INDAR ELECTRIC

ELECTRIC MACHINES

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Indar Electric designs, manufactures and supplies electric machines. Thousands of motors and generators produced in a period of more than sixty years have led it to create a strong basis of experience and know-how.

Nowadays, Indar Electric belonging to Ingeteam is the largest Spanish manufacturer of electric motors and generators.

Our machines are renowned and appreciated for their sturdiness, quality and maximum reliability.

The corporate philosophy and products aim to give a differentiated personal treatment and custom-built solutions.

This spirit of adaptability, is the force behind our own advanced technology which, in turn, allows a strong position in the international markets.

That is the only way to win, to break limits and reach new goals.
Resources

The different sections are equipped with cutting-edge technological resources - R+i, sheet metal cutting, machining, winding, assembly, test bench and deliveries. These installations are 40,000 m². In line with Indar’s commitment to its environment, it has been certified in accordance with the EN ISO 14.001 Environmental Management System.

1 Sheet stamping

This section is housed in a soundproofed building and is equipped with cutting lines, automatic numerical control punch presses and an enamelling line. Here the sheet is stamped with maximum precision, thus guaranteeing optimum quality during the useful life of the electrical machine.

2 Machining centres

Equipped with the most advanced systems and equipment, such as vertical lathes, boring mills, axle lathes and grinding machines, CNC machining centres, especially designed for the manufacture of large machines.

3 Coil manufacture and windings

The winding section consists of two areas, one for coil manufacture and the other for the insertion of coils and for connections.

The first area is isolated from the other working areas, with constant temperature and humidity control and modern means of production to guarantee maximum quality when preparing the coils.

The second area is equipped with abundant resources that allow the machines to be manipulated carefully in the different winding stages. Tests are carried out to ensure perfect quality throughout the process.
Impregnation

The VPI impregnation process consists of two cycles. The first of these consists of creating a vacuum, removing the air and all humidity from the insulating material, then injecting resin under pressure into the windings. Finally, they are placed in the oven for the resin to polymerize, resulting in optimum insulation and solidity.

This section consists of the Vacuum Pressure Impregnation (VPI) tanks, from which we obtain insulation class H machines, immersion tanks (static and dynamic) and curing ovens.

Machine assembly

The assembly area has a crane capacity of up to 240 tons. There is also an area specifically prepared for the assembly of vertical machines.

Test center

At Indar Electric we test asynchronous, synchronous and d.c. machines in compliance with such International Standards as IEC, NEMA, etc. Data gathering is automated during these tests.

If the client wishes, the machines can be certified in accordance with the requirements of official classifying societies such as Lloyds Register, Bureau Veritas, Norske Veritas, etc.
Advanced technology R+D+i

Indar Electric possesses a R+D+i support unit staffed by highly skilled people and equipped with state-of-the-art systems for the design and development of its machines.

The philosophy of only working with one’s own technology ensures maximum flexibility and performance.

Mechanical Finite elements calculations

The finite element study of the different components that form part of the machine. The mechanical stresses require detailed research including the calculation of shafts, finite element simulations of the stresses supported by critical parts (frames, base-plates, covers, shafts, etc.).

FEM Magnetic design

Our knowledge of the physical phenomena, together with the latest software to calculate finite elements, has allowed us to optimize the electro-magnetic design of our machines and thus obtain higher performance.
Electric engineering uses modern electrical computing programs that result in designs of optimum capability and efficiency. These are checked by conducting finite element simulations of electromagnetic fluxes and tests on the bench in our installations. Also, close cooperation with centres of technological development and universities allows us to develop new products.

Cooperation with the client forms part of the philosophy of the company, with a personalized and unique treatment forming the basis of the relationship, and with a clear common purpose: to develop products and services adapted to the characteristics of each project. Constructional design is particularly robust so as to ensure the machine’s long service life.

Indar Electric also uses advanced computer fluid dynamics (CFD) simulation software that is a model of current practice in the calculation and design.

The main structural components are analyzed by means of 3-D Drawing System. The greater flexibility of design in the machines allows adaptation to the specific requirements of each application.
Range of products

Indar Electric offers a wide range of products designed to meet the most varied needs of our customers, from the energy, marine, and industrial sectors.

All the machines have been integrally developed with our own technology and by making the most of Indar’s rich experience in those fields in order to provide maximum sturdiness and quality.

1. **Wind generators**
   - Double fed asynchronous generators from 850 kW up to 6,000 kW and voltages from 690 V up to 15 kV. For all machines insulation class H, IP-23 to IP-56 and horizontal.

2. **Hydro**
   - Synchronous generators from 1,250 kVA up to 40,000 kVA and voltage from 690 V up to 15 kV. For all machines insulation class H, IP-23 to IP-56 vertical and horizontal.

3. **Cogeneration**
   - Synchronous generators for steam turbines, gas and diesel engines from 1,250 kVA up to 35,000 kVA from 690 V up to 15 kV. For all machines insulation class H, IP-23 to IP-56 and horizontal.
Asynchronous motors
Squirrelcage and slip ring motors from 400 kW up to 15,000 kW and voltage 690 V up to 15 kV. For all machines insulation class H, IP-23 to IP-56, vertical and horizontal.

Synchronous motors
From 1,000 kW up to 15,000 kW and voltage 690 V up to 15,000 V. For all machines insulation class H, IP-23 to IP-56 and horizontal.

Submersible Motors (IP-68)
From 1,000 kW up to 10,000 kW, and voltages from 690 V up to 15 kV and 1,000 m depth in the sea.

DC Machines
From 400 kW up to 4,000 kW.
The experience acquired during this time allows us to provide a wide range of products, developed from our own technology, placing us in a position of leadership both in the Spanish and international markets.

All of the generators and the motors installed throughout all the world are a clear exponent of our competitiveness and productive capability.

One of the most important factors of Indar Electric is the quality offered in products and services, guaranteed by the ISO 9001 and 14001 certificates, as well as the high level of involvement of all of the personnel that directly and indirectly take part in the design and manufacturing processes.

In this context, the Ingeteam company has decidedly opted for the EFQM model, as a framework for competitiveness in the coming years, with the aim of offering excellence in our products and services.
Business areas

INDAR WIND POWER
- Wind power

INDAR HYDRO
- Hydro power

INDAR CIM
- Cogeneration
- Industry
- Marine
Cooperation with the client is part of company philosophy, with a personal treatment as the cornerstone of the relationship. Also with a clear common aim - to develop products and services tailored to the characteristics of each project.

Indar Electric has allocated a production line with full technical, productive and after-sales capacity exclusively to the manufacture of wind generators. The mechanical and electrical software applied to the design are based on own technology and also are used advanced electrical and mechanical simulation tools (mechanical calculation using finite elements, magnetic flow measurement, etc.).

The wind generator range has been designed to cover all the energy needs of the market. Indar Electric supplies generators with the required output powers, from 850 kW up to 6 MW and voltages from 690 V up to 15 kV. Asynchronous double fed or synchronous with permanent magnets and the technology xDFM, Clean Power Series.

The generators are manufactured in accordance with internationally approved quality assurance standards, using the highest quality materials, as insulation and impregnation systems, resulting in machines that are very reliable, due to their low maintenance and high efficiency.

The over 8,000 wind generators supplied clearly indicate the trust Indar’s clients have shown in the company.

2,000 kW
1,500 rpm, 690 V. Asynchronous, double fed.
Wind power generation

- Generators of power levels from 850 kW up to 6 MW.
- Asynchronous double fed or synchronous with permanent magnets and technology xDFM, Clean Power Series.
- Air and water cooled.
- For all machines up to isolation H.
- Voltage from 690 V up to 15 kV.
- For variable flow turbines.
- Various fabrication structures and forms.
- Noise level adjusted to client needs.
- Compliance with international standards: IEC, NEMA. Etc.

1,750 kW
1,500 rpm, 690 V. Asynchronous, double fed.

2,000 kW
1,500 rpm, 690 V. Asynchronous, double fed.
cooperation with the client

2,500 kW
1,000 rpm, 690 V.
Asynchronous, double fed.

850 kW
1,500 rpm, 690 V.
Asynchronous, double fed.

1,500 kW
1,500 rpm, 690 V.
Asynchronous, double fed.

1,500 kW
1,000 rpm, 12 kV.
Asynchronous, double fed.
Indar Electric has been extremely active in this field for several decades now, supplying synchronous generators from 1,250 kVA up to 40,000 kVA and voltages from 690 V to 15 kV to suit the needs of each customer.

Design flexibility extends to all the peripherals that can practically be incorporated into these machines, like controllers, fireproofing systems, lubrication equipment, temperature probes, brakes, inertia flywheels, etc.

Nowadays Indar Electric is the leader of the Spanish market with a strong foothold in other countries. This leading position is just the logical result both of our continuous effort to give customers and users individualized solutions and of a close co-operation with hydraulic turbine manufacturers.

Collaboration in developing the projects from their initial stage, with the input of the know-how gathered from countless dealings in all types of turbines and hydraulic jumps world-wide.

Extremely reliable machines specially designed for hydro power generation, that ensure maximum availability at high efficiency throughout the year.

Installation and start-up or supervision of these processes in hydraulic plants anywhere in the world.
Hydro power generation

- Synchronous generators from 1,250 kVA up to 40,000 kVA.
- For all machines up to isolation H, IP-23 to IP-56.
- Air and water cooled.
- Manufactured in different voltages, from 690 V to 15 kV.
- For hydraulic turbines of different types, Pelton, Francis and Kaplan.
- Different forms of construction, vertical and horizontal.
- International standards: IEC, NEMA, etc.

C.H. Kargilik (Turkey)
13,670 kVA
750 rpm, 6.3 kV
Brushless three-phase synchronous.

C.H. Sahechores (Befesa)
14,750 kVA
330 rpm, 6.6 kV
Brushless three-phase synchronous.
maximum availability at high efficiency
Cogeneration

Co-generation plants demand the highest possible full-capacity utilisation rate from the installed equipment. Indar Electric has been giving satisfaction and assurance to the customers for many years, due to the high reliability and sturdiness standards applied to the design and manufacture of the generators.

Besides, a close collaboration with the supplier of the engine (diesel, fuel, gas or oil) or turbine (gas or steam) permits the production of generators perfectly adapted to its equipment and to the plant.

The flexibility of our organisation also allows us to supply these machines within a very short period, in a range of powers from 1,250 kVA up to 35,000 kVA and voltages from 690 V up to 15 kV.

Finaltair Power Plant (Caterpillar)

4,111 kVA

1,000 rpm, 6.3 kV.
Synchronous brushless generator driven by gas engine.
Cogeneration

- Synchronous generators with power from 1,250 kVA up to 35,000 kVA and voltage from 690 V up to 15 kV.

- Indar Electric has been giving satisfaction and assurance to the customers for many years, due to the high reliability and sturdiness standards applied to the design and manufacture of the generators.

- Besides, a close collaboration with the supplier of the engine (diesel, fuel, gas or oil) or turbine (gas or steam) permits the production of generators perfectly adapted to its equipment and to the plant.

- The flexibility of our organisation also allows us to supply these machines within a very short period.

Moyresa (Rolls Royce)

4,040 kVA

1,000 rpm, 6 kV. Synchronous generator driven by gas engine.

Test Bench (Wärtsilä)

9,119 kVA

750 rpm, 13.2 kV. Synchronous generator driven by diesel engine.
perfectly adapted in a short period
Since its creation, Indar Electric has always seen the industry as the core for the growth of the company. Business in this sector enabled us to amass a tremendous amount of experience and gain customers from all over the world.

The most frequent applications in the industry include drives for pumps, fans and mills as well as traversing motors. Four sectors that, however, have their own peculiarities to be added to the characteristics of each installation. The design parameters of a motor drive are basically the same for a banbury mixer in the rubber industry or a pulper in the paper industry, or a coal mill in a thermal power plant, but it is this vast experience in all these sectors which permits the development of optimum equipment for each use.

In-house developed technology makes it possible for us to transform an initially standard machine by adding different modules and accessories in order to make it fit for the required application or to build a totally customized or purpose-designed machine.

In the iron&steel industry, the characteristics offered by Indar Electric can make the difference:

- Long experience and supplies all over the world.
- Versatility to meet customer or plant-specific requirements, owing to high technological standards and to the organisation’s great flexibility.
- Sturdiness, reliability and quality as required by the iron&steel industry for uninterrupted operation even in adverse environmental and working conditions.

To satisfy all the needs of this sector, we offer a complete range of specially designed products, including from direct-current motors to cycle-converter-fed synchronous motors or PWM-controlled alternating current motors. The design and manufacture of all those machines comply with diverse international standards in the iron&steel industry, like IEC, NEMA, AISE MILL, ASA, ANSI, VDE, JEMA.
Asynchronous motors with power from 400 kW up to 15,000 kW and voltage from 690 V up to 15 kV.

Synchronous motors with power from 1,000 kW up to 15,000 kW and voltage from 690 V up to 15 kV.

Thanks to the modularity of these motors and the new series, Indar motors are a perfect solution for applications as diverse as:

- Combined cycle plants: Circulation pumps and condensation pumps. Compressors. Fan drives: Wind tunnels, thermal generating stations, smoke extraction, etc.
- Drives for mills in the paper, cement and industries.
- Steel industry: Milling boxes, winders, unwindors, cutters, etc.

Combined Cycle Plant (Bahía de Bizkaia)

1,600 kW x2
420 rpm, 6 kV. 2 AC motors to drive circulating pumps.

Hoesch (Germany)

4,500 kW
50 rpm, 1.65 kV. Synchronous motor powered by a cycle converter.
supplied all over the world

- Torrevaldaliga Nord (Italy)
  - 4,450 kW x 12
  - 990 rpm, 6.6 kV
  - 12 motors to drive the ventilators from a thermal station.

- Hoesch (Germany)
  - 2,500 kW
  - 600 rpm, 830 V.
  - Synchronous motor fed by cycle converter.

- Combined Cycle Plant Santurce (Spain)
  - 875 kW
  - 500 rpm, 6 kV.
  - Asynchronous squirrel cage motor to drive a pump.
For more than 50 years, the shipbuilding industry has been trying and testing the sturdiness of Indar machines and, over that period of time, Indar Electric has won recognition and prestige for the reliability of its machines in the most adverse working conditions.

Such long experience in the supply of equipment for all kinds of craft, e.g. fishing ships, offshore platforms, cargo liners, dredges, ferries, etc., proves the users’ trust in our machines.

The wide range of products available covers all the needs for electric drives existing aboard ship, namely main and transverse electric propulsion, principal and auxiliary power generation, deck machinery and so on.

As a special application intended to revolutionize the dredging market, submersible pump and cutter motors from 1,000 kW up to 10,000 kW and voltages from 690 V up to 15 kV have been designed and produced thanks to the company’s great R&D assets. Indar Electric is a world leader in this line of hi-tech equipment apt to work as deep as 1,000 m below sea level.

Hopper Dredger Vasco Da Gama
Jan De Nul (Belgium)

6,500 kW x2

253 rpm, 3.1 kV.
Two submersible motors.
Marine

- Submersible motors with power from 1,000 kW up to 10,000 kW and voltages from 690 V up to 15 kV. Indar is a world leader in this line of hi-tech equipment apt to work as deep as 1,000 m below sea level.

- Asynchronous motors with power from 400 kW up to 15,000 kW and voltage from 690 V up to 15 kV.

- Synchronous motors with power from 1,000 kW up to 15,000 kW and voltage from 690 V up to 15 kV.

- DC motors with power from 400 kW up to 4,000 kW.

- Synchronous generators with power from 1,250 kVA up to 35,000 kVA and voltage from 690 V up to 15 kV.

- A wide range of products for electric drives existing aboard ship, namely main and transverse electric propulsion, principal and auxiliary power generation, deck machinery, etc.

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Cutter Dredger
Jan De Nul (Belgium)

- 3,800 kW x2
- 1,200 rpm, 3.3 kV.
- 2 cutter motors.

Swath Ferries (Holland)

- 1,320 kW
- 353 rpm, 3 x 690 V.
- 2 double AC motors.
Oceanographic Research Vessel
Celtic Explorer (Ireland)

1,500 kW x2
190 rpm, 750 V.
2 DC motors.

2 Hopper Dredgers 11,300 m³
Jan De Nul (Belgium)

3,400 kW
280/320 rpm, 3.3 kW.
1 Submersible motor.

Cutter Dredger
Jan De Nul (Belgium)

3,750 kVA
1,000 rpm, 690 V.
Synchronous generator.

Double Ended Ferry
Dokter Wagemakeer (Holland)

1,650 kW
900 rpm, 660 V.
4 Asynchronous motors fed by PWM.

World leader in submersible motors
Technical assistance services

— 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 machinery allows us to develop personalized maintenance programmes. This involves both preventative and predictive maintenance.

— Through our spare parts service, we establish calendars and specific initiatives in close coordination with our assistance team. Manufacturing and supplying our own spare parts as well as third-party ones also forms part of our Customer Support Service.

— Common elements that form part of our service include sets of rings and coils, complete rotors, spare stators, DC poles, shafts, etc.

— Our extensive test bench facilities, together with the support from our machine engineering department, enables us to solve complex problems and guarantee our repairs.

— Our support team has experience in a wide range of fields of application (marine, hydraulic, cogeneration, etc.) and in all types of mechanical and electrical contingencies.
around the world

Commercial agencies all over the world
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