

Lockheed Martin will leverage its expertise to manufacture cryogenic tanks for LNG marine applications



From Space Ships to Supply Ships

By John R. Snyder, Publisher & Editor-in-Chief

Lockheed Martin's new LNG fuel tanks for Platform Supply Vessels will have a touch of aerospace technology

What do the space shuttle and three new Harvey Gulf International Marine dual-fuel Platform Supply Vessels have in common? The answer is that the fuel tanks for the shuttle and PSVs will have been manufactured by Lockheed Martin at its NASA Michoud Assembly Facility Main Manufacturing Building in New Orleans, LA.

Of course, the final space shuttle mission concluded almost three years ago, when Atlantis landed at NASA's Kennedy Space Center in Florida. With government budgets shrinking and the space shuttle program retired, Lockheed Martin is looking to diversify its customer base by leveraging its aerospace knowledge and technologies for uses in the private sector.

Over the years, there have been a number of consumer and business products that can trace their roots to the space program—water purification systems, solar cells, freeze drying, firefighting equipment, computer technology, medical procedures and even memory foam beds. With the Liquefied Natural Gas (LNG) market on the upswing, it was a natural fit for Lockheed Martin to leverage its expertise in handling super-cooled liquids to manufacture cryogenic tanks for LNG marine- and land-based applications. Natural gas condenses into a liquid state when it is cooled to -162 degrees C (-260 degrees F).

Lockheed Martin's first contract for a marine application is with Wärtsilä to supply at least three LNG tanks for three Harvey Gulf International Marine's 310-foot-long dual fuel PSVs under construction at the Gulf Coast Shipyard Group (GCSG), Gulfport, MS. As the first U.S. shipyard to construct dual fuel PSVs, John Dane III, President, GCSG, says one of the biggest challenges for the group was getting ABS and the U.S. Coast Guard to agree on what is considered the "hazardous zones" based on the systems aboard.

The first of the 100-foot-long by 14-1/2-foot-wide tanks will be installed in the Harvey Liberty, the third of a series of six dual fuel PSVs for Harvey Gulf International Marine (HGIM). Lockheed Martin will also supply the tanks for the Harvey America and the Harvey Patriot, the fifth and sixth vessels in the series. The fuel tanks for Harvey Energy, Harvey Power and Harvey Freedom—the first, second and fourth vessels in the series—will be manufactured by Chart Industries, Cleveland, OH. The last of the three Chart Industries-fabricated tanks will be delivered this July.

The 250,000-pound tanks are installed as part of Wärtsilä's LNGpac fueling system under the centerline deck of the PSVs. The LNG capacity will be 295 m³.

The delivery of the first PSV in the series, the Harvey Energy, will be in October 2014, with subsequent vessels delivered every

four months, according to Dane. Once delivered, the PSVs will go to work for Shell in the Gulf of Mexico.

Refueling of the dual fuel PSVs will be handled at HGIM's first-of-a-kind LNG fueling facility in the Port of Fourchon, LA. The LNG facility will consist of two sites each having 270,000 gallons of LNG storage capacity. Lockheed Martin will manufacture the LNG tanks, which will be of stainless steel, Type 'C' construction. Each facility will be able to transfer 500 gallons of LNG per minute. Each of the ABS-classed vessels will have a capacity of about 67,625 gallons of LNG.

At a maximum speed of 14 knots, HGIM estimates the LNG fuel consumption will be about 393 gallons per hour. This compares with a fuel consumption of 284 gallons per hour of MDO at the same speed. At a cruising speed of 12 knots, however, LNG fuel consumption is estimated at 185 gallons per hour, as opposed to 186 gallons per hour for MDO.

The dual fuel 5,135 dwt PSVs will have ABS class notations of +A1, Offshore Support Vessel, +AMS, +ACCU, +DPS-2, ENVIRO+, GP, UWILD, FFV-1, GFS(Dual Fuel Diesel), Circle E, with certifications of U.S. Coast Guard Subchapter I and Subchapter L, and SOLAS.

TGE Marine to supply tanks for CONRO ships

Meanwhile, less than an hour's drive from the Gulf Coast Shipyard Group's Gulfport facility, VT Halter Marine's Pascagoula shipyard will construct a pair of Combination Roll-on/Roll-off (ConRo) ships that will be fueled by LNG. Being built for the Puerto Rican Jones Act trade by Crowley Maritime Corporation, the two 219.5m x 32.3m ships will each have a MAN B&W 8S70ME-GI8.2 main engine and three MAN 9L28/32DF auxiliary engines. The diesel-cycle ME-GI engines have high efficiency and power concentration, with negligible methane slip.

MAN Diesel & Turbo recently awarded a contract to TGE Marine, Bonn, Germany, to supply high- and low-pressure LNG fuel gas packages for the two ConRo vessels. Under the contract, TGE Marine will fabricate three 770 m³ vacuum insulated LNG storage tanks, high pressure/low pressure pumps, BOG-compressors, vaporizers, utility and safety system, as well as a control and alarm board for each ship. VT Halter Marine will deliver the DNV GL-classed El Coqui and Taino in the second and fourth quarter of 2017.

The human element

With delivery of its first dual fuel PSV imminent, New Orleans-based operator HGIM has been working closely with Maritime Simulation Institute (MSI), Middletown, RI, and Wärtsilä in finalizing the development of the first LNG bunkering safety training course in the U.S.

MSI has developed a "U.S. Coast Guard accepted" 45-hour bunkering course for HGIM's LNG bunkering persons-in-charge (PIC), says Margaret Kaigh Doyle, MSI Vice President. Doyle explains that the course is "accepted" as opposed to "approved" because it comes ahead of any U.S. Coast Guard regulations governing LNG bunkering.

The courses will be offered at MSI facilities at Texas A&M, near Houston and at the Massachusetts Firefighting Academy (MEA) in Stow, west of Boston. The course will include a simulation of Wärtsilä's LNGPac system. Additionally, both facilities will allow course participants to conduct drills firefighting an actual LNG fire—which is currently not available at any other training facility. The course will be ABS and DNV GL certified. The first session is expected to begin in June.

"Harvey Gulf is committed to using state-of-the-art vessels that provide clean, safe, efficient, reliable and competitive operations.



The Maritime Simulation Institute is finalizing the development of the first LNG bunkering safety training course in the U.S. that will include firefighting drills on actual LNG fires.

Key to this paradigm shift is ensuring that our ships' crews are properly trained in the bunkering of LNG," says Chad Verret, Executive Vice President, Alaska & LNG operations.

Once they complete the course at MSI, HGIM masters, mates and engineers will undergo additional training at the Wärtsilä Land & Sea Academy in Fort Lauderdale, FL. Wärtsilä is supplying each ship with three Wärtsilä 6L34DFs main generators.

USCG working on LNG fuel transfer guidelines

This past February, the U.S. Coast Guard published CG-OES 2-14, Guidelines for Liquefied Natural Gas Fuel Transfer Operations and Training of Personnel on Vessels Using Natural Gas as Fuel. Once it issues its final policy letter, the Coast Guard will establish the guidelines for fuel transfer operations and training of personnel working on vessels that use LNG as a fuel and conduct transfer operations in waters subject to jurisdiction. MSI is working with the U.S. Coast Guard and a number of classification societies to develop this and other training courses.

Doyle is heading up the Coast Guard's Chemical Transportation Advisory Committee (CTAC) Working Group for Safety Standards for the Design of Vessels Carrying Natural Gas or Using Natural Gas as Fuel. "This working group was asked to identify gaps in current Coast Guard policy and regulation on the design, installation and operation of natural gas fueled systems for propulsion of commercial vessels and the design of novel vessels carrying or processing natural and compressed gas vessels," says Doyle. "The working group also has been selected to develop acceptable design criteria to fill those gaps."

LNG is nothing new to MSI. It has worked with major oil and gas transport companies on LNG ship-to-ship transfer. Additionally, it has four simulators in its 16,000 ft² facility, with a Full-Mission, Bridge Wing, Visual Bridge Simulators, a 360° ASD Tractor Tug Simulator, and a new electronic navigation classroom. MSI offers 40 USCG-approved courses, meeting IMO STCW requirements. ■