Ingeteam Power Technology - Marine Systems
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Ingeteam

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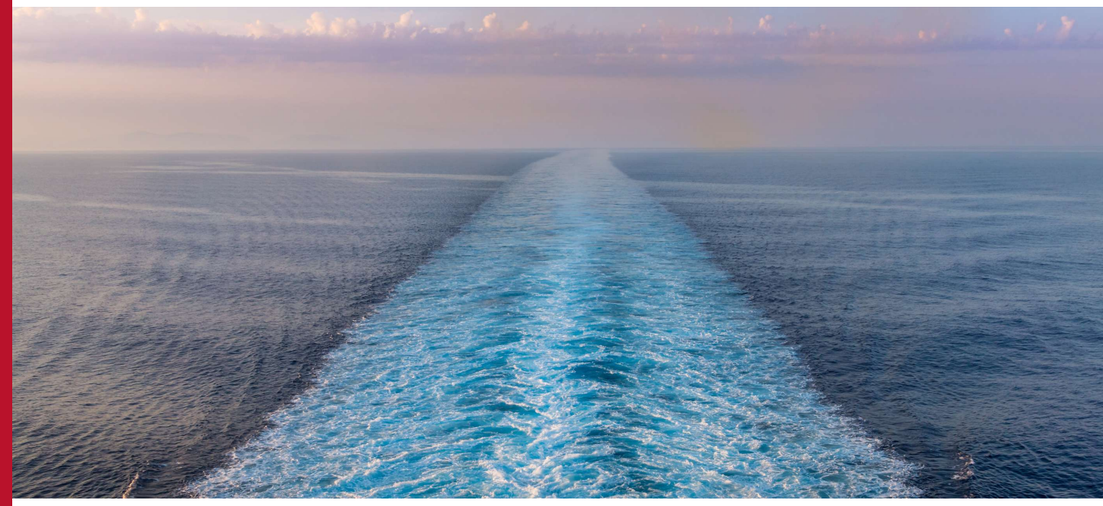
Complete Integrated Marine Solutions



Ready for your challenges

Ingeteam

About us

Ingeteam is the global market leader, delivering turnkey electric and automation projects and offering wide range of complete integrated solutions for the marine sector. With our complete in-house technology and manufacturing of marine generators, motors and converters, we combine our electrical engineering expertise with the high-quality equipment for diesel-electric, hybrid and full electric propulsion systems for the global marine market, building an outstanding reputation for our excellent quality and reliability. The design flexibility of the electric and automation integrated systems together with leading innovations and technological advances guarantee effective tailored solutions that meet all technical and quality needs of our clients.

Ingeteam marine systems

Why leading companies like yours are partnering with us?

Product range We offer a comprehensive range of advanced and reliable electrical equipment developed to provide solutions within wide range of sectors

R&D We are committed to innovation and development of full in-house technology. R&D expenditure accounts for 6% of net sales.

Flexibility Our engineering teams can provide you with flexible solutions tailored to meet your project needs

Worldwide We have manufacturing facilities and service centers strategically located in Europe, Asia, North and South America to deliver the most efficient support and service to you.

Experience We have 20+years of experience in marine industry and 20+GW of installed power capacity worldwide.

Partnership We aim to build long-term partnership with our customers, providing active support for each specific project throughout the entire product life cycle.

Ingeteam by the numbers

>45	80	22	3	3,900	6%
> 45 years of experience In integration solutions	Vessels with complete Integration solutions	Presence in number of countries	Production plants located worldwide	Employees worldwide	Annual Investment of turnover in R&D

Products for the electrical systems

The experience acquired over the years has enabled us to produce a wide range of products using in-house technology and to assume a leadership position in both Spanish and international markets. The electric motors, generators, switchboards & frequency converters we have installed worldwide are the best examples of our competitiveness and production capacity..

Our in-house technology and manufacturing for permanent magnet in-line shaft generator enable our customer to have high efficiency PTO/PTI hybrid electrical system. Our broad experience with super silent motor design and manufacturing ensure our customer to have high performance research vessel to fulfill ICES 209 or DNV Silent-R requirements.

One of the most important features of Ingeteam is the quality and reliability of our products and services, backed up by ISO 9001 and 14001 certification, and the high level of involvement of all the personnel who directly and indirectly take part in the design and manufacture processes.

ELECTRIC GENERATORS

MAIN SWITCHBOARDS

POWER CONVERTERS

ELECTRIC MOTORS

Ingeteam

INTEGRATED SOLUTIONS

Ingeteam delivers the integrated solutions along with the wide range of necessary services, allowing our customers to fulfil their economic, technical and quality objectives. Compliance with technical standards, adherence to target price, meeting the deadlines and customer-oriented strategy are the main elements of our services, which include: engineering, calculations, project management, electrical consultancy, purchasing management, energy comsumption analysis and optimization.

Engineering & calculations

Basic engineering & Electrical calculations

- Electrical design philosophy
- Equipment basic definition
- Single line diagrams
- Electrical load calculation
- Short circuit calculation
- Harmonics calculation
- Aux. power supply requirement
- 230V UPS calculation
- Power Losses and Dimensions
- PMS functional description
- Transformer load calculation

Detailed Engineering

- Electric scheme and material list of the MSB
- External and internal views of the MSB
- Mechanical manufacturing drawing of the MSB
- Electric scheme and material list of the auxiliary and ESB
- Mechanical manufacturing drawing of the auxiliary and ESB
- Feeder list MSB/ ESB
- Instrumentation list
- Starter list

Project Management

- Project control and assistance
- Manufacturing control
- Project technical coordination
- Commissioning supervision
- Project technical documentation
- Document management.

Purchasing Management

- Enquiry specs preparation
- Potential suppliers enquiry
- Offers evaluation
- Placing orders with suppliers
- Suppliers control and follow up

Electrical consultancy

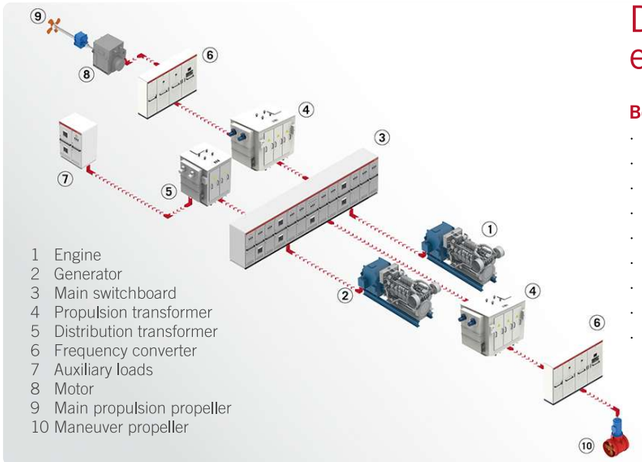
- Design of the electrical system
- Concept studies
- Coordination with other suppliers
- THD studies
- Arrangement of the equipment
- Collaboration with the Classification Societies
- Supply of the required information for the FMEA

Energy consumption analysis and optimization

- Monitoring and recording all relevant data of the vessel
- Development an Energy Model
- Energy balance of the vessel
- List of energy savings opportunities

ELECTRIC PROPULSION TOPOLOGIES

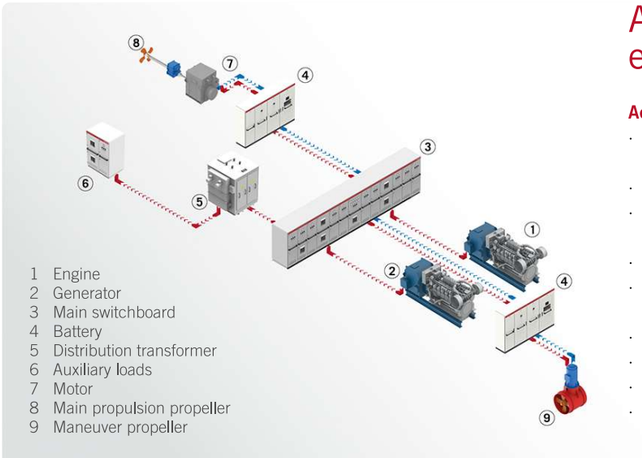
Ingeteam conducts a comprehensive analysis and performs deep understanding of the specific operational needs of our clients, that enables us to define optimized concepts and offer practical and efficient solutions, always meeting the high demads of performance and reaching the required efficiency.



DFE Diesel electric propulsion

Benefits of DFE electric propulsion system

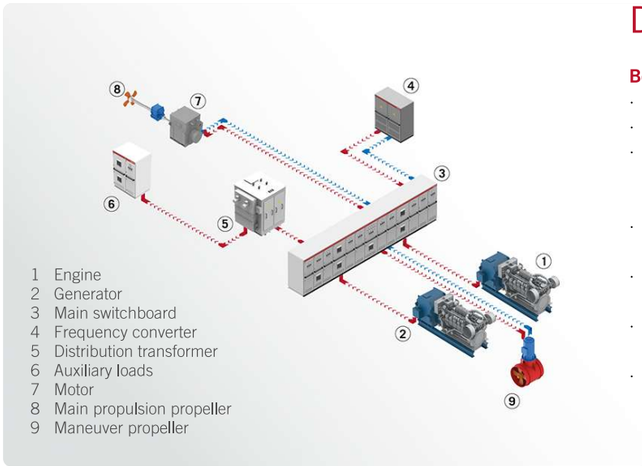
- Optimal performance of the propeller
- Availability of the maximum torque of the propeller
- Optimal acceleration response
- Minimal vibration, noise, and smoke emissions
- Optimization of power installed on board
- Power provided up to 15.000kW
- Low operation cost
- Layout flexibility
- Reduced maintenance



AFE Diesel electric propulsion

Advantages of the transformer less AFE Topology:

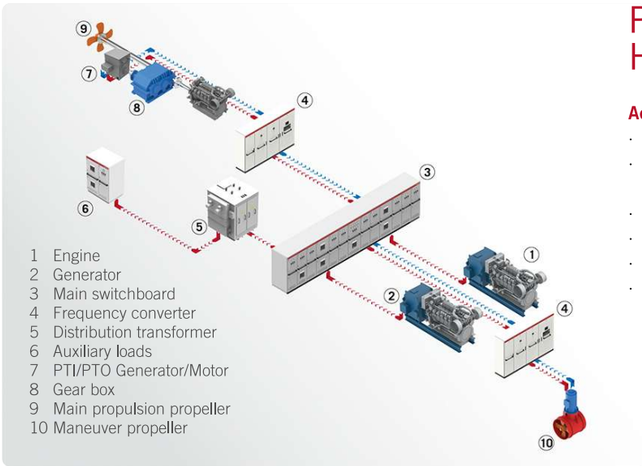
- Size-Weight optimization. Transformerless configuration, cabling simplicity
- Supply Quality. THD improvement
- Stability. Higher compensation capability under load transients
- Energy saved from the stopping of the propeller
- DC Bus Regulation: better performance under grid voltage transients
- Unitary Power Factor. Reduction of Generator size
- Less cabling
- Lyout flexibility
- Saving in hull space



DC Distribution

Benefits of DC distribution system

- High energy efficiency: up to 30% savings in fuel
- Permits the operation of gensets at variable speed
- Compact, highly-reliable and safe solution: guarantees stability, signal & power quality and system protection by design
- Efficient integration of electrical energy storage systems
- Electrical propulsion with the option to operate at zero emissions from the batteries
- Vessel power system integration with ON-SHORE connection
- Versatile and highly-dynamic control, management and reconfiguration of energy and power flows



PTI/PTO Hybrid propulsion

Advantages of the hybrid system

- Reduced emissions and consumption
- Quick and easy switching between the different operating modes
- Increased life cycle of gensets and propellers
- Increased propulsion options
- Redundant and highly reliable propulsion system
- Reduced Acoustic noise and vibrational levels

INTEGRATED AUTOMATION SYSTEM
Ingeship IAS

INGESHIP™ IAS stands for Ingeteam's Integrated Automation System for marine applications: being part of part of the INGESHIP™ automation platform IAS features all necessary monitoring and control functions and delivers enhanced functionality of all electrical systems. INGESHIP™ IAS is the perfect automation solution for medium to large size vessels. It can be used as a stand-alone Integrated Automation System, extended with Power Management, Tank Gauging System, DLM calculations, Water Ballast System Control and many other integrated engine room or navigation functions.

The main components of IAS:

- Distributed Input/Output units connected in a redundant field bus
- Distributed Control Processors that control the remote Input/Outputs units
- Workstations providing the Human Machine interface
- Extended Alarm System
- Extended functions such as Water Ballast Automatic Control, Power Management System

The system performs the following control and monitoring functions:

- Alarm Monitoring System
- Engine monitoring
- Propulsion control & monitoring
- Control engine room and cargo system
- Diagnostic and maintenance tools

Ingeship consoles

Ingeteam supplies the high quality consoles consoles in order to integrate all the systems involved onboard, compliant with the main safety and ergonomic requirements.

The main integrated systems are the following:

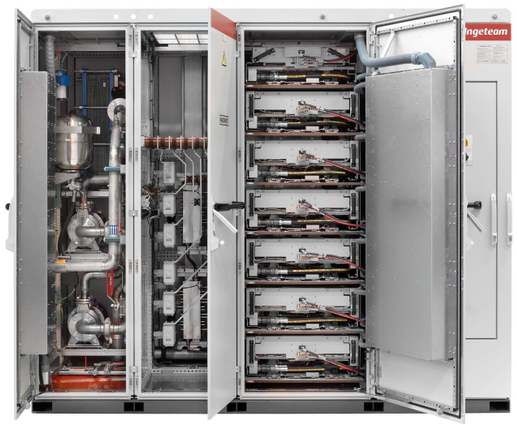
- Alarm Monitoring and Control System
- Navigation and communication equipment
- DP/DT system
- Engine Control System
- Dredging Control System
- Fall-Pipe and Mining Control System
- Side Stone Dumping Control System
- Cargo System
- Survey System, CCTV

Ingeteam

PRODUCTS
Frequency converters

INGEDRIVE™ is a family of low- and medium-voltage modular AC drives designed for demanding single-motor or multi-motor applications handling and controlling synchronous, induction, and permanent magnet motors. These drives are suitable for four-quadrant operation, driving and braking in both rotational directions. INGEDRIVE™ is designed to be a highly-efficient drive which significantly reduces energy consumption. Its modular design enables it to cover a wide range of powers and voltages while its intuitive structure makes it easy to use and maintain.

INGEDRIVE™ is available with power ratings up to 44 MVA, from 400V to 690V in low voltage and 3.3 kV to 6.6 kV in medium voltage, offering great performance, robustness, reliability, and long life expectancy.



Up to 44 MVA
from 400V to 690V in low voltage
and 3.3 kV to 6.6 kV in medium voltage

BESS for hybrid solutions

Ingeteam's Battery Energy Storage Systems (BESS) is a compact battery storage solution controlled by an optimized energy management system that enhances vessel's power plant capabilities. Ingeteam's BESS turns any standard electric propulsion vessel into a latest generation hybrid-electric propulsion vessel.

Working principle and design
Ingeteam's BESS stores energy during low demand conditions, returning it back to the grid when the demand increases. The Energy Management System is responsible for reaching the minimum fuel consumption for the possible combination of energy sources, complying with the restrictions inherent in the system.

Functionalities and capabilities
Adaptable to each vessel's characteristics, BESS allows the following modes of operation:

Peak Shaving
Fixed Load
Load Sharing
Dynamic Boost
50/60 Hz shore connection
Spinning reserve

Up to 40,000 kVA
from 400 V up to 15,000 V

Electric generators

Ingeteam offers a wide range of power, speed, voltage and cooling systems. The power ranges available in synchronous generators varies from 1,250 kVA to 40,000 kVA, with 690 Vac to 15 kVac voltage ranges. Air or water-cooled, open or closed architecture, with brushes or brushless, with or without PMG. High performance and capacity to withstand the overloads and vibrations generated by drives.

Electric motors

Indar offers customized machines based on customer requirements. The IM series of induction motors and SM series of synchronous motors are clear example of our versatility and adaptability to the client's specific requirements based on standard criteria. All the motors in the IM and SM series can be fed both directly from the electrical gird and from frequency converters.

Up to 15,000 kVA
from 400 V up to 15,000 V

REFERENCES

VOLTAIRE

SELF ELEVATING WIND TURBINE INSTALLATION VESSEL

Shipyard: COSCO NANTONG (CHINA)
Shipowner: Jan De Nul
Scope of supply:
4x 4.200 kVA Main Generators, 4x 3.125 kVA Main Generators, Main Switchboards, Transformers, INGESHIP IAS, PMS, PCS, RAS

5500 LANES

RORO SHIP

Shipyard: YANTAI CIMC RAFFLES OFFSHORE (CHINA)
Shipowner: WALLENIUS SOL
Scope of supply:
2x INGEDRIVE LV400 Multidrive Frequency Converters, 2x Permanent Magnet Shaft Generator

GALILEO GALILEI

HOPPER SUCCION DREDGER 18 000 m³

Shipyard: COSCO DALIAN (CHINA)
Shipowner: Jan De Nul
Scope of supply
3x 9.000 kVA Main Generators, main switchboards, 4x INGEDRIVE MV (10.000 kW) Frequency Converters, 4x Asynchronous Motors INDAR, INGESHIP IAS, PMS, RAS

LIVING STONE

MULTIPURPOSE CABLE LAYING VESSEL

Shipyard: LA NAVAL (SPAIN)
Shipowner: DEME
Scope of supply
2x 4.800 kVA / 720 rpm Main Generators, 2x 3.200 kVA / 720 rpm Main Generators, Main Switchboards, INGESHIP IAS, INGESHIP PMS, INGESHIP RAS

KHAKENDI

SUBSEA CONSTRUCTION VESSEL

Shipyard: KEPPEL SINGMARINE BAKU
Shipowner: BRITISH PETROLEUM EXPLORATION
Scope of supply
6x 4.941 kVA Main Generators, 2x 3.941 kVA Main Generators, Main Switchboard, Transformers

Dr. FRIDTJOF NANSEN

FISHERY AND OCEANOGRAFIC RESEARCH VESSEL ICES 209

Shipyard: GONDAN SHIPYARD (SPAIN)
Shipowner: THE INSTITUTE OF MARINE RESEARCH
Scope of supply
2x 1.824 kVA Main Generators, 1x 1.216 kVA Main Generator

TEXELSTROOM

PASSENGER FERRY

Shipyard: LA NAVAL (SPAIN)
Shipowner: TESO
Scope of supply
4x 2.000 kW, INGEDRIVE LV400 Special Frequency Converters, 4x 1.800 kW Indar Asynchronous Motors, Main Switchboards, INGESHIP IAS, PMS, RAS

REFORMA PEMEX

OFFSHORE ACCOMODATION SERVICE VESSEL

Shipyard: HJB BARRERAS (SPAIN)
Shipowner: PEMEX
Scope of supply
6x 3.000 kVA / 720 rpm Main Generators, Main and auxiliary Switchboards, INGESHIP IAS, RAS, PMS.

CRS 360° CUSTOMER RELATIONSHIP SERVICE

SERVICES & AFTER SALES

Ingeteam always aims to bring safety and reliability to our customers, constantly proving that they can count on us for excellence, expertise and responsiveness using our services and after sales services, including: commissioning and sea-trials, training, 24 hours technical support, maintenance, spare parts, agreements with local companies.

Commissioning & Sea trials
Carried out by our technical personnel that actively participated in the elaboration of the project. Before commissioning the systems installed in the vessel functional tests are carried out at our premises. These tests reduce costs and the execution delay of this part of the project, ensuring that commissioning is performed with maximum efficiency.

Training
Carried out at our headquarters or the ship owner´s and/or shipyard installations through tested-out courses adaptable to each type of vessel. Our training personnel offers you a comprehensive range of learning solutions. These solutions are designed to give the required technical understanding and working skills to guarantee the functionality of vessel installation.

Technical support 24 hours
24 h technical support service guarantees the availability of a technician to be in phone contact with the chief engineer and logged to the vessel in a less than 1h, at any time of the day.

Maintenance & Spare parts
Our service, together with our workshop network allows us to offer an effective and agile service. The initial analysis made during the commissioning of our machines and equipment allows us to develop personalized maintenance programs.

Response times, key account engineers and support demands can be defined by agreement, and aligned with the level of availability required. Such an agreement can be combined with the maintenance services and a spare parts availability contract. Through our spare parts service, we establish calendars and specific initiatives in close coordination with our technical assistance team.

Services agreement with local companies
Ingeteam is ready to enter into an agreement for special service at the owner place, in order to obtain an easy access on board of the vessel in case if needed. Via Ingeship RAS the local company technicians on board will be able to perform a technical assistance 24/7, as well as to schedule maintenance programs.