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OIL & GAS: NEW OPPORTUNITIES

THE DEMAND FOR OIL IS STILL STRONG AND THE RISE IN PRICES IS DRIVING THE SUPPLY CHAIN WHERE GBE IS THE TECHNICAL REFERENCE PARTNER

The global demand for energy is still increasing and oil will be essential in order to meet this demand. The latest World Energy Outlook of the International Energy Agency forecasts a 30% expansion in global energy requirement between 2016 and 2040, since the upturn in the demand from emerging markets should more than compensate for the expected downturn in advanced economies.

It could be argued that the growth of renewable energy will cover part of this supply shortage, but the gap in the consumption of renewable energy compared to oil needs is still significant.

On the one hand, the overall share of the latter in the energy market is falling whereas crude oil is still increasing if you look at the primary energy consumption for fuel.

Therefore, the long-term role of crude oil in the energy market should not be underestimated. Oil prices have bounced rapidly back after the global financial crisis of 2008-9 and despite a volatile period, there were no major opportunities for operators in the sector up until 2017. The scenario, however, has changed over the last year. Oil prices had not

gone over 70 dollars a barrel since 2014 and, towards the end of 2018, the threshold of 80 dollars a barrel was surpassed.

Thus, companies involved in the extraction and processing of crude oil that had continued to diligently invest, even during the recession, now find themselves in a good position, with demand still strong and oil prices on the rise once again.

In short, GBE got it right. We have been rewarded for the focus we placed on the opportunities in this sector, despite the critical situation that occurred after 2014. GBE is, in fact, a strategic partner for many industrial companies which supply services for the extraction, refining and transportation of oil and gas. Many of these are Italian and European, but since it is a global market, the plants where we have done business are situated all over the world. Russia, Kazakhstan, Ukraine, Norway, United Kingdom, England, Germany, Middle East, Algeria, Lebanon, Egypt and Argentina are just some of the countries where, in collaboration with our local partners, we have installed our customised transformers, both in resin and in oil and with considerable power.



A LOOK AT OUR FUTURE



2018 was a year marked by highs and lows. In the first four months, the market was stagnant, especially with regard to oil

transformers. The competition was very fierce, with continual price cuts to procure the few orders present. A challenge that resulted in margin reductions for GBE as well which was overcome by leveraging the technical competitiveness of our products, especially our know-how in the insulated cast resin transformer market and the quality of our service, meaning prompt deliveries for power transformers. As a result, revenue grew by 12% compared to the previous

year. The company keeps investing, such as the new high-voltage test room and new assembly area for transformers and power reactors. The R&D department has also made a difference this year thanks to the prototyping and launch of the oval-section cast resin transformer. Moreover, we can confirm that, after the excellent results obtained with the GBE UK plant in Leeds, we are now also present in Australia in Wollongong, not far from Sydney.

MEDIUM AND HIGH VOLTAGE REACTORS: ALWAYS TAILOR MADE

A PRODUCT ALWAYS DESIGNED AND MANUFACTURED ACCORDING TO EACH CUSTOMER'S REQUIREMENTS AND SINGLE APPLICATION

Not just transformers: GBE S.p.A. is also specialised in producing reactors that can be vacuum pressure impregnated, cast resin encapsulated or immersed in oil. Customisation is what sets the reactor apart from all other products. In fact, it can be designed according to the customer's specifications based on the type of installation and application. Various solutions are available: the main ones are outlined below.

CURRENT LIMITING / SHORT CIRCUIT REACTORS

The current limiting reactors are used to limit the line current. They are normally used to ensure that the current does not exceed the values allowed by the protections in the event of a failure. They are connected in series with the line. They are single-phase coreless coils which can be connected one above the other, or supplied individually and connected on site. If they are produced in oil for medium and high voltage, they are shielded.

EARTHING REACTORS

They have a three-phase core with zig-zag winding. This type of reactor is used to create a false neutral directly connected to ground or through a resistor. The neutral formers are shunt connected to the line.

FILTER REACTORS

These are single-phase or three-phase re-



400kVAr starting motor VPI reactors in box IP23 (Norway)

actors used to reduce the harmonic content in the grid or inside plants with high voltage distortions. They are connected in series or in parallel to the capacitors on both MV and LV side.

SHUNT REACTORS

The shunt reactors compensate for the capacity of the long transmission lines, avoiding voltage increases at the end of the same line and are shunt connected to the line.

SMOOTHING REACTORS

The smoothing reactors are connected in series to the DC line, where there is a current ripple that must be reduced. Smoothing reactors are typically single phase.

DETUNING REACTORS

These are reactors connected in series to capacitors, allowing the resonance frequency to be moved to values that are not dangerous to these capacitors.

GBE REFERENCES WORLDWIDE



01 | 250kVAr mono-phase short circuit reactors (Argentina)



02 | 1800kVAr detuning reactors (Africa)



03 | 1200kVAr current limiting reactors (Sweden)



04 | 2000kVAr oil shunt reactor (United Kingdom)

TRANSFORMERS FOR STARTING HIGH-EFFICIENCY GAS TURBINES

YES TO RENEWABLE ENERGY, BUT LET'S NOT FORGET ABOUT CONVENTIONAL POWER STATIONS



There are many developing countries where the demand for energy is growing at an impressive rate. To meet this demand, some of them are investing not just in new renewable energy power plants (e.g. solar, wind and hydroelectric power), but also in conventional gas power plants given the large deposits of underground hydrocarbons and gases. Indeed, the latter allow for greater operating flexibility and shorter implementation times, speeding up the supply of electricity to private homes and industry. All of which is achieved with limited CO₂ emissions thanks to the latest technical innovations. This kind of conventional power plant has allowed GBE to complete numerous supplies in Africa, Asia and Latin America on behalf of the one of the leading European companies specialised in technology for electrical installations. More specifically, the type of product in question consists of a starting gas turbines transformer with a highly accurate load cycle. These specific turbines have an electrical capacity of over 50MW, so significant power, but more surprisingly, an electrical efficiency close to 40%. To achieve these results, turbine technology in the last twenty years has evolved significantly and taken great strides. GBE has always collaborated to the utmost to create prototypes of a transformer that could fit it with these new prerogatives. In particular, GBE has supported this innovation process by creating cast resin transformers with one or two significant secondary voltages, even for installations in places with adverse weather conditions, in which an IP54 protection rating was required for enclosures. To this end, GBE has obtained TUV certification in recent years for the entire production of protection housing for cast resin transformers from IP23 to IP54. In particular, the IP54 housing is completely sealed, so the transformer can only dispose of any losses through exchange with the side panels. In addition, the transformer must have innovative performance capabilities to guarantee an overtemperature of the windings and core of less than 50°C to avoid compromising the maximum temperature envisaged by the Class F or H insulating material. Unlike conventional housing, it has corrugated panels which result in double the exchange surface in space-saving dimensions. This is another demonstration of the expertise of GBE's R&D, which is increasingly recognised as an added value giving an edge on the competition.

THE NEW TEST ROOM

ADDITIONAL INVESTMENT TO GUARANTEE THE HIGHEST LEVELS OF PERFORMANCE AND RELIABILITY



A company with a desire to stamp its mark on the reference market, uncompromising when it comes to the quality and performance of its products and always willing to invest in research and development, production processes and in its approach to production and materials. GBE has always adopted this philosophy which is why it has constantly invested over the years in boosting its testing and measurement department.

GBE has three test rooms, each one geared towards a specific product type: cast resin transformers and reactors for distribution and special applications; oil transformers and reactors for distribution and special applications and high-voltage power transformers and reactors.

To compete with major players worldwide, GBE has focused its investments on a new production area for power and consequently, on the new dedicated test room. We have, therefore, acquired a power inverter that allows us to carry out balanced tests on the transformers being tested with a frequency range from 15 to 150Hz and with a timely reactive power compensation.

Thanks to a greater inverter reactive compensation, we will be able to perform in-house tests even on reactors with a high X/R ratio and increased power. Quality has always been our signature feature and we have never taken anything for granted.

THE COATING PLANT HAS BEEN UPGRADED

NEW QUALITY STANDARDS AND NEW INVESTMENTS FOR MAXIMUM QUALITY EVEN IN THIS PRODUCTION PHASE



corrosivity and therefore, different thicknesses, one, two or three coats of primer must be applied, followed by the same number of coats of paint, without ever halting the process. The primer and paint can be epoxy, acrylic or polyurethane or a combination of them all, but it is essential that they are suitable for being used together. In 2018, the in-house coating plant, which was already able to guarantee excellent standards, was further upgraded. Water-based paints have made considerable advances over the last ten years, but unfortunately, not enough for to warrant their use in aggressive environments with high levels of condensate and pollution. And if on the one hand, respect for the environment is our priority, on the other, we cannot allow this to jeopardise the resistance of the coating on metal materials. So, the winning compromise was achieved by adding a new phase to the coating cycle and using one cabin for a single-component, high-resistance primer, followed by a water-based paint finish. To cut the coating process times down to a minimum, the plant was also upgraded by adding a new continuous cycle oven as the boxes pass from the washing to the coating stations, the latter of which have been divided into two types: flow-coating and airless. Lastly, GBE periodically sends painted samples to certified laboratories to carry out salt mist corrosion tests according to the criteria of UNI EN ISO 9227, as a further guarantee of the quality of this stage of the production process.

As is well known, GBE has an in-house steelwork for the production of profiles, core clamps, trucks, panels, boxes and tanks for oil filled transformers. We have already explained the reasons why we decided to produce this kind of semi-processed product in-house, unlike our competitors who outsource them. We firmly believe that one of the most important reasons is having the ability to guarantee high quality levels, not simply in the use of strong materials suited to special applications such as low temperatures or high standard welding by expert personnel, but above all, for coating that meets the resistance criteria according to ISO 12944 for category C3 and C4 up to C5M. The coating system must obviously guarantee the correct binding of the paint in a uniform manner with an even thickness all over. Based on the type of semi-processed product, one or both coating methods are used in a continuous cycle. To guarantee different categories of

THE WINNING COMPROMISE WAS ACHIEVED BY ADDING A NEW PHASE TO THE COATING CYCLE



CASE HISTORY



TANZANIA: HYDROELECTRIC ENERGY FOR LUGARAWA

GBE has been investing in the African market for several years with tangible results given the numerous projects we have completed for energy production, with the installation of photovoltaic, hydroelectric, wind and obviously simple distribution plants. Among these, the most noteworthy is the recent work carried out in the district of Ludewa, in the region of Njonbe, in Tanzania. The European Union has, for some years now,

been planning the construction of a 1.7MHW hydroelectric plant on the river Madope, near the village of Lugarawa. The project has brought with it the guarantee of modern services to the district with a low environmental impact and sustainable costs, improving the social and economic conditions of the population of the twenty rural villages for a total of over 50,000 inhabitants. But what makes this contract even more gratifying is the fact that the energy will be made available to no

RESIN: ALSO WITH OVAL SECTION

SHAPES ARE CHANGING AND PERFORMANCES ARE IMPROVING



A typical cast resin transformer is designed with a magnetic core and circular section. All transformers manufacturers know that the circular section can become both oval, by lengthening the central step, and rectangular if the core has a single step. Low voltage VPI transformers are almost exclusively produced with a rectangular section. Oil transformers can, however, come in various shapes: a section with a rectangular core for small power, oval for distribution up to 3150kVA and circular for special or high-powered transformers. The typical shape of the core section for resin transformers is always circular with the exception of the amorphous transformer, for which the best shape is oval for construction reasons bound by only three types of tape. To this end, in the last four years GBE has invested heavily in the amorphous transformer and even though this technology is now no longer a source of interest due to the ECO directive, the construction features and design studied algorithms helped us to develop and fine-tune a new range of cast resin transformers: the oval series. This type of transformer had already been developed in 2012, but its potential has only been fully recognised over the last few years. The ECO directive has resulted in the need to drastically reduce core losses and reduce them even further from 2021 onwards. To guarantee the figures promised, the best solution to adopt is to use magnetic material with reduced losses, therefore, lasered magnetic steel sheet with a lighter core with the same section. Thanks to the oval core, this last feature is guaranteed because the length of the magnetic circuit is decreased, the weight is reduced and consequently, the losses. GBE has developed a complete range of cast resin transformers in class 12kV and 24kV Eco Tier1 and Eco Tier2. This new transformer design is more compact, weighs less and the standards and required performances are guaranteed without sacrificing the results offered by the series with a circular section. To produce this new type of product, GBE's research and development department has once again adopted a series of stand-out construction features to differentiate us from our competitors, confirming our role as "specialists in special transformers".

less than forty-three primary and secondary schools, a hospital, about twenty sanitary services and offices for the local authorities. The transformers supplied to the hydroelectric plant in Lugarawa are in oil and cast resin in class 40.5kV with induced voltage withstand of 190kV and copper windings. The installation site is at an altitude of over 1,600 m with an ambient temperature of up to 55°C. But it was the specific climate conditions and the specialised know-how of GBE for applications in extreme situations that ultimately made the difference in the

negotiation stage, compared to any other competitor. We are proud to make our own small contribution to such an important project and flattered that our brand is recognised and acclaimed for its quality and reliability in a country that is so far away. Indeed, if it is true that projects like this one are possible thanks to sound agreements between local communities, public institutions, non-governmental organisations and the European Union, it is just as true that experienced and knowledgeable companies are needed to make sure they get implemented.

A NEW STRATEGIC PARTNERSHIP IN MALAYSIA

GBE IS PRESENT IN THIS HIGHLY COMPETITIVE MARKET WITH A JOINT VENTURE, BACKED BY EXPERTISE IN THE FAR EAST AS WELL



Malaysia is not a new market for GBE. Indeed, we have consolidated our presence in the country in recent years, despite its proximity to our fiercest competitors in the world market, such as China, Korea and India. Here again, GBE has succeeded in supplying a product with a quality construction design, plus the efficiency and performance criteria that have always been our stand-out features, thanks to the joint venture with a local distributor. It all started following a market analysis which highlighted the demand for a competitively priced product that complied to European standards. There was considerable competition and taking on the market focusing solely on the price was never going to be a winning strategy. However, the belief in the quality and potential of our production encouraged us to take up this challenge, undertaking a significant investment with our partner.

However, it is far from easy to transfer production know-how on cast resin transformers to a distant country, especially to one which has different operating methods, training and experience compared to ours. However, the desire on both sides to work together towards the common goal of securing a share in this new market has eliminated any difficulties encountered along the way. The transformers are assembled in Malacca City, a flourishing centre on the coast between the capital Kuala Lumpur and Singapore. The production facility is new and spacious with a layout designed to speed up the production phases, but also adapted for storing transformers and for any special protective housing work required. The test room is latest generation, equipped with certified instrumentation for performing all routine tests, as well as type-based and special testing in the near future. Lastly, another aspect which merited particular attention is staff training which was carried out at our Cast Resin division in Italy and later, in Malaysia. The training was not limited just to the production phase but also involved activities in the test room to pave the way for more effective management of the final testing of the transformers.

INTRODUCING GBE AUSTRALIA

A STRUCTURE DEDICATED TO THE AUSTRALIAN MARKET, INCLUDING AN ASSEMBLY AND MAINTENANCE FACILITY

GBE has always looked to expand into international markets, not just in Europe, but worldwide. In recent years, bolstered by the positive results achieved in Asia, Africa and Latin America, this commitment has translated into a commercial presence even further afield, in Australia, on the other side of the world.

As well known, this is by extension a vast market which in recent years has recorded a significant economic upswing and is totally self-sufficient in terms of energy demand, as well as being among the biggest global producers of certain minerals. The analysis of this potential resulted in the creation of GBE Australia, located in Wollongong near Sydney, the biggest city in Australia, not too far from Melbourne, Brisbane and Canberra. The large, spacious office is run by a highly qualified team, specialised not just in transformers and reactors, but also in providing customised technical solutions, based on the philosophy and know-how which have always been the stand-out features of GBE's business model. Indeed, in addition to sales, GBE Australia, in partnership with its local distributor, Auspower, is also able to assist the customer up until the installation of the transformer and with all post-sales aspects. There is a facility located, next to the office, for the assembly of transformers in electrical substations and for any maintenance work on both cast resin and oil-filled transformers. The workshop is also equipped with machinery for producing windings, processing ovens and assembly areas and the testing of assembled products.



GBE Australia headquarters



The office and the assembly department

R&D

AN ALL-NEW ENVIRONMENTAL RANGE



The growing interest in sustainability is nothing new to GBE, that, for several years, has been offering its own "Environmental Range" dedicated to installations where a limited energy load is required in the event of fire and maximum respect for the environment. This commitment is being continued now with a complete overhaul of the "Environmental Range" VPI transformer, both for distribution and for special applications up to class 36kV.

And there are a whole host of technical features in this new product range. The low and medium voltage windings are produced in foil, strip and/or wire, and are helically wound or with a disc. The insulating material used is class F and/or H,

guaranteeing high temperatures and space-saving dimensions. Both the windings are vacuum pressure impregnated with class H high cementing polyester resin. Moreover, the design used and the impregnation process provide excellent mechanical sealing which is ideal for special applications, such as starting motors, earthing transformers and reactors, and current limiting reactors.

And then, of course, there are the guarantees in the event of fire. Unlike the self-extinguishing cast resin transformer which in the presence of fire has a combustible mass, albeit limited, the VPI transformer has an extremely low content of inflammable material. Looked at in terms of kg of inflammable material and therefore, kJoules of energy load in the event of fire, the difference is ten times lower.

From an economic standpoint as well, the "Environmental Range" presents some interesting aspects. While it is true that the "Environmental Range" VPI transformer is more expensive than the cast resin transformer because the production process is more complex and time-consuming, it is, however, worth considering the significant savings on construction costs of the housing in which the transformers are installed as they can have very low fire resistance.



GBE: AN ORGANISED STRUCTURE



The founding partners of GBE are: Giuliano Sanson, Renato Tapparelli and Francesco Muzzolon

Dynamic and with a spirit of enterprise



Giancarlo Girardi
Head of the account department

GBE is a young company. The key aspects are spirit of enterprise and above, the desire to grow, but not just that. To keep up with the constant changes in administrative and tax matters, we need to be dynamic, hard-working and, above all, up-to-date on new regulations. The administrative office must be accurate, thorough and punctual. Although the work that we do is separate from all the other activities, we still constantly interact with all the other offices. We feel like part of a team and we have a great team spirit which helps us all to overcome the daily challenges. All the members of our department are encouraged to do their very best when they work independently and take responsibility for their own work. Trusting one another is the corner stone of our relationship of collaboration. It is what binds us together and allows us to constantly compare our approach in managing all aspects of our work. GBE is the headquarters of several wholly-owned subsidiaries and the administrative office checks and coordinates the administrative activity of each company in the group. This management process, which is far more complex than the past, is now guaranteed thanks to an internal reorganisation that I personally oversaw, involving the introduction of a new proprietary software for recording all tax-related matters

We are young and well trained



Francesca Grigolato
Head of the sales department

The sales department is made up of young, dynamic personnel. It is very easy to work together when you have the same mindset and you can instantly establish the right balance for routine management and problem-solving. Cohesion is the strength of a team pursuing the same goal. Even though working for GBE is my first job experience, in the four years I have spent in

the company, I have always been given new opportunities and allowed to advance my career significantly. The people working in this office are all university graduates and, therefore, have a good basic education. Each of us speaks and writes fluently in at least three languages which helps us when dealing with our distributors in the countries we represent and follow directly. Each of us is responsible for all aspects of one or more markets. I think this is where our strength lies: we never overlook any detail and we are directly responsible for our work. There is the utmost respect and trust among colleagues which means we can work together more effectively towards the common goal of achieving a positive result for the company. Another of our strengths is that we do not sit around waiting for something to happen. The sales department acts as the bridge between the company and its customers and what sets us apart is our desire to continually invest in new markets, organising trade missions and fairs all over the world.

Passion for new challenges



Daniele Zambon
Head of the technical department

GBE is an open-minded company. We never work to set patterns and we are always ready to take on new challenges. This has allowed us to grow, not only by increasing our turnover and presence in foreign markets, but also by expanding the range of products we offer. This attitude, together with ongoing investments in research and development, is recognised and highly appreciated by the market. There is an internal hierarchy in the technical department with a division of roles and responsibilities, but we always work and pull together as one team. A very important aspect of our department is that we work with cutting-edge software, tailored to our needs, which we periodically improve based on the feedback we receive, from the production process to the final testing. As I mentioned before, the technical department is very close-knit. As colleagues, we respect one another and the passion we share for our work is what binds us together. This means that each of us to

can take the lead in our work which encourages us to design and seek out new solutions and, obviously, it also provides incentive for creativity in the design phase. In the coming months, the design reference models will be changing for both the oil and resin range. All the technical documentation and support drawings will be updated with a totally new overview. This will speed up our work, but it will also make all the follow-on activities in the other departments easier when it comes to managing contracts.

Quality and price, no compromise



Gianni Rigolon
Head of the purchasing department

GBE is a highly organised company in which it is easy to communicate with other colleagues. The same structure in the departments makes it easier to interact with other divisions, without wasting any time. It is no coincidence that our position is central and therefore, strategic. The purchasing department is constantly called upon to interact with other departments and above all, to monitor and anticipate production requirements in order to guarantee ongoing procurement whilst striking the right compromise with the technical department. We are dynamic, resourceful, competent and above all, available. It is not always an easy job because we have to constantly chase up our suppliers and keep calm at all times. GBE has a number of products that can be divided into two main types, resin and oil. Our department has an identical set-up with separate managers for each of these two product types. The aim is to avoid confusion and speed up the entire procurement process. Our department also works with the R&D department and the test room. We always aim for the utmost quality in whatever we purchase, but obviously at the best possible price. There is no such thing as compromise. Our standard of quality is very high and so, we are always on the lookout for the best materials. There is plenty of satisfaction to be had, especially because by striving in this direction every day, we directly contribute towards guaranteeing the quality of our product which is always our main objective.

UPCOMING TRADE FAIRS

TO FIND OUT MORE ABOUT GBE PRODUCTS AND TECHNOLOGY AND OUR KNOW-HOW IN CREATING SPECIAL PROJECTS



ELEKTROTECHNIK – DORTMUND
 13/02/2019-15/02/2019



ALL-ENERGY – GLASGOW
 15/05/2019-16/05/2019



DATA CENTRE WORLD – LONDON
 12/03/2019-13/03/2019



80 JAHRE DRIESCHER - MOOSBURG
 27/06/2019



ELTEFA – STUTT GART
 20/03/2019-22/03/2019



HYDROMATTERS 4.0 – PADOVA
 17/09/2019



HANNOVER MESSE – HANNOVER
 01/04/2019-05/04/2019



ALL-ENERGY - MELBOURNE
 23/10/2019-24/10/2019



AFRICAN UTILITY WEEK – CAPE TOWN
 14/05/2019-16/05/2019



CAST RESIN, DRY TYPE, OIL FILLED TRANSFORMERS & REACTORS
Standard and Customised Solutions



HEADQUARTERS



POWER AND CAST RESIN TRANSFORMERS PLANT



OIL FILLED TRANSFORMERS PLANT



STEELWORK PLANT