PRESS RELEASE

SENER concludes the Almirante Irizar icebreaker engineering works for reoutfit and overhaul

SENER has already finished the engineering works related with the reoutfit and overhaul of the Almirante Irizar icebreaker, after the fire accident in an antartic season.

During 2009 year, the Argentinian Navy and the Tandanor SACyF shipyard asked SENER Ingenieria y Sistemas - Argentina to deliver an engineering integral project for the repair and modernization of the Almirante Irizar icebreaker, taking as a reference the experience from SENER in the marine industry, not just as a ship design firm, but as the developer of the FORAN CAD/CAM system, already in use in more than 150 shipyards and offices all over the world.

After a series of meetings between the Tandanor design team and SENER, it was reached the final agreement for the technical scope of work to be included both for the basic and the detail designs, based in a previous concept project from STX Wärtsilä, so dated 20th October 2009 they started the project works. Attending to the technical characteristics from the project, the size and scope of work and the ship itself, it may be considered as one of the most relevant marine projects in Argentina within the last 25 years.

As a consequence from the incidences suffered by the ship, 75% of her lower structures from the hull, decks and superstructures aft from the accommodation area (frame #84) were severe or totally affected. Pipes, fittings and auxiliary equipment, ventilation ducts, cable trays, cables laid and distribution panels located aft from frame #84 were completely ruined or heavily damaged. All the main and auxiliary diesel generators were also lost, same as the main and secondary distribution cabinets, and the emergency generator with its console.

Meanwhile, the electric propulsion engines and the auxiliary propulsion equipment suffered minor damage, caused by the smoke and high temperatures. The outer shell and wing tanks aft from frame #84, and the accommodation and superstructure fore from frame did not suffer any damage.

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In order to have a complete understanding of the magnitude of the project, it must be known that these extensive reconstructions are far more complex than the building of a new ship. The complete project was the conjunction of a general repair of parts not affected by the fire, some ordinary tasks typical from a dry-docking, some new parts and some refurbishment for out-of-date equipment and systems.

There are new structures that must be connected with the original ones, same as for the pipes and auxiliary structures. This procedure required of more than 1,500 hours of measuring onboard from field technicians, for a further development of a CAD 3D model.

From the ship owner requirement of having a DNV’s classified ship (DNV’s ClassNotation1A1 Specially Ice Strengthened, Naval Support, HELDK SHF, E0, DG-P, LFL), one of the most challenging aspects for SENER was to prepare her for the IMO and SC rules, due to the vast changes that the classification
rules have suffered for ships this type, since the time that the ship was built, back in 1978. It is to be noticed that the Almirante Irizar is a lot more than a simple ice breaker: she is also a general and refrigerated cargo, liquid cargo, passenger, scientific research, hospital and logistics support vessel, with a hull designed for Antarctic waters navigation and ice breaking.

She also has the capability to run under UMS condition (Unmanned Engine Room), and adds a modern flight deck and a JP1 jet refueling station for all kind of helicopter operations from the ship.

The main topics included in this overhaul are as follows:

- Refurbishment and enlargement of the accommodation areas to fit up to 313 people (crew, research personnel and passenger), both for the existing and the new ones.
- Increment of the research area onboard (total of 400m² available)
- Increment of the liquid cargo capacity (650 m³)
- Increment of the cargo hold capacity (930 T for dry cargo, 120 m³ for refrigerated cargo, 1,000 drums, 500 gas cylinders and 1,200 m³ of different cargo types)
- Classification, class marks and certificates according to DNV requirements (July 2009 rules)
- Adapt the ship to the IMO (MARPOL - SOLAS) requirements and the Antarctic Treaty and the Madrid Protocol, in force at the time the ship repair started
- Structural analysis using FEM model and engineering processes during the dismantling of the damaged parts while in floating condition (with deformation analysis through strain gauges)

And all the above under the constraints from the economic parameters and the shipyard building and strategic limitations.

Results from the project:

- 130,000 hours of engineering and project control
- Use of the FORAN V60R3.0 for the development of the design
- Replacement and modelisation of 760 T of steel structures (decks and bulkheads)
- 42 structure blocks
- Modelisation of 4,000 T of structure for references of the outfitting items
- Modelisation of equipment, auxiliary structures and 4,000 m of pipe lines for references of the outfitting items
- 12,000 m of pipe lines modeled and renovated
- 8,000 pipe spools for manufacturing
- 2,500 m of electric cable trays modeled and renovated
- 2,250 m of HVAC ducts modeled and renovated
- 700 equipment elements modeled with their foundations, and 100 auxiliary structures modeled and built
- 67 technical specifications elaborated and 181 supply homologations done
- 1,950 engineering documents in their final revision status

This was achieved with the continuous work from three divisions focused in the marine design, located in Tres Cantos (Madrid), Valencia (Spain) and Buenos Aires (Argentina), with a total of 40 people for the project load peaks, 23 of them Argentinian. The FORAN database was centralized in Tres Cantos, but two slave databases in Valencia and Buenos Aires gave local access to the designers in both sites. This procedure made a hit in the use of FORAN, being the first time that a project is developed remotely from three sites so distant.

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In the Madrid division there were works for Naval Architecture, structure and FEM analysis. In the Valencia division there were outfitting design, HVAC, fire structure integrity calculations, lifesaving means and devices, electrical design and automation, and finally accommodation. In the Buenos Aires division, there were project management, planning, documentation control, cost control and the development of all the detail design for hull structure and outfitting, plus the technical assistance to the shipyard.

All this work was executed in conjunction with Tandanor, the designated shipyard for the construction. Hence, combining the efforts from SENER and Tandanor, the result is one of the most relevant tasks ever undertaken in the marine history of Argentina.

A special consideration is also reserved for the Argentina Navy personnel, both for the DGMN (Direccion General Material Naval) and for the Navy members assigned to the ship all along the repair work.

It is worth to mention, in words of Norberto Fiorentino from SENER Argentina “The effort and dedication from all those involved in the project, either in the SENER team, the shipyard team and the ship owner team, which ended up with a clear success of the enterprise”.

About SENER:

SENER is a private engineering and technology group founded in 1956, which seeks to offer its clients the most advanced technological solutions and which enjoys international recognition, thanks to its independence and its commitment to innovation and quality. SENER has more than 5,500 professionals at its centers in Algeria, Argentina, Brazil, South Korea, Chile, China, Colombia, the United Arab Emirates, Spain, United States, India, Japan, Mexico, Poland, Portugal and the UK. The group has an operating revenue of €1,218 billion (2013 figures). SENER engages in the specific activities of Engineering and Construction, and also has industrial holdings in companies involved in Energy and Environment, as well as in Aeronautics. SENER’s Engineering and Construction division has become one of the world’s benchmark companies in the Aerospace, Infrastructures and Transport, Power and Process, and Marine sectors.

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About FORAN:

FORAN is a totally integrated computer system specifically developed for the design, production and engineering of ships. It comprises several main packages (hull forms definition, naval architecture, hull structure, outfitting, electrical), a number of common modules (build strategy, drafting, walk-through design review, collaborative engineering), links with production equipment (cutting machines, bending machines, robotic systems, etc.), interfaces to management systems and its own integrated development environment.

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