“There is a driving force more powerful than steam, electricity and atomic energy: the will.”

Albert Einstein
CORPORATE HISTORY

A GREAT HISTORY FOR A GREAT FUTURE

BACKGROUND
First in-house products in control, measurement and power electronics.

EIGHTIES 80’s
Ingeteam strengthens its position in the industry and energy sectors, digital control products and application engineering.

NINETIES 90’s
Strengthening of the commitment to develop electrical and control systems for the renewable energy, wind and solar areas. The beginning of international expansion (Founding of subsidiaries in Germany, Czech Republic, China, Brazil and Mexico).

21st CENTURY
Commencement and consolidation of activities in the marine, traction, rail, engineering sectors and the turn-key supply of energy plants.

Timeline:
- 1999: Start of operations in Ingeteam Service
- 2001: Start of operations in wind power
- 2005: Start of services in AWP and Neg Micon turbines
- 2006: Start of Photovoltaic activity
- 2007: Start of services in Vestas turbines
- 2008: Start of Hydropower activity
- 2009: Opening in Mexico
- 2010: Opening in the United States
- 2010: Opening in Italy
- 2010: Opening in Germany

1 GW in O&M projects
2 GW in O&M projects
A comprehensive range of products and services, customised to meet the specific needs of each customer or project

**Ingeteam Service** offers its customers all the experience and assurance of being part of the Ingeteam Group: A leading company in the electronics-electrotechnical sector.

The core of Ingeteam’s business is based on power and control electronics, the technology for electric machines, generators and motors, and application engineering.

Ingeteam’s key asset is its team of more than 3,500 professionals, 9% of which are dedicated to R&D&I. Whilst, with regard to the Renewable Energy division, the percentage of personnel dedicated to R&D is as high as 37%.

Ingeteam is committed to Technology and Innovation as a growth engine.

A business corporation structured into 4 sectors, each specialising in the development of customer-oriented technology and service provision.
INGETEAM IN THE WORLD

NORTH AMERICA
USA
Mexico

SOUTH AMERICA AND CENTRAL AMERICA
Honduras
Uruguay
Brazil
Chile
Panama

EUROPE
Spain
France
Italy
Germany
United Kingdom
Poland
Czech Republic
Romania
Bulgaria

Zamudio
(Bizkaia)
Ingeteam Power Technology Service · (Albacete)
Germany
Australia

France
Italy
Mexico
Panama
**Ingeteam Service**

Ingeteam Service is a member of the Ingeteam Group, with registered offices in Albacete (Spain). The company started up in 1999 and is currently a leader in the provision of operation and maintenance services at energy generating and exchange facilities, and enjoys a global presence.

Ingeteam Service provides Operation & Maintenance services at:

- **Wind Farms**
- **PV Plants**
- **Energy generating plants**

Ingeteam Service is a customer-oriented company, focussed on providing excellent service through ongoing collaboration with customers. In this way it is possible to meet the specific needs of each and every customer and to remain in close contact throughout the project life cycle.

In order to successfully meet the requirements of each specific plant, Ingeteam Service has a workforce that is committed to quality and efficiency. Ingeteam Service considers its team of staff to be the company's greatest asset. As a result, the company is making an ongoing effort to ensure that personal safety is one of the key aspects of its work.

In this new period with a renewed commitment to innovation, Ingeteam Service is maintaining the company's strategy of active participation in the different Research Programs of the European Union, Spain, and the Autonomous Communities. Ingeteam Service is directing the management of R&D&I towards the achievement of increasingly efficient processes, the development of new maintenance technologies, and the implementation of new tools that provide benefits and competitive advantages to shareholders, customers and employees.  

**Headcount:**

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
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<td>2012</td>
<td>342</td>
</tr>
<tr>
<td>2011</td>
<td>373</td>
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</table>
MISSION
To provide tailored services to customers in the energy generating and exchange sector, by applying engineering, research and design.

VISION
To be a leader in all the specialist services we provide.

Why Ingeteam Service?

Because we’re the world leader in the provision of Operation & Maintenance Services to energy generating plants.

► Anywhere in the world
More than 1,200 professionals working across the globe. Present in 22 countries with local personnel and high performance capabilities.

► Experience in Multi-technology
Ingeteam Service’s extensive experience in the sector means that the company is considered to be a reputable leader by the principal renewable energy OEMs. With a business model that is differentiated by the added value derived from its capability to implement multi-technology services, the company provides innovation in its processes.

► Throughout the value chain
Collaboration with the customer takes place throughout the service life of the plant, facilitating commissioning, carrying out all-inclusive maintenance and supporting plant management and operation, in order to maximise performance.
Flexibility to meet your needs

Our experience includes the following technologies:

- Gamesa
- Vestas
- Siemens
- General Electric
- Acciona WindPower
- Neg Micon
- Mtoi
- Senvion
- Suzlon
- Goldwind
- Mitsubishi Power Systems
- Adwen
- Nordex

Growth

Maintained Wind Power (MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>MW</th>
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<tbody>
<tr>
<td>2016</td>
<td>6.500</td>
</tr>
<tr>
<td>2015</td>
<td>5.000</td>
</tr>
<tr>
<td>2010</td>
<td>2.210</td>
</tr>
<tr>
<td>2005</td>
<td>1.093</td>
</tr>
<tr>
<td>2000</td>
<td>111</td>
</tr>
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</table>

More than 4,200 Wind Turbines maintained throughout the world with a Total Installed Wind Power of +6,500 MW
Since 1999, Ingeteam Service has been dedicated to the provision of all-inclusive Operation and Maintenance Services for wind farms. Currently, Ingeteam Service is working on more than 200 Onshore and Offshore wind farms throughout the world with a total installed power of more than 6,500 MW. The extensive experience gained means that Ingeteam Service is qualified to become your strategic partner for implementing maintenance programs.

Our knowledge, coupled with agreements with manufacturers, enables us to work on the implementation of maintenance programmes for wind turbines under warranty, according to the technologist’s specifications. Furthermore, being an independent supplier, we have developed strategies based on Customised Services: **we aim to meet our customer’s requirements, by increasing plant availability.**

### Wind Power Maintenance Models

1. **Support for the customer’s maintenance teams** or maintenance campaigns with specialist technicians.

2. **Preventive maintenance**, according to the manufacturer’s manual, our own criteria and that of our customers.

3. **Preventive maintenance and Minor corrective maintenance**, either in-person or through a 24/365 on-call service.

4. **Customised design** of Maintenance Services according to the customer’s requirements and warranties.

5. **Integrated Operation and Maintenance** of the plant.

   - Preventive Maintenance, Minor Corrective Services and Major Corrective Services.
   - Maintenance of safety elements, roads and infrastructures.
   - Predictive maintenance and on-line indicator monitoring.
   - Plant operation, Monitoring and reporting.
   - Plant performance study, efficiency analysis and continuous improvement.
   - Provision of stock, the supply of spares, consumables and components.
   - Management of purchasing, logistics and repairs.
   - Environmental management.
On / Off-shore commissioning services
- Pre-Commissioning / Commissioning
- Maintenance Service up to power up
- Technical training of local teams.

Blade Services
- Work using a platform, rope access and skyclimber.
- Preventive/Corrective maintenance.
- Supply of materials and spares.
- Cleaning of blades and towers.
- On-ground and at-height inspections
- SAR Conductivity measurement
- Fitting marking lights
- Blade balancing
- Fibre repairs Nacelle and Cone

Major Corrective Services
- Replacement of Major Components
- Technology-specific tooling.
- Spares: Sale or Exchange
- All-inclusive management of the service
- Up-tower Repairs

Spares
- Characterisation of components
- Development of maintenance stocks
- Repair of components
- Supply of components
- Exchange of components
- Supply of consumables & material for preventive material
- Logistics management of customer warehouses

Retrofits and Maintenance support
- Design improvements
- Lubrication
- Oil changes
- Generator alignment
- Joint re-tightening

Maintenance Engineering and Management
- Development and implementation of work instructions and procedures
- Design and certification of specific tooling
- Customised training courses
OMS Wind Power

Life-time Extension
Audit to certify the remaining life
Replacement of components to extend life time
Technological upgrades for FSWT-VSWT turbines

High voltage services
Preventive & Corrective Maintenance TS & E.Substations
Electrical Protection Testing
Predictive Testing on Substation Switchgear Preventive & Corrective
Maintenance of MVL and HVL
Power Quality Measurement
Prev. Maint. S. Circuit Controllers for Power Transformers
Automation & Control
On-call service 24/365
Management of Regulatory Technical Inspections

External Audits and QC/QA
End-of-warranty audits
Maintenance Audits
Condition monitoring
Audits Inspections with videoscope
Power train inspection through vibrations
Thermography and Electrical Testing
Oil & grease analysis
Supervision of Construction, Assembly, Quality and ORP
Supervision of Logistics and Ocean shipments

INGESYS® CMS
Condition monitoring system
Equipment supply and installation
Data analysis and processing
Training in vibration analysis
Integration of data from different manufacturers

Ingeboards® Tool for the Advanced Operation of Wind Farms
Data analysis operations
Analysis of errors, alarms, defects and stoppages
Analysis of predictive data and inspections
Display and comparative analysis of variables
Data processing service
Ingeteam not only designs and manufactures the power and control electronics installed at PV plants. In addition, since 1999, Ingeteam has also been focused on offering the best possible maintenance service to ensure optimum performance and continuous operation.

The knowledge, experience and specialisation of Ingeteam’s team of highly qualified specialists, are all decisive factors in the maintenance of your PV plant.

**Realistic flexibility**

The solutions provided by Ingeteam for any type of PV plant, guarantee reliability and maximum efficiency.

Simply tell us what you need. Our company is so versatile that we can meet your requests right from the outset, when the contract is drawn up, so that we are always in a position to offer you excellent service.
Growth

Maintained power (MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
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<tbody>
<tr>
<td>2016</td>
<td>2.400</td>
</tr>
<tr>
<td>2015</td>
<td>1.400</td>
</tr>
<tr>
<td>2010</td>
<td>250</td>
</tr>
<tr>
<td>2005</td>
<td>2</td>
</tr>
</tbody>
</table>

More than 450 Plants maintained throughout the world with a Total Installed Power of 2.400 MW
Each plant is constantly monitored from our Control Centre.

We are committed to offering our customers a proactive service, always planning ahead for any potential contingencies at the PV plant.

We compile data on production, performance, maintenance etc. Acting immediately to ensure the correct operation of the plant, whilst also providing plant status reports.

We'll take care of everything, for your peace of mind.

This service is an absolute must for any plant. Ingeteam uses its expertise to develop maintenance protocols that are based on the most demanding standards, for guaranteed plant operation and extended service life.
Spares
Our supply is governed by your needs

We adapt to the specific stock size requirements of each plant. With our own logistics centres, we are able to guarantee the supply and an immediate response time with no need to invest in spares.

We can guarantee the procurement of all brands of spares and components, thanks to agreements with leading manufacturers and distributors.

Production Guarantee
Our supply is governed by your needs

We have the necessary technical capability to achieve the production expected from your plant and the necessary financial standing to cover the production cost of possible deviations.

The operational availability of components is guaranteed, and so is the Performance Ratio. Should the financial result obtained be lower than that stated in the contract, then Ingeteam will provide financial compensation. Our commitment is to guarantee a return on investment.
The experience of the Ingeteam group, together with its engineering and project management capabilities, means that it is capable of addressing all types of challenges ranging from the supply of a simple component to the operation and maintenance of any energy generating plant, supplying all-inclusive solutions for the development of electricity generating plants whilst seeking to optimise the use of energy resources.
We have combined our experience in O&M, which dates back to 1999, with our knowledge of the development of electronic monitoring products and our energy plant design know-how, in order to offer our customers all the services that maximise availability and profitability for all types of energy generating plants.

**Types of Service**

- All-inclusive Operation & Maintenance
- Supervision of assembly
- Commissioning and operating tests
- All-inclusive operating solutions
- Plant operation management
- Plant local and remote operation
- Programmed shut-downs and overall inspection
- Customised Predictive, Corrective and Preventive Maintenance
- Specialist services
- Supply of equipment and spares

**Energy Sources**

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Power (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>69</td>
</tr>
<tr>
<td>Solar Thermal / Cogeneration</td>
<td>310</td>
</tr>
<tr>
<td>Hydro</td>
<td>940</td>
</tr>
</tbody>
</table>
Maintenance Engineering
- Definitions of the types of maintenance
- Definition of work flows
- Supply and implementation of COMPUTERISED MAINTENANCE MANAGEMENT SYSTEMS (CMMS)

Technical training
- +3,000 Hours of technical training given each year
- +100 Hours of courses implemented
- INGEBOX e-Learning platform (www.ingebox.com)

Development and certification of lifting tools and accessories (UTMs)
- +200 UTMs developed and certified

Development of technical instructions (TIs) and checklists (CKLs)
- +2,000 TIs developed
- +300 CKL’S developed
- +50 Technical manuals developed

Technical Support
- +20 Technologies
  (Wind Power, Photovoltaic, Biomass & Solar Thermal)
- Specialisation
R&D&i
Committed to ongoing innovation

Strategic lines
► New diagnostic techniques applied to the maintenance of renewable energy plants and maritime and rail traction systems.
► Improvements in existing production technologies.
► New renewable energy production systems.

Functions
► Coordination and development of national and international R&D&I projects.
► New predictive maintenance systems.
► Technology Watch Newsletter.

More than 25,000 hours per year dedicated to Research & Development
With a staff of 30 employees

MOST OUTSTANDING PROJECTS

CENIT WIND POWER: “Operation and Maintenance methodologies for deep water offshore wind farms”.

ICINGBLADES: “Development of advanced techniques for defrosting wind turbine blades and preventing the accumulation of snow”.

WINDBB: Predictive diagnosis of the wind turbine power train through the application of smart algorithms to the acquisition of sound recorded at ground level”

OPTIMUS: “Development of methods and tools for the optimisation of large sized wind turbines”.

SUPRAPOWER: “Development of superconducting wind generators that are more lightweight, robust and reliable, installed in 10 MW offshore wind turbines”.

Engineering | R&D&i | ingteam
Ingeteam Service is firmly committed to establishing policies and guidelines that guarantee customer satisfaction whilst maintaining respect for the environment. Likewise, Ingeteam Service is committed to safety, as a core value, in order to guarantee the health and safety of its employees and collaborators.

With these aims in mind, the company’s actions are directed at:

- The continuous improvement of its integrated quality, environmental and occupational risk prevention management system, in line with standards: ISO 9001, ISO 14001, OHSAS 18001 and UNE 166002.

- Furthermore, Ingeteam Service guarantees the training of its employees to the highest safety standards. The company is GWO certified.

- We are progressing in Corporate Social Responsibility models.
Company Directory

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