

EXCELLENCE AND INNOVATION IN THE NUCLEAR INDUSTRY

Equipos Nucleares (ENSA) was born to satisfy the demands of the Spanish civil nuclear program by manufacturing large components for the nuclear industry. After the Spanish nuclear moratorium the company began its internationalization and more than four decades later, the largest percentage of its production is destined to the international market.

ENSA has been able to meet its customers most demanding regulations and requirements and bet on an optimistic future based on its multi-system character, its culture for continuous improvement, its technological capabilities, its commitment to R & D & I and its highly qualified team.

ENSA, Equipos Nucleares, S.A., S.M.E, was established on July the 10th, 1973 to satisfy the demands of the Spanish civil nuclear program in the manufacture of large components intended for the nuclear industry. In 1981 it delivered its first primary component: the reactor for Valdecaballeros plant.

Since then, its career began with the manufacture and supply of services for the Spanish plants, an essential experience for the internationalization starting during the 1980s.

Its first incursions into the international market were in Germany with the manufacturing of two pressurizers for the Isar 2 and Neckarwestheim power plants and with a reactor cover head for the Atucha plant in Argentina.

More than four decades later, around 90% of its primary components

are delivered to international customers. ENSA's multi-system character has allowed to manufactured equipment's with different technologies and codes (ASME, EN, RCCM, KTA, TBM, KTM ...) being safely and reliably operating in more than ninety nuclear power plants around the world: Sweden, France, United States, United Kingdom, China, Germany, Finland, Argentina, Brazil, South Africa, India, Slovenia, Switzerland, Belgium, South Korea...

ENSA has a strong commitment to the R & D & I culture, as well as the technological capabilities that combine the experience of its engineers and designers, the knowledge and the personnel necessary to be involved in a culture of continuous improvement and in the design and manufacturing of large components such as reactors,



LUCÍA L. CANO SANZ

Communication and Image

EQUIPOS NUCLEARES S.A., S.M.E.

BA in Journalism and Political Sciences and Administration by the University of the Basque Country (UPV/EHU).





steam generators, primary piping, pressurizers, heat exchangers, fuel nozzles, storage racks and storage and transport casks.

It also offers a wide range of services, providing solutions from the supply of equipment, design and special tools, maintenance, support to the operation and repairs and finally, dismantling the plants, including the treatment of their waste.

In the components area, steam generators deserve a special mention, with more than 123 steam generators, with 41 shipments to the USA, 28 to France, 11 of which are in the process of being manufactured, 7 supplied to the Chinese market (Qinshan 2, Hainan and Sanmen 2), and others to India, Sweden or Korea and the most recent ones: 3 replacement steam generators for the Beaver Valley plant in Pennsylvania (USA).

In the Services area, ENSA has lately completed the manufacture and installation of 15 shieldings in different areas of the third reactor of Olkiluoto-3 power plant in Finland to reduce radiation exposure. The shieldings have different geometries and materials depending on the doses of the areas to be shielded. In addition, ENSA was in charge of the manufacture and installation of the Pressure Equalization Ceiling of the 4 steam generators of the EPR reactor; structures that during the normal operation of the plant allow the access to equalize the pressures reducing the loads transmitted to the civil works.

In the same plant (EPR), ENSA completed the installation of the Aeroball Measurement System Shielding, (AMS) whose main function is to limit the neutron flow between the room where the AMS is located and the reactor pool.

For the Flamanville 3 EPR power plant in France ENSA carried out the design, manufacture and assembly of the 21 heat exchangers through a Temporary Union of Companies with Iberdrola and for the Taishan 1 & 2 in China, designed, manufactured and Supplied two boric acid columns and 22 heat exchangers with Técnicas Reunidas.

In the fuel management area, the Cantabrian company has 38,941 rack cells spread



all over the world. The racks for the Olkiluoto 2 KPA-Store or the ones for the Shin Hanul plant in South Korea's "Interlock Cell Matrix" model, developed and patented by ENSA, are a small sample of ENSA's capabilities.

Furthermore, ENSA has an extensive experience in the field of casks of fresh and used fuel. Since 1985 has supplied casks of multiple technologies, includ-

ing own designs such as DPT and ENUN models, being able to provide an integral service from conceptual design, manufacturing, operation and loading in plant.

It has provided casks to China, Japan and the United States in addition to all the casks in operation in the Spanish plants. The last example is the ENUN 24P cask for fuel transport from two power stations in China: Daya Bay and LingAo.

In addition, ENSA has a long experience in the dismantling of several Spanish centers and plants:

In Vandellós I, the company undertook the emptying and cleaning of the silos 1, 2 and 3 to construct some buildings and facilities for the extraction, crushing, segregation and encapsulation in casks of the graphite sleeves contained in these silos. All these facilities were dismantled and the surfaces of the silos were decontaminated: walls, floors and ceilings.

In the José Cabrera plant ENSA carried out the works of cleaning and decontamination of all the elements of the primary circuit (except the vessel) as well as the walls, structures and singular elements of the radiological areas of the Containment Building and the Auxiliary Building of the plant, among others.

In 2007, ENSA began the decommissioning of the CIE-MAT experimental reactor with the reactor pool and its





auxiliary systems: tanks, pipes, buried pipes, ventilation, etc. Later, the walls of the reactor building were decontaminated: walls, floors, etc.

Similar works are being performed at the Kozloduy plant in Bulgaria and at the Enrico Fermi plant in Trino, Italy.

In Bulgaria ENSA-in a Consortium is in charge of extracting samples of ion exchange resins from six tanks for their characterization and to know their composition and radioactive doses for their neutralization in drums and subsequent dismantling of the tanks. The consortium also manufactures the equipment to remove the resins of the tanks, among which a telescopic pole stands out.

In Trino, within a Temporary Union, ENSA deals with the executive design and dismantling of the primary circuit and its auxiliary systems, dismantling, segmentation, segregation and loading in containers of steam generators, pressurizers, pumps, pipes and associated lines.

Its passion for continuous improvement has led it to take a step further and participate actively in innovative projects related to the development of fission and fusion nuclear power and waste management. It has experience

in the realization and supporting of the design of special reactors such as ASTRID (France), NuScale (USA), ESFR (Europe), PBMR (South Africa), JHR (France) and in the fusion with the ITER reactor. In these reactors, ENSA has performed scopes that vary from manufacturing viability studies, support calculations, material selection, cost analysis, to the realization of welding coupons under real conditions.

In relation to the last two projects, it should be noted that ENSA was the first European company to deliver a component to the ITER (International Thermonuclear Experimental Reactor) fusion experimental reactor project in Cadarache, France: The first of two 100-cubic-meter emergency tanks and four 20-cubic-meter storage tanks for the "tritium segregation system".

ENSA's participation in ITER also includes the welding assembly of the reactor vacuum chamber composed of 9 sectors and 53 ports and in the manufacture of part of these sectors of the vacuum chamber.

Currently, ENSA is executing the development phase of the systems, techniques and processes that will be used later in the field, consisting of simulation of welding, equipment and tool

design, prototyping and non-destructive inspection techniques.

It also works for the Reactor Jules Horowitz (RJH) project, as a result of a bilateral agreement with CEA (Commissariat à l'Energie Atomique) whose participation is led by CIEMAT and whose objective is to have an experimental reactor to replace the current reactors (HALDEN, OSIRIS, etc). ENSA contributes through the complete supply of 3 heat exchangers (HEX) for the primary circuit.

One of its most recent projects is the supply of equipment for a waste treatment plant generated by a research center of the Sao Paulo Navy in Brazil. ENSA will manufacture a series of equipment to reduce the volume and store the waste generated. These include: storage tanks, heat exchangers, handling equipment, valves and instrumentation.

Its national and international experience, prove that the company has been able to respond to the most demanding regulations and requirements of its customers and will continue to do so, since in its DNA one can find the culture for improvement, the technological edge, and the reliance on R & D & i. ■