ESD PRODUCT INFO 2021

FOR PLANING HULL: MILITARY, COMMERCIAL, FISHERY AND PLEASURE USE

ECO SURFACE DRIVES

Straight Shaft Stern Drives Surface Propellers Steerable Thruster for Main Propulsion with INTEGRATED Built-in Steering Rudder, Shaft Seal, Cool Water Intake and Exhaust Tail Pipe.

ENERGY Efficient

| Fuel Efficient | Low Maintenance | Green Technology | Affordable |

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Compliance Standard:

American Boat & Yacht Council ABYC
THE PRODUCT IS BUILT TO TO COMPLY WITH ABYC SAFETY STANDARD P-04 46 CFR 182.420 (B)

SYSTEM CERTIFICATION STANDARD SGS

"The future of Marine Propulsion for Fast Planing Vessel"

Visit Us at www.ecosurfacedrives.com

PRODUCT STANDARD COMPLIANCE

Product Class Name: ***Straight Shaft Stern Drives Surface Propellers Steerable Thruster for Main Propulsion with INTEGRATED Built-in Steering Rudder, Shaft Seal, Cool Water Intake and Exhaust Tail Pipe.***.

MyIpo Copyright Patents Number for ESD products reference are PI2014000963 and PI2014000964. ESD unit is designed and manufactured to comply with ABYC Safety Standard compliance, as refer to the following code:

- ABYC - P-04 Marine Inboard Engines
- ABYC- P-06 Propeller Shafting System.

Beginning 2020, ESD unit comply with SGS International Safety Standard for Product Conformity Compliance. The Product International Exports Harmonised Commodity Description and Coding System (HS CODE) reference number is 8487 10 0080 for USA Market and 8487 10 0000 for other countries.

PRODUCT MODEL CODE GUIDELINES

The following is the product classification code guidelines to differentiate the type of product range and variation or models. The first three letters indicate the make and the first two digit is the size for rudder and the next two digits is the propeller size.

For Example.

MODEL "ESD 2624"
ESD = Eco Surface Drives
26 = Rudder size is 26 inches Inside Diameter (I.D.)
24 = Propeller size is 24 Inches Diameter (D)

Special Notice: All our product comes with serial number engrave at drives body, rudder and propeller after the model number reference code which indicates manufacturing date and reference number.

Design Features and Advantages

Surface Mount Propeller	=> Shallower Draft
Very Low Drag Design	=> Fuel Saving
Less Moving Parts	=> Low Maintenance
Stronger Material	=> Heavy Duty Capable
Oversize Reverse Plate	=> Full Reverse Capable
Neutral Force Rudder	=> Easy Steering
Thrust Vector Rudder	=> Small Turning Radius

Propellers Move Boats, Engines Just Turn Them…

PROPULSION SYSTEMS

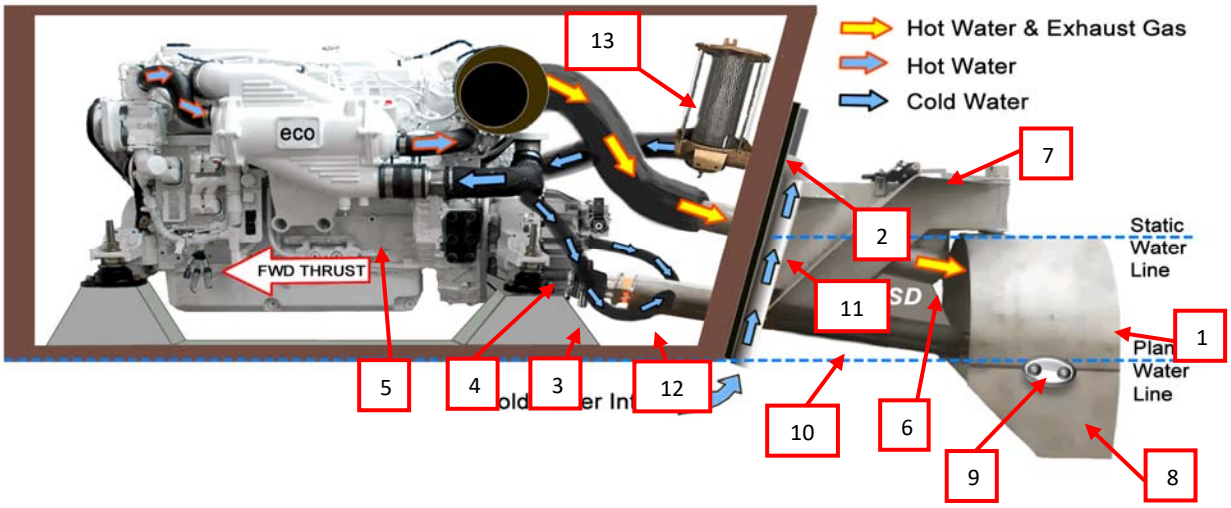
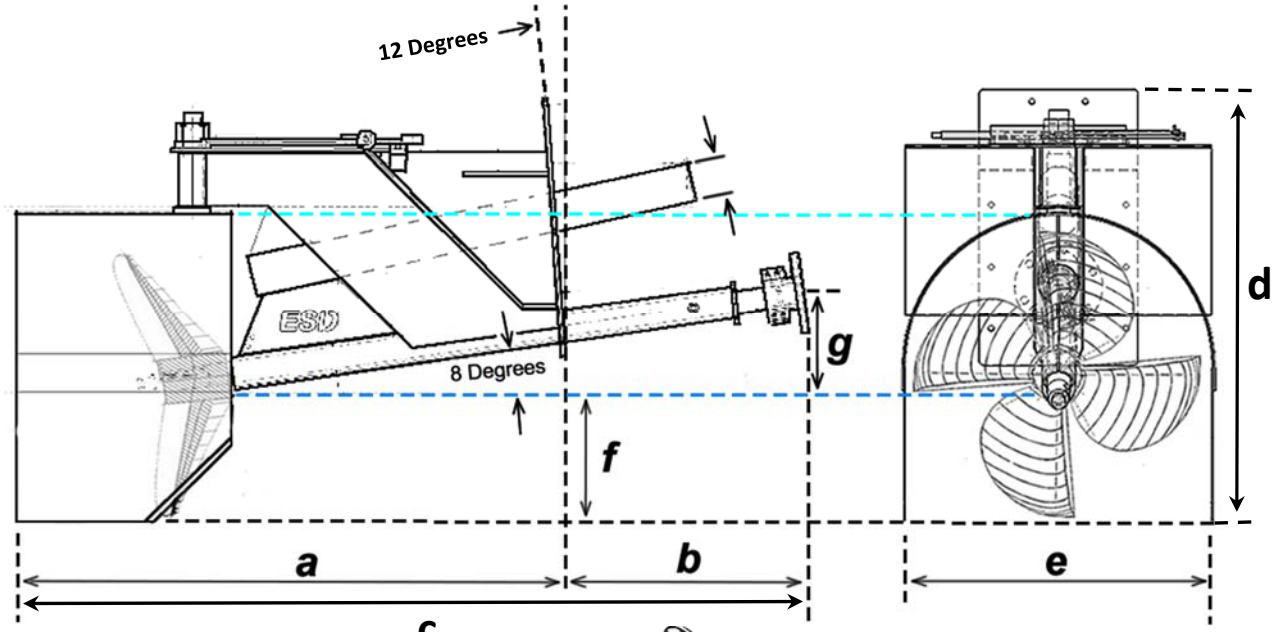
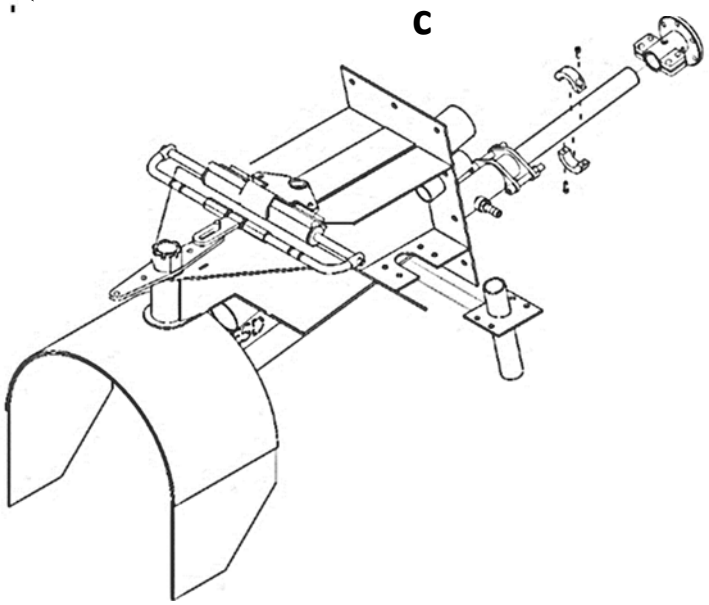


Illustration 1: The Components Placement and Sizing of Eco Surface Drives System

1. Surface piercing super cavitation propeller.
2. Transom Mounting Plate at certain angle with Rubber Vibration Damper Mounting Ready.
3. Shaft Coupling *(the A Side Only)* with Semi Flexible Rubber Damper and Vibration Absorber.
4. Marine Transmission Gearbox with Water Cooled System
5. Motorized Engine: Turbo Diesel / Gasoline / Electric
6. **SeaActive™** Technology Exhaust tail pipe: Exhaust gases from Engines is discharged to the upperside behind propeller blades, pressure side pushes the exhaust gases away from the vessel at high speed.
7. Geometrical Tiller Arm and Actuator for the usage of Hydraulic Powered Steering System.
8. Oversize Inverted “U” shape thrust vector rudder.
9. Zink Anode / Aluminum Anode.
10. Special designed stern tube with:
    - Built-in shaft seal : Pressurized seal packing type.
    - Floating Shaft System: Pressurized water lubricated rubber cutlass bearing.
11. Cold Water Intake Pipe: Sea water pump pull the seawater into the system, to cool down the engine’s fresh water closed circuit cooling, transmissions oil, stern tube lubrication, and cooling the exhaust gasses.
12. Cold Water Hose injected into Stern Tube for Shaft Lubrication.
13. Cold Water Intake Strainer/ Filter: Located Above Waterline for Easy Servicing

Standard Models Variant	Product Model General Dimensions (mm)						
	(a) Outside Length	(b) Inside Length	(c) Total Length	(d) Total Height	(e) Total Width	(f) Draught	(g) Center Shaft to Hull Floor
ESD 1716 (F)	736.60	609.60	1,346.20	568.96	431.80	165.1	152.40
ESD 1918 (F)	1,155.70	469.90	1,625.60	680.72	482.60	177.80	190.50
ESD 2220	1,295.40	520.70	1,816.10	756.92	558.80	190.50	215.90
ESD 2624	1,515.40	769.90	2,285.30	919.48	660.40	236.22	236.22
ESD 3330 (M)	1,804.19	1,170.78	2,974.97	1,295.52	888.00	448.07	494.29





STANDARD STEERING SYSTEM IS PASSIVE HYDRAULIC HELM TYPE, OTHER OPTIONS IS AVAILABLE UPON REQUEST.

GENERAL SPECIFICATIONS TABLE FOR EACH MODEL

Model	Propeller Torque @ Shaft		Motor Power Rated Demand *		Required Speed Diesel Motor Option [High Speed Green Diesel Engines Only]		Required Speed Gasoline Motor Option *[Discontinued for Safety and Environment]*		Required Speed Electric Motor Option [Multi-Phase AC / BLDC Electric Motor Only]	
	Startup Torque Demand @ Shaft (Nm)	Max. Torque Handle @ Shaft (Nm)	Min. (HP)	Max. (HP)	Rated Rotation Speed (RPM)	Reduction Gear Ratio	Rated Rotation Speed (RPM)	Reduction Gear Ratio	Rated Rotation Speed (RPM)	Reduction Gear Ratio
ESD 1716 (F)	112.09	652.72	60	150	3600-4400	1.2:1 - 1.6:1	N/A	N/A	2000 - 4000	1:1
ESD 1918 (F)	123.87	652.72	150	300	3800 - 4000	1.2:1 - 1.5:1	N/A	N/A	2000 - 4000	1:1
ESD 2220	167.67	965.68	300	480	3000 - 3800	1.1:1 - 1.4:1	N/A	N/A	2000 - 4000	1:1
ESD 2624	281.29	1,441.48	480	680	2800 - 3800	1.1:1 - 1.3:1	N/A	N/A	2000 - 4000	1:1
ESD 3330	581.59	4,065.01	680	1,200	2400	0.9:1 - 1.1:1	N/A	N/A	2000 – 4000	1:1
ESD3330 M	602.51	5,265.01	800	1,900	3000	0.9:1 - 1.1:1	N/A	N/A	2000 – 4000	1:1

***NOTES: CUSTOMIZED MODEL IS AVAILABLE FOR ANY ORDER REQUIREMENT BEYOND STANDARD SPECIFICATION**

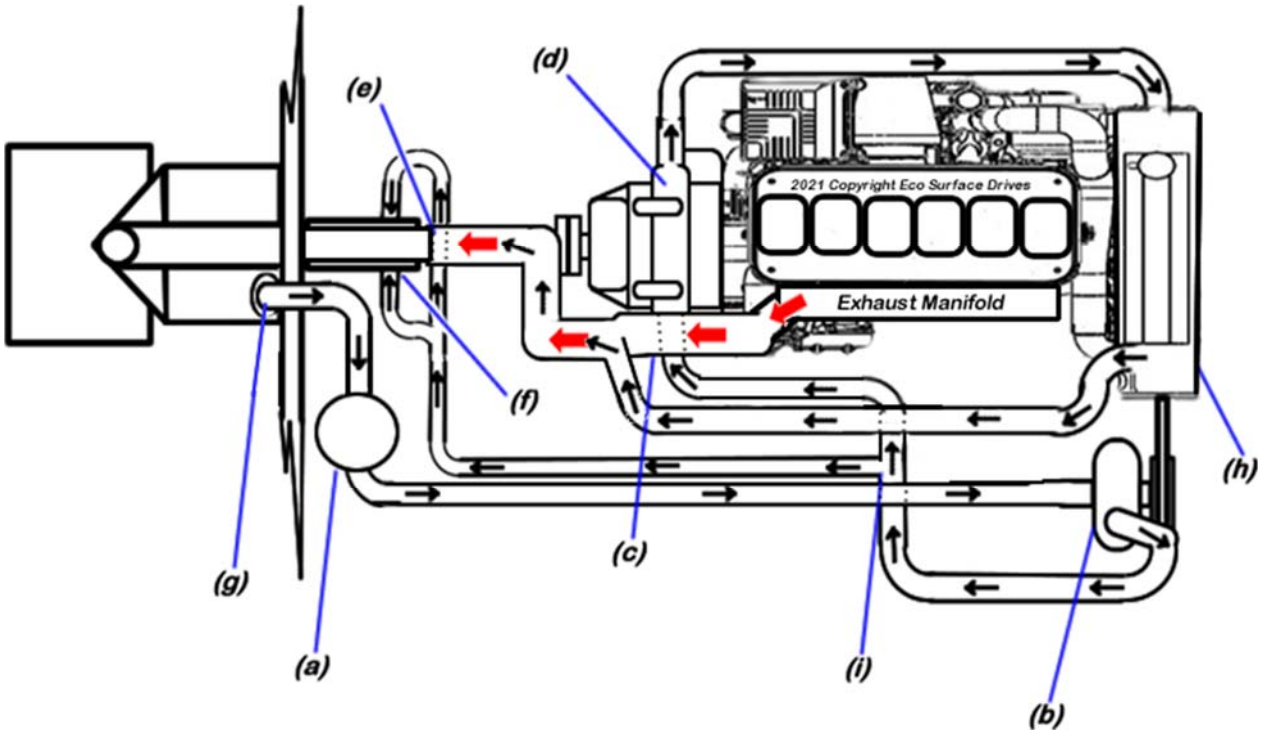
Model	Minimum Engine Room Space			Total Estimated Gross Weight (kg)	Shaft Maintenance interval		Std Shaft Size		ABYC tm Rating Index
	Length (inch)	Height (inch)	Width (inch)		Cutlass Bearing (Hours)	Shaft Seal Packing (Hours)	Diameter (in)	Length (in)	
ESD 1716 (F)	74.00	36.00	36.00	65	7,000	500	1.50	42.00	1,2,5,
ESD 1918 (F)	78.00	38.00	38.00	88	6,000	500	1.75	42.00	1,2,5
ESD 2220	80.00	40.00	40.00	113	6,000	500	2.00	58.00	1,2,5
ESD 2624	82.00	46.00	46.00	167	5,000	500	2.50	72.00	1,2,5
ESD 3330	84.00	48.00	48.00	381	4,000	500	3.50	84.00	1,2,5
ESD 3330 M	84.00	48.00	48.00	525	3,000	500	4.00	84.00	8, 10

Notes:
ABYC tm Safety Rating Index: Pleasure Duty (1); Light Duty (2); Medium Duty (5); Heavy Duty (8); Continuous Duty (10)

GENERAL SPECIFICATIONS TABLE *(Continued from previous page)*

Model	Steering Type			Half Kort Nozzle Rudder Specs						
	Cables Pulley	Ultra -flex Cable	Hydraulic Cylinder	Std. Turn Angle	Max. Turn Angle	Rudder Shaft (in)	Surface Area @ Plane (cm2)	Rudder Travel Radius (mm)	Tiller Bracket length (mm)	Minimum Steering Torque (Nm)
ESD 1716 (F)	Yes	Yes	Yes	40-40	45-45	1. 5	21.29	169.6	155.0	2.33
ESD 1918 (F)	Yes	Yes	Yes	40-40	45-45	1.75	26.26	189.5	175.0	3.21
ESD 2220	Yes	Yes	Yes	40-40	45-45	2.0	37.94	219.4	260.0	5.37
ESD 2624	No	Yes	Yes	40-40	45-45	2.0	51.61	259.3	260.0	8.64
ESD 3330	No	No	Yes	40-40	43-43	3.5	73.16	329.2	350.0	15.55
ESD3330 M	No	No	Yes	40-40	45-45	4.0	73.16	329.2	350.0	21.85

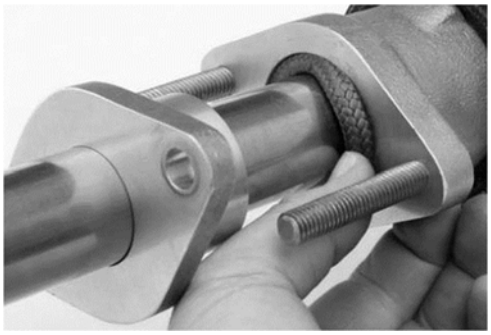
ESD CLOSED LOOP COOLING SYSTEM

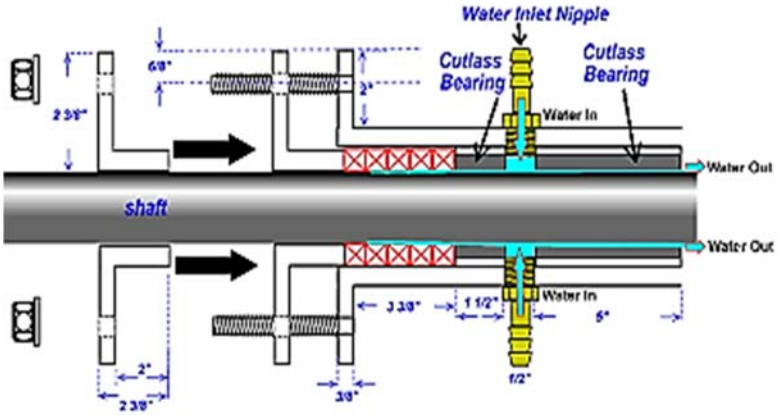


(a) Sea water strainer | (b) seawater pump | (c) exhaust-sea water mixer | (d) transmission hydraulic oil cooler heat exchanger | (e) high temperature rubber exhaust hoses | (f) raw water inlet nipple for stern tube | (g) sea water inlet scoop | (h) engine heat exchanger.

ESD MERIT FEATURES # 1: LOW MAINTENANCE SHAFT SEAL

Built-in Water Lubricated Pressurized Shaft Seal Packing for Easy Installation and low costs maintenance. *(See Photo and shaft seal cross section diagram below)*





ESD MERIT FEATURES # 2: PERFORMANCE IMPROVEMENT & SAFETY

SeaActiv™ Technology is to Ventilate Propeller, eliminate the need to use exhaust silencer. Exhaust Gasses is pulled away from the vessel for safety and performance. *(See the Fig. 1a and Fig. 1b below)*

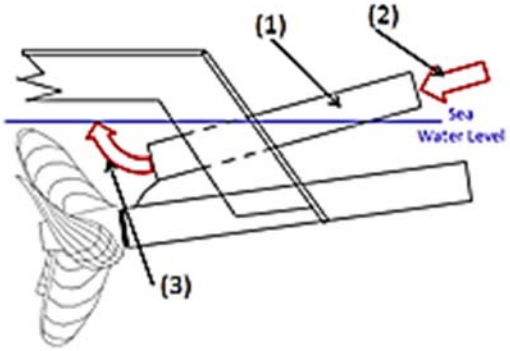


Fig 1a : Exhaust is submerged underwater at static

(1) Exhaust Pipe
(2) Exhaust Gasses intake
(3) Exhaust Gasses exit at sea water atmosphere

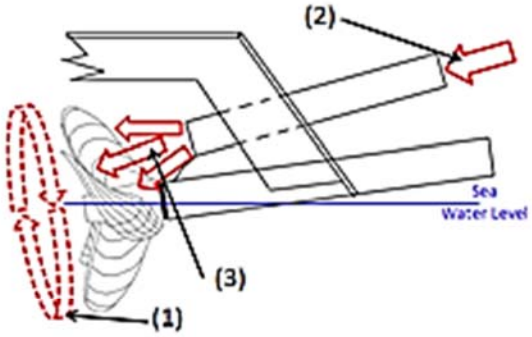
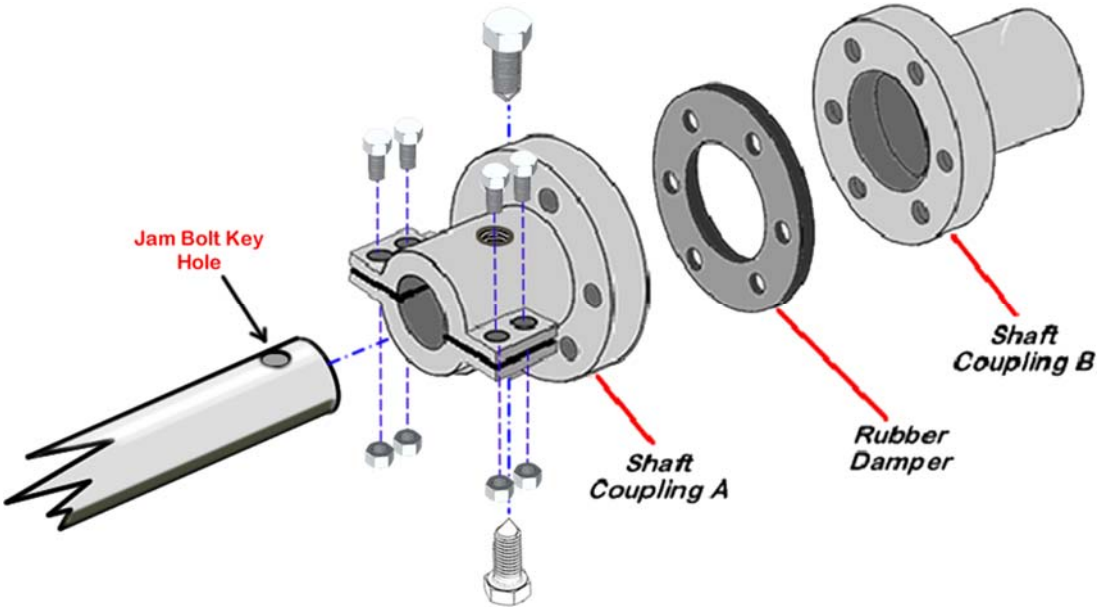


Fig 1b: Exhaust is pulled by negative pressure created behind the rotating scoop at plane speed.

(1) Scoop Rotation
(2) Exhaust Gasses intake
(3) Exhaust Gasses exit at negative pressure

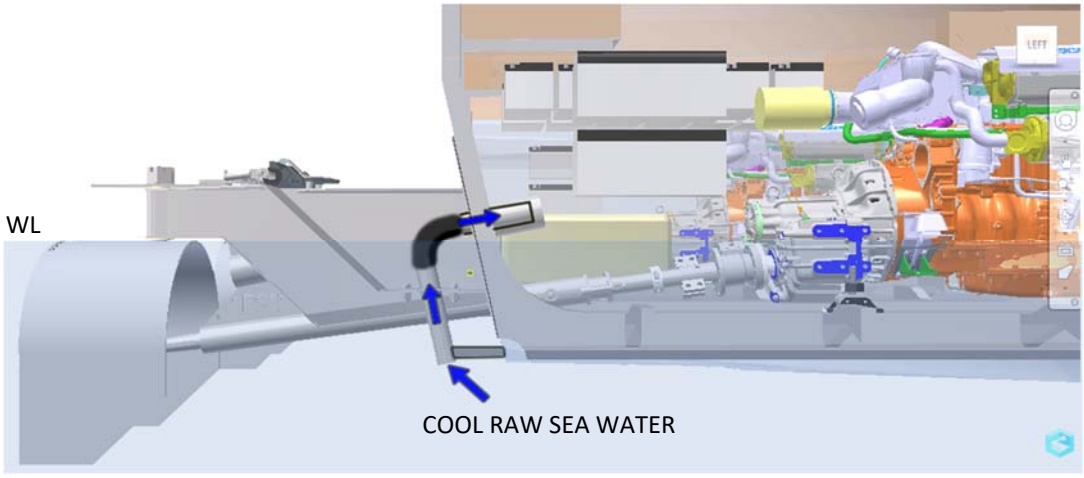
ESD MERIT FEATURES #3 : LOW VIBRATION AT SHAFT

Semi flexible clamp type shaft coupling with rubber damper for vibration absorber to isolate engine vibrations and shaft vibrations (vibraton singging prevention) and shaft flexibility tolerance is up to 1 degree for easy and quick maintenance. *(Refer to the diagram below)*



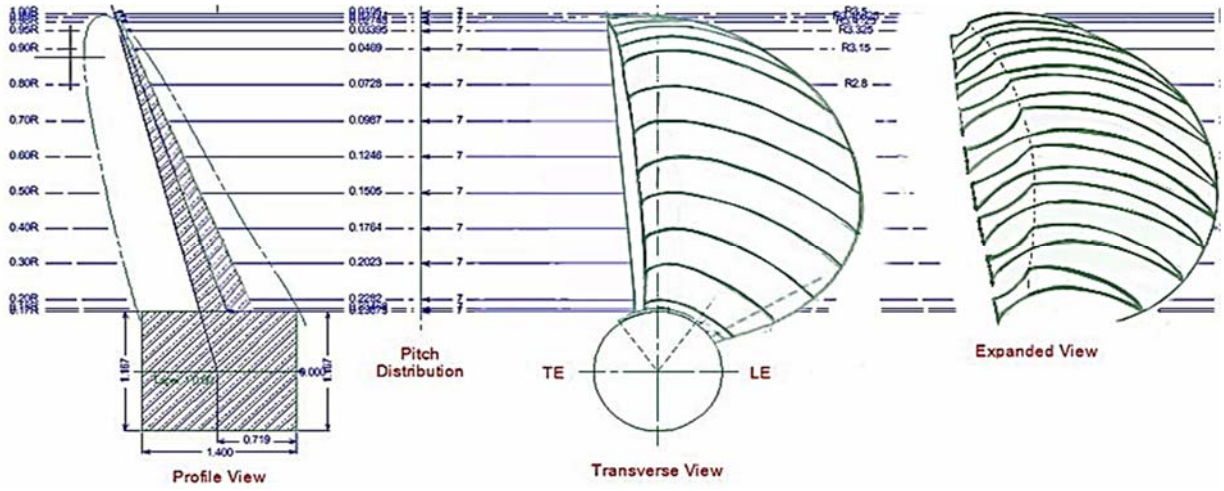
ESD MERIT FEATURES #4 : EASY ENGINE PLUMBING MAINTENANCE

Cool water intake is designed to be integrated at transom, optimized at certain scoop angle for continuos supply of cool water at any speed, even during full reverse and emergency stop manouver. The faster the vessel speed, the more water is scoop up to reduce engine heat. Cool water intake hole at engine room is drilled at transom, above the waterline for safety reason and easy engine plumbing maintenance. *(See diagram below)*



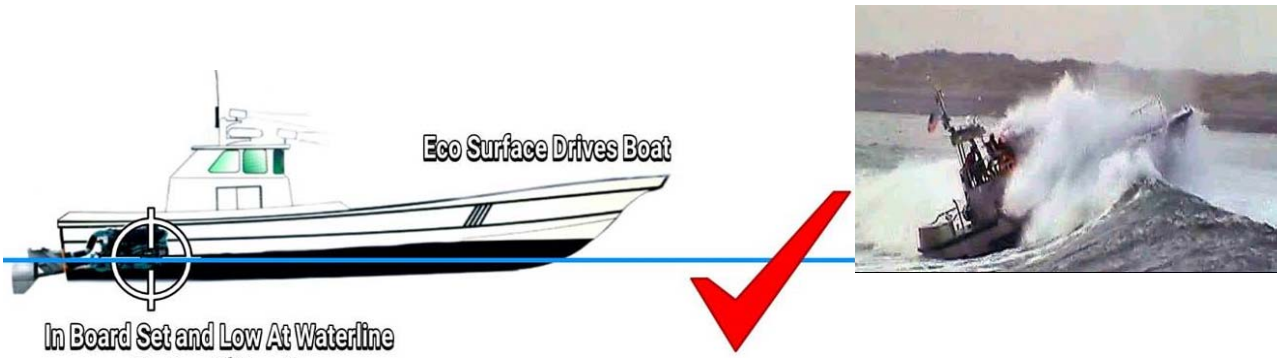
ESD MERIT FEATURES #5 : HIGHLY EFICIENT & STRONG PROPELLER BLADE

Propeller Blade is non helical, supercavitation, ventilated, paddle scoop type, specifically designed for specific use, only with of ESD UNIT. The back side of the propeller blades is thickened to add strength. The added weight is for adding rotational inertia effect for efficiency improvement. The blade is also raked to compensate the shaft angle loss, skewed tranversely to reduce vibration. *(Please see the general design diagram below)*



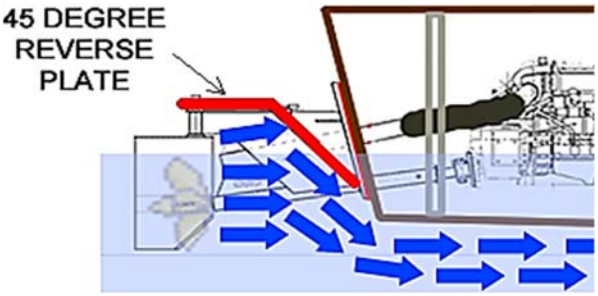
ESD MERIT FEATURES #6 : EXCELLENT DYNAMIC STABILITY AT HIGH SEA

ESD vessel operates at best, in a positive bow up trim angle of 12°-20°and with hull Ae/Ao ratio of 1.0-1.4 for faster planing. ESD enable boat designer and naval architect to design safer vessel by improving vessel stability at high sea. ESD propulsion system is specifically designed to optimized vessel's Center of Gravity (CG) and obtain the vessel's positive trim. The common CG location for ESD propulsion boat height is at the waterline height, transversely located at center keel and laterally located within in engine length inside the engne room. *(See picture below)*



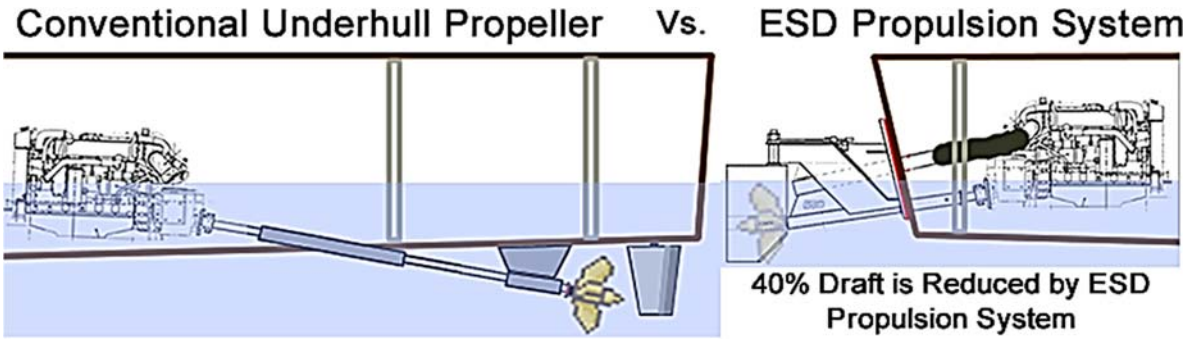
ESD MERIT FEATURES #7 : FULL REVERSE AND EMERGENCY BRAKING

The ESD comes with 45 degree reverse plate for reverse thrust vector deflector. This enable ESD unit to do full throttle reverse burst for emergency stopping or braking manouver, and full reverse with full rudder steering for 360° turn on axis manouver.



ESD MERIT FEATURES #8 : SHALLOW DRAUGHT & LITTORAL OPERATION

The ESD unit enable vessel designer to design shallow draft vessel for littoral, brown water and coastal water application, and not limiter to that, ESD units also performs at its best for blue water, deep sea, high sea application. ESD vessel is shallow draft by 40% as compared to conventional underhull propeller system. ESD sizes and application is not limited to small vessel, but could be applied to fast planing ship of ferries as well. (Please See Diagram Below)



ESD MERIT FEATURES #9 : WIDE VARIETY CHOICE MOTORIZED POWERING

Flexibility selection of High Speed Motorized Marine Engine Choice in the market; as long as the Motor is required to produce shaft rotational speed of 2,000rpm and generate enough torque to turn ESD propellers in the initial stage. (Refers to Torque Demand Table in page 4).

Notes:

Hull characteristics for common planing vessel design with related to Planing speed and Ae/Ao ratio:

- *Light Weight Vessel Plane in less than 14 knots, (Less than 0.20 Ae/Ao ratio)*
- *Medium Weight Vessel Plane at 15-20 knots, (0.21-0.30 Ae/Ao ratio)*
- *Heavy Weight Vessel Plane at 21-30 knots, (0.31- 0.40 Ae/Ao ratio)*

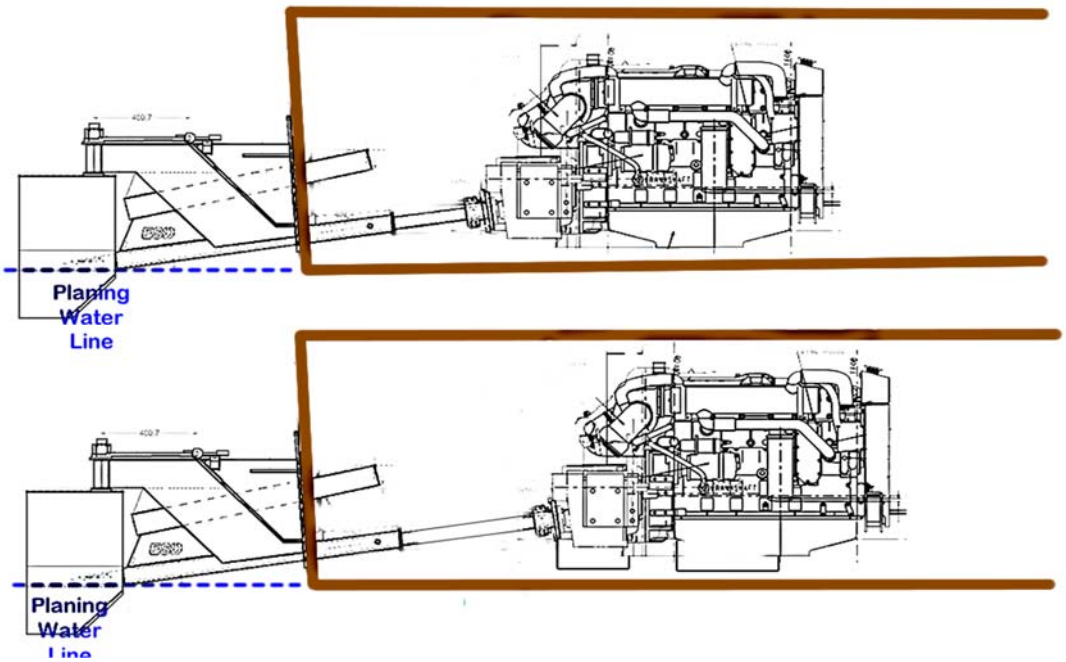
- *Overweight Planing Vessel plane at 31-35 knots. (0.41- 0.5 Ae/Ao ratio)*

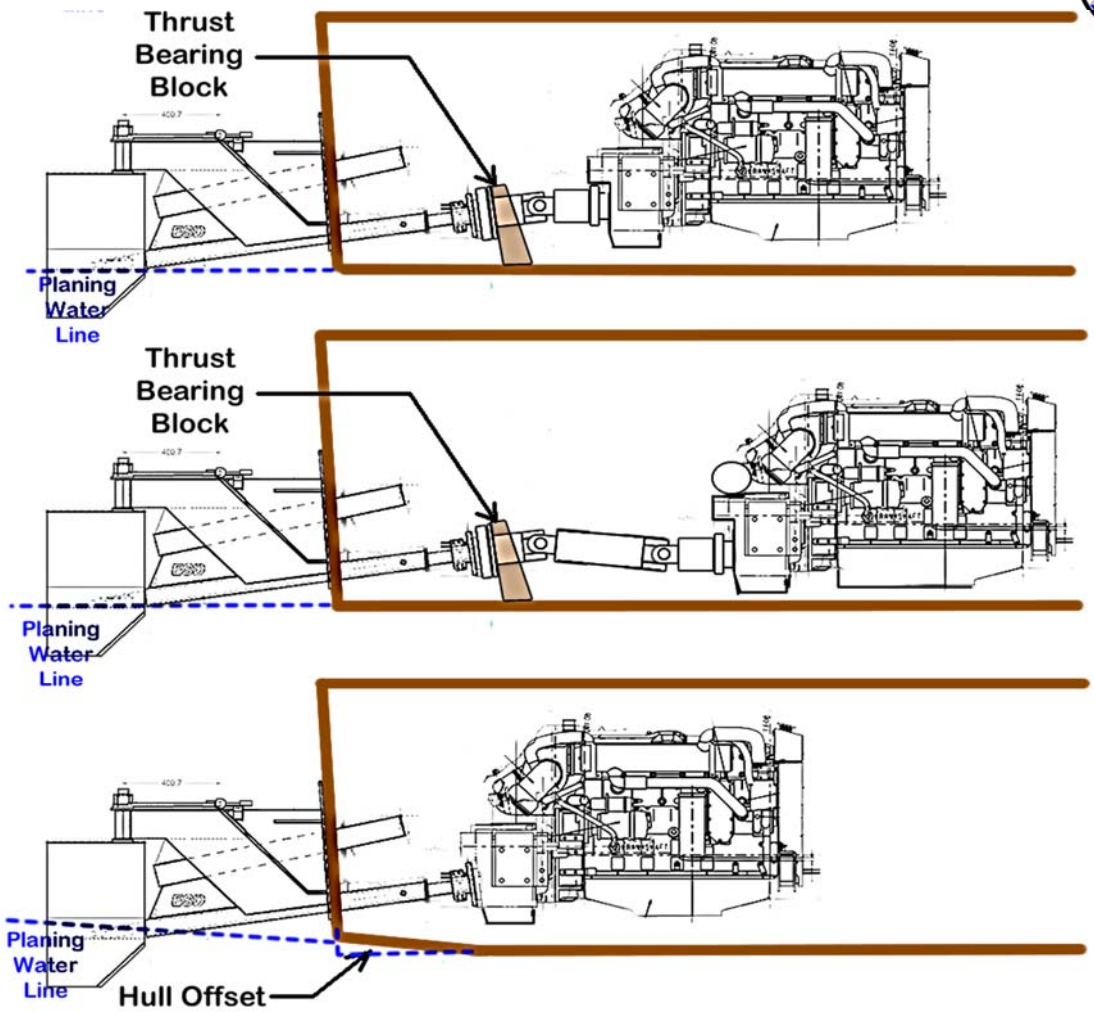
A Semi-planing Vessel plane at speed more than 35 knots (More than 0.5 Ae/Ao ratio), whereas in some cases never get to plane at all.

The key to efficient high speed vessel is to get to plane at lower speed for lean fuel burn. To get plane vessel must have lesser Ae/Ao ratio. We also offer vessel propulsion efficiency auditt service, provided by our Lean Management Consultant Team. Get your vessel surveyed by our Lean Management Consultant Team Today. Improve vessel efficiency and reduce waste. Simply switch to ESD system.

ESD MERIT FEATURES #10 : FLEXIBILE ENGINE DESIGN COMPATIBILITY

Flexibility in engine configuration placement design. There are many types of general arrangement configuration setup that are suitable for ESD system. Designer could design many type of floor plan according to the purpose of the vessel, as long as the ESD shaft remain at 8 degrees down angled.





ESD MERIT FEATURES #11 : PROVEN STRONG AND PREMIUM MATERIAL

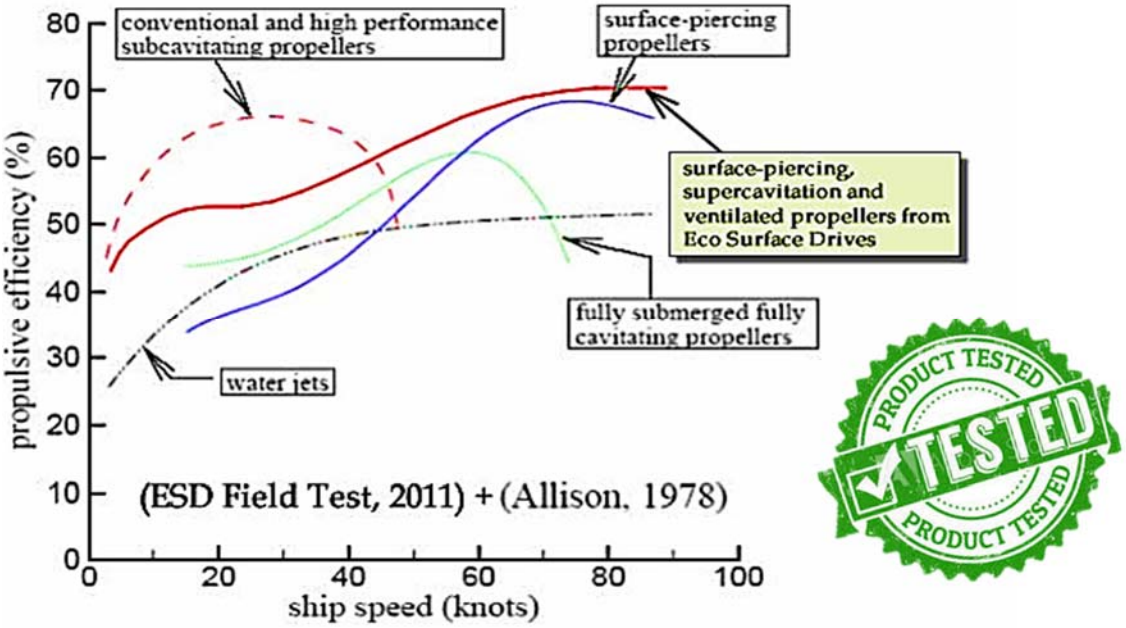
ESD unit is designed to built using Strong and Tough Material to withstand harsh environment of sea water and floating marine debri. The drives main body unit is made of marine grade Stainless Steel ANSI 316 / 316L, 304 and the ESD Propeller Material is MgBz ASTM B147-865 [Military Code C-22229 Gr7].

ASTM INTERNATIONAL
Standards Worldwide

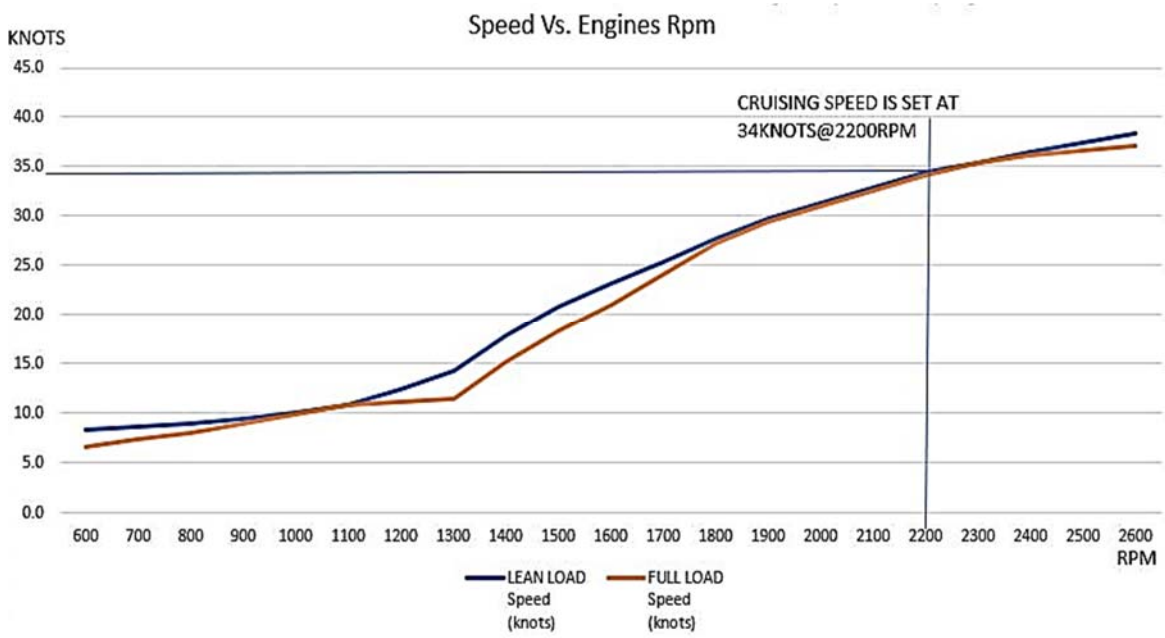
ANSI
ANSI Accredited Program
PRODUCT CERTIFICATION

ECO SURFACE DRIVES TEST PERFORMANCE RESULTS:

1. Product Efficiency Results Comparison Vs Speed (See chart below: The ESD field test data comparison is made with the past data presented by Allison 1978)

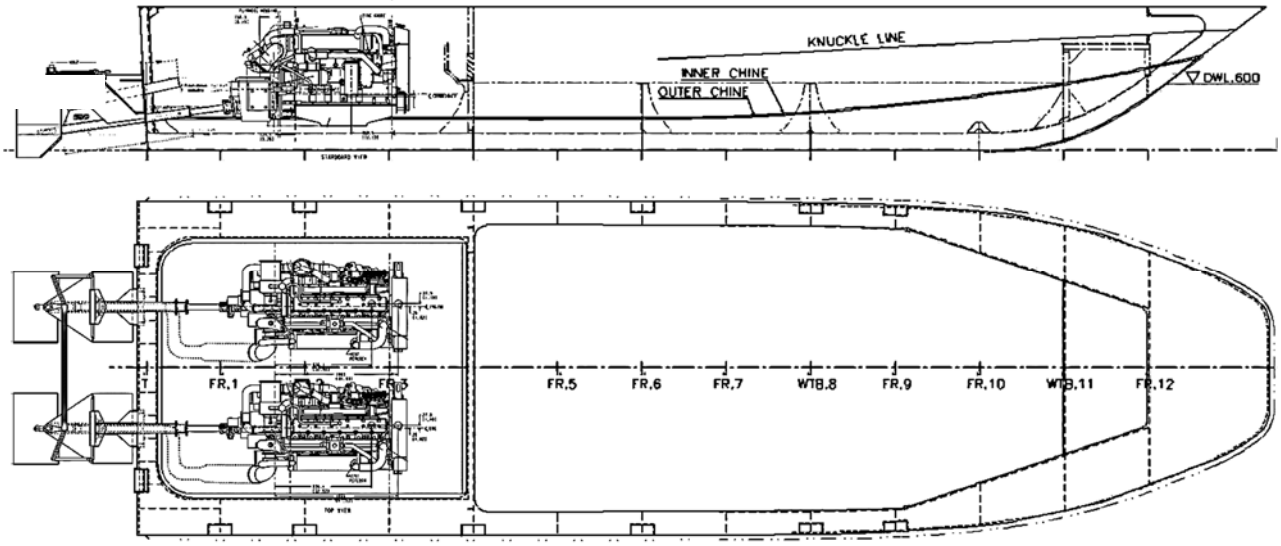


2. TYPICAL ESD TEST RESULTS *(Sample Test Taken with 17meters Vee Hull vessel using 2x Cummins QSB 8.3 500hp@2600rpm)*

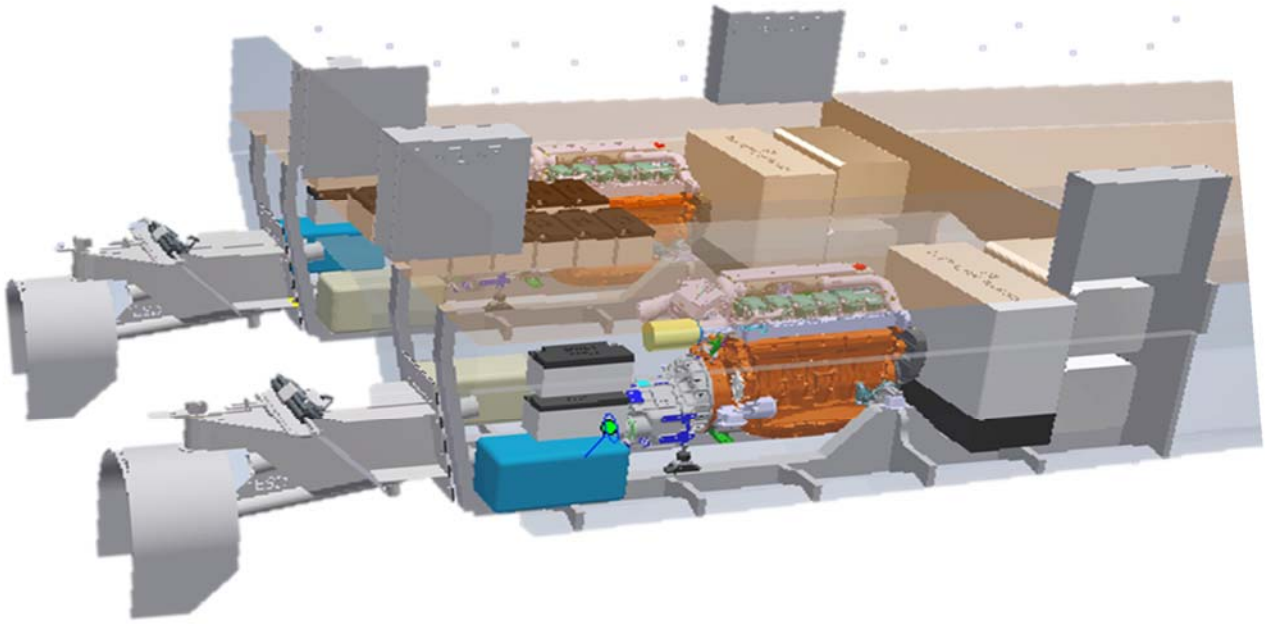


ESD VESSEL'S GENERAL ARRANGEMENT

- ESD3330M ("M" = Military Specs) for 1000hp Turbo Diesel Engines x 2 for Fast Interceptor Class Vessel L.O.A. 18.9 Meters with estimated top speed of 45++ knots.



- 3D Design ESD3330 for Passenger Ferry Catamaran 17.8 Meters

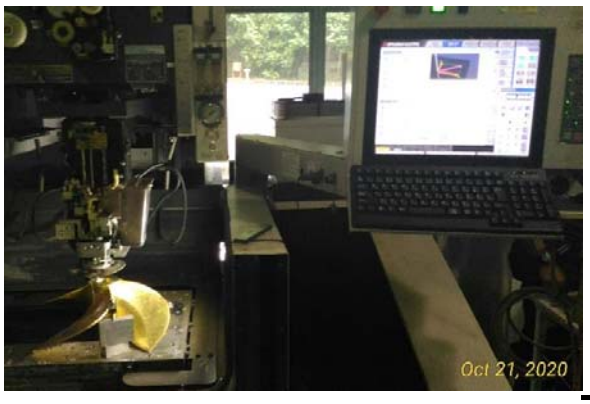


MANUFACTURING PHOTOS: INDUSTRIAL 4.0









INDUSTRIAL 4.0: In-house 3D Modelling & CAD Design, 5 Axis CnC Machining, Precision Laser Cutting, Certified Welders, Digital Metal Folding Machine, Automated Sheet Metal Rolling Machine, Digital Welder, JIT Inventory, QC Fitting Assembly, ISO CERTIFIED FACTORY, Kaisen Packing, IMO Std Fumigated and Sanitized Shipping Box, Digital Tracking and Well Insured Safe Shipping.

ESD VESSEL HULL VARIETY AND INSTALLATION TYPE

CONTACT US

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