

WORK-STATION SERVICE OPERATION VESSEL (SOV)

Based on extensive ship design experience over more than 50 years, ICE offers a cost-effective SOV for wind farm maintenance. The robust, dynamically-positioned vessel has a production-friendly hull form and incorporates proven equipment to offer short delivery time and reduce both initial construction and future maintenance costs. An elevator combined with a walk-to-work gangway positioned midships allows safe and convenient transfer of technicians and goods to either side. The design offers a 370 sqm (3980 sq.ft) warehouse and a 270 sqm (2910 sq.ft) working deck and a high-standard accommodation with single cabins. Energy saving features include an ESS, ready for future in-field battery charging of wind-generated electricity to achieve zero pollution.



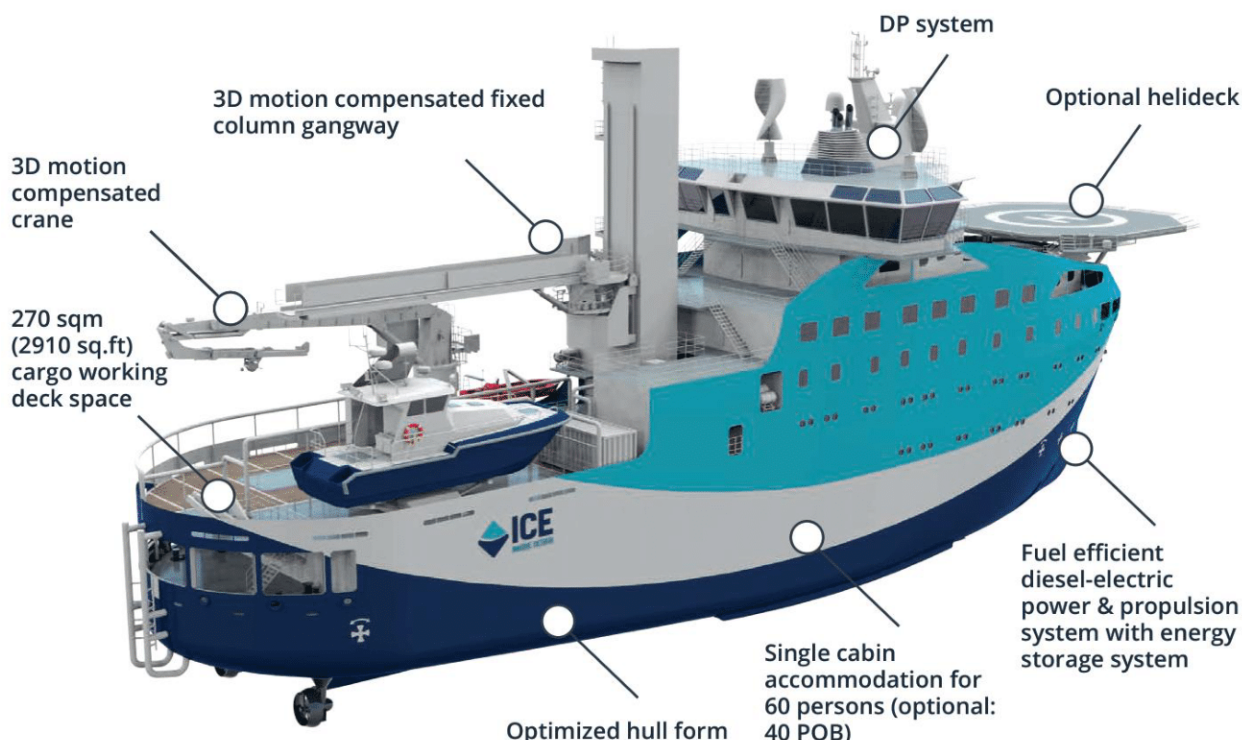
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Design Highlights:

- Standardized, cost-effective vessel design that can be readily adapted to a variety of operational conditions,
- Optimized hull form, using Computational Fluid Dynamics (CFD) analysis for fuel efficiency and favourable motion characteristics,
- Integration of Energy Storage Systems (ESS),
- Safe walk-to-work transfer by 3D motion compensated gangway,
- 3D motion compensated crane for efficient cargo handling,
- Smart container skidding and seafastening system in below deck warehouse,
- Integration of an HVAC system that provides 100% fresh air flow,
- Ship-to-ship transfer capability.



ICE WS-60-SOV design combines safety, comfort and operational efficiency for offshore wind support and maintenance activities.



Logistics, Efficiency & Safety

ICE WS-60-SOV concept combines workshops & storage space, high-comfort accommodation facilities and a transport method in one single design.

High attention has been paid to the vessel arrangement, optimizing the logistics for personnel and cargo transits. A 3D motion compensated gangway in combination with an elevator provide safe and flexible walk-to-work operations and stepless access to the different decks.

Sustainability

The integrated HVAC system with 100% fresh air ventilation flow (no recirculation) helps reducing the required heating, cooling and humidification demand significantly. Furthermore, the integrated energy storage system helps enhance efficiency and sustainability of operations.

The design is ready to meet future requirements and can be fitted with tailored solutions.

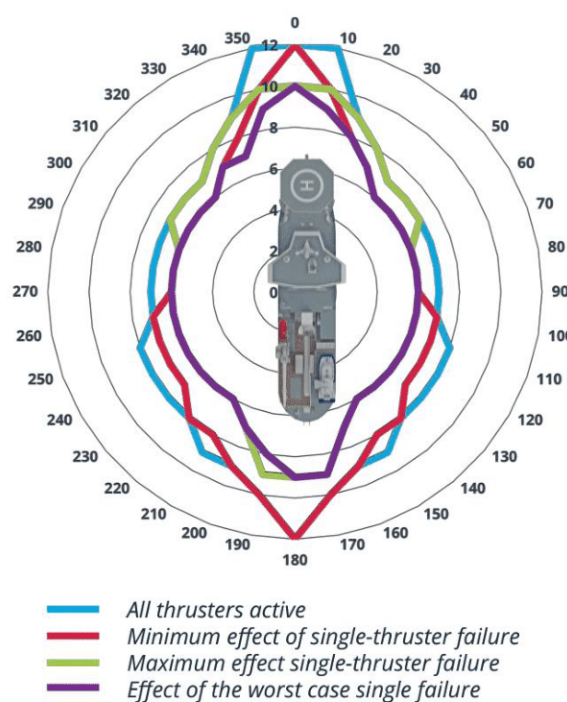
Accommodation

The concept is offered as a standard 60 POB vessel (WS-60-SOV), or optional 40 POB vessel (WS-40-SOV) with the removal of the C Deck accommodation level. Special attention has been given to the level of comfort for the crew and maintenance personnel on board by reducing noise, vibrations and vessel motion.

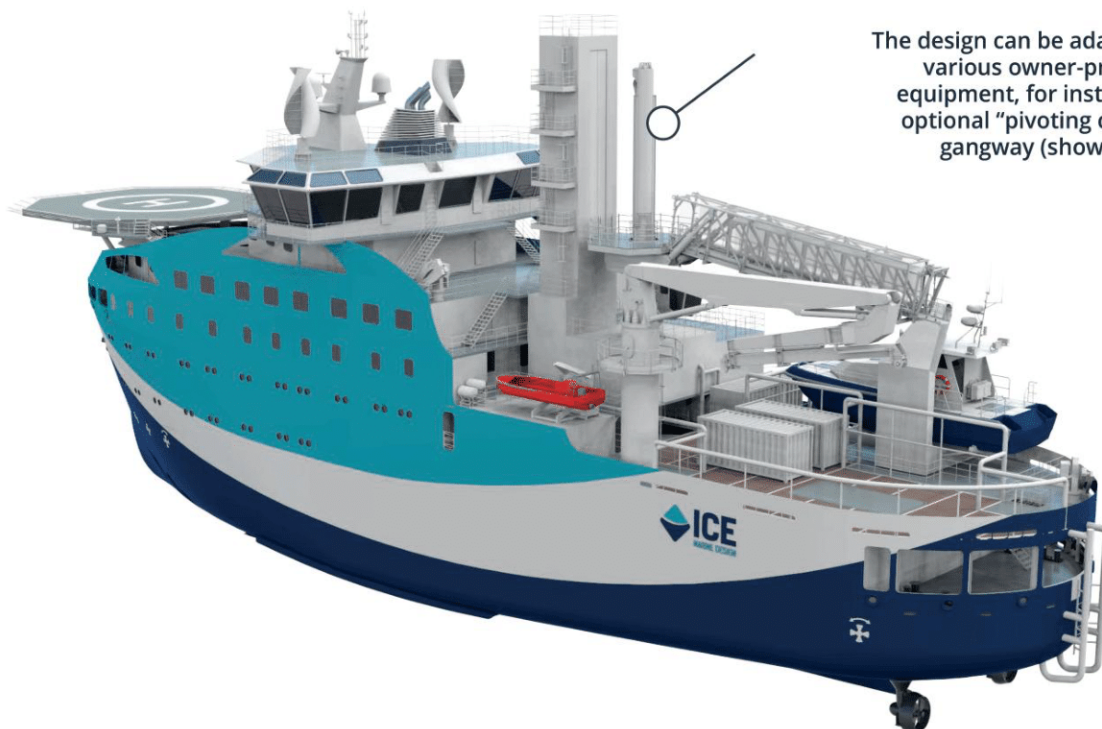
DP Capability

DP mode IMO DP-2
 DP performance ERN (99,96,90,90)

Environmental Conditions, Beaufort Numbers
 Wind and Waves, colinear 0.75 m/s current also considered

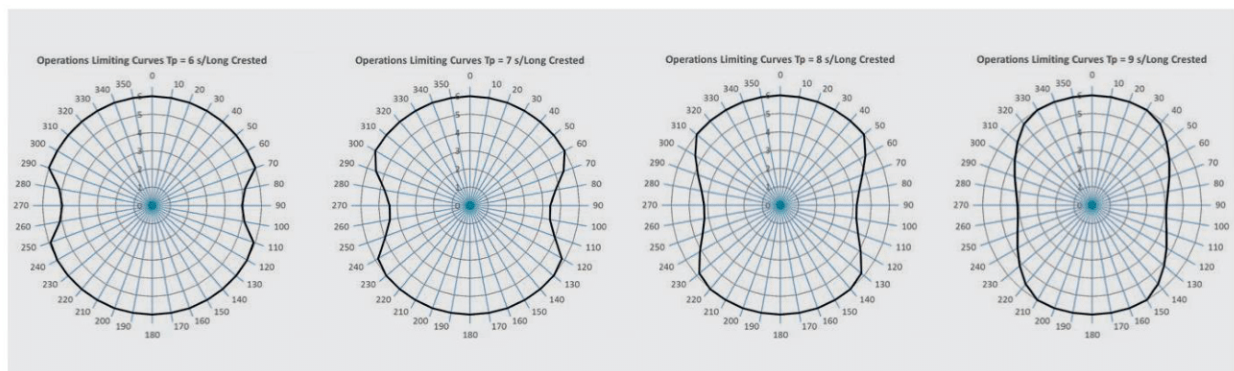


ICE WS-60-SOV design can incorporate a range of owner and shipyard equipment preferences to meet specific operational and cost objectives.



The design can be adapted to various owner-preferred equipment, for instance an optional "pivoting column" gangway (shown here).

Workability Plots ("Pivoting Column" Access Gangway)



The operational envelope shows the maximum allowable wave height for all headings of the ship and for 4 different peak wave periods ($T_p=6, 7, 8$ and 9 seconds) in North Sea conditions. The radial axis shows the significant wave height in meters.

For these plots the ICE WS-60-SOV has been outfitted with the "pivoting column" access gangway.

Principal Dimensions

Length o.a.	79.50 m
Breadth mld	18.20 m
Depth mld	7.70 m
Draught, summer	5.00 m
Freeboard at summer draught	2.70 m
Deadweight at summer draught.....	1,600 t
Deckload (A Deck aft)	5.0 t/sqm
Cargo deck area	270 sqm
Warehouse area	370 sqm
Trial speed at summer draught	12 knots
Endurance	30 days

Capacities

Fuel Oil	700 cbm
Fresh Water	120 cbm
Water Ballast	790 cbm
Containers	8 x 20 ft in normal or Hi-Cube
	Warehouse 5 x 20 ft containers
	Weather Deck 3 x 20 ft containers

Accommodation & Facilities

Accommodation, up to	60 POB (WS-60-SOV)
	40 POB (WS-40-SOV)

Covered warehouse, changing rooms, drying room, galley, mess hall, lounges, offices, meeting rooms, gymnasium, high standard single cabin units, hospital and laundry facilities.

The HVAC system is a 100% fresh air intake system with Enthalpy Exchanger for the entire vessel.

Deck Cranes

3D motion compensated crane	5.0 t @ 25 m / Offshore 15 t @ 15 m
Offshore/Deck crane	1 x 3t @ 12m (offloading aft)
Provision crane	1 t @ 10 m

Equipment

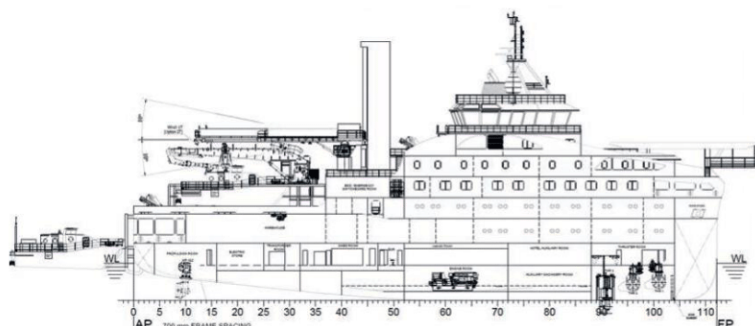
Access System	Motion compensated gangway, up to 28 m above LAT with 30 m outreach and 1,000 kg 3D compensated lifting
Elevator	Providing convenient transit between the warehouse/changing area and the gangway
Warehouse Crane	1 x 1,500 kg @ 5 m
MOB	1 x 6 POB
Daughter Craft	1 x up to 11 POB or 2,000 kg of cargo
Designed for optional D17m / 7t helideck.	

Power Generation

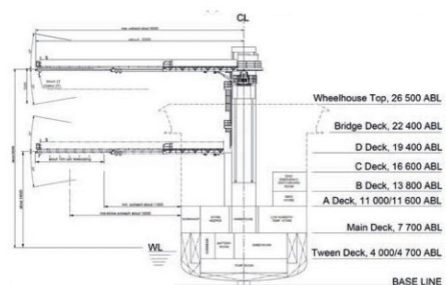
Main Generators:	3 x 1,670 kW / 690 V / 60 Hz
Thrusters (aft)	2 x 1,000 kW Azimuth
Retractable azimuth thruster (forward).....	1 x 800 kW
Tunnel thruster (forward)	2 x 750 kW
Electric System	60 Hz, 690V/440V/230V(110V)
Emergency Generator	1 x 200 kW / 690 V / 60 Hz
Battery Storage	730 kWh
Two Axis Wind Turbine Generator	Optional

Class – DNV

✱ 1A, Offshore Service Vessel (Windfarm Maintenance), WALK2WORK, CRANE, DYNPOS (AUTR), NAUT (AW), E0, Battery(Power), BIS, CLEAN (DESIGN), BWM(T), Strengthened (DK), COMF-V(2)C(2), SPS, RECYCLABLE.



PLAN VIEW at MAIN DECK (7 700 ABL)



Wheelhouse Top, 26 500 ABL
Bridge Deck, 22 400 ABL
D Deck, 19 400 ABL
C Deck, 16 600 ABL
B Deck, 13 800 ABL
A Deck, 11 000/11 600 ABL
Main Deck, 7 700 ABL
Tween Deck, 4 000/4 700 ABL
BASE LINE

ICE GROUP CAPABILITIES AND RESOURCES

ICE is an independent full service marine design company with substantial capacity, serving clients world-wide. Our experience includes 40+ FSO / FPSO projects (new construction, conversions and various studies), jack-up drilling platforms, drill ships, semi-submersible drilling rigs, self-elevating vessels for wind turbine installation, well intervention vessels, converter platforms, etc. We are familiar with the rules of the major IACS Classification Societies and with Brazilian, UK and Norwegian (NORSOK and PSA) regulations. Most of our work is done for repeat clients.



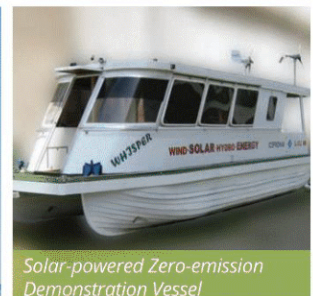
ICE Main Design Office



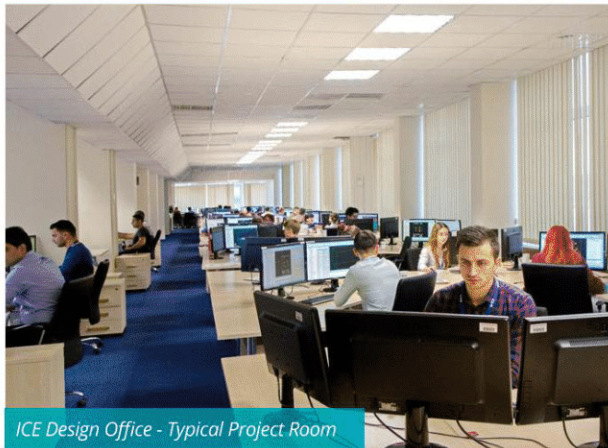
"Seajacks Hydra" serving the "SylWin Alpha" windfarm transformer platform. ICE contributed substantially to the design of both platforms.



Wind Turbine Installation Vessel



Solar-powered Zero-emission Demonstration Vessel



ICE Design Office - Typical Project Room



Electrical Ferry Concept



Modular Floating Island



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With a 55-year track record and an annual output having exceeded 700,000 professional engineering man-hours, the International Contract Engineering (ICE) Group is Europe's largest independent ship design consultancy. We provide high-calibre multi-discipline design services to yards and owners in the commercial shipping, defence and offshore energy industries, ranging from conceptual studies and Class drawings to detail design and production information. We cover a full range of naval architecture and marine engineering disciplines such as hydrodynamics, structural, mechanical, piping, electrical, instrumentation, outfit and HVAC. Our experience includes gas carriers, passenger vessels, navy and coast guard ships, chemical tankers, drill ships, FSO/FPSOs and a range of other vessels. We also have available proprietary designs that can be adapted to clients' requirements.

With our head office in the Isle of Man and engineering facilities in Romania and Croatia, we provide high quality design and engineering at very competitive prices.