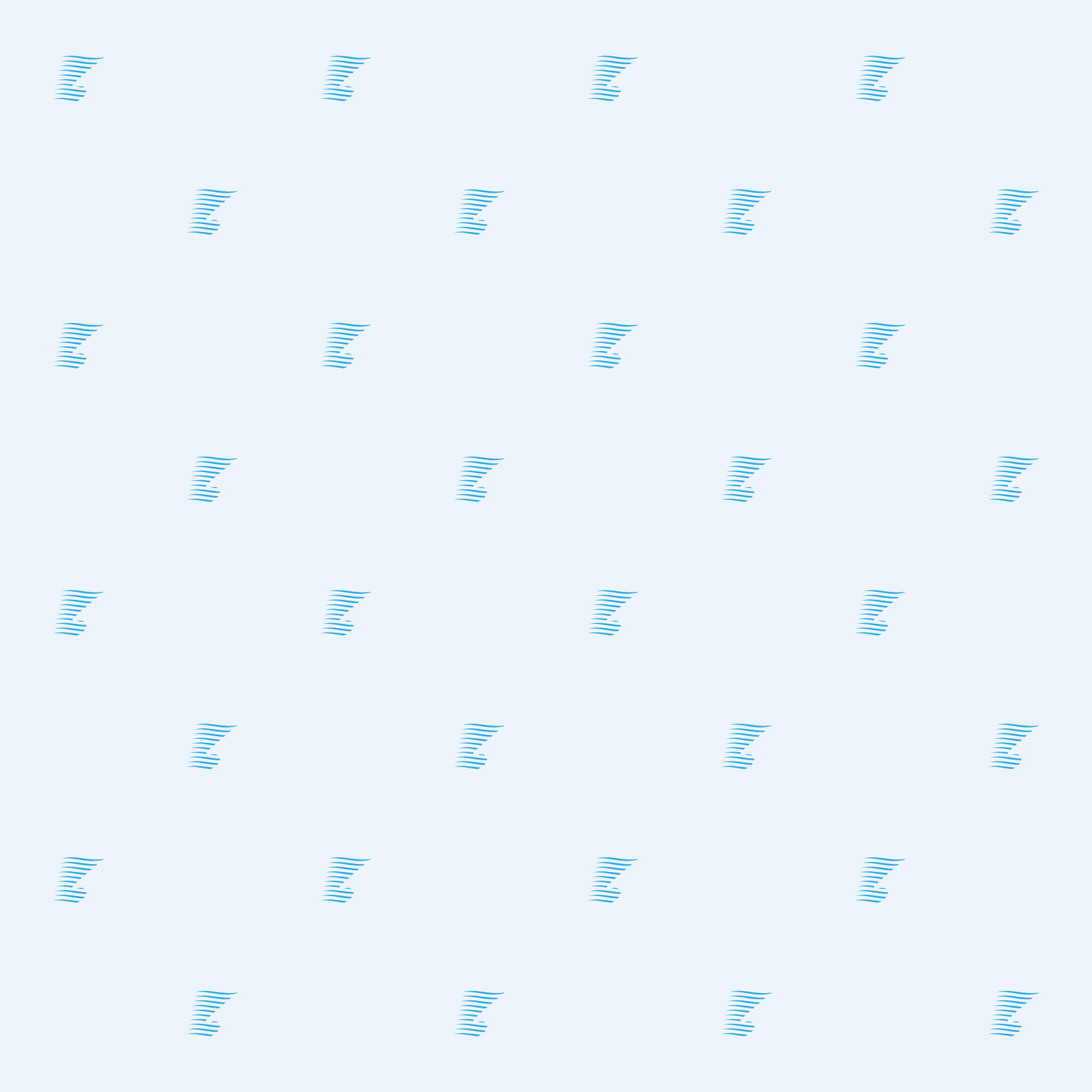

FLOW
SHIP DESIGN



CONTENT

THE COMPANY

An independent ship design and consultancy company. Established, owned, managed and fostered by a team of 4 naval architects with the aim to deliver innovative design and engineering solutions.

Close cooperation with customer, in forefront of new technologies implementation, research, development and experience are key factors to successful designs and satisfied customers.

THE TEAM

Team of 18 engineers - Naval architects, marine engineers, electrical engineers with comprehensive knowledge and experience from designed, built and delivered vessels.

All employees with average more than 15 years working in ship design, production and commisioning departments in various fields in shipyards, class society and as ship owners' representatives.

OUR PROFICIENCY

PROFICIENCY

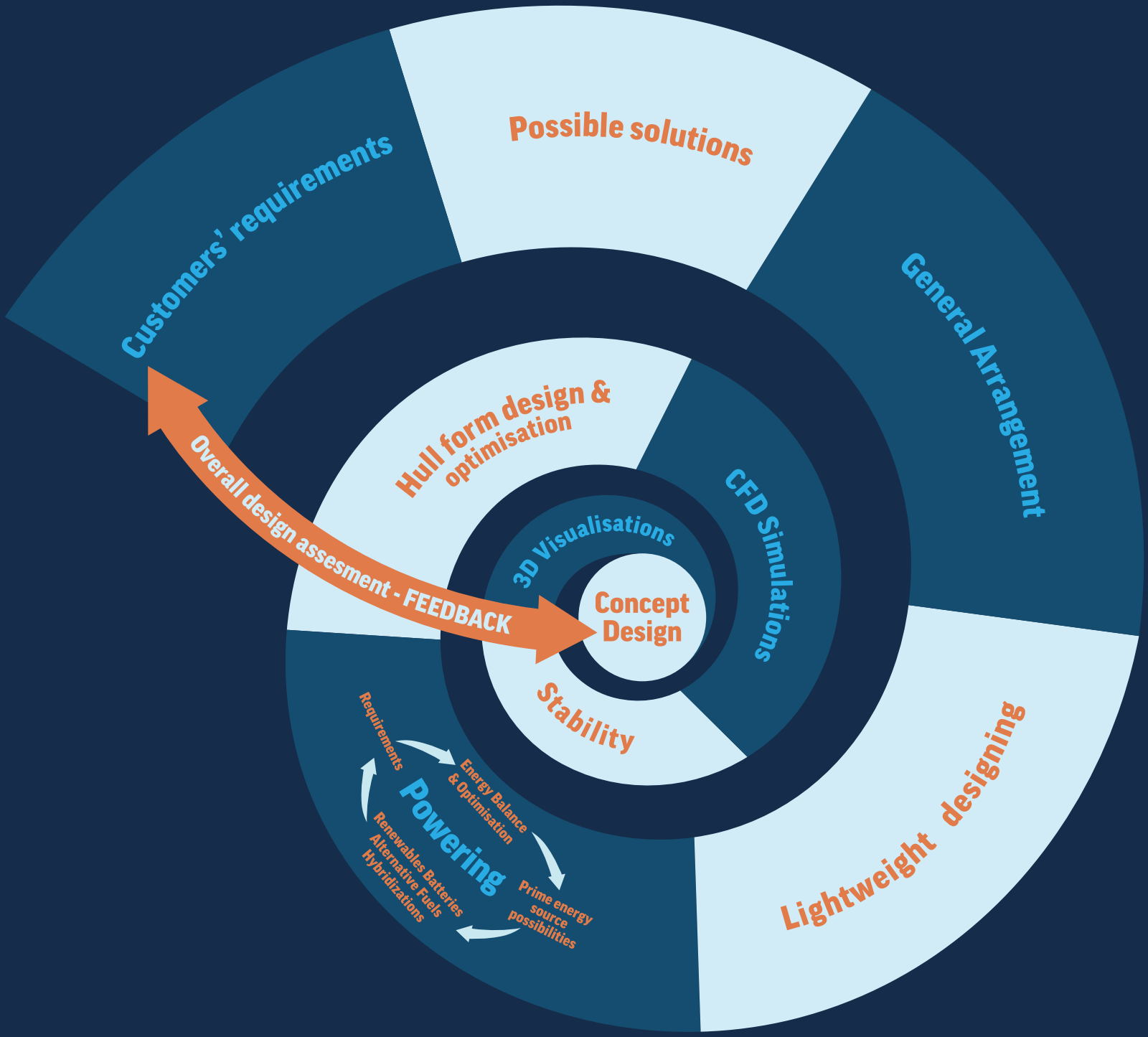
Flow ship design delivers innovative designs with customer specific requirements.
The close cooperation with the customer is a key factor in the design process.
The company specialization covers various types of vessels, including all the phases of the ship design process.

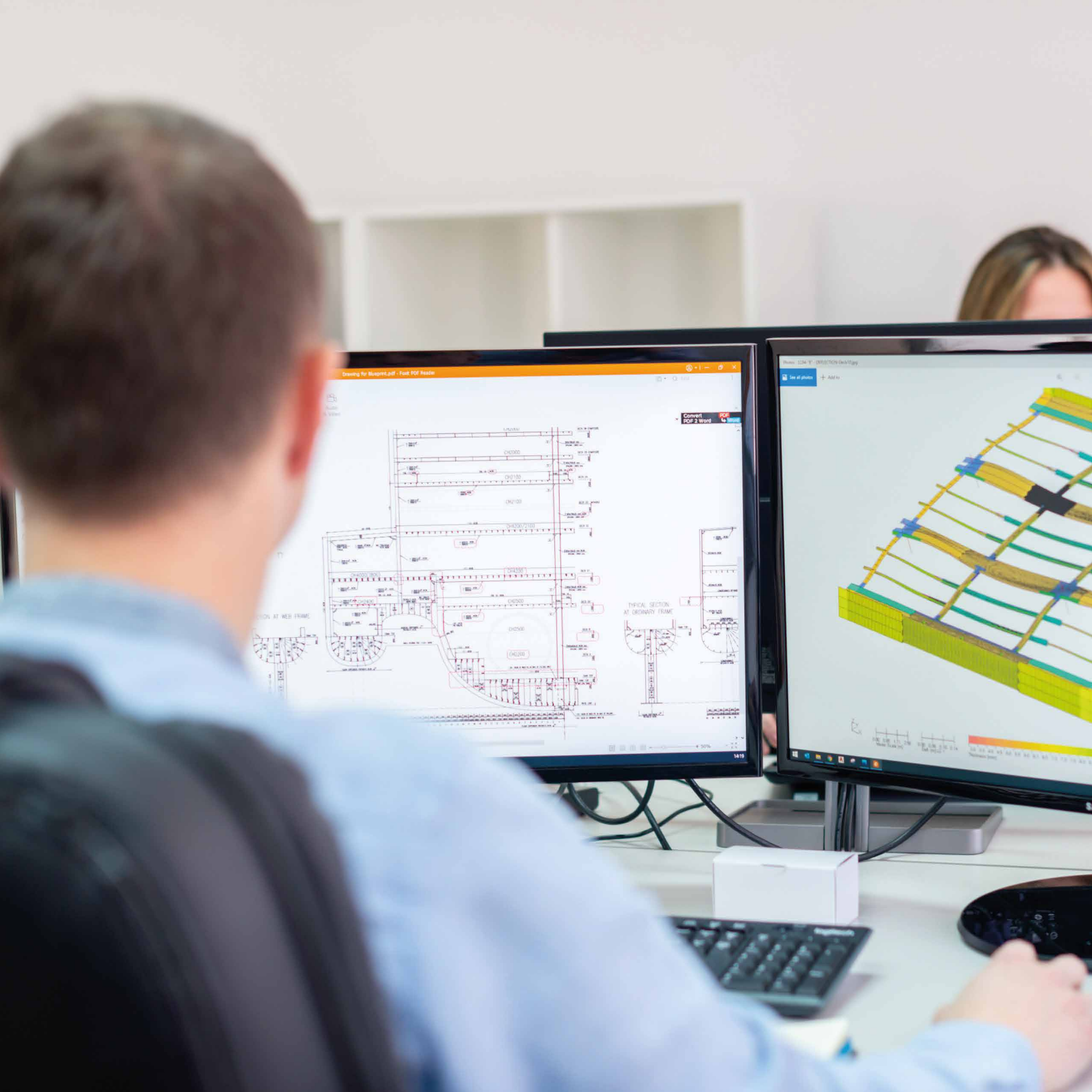
- CONCEPT
- HULL & STRUCTURAL
- OUTFITTING
- ELECTRICAL & AUTOMATION
- R&D
- CONVERSION & RETROFIT
- CONSULTANCY
- E&A TURN KEY PROJECTS

CONCEPT

From operational requirements and Customers' ideas, Flow Ship Design aims to deliver optimized concept designs based on long years experience in designing and cutting-edge technologies.

≈Technical Specification
≈ General arrangement plans
≈ Tank and capacity plan
≈ Preliminary Midship Section
≈ Lightweight estimation and distribution
≈ Hull form
≈ Stability
≈ Speed, Powering and Propulsion
≈ CFD Analysis
≈ Preliminary Load Balance
≈ Single Line Diagram


Customers' requirements
Possible solutions
General Arrangement
Lightweight designing
Hull form design & optimisation
CFD Simulations
3D Visualisations
Concept Design
Stability
Overall design assesment - FEEDBACK
Powering
Requirements
Energy Balance & Optimisation
Prime energy source possibilities
Renewables Batteries Alternative Fuels Hybridizations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TYPICAL SECTION AT ORDINARY FRAME

HULL & STRUCTURAL

Hull structural design by Flow Ship Design ensures safe and lightweight solutions with implementation of new materials into the ship's structure to accommodate growing need for reduced powering and efficient solutions for emissions reduction.

≈ Structural Calculations and Optimization
≈ Hull structural Classification drawings
≈ Finite Elements Structural Analysis
≈ Hull Classification Model

≈ Hull Equipment
≈ Anchoring and mooring arrangement
≈ Rudder arrangement and calculation
≈ Arrangement and design of communications – stairways, ladders, railings
≈ Load bearing supporting structures


RM – DECK 2
Lenovo

OUTFITTING

From main propulsion and auxiliary systems, to cargo equipment, arrangements and accommodation, Flow Ship Design delivers the complete customized solution.

≈ Cargo and cargo equipment
≈ Accommodation
≈ Safety (Fire, Lifesaving)
≈ Navigation and Communication

Plans, diagrams, specifications and calculations system diagrams for
≈ Main and auxiliary machinery
≈ Ships' systems
≈ Cargo systems
≈ Accommodation systems


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SHIP DESIGN

ELECTRICAL & AUTOMATION

Electrical and Automation design at Flow Ship Design - bringing the hardware to life.

≈ Electric load analysis
≈ Equipment specification according to the vessel technical specifications and class requirements
≈ Short circuit & THD calculation
≈ Battery systems consulting and integration for hybrid and full electric vessels
≈ Generators, transformers & special el. motors specification
≈ Main & emergency switchboard project drawings
≈ Distribution boards & starters project drawings
≈ Ship automation specification & project drawings
≈ Automation system detail specification, programming, SCADA system design
≈ Navigation equipment specification & project drawings
≈ DP system specification & project drawings
≈ Communication specification & project drawings
≈ Fire detection specification & project drawings
≈ Internal communication specification & project drawings
≈ CCTV system specification & project drawings
≈ Entertainment system specification & project drawings
≈ Cable size & type selection for all power systems
≈ Cable routing basic design
≈ Lighting calculations & project drawings
≈ Wiring diagrams
≈ Wheelhouse / ECR console design
≈ Consulting for commissioning and on-site support
≈ Troubleshooting of industrial and marine automation systems

R&D

Research and development are central to the business strategy program. The experience in research projects results in an improved ship design which provide higher performance and more value for our customers.

2006-2010

- DELIGHT TRANSPORT
- IMPROVE

2011-2016

- THROUGHLIFE
- GRIP
- ADAM4EVE
- SHOPERA

2016-2023

- RAMSSES
- HOLISHIP
- LASHFIRE

IMPLEMENTATION OF PROJECT RESULTS:




CONVERSION & RETROFIT

New purpose, additional feature, new class notation, new flag...
Flow Ship Design can assist you through the process from the feasibility study through implementation and approval of the solution(s).

Providing ship's documentation for changing flag procedure (class & statutory)
≈ Intact & Damage Stability
≈ Damage control plan
≈ Freeboard
≈ Fire&safety
≈ Life saving appliance
≈ Vessels
- Jadrolinija Double ended FERRY 600 PAX
- Jadrolinija Double ended FERRY 650 PAX
- Jadrolinija Double ended FERRY 650 PAX

CONVERSION & RETROFIT

Retrofitting design and documentation by Flow Ship Design provide the installation onboard ships of state-of-the-art or innovative components or systems as Exhaust Gas Cleaning System and Ballast Water Treatment System Feasibility and Implementation Study

≈ Feasibility and detailed study for any application
≈ Ship's powering system – prime movers, fuel type, hybrid and full electrical systems
≈ Electrical systems and equipment design
≈ Exhaust Gas Cleaning System
≈ Ballast Water Treatment System
≈ EEXI compliance

Providing ship documentation in concept study for implementation of EGCS or BWTS system as turn-key solution in terms of documentation:
≈ Structural arrangements
≈ New Outfitting & piping arrangements
≈ Electrical arrangements
≈ All calculations and drawings
≈ Approval procedure for class & statutory items
≈ Vessels:
- Aframax 112500 DWT EGCS
- Bulk Carrier 92500 DWT BWTS


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CONSULTANCY

Any issue, any feature, any vision that requires a professional opinion, Flow Ship Design can assist you with your ideas to implement the solution.

Ship delivery documentation:

≈ Lightship Check
≈ Inclining Test
≈ Intact Stability Calculation
≈ Final GAP and Engine Room GAP
≈ Final Capacity Plan
≈ Final Trim and Stability Booklet
≈ Subdivision and Damage Stability Calculation
≈ Vessels:
- Self-unloading Bulk Carrier 25000 DWT
- Vehicle Carrier 7000 cars
- Oil Chemical Tanker 50000 DWT

CFD – analysis of fluid flows:

≈ Hull for optimization for new concept designs
≈ Hull for optimization for hull form retrofit
≈ Bulb optimization
≈ Vessels:
- Patrol Boat
- Polar Expedition Cruise Vessel (25000 GT)
- Fast Passenger Boat
- Vehicle Carriers 1000 and 2200 cars

New Building Commissioning assistance

≈ Vessels:
- JDN Cutter Suction Dredger
- Vehicle Carrier 7000 cars
- DEME Green Jade
- Spray Pontoon Barge

Other:

≈ Cost Estimation
≈ Turnkey solution for alarm Monitoring & Control system, shore connections, switchboards, control cabinets...
≈ Assistance and Consultancy for Model Testing in Towing Tank
≈ Construction supervision
≈ Commissioning, testing sea trial procedure

E&A TURN KEY PROJECTS

Nowadays more and more customers are looking for complete solutions that can help them achieve the desired business goals.

There are several advantages for choosing turnkey solutions:
≈ Optimization of costs
≈ Efficient improvement of commissioning and start-up phases
≈ Clear responsibilities, no need for client's efforts to manage the project and coordinate activities

Turnkey solutions provided by Flow Ship Design include all these advantages as we can meet the requirements and needs of various customers from small and simple – to the most demanding and complex projects.

Flow ship Design offers turnkey solution for electrical and automation systems
≈ Alarm and monitoring system
≈ Control cabinets
≈ FC control cabinets
≈ Shore connection retrofits

E&A TURN KEY PROJECTS

≈ Project design
≈ Class approval
≈ Detail workshop documentation
≈ Delivery of custom hardware solutions
≈ Custom PLC and SCADA software development
≈ Site installation and commissioning
≈ Equipment familiarization
≈ Long term support

Reference vessels:
≈ Alarm and monitoring systems (Moen Marine, FreeWings)
≈ Control cabinets (JDN)
≈ Shore connection retrofit (Yara Marine)

PROJECTS BOOK

01. PASSENGER CATAMARAN F150 PAX

DESCRIPTION

The vessel is a passenger vessel intended for short voyages in area 6 of Croatian coastal waters. Equipment and systems are modern, energy efficient, environmentally friendly and suitable for transportation of passengers. The design can be easily adapted for hybrid or full electric solution.

GENERAL

Hull material	Aluminium
Basic functions	Passenger Vessel

DIMENSIONS

Length, overall	21.85 m
Length, between perpendiculars	20.90 m
Breadth, max	9.00 m
Breadth, hull	3.00 m
Hull depth to freeboard deck (midship)	3.00 m
Draught, loaded midship	1.50 m
Draught, design	5.25 m
Deadweight (at scantling draught)	abt. 20.0 t
Gross tonnage	150 GT

PERFORMANCE

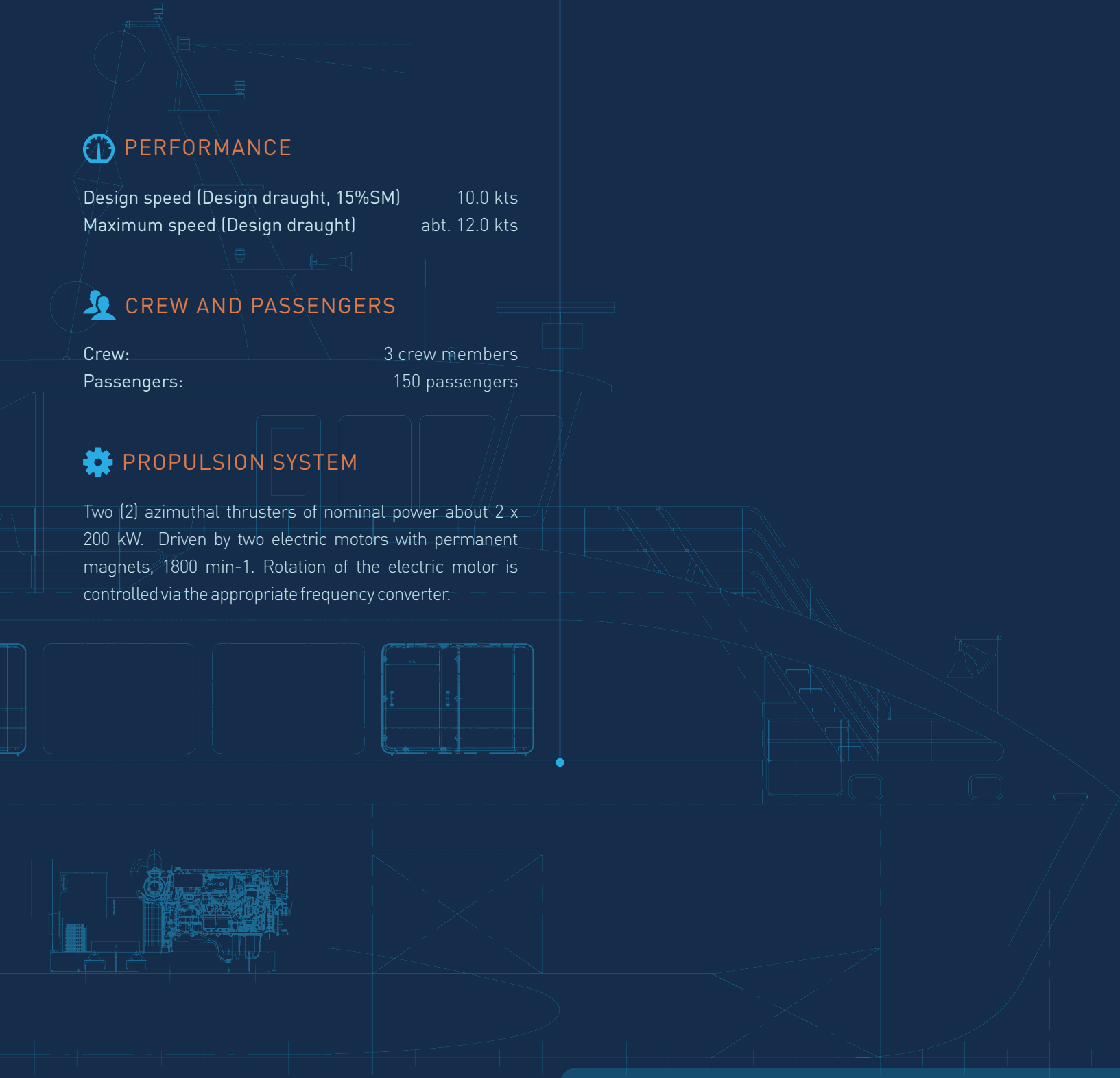
Design speed (Design draught, 15%SM)	10.0 kts
Maximum speed (Design draught)	abt. 12.0 kts

CREW AND PASSENGERS

Crew:	3 crew members
Passengers:	150 passengers

PROPULSION SYSTEM

Two (2) azimuthal thrusters of nominal power about 2 x 200 kW. Driven by two electric motors with permanent magnets, 1800 min-1. Rotation of the electric motor is controlled via the appropriate frequency converter.



02. RO PASSENGER FERRY

DESCRIPTION

Full electric Ro-Pax Vessel intended for the regular service between mainland and island ports in Croatian coastal waters. Certified as Class C at Rules for statutory certification of passenger ships in national navigation. Furthermore, in compliance with Rules for the Classification of Ships for navigation area 6 (national coastal service). Equipment and systems are made as modern, energy efficient and zero emission ship, suitable for transportation of passengers, trucks, and other wheeled cargoes.

DIMENSIONS

Length, overall	50.45 m
Length, between perpendiculars	47.24 m
Breadth, max	10.90 m
Breadth, hull	4.30 m
Hull depth to freeboard deck (midship)	2.80 m
Draught, loaded midship	2.70 m
Draught, design	abt. 105 t
Deadweight (at scantling draught)	abt. 42 t
Gross tonnage	1360 GT

GENERAL

Hull material	Steel, Aluminium
Basic functions	Ro-Ro Passenger Vessel

PERFORMANCE

Design speed (Design draught, 15%SM)	10.0 kts
Maximum speed (Design draught)	abt. 13.0 kts

CARGO SPACE CAPACITIES

Main deck:

Option 1: 4x Trucks max weight 7.5t + 5xcars (CEU)

Option 2: 16x cars

CREW AND PASSENGERS

Crew:	10 crew members
Passengers:	389 passengers
Passengers winter seats:	184 seats
Passengers summer seats:	389 seats

CARGO EQUIPMENT

The Vessel is designed with stern ramp for facilitated loading/unloading of ro-ro cargo and passengers in fully enclosed main cargo hold. Two side passenger ramps at Main deck level on each side. The ramp can be operated electrically or hydraulically.

PROPULSION SYSTEM

The ship's propulsion machinery consists of two (2) frequency controlled electric motors of abt. 400 kW of max. power each. The motors are be coupled to the two (2) fully rotatable azimuth thrusters having four bladed fixed pitch propellers (Z-type).

An electric Energy Storage System (ESS) of suitable capacity is used for covering ship 's electrical energy demand, according to the given operational profile.The electrical system, including the battery systems , as a minimum meet the following requirements and capacities:

- continuous all electric operation, also in adverse weather and periods with heavy traffic, at given operational profile
- the battery lifetime to be minimum 10 years
- deliver full power (2 x 400 kW) on the shafts of both thrusters simultaneously and at the same time supply all additional auxiliary consumers, including "hotel load".
- one charging station, arranged at a suitable location on a ship

Electrical distribution system is an insulated (IT) 3 phase 3 wire system, 400V / 50 Hz and 230V / 50 Hz. A four stroke, direct-injected, common rail, turbo charged marine diesel engine with aftercooler. Engine, with speed 1500 r/min in operation, will be used during longer voyages to dry-docking or winter lay-up location.

03. RO-RO PASSENGER SHIP

DESCRIPTION

The vessel is Ro-Ro passenger ferry intended for short international voyages year around operation for regular service between ports in Croatia and Italy in Adriatic Sea. Equipment and systems are designed for modern,energy efficient,environmentally friendly operations and suitable for transportation of passengers and wheeled cargoes.

GENERAL

Hull material	Steel Ro-Ro Passenger
Basic functions	Vessel

DIMENSIONS

Length, overall	129.00 m
Length, between perpendiculars	123.00 m
Breadth, max	23.60 m
Breadth, hull	8.00 m
Hull depth to freeboard deck (midship)	5.60 m
Draught, loaded midship	5.25 m
Draught, design	abt. 2240 t
Deadweight (at scantling draught)	abt. 1400
Gross tonnage	15040 GT

PERFORMANCE

Design speed (Design draught, 15%SM)	15.5 kts
Maximum speed (Design draught)	abt. 18.0 kts

CARGO SPACE CAPACITIES

Cars: 1.80 x 4.20 m, 0.4 m gap in between	
Main deck:	181 PCU
Car deck (hoistable):	161 PCU
Trailers: 2.5 x 18.0 m, 0.6 m gap in between	38 units

CREW AND PASSENGERS

Crew:	175 crew members
Ship's crew single cabins:	27 berths
Hotel staff single cabins:	24 berths
Hotel staff double cabins:	24 berths
Passengers:	1336 passengers
Passengers 4-berths cabins:	400 berths
Sitting lounges:	513 seats
Public spaces:	423 seats

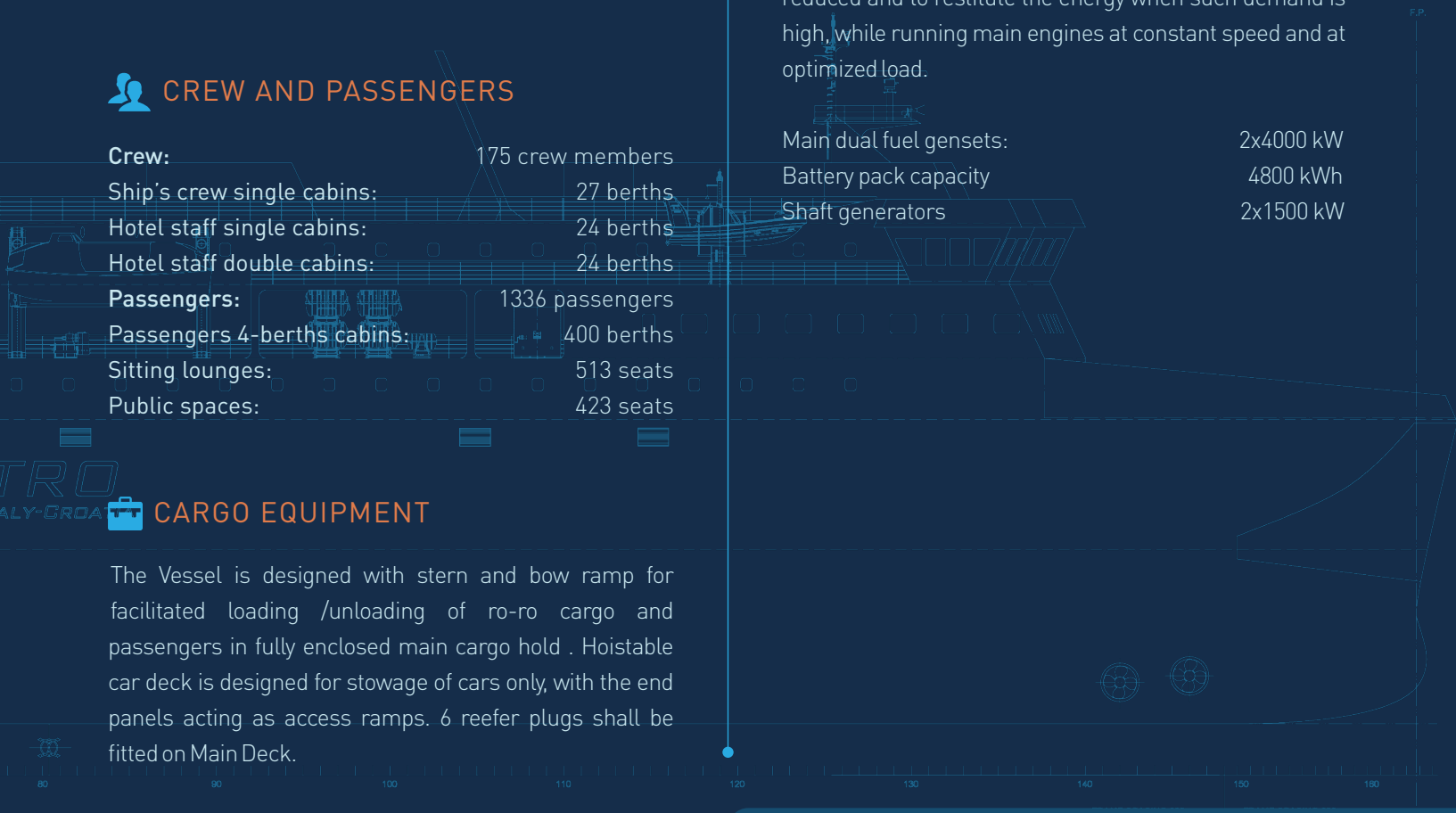
CARGO EQUIPMENT

The Vessel is designed with stern and bow ramp for facilitated loading /unloading of ro-ro cargo and passengers in fully enclosed main cargo hold . Hoistable car deck is designed for stowage of cars only, with the end panels acting as access ramps. 6 reefer plugs shall be fitted on Main Deck.

PROPULSION SYSTEM

The ship is driven by a dual fuel engine machinery propulsion unit consisting of two (2) medium speed, four stroke, non-reversible main engines, coupled to reduction gears, propulsion shafts and controllable pitch propellers. Two (2) shaft generators and one (1) emergency diesel generator unit are provided, as well as battery pack for pure battery operation (manoeuvring, low speed and emergency –PTI operation) and hybrid "peak shaving" operation, used to store energy when the power demand is reduced and to restitute the energy when such demand is high, while running main engines at constant speed and at optimized load.

Main dual fuel gensets:	2x4000 kW
Battery pack capacity	4800 kWh
Shaft generators	2x1500 kW



04. RO-RO PASSENGER SHIP

DESCRIPTION

The vessel is double ended car & passenger ferry intended for restricted waters year around operation in Croatia. The propulsion is based on diesel electrical solution designed in terms of arrangement and electrical system for battery hybrid plug-in solution.

GENERAL

Hull material	Steel
Basic functions	Passenger Ferry

DIMENSIONS

Length, overall	101.90 m
Length, between perpendiculars	92.70 m
Breadth, moulded	20.00 m
Hull depth to lower car deck (midship)	1.05 m
Hull depth to upper car deck (midship)	3.80 m
Draught, max	2.50 m
Draught, design	2.30 m
Air draught	abt. 25.0 m
Deadweight (at max. draught)	abt. 1000 t
Deadweight (at design draught)	abt. 660 t
Gross tonnage	4860 GT

PERFORMANCE

Design speed (Design draught, 15%SM)	10.0 kts
Maximum speed (Design draught)	12.0 kts

CARGO SPACE CAPACITIES

Cars: 1.80 x 4.25 m, 0.4 m gap in between	
Main deck:	130 PCU
Lower deck:	40 PCU
Trailers: 2.5x18.0m, 0.6m gap in between	22 units

CREW AND PASSENGERS

Crew:	12 crew members
No. of crew cabins:	4 off "single" and 4 off "double
Passengers:	600 pax
Lounge:	320 seats
Open decks:	300 seats

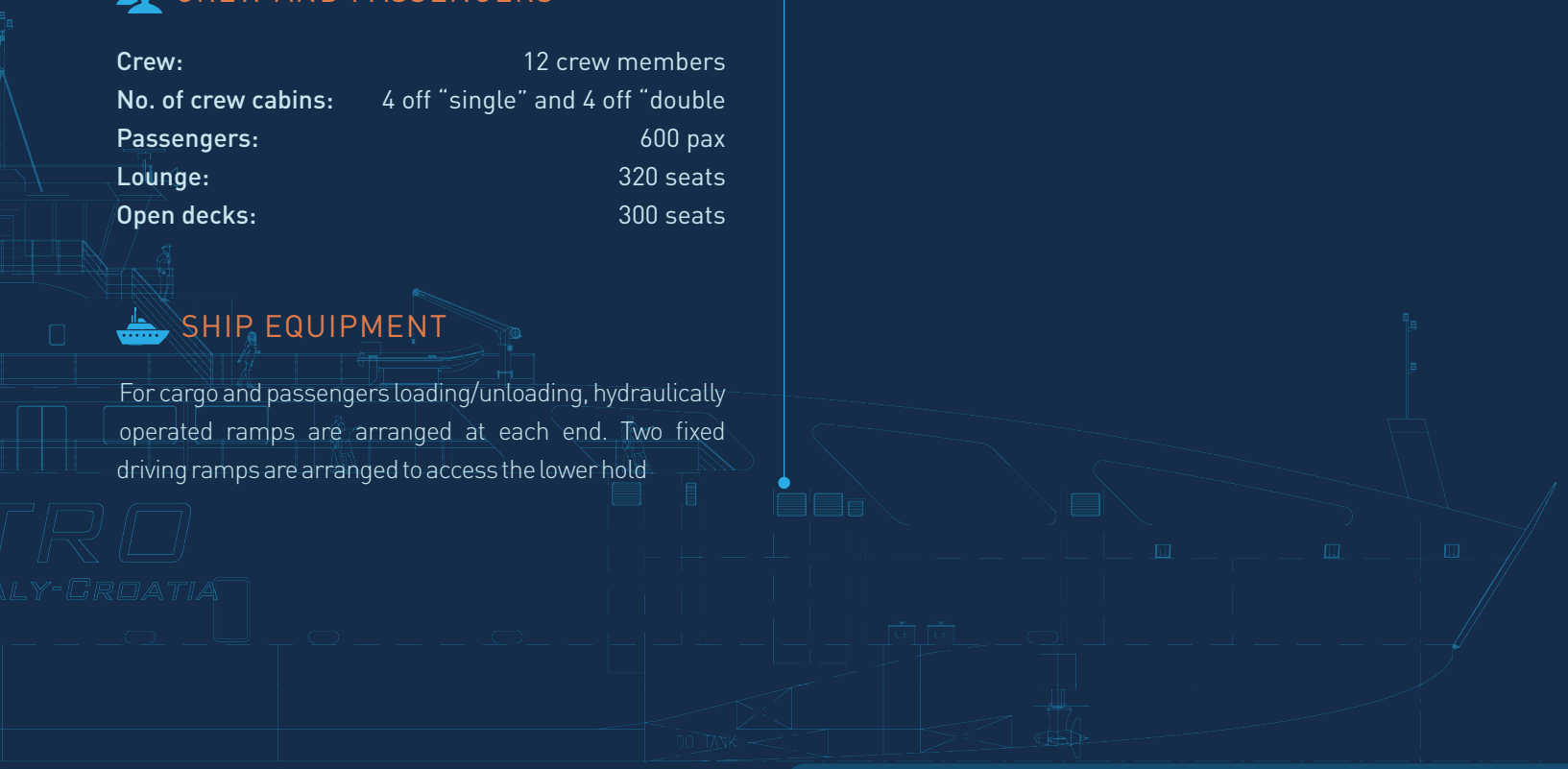
SHIP EQUIPMENT

For cargo and passengers loading/unloading, hydraulically operated ramps are arranged at each end. Two fixed driving ramps are arranged to access the lower hold

PROPULSION SYSTEM

The propulsion is based on a diesel electrical hybrid solution with a battery system. The vessel is able to operate in pure battery mode, with the possibility to charge the batteries from a suitable quick connecting shore power system . Power generating plant consists of diesel gensets and batteries.

Main diesel gensets:	2x1000 kW
Battery pack capacity	700 kWh
Azimuth thrusters	4x370 kW



05. RO-PAX RAIL FERRY Caspian Sea

DESCRIPTION

The vessel is a Ro-Pax rail ferry suitable for transportation of passengers, dangerous cargo in wagons, trucks and other wheeled units in the Caspian Sea Region. The vessel is designed with the possibility of a single passage by the Volga Baltic-Caspian Sea waterway. The cargo area is arranged in the lower hold/tank top and on the main deck. Passenger and crew accommodation are arranged above the cargo area in the fore part of the vessel.

DIMENSIONS

Length, overall	32.60m
Length, between perpendiculars	126.90m
Breadth, moulded	17.50m
Hull depth to lower cargo deck	1.80m
Hull depth to main cargo deck (freeboard)	7.20m
Draught, max	4.50m
Draught, design	4.30 m
Deadweight (at max. draught)	abt. 3850 t
Deadweight (at design draught)	abt. 3450 t

GENERAL

Hull material	Steel
Basic functions	Ro-ro passenger rail ferry

PERFORMANCE

Service speed at 90% MCR, Design draught, 15% sea margin	14.5 kN

CARGO SPACE CAPACITIES

Wagons: 3.08/3.60 x 12.02 m, clear height 4.70/5.25 m
Lane meters for Trailers 3.0 m wide

Main deck:	470 Lane meters
	26 Wagons
Lower hold:	210 Lane metres
	12 Wagons

CREW AND PASSENGERS

Crew:	24 crew members
No. of crew cabins:	14 off "single" & 6 off "double
Passengers:	64 pax
No. of passengers cabins:	16 off "double" & 8 off "quadruple"

Passenger area is arranged on the 1st accommodation deck consisting of passenger cabins area, lounge, restaurant, hospital and public toilets.
No. of passengers cabins: 16 off "double" and 8 off "quadruple".

CARGO EQUIPMENT

Two/four pairs of rails are fitted at main deck and two pairs of rails in the lower hold, spaced 1524 mm apart. One pair of switch gears is fitted on the main deck. One wagon/truck elevator operating between main deck and lower hold. Two wagon pushers are foreseen in the lower hold. Rails are of recessed type and are flush with deck surface. Cargo loading/unloading operations directly to the main deck via the stern door are foreseen. Optionally, side ro-ro ramp can be arranged.

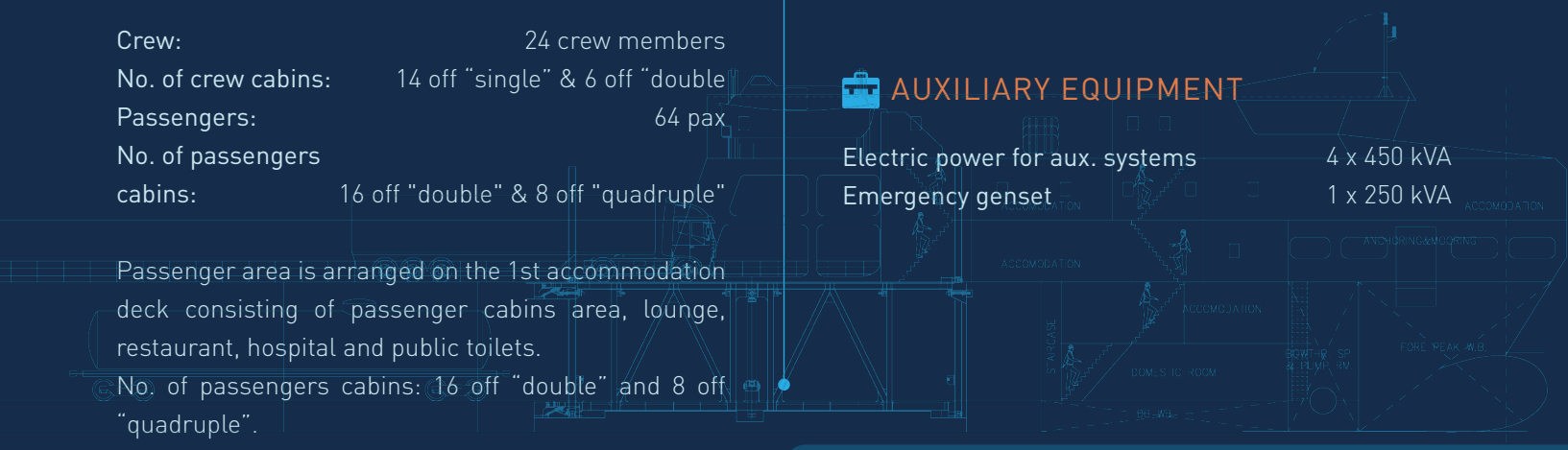
PROPULSION SYSTEM

The propulsion is based on a twin screw concept. The machinery consists of two (2) four stroke diesel engines coupled to the reduction gears, driving shafts and controllable pitch propellers (CPP). The engines are prepared for operation on Marine Diesel Oil (MDO).

M.E. type: Medium speed, four stroke, Tier II
Propulsion power: 2x 2000 kW

AUXILIARY EQUIPMENT

Electric power for aux. systems	4 x 450 kVA
Emergency genset	1 x 250 kVA



06. LNG-FO-BUNKERING VESSEL

DESCRIPTION

Intended for FO/LNG bunkering for coastal or unrestricted navigation, the 5000 dwt vessel has HFO and MGO cargo tanks in double hull construction with C-type LNG storage tanks above Main deck.

GENERAL

Project number	18001
Hull material	Steel
Basic functions	FO/LNG Bunkering Vessel

DIMENSIONS

Length oa	97.5 m
Length bpp	93.4 m
Breadth	18.0 m
Depth to upper deck	8.6 m
Depth to freeboard deck	8.6 m
Draft design	5.6 m
Draft scantling	7.0 m

PERFORMANCE

Speed (service, dft. 5.6 m / 90%SMCR)	3.0 kts
FuelConsumption(MGOmode)	12.6 t/day
Fuel Consumption (LNG mode)	11.7 t/day(27.8 m3/day)
Cruising range	(tbd - 500 or 2500 nm)

CARGO SPACE CAPACITIES

Heavy fuel oil (8 tanks)	3200 m3
Marine gas oil (4 tanks)	1200 m3
LNG (2 tanks)	1500 m3

CARGO EQUIPMENT

Crane Capacity	SWL 4.0 t outside ship's rail 2.0 t at 15m outreach
Tank washing	Built-in system
Manifold position	Amidship and astern
Cargo pumps	250 m3/h per tank
Pump rate capacity	600-1000 m3/h for HFO simultan 300-500 m3/h for MGO simultan 250 m3/h for LNG simultan 1000 m3/h for HFO simultan
Min. loading rate capacity	500 m3/h for MGO simultan

AUXILIARY EQUIPMENT

Electric power for aux. systems	2 x 700 kVA
Emergency genset	1 x 100 kVA
Genset type	DF

SHIP EQUIPMENT

Anchor/mooring winch – bow 2x	electric
Mooring winch – cargo deck bow and aft total 2x	electric
Mooring winch – aft 2x	electric
Bow thruster	1x500kW
Heating system	(tbd)

PROPULSION SYSTEM

M.E. type	DF
Propulsion power	2x 1300 kw
Propulsion type options	2xCPP with reduction gearbox and rudders, or 2x Azipull or 2x Azimuth thrusters with direct DF engine prime mover or diesel electric propulsion

SAFETY EQUIPMENT

Lifeboat	1 x totally enclosed, free-fall, 18 persons
Rescue boat	1 x 5 persons
Life raft	2 x 18 persons
Provisioncrane	2 x 1.5 tSWL/5m (PSandSB)

07. LIVESTOCK CARRIER

DESCRIPTION

The vessel is designed as modern, fuel efficient, environment friendly (green) Livestock carrier suitable to carry various species of livestock, mainly sheep and cattle, in a worldwide service.

GENERAL

Hull material	Steel
Basic functions	Livestock carrier

DIMENSIONS

Length, overall	150.80 m
Length, between perpendiculars	146.00 m
Breadth, moulded	27.00 m
Hull depth to freeboard deck (midship)	13.70 m
Draught, scantling	8.70 m
Draught, design	7.50 m
Deadweight (at scantling draught)	abt.12500 t
Deadweight (at design draught)	abt. 9000 t
Gross tonnage	25692 GT

PERFORMANCE

Design speed (Design draught, 85%MCR)	17.5 kts

CARGO SPACE CAPACITIES

Two (2) portable side ramps for the livestock loading/unloading. Each deck will be divided in six (6) longitudinal rows of pens with four (4) passageways . Two (2) fodder silos, with total net volume of abt. 6200 m3 with fully automatic fodder distribution system.

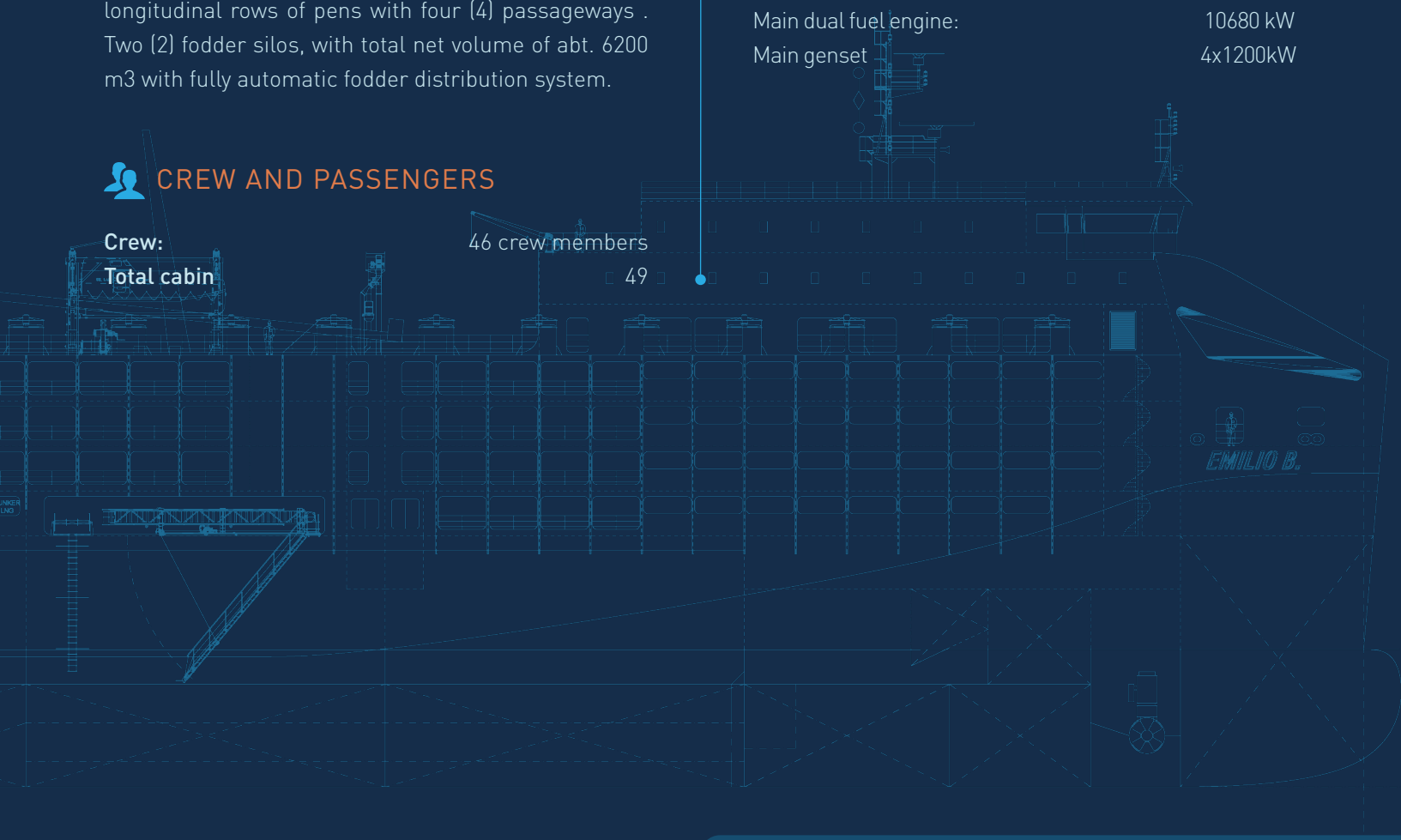
CREW AND PASSENGERS

Crew:	46 crew members
Total cabin	49

PROPULSION SYSTEM

Main propulsor system consists of one (1) marine two-stroke dual fuel engine, crosshead type and one (1) solid type propeller with four (4) fixed blades.
The main power generating plant consist of four (4) dual fuel engine driven generators fitted at ER, one (1) diesel engine driven generator located in AMSA space, and one emergency generator, for electric power supply.

Main dual fuel engine:	10680 kW
Main genset	4x1200kW



08. POLAR EXPEDITION CRUISE VESSEL

DESCRIPTION

The vessel is luxury, modern polar exploration passenger cruise vessel intended for worldwide operation, including polar and tropical areas.

GENERAL

Hull material	Steel
Basic functions	Passenger Vessel

DIMENSIONS

Length, overall	168.00 m
Length, between perpendiculars	147.30 m
Breadth, moulded	21.50 m
Hull depth to freeboard deck (midship)	7.50 m
Draught, scantling	5.60 m
Draught, design	5.30 m
Deadweight (at scantling draught)	abt. 1200 t
International	abt. 15000 t
Gross Tonnage	

PERFORMANCE

Design speed (Design draught, 78% NP)	16 kts
Maximum speed (Design draught)	abt. 17.5 kts

CREW AND PASSENGERS

Crew:	180 crew members
Passengers:	237 passengers
Owner suite:	2
Master suite:	4
Balcony suite:	12
Balcony Stateroom suite C:	30
Balcony Stateroom suite: B:	66

LIFESAVING

Max. Persons on board	417

SPECIAL FEATURES

Submarine garage
Zodiac garage
Marina
Helicopter expeditions

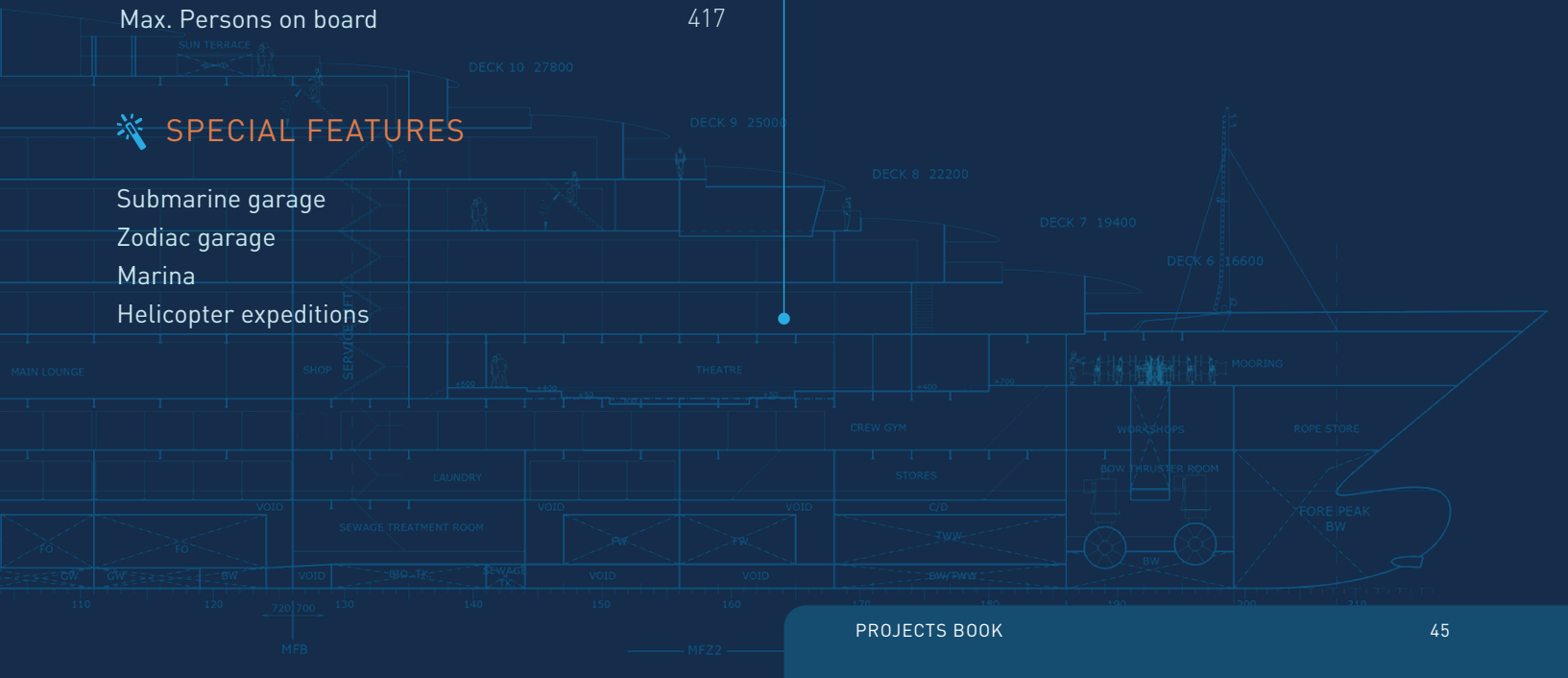
PROPULSION SYSTEM

The ship has diesel-electric power plant, with electrically driven propulsor with an azimuthing pod unit directly driving a fixed-pitch propeller.

The main machinery is arranged as a diesel-electrical power plant, consisting of four medium speed main diesel engines, each coupled to a low voltage synchronous AC generator. Main voltage of electrical system shall be 3 x 690V – 60Hz.

Two (2) AC asynchronous electrical propulsion motors provide continuous power of abt. 3000kW per shaft.

No. Genset	4x3000kW
Total installed power	12.0 MW
Propulsion concept	2xAzimuth
Propulsion power	6.0MW
Polar Class	PC6



09. FIRE BOAT

DESCRIPTION

The Vessels is a Twin-Screw Fire Boat primarily for Firefighting, Pumping, Dewatering, Rescue. EMS (Emergency Medical Service) and anti-oil pollution operations for operating in port area, coastal waters and open sea. The Vessels is designed to meet requirements of Type 1 of NFPA 1925. Standard on Marine Fire-Fighting Vessels, and also Class 1 Firefighting Vessels in accordance with requirement of the classification society and shall be classed as "Special Service Craft, Fire Fighting Class I".

GENERAL

Hull material	Aluminium
Basic functions	Passenger Vessel

DIMENSIONS

Length, overall	40.40 m
Length, between perpendiculars	36.65 m
Breadth, moulded	10.80 m
Hull depth to freeboard deck (midship)	4.80 m
Draught, scantling	3.00 m

PERFORMANCE

Design speed (Design draught, 85% rated speed)	14 kts

FIRE FIGHTING CAPACITIES

System design for the Off-Ship Fire Fighting and Foam Delivery System ("Fi-Fi"). Each fire pump has its own dedicated engine.

The Fire Pump Engines are 4-stroke marine diesel engines and will be able to run the fire pumps at specified flow rate and head for 48 hrs continuously. Vessel has:

- Three (3) dedicated fire engines with pumps.
- Engine control system,
- Fire pump control system
- Fire monitor and valve control system
- Firefighting system (with associated piping, valves, fittings, overboard discharges, fire monitors, manifolds, hydrants) and a foam delivery system
- Water spray system,
- Infrared system to detect the temperature of targets

CREW AND PASSENGERS

Crew:	6 persons
Firefighter:	8 persons
Rescued person:	12 persons

PROPULSION SYSTEM

Propulsion system consists of two (2) four-stroke marine diesel engines, each drives a fixed pitch propeller via a shaft with flexible coupling and reverse / reduction gearbox with built -in clutch.
Two (2) sets of marine diesel engines of heavy-duty type, with mechanical governor. The marine diesel engines are electrically started and water - cooled by means of heat exchanger.

Two (2) rudders of streamlined balanced type of double plate construction are fitted behind the propellers.

10. VEHICLE CARRIER – VINDSKIP®

DESCRIPTION

Pure Car Truck Carrier Vessel VIndskip® intended for the worldwide unrestricted service . The Vessel is capable of carrying various ro-ro cargo, such as cars, roll trailers, buses, and rolling cargoes.

GENERAL

Hull material	Steel
Basic functions	PCTC Vessel

DIMENSIONS

Length, overall	199.00 m
Length, between perpendiculars	194.00 m
Breadth, moulded	54.00 m
Hull depth to freeboard deck (midship)	13.80 m
Draught, scantling	9.60 m
Draught, design	8.50 m
Deadweight (at scantling draught)	abt. 9800 t
Total cargo area	abt. 60000 m2
Total car capacity	abt. 6600 CEU
International Gross Tonnage	abt. 76530 t

PERFORMANCE

Design speed (Design draught, 15% S.M.)	14 kts
Maximum speed (Design draught)	abt. 17.7 kts

CREW AND PASSENGERS

Crew:	25 crew members

CARGO EQUIPMENT

13 fixed cargo decks and 1 liftable car deck. One stern/quarter ramp-door at SB aft for loading/unloading vehicles will be provided. Set of internal fixed ramps, watertight/gastight doors are provided giving access to fixed and liftable decks within the holds. The ramps, flaps and doors are electro-hydraulic driven. Two mobile deck lifters for handling of liftable deck panels to be supplied.

SPECIAL FEATURES

• This concept was patented by company LADE AS - a vessel with a hull shaped like a symmetrical air foil going in the relative wind, will generate an aerodynamic lift giving a pull in the ships direction, within an angular sector of the course. This is Vindskip's Wind Power.

• Hull- steel structure with composite panel on 6 cargo decks and aluminium top.

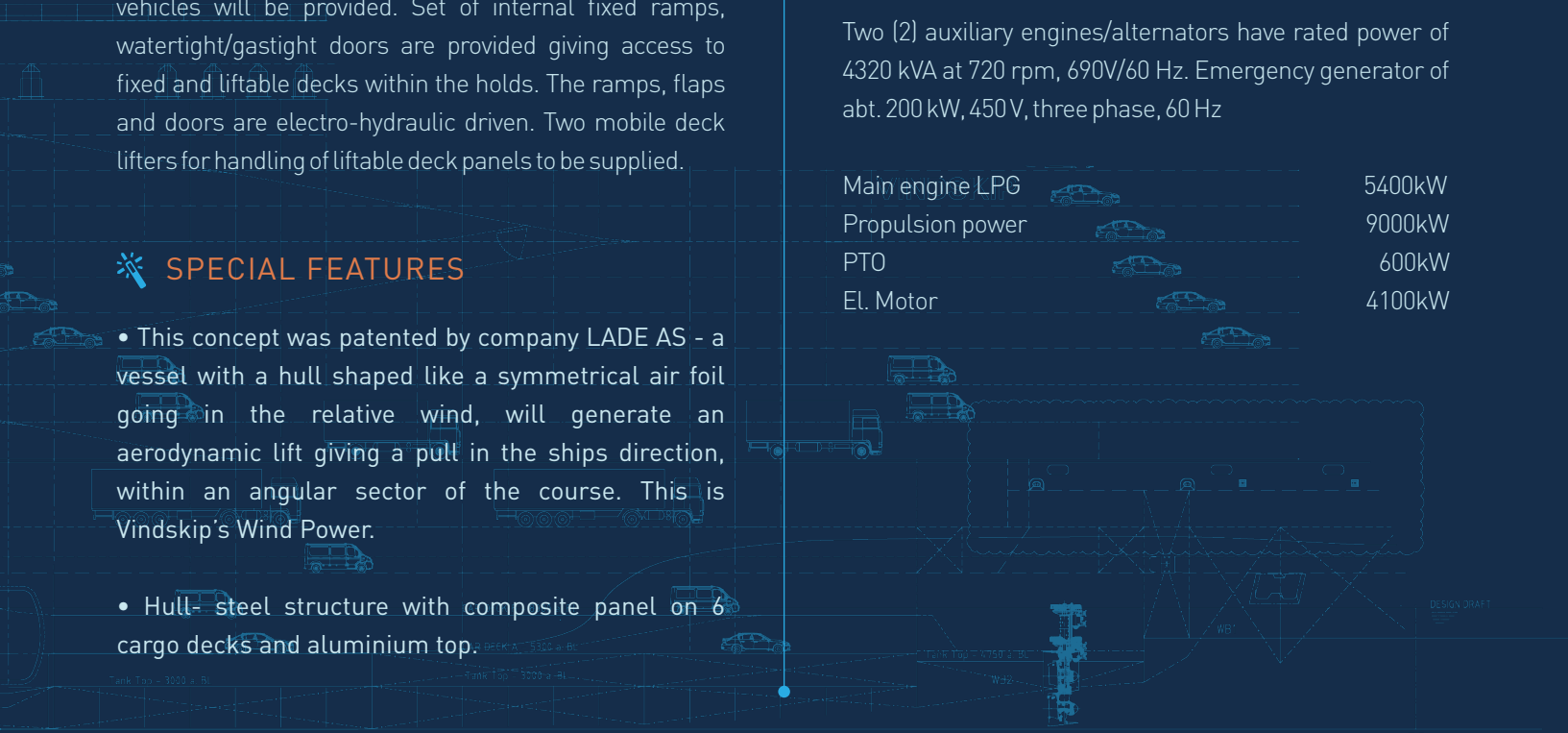
PROPULSION SYSTEM

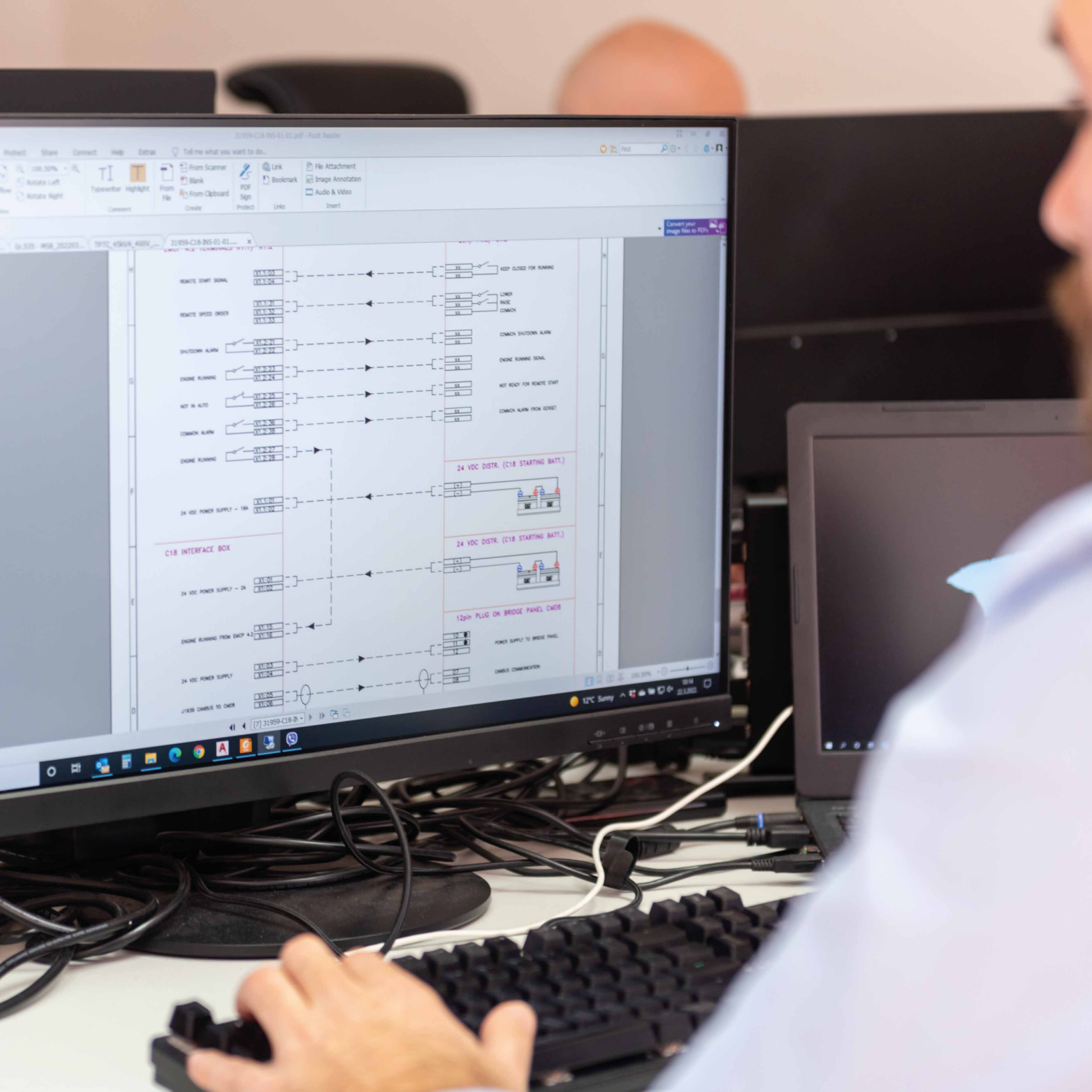
The vessel's propulsion power consists of one (1) main engine, burning LNG fuel and one (1) electric motor for boosting power, coupled to twin input /single output gearbox with primary driven PTO, driving one (1) Controllable Pitch Propeller with diameter of abt. 5700 mm, 4-bladed.

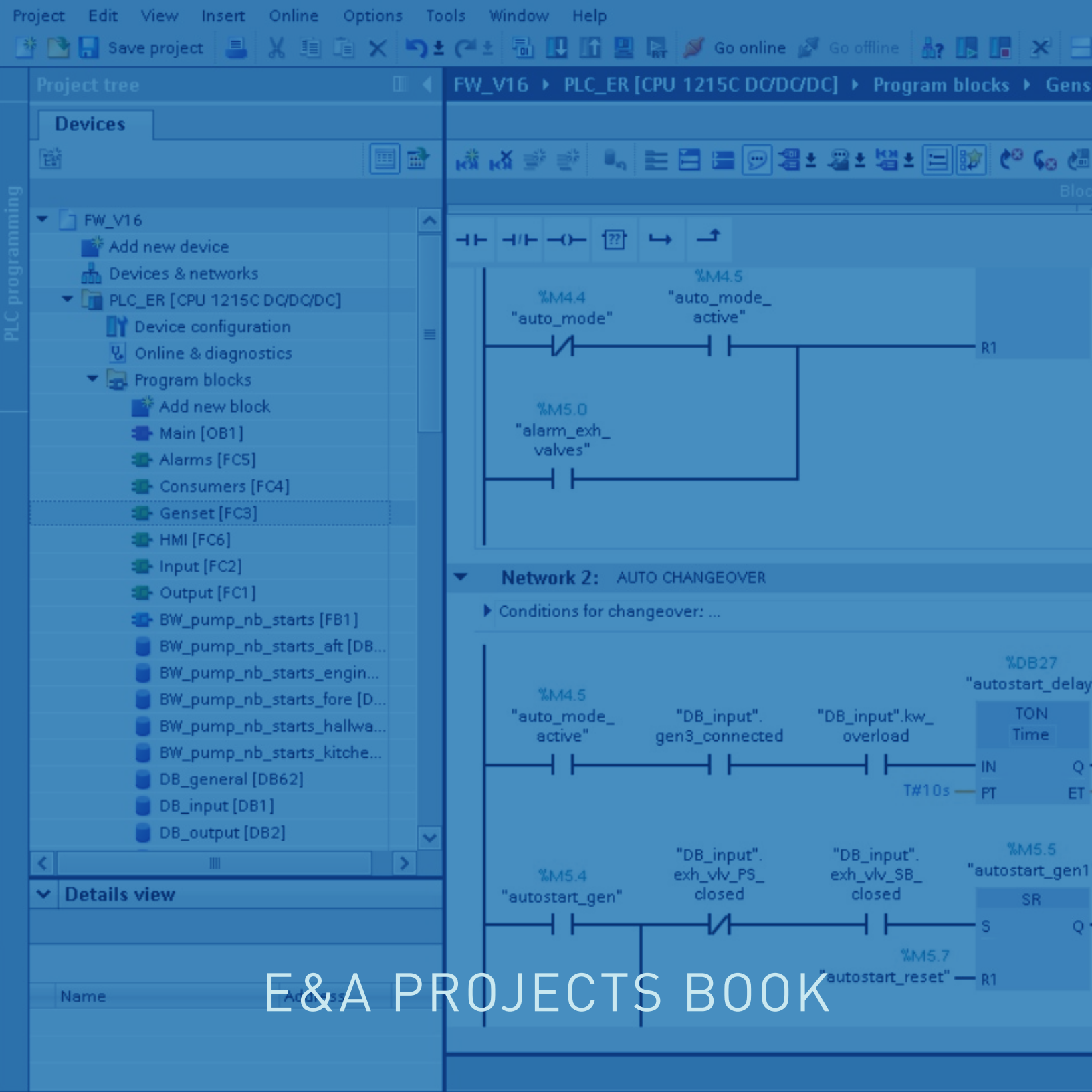
The main engine for ship's propulsion is a four stroke, turbocharged, intercooled, Tier III LNG engine, giving MCR of abt. 5400 kW at 750 rpm. Electric motor for CPP main propulsion has 4100 kW of power at 900 rpm, 690 V and 60 Hz.

Two (2) auxiliary engines/alternators have rated power of 4320 kVA at 720 rpm, 690V/60 Hz. Emergency generator of abt. 200 kW, 450 V, three phase, 60 Hz

Main engine LPG	5400kW
Propulsion power	9000kW
PTO	600kW
El. Motor	4100kW




REMOTE START SIGNAL
REMOTE SPEED ORDER
SHUTDOWN ALARM
ENGINE RUNNING
NOT IN AUTO
COMMON ALARM
ENGINE RUNNING
24 VDC POWER SUPPLY - 10A
C18 INTERFACE BOX
24 VDC POWER SUPPLY - 2A
ENGINE RUNNING FROM EMCP 4.2
24 VDC POWER SUPPLY
J1939 CANBUS TO CMDB
KEEP CLOSED FOR RUNNING
LOWER
RAISE
COMMON
COMMON SHUTDOWN ALARM
ENGINE RUNNING SIGNAL
NOT READY FOR REMOTE START
COMMON ALARM FROM GENSET
24 VDC DISTR. (C18 STARTING BATT.)
24 VDC DISTR. (C18 STARTING BATT.)
12pin PLUG ON BRIDGE PANEL CMDB
POWER SUPPLY TO BRIDGE PANEL
CANBUS COMMUNICATION



E&A PROJECTS BOOK

01. MULTIDRIVE AND WHEELHOUSE CONTAINERIZED SOLUTION FOR SPRAY PONTOON BARGE

DESCRIPTION

The Spray Pontoon with 4 x 45ton mooring winches has a modular, containerized design of different systems to ease the production in remote production location.

Flow Ship Design made the complete electrical equipment design of the Spray Pontoon and design and commissioning of 2 main containerized systems:

1. Power and distribution switchboard
2. Wheelhouse Container

TECHNICAL SPECIFICATION

• Power and distribution system in a 40ft Switchboard containerized solution, air-conditioned and suitable for use in a marine environment. Components including:

- Main Switchboard 400V
- Multidrive (double supply, tie-breaker, six motors control, double electrical breaking) for the speed control of pontoon's winches
- Lighting Switchboard 230V
- Transformers 400/230V
- Battery backed-up 24Vdc supply and distribution
- UPS 230V
- Pontoon's central Alarm & Monitoring system

• Control systems in a 20ft Wheelhouse container with the following components/systems:

- Navigation and Dredging lights
- Communication and navigation systems
- Fire detection
- Wipers
- Searchlight
- Vessel's cable tray design

02. E-CONVERTER

DESCRIPTION

Installed on board offshore installation vessel 'Green Jade' the E-converter is plug and play solution for supplying different deck consumers for offshore vessels.

Flow Ship Design scope in project

- Complete design documentation
- Workshop documentation
- Multidrive software for client customized solution
- Control and alarm system
- FAT and SAT

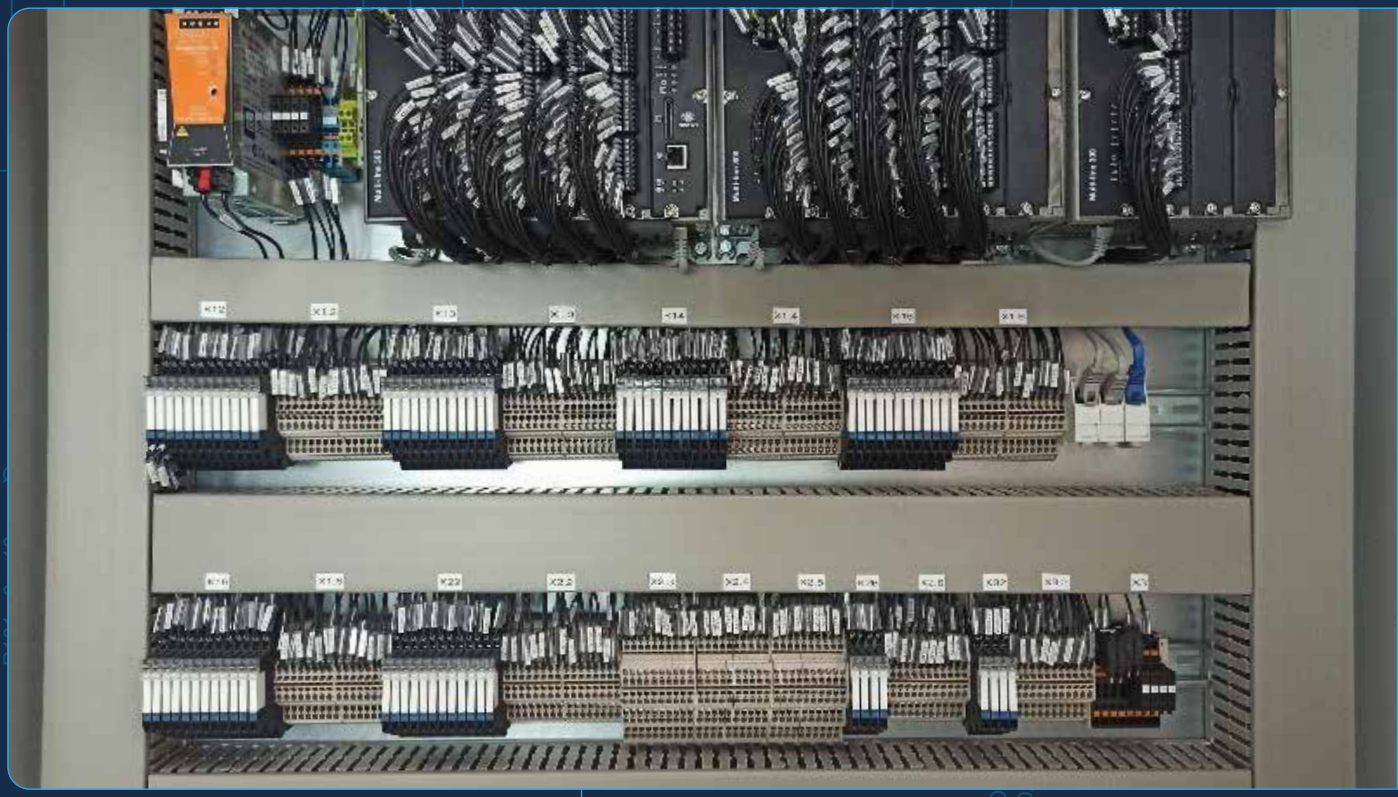
TECHNICAL SPECIFICATION

- ABB OGC with 1000 kVA providing TN-S grid on 400VAC 50Hz
- Transformer 630 kVA providing 440VAC 60Hz grid
- Distribution boards with power sockets TN-S and IT
- Control and monitoring system
- Fire detection system prepared for vessel integration
- Standalone cooling system
- Marine approved equipment and container

03. ELECTRICAL DESIGN AND AUTOMATION AND CONTROL SYSTEM FOR FISH FARM VESSEL

DESCRIPTION

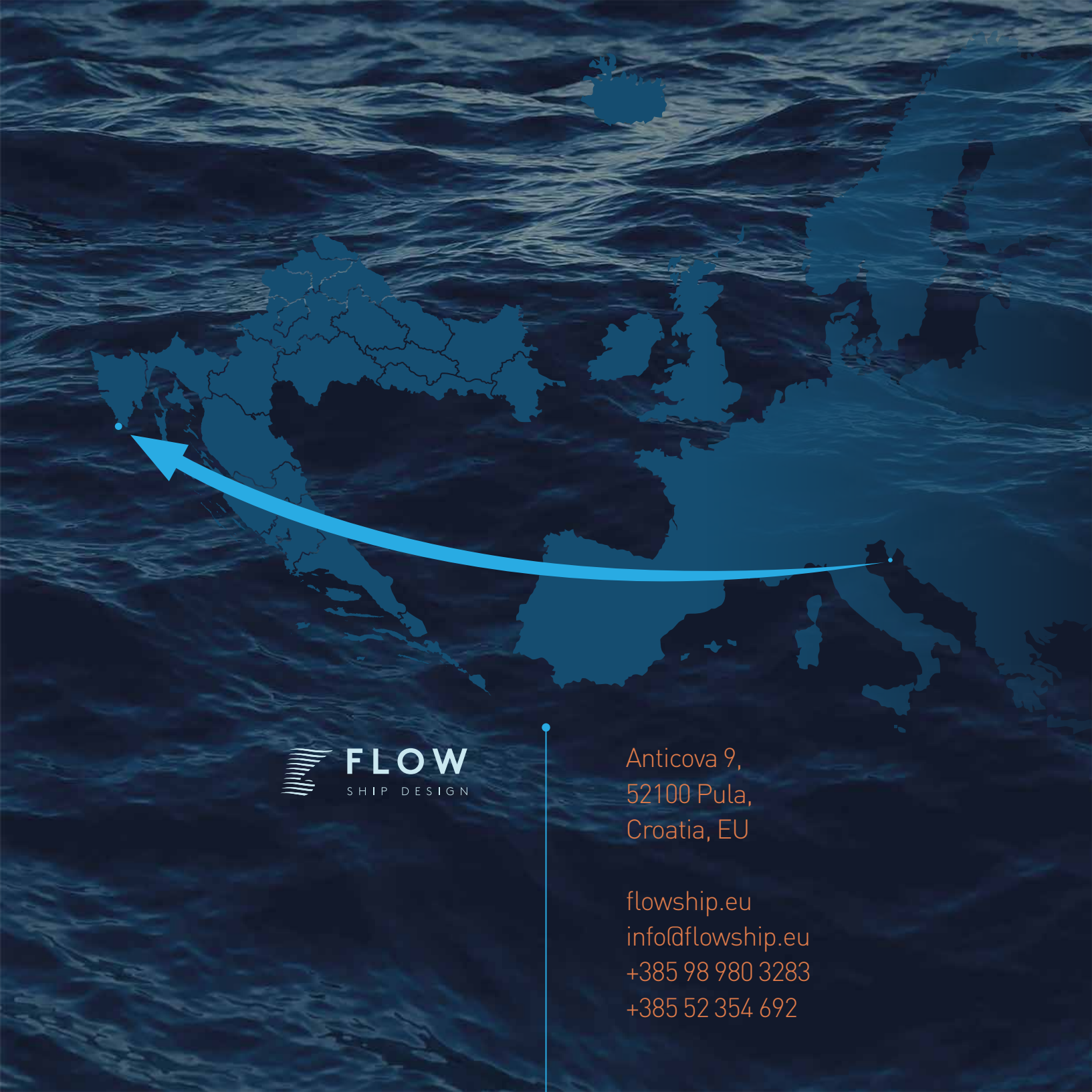
Integrated automation solution for alarming and control of fish farm supply vessel. Used as standard vessel alarm system, tank level monitoring, ballast system control, outside lighting control and power management system.



TECHNICAL SPECIFICATION

- DEIF marine approved hardware
- Complete in-house developed software
- IO CPU cabinet with all IO modules
- 3 control HMI stations
- OPC UA connectivity
- Remote alarming
- Integrated DEIF power management system

DALJINSKI ISKLO
VENTILACIJE NADGRAĐ



FLOW
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