Tailoring tug technology to meet specific needs

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In the world of ship assist and tanker escort operations, a myriad of challenges and endless ideas about how to address those challenges are commonplace in harbours around the globe.

From escorting a large tanker carrying environmentally sensitive cargoes to assisting other vessels within the harbour, it is crucial that the company or harbour master contracted to handle these operations have a full understanding of the task at hand and the best way to successfully address the needs of the project with the proper technology. Having the right equipment, specifically tugboats, to handle these types of jobs is a key component in the harbour and escort operations businesses.

The technology available to harbour masters is endless. As such, it is important companies analyse what technological components are needed to handle operations. "When considering what type of tug to design, build, purchase, or charter, vessel operators have a good understanding of what needs they require and what capabilities they want to tug to have," said Ed Schlueter, Vice President of Vessel Management Services for Crowley. "The amount of technology out there is so great it really becomes a balancing act to determine the best available technology and what is commercially viable."

In harbour and escort operations, having a highly manoeuvrable tug that can operate in tight areas is important. At Crowley, the needs of the client and each specific harbour guide engineers in choosing which technology is needed for each tug.

Tug design

Crowley provides harbour towing services in the San Francisco Bay area, San Diego and Los Angeles/Long Beach, California, and Seattle and Tacoma, Washington consisting of escort and docking services for tankers, container ships and other vessels as they enter and depart from the harbours. In Valdez and Cook Inlet, AK and North Puget Sound, Washington, Crowley tugs assist large tankers and provide both tethered and untethered escort services.

Each tug assigned to those respective regions has different technology tailored to the needs of the client and the harbour. Crowley currently uses three different tug designs in their ship assist and escort business, explained Chris Peterson, Crowley's Vice President of Marine Services.

Twin-screw propeller

One of the tug designs used at Crowley is a conventional twin-screw propeller tug, equipped with two or three rudders and two propellers. This tug design generates a tremendous amount of force and can be used for conventional towing while still providing above-average manoeuvring capabilities. Reaching up to 15 to 16 knots in speed, a conventional tug design provides harbour masters the ability to handle towing, ship assist and escort work.

"Crowley's *Hunter* is a conventional tug and it can reasonably handle a variety of ship assist, escort and towing projects," said Peterson. "While it provides a little less manoeuvrability than Crowley's other tugs and is equipped with less technology than our other tugs, it is a good choice for harbour masters looking for a tug that can handle a variety of roles successfully."

The Sea Victory and Sea Venture, both Crowley Invader-class, twin screw tugs, are shown towing of the Chemul, an ex-semi submersible drilling platform that is being converted as a floating hotel and work platform for PEMEX just outside the Port of Mobile in March 2008.

Voith Schneider

Crowley's Voith Schneider tugs provide superior manoeuvrability over a conventional tug and are most often the preferred tugs for tanker escort operations. Voith Schneider cycloidal propulsion tractor tugs are considered to be among the world's most advanced.

The blades are characterised by a turning and sweeping motion and sit far lower than the conventional tugs. Visually, when seen on dry dock, the blades have a similar appearance to that of an old-fashioned eggbeater, explained Peterson. This design makes the tug highly manoeuvrable and capable of making instantaneous thrusts in any direction.

The five-blade propulsion system in the two drive units and the absence of rudders in the Voith Schneider design are an excellent choice for assist and escort work. Reaching speeds of 11 to 14 knots this vessel provides tremendous amount of forces in any direction. "The way the hull is designed, the weight of the tug and water working against the deep skeg is used to stop a ship. The Voith Schneider has huge breaking forces," Peterson said.

Z-Drive

The third type of tug used at Crowley is the Azmuthing Drive, or Z-Drive, tug, which has its propulsion system located in the rear of the tug and boasts propellers that rotate 360 degrees in nozzles, permitting the vessel to thrust easily in any direction. The highly manoeuvrable tug is slightly faster than a Voith Schneider and is best suited for ship assist and escort work in very narrow channels and harbours because of its superior bollard pull capabilities. It can also be used for long-distance towing.

Deciding what propulsion design best meets your project needs is just the beginning. There are additional technological factors that should be considered when designing, building or chartering a harbour tug.

Environment and safety

At Crowley, engineers consider not only customer needs and requirements but also safety and the environment given the fact that port and government regulations can vary greatly.

"Making safety a priority for crews and our customers is an important aspect of what technologies should be installed on a tug," Schlueter said. Crowley tugs based in certain areas, such as Valdez, are outfitted for fire-fighting services. Tugs can also be outfitted with specialised technology with more efficient fuel systems and improved emissions standards. On the West coat, Crowley's entire fleet of tugs use ultra low sulphur diesel fuel as a more environmentally friendly alternative to the standard diesel fuel.

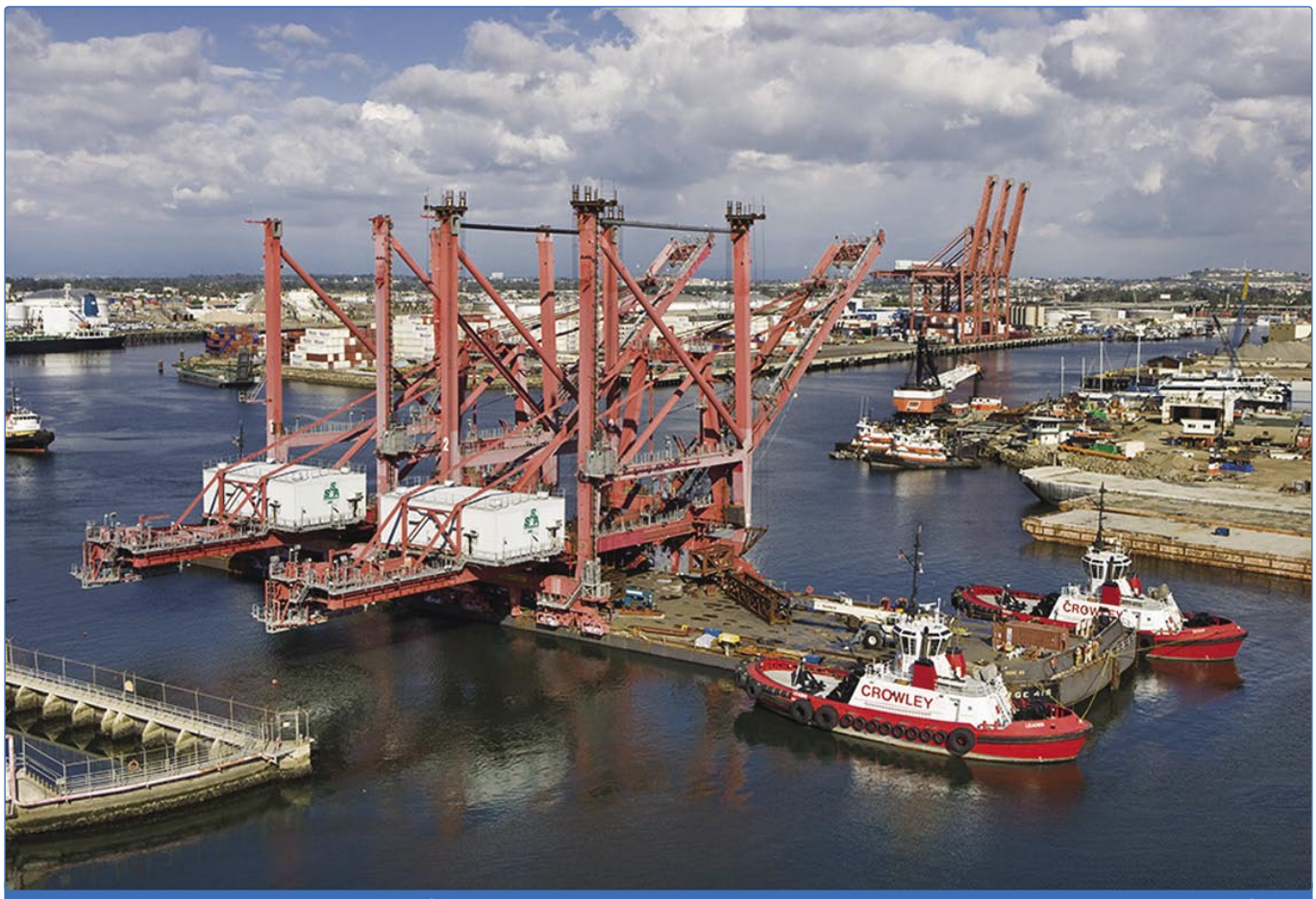
Among other technologies harbour masters should consider is a tug with a kort nozzle, or propeller guard. The guard offers advantages over open propeller designs in that it helps provide the propeller with increased thrust and some protection in shallow waters where the propeller has the possibility of touching the bottom or in debris-filled water where the propeller can become damaged.

Towing winch designs are another area that harbour masters can explore. The tow line render recovery system, as it relates to towing winches, is a practical and smart way to ensure the tension has stability while the tug is tethered to a tanker or vessel. The computer-driven system pays out and recovers tow lines while the tug and vessel is in transit with a simple turn of a dial by the captain. This technological feature not only provides better stability amidst rolling waves and bad weather conditions, but also added safety for the crew who previously had to manually let the lines in and out. Plus, it provides a safer environment for vessels as they are more securely tethered to the tug, helping to prevent incidents.

The Aware, a Crowley Azmuthing or Z-Drive tug, provides tanker assist and escort services through the Prince William Sound, Alaska to and from Valdez. The Z-Drive tug is best suited for ship assist and escort work in very narrow channels and harbours because of its superior bollard pull capabilities. The Tan'erliq, a Voith Schneider tug, is seen in the background.

Twin screw tug operators and designers also have the option of fitting the vessel with controllable pitch and cycloidal propellers which allow the vessel increased manoeuvrability and speed control.

The technology doesn't stop there. In addition to normal upgrades like larger engines and more intricate propulsion systems, those interested in designing, building, purchasing or chartering tugs can also add features such as computerised consoles in the



Crowley Voith Schneider tugs assist in the transport of cranes in the Port Los Angeles/Long Beach in November 2008. Voith Schneider tugs are equipped with a five-blade cycloidal propulsion system providing superior manoeuvrability essential for ship assist and escort operations, especially in tight areas.

wheelhouse that permits a captain to control and monitor every single feature on his vessel without leaving the wheelhouse.

"The available technology can get very sophisticated and of course, with that, very costly," Schlueter said. "We must also keep in mind however; the vessel must be commercially viable and utilise the technology to compete. It makes no sense to design a state-of-the-art tug with every bell and whistle if you can't generate enough revenue with that tug to amortize the cost." He added that those in the market for a tug should analyse a few questions, including what harbour the tug will operate in, what are the harbour specifications and limitations as well as the size of the vessels the tug will be working.

Answering these questions is an important aspect in helping make an informed decision about which type of tug that is needed. Harbour masters can also consult with architects and marine engineers in Crowley's Technical Services group to help them narrow down the features and specifications that are crucial to their unique ship assist and escort operations.

Crowley's technical services group provides a full range of services and solutions from vessel concept design and shipyard management to operation, repair and maintenance of the vessel after delivery; customers can utilise Crowley expertise throughout the entire life of a vessel or for selective services at any point in the process.

ABOUT THE COMPANY

Jacksonville-based **Crowley Holdings Inc.**, a newly formed holding company of the 117-year-old Crowley Maritime Corporation, is a privately held family and employee-owned company that provides diversified transportation and logistics services in domestic and international markets by means of six operating lines of business: Puerto Rico/Caribbean Liner Services, Latin America Liner Services, Logistics Services, Petroleum Services, Marine Services and Technical Services. Offered within these operating lines of business are the following services: liner container shipping, logistics, contract towing and transportation; ship assist and escort; energy support; salvage and emergency response; vessel management; vessel construction and naval architecture; government services, and petroleum and chemical transportation, distribution and sales.

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