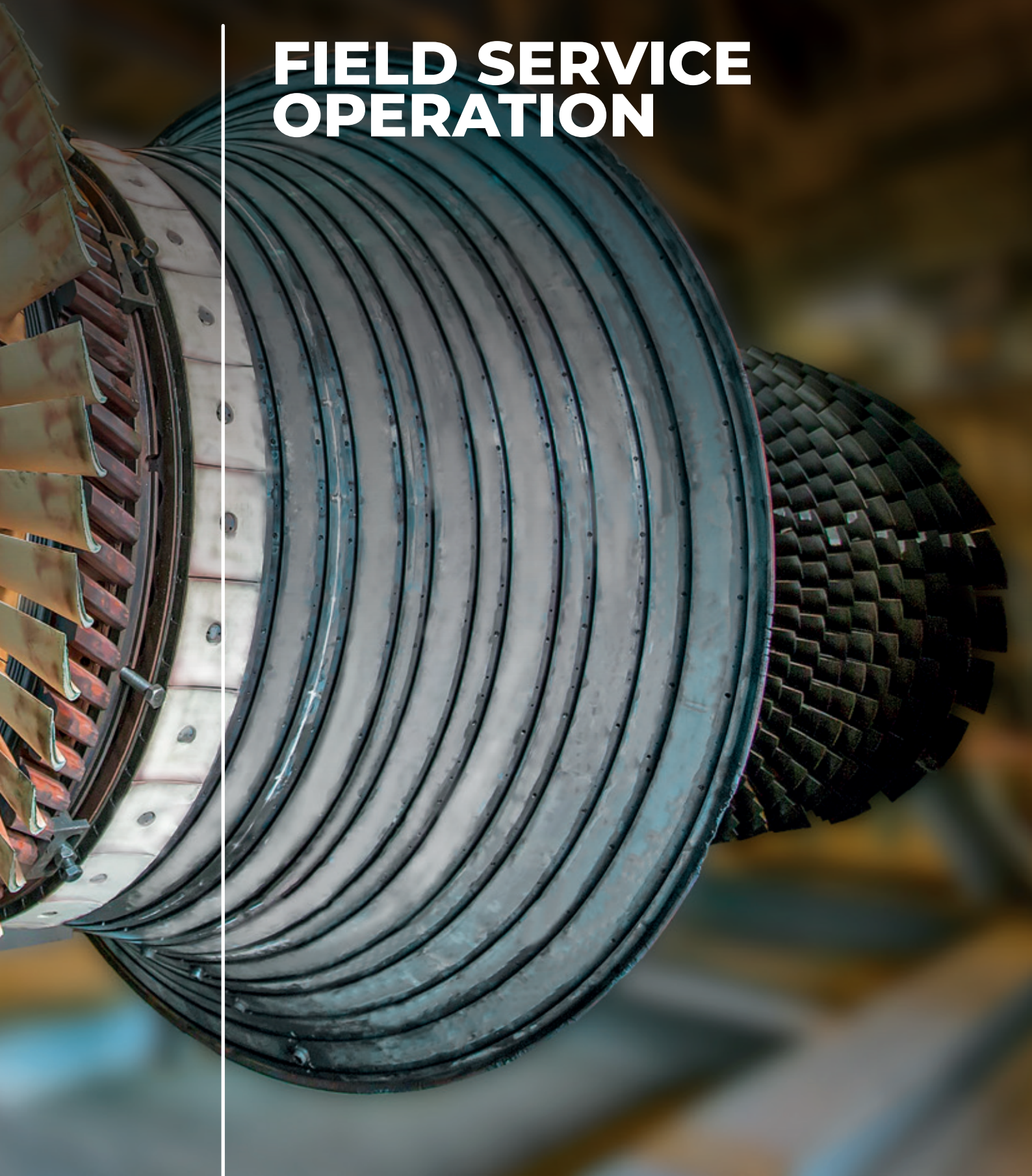


FIELD SERVICE OPERATION



FIELD SERVICE OPERATION

Ansaldo Energia Field Service supports a full range of activities from on-call day-by-day technical field dispatching to long term turnkey maintenance contracts, with jointly agreed scope and duration, at the highest quality level. All in accordance with customer, and Ansaldo Energia Environmental, Health and Safety requirements: "Safety First" is our main priority.



Supporting customers by providing a Flexible, Reliable & Multi-Platform Field Service Portfolio

We offer fully integrated outage teams of highly experienced professionals capable of completing overhauls in a timely, safe and high quality manner. Our Field Services support a wide range of power generation equipment including gas turbine, generator, steam turbine and auxiliary equipment.

Our mission is to support our customers by providing a flexible, reliable and multi-platform Field Service portfolio, by:

- Performing site execution according to customer targets for quality and time
- Developing regional field service capabilities to be closer to customer needs
- Ensuring the availability of qualified personnel on-time, at the right place and at competitive costs
- Optimizing the utilization of global capacities and competencies with local capabilities

We deliver expertise based on 170 years of know-how

WE PROVIDE:

- Periodic Inspections
- Predictive Analysis
- Routine Maintenance
- Unplanned Maintenance
- Cost savings analyses

IN A TYPICAL YEAR WE PERFORM:

- More than 400 Major Outages / Inspections worldwide, carried out on Gas Turbines, Steam Turbines, Generators, BOP of different technologies
- More than 1,000,000 manpower hours on sites all around the world performed by our
- 400 Field Service Engineers, TFAs, Fact Finders, Specialized Technicians, Supervisors, Commissioning Engineers, Site Managers

A Global Network...

A regional organization with customer vicinity

Our Global Network is aimed to ensure:

- proper execution of contracts and tendering activities
- support and coordination of local entities
- optimization of Field Service processes and capacity based on shared best practices
- management of tools and equipment at a global level

Our global network is based on three pillars

1.

TECHNOLOGY

- Standard Procedures
- Technical Support
- Knowledge Management
- Critical Skills
- Specialist Functions
- Methods Developments
- Special Tools & Equipment Developments
- Commissioning Specialist
- Training and Qualification

2.

PROCESS & CONTROL

- Management Process and KPI
- Operation Reviews/ Site Audits
- Continuous Improvement Process
- Process Innovation
- Knowledge Sharing

3.

EXECUTION

- Site Logistics
- Site Execution
- Local field Service resources
- Residents
- Tools & Equipment Management
- Local vendors
- Global Planning and Integrated Execution
- Tools, Instruments, Equipment Forecasts
- Tools & Equipment Management

An Innovative Approach for Field Service

- To reduce intervention time, logistic time and cost saving
- To allow problem solving promptness: our team of experts is available from Headquarters to deliver you competences
- For an augmented reality concept: real time component evaluation



Digital training and documentation

- The digitalization of operative sequences facilitates in situ operations.
- Advanced digital tools are available to train internal and third-party personnel.



Remote Operating and smart commissioning

- Our experts act directly for corrective actions and plant operational optimization through remote connection to control system.
- We supports our Customers in implementing the connectivity infrastructure and cyber security.



Remote Assisted Activities (Helmet with smart glasses)

- Interactive step-by-step "how-to" to guide field works in the execution of complex interventions
- Available on RealWear device
- Voice-controlled interface that enables hands-free operations and data inputs.



Generator Robotic Inspection

- In-Situ General Robotic Inspection for improved availability.
- Our IDLIR diagnostic tool operates inside the turbogenerators and performs diagnostic measurement.

A Wide Range of Field Service Options

Ansaldo Energia is able to offer our Clients a wide range of field service options, based on the characteristics of each component of your plant : from a short inspection to a major overhaul, including the machines and their auxiliaries. We cover different technologies: OEM, OEM-like as well as multi - OEM platforms. as well as multi - OEM platforms. .

Inspection type	Duration	Scope
A ↓ B ↓ C ↓	A / B* MINOR / SHORT	< 1 Week
	B HGPI / INTERMEDIATE	From 3 to 5 Weeks
	C MAJOR	From 5 to 7 Weeks

* GT26 B Inspection

Legend:



Visual inspection



Mechanical activities and dimensional check



Turbine Blade/Vanes replacement or refurbishment



Rotor extraction

Standard inspection activities

Gas Turbines:

Minor Inspection

- Visual inspection on combustion chamber, 1st and 4th turbine stage, 1st compressor stage, exhaust gas duct, filter house and air intake.
- In case of humming, a short inspection includes a visual inspection on combustion chamber and 1st turbine stage.

Hot Gas Path Inspection (HGPI)

- We focus on the hot parts of the machine, including checks/inspection on combustion chamber, turbine stages (including replacement of coated blades/vanes), filter house, air intake.
- Rotor is left inside stator parts and only the turbine blade carrier is removed.

Major Overhaul

- HGPI activities plus removal of stator parts and thorough inspection of blades/ vanes, both compressor and turbine section.
- Rotor is removed from stator parts to allow the execution of visual inspection, Non Destructive Tests (NDT) and fact finding.

Generators:

Short inspection

- Inspection of components outside generator frame (make up filter, slip ring, brushless check)
- Electrical checks on rotor and bearing NDE insulation.

Minor inspection

- Dismantling of frontal end covers of the machine in order to allow visual inspection on end winding.
- Dismantling and inspection (dimensional and NDT test) of the bearings.
- Air gap robotic inspection (called "Magic Inspection") in the stator core with rotor inside.

Major inspection

- In addition to activities performed during a minor inspection, rotor is pulled out from the generator to allow a detailed visual inspection and electrical tests.
- Every components of the generator are checked and restored.

Steam Turbines:

Minor inspection

- Observations during operation: check of safety devices, visual inspection of L-0 blades

Medium inspection

- Accurate observation and check performed of:
- Steam turbine bearings
 - Stop and control valve (main, reheat and third admission)
 - LP last-stage blades
 - Accessible turbine components (Endoscopic examination)
 - Turbine control system, oil pumps etc

Major inspection

- Comprehensive examination of the entire turbine. It includes the opening of all turbine casings.

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