



Costruzioni Elettrotecniche
Cear's workshop

Responding to the Electrical and Automation Requirements of Industrial Plants

Costruzioni Elettrotecniche Cear's effort to anticipate trends in demand of industrial plants doing the electrical revamping of existing plants, the execution of specialized supplies and investing in R&D for acquiring new products certifications

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In recent years, manufacturers of industrial plants have seen an escalation in the challenges posed by the continually changing global market, which requires entrepreneurs and corporate groups to adapt quickly to change; failure to do so may result in loss of market share and even disappearance from the industrial scene.

Ever since it was first established in the 80s, Costruzioni Elettrotecniche Gear has always followed a philosophy of anticipating trends in demand, staying on the cutting edge of the electrical technology and automation industry to offer its clients the highest levels of technology and quality in the sector. And so Gear was among the first pioneers in the field of logic relay to introduce PLC logic in industrial automation and suggest to our customers to go from synoptic panels to the use of Scada on industrial PCs, offering customized engineered solutions.

An additional challenge for Gear was multidisciplinary: offering clients all-round consulting services integrating know-how in electrical technology, instrumentation and automation; a know-how which the company has accumulated and consolidated over the years, which is still difficult to find in companies in the field, that tend to be highly specialized in specific disciplines or types of production.

Our international, multi-sectorial heritage is another distinguishing element which has allowed us to grow and expand our knowledge hand in hand with our

customers, who work in big international industries in a variety of different sectors and therefore have different requirements, allowing us to add to our technical and cultural know-how and qualifying us to participate in prestigious projects all over the world.

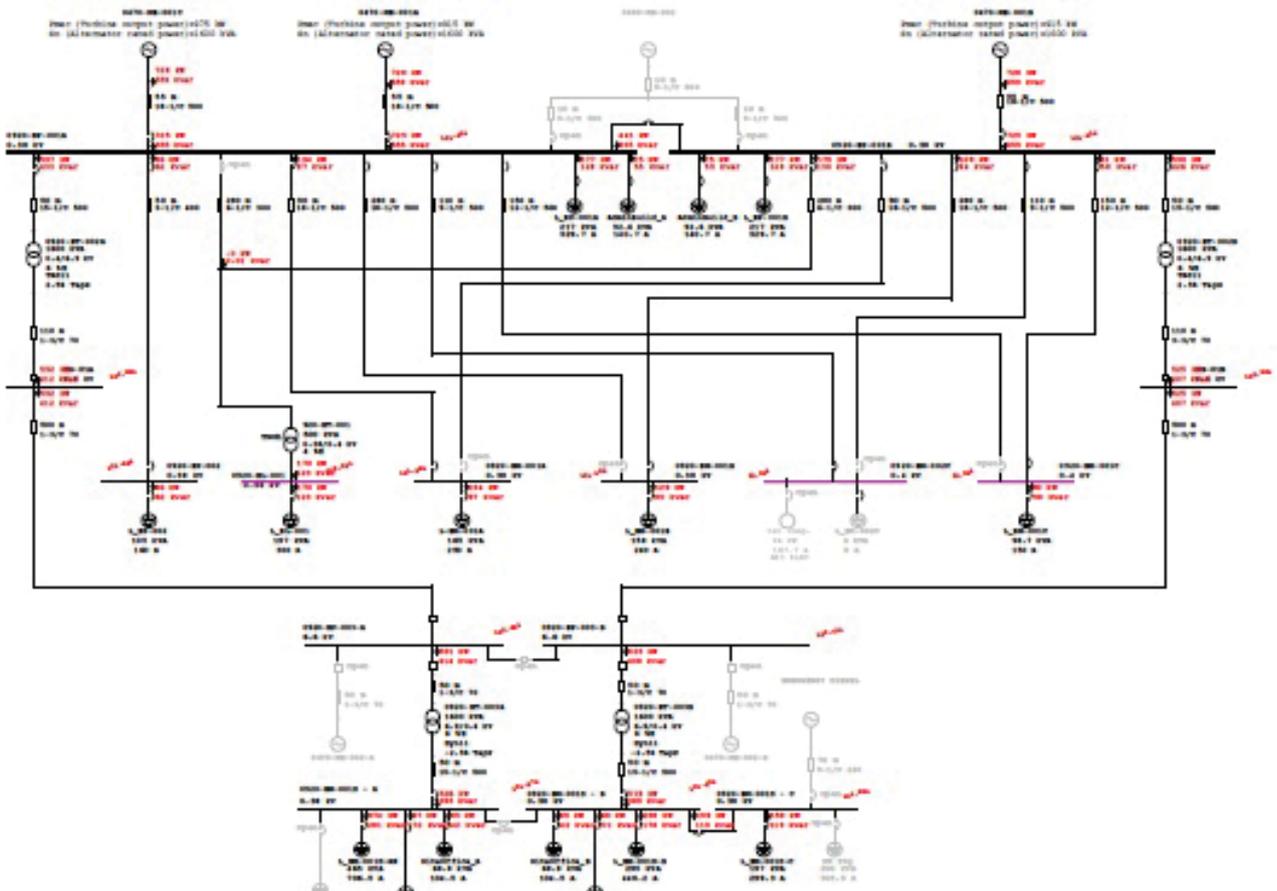
In these highly complex and competitive times, Gear's approach of going against the trend in the sector and opening up the company to new opportunities, on the market has been rewarded, allowing Gear to expand its sales network, move its head offices and expand its prospects for sale and production into new market niches.

Versatility in revamping projects

On the basis of these prospects, Gear fully expresses its capacity in revamping projects on existing plants. Gear modifies and adapts existing engineering documents, changing electrical parts which must be replaced or adapted for new uses and updating them with the latest new technologies. Our specialized technicians often find themselves attempting to revamp obsolescent equipment decades old, or having to make changes on-site, often facing unforeseen circumstances and unpleasant working conditions (figure 1).

Over the past seven years Gear has worked on a state-owned gas treatment plant in Egypt (shared with International Oil&Gas Company), modernising and

Fig 1 – A detail of the power study



expanding the complex. In 2008 Cear worked on the enlargement of some existing switchboards located in the main switchgear building.

The customer asked us to revamp equipment made by manufacturers who are no longer in business on the market, and specifically to:

- supply a new 500 kVA 0.38/0.4 kV transformer;
- modify the power rate (rating from 2.2 kV to 30 kV) and some existing motor starter drawers in two motor control centers;
- modify a power center to increase the current rating from 800 A to 1200 A, changing a number of cubicles and circuit breakers on incoming lines to adapt the structure of the cabinet, also modifying the main busbar.

These changes were not limited to replacement of electrical components, but were part of a much more complex supply in which Cear sent fully trained & competent personnel to perform a site survey and collect all the required data & drawings from the site in order to prepare a technical offer and develop the required engineering package modification and documents for review and approval (**figure 2**).

Subsequently, in response to the requested changes, part of the work was performed in Cear's workshops, but most of the more complex changes had to be implemented in the workshop of our Sales Representative, based in Cairo, and directly on site.

To complete the revamping and testing, Cear's personnel performed commissioning and start-up, and, as per the customer's procedure, field acceptance testing and a dedicated training program, complete with certificate of attendance for local specialized technicians in the plant.

In 2011 a second revamping project was performed on

the same plant, in which Cear made further changes and expanded the plant's electrical structure, working on site once again to revamp electrical and mechanical equipment:

- a competitor's PMCC (Power Motor Control Center), with addition of two columns of cubicles to be utilized as a 1 MVA transformer feeder;
- two MCC (Motor Control Center), replacing a number of drawers required as motor starts and power feeders.

Following these changes, the client made an even more complex request: an overall protection relay coordination study and relay setting tables for the whole distribution system, including short circuit calculation, load flow calculation and motor starting analysis for medium and low voltage apparatuses. The aim of this work was calculation of the protective relays' set value, in order to ensure protection for users and obtain selectivity in the event of faults in the electrical network. The study pertained to the low and medium voltage switchgear and did not take generator protection into account; basically, the protection philosophy was based on the knowledge that faults or abnormal operating conditions can lead to:

- overloads;
- ground faults;
- phase to phase and three phase faults.

Know-how and multidisciplinary in specialized supplies

Know-how is not only a matter of technical knowledge, but also includes a company's ability to adapt to the specific needs of a plant, dictated by specific construction standards, such as UL/CSA regulations, RINA maritime standards, or international rules such as Atex standards for construction of electrical panels in the presence of a hazardous area.

Cear has obtained certification to manufacture control panels listed by UL, which meets the applicable safety standards valid for the US and Canadian market. In 2013 Cear's familiarity with these standards allowed our technicians to supply power and control panels built to UL standards and an entire automation system for an air dryer package in one of Mexico's biggest petrochemical plants, recently constructed.

The air dryer package was composed of twin drying systems, one in operation and one on standby, with two dryer towers for absorption and regeneration of the operating cycle, controlled by two PLC panels (**figure 3**).

These power and control panels, complete of an touch

Fig. 2 – The PLC control panel for the job in Mexico



panel PC as HMI, manage the entire system through a redundant Siemens S7-400 PLC (Hot backup) and interfaces with the client's DCS by serial link. Furthermore, the PLC controls a package that is fully automatic and also implements all interlocks necessary to protect the plant and the personnel against operating faults or plant failures.

Cear's part of the project was not limited to construction of the panel, but included development of the engineering behind the automation system, development of the operating software for the process and on-site support during installation and commissioning of the system.



Fig. 3 - The prototype of Ex p substation

Research and development as investment in the future

Research and Development is definitely the best investment for an enterprise: useful for qualifying and expanding its range of production, and for meeting very high quality and safety standards. For Cear, Research and Development means keeping up with the new demands of the market. By the first half of 2016 the company will conclude a plan for acquiring the following product certifications:

- *QDP Power Center* ("Quadro elettrico di Distribuzione Primaria") certified with internal arc proof up to 100 kA / 1 s, obtained in 2015, as per 61439-1 and 61439-2 standards;
- *Containerized Transformer Substation* (model CTE-IAC) certified to withstand an internal arc of 20 kA / 1 s, according to IEC 62271-202 and IEC 62271-200, obtained in 2015. The advantage of this application is its focus on "operational safety", even more important in yards and workplaces. Cear's substations are therefore designed and tested for Class AB (IAC-AB-20 kA / 1 s), Protection for Industrial Operators and for public service utilities in general;

- *Compact Transformer Substation (CTS)* as per Atex/94/9/CE regulations, with "internal over-pressure" Ex safety construction with protection mode "p", suitable for installation in mines in areas classified as Group I Category M2 and for Petrochemical and oil & gas plants in Group 2G with protection level Gb. The apparatuses making up the pressurization system are designed to guarantee maximum safety and continuity of operation, with automatic management of washing and maintenance cycles through a SIL 2 PLC;
- *12 and 24 kV MV junction box* as per Atex/94/9/CE rules, with Ex e safety construction and, to further improve safety, suitable for installation in mines in areas classified as Group I Category M2 and for petrochemical and oil & gas plants in Group 2G with protection level Gb.

Conclusion

This multidisciplinary, multi-faceted vision completes the picture of a company that has managed to build a very clear vision of its identity over the years: versatile, quick and dependable, offering clients products and solutions featuring exceptional levels of technology, safety and quality.



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Alessandra has studied Languages and Communication, then graduated in Marketing & Communication at the University of Milan. She's in Cear since 2010 and she's

in charge as Sales and Marketing Manager for coordinating marketing activities, sales team and implement international markets.