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Always looking to the future

GBE CROSSED THE FINISH LINE OF 15 YEARS IN BUSINESS WITH A YEAR RICH IN IMPORTANT PROJECTS AND COMMERCIAL RESULTS IN CONTINUOUS GROWTH

15 years in business: this is just one of the achievements GBE reached by the end of 2014. It may sound a lot, in an industry where technology and the market are constantly evolving, and at the same time, it is very little, if we think about the results achieved by our Group in this period of time: the innovations introduced, the investments made, the world markets reached and the references gathered across a broad spectrum of applications.

At GBE, we always look forward, so it is difficult to stop and look back to the past, yet it is impossible to not emphasize that this anniversary has come at the end of a particular year, which has brought us important results and major new projects. From the new plant entirely dedicated to metal carpentry: inaugurated at the start of last year, in a few months' time has now become fully operational, enabling us to respond even faster and more flexibly to the demands of our customers around the world.

And then of course, there is the commitment to quality and continuous investment in research and development, thanks to which we have obtained new certifications that guarantee full reliability of our transformers, even in the most extreme environments.

This expertise also benefits all the other products, which have as their recurring theme the search for quality and widening of the range.

Thanks to these distinctive features, important results were obtained from the power transformers, which GBE offers in resin up to 30MVA, 52kV and in oil up to 50MVA, 145kV. Entering the reactors market leads GBE to extend its offer range. Whilst at the start of last year the production of amorphous transformers, today allows us to ensure superior performance of the transformer with an amorphous core and those required by new European regulations (Directive 2009/125/EC - Eco design). Because even in this area, GBE has been able to anticipate the times, investing in research on a subject matter - energy efficiency - which will increasingly be one of the key factors of the market.

It is in this spirit, at the start of 2015 GBE has always aimed towards new investments and continuous research, which has already brought important news as you can see: a newsletter through which we want to establish more direct and continuous dialogue with our customers, distributors, and other technical and commercial partners. Because GBE, with its 15 years of experience and its attitude of looking to the future, still has a lot to say.



GBE has been able to anticipate the times, investing in energy efficiency research

GBE IN 2014: TURNOVER +7%, UNITS PRODUCED +9%



In 2014, GBE has produced around 2,700 transformers, with overall power of 3150MVA. These numbers, compared to the previous year, mean an increase in production of 9%, while turnover increased by 7%.

By analysing the data in more detail, there were 1,326 transformers made of resin, with an overall power of almost 1800mVA, while there were 1,178 transformers made of oil, giving an overall power of 1350mVA. These numbers translate into an average

monthly production of around 110 resin transformers and 106 oil transformers. These data are particularly significant if we consider that over 50% of the machines supplied were for special applications, so with processing times that were far longer than standard products. Regarding the maximum power of the individual units, GBE is able to produce up to 50MVA/145kV for oil transformers and up to 30MVA/52kV for resin transformers.

KNOW HOW
A SPECIAL INSTALLATION FOR NOISE, SIZE AND TIME

THANKS TO GBE'S EXPERTISE IN SPECIAL PROJECTS AND THE INTERNAL STEELWORKS PLANT

There are many technological challenges that GBE has successfully overcome at the time of a recent major installation in Russia. In fact, in recent months the company has built 8 x 12.5MVA resin power transformers with MR type load tap-changer, intended to replace the oil transformers produced around 50 years ago and equipped with very specific technical characteristics. The pilot project was started the year before, with the request to GBE for transformers that can guarantee exceptional performance in terms of the noise output while in operation. The sound pressure of the transformer should be lower than 65dB (A) at a distance of 1 metre, to guarantee the power emitted in the surrounding area in dBA, is such as to not create disturbance to the surrounding area, a residential area in the historical centre of a metropolis.



After having successfully satisfied this first complex request, the request then came for a further supply, in which among the specifications, in addition to the limitation of noise emissions, were also restrictions on the dimensions, in order to install the transformers within existing sub-stations. Even this requirement has been fully satisfied, thus confirming GBE's expertise in the area of special projects, to satisfy any performance and installation demand of the Client.

A result that is all the more significant considering that the design, manufacture and supply were performed in record time: 8 x 35 ton transformers were made in less than 12 weeks, including the verification of their resistance to short circuit at a certified SIEMENS laboratory. A great demonstration of dynamism and speed of response, made possible by the contribution of the new GBE plant, entirely dedicated to steelworks.



Oil and resin, for the most diverse applications



GBE specialises in the design and construction of oil and resin power transformers, with a wide range of solutions. The power reached by the oil transformers is 50 MVA class 145kV BIL 650kV ONAN/ONAF/OFAF 50-60 Hz, while for resin transformers the power reaches 30MVA in class 52kV BIL250kV, AN/AF 50-60 Hz.

The oil power transformers have no particular limits in power and voltage, so the oil insulated transformer is the most widespread on the market.

GBE produces both standard transformers and customised solutions on the specific demands of the customer, respecting any size restrictions and with a construction design that facilitates installation in pre-existing stations. On the other hand, the resin power transformers were specifically designed for certain types of application where the use of pollutant insulations, such as oil, could lead to environmental problems. Thanks to the design, to

specific care in the design phase and to the use of special epoxy resin, these transformers can be installed in extremely hostile environments, with temperatures as low as -60°.

The entire internal design is done in 3D to allow the checking of each component and semi-worked piece under the dimensional profile. Furthermore, thanks to being developed with latest generation design software, GBE's specialists are able to simulate and thus ascertain the mechanical resistance.

In the last quarter of 2014, GBE has made over ten power transformers: specifically, 8 resin transformers of 12.5MVA and 35000 kg each, 2 oil transformers of 17MVA (38,500 kg) and one transformer of 36MVA (49,800 Kg).

Among its best customers, GBE also counts major transformer manufacturers who turn to the Italian company for the shortest time-scales, even when special solutions are requested.

KNOW HOW
MAXI INSTALLATION IN AFRICA

GBE HAS PROVIDED 77 DETUNING REACTORS FOR A SPECIAL PROJECT



If reliability is the first requirement for an electricity distribution network, it is all the more reason for installations in places where access is difficult or where there is no on-site support structure. So that makes all the more significant GBE's supply of 77 detuning reactors, with reactor power from 200 kVAR to 1000 kVAR, for a special project in Africa in collaboration with a leading manufacturer of capacitors in Mantua.

To explain the role and importance of this provision, it is worth remembering - for the power factor correction of the electrical grids - the problem of protecting capacitor batteries against overcurrents. A general remedy is constituted by the insertion in series to the battery or capacitor units of an inductive reactor, said detuning reactor, calculated so as to shift the resonance frequency of the capacitor bank at a frequency not present in voltage power factor correction grid.

It is also worth remembering that in the same year, GBE has also supplied some reactors for the creation of harmonic filters for power factor correction of the linear loads. The power factor correction can be achieved simply with the pure power factor correction banks. However,

AN EFFECTIVE SOLUTION TO THE PROBLEM OF THE POWER FACTOR OF THE ELECTRICITY GRID

this would result in a consistent resonance between the network and the capacitors and therefore a amplification of some harmonics, producing a distortion of the supply voltage far exceeding the limit set by the regulations. Instead, with a filtering system implemented with a bank of capacitors and medium voltage reactors supplied by GBE, the most significant harmonics are absorbed almost entirely by the

filtering system and subsequently dangerous harmonic voltage do not circulate in the system and the voltage distortion falls within the regulatory limits.

This important provision confirms GBE's international projection and the reputation of its products, chosen by many of the leading companies for important projects around the world.

GBE IS A SPECIALISED MANUFACTURER OF DRY AND OIL FILLED REACTORS FOR THE FOLLOWING APPLICATIONS:

- LIMITING REACTORS / SHORT CIRCUIT REACTORS
- EARTHING REACTORS
- FILTERS
- SHUNT
- SMOOTHING REACTORS
- DETUNING REACTORS

www.gbeonline.com

A COMPLETE RANGE OF SOLUTIONS FOR REACTORS



Alongside the production of reactors, GBE distinguishes itself through the completeness and variety of its range, with class F or H air and resin and oil insulated machines, for indoor and outdoor applications up to 5000 A/52 kV.

More specifically, GBE is able to provide current limiting reactors (that is, the short-circuit reactors), earthing reactors, filter reactor, shunt, smooth and finally detuning and other reactors

Even in this context, the approach of the company is to provide the widest variety of solutions, to meet the different and specific needs of every customer: therefore, for example, the recent installation in Poland of a detuning reactor developed by GBE for outdoor installation. For outdoor applications, GBE SpA is able to create resin reactors without protection box, with the use of resin and/or special UV-resistant coatings.

All this, of naturally ensures maximum reliability and quality, thanks to the rigorous tests performed in the company test room and the compatibility with the strictest international regulations. GBE's commitment to quality was decisive in the Italian group being allocated another important provision: a short circuit limiting reactor, recently installed at CNR, an important research centre in Padua Great attention is paid to the technical assistance service: for the reactors any maintenance operation can be performed, even on products not manufactured by GBE, with onsite checks on the proper operation of the system.

NEW EU DIRECTIVE FOR ECOCOMPATIBLE DESIGN

THE GOAL IS TO REDUCE LOSSES: GBE IS ALREADY PREPARED, WITH A LINE OF AMORPHOUS CORE TRANSFORMERS CAPABLE OF EVEN BETTER PERFORMANCE THAN THOSE IMPOSED BY THE DIRECTIVE



The global commitment to energy efficiency and reducing emissions continues. The latest regulatory news is represented by Regulation 548/2014 of the European Commission, an eco-compatible design directive which requires a drastic reduction in the losses of new transformers placed on the market.

The new standard, which applies to all EU countries as well as Norway, Liechtenstein and Iceland, will come into force on 1 July 2015, while from 1 July 2021 a further reduction of the required levels is planned.

The goal is ambitious: according to a study of the EU itself, in 2008 the total annual losses suffered by the transformers park in the EU27 amounted to 93.4TWh, a value will drop to just 16.2 TWh per year, equivalent to 3.7Mt of CO2 emissions by 2025.

The new legislation does not find GBE unprepared, as it has for a long time offered a line of high efficiency transformers that are already in complete compliance with the new limits imposed by the EU.

Indeed, as always GBE has gone beyond the required standard: thanks to the constant research and development carried out over the years and the use of superior quality materials, the Italian

company designs and constructs a new line of amorphous metal core transformers with that guarantee of even lower levels of losses than the strict limits set by the new Community legislation.

As usual for GBE, this technology is organized in a wide range of solutions to meet the different design requirements: dry or with oil insulation, with power up to 2500kVA. GBE believes in amorphous transformer technology, aware that this solution will be increasingly successful in the future with the ability to achieve significant energy savings: no-load losses are in fact up to four times lower than those of a standard transformer.

A winning technology destined to spread more and more, both due to the increasingly restrictive regulatory limitations on energy efficiency, and due to the spread of environmental awareness that today in many markets allows "green" businesses to enjoy a significant competitive advantage in terms of image. There are in fact different installations of amorphous core transformers already made by GBE, particularly in Northern Europe for amorphous resin transformers and in the UK market for oil transformers, confirming the capacity of the Company to meet the new demands of the market with reliable and versatile technological solutions.

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THE NEW STANDARD WILL COME INTO FORCE ON 1 JULY 2015 AND A FURTHER REDUCTION OF THE REQUIRED LEVELS IS PLANNED FROM 2021

THE SECRET OF TRANSFORMERS WITH AMORPHOUS CORE

Power	1000	KVA
Load factor	0,5	(0...1)
En. Cost	0,12	€/kWh



	Po (kW)	Pcc(kW)
STANDARD	2100	10000
ECO	1300	9000
AMORPHOUS	590	7250

CAST RESIN TRANSFORMER 1000 kVA CLASSE 12kV		
STANDARD TRANSFORMER EN. COST IN 5 YEARS:	€24.172	
SAVING WITH ECO TRANSFORMER ECO:	€5.518	22,83%
SAVING WITH AMORPHOUS TRANSFORMER:	€11.548	47,77%

The structure of the normal oriented grain silicon steel (RGO) used for the creation of the core is simple and orderly: not by accident, it is called "lattice", made up of atoms arranged in a precise way. However, amorphous metals (the so-called "glassy metals") lose the ordered atomic structure, acquiring new properties and characteristics.

More specifically, the amorphous structure is obtained thanks to an ultra-rapid cooling process of the

molten mass which, by preventing the formation of crystals, provides the structure with a glassy character. The metal alloy is melted and poured into a centrifuge rotating at high speed and then subcooled: this metal then undergoes a sudden temperature swing that can reach up to one thousand degrees per second. Like in the liquid, in the molten alloy, the atoms move randomly and without a predetermined order and the sudden cooling causes "freezing" of the metal

atoms in their disordered position, since it does not have the time to be arranged in their crystal lattice. Unlike crystalline metals, liquid metals - as they have an amorphous structure - do not have the grain boundaries due to the crystalline domains, and thus they have no weak areas related precisely to these grain boundaries.

This random orientation of the molecules of the amorphous metal, when a magnetic field is applied, causes the friction inside the material to become smaller than those

of metals with oriented grain structures and dosed with silicon (used for the core of the standard transformer); and the amorphous material is rolled very thin. These two characteristics combine to result in a value of losses of up to 75% lower than those of a transformer with a grain oriented core.

Finally, it is necessary to consider that each transformer in service consumes energy even without load (idle operation), so with the amorphous core, it is possible save, even under this condition.

GBE STEELWORKS PLANT ALREADY AT FULL CAPACITY

ALLOWS HIGH QUALITY CUSTOM OR SPECIAL PRODUCTS TO BE MADE, QUICKLY MEETING ALL CUSTOMER NEEDS



ALWAYS TOP COATING QUALITY



Within the Steelwork plant, special attention is also paid to the quality of the coating, using the latest technology combined with advanced control processes.

The semi-automatic coating plant is spread over a length of 12 meters, it uses flow coating technology and comes complete with washing, phosphating, rinsing, drying, coating and drying in the furnace.

The coating used is mono component, water-soluble acrylic epoxy type, and fully complies with environmental regulations. To ensure perfect adhesion of the coating, the surface is treated by all markings, subsequently degreased with phosphating and rinsed. After rinsing, the object is dried and finally coated with several layers of coating in order to ensure the desired thickness and class. After each layer, the object is left to rest for about half an hour and then dried in the furnace for 60 minutes at 70-75°C (polymerization process).

All marking is done with a grit blasting machine with internal measurements of 2.5x3 mm and height of 3 mm, which allows you to process oil cases up to 3150kVA. With these machines, the coating processes undertaken in GBE's Steelworks plant conform to regulations ISO 12944, the highest standard of reference in the world for effective protection against the corrosion of steel structures. As is known, the unprotected steel exposed to air, immersed in water, or buried, is subject to corrosion that may cause damage.

Therefore, to avoid damage from corrosion, the steel structures are generally protected to withstand corrosive stresses for the whole service life required of the structure. GBE may ensure a coating up to category C5M, suitable for machines to be installed outdoors in coastal and offshore regions, so in environments with high salt concentrations, or inside buildings and areas with condensation that is always present and high levels of pollution. Not only that, but for exceptional executions, the metallisation of the component or parts thereof is also performed, guaranteeing a product that is even more resistant.

R&D
**RESIN TRANSFORMERS:
 GBE RECEIVES THE C4
 CERTIFICATION (-60° C)**

Another technical result of absolute significance for GBE, which has obtained C4 certification according to GOST-R 54827-2011 regulations, attesting to the perfect reliability of its resin transformers, even at the coldest temperatures, up to -60° C (and +40° C). The certification was obtained at a technologically advanced laboratory, where it was possible to reproduce the most extreme environmental conditions. In compliance with C4 regulations, a GBE 2000kVA cast resin transformer, 24kV class was inserted into a cold room, where the temperature was taken down to -60° C, so powered in short circuit with a 2In current until it reached 140°C, so with an excursion of around 200° C. It should be noted that the performance of the test was even stricter than the provisions of the regulations, as to reach the temperature of 140°; the transformer was powered with a current of 2.5In. A further thermal stress that the GBE cast resin transformer has proven to withstand perfectly, without any signs of damage or malfunction.



THE TEST ROOMS: RIGOROUS TESTS WITH THE LABORATORY SERVICE

Obtaining the prestigious technical results, such as the C4 certification, gives rise to another possibility for GBE technicians: subjecting every machine made to even more rigorous checks and simulation. This is possible thanks to the presence in the Company of 3 test rooms, subject to regular calibration and checks and SIT-certified instrumentation. These same technologies are also used to offer a laboratory service to check insulation, electrical measurements of any type and measurement of losses, even for transformers and machinery owned by the Customer. This way, it is possible to identify any malfunctions or non-compliances in the test that could not be detected through a visual examination, but evident in the complete test report, issued at the end of the tests. Furthermore,

the professionalism of the test room personnel and the experience in taking measurements and testing, allow any construction devices for removing problems or solutions to improve installation. Apart from the standard tests, custom tests are also performed on the specific request of the Customer. To ensure the highest quality in the tests, among the instruments, there is a pulse generator up to 1100 kV and a transformer for the insulation test up to 400 kV. Over the last year, GBE has performed many tests with the main certifying bodies (CESI, SIEMENS, LLOYDS, RINA, DNV and many others) and the test rooms are currently in the process of being certified by qualified external bodies. This is to always ensure GBE's high technological and quality standards.

CASE HISTORY IN CHILE

On site measurements and repairs in record times



THE CITY OF SANTIAGO

GBE is a global company, not only because of its international commercial presence, but also because of its capacity to offer a rapid and efficient assistance service throughout the world. An example? Following an intervention request for a malfunction on a 25000 kVA oil transformer located in Chile, a team of technicians left Italy immediately with all the equipment required and resolved the malfunction within a week. This was made possible because most of the checks were able to be performed at the place of installation. This way, being already on site it is possible to safely ascertain whether the transformer is running correctly or to identify the cause of

any failure and remedy it. In more details, the tests that can be made directly on site are as follows: integrity check through a visual inspection; check of the correct operation of the protective accessories; measurement of the resistance to insulation; ratio of transformation and polarity/carrying unit; measurement of the electrical resistance; measurement of the sound pressure dB(A); FRA – frequency response analysis – to check the mechanical integrity of the nucleus, the winding and the pressing structure; analysis of the oil to distinguish PCB, PCT in ppm with emission after taking any gas chromatography.



THE BEST OF ENERGY
 FROM SMALL ITALIAN COMPANY TO INTERNATIONAL COMPANY IN JUST 15 YEARS. A SUCCESS STORY TOLD BY THE FOUNDING MEMBERS OF GBE



THE QUESTIONS

- 1) What makes the difference on the market today?
- 2) Where does GBE'S attitude for special products come from?
- 3) GBE has grown a lot in 15 years, on all fronts. What are the future areas of investment?
- 4) GBE is a medium-sized company, yet it is present on all major world markets: what is the secret?

**Giuliano Sanson
 Commercial Policy**



1) «Fortunately, the difference in the market is not just given by price: customers seek a partner that ensures a quality product and fully meets their needs, even if not explicitly requested. Our philosophy is to offer customers more than what they asked of us, and perhaps this sets us apart from our competitors. Furthermore, in our products we take into account various details to ensure friendly use: this particular way is recognised by the installers that return with positive feedback to the purchasing office of the Buyer, confirming that they would prefer GBE products for other future installations. All this is summed up in the partnership concept with our customers, in the capacity to create a rapport and always ensure the best care».

2) «GBE has always invested in engineering, which now allows us to tackle a new or non-standard project with the ability to analyse all aspects of the implementation and to resolve even the most complex problems».

3) «All investments made so far have been aimed at improving the different production phases, industrialising many of the process. I think this is among the most important factors to ensure a quality product that is free from defects. In keeping with this vision, for the future we aim to make more and more components and semi-finished products internally, to ensure ever more quality of each individual component. Over the past 15 years, this has been a choice in contrast, but I believe that it is exactly this that has set us apart».

4) «When a structure is well-organised and has

a quality product, it finds no difficulty in promoting and selling in another continent. This is possible thanks to the ability to understand the specific needs of the different national markets and the needs of the customer: it is the partnership concept».

**Renato Tapparelli
 Mechanics and production**



1) «Today more than ever, to make a difference in the market quality, customer service and the ability to quickly find solutions to all requests are paramount. In this regard, we are helped by an internal organisation that is optimized according to the speed of decision, but at the same time flexible, to continually renew ourselves and to always assess what could be done differently».

2) «We are confident in our ability and so we have no fear about any request: now we have become special product specialists. Thanks to the experience we have gained, we are able to tackle any technical problem with the serenity that comes from our expertise. The thorough knowledge of each step of the production process also allows us to work effectively in the mechanical part, where necessary».

3) «The objective is always the same: to improve the production process, make it less manual and reduce production times. This is a process of continuous improvement that has no real limit».

4) «As strange as it may sound, I think it also depends on the ability to "create friendships." In the Company we are like a family and we

make sure that our foreign partners feel like they are part of it».

**Francesco Muzzolon
 Research and development, testing room**



1) «There are always three elements: quality, price and customer service, and in this area GBE provides a complete and fully equipped testing room and the ability to offer its customers all the services that may be required in the field of transformers».

2) «We are guided by our passion for electro-technology. Therefore, every request for special machines represents a challenge, each new project is one more motivation, even if it means not all costs fit with the first specimen. Moreover, the prototype from an economic point of view is always less profitable, but in the long run these investments lead to the result».

3) «We intend to continue to invest in the growth of the personnel, especially engineers, to make products that are increasingly particular and complex. However, at the same time we must continue to also research standard products, otherwise they will never reach perfection. Especially today, with the market that requests increasingly efficient transformers but at a reduced cost, we need to rethink both the choice of materials and the construction design».

4) «Provide assistance to everyone, customers large and small, to answer all questions without ever discriminating. Therefore it is naturally essential to invest in promotion: in the early years, we participated in many trade exhibitions and created advertising campaigns. To do that, we incurred significant costs, but now we can see the results».

UPCOMING TRADE EXHIBITION

MEET US AT ONE OF THE UPCOMING TRADE EXHIBITION TO DISCOVER OUR RANGE OF PRODUCTS, OUR TECHNOLOGY AND KNOW-HOW FOR SPECIAL PROJECTS



MIDDLE EAST ELECTRICITY - DUBAI
02/03/2015 - 04/03/2015



ELTEFA - STOCCARDA
18/03/2015 - 20/03/2015



HANNOVERMESSE - HANNOVER
13/04/2015 - 17/04/2015



NEMEX - BIRMINGHAM
21/04/2015 - 23/04/2015



ALL ENERGY - GLASGOW
06/05/2015 - 07/05/2015



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

