18 Meter 1,300 HP - ASD Work Tug

Preliminary Specification

March 2015

VERY MANEUVERABLE TWIN Azimuth Stern Drive Work Tugs

This 18 meter ASD (Azimut Stern Drives) Work Tug is primarily designed for work tug use in waterfront construction projects. The very maneuverable tug with her dynamic positioning system will place her and the construction barges exactly where they require and will hold them in position. The system automatically either holds or makes any changes in the tug/barge position and/or orientation.

- Note: the specifications are very flexible with interior and equipment options.

MAJOR ASSETS:

The vessel is provided with the most efficient propulsion system available; Twin in-line 6 cylinder turbocharged after-cooled Volvo Penta D16-MH Heavy Duty Diesels driving two stern mounted Z-Drive Azimut Thrusters by Thrustmaster.

- Extremely Maneuverable: with her twin stern mounted steerable Azimuth Drives.
- Joystick Docking or coming along side another vessel: Simply push the joystick in the direction you want your boat to move, or twist the top to rotate the vessel.
- Dynamic Positioning System holds the boat in position and heading, despite winds or currents. An excellent feature, useful in many mission situations.
- Cruise control is a new feature that provides fingertip control of engine rpm, letting the operator optimize fuel economy.
- Single-lever mode**:** lets you control all engines with one lever. Easy and precise even in rough seas.
- Integrated with the EVC (Electronic Vessel Control) system, the Glass Cockpit provides an enhanced overview and control of both engine and all navigation systems.
- A 30% reduction in fuel consumption provides a 40% longer operating range.
- Designed to be easily maintained and reduced operating costs.

PRINCIPAL DIMENSIONS:

Length: 18.0 meters (59') Beam: 8.18 meters (26'7')

Length Water Line: 16.7 meters (54'8") Draft Fully laden 2.63 meters (8.6")

Displacement: Gross tonnage 198 tons

Fuel: 6.5 tons Approximately 30+ hours of operation

Cruising Speed Fast cruise 10 knots *@ 1,400 RPM*

Maximum 11 knots *(@ 28C degrees ambient air)*

CONSTRUCTION:

- Hull; Steel displacement stern mounted Z-Drive Azimut Thrusters, Watertight bulkheads, frames and engine mounts are all of welded high-tensile steel. Minimum of five (5) watertight compartments with watertight doors and/or hatches
- Superstructure; Kevlar/Reinforced Fiberglass with Core-Cell. Hand layup vacuum infused. Superstructure bulkheads are of welded from 5083 aluminum alloy, reinforced with welded structural aluminum 5086-H116 alloy angles.
- Aluminum mounting backing plates embedded, handrails, doors, hatches, etc.
- Hand rails and railings of anodized aluminum
- The vessel to be designed in accordance with American Bureau of Shipping.

PRIMARY POWER:

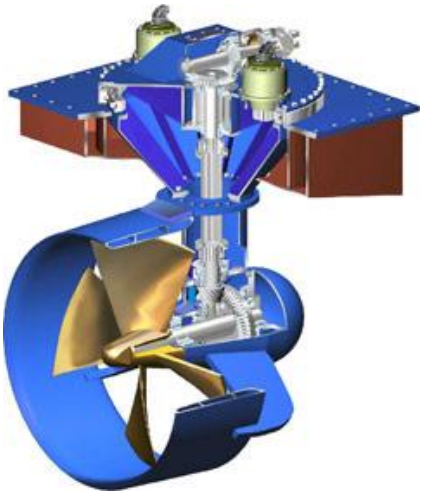
The twin Volvo Penta D16 MH in line 6 heavy duty diesel, turbocharged keel cooled, providing 1,800 rpm for a total of 958 kW (1,300 hp) provides power to turn the very efficient Z-Drive Azimuth Thrusters by Thrustmaster.

The D16 in-line 6 diesel is specially designed and developed for installations in heavy duty commercial displacement craft, featuring the latest design in modern diesel technology.

The engine features a robust block with ladder frame, high pressure unit injector system, 4 valves per cylinder, "twin entry" turbo and charge air cooler. The heat exchanger is designed for reduced charge-air-cooling temperature, which in combination with the injection system, and the Engine Management System (EMS-2) further improve performance and control, meeting stringent emission requirements. This results in a very smooth running engine with world-class performance, combined with low fuel consumption and low emissions.

- Power plants are mounted in a side by side engine compartment within an isolated fireproof and watertight compartment. Engine compartments are equipped with two Fire Extinguishing Systems. The batteries are located in a watertight compartment just ahead of the engine compartment. The diesel fire/de-watering pump is at the aft portion of the wheelhouse, accessible from the main deck.

PROPULSION DRIVES: Twin (2) Thrustmaster of Texas Model TH750MZ azimuth thrusters in a Z-Drive configuration using fixed pitch propellers and nozzles. They are optimized for maximum bollard thrust. Z-drives turning 144 cm (57 inch) diameter propeller/nozzles.



- Unsurpassed maneuvering capabilities
- Increased fuel savings – and as a result – lower emissions
- Practically non-existent vibration and cavitation
- Multiple levels of redundancy and fail-safes that make the propulsion system durable and reliable. The end result is a supremely efficient and reliable, high-power propulsion system for applications that require high power and high reliability.

Maneuvering and handling are areas where Puma Aero Marine ASD Tugs truly sets a completely new standard. The reason for this excellent maneuverability is:

- The propulsion units are individually steerable, turning and pointing the entire thrust in the desired direction. This results in much higher efficiency and far greater response to helmsman's commands.

THE TUG HELM STATION MANEUVERING CONTROLS

Port ASD & Engine Controller

The Joystick for inputing Dynamic Positioning System

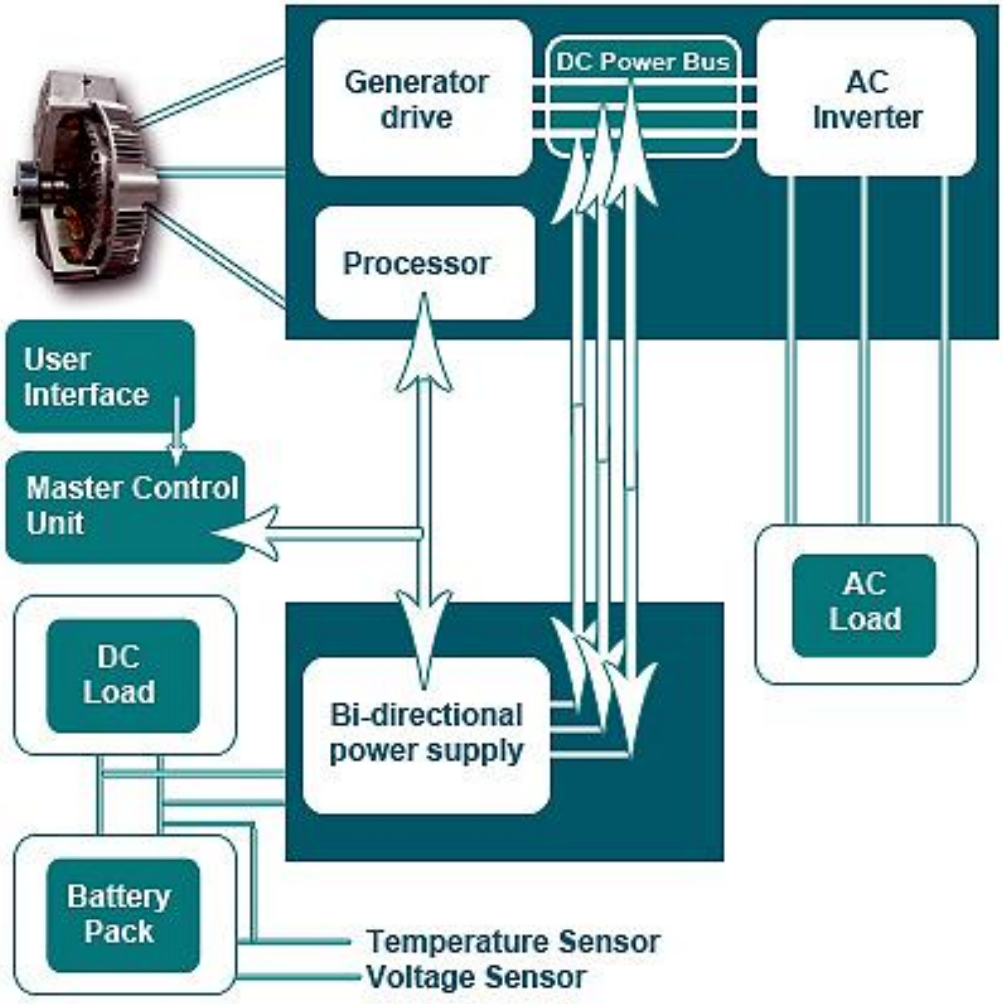
Starboard ASD & Engine Controller

- The propellers are producing horizontal thrust and working in undisturbed water with no cavitation.
- Electronic controls give a distinct and precise feeling, and shifting is immediate. Thanks to the progressive electronic steering, the wheel spins easier at low speed, further reducing driver effort.
- The system is equipped with revolutionary features such as Joystick and Dynamic Positioning System.
- Integrated with the EVC (Electronic Vessel Control) system, the Glass Cockpit provides an enhanced overview and control of both engine and all navigation systems.
- At higher speeds there is immediate response to driver commands with safe and predictable handling. Driving the boat is both safe and economical.

ELECTRICAL SERVICE:

Main System: 24-28 Volt DC System: AC sub-systems 120/240 Volt / 60 Hz.

- Main engines starter motors 24 VDC
- Four 12 VDC Marine Gel-Cell Batteries, 225 amp hour, 1,470 cranking amps each
- Newman Phase Three series 120 VAC Battery Chargers
- Four (1 in each watertight compartment) automatic submersible bilge pumps, 2,000 GPH
- Docking lights: Forward and Aft, 50 watts each (24 VDC)
- IML underwater hull lights (24 VDC)
- Navigation lights, spot lights and cabin lighting all 24VDC
- Shore Power 50 Amp Powersmart Heavy Duty 240 VAC Cord set, 15.2 meters (50') long
- AuraGen Power System: two (2) engine driven alternators provides 16,000 watts of continuous power/17,000 watts of peak power at engine idle. The continuous power can be up to 16,000 watts of 120/240 VAC, or a combination of up to 250 amps at 28VDC in addition to 9,000 watts AC.
  - Pure AC sine wave will not interfere with any electronics, computers or sensitive digital electronics.
  - Equipped with heat sensor and re-settable circuit breaker.
  - Maintenance free, no parts to replace.
  - Safe and reliable, no spark or hot components
  - Operating range: from engine speed, from idle to red line.



CREW:

A two (2) to three (3) man crew is recommended for normal operations. This ASD Tug is controlled completely from the enclosed wheel house. The wheelhouse area has an arrangement with one captain's chair and three crew seats, in 16,500 BTU of air-conditioned comfort. Note: Air conditioning can be powered by the main engine alternators via the inverter and from shore power.

Below of the wheelhouse is an entry to a small galley and crew head, equipped as follows:

- Vitrifrigo Sea Drawer DW 180 Refrigerator / Freezer: Gross capacity: 141.6 liters (5.0 cu ft.), dual power 24 VDC and 220 VAC
- One Burner Cook Top Stove Combo Alcohol and/or 220 VAC
- A Stainless Steel Microwave Oven 220 VAC
- Galley Sink
- "U" shaped dinette seating for four
- Toilet, Manual by Jabsco

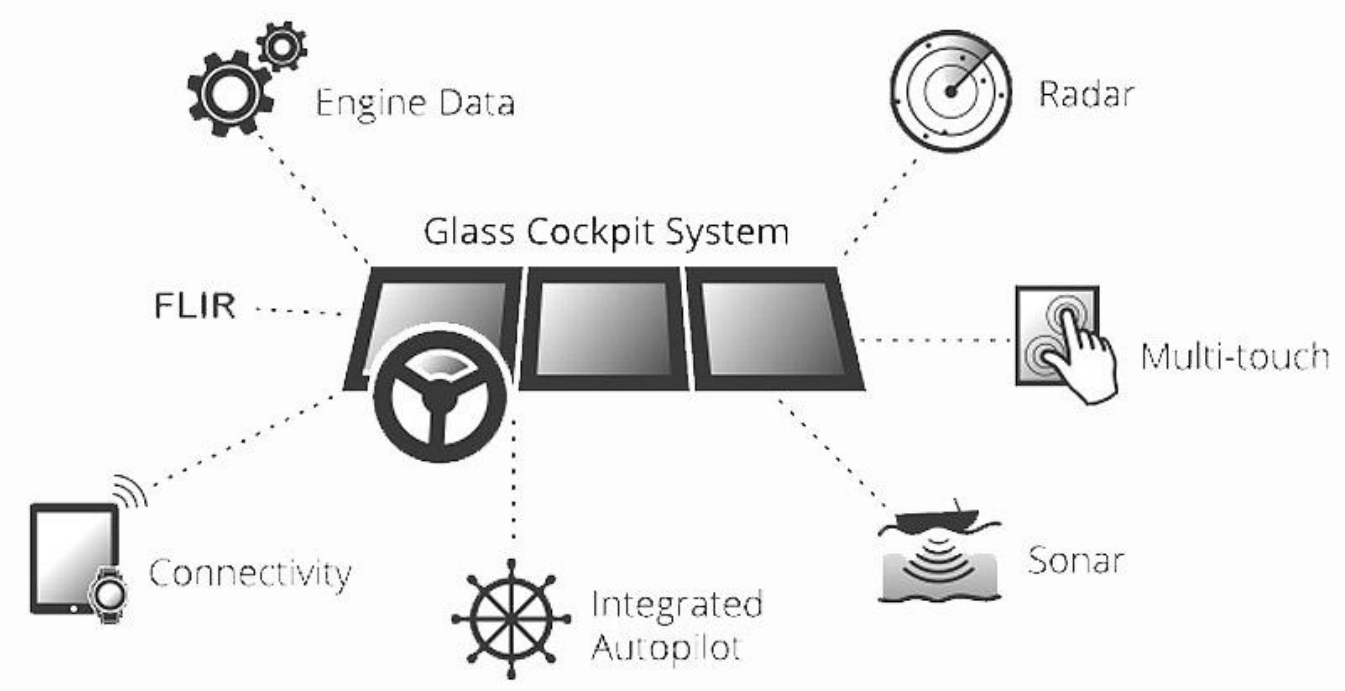
ELECTRONICS:

Garmin the unique Glass Cockpit system means a clean, easy-to-use dashboard – and more importantly – enhanced overview with control of both engine and navigation in one place.

Integrated with the EVC system (Electronic Vessel Control), the Glass Cockpit gathers all driver information and displays it in one spot. The easy-to-handle, pinch-to-zoom displays giving you instant control. In the wheelhouse are three of the largest Garmin displays. The GMM 190 ultra-thin 19" SXGA anti-glare touchscreen Monitor, 45.4 cm x 39.9 cm x 8.1 cm (19"), which are easy to read by the helmsman and the vessels captain. The fly bridge is provided with three Garmin (30.5 x 22.9 cm; 38.1 cm diagonal) (15") touchscreen displays.

- One look. One touch. One system.
  When you power up your boat all screens light up simultaneously. All settings that you control, including instrument dimming, are carried out concurrently at the helm and the flybridge. The Glass Cockpit system is a common, ergonomic design – and interface – for the whole dashboard, with push-buttons on the controls and touch-buttons on the screens.

- Auto guidance
  This unique feature searches through all relevant charts to create a route you can follow – and avoid shallow water, buoys and other obstacles. Coupled with the autopilot, it not only shows the way, it takes you there!
- Total integration
  Full EVC functionality means that you monitor functions like Dynamic Positioning System, Interceptors and Autopilot through the displays.



Marine Autopilot System: Garmin GHP™ 10V

- Garmin Auto-guided Navigation for Volvo Penta. Designed for Volvo Penta Inboard Performance Systems (IPS) joystick systems
- Shadow Drive™ technology, operators will enjoy the security of knowing they maintain control even when relying upon the autopilot. The Shadow Drive system automatically disengages the autopilot if the helm is turned, allowing the helmsman to maneuver the vessel. The autopilot automatically re-engages when the helmsman holds a steady course.
- Controlled using a GHC™ helm control unit and is compatible with the GHC remote and quatix™ the world's first marine GPS navigation watch featuring ANT™ wireless technology
- NMEA 2000® connectivity. This control unit communicates with the autopilot system via a NMEA 2000® bus, so autopilot heading data can easily be shared with other devices.
- The GHP 10V's simple interface offers easy operation with intuitive controls. Up to 3 GHC controllers can be interfaced with a single GHP 10V, allowing for autopilot capabilities in multiple stations on the vessel.
- The GHP 10V marine autopilot adds a whole new level of versatility. Made specifically for use with Volvo Penta's Inboard Performance Systems (IPS) Joystick systems, the GHP 10V gives mariners an easy-to-use autopilot setup for auto-guided navigation.
- The GHP 10V is a robust autopilot system designed to meet your needs and exceed your expectations. Its confidence you can count on when you're navigating open waters.

GPS Receivers: Garmin GPS: 19x NMEA 2000® WAAS-capable

- The highly accurate GPS 19x NMEA 2000 position receiver/antenna provides 10 Hz update rates for position, velocity and time data. It offers high-sensitivity reception and enhanced position acquisition to the Garmin multifunctional displays (MFD), instrument display and autopilots.
- Delivers Reliable Location Data: The 32-channel receiver is capable of tracking multiple global navigation satellite systems, including GPS, GLONASS, Galileo[1] and QZSS[1]. Since more satellites are visible, it can provide more accurate fixes in challenging conditions. With its enhanced position, heading and speed accuracy delivered 10 times more often than other receivers/antennas, it provides smoother drawing of your position on the chart/plotter/MFD at higher speeds. It can determine your precise location to within 3 meters (9.84 ft).

FLIR ***M-Series***: Premium Multi-Sensor Maritime Thermal Night Vision System

- Watch thermal and low-light video simultaneously on the EVC systems multiple displays and/or single multi-function display. Sleek, powerful, and effective, M-Series cameras are thermal night vision systems for on the water. The M-618CS a Gyro-Stabilized system has a Thermal Range Performance of 1,200 meters for images the size of a man and 2,700 meters to see another vessel. It's clear, sharp images that let you see what you're trying to find or miss.

Open Array Radar: Garmin GMR™ 24 x HD Radar

- GMR 24 HD features high-powered Digital Signal Processing, providing sharper radar imagery and improved target separation to the professional mariners.
- This 24" (60.96 cm), 4 kW high definition radar has a 3.6 degree beam width and a 48 nm range. With automatic pulse optimization technology, the radar matches pulse widths and repetition rates with the nautical mile range that is selected. This gives you powerful 4 kW radar penetration and unbelievably clear echo definition at all ranges up to 48 nm.
- To help you avoid traffic on the water, the GMR 24 HD provides the option of MARPA target tracking when combined with a multi-function display and an optional heading sensor. MARPA tracking allows you to track the bearing, course, speed and predicted closest approach of up to 10 targets. In addition, like all Garmin radars, the GMR 24 HD has self-contained signal processing, which provides you with a more precise, easy to read signature.

Transducer: Garmin GSD™ 22 Digital Remote Sounder

- The powerful Garmin GSD 22 digital sounder adds detailed sonar data to your compatible EVC Network. To provide high-speed sonar data returns and super-crisp detail.
- The GSD 22's digital design provides extraordinary target definition and deep water performance and allows it to transmit at up to 2 kW, depending on your transducer. The GSD 22 also adjusts gain and transmits power automatically to optimize the returns for shallow water. It connects to a dual-frequency transducer and works with everything from a standard 500 W transom-mount transducer to a heavy-duty 2 kW thru-hull or in-hull transducer and can reach a depth of up to 1,524 meters (5,000').
- The AIS 600 black box transceiver allows you to receive AIS target data as well as transmit your own vessel information to others in the fleet with AIS receivers in your area.

VHF Communication Radio

- Garmin VHF 300 AIS combines radio communication and 1 or 25 watts of transmit power with multi-station support to give you the flexibility and convenience you need to safely navigate and communicate on the open water.
- The VHF 300 AIS is equipped with a 2-way 30 W hailer system for communication with other boats or deckhands. In addition, the VHF 300 AIS has a voicemail feature that lets you pre-record a 15 second message and deliver the message to any Digital Selective Calling radio; providing the ability to replay the last 90 seconds of any incoming voice transmission at the touch of a button.
- The VHF 300 system provides detailed data on your surroundings, regardless of visibility. You'll have ship identification information, position, course and speed for vessels equipped with AIS within range. The VHF 300 AIS also receives both Class A and Class B signals at the same time to ensure no critical information is lost.

Intercom System

- Bluetooth wireless combined wired 4 Position (hybrid), 3 Radio 9500 system.

SAFTY EQUIPMENT:

- Five Life Jackets U.S.C.G. Type III
- Five Portable 1A10BC Rated Fire Extinguisher
- Each engine equipped with Fire boy Automatic FE-241 Fire Extinguishing System
- Fire and de-watering pump diesel 13.8 kW (10hp) Head lift Max 116 meters (380') Output Maximum 24,000 liters per hour (9,200 GPH)
- Five Manual Bilge Pump Jabsco Amazon Universal 22 GPM self-priming pumps for each watertight compartment
- To include all required safety equipment for the size and class of vessel
- Satellite 406 MHz EPIRB Category II

FINISH:

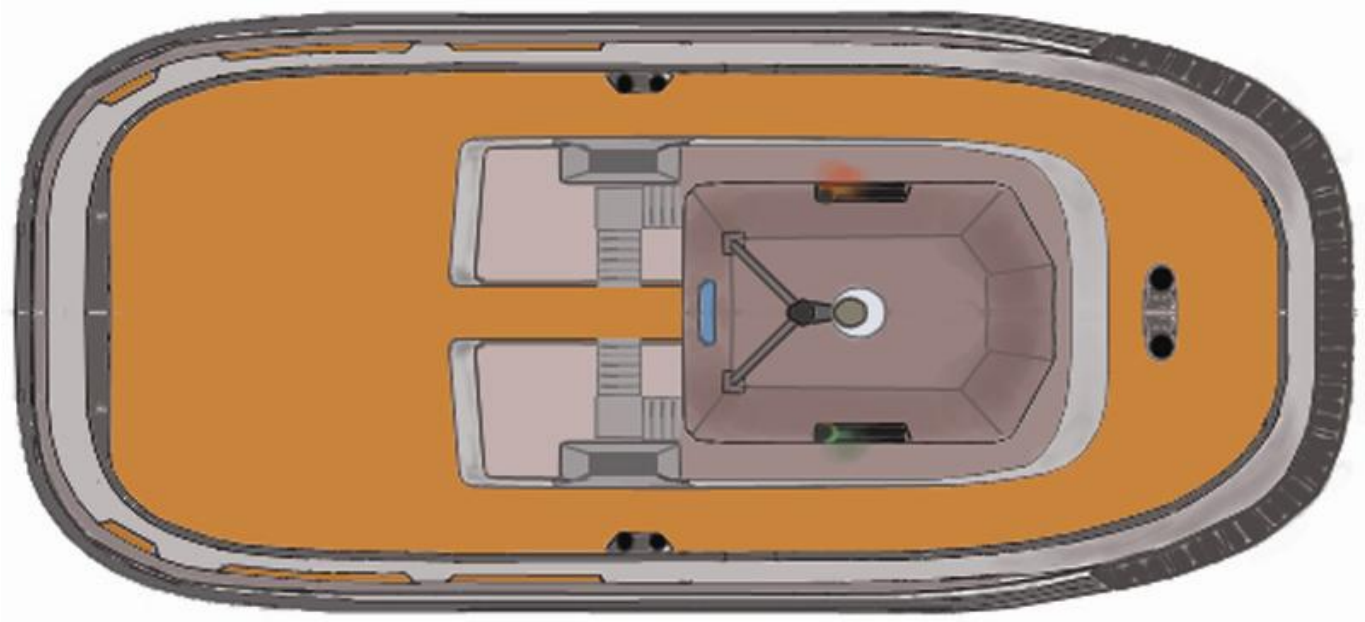
- Exterior is primarily a Gel coat finish. Balance of exterior primed and painted according with INTERLUX specifications for their Perfection Topside Paint, a 2-part polyurethane.
- Below waterline primed and painted according to INTERLUX specifications for Interlux Nautical Epoxycop hard modified-epoxy antifouling paint.
- Interior walls painted or covered with deluxe commercial grade wall covering.
- Decks covered with grey Decko Dot Marine Flooring

OTHER EQUIPMENT:

- Compass (Magnetic)
- Fenders along the gunnels
- Anchor with 35 meters of chain
- Lifting points (eyelets)
- Vessels Shipping Cradle
- Direct engine air inlet system
- Two 28 VDC engine compartment blowers
- One large 220 VAC engine compartment blowers to cool the engine compartment dockside
- Flood lights
- Controllable Spot Light
- Fuel Polishing System GCF MODEL FPS-240BCR
- Larger Towing Bollards

Under Water Profile

Deck Arrangement



CUSTOM DECORATION: Interior decoration will be designed and provided by the Buyer.

TRAINING: Intense Training will be provided for client's key personnel for operating all equipment installed and vessel maintenance in Florida. Plus, onsite training for other personnel provided in a maritime system simulator and on-the-vessel training.

SPARES: Provide recommended spare parts required for equipment installed on the vessel

WARRANTY: All fabrication work unconditionally guaranteed for 12 months. Installed equipment by Manufacture's Standard Warranty based of the following utilization.

- Excess of 12 knots 150 hours annually or a 10% annual utilization
- Excess of 8 knots to 11 knots 1050 hours annually or a 70% annual utilization
- Excess of 5 knots to 7 knots 300 hours annually or a 20% annual utilization
- Total annual utilization 1,500 hours

Design & Built by: Puma Aero Marine of Florida
Link: http://PumaMarine.com/_ ~ **Email:** Sales@PumaMarine.com

• Note: the specifications are very flexible with interior and equipment options.