



For Salt Ship Design, it's a milestone to work with such an environmentally conscious and future-oriented fishing company.

Denmark's Futuristic Flagship

The new *Isafold HG333*, built at the Zamakona yard in Spain to a design developed by **Salt Ship Design** is the newest and most innovative pelagic vessel to join the Danish fleet operating in the North-East Atlantic

The *Isafold HG333* was delivered to new owners **Hirtshals** company **Rederiet Isafold** in November. Rederiet Isafold, run since 2004 by Lise Björn Jorgensen and Karsten Mølgaard, is itself a pioneer, and one of the companies that emerged from the extensive consolidation of the Danish pelagic fleet in the 90s and 2000s, when the licences and rights of dozens of smaller pelagic vessels were bundled together as the fleet took on its current composition of a relatively small number of high-efficiency, high-capacity vessels.

The new pelagic trawler/purse seiner has an 87 metre overall length and a beam of 20 metres, with a 3700m³ capacity in its RSW tanks, and this capacity is *Rederiet Isafold's* rationale for putting investment into a new fishing vessel. Fisheries for mackerel, herring and blue whiting take place over a wide swathe of the North Atlantic as these species migrate long distances, and a larger vessel is both safer and more energy efficient.

According to Norwegian naval

architect **Salt Ship Design**, which partnered with the project's instigator Henning Kjeldsen at the outset, *Isafold* represents a serious step into the future of fishing.

"Zamakona with Lise and Karsten have built a ship that is groundbreaking in terms of energy efficiency and safe fishing," said Egil Sandvik at Salt Ship Design.

Isafold is the first fishing vessel to be built with diesel-electric propulsion, with both the twin propellers and the winch system based on high-efficiency permanent magnet (PM) motors. The combination of five medium-speed Yanmar gensets and a 1130kWh battery pack ensures optimal production and use of energy under any scenario, while the twin propellers require minimal energy and provide excellent manoeuvrability, especially for trawling.

"For Salt Ship Design, it's a milestone to work with such an environmentally conscious and future-oriented fishing company as Lise and Karsten represent. There

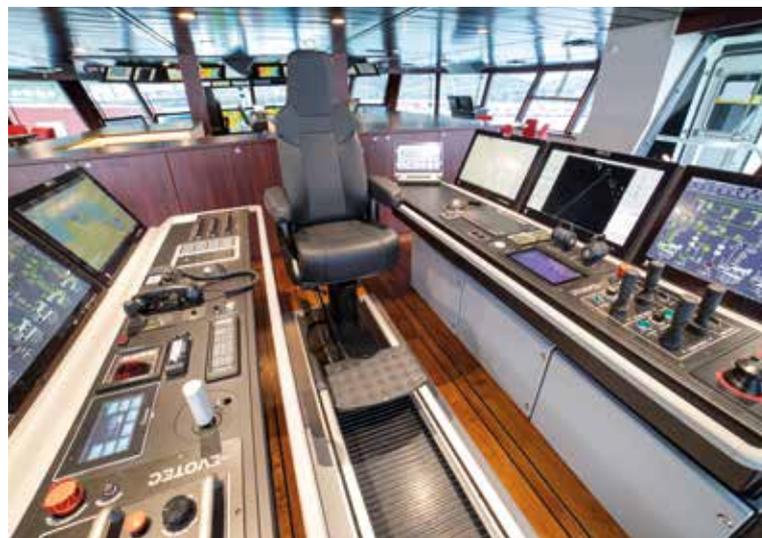
are not many people who put in the extra investment in order to make fishing as energy-efficient as possible, so it is important for Salt to take part in the quantum leap that *Isafold* is on the road to sustainable fishing.

There's a lot to get used to for

both the owners and for skipper Kristian Larsen and his crew as they brought the new *Isafold* home to Hirtshals and prepared to start fishing.

There's a wealth of technology incorporated in the new *Isafold* that has not previously made an appearance on a fishing vessel.

"It has been a fantastic experience to be out and test the new vessel and feel the effect of diesel-electric sailing. There is a world of difference in terms of noise and





Isafold is the first fishing vessel to be built with diesel-electric propulsion.

vibrations,' said Karsten Mølgaard, who has spent much of the past few months with the skipper and crew at the Zamakona yard in Bilbao as *Isafold* has been through the final stages of outfitting and sea trials.

'We found that this larger vessel than we are used to has very good seakeeping qualities and I think we'll get a great deal of benefit from the broad hull in terms of stability, handling in a seaway and the wide working deck aft,' he said.

'The decision to go for a larger vessel feels absolutely right in terms of efficiency, quality and, not least, climate footprint, as CO2 emissions are significantly reduced per kilo of catch. I believe the option to

automatically switch on or off one or more of the five diesel engines in relation to the power we may need will be very effective step in an environmentally sound direction.'

The five Yanmars are located in two separate engine rooms as a safety precaution and these supply all of *Isafold's* energy requirements, as well as the battery pack. The choice of genset size is designed to optimise the power balance on board across modes of operation depending on weather conditions, demand from the RSW system, mode of fishing and the many other parameters that can affect operation. The generators are fitted with catalytic converters and meet

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Egil Sandvik, Salt Ship Design

strict IMO Tier III requirements.

The battery pack, located in a dedicated space, provides opportunities to support the generators at points when there is a high energy demand, and this recharges as the overall load is reduced, including using regenerated energy from the winches. This also allows for peak shaving, as the diesel generators

don't suffer extensive load variations, and being able to them at a largely constant speed can generate a fuel saving of as much as 10%, based on experience with other diesel-electric vessels.

Isafold's layout has two propellers and a twin-skeg hull design, the result of extensive flow analysis and testing that indicated this is a more efficient stern and propeller design, →

ZAMAKONA
YARDS

JUST DELIVERED

ISAFOLD HG333 (NB799)
87m Midwater Trawler / Purse Seiner
3700m³ RSW
Diesel-electric
Electric Winches
PM Motors

zamakonayards.com



Deck cranes and electric fish pumps provided by SeaQuest.

providing greater towing power for less fuel consumption. The two propellers provide opportunities to steer effectively with minimal use of the rudder, which also contributes to fuel efficiency both in trawling and steaming.

The permanent magnet motors that power the propellers have lower levels of electrical loss and are able to perform with significantly greater efficiency throughout the power range, and particularly at low engine speeds. In addition, not having the traditional reduction gear arrangement means a considerable source of mechanical power loss is eliminated, noise levels are lower and overall propeller efficiency is greater.

PM WINCHES

ENTEC Evotec has supplied the full package of winches on board Isafold, and these also take advantage of permanent magnet technology, with an electric drivetrain utilising next-generation Evotec PM motors with highly robust converters to contribute to reducing energy demands and ultimately CO2 emissions.

The MultiSoft trawl winches are managed by ENTEC Evotec's own autotrawl system, and have a 110-tonne pull. The purse seine

rig is from the same supplier, and this includes new functionalities, is designed to improve shooting the gear and to make the process as smooth as possible. The winches also recover energy and re-route it back into the ship's systems to make it available for propulsion of the RSW system.

'We are looking forward to seeing Isafold in operation as our second pelagic vessel, and are confident that the owners will be satisfied with the performance of the system,' said ENTEC Evotec's sales manager Håkon Woldsund.

Plenty of thought has gone into the RSW system, with the tanks given a smooth inner finish free of any obstructions or sharp edges. The arrangement is for each of the four independent Johnson Controls RSW systems to cool four of the tanks. Cooling tanks in these blocks of four provides further energy savings, plus the C-Flow vacuum discharging has been boosted with an additional 40% capacity compared to standard systems.

SeaQuest delivered the deck cranes and the electric fish pumps.

ZAMAKONA
YARDS

ISAFOLD HG333

(ZAMAKONA YARDS Newbuilding C799)

DESCRIPTION & DIMENSIONS

Midwater Trawler & Purse Seiner.

The Vessel has diesel electric propulsion, electric driven winches and battery packed.

Length over all:	87.65 m
Length between perpendiculars:	78.20 m
Breadth moulded/Max breadth	19.00/20.00 m
Depth to 1-deck:	10.20 m
Depth to 2-deck:	7.20 m
Scantling draft:	8.20 m

SUM RSW approx. 3700 cum

The fish hold area shall be divided into 16 x RSW holds.

Recessed ducts in tank top for circulation of RSW water.

■ The Vessel has accommodation for totally 13 persons, all in single cabins with bathroom. Public/Common Areas: Mess room, Day room (TV), Cinema/ Gaming room, Office, Lobby / Smokers room, Oil skin room, Wet Lab, Gymnasium, Solarium, Shower room.

■ The Vessel is BV Classed.

■ The Vessel is built and certified according to Danish Maritime Authorities (DMA) for fishing vessels and have Danish flag.

PROPULSION AND POWER

■ The Vessel has diesel electric propulsion, with 2 x CP propellers in nozzle.

1 x Permanent Magnet electro motor direct coupled to each propeller shaft.
3 x generator sets in engine room aft and 2 x generator sets in engine room forward. 690 V / 60 Hz Emergency aggregates.

Emergency system is based on two independent engine rooms philosophy.

■ A SCR unit with bypass shall be installed for each diesel engine exhaust pipe systems for compliance with IMO Tier III requirements for NOx emissions.

■ A 1130 kWh battery pack used for peak shaving, peaks when starting of heavy electrical consumers and for use for ships system in harbour. Discharge rate 3C.

The battery shall also be used in harbour. In harbour when the SOC is close to the defined minimum level, one of the generator sets shall start and charge the battery. When the SOC is close to the max level the generator.

2 x Contr. pitch propeller plants with propeller in nozzle.

- Rating: 3400 kW
- Propeller diameter: 4000 mm

2 x Fish tail rudders with forged steel rudder-stock

2 x Steering gears electro-hydraulic driven.

1 x Tunnel thruster forward
2 x tunnel thrusters aft

FISHING EQUIPMENT

Purse nets & seine Equipment

Rollers for purse seine: 1 x opening in A-deck for fish hose, a Ø 100 mm stainless steel pipe around the opening.

Davits for purse seine: 2 x davits for purse wire on A-deck

Purse seine winches: 2 x Purse seine winches

End wire winch (combined mooring):
1 x End wire winch

Float winch (combined mooring)

Breast winch

Net hauler

1 x Net chute

Ring needle

TRAWLING EQUIPMENT

2x Trawl winches

2 x Net drums

2 x Tail end winches

3 x 20 " Fish hose reels

2 x Netsounding winchesw

4 x Auxilliary winches

1 x trawl gantry aft

The gallowes shall have 2 x legs and

3 x horizontal transverse platforms.

Foundation for net stacker/deck crane, two fish pump cranes and other equipment.

FISH HANDLING

1 x double built in fish separator, made of stainless steel.

VACUUM PUMP SYSTEM

■ Discharging pipes from bottom of all RSW holds to vacuum pumps.

■ Pipes with diameter Ø 350 mm on the suction and pressure side.

3 x 24" Fish pumps

3 x 20" Fish hose, 100 m

OTHERS

■ Fish holding tanks shall be provided for RSW cooling.

4 x dedicated RSW cooling systems, Refrigerant R - 7117 (Ammonia)

RSW CIRCULATION

■ RSW circulation system shall be arranged with 4 x separate circulation systems with cross connection.
4 x RSW circulation pumps

■ RSW circulation system in RSW tanks

Vertical drains:

2 x vertical drains in each RSW hold, connected to the vent pipe.

The vertical drains shall be 15 mm perforated PEH plate with Ø 8 mm, located in corrugated bulkhead and connected to the bilge system via a duct below lining on the tank top.

DECK CRANES

1 x Knuckle Boom Crane - Forward

1 x Knuckle-Boom Crane Forward

Trawl handling crane/Net stacker crane on top of Trawl Gantry.

Trawl handling /Net stacker Crane on B- dk, SB aft.

2 x Fish Pump Cranes on top of the Trawl Gantry.

GANGWAYS

• 1 x hydraulic operated hinged platform on PS on A-deck.

Hydraulic aluminum telescopic gangway ladder of suitable length, approx 12m sliding.

• 1 x hydraulic operated hinged platform on A-deck with door on SB.

Hydraulic aluminum telescopic gangway ladder of suitable length, approx 12m sliding.

• 1 x Light, aluminium gangway forward with handrails, safety net and turning arrangement. Length: 10 m, deep step type.