in oil, but also reactors for various types of applications and, finally, a new product which is the amorphous transformer. The catalogue contains many technical details to explain some points of the new legislation, with reference also to the special features of GBE products with respect to those of the competition. With regards to environmental, weather and fire behaviour classes, emphasis is made on the addition of E3 in accordance with IEC 60076-16 and C3 and C4, not foreseen by the IEC but present in GOST-R 54827 legislation for the Russian market.

New housing for resin transformer protection for various types of installations, up to IP54, are among the changes made to the new catalogue. The catalogue has also been enriched with many images to support the technical description and to emphasise the variety of products that GBE is able to produce for all types of installations, with personalised constructive design. Finally, ample space has been reserved to the particularities and structure of the production process, confirming the high-level dimension reached by the company over the years.

TRANSFORMERS LINE

timisation Local Transformer complete with an on-load tap-changer (OLTC) with controlled motor, low voltage side voltage meter and, therefore, with automatic regulation.

This solution ensures constant correct voltage values on the secondary side irrespective of the changes of the medium voltage grid with switching times of less than 1 second, with the great advantage of keeping the size of normal for distribution transformers.

When there are large variations in the grid voltage, transformers must often operate at a voltage that is different from the nominal value and, in some cases, this results in large amounts of wasted energy, because – as is well known – a higher grid voltage than the nominal value causes an increase in losses not only in the transformer, but also in particular in the installation and in the equipment powered by it. Ultimately, therefore, ensuring the correct voltage results in energy savings.

NEW GBE MARKETING DEPARTMENT



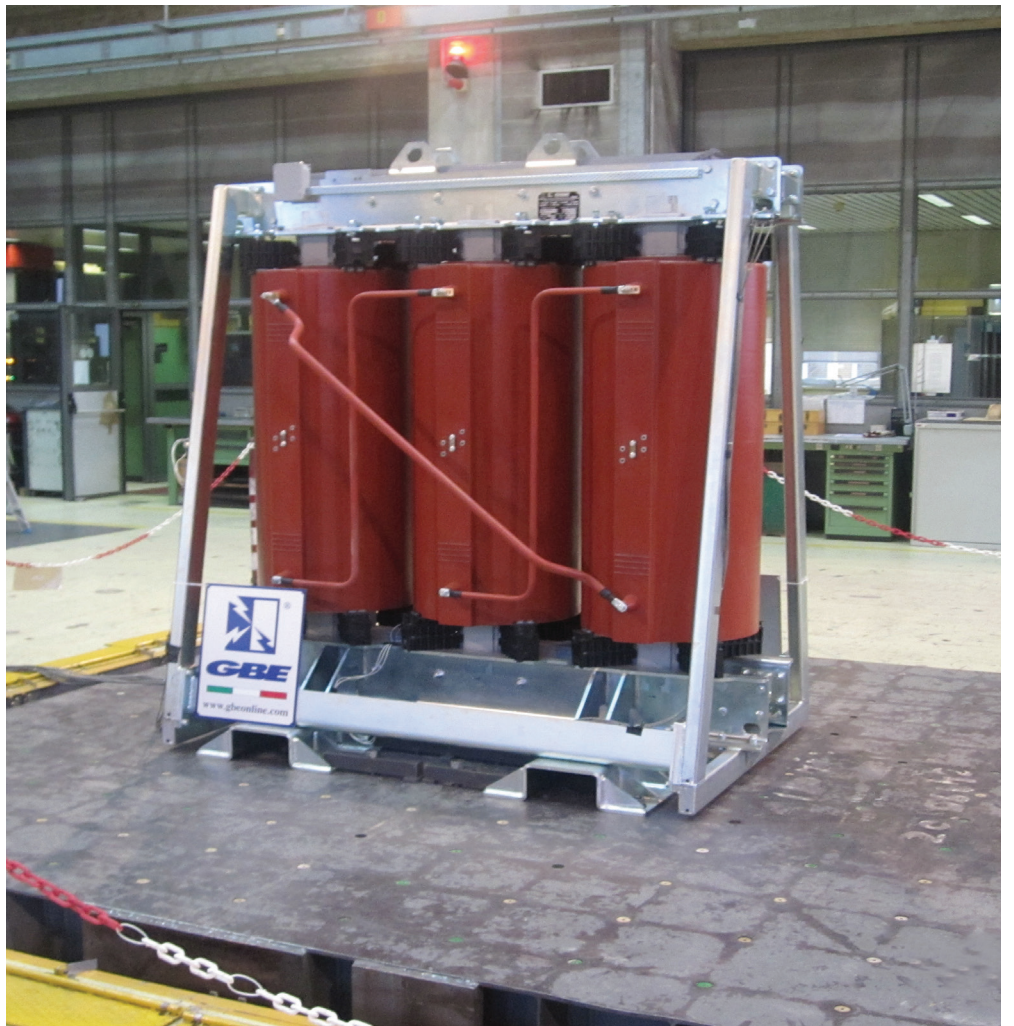
In support of key production and sales operations, the company has strengthened its marketing department, whose work is of fundamental importance for the valuable support it offers to the entire organisation and the sales network. The marketing department can now count on two new professionals and can pay particular attention to graphics, website management and the promotion of all aspects related to the technological innovations introduced into the company. The agenda for the new marketing department is already full of commitments. In fact, many new communication tools are being planned,

THE COMPANY'S SUCCESS
ENCOURAGES THE
PROMOTION
OF MARKETING
STRATEGIES DAILY

including the new company video (which it will be created and edited by an important outside video editing company), the highly anticipated new general catalogue 2016 summarizing all "made in GBE" products, and the organisation of new trade fairs including Hannover Messe, All Energy in Glasgow and Wind Energy in Hamburg. Despite market difficulties, the company's success encourages the promotion of marketing and sales strategies daily in European and non-European markets, with the knowledge that quality in symbiosis with technology, always in step with the times and attentive to all needs, is a solid basis for any communication tool.

GBE RESIN TRANSFORMERS APPROVED FOR INSTALLATION IN SEISMIC AREAS

Already a few years ago, GBE obtained positive approval for its 2000 kVA, 36 kV class transformer (40.5 kV GOST) for Mercalli scale seismic level X, equivalent to 7.3 points on the Richter scale and level 9 according to system MSK-64 at the CESI (ISMES) laboratory in Bergamo. Testing was performed in accordance with standards IEEE 693-2005, EN 60068-3-3, and GOST 17516.1-90. The entity of the stress withstood by the transformer under testing corresponds to an acceleration along the three axes of 1g, which is approximately 10 m/s². According to regulations, these levels of seismicity correspond to a phenomenon defined as very destructive, causing the destruction of many buildings, landslides, crustal lifting and victims. Consequently, resin transformers in high-level areas of seismic activity must not only ensure high electrical performance but especially a mechanical construction such as to withstand high dynamic stresses in the accelerations on the three axes caused by seismic events. Thanks to this passed test, GBE has been able to expand the installations of its machines in Latin America, where there have been many investments in the energy sector in recent years, both for industrial and residential use.



SERIES OF HOUSINGS FOR DRY TYPE TRANSFORMERS

MAXIMUM RESISTANCE TO CORROSION AND ADVERSE WEATHER, RATED UP TO IP 54



GBE has introduced a new line of housings for dry transformers, available in three different types with customised solutions for different indoor and outdoor applications and installations.

These types of housing guarantee the desired IP (IP21 - IP54), but also the highest resistance to corrosion in severe weather conditions, such as installations at temperatures below zero and snow load or using the transformer housing in the desert at ambient temperatures above 50°C and with sand.

Each housing has been defined in full compliance with regulations, with special attention to every construction detail. Furthermore, specific measures ensure easier and faster maintenance: panel dismantling to view the transformer can be performed by quickly mounting and removing

the screws. Last but not least, the housings can be equipped with locked doors and any other accessories required may be provided according to GBE's vision, providing highly customised products where necessary.

The new series of housings is another highlight of the new GBE in-house Fabrication Facility. It was established two years ago and guarantees the company maximum flexibility in the production cycle, as it makes it independent from external suppliers and therefore able to operate with short production times, thanks to its advanced technologies that guarantee the production, processing and finishing of all steelwork used for transformer and reactor manufacturing.

SL TYPE



Housing with 2 mm steel bearing structure with removable lid and panels in coated 15/10 thick sheet steel.

SG TYPE



Housing made entirely of coated 15-20/10 thick sheet steel panels. Front panels removable on both sides. Removable lid to ensure lifting of the complete unit directly from the transformer lugs.

AL TYPE



Housing with anodised aluminium standards with removable lid and panels in coated 15/10 thick sheet steel.



SO MANY WAYS TO BE SPECIAL



THE STRENGTH
OF GBE IS ITS ABILITY
TO MEET EVEN THE
MOST PARTICULAR
TECHNICAL NEEDS
ALONG WITH
WORLDWIDE
COMMERCIAL
PRESENCE AND
ASSISTANCE

*The founding members of GBE:
Giuliano Sanson, Renato Tapparelli
and Francesco Muzzolon*

More value for customers



**Massimiliano Galasso,
General Manager**

"We are a company that has always focused not on quantity but on quality, particularly on custom products, through which we offer customers an important added value. It's that precise flexibility that is our strong point, which also means faster delivery and order management competence in the event of changes or other issues. We are a company that operates in five continents and with an offer covering the entire range of possible needs but, at the same time, we work to streamline processes, so much so that our competitors are among our own customers, as they come to us whenever they receive a special product request. We should note that markets have become increasingly demanding and, at the same time, consideration of the importance of transformers has increased in recent years. This is because the importance - including economic - of energy efficiency, an issue that rewards quality achievements, has finally become more fully understood. Quality and innovation are becoming increasingly awarded and this challenge continues to represent a welcome challenge for GBE, seeing as we have always invested in these very factors. In this sense, the importance of other "hidden" but essential facilities and business functions have emerged, such as our testing room to perform sophisticated simulations or the ability to produce all major certifications required by reference markets. In general, we can say that the trend today is to follow the will of the customer to a much greater extent, but this has always been our attitude."

The specialists of special



**Alessandro Tapparelli,
Electrical Engineer**

"The creation of non-standard machines has always been the pride and joy of GBE. It all begins with cu-

stomers who present us with specific technical specifications they need met. From there, we proceed with a feasibility study through a preliminary plan which is always an expensive investment for the Company in terms of resources, time and expertise involved. Sometimes in order to offer customers the most complete and advantageous consultancy, we even suggest changes to initial requests in order to achieve the same goals, simplifying the project and reducing costs as a result. Once we have found the best solution for the installation, production begins. Naturally, all of this is carried out after we have verified total reliability and quality by means of the strictest testing in our test room, because customer peace of mind is a priceless strategic value. This system currently is the case for approximately 50% of our production, which is made from of non-standard machines, proving how much this competence and speciality is recognised by our customers."

Leaders in new markets



**Giampaolo Mattiello,
Business Development
Manager**

"Since joining the company in 2004, I have always worked on business development and, over the years, I have seen GBE grow steadily around the world: nowadays, in addition to the European market where we are well established, we boast a major presence throughout Eastern Europe, in Russia, and even in North Africa, the Middle East, the Persian Gulf region, South East Asia, all the way to South America and Australia. The secret of this global presence is our flexibility, which allows us - also through the creation of special products - to truly meet any need, with such a wide-ranging commercial horizon, from -60°C in Siberia to the deserts of Africa. Also of great importance is our ability to understand the needs of different markets, in technical terms as mentioned but also as a business model and cultural approach: this is

part of our DNA as an Italian company, always attentive to our relationship with customers. Because the human element makes a difference. All this naturally is supported by an always active organisational machine: we have a technical network available around the world, able to respond very quickly to all customer needs wherever they may be, for 24/7 service. This organisation includes our After Sales Service, but I am speaking also in terms of logistics: just think of the fact that we completely change the packing method based on the destination country in order to eliminate any risk related to conditions or communication routes in some countries."

GBE on the German market



**Luca Ferro,
Sales Manager**

"Being present at the Hannover International Trade Fair, in the home of our main competitors, is a major challenge that we face, aided by the strong reputation we have been able to build over the years also in the German market. A market, I want to emphasise, which to us is very strategic and from which important awards have arrived in recent years, thanks to our ability to meet even the most specific technical requirements, designing and creating made to order products. We are present in Germany with six agencies who represent us and allow us to cover the entire country in a widespread manner, obviously also including assistance plans. Our philosophy in fact remains that of accompanying the customer through all phases, from consulting to sales to installation and service. Moreover, it is precisely the flexibility typical of Italian companies that is for us a strength and an advantage recognised by our German customers: flexibility which means the capacity to develop special projects, but also in providing rapid response and the ability to establish a relationship with the customer, to help us understand and meet their needs."

UPCOMING TRADE FAIRS

TO DISCOVER GBE PRODUCTS AND TECHNOLOGY AND
OUR KNOW-HOW IN THE CREATION OF SPECIAL PROJECTS



HANNOVER MESSE - HANNOVER
25/04/2016-29/04/2016



DRIESCHER HAUSMESSE - EISLEBEN
30/06/2016



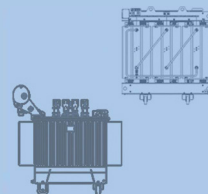
ALL ENERGY - GLASGOW
04/05/2016-05/05/2016



WIND ENERGY - AMBURGO
27/09/2016-30/09/2016



**CAST RESIN, DRY TYPE AND OIL FILLED
TRANSFORMERS & REACTORS**
Standard and customised solutions



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