



“6-in-1”

24m Multipurpose Vessel

 **SkipaSýn**
fishing vessel design

With over 30 vessels built and numerous conversions conducted, Skipasýn has vast design experience for the worlds fishing fleet. In order to be leading in the design of sophisticated sustainable fishing vessels the company specialists are constantly searching for innovative solutions and providing scientific researches in order to satisfy client needs. In all cases Skipasýn provides personalized solutions for owners, most importantly on how to provide an energy efficient and sustainable solutions catered to their needs. Skipasýn has specific solutions for vessels of all sizes that can be implemented to the global market.

It's important in project development to set guidelines for every design aspect and one of the key factors is sustainability, which can be categorized as seen in Figure 1.

SUSTAINABILITY IN SHIP DESIGN			
PROFITABILITY	REDUCED ENVIRONMENTAL IMPACTS	REDUCED ACCIDENT RISKS	QUALITY OF DELIVERED PRODUCTS
CATCH CAPACITY	ENERGY EFFICIENCY	SAFETY OF OPERATIONS	CARGO HANDLING
COSTS REDUCTION	REDUCED EMISSIONS	SAFETY OF SAILING	CARGO PROCESSING
	REDUCES NOISE / VIBRATIONS SELECTIVITY	AUTOMATED FACILITIES	STORAGE AND PRESERVANCE

Figure 1 – Attributes of sustainable fishing vessels according to Skipasýn’s vision

Clear defined targets allows Skipasýn to look upon and implement up-to-date technologies, conduct optimization researches and develop their own solutions to achieve sustainability in order to increase efficiency for individual clients and the industry in general.

Towards Sustainable Fishery

Following Skipasýns guidelines for sustainability, all aspects of onboard equipment and machinery must be taken in to account. Following figure (Fig.2) is presenting possible elements to be improved towards sustainable fishery onboard the vessel. In general, there are two ways: „Ship technology“ and „Fishing gears“ as shown in fig. 2. Also importantly the Operational Management of companies should be implemented.

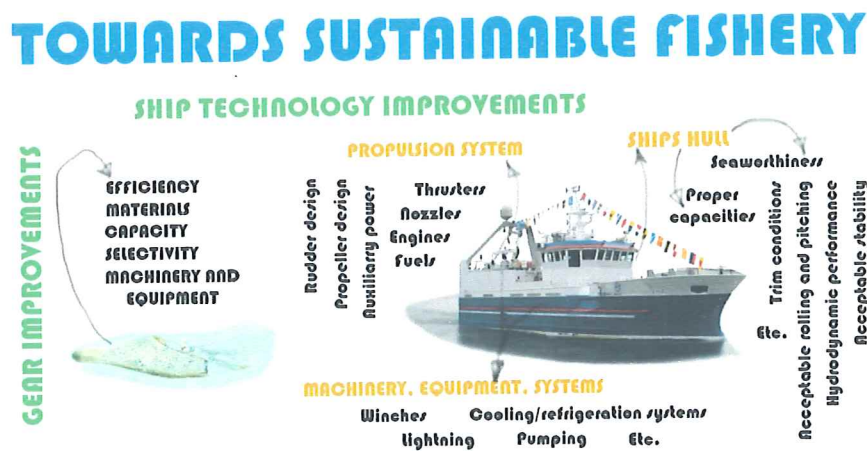


Figure 2 – Vital equipment and machinery improvements of fishing vessels

24m Multipurpose Vessel – Project 2475

The main focus of the design, PR2475, was to provide a solution which would significantly reduce the time necessary for equipment refitting and required maintenance. Other sustainable solutions like optimization studies, distinct features and modern hull design are in full effect in this project.

The detailed design works are currently being conducted for one composite vessel to be built in 2017.

24-m Multi-Purpose Vessel General Description

The vessel is single-screw multipurpose fishing / research vessel.

Main dimensions:

Length Over All	23,95 m
Length p.p.	22,20 m
Beam Moulded	7.50 m
Depth to Main Deck	4.00 m
Depth to Forecastle Deck	6.40 m

Capacities:

Fish hold/store	aprx. 120m ³
Fuel tanks	aprx. 20 m ³
Fresh water tanks	aprx. 10 m ³
Ballast water tanks	aprx. 10 m ³

The idea in this case is to provide a customer with highly sophisticated Multipurpose fishing vessel (Fig. 3) came from the need to adjust to different fishing seasons and limited quota on specific species the owners are allowed to catch. Another factor is the uncertainty of fishing ground locations and overcapacity of the fishing fleets (especially within the EU). With PR2475, Skipasýn provides the customers with a possibility to have the following modifications ready to bolt on/bolt off just by replacing a standardized unit on the aft:

- Trawling;
- Flyshooting;
- Gillnetting;
- Auto-lining;
- Passenger solution;
- Scientific-research solution.

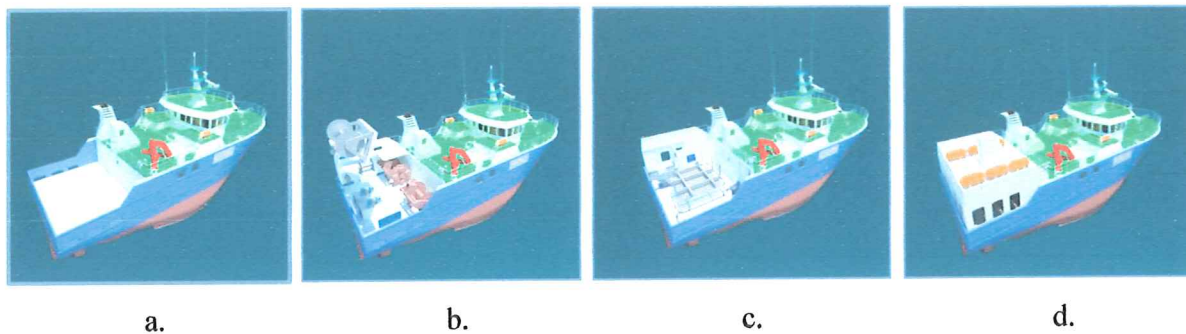


Figure 3 – Versatility of the Multipurpose Vessel by Skipasýn

(a. – Basic version; b. – with trawling unit; c. – With longlining unit; d. – With passenger unit)

The design provides an opportunity to diversify the vessels activity and increase profitability of the owner by utilizing several units for one ship. One of the features of this project is the light weight building material used. Using a composite plastic hull can reduce fuel consumption and maintenance significantly.

Table 1 – Proposed solutions towards sustainability

No	Solutions proposed	Summary effects description	Reduction of fuel consumption
1	Composite hull constructions	Optimized capacities V-shaped underwater part – Less fuel consumption (LFC), Reduced emissions (RE) Less maintenance	Case oriented
2	Optimized floating conditions	Better operability (BO) LFC, RE	5 – 15 %
3	Vessels motions optimizations	BO, LFC, RE	5 – 15 %
4	Form, propeller and rudder optimizations	LFC, RE	5 - 10 %
5	Optimized fishing gears	LFC, RE Increased selectivity	5 – 10 %
6	Efficient energy Production schemes	LFC, RE	Case oriented
7	Alternative fuels: Hybrid Diesel-Electric	LFC, RE Reduced noise and vibrations	Case oriented
8	Heat recovery system	LFC, RE	5 – 10 %
9	Sails as additional power source	LFC, RE Decreased emergency risks	5 – 15 %

The results in Table 1 are conducted by comparing last generation technologies to newer and are evaluated by model / computer testing and experiments, or are claimed by the modern equipment producers.

For the project, Skipasýns design focuses on key elements that affect the seaworthiness of the vessel and ensure the best performance in all fishing operations. Following are the focus points of our design:

- Anti-rolling tank;
- Hydrodynamically optimized hull lines and hull-propeller interactions;
- Hybrid power scheme;
- Sail as an additional power source.

Anti-rolling tanks implementations

In order to reduce roll motions of a vessel, Skipasýn designs and decide the position of an anti-rolling tank (ART) onboard. The roll reduction that can be expected from a properly designed ART is generally 50% or better. An ART is a complicated dynamic device and it is easy for the tank to be ineffective or even detrimental if not designed properly. In order to have all aspects to be considered and the best possible efficiency obtained our specialists are conducting specific hydrodynamics and stability (Fig. 5) computer calculations and model testing.

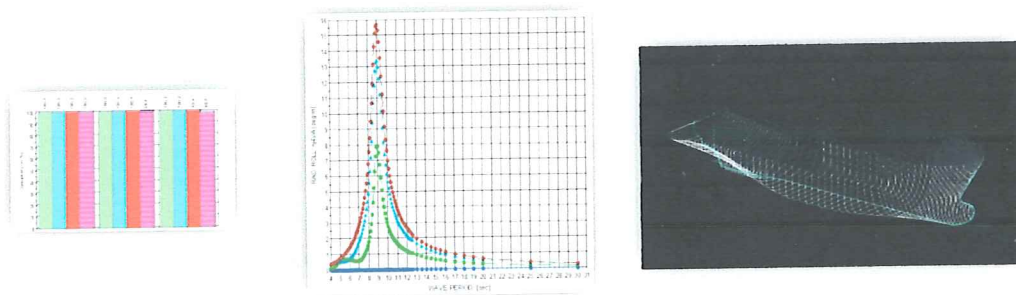


Figure 5 – Hydrodynamic investigations for roll reduction from an anti-rolling tank

Development of hull lines and hull-propeller interaction

3D Modeling and Computation Fluid Hydrodynamics (CFD) software packages are used to refine hull lines to ensure optimized performance. The results are validated by carrying out model testing in a towing tank.

Some graphical outputs and photos of the testings are presented in Fig. 6.

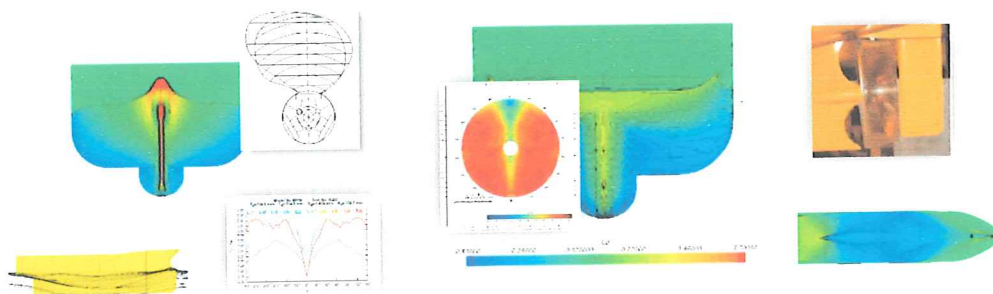


Figure 6 – CFD and Model testing conducted by Skipasýn
These kind of tests are usually conducted to ensure the best results of:

- Hull resistance reduction;
- Optimizing waterline areas;
- Improvement of water flow to propeller;
- Wake equalization;
- Obtaining suitable propeller parameters: blades number, diameter, RPMs.

Power production scheme optimization. Alternative Fuels

Additionally, it should be mentioned that at the moment Skipasýn is dealing with development of hybrid diesel-electric and full-electric solutions. We consider several options, such as:

- Diesel-generators as primary source of energy supplying energy to electric motors;
- Lithium batteries as primary source of energy;
- Lithium batteries as supplementary source of energy;

Since all electricity in Iceland is produced from renewable energy, it should definitely be utilized onboard of the Icelandic fishing fleet. Modern technology levels brings batteries as main power source and can be utilized for primary propulsion. Other alternative fuels such as Methanol are also available and are already implemented in our projects.

Sails for a fishing vessel

Using sails for wind assisted propulsion is a viable option in some parts of the world. Sail power could be considered as an alternative way to save fuel when moving to and from fishing grounds. Additional costs of installing a sailing rig are covered by the annual fuel savings and the possibility of installing a smaller main engine. Most importantly the option of using sails as an emergency propulsion in case of a mechanical breakdown. Example of sail implementation is presented for 24m vessel in Fig. 7.

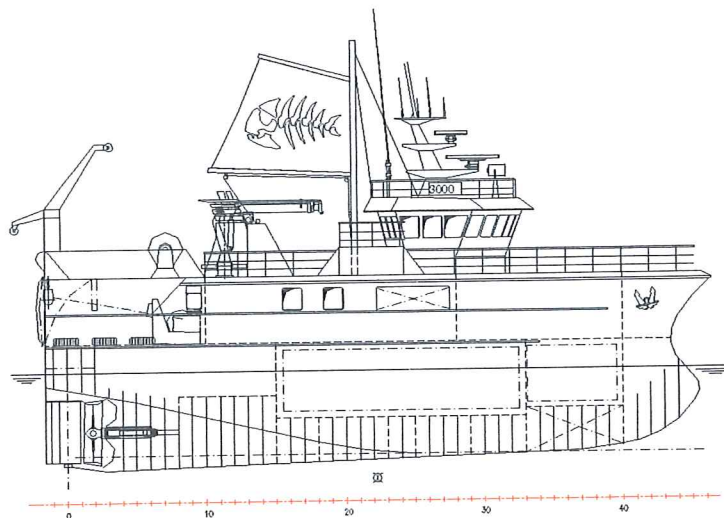


Figure 7 – Concept of sail implementation onboard the 24m vessel

Conclusion and Further Research

PR2475 has many sustainable solutions, besides the increased functionality and higher rate of year-round involvement the project contains a number of the up-to-date improvements towards the sustainability in general and energy efficiency. Energy consumption along with the negative emissions could be reduced up to 50-60% when compared to older vessels of similar size.

The project offers reduction in emissions, less fuel, lower maintenance costs, versatile operations and safer work environment. Fuel consumption savings has the biggest influence in economic and environmental performance of the fishing fleet.