



Gas Turbine technologies & services

Engineering and upgrade services, supply and construction, installation, operation, repair and overhaul of oil and gas units and power plants

2020



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1. Introduction

All manufacturers (OEMs) and suppliers of gas turbines and gas engines, including Siemens, ABB / Alstom, Ansaldo and Mitsubishi, have offered a variety of after-sales service strategies. Ansaldo, with a very agile portfolio has been able to have a significant market share especially in Europe and Asia. Such companies offer their services in the fields of supply of spare parts and equipment, power plant site services, repair, long-term contracts, upgrades, and training.

Different leading companies have different definitions in the way of their cooperation contracts, which can be developed depending on the geographical areas, technical and capital potential, as well as customer approaches.

The key factors that distinguish a company like Ansaldo (Italy) in this area are:

- Complete supply chain of parts and equipment
- Flexible management in technology transfer
- Updated engineering and application of IoT in monitoring and maintenance
- Cooperation with agile engineering and research companies (like Euro Energy Solutions AS)

Due to the increasing approach of outsourcing engineering services, operation and repairs with the aim of increasing quality and reducing advertising risk in recent decades, we see various contracts in this regard between manufacturers, suppliers and owners.

These contracts are concluded at a high level of product diversity, limited range of engine sizes. During the contract, the turbine manufacturer is committed to providing services such as spare parts in specified delivery time, preparation of repair schedules, quality implementation, remote monitoring, and the use of advanced methods of failure diagnosis.

The key point in the successful strategy of some turbine manufacturers is that with the participation of agile engineering and research companies, they are able to strengthen their role as service producers.

In fact, today, the presence of capable engineering partners in implementing the goals of turbine manufacturers in the field of after-sales service has determined the key part of the management and leadership of the service portfolio.

The **Energiring Group**, as an energy management company, performs a variety of tasks for our energy business clients, advise them on a diverse range of issues, and offering the best solutions including energy consultants. The firm will mainly have corporation structure, open to any mutually beneficial partnership with and/ or representative of well-known international organizations known for their energy-efficient products/ services. We work with businesses of all types and sizes in the Europe and beyond, sharing proven energy-saving strategies and technologies.

Main expertise of founders, top managers and principal experts of Energiring is on energy system efficiency, technology and integration. Thanks to our:

- Highly qualified expert team involving energy analysts, auditors, engineers, and consultants

- Distinguished national and international associates
- Very good understanding of state-of-the-art of energy systems and modern performance enhancement methods, and
- Capability of implementing creative solutions and new management approaches

The purpose of preparing this document is to provide internal and external capabilities of Energiring group for participation, knowledge transfer in engineering and service of O&G turbines and power plants, as well as gas engines, including consulting services, design, installation and launching, overhauling, upgrading and supplying spare parts in a long-term cooperation.

2. Reliable solutions to improve the operating conditions and upgrade turbines

Energiring group provides advanced technologies in after-sale services, performance upgrades, parts recycling and repairs of power plants, petrochemicals and industrial turbines. We with new engineering solutions for gas turbine operators, the ability to repair and upgrade parts using new technologies to increase the life of parts that are better than the products of the main manufacturers (according to the specific geographical conditions of each region) and network access Engineers and capable consultants of engineering offices and domestic and foreign research and development, we have the opportunity to use the latest service technologies to significantly reduce the cost of life and upgrade gas turbines to higher efficiency, more reliability and flexibility and provide to users.

3. Gas turbines, steam turbines and gas engines capabilities

Some capabilities related to the O&G and power industries in the form of equipment supply and special engineering services and upgrades, installation and commissioning, maintenance, and overhaul for gas and steam turbines and gas engines include:

- Overhaul and repairs of units along with performance testing
- Upgrading gas turbine units to the latest versions
- Full LTE implementation includes evaluation and determination of life estimation of gas and steam turbine components
- Consulting and implementation to improve the performance of unit in different environmental conditions
- Determining the destruction and failure of sensitive parts
- Vibration analysis of fixed and rotating equipment, modal test, rotor-dynamic analysis
- Component stress analysis, thermal and fluid analysis of turbines, pumps and compressors
- Vibration analysis, balancing and alignment services
- Providing laboratory services for testing fatigue, creep and residual stress
- Sensing, control, data collection and monitoring of industrial gas turbines and power plants
- Gas turbine maintenance planning instructions

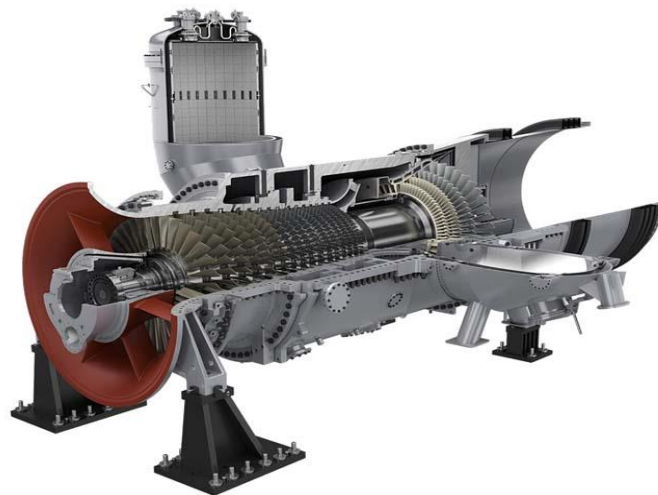
- Technical supervision of maintenance and repair operations of gas turbines and subsequent delivery
- Establishment of supply-chain network and communicate with OEM and Non-OEM manufacturers
- Implementation of engineering and research projects for power plants, oil and gas units
- Providing training services and holding specialized courses
- Consulting services of power generation, supervision or inspection programs for oil and gas companies and power plants
- Training and transfer of experiences to oil and gas units and power plants using domestic and foreign expert team with more than 20 years of experience in international power plants and oil and gas companies

4. Our target turbines portfolio

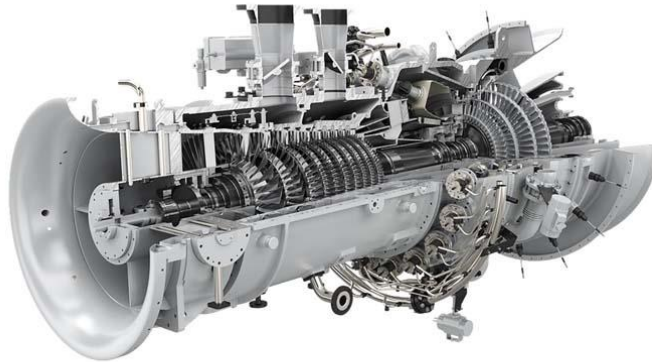
The list of our target portfolio is as following:

- SGT-100, SGT-200, SGT-400, SGT-600, SGT-700 and SGT-800
- DU80, DG 80, DG90
- GT10, Avon
- V94.2 (SGT5-2000E)
- MS9001E (Frame9- PG9171E)
- MS6001B (Frame9- PG6581B and PG6561B)
- MS5001 and MS5002 GE
- etc. (based on request)

SGT5-2000E



SGT-600



MS9001



5. Distributed generation and CCHP using gas engines & micro-turbines

Nowadays, distributed energy technologies are playing a key role in transforming the way we generate energy. Energiring can help to determine whether on-site renewable/ conventional energy generation makes sense for clients' business. Energiring offers its customers a wide variety of local generation solutions ranging from renewable, resources driven to gas-fired energy resource technologies for commercial (schools, shopping centers, hotels, swimming pools, airports, hospitals, etc.) and multi-family building as well as industrial applications.

The output from a CCHP unit is typically approximately 30-40% electricity, 60-70% heat, so you need to establish whether the CCHP system is getting the sizing right. All of these require a precise techno-economy study and reliable case-dependent analysis which can be done by Energiring.

- Civil design of the power plant
- Power plant mechanical design services
- Power plant electrical design services
- Mechanical installation services of the power plant
- Electrical installation services of the power plant
- Purchase of electrical and mechanical equipment of the power plant

Energiring, as distributor of ANSALDO ENERGIA for its microturbines, supports clients in term of procurement, installation, commissioning, operation and maintenance of this technology.

The fossil energy market provides business opportunities for capable companies in energy efficiency. In *Energiring*, the strategies to increase energy efficiency based on fossil fuels are considered on supply and demand sides.

- Improve the performance of thermal power plants, increase power and heat recovery solutions such as multi-faceted layout
- Improve the performance of pressure boosting stations of gas transmission lines and related turbo-compressors
- Different types of engineering and consulting services based on performance data and smart control and monitoring of industrial units and power plants to improve operation, maintenance and repairs
- Other gas turbine related projects including component stand test, control, data collection and optimization

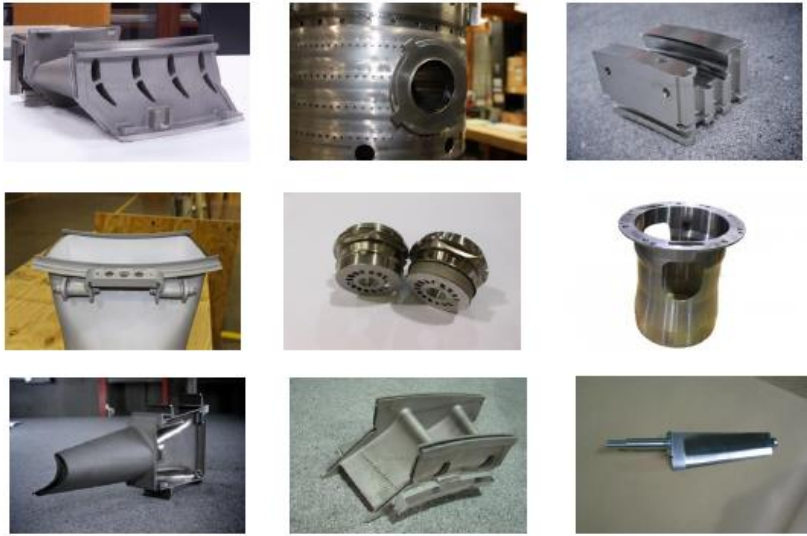
6. Our services for DU80 & DG80 industrial gas turbines

6.1. Development of overhaul instrumentation workshops for clients

- Preparation of fixtures model and special overhaul tools
- Preparation of cost table for construction of all fixtures and extraction of the list of approved contractors
- Consulting in holding a limited tender for the internal construction of tools if the employer needs it
- Supervision of internal construction of all fixtures based on technical documents and experiences
- Supply and manufacture of all fixtures and tools for overhaul
- Preparation of assembly and disassembly instructions for complete unit up to the final levels and modules

6.2. Supply of spare parts

- Due to existing restrictions on the import of spare parts of Zorya gas turbine, it has been possible in the supply and delivery of spare parts via our external communication, although it is not final. These cases will be followed if the cooperation with the applicant continues and in the framework of the consultation contract, our suggestions will be provided for the final decision
- In-house construction of many spare parts can be done with proper investment.



6.3. Execution of overhaul as a contractor

Our company with access to the necessary workshops and tools and a professional team and experienced consultants has the ability to fully overhaul industrial units.

6.4. Upgrading and recovery of power and efficiency in summer and troubleshooting existing units

6.5. Specialized training for operators and repair units

6.6. Preparation of three-dimensional models

UGT 25000
(DU80)





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