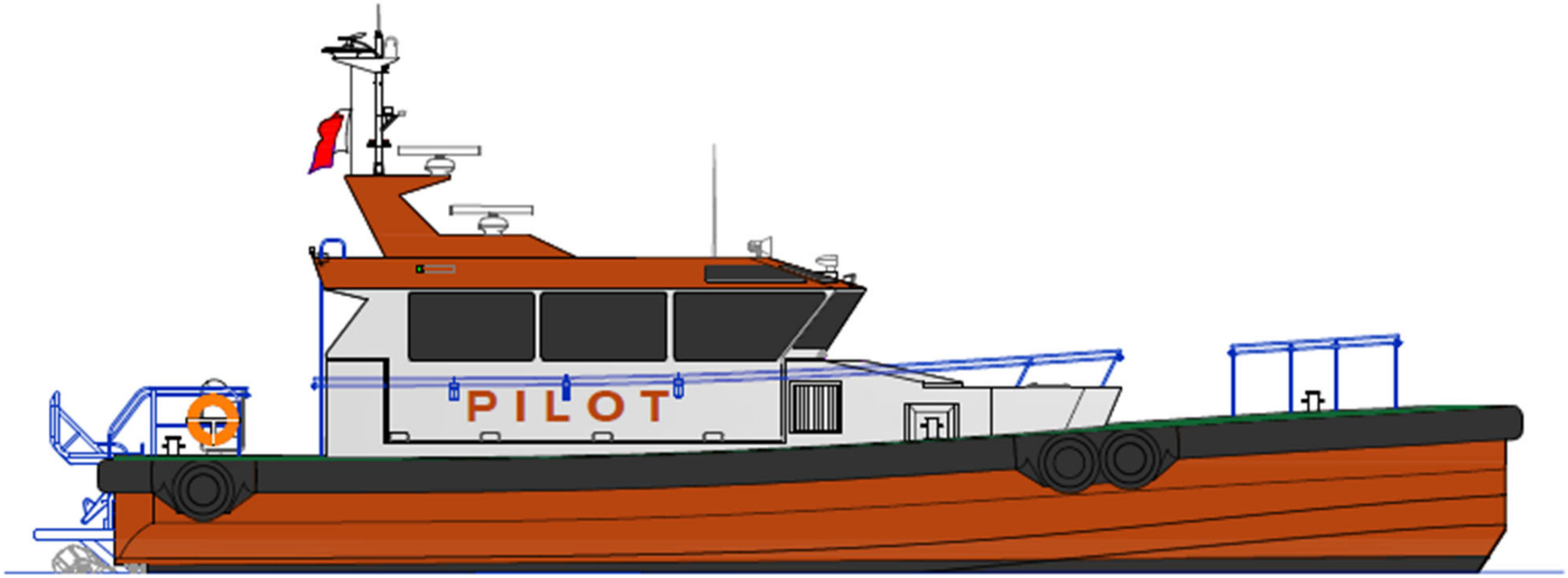
San Francisco Bar Pilots
New High Speed Pilot Vessel Project



New SFBP High Speed Pilot Vessel Requirements

- Safety - Appropriate design and general arrangement for pilot transfer operations to ships and the offshore station pilot vessels
- Seakeeping - Operate in both protected bay waters as well as transit to and from the offshore pilot station in moderate to heavy weather
- Emergency Operations - Man overboard recovery capability in all conditions
- Speed, Endurance and Reliability - Cruising speed of 25 kt for typical SF Bar Pilots workload and vessel operational tempo
- Maneuverability - Excellent handling at both high and low speed for pilot transfers to vessels underway, at anchor and to docks
- CARB Emissions Requirements - Comply with current and future CARB regulations
- Environmental footprint - Reduce emissions, fuel consumption and noise profile
- Pier side shore power - Efficient remote switching to and from shore power to reduce generator emissions while at the Pier 9 home berth
- Crew workspace ergonomics - Modern equipment and arrangement for crew endurance and well-being
- Cabin noise reduction - Best soundproofing design and construction methods to reduce long term hazardous noise exposure to crews and pilots
- Electronics – Current, best available technology for navigation and vessel systems monitoring
- Cabin environmental system - Modern HVAC equipment for improved cabin fresh air exchange and temperature and humidity control

SFBP Pilot Vessel Research and Development

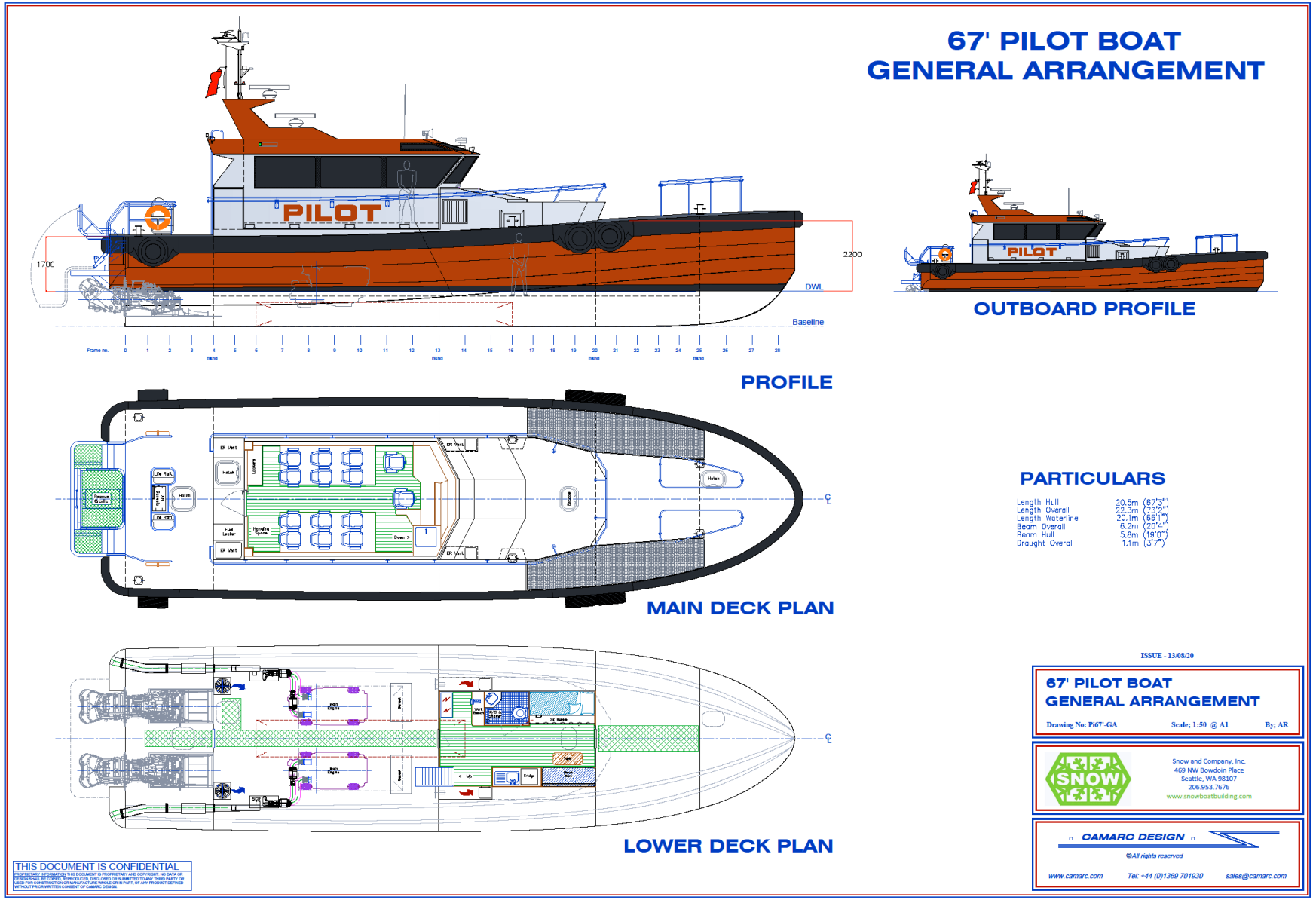
- Snow & Company Boatbuilding – Shipyard now located at the former Kvichak facility in Ballard, WA that has built several high quality Camarc Design pilot vessels for U.S. pilot groups. Snow has retained many of the former Kvichak tradesmen and staff.
- Gladding-Hearn Shipbuilding – East Coast shipyard well known for U.S. Pilot vessels. Builder of the current SFBP run boat PV GOLDEN GATE. Visited facility and met with naval architect firm Ray Hunt Design.
- Nordlund Boat Company – Tacoma, WA shipyard that has built high quality pilot vessels for Long Beach and Puget Sound Pilots. Met with designer Tim Nolan who also visited SFBP to observe our vessel operations.
- Baltic Workboats – Estonian shipyard and design firm known for modern pilot vessels. Visited their facility in Saaremaa on the Baltic Sea.
- Lyman Morse Boatbuilding – Visited Maine boatyard in possible joint venture to build Baltic design pilot vessels in the U.S.
- Vigor Industrial – Toured former Christensen Shipyard in Vancouver, WA recently built 2 new pilot vessels for Los Angeles.
- Damen Shipyards – Based in The Netherlands, met with representatives and reviewed several pilot vessel designs.
- Columbia River Bar Pilots – Visited their facility and inspected vessels several times including observing pilot transfers at sea. Currently operating Camarc designed, Kvichak built vessels.
- Charleston Harbor Pilots - Operator of Gladding-Hearn built pilot vessels.
- Puget Sound Pilots – Operator of 2 Nordlund FRP waterjet powered pilot vessels.
- Savannah Pilots – Operates one 20m Camarc Design, Kvichak built vessel with 2 more similar vessels currently being planned for building at Snow in 2021.
- Long Beach Pilots – Operates 2 new Nordlund FRP waterjet pilot vessels.
- Port Everglades Pilots – Has one 15m Baltic Workboats vessel from Estonia with modern wave piercing hull design.
- Belgian Pilots, Dab Vloot – Visited pilot station in Holland operating 20m Baltic pilot vessels.
- Tampa Bay Pilots – Operator of 3 Gladding-Hearn pilot vessels.

New Proposed SFBP High Speed Pilot Vessel

- Builder: Snow and Company - Seattle, WA
- Designer: Camarc Design - Argyll, Scotland UK
- Construction: 73-foot LOA - Aluminum Mono Hull
- Engines: MAN D2862 LE 438 1,200HP US EPA Tier 4
- Propulsion: Hamilton HTX52 Waterjets
- Gearboxes: Twin Disc MGX 6599 SC
- Generators: Northern Lights M944T3F 38kW
- Capacity: 2 Crew and 12 Pilots

Design Renderings

General Arrangement



Tier 4 Engines

- Power required for the SFBP high speed pilot vessel's operational profile is over 803 HP per engine
- US EPA and CARB require Tier 4 compliance on engines over 803 HP
- Pilot vessels are included in the upcoming CARB Commercial Harbor Craft Regulations
- In addition to Tier 4 exhaust aftertreatment, diesel particulate filters (DPF) will be required on commercial vessels in 2028
- New pilot vessels must be built to accommodate DPF systems – this impacts current selection of main engines

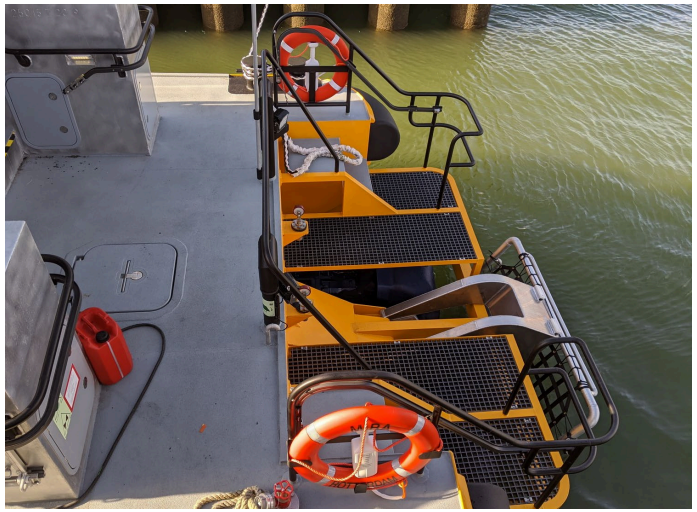
Waterjet Pilot Vessels

Link: Hamilton video on waterjet pilot vessels

- Pilot Safety: no propellers, rudders or struts under vessel during a man overboard event
- Improved maneuverability during pilot transfers
  - Fast acceleration
  - Full directional control at all speeds
  - Greatly improved positioning control during transfer
  - No gearbox and shaft brake shifting delays as with propellers
  - Can maintain a greater angle when alongside a ship for safer pilot transfers due to vectored thrust of all available power
- Improved high-speed efficiency compared to propellers
- Better suited for modern emission-controlled engines
- Greatly reduced debris strike damage compared to propellers

Man Overboard Recovery System

- Rapid recovery of victim
- One-person operation
- No lines, winches or rigging
- Safe use with waterjets
- Controlled at aft helm station
- Safer crew operation
- Greater chance of victim recovery in extreme conditions compared to hoist and line type systems



Builder - Snow and Company Boatbuilding

Link: Snow Boatbuilding

- Licensed to build Camarc Design vessels
- Former Kvichak Shipyard Facility in Ballard, WA
- Kvichak Shipyard built many U.S. and International pilot vessels
- Snow currently in contract to build 2 new Camarc pilot vessels for Savannah, GA Pilots
- West Coast builder for SFBP staff on site project management and prompt delivery when construction is completed

Designer - Camarc Design

- A worldwide leading pilot vessel design firm
- Specializes in seaworthy high-speed working craft from 5m to 70m
- Collaborated with the Kvichak Shipyard on several pilot vessel projects
- Designed over 130 pilot vessels worldwide
- Over 30 years of design experience and evolution

Link: Camarc Design

Three Columbia River Bar Pilots Vessels
Designed by Camarc
Built by Kvichak (now Snow)

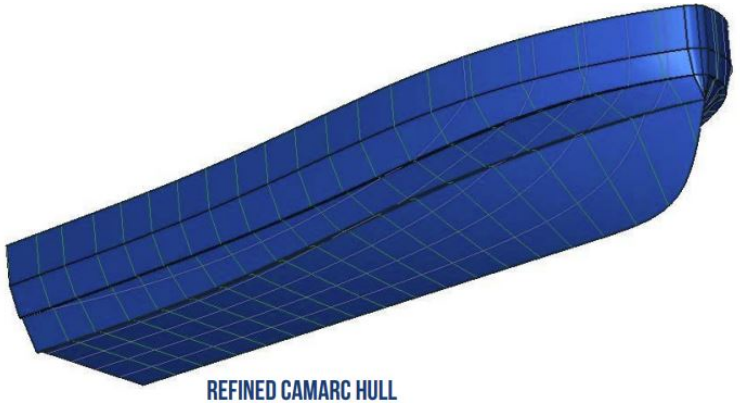
Camarc – Over 130 Pilot Vessels Worldwide

- Camarc US pilot vessels:
  - Columbia River Bar Pilots
  - Sandy Hook Pilots
  - Los Angeles Pilots
  - Houston Pilots
  - Savannah Pilots
  - Sabine Bank Pilots
  - Foss Maritime

- Camarc international pilot vessels:
  - Dutch Pilot Organization
  - Port of Harwich, UK
  - Port of Tees, UK
  - Milford Haven Port Authority, UK
  - Bordeaux Pilots, FR
  - Belgian Pilots
  - Sydney Ports, AU
  - Atlantic Pilotage Authority, CA
  - Pacific Pilotage Authority, CA
  - Suez Canal Authority
  - Port of Dalian, China

Camarc Refined Hull Design

- The new Refined Camarc Hull is based on the original and well proven hull form
- Extended waterline length improves seakeeping and efficiency
- Seakeeping
  - 10% reduction in vertical acceleration
  - Reduction in slamming
  - No compromise in course keeping
  - Curved forefoot to assist in boarding and breaking away
- Efficiency
  - 2.3 knot speed improvement, 9% more efficient
  - 10% reduction in fuel consumption
  - Cleaner water separation and spray reduction



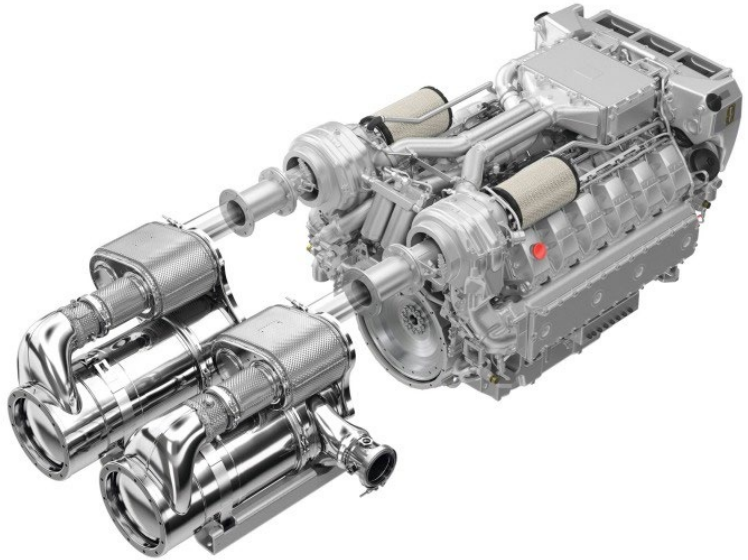
Link: Camarc Refined Hull

Dutch PV MIRA – Refined Camarc Hull

MAN - Main Engines

- Model D2862 LE 438, 24-liter, 12 cylinder 4-stroke diesel
- 1,200 HP (882 kW) at 2,100 RPM
- Common Rail Direct Fuel Injection
- Modular SCR (Selective Catalytic Reduction) exhaust aftertreatment system with compact design and high flexibility in compact spaces
- US EPA/CARB Tier 4 Compliant
- Appropriate power density for high speed pilot vessels
- In service now on Dutch pilot vessels, soon on Canadian pilot vessel in construction
- Under consideration for SF Bay Area WETA ferry new construction and repower projects
- Low noise level

Link: MAN Engines



MAN – Tier 4 Exhaust Aftertreatment

- MAN modular exhaust gas aftertreatment (EAT), a compact SCR (Selective Catalyst Reduction) system
- Meets US EPA and CARB requirements
- Lightweight and compact, ideal for pilot vessel size
- Reduces nitrogen oxides (NOx)
- Can be used with diesel particulate filter (DPF) in future CARB regulations

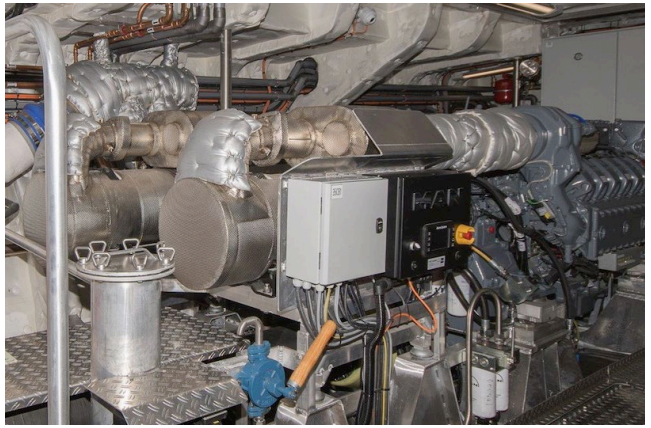
Link: MAN SCR

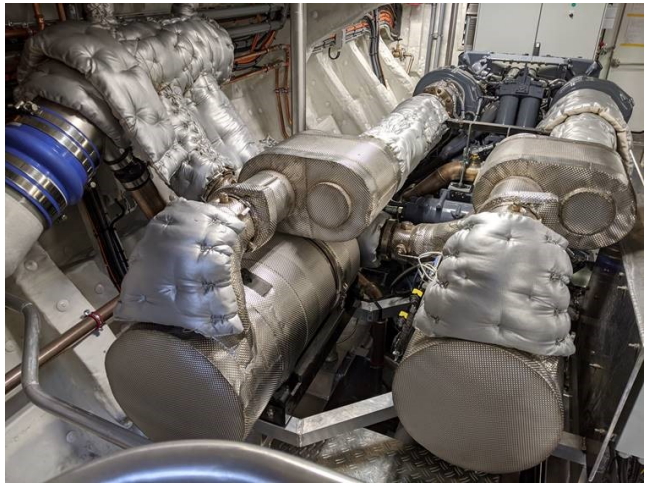
Link: Dutch P/V LUNA MAN SCR

MAN – D2862 Engine In Pilot Vessel Use

Dutch Pilot Vessel MIRA

Link: Dutch P/V MIRA





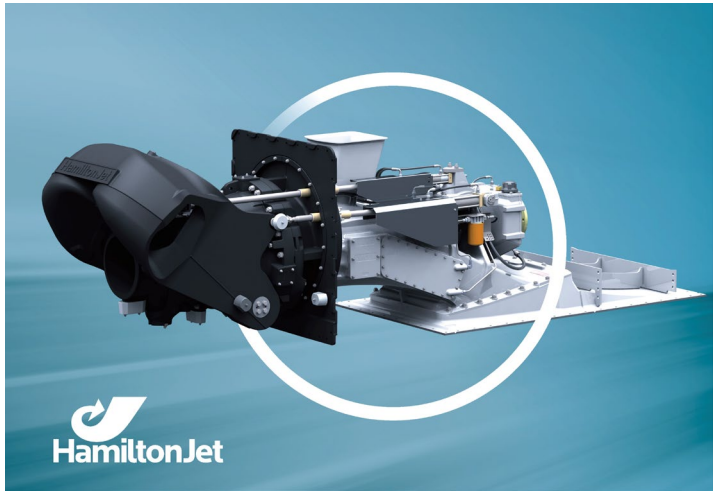
Link: MAN D2862 on Dutch P/V LUNA

Dutch Pilot Vessel LUNA

Hamilton – HTX Waterjets

Link: Hamilton HTX Series

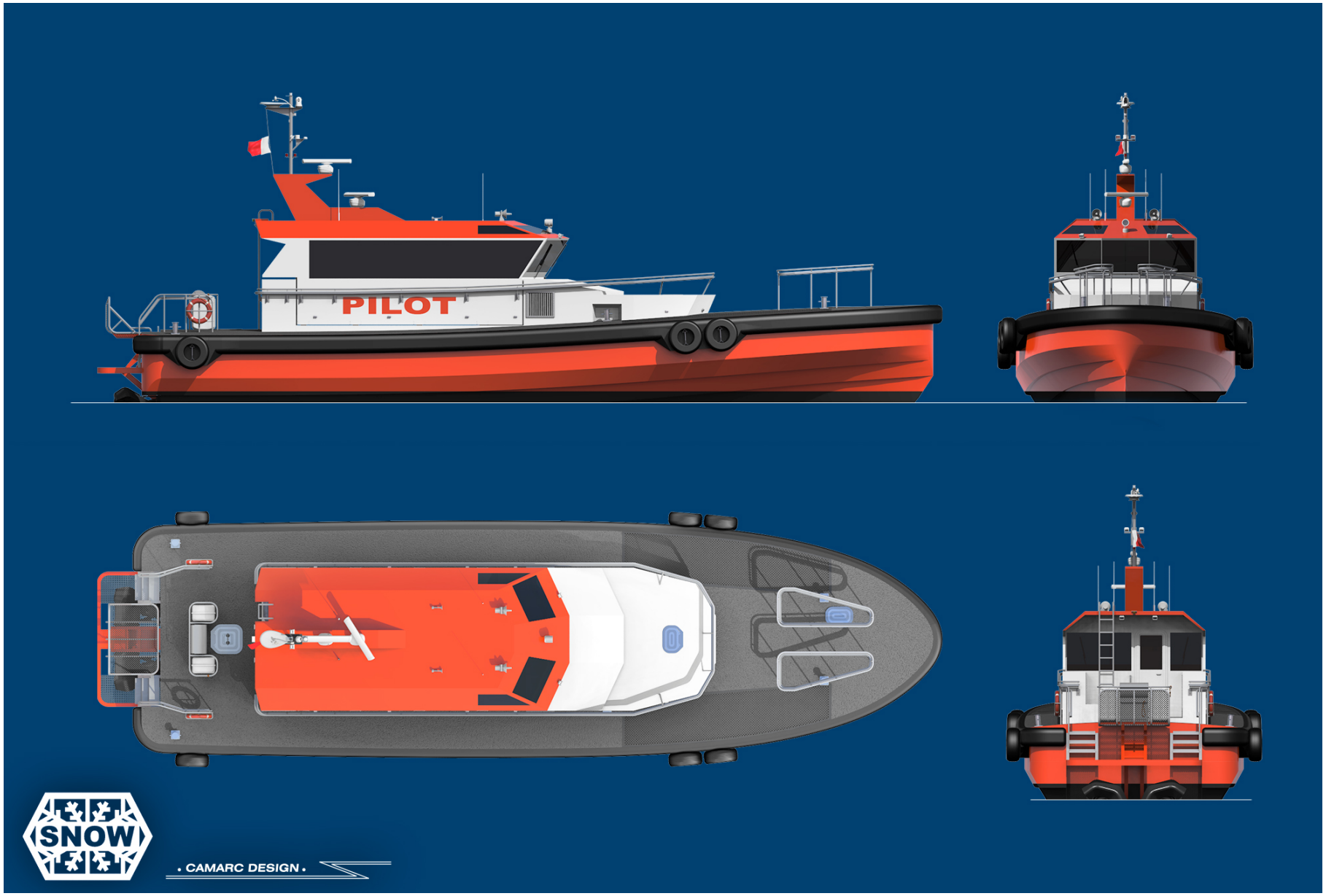
- HTX – Newest generation of proven Hamilton waterjet propulsion
- 5% - 7% more thrust than previous models at high speeds
- Improved cavitation resistance
- Enhanced corrosion resistance and anode layout
- Compact inboard footprint for smaller engine rooms
- Improved AVX electronic controls



Hamilton HTX52

Dutch Pilot Vessel MIRA

Similar to Camarc SFBP Design

Link: Marine Pilots - Christening of new pilot tender "Mira"

SFBP Design Renderings