



Ichthys Riser Protection Net

Design and development of the largest riser protection net system in the world.

The Ichthys LNG Project is one of the world's most significant oil and gas projects, involving some of the largest offshore facilities industry-wide. Natural gas and condensate are extracted onsite by the Central Processing Facility (CPF), one of the key centers in the Ichthys Offshore Development. Here they undergo initial processing, and the natural gas is then transmitted to the Darwin Facility onshore via an 890 kilometer gas export pipeline. Most condensate will be sent to a nearby FPSO for processing. Working from extensive designs developed by Tension Technology International (TTI), SWOS was awarded the contract to construct three riser protection nets to significantly mitigate collision damage to the CPF, one of the key centers in the Ichthys Offshore Development.

The Ichthys LNG Project is one of the most significant oil and gas projects in the world, involving several of the largest offshore facilities industry-wide. 220 kilometers off the coast of Western Australia, the Ichthys Project is a Joint Venture between INPEX (operator), major partner Total, CPC Corporation Taiwan, and the Australian subsidiaries of Tokyo Gas, Osaka Gas, Kansai Electric Power, JERA and Toho Gas. The Ichthys project is listed as the largest discovery of hydrocarbon liquids found in Australia in the past 40 years.

One of the key centers of the Ichthys offshore development is the Column-Stabilized, Central Processing Facility (CPF). This Semi-Submersible production unit, constructed by Samsung Heavy Industries in South Korea, houses and supports the extensive hydrocarbon processing equipment and utilities, along with living quarters housing up to 200 people at one time. In addition to the historic value of the discovery and massive production capacity of the project, the CPF also boasts the world's largest riser protection nets, built by SWOS to last 40 years and ensure the continued success of the project.

As with any offshore facility, safety considerations are a top priority. Collision damage to the CPF risers could be catastrophic to personnel, operations, and the platform itself. Due to the unique inboard riser layout of the CPF, and risk of accidental vessel collision, the riser protection nets were designed by Tension Technologies International (TTI) to engage and repel any oncoming vessel or like size structure. On February 12, 2015, SWOS was awarded a 12-month contract for testing, construction, and packaging of the three TTI designed riser protection nets.



This net system's specifications required unique fibers and rope constructions for horizontal strength members in each net. Per TTI's specifications, Whitehill Manufacturing designed and provided SWOS with the synthetic ropes needed to fulfill this specific one off engineering requirement. The East and West net's main strength members were constructed from 140mm high performance polyester rope, measuring 78 meters in length, 10 meters in height and weighed 5mt. Altogether, the East and West nets allocated 2,100 feet of polyester rope.

With the North net closest to the risers, the North net had to maintain a very low deflection distance should it be impacted. Per TTI's specification, this side of the net was constructed from a Polyethylene Naphthalate (PEN) fiber rope, a stiff fiber with a low, easily managed creep rate over the net's planned 40-year lifespan. This unique fiber is rarely used in rope due to its unique properties, but its durability and stiffness properties made it the best fit for the Ichthys LNG Project.

The 195mm North net measured 109 meters in length, six meters in height and weighed 12mt. All three nets combined housed 7,800 feet of Samson's AmSteel®-Blue rope which served as the vertical strength members on each net. The vertical lines were spaced three meters apart, and constructed with eyes just wide enough to slide over the molded collars on the main lines. These molded collars keep the squared spacing of the nets consistent by providing a grooved structure to house each eye. 100% of the rope on each net was fully encapsulated with an orange urethane coating to ensure extensive protection of the load bearing fibers.



After rigorous testing, several months of construction, and a detailed approval process, the massive, highly engineered, and technically complex riser protection nets were ready for operation. Packaging and shipping these nets presented additional factors that SWOS addressed with innovation. Proper spacing in packaging was essential to preventing damage to the urethane coating, and SWOS strategically designed three reels to individually house the North, East and West nets. Per the design, each spool underwent an extensive and precise measurement process to ensure efficient reeving and unspooling capabilities. SWOS was awarded the responsibility of constructing the individual spools, which entailed a detailed plan for the spooling evolution of each net while incorporating all required components for the lifting and rigging system. This included the implementation of a custom spreader bar, drive shaft, spooling support unit, various hardware items and lifting slings. The East and West reels weighed in at 11.334mT, the North spool at 19.699mT. The immense size of these nets also presented new challenges in the field of riser protection net installation.

SWOS was contracted to advise and witness the installation process taking place in South Korea. Proper installation procedures were critical, not only to ensure proper handling but also to maintain the net's 40-year design life. In addition to overseeing the installation, SWOS inspected the system on site to ensure the nets were unspooled and installed without damage. A SWOS engineer remained on site for 60 days to see this process through from start to finish. Roughly 10,880 man hours were invested on the SWOS scope of work for this project with zero lost time accidents. Alongside its partners, SWOS ensured project fulfillment and success by providing expert knowledge and commitment to service in one of the most significant offshore projects in the world. From beginning to end, the project has been a testament to SWOS' commitment to excellence.