

# IGT27F

## OTC

### OFFSHORE

### PACKAGE

### SOLUTION



**OTC**  
OIL TURBO COMPRESSOR CO.

Power Generation  
(45°C)



22.4 MW(e)

Mechanical Drive  
(45°C)



23.1 MW



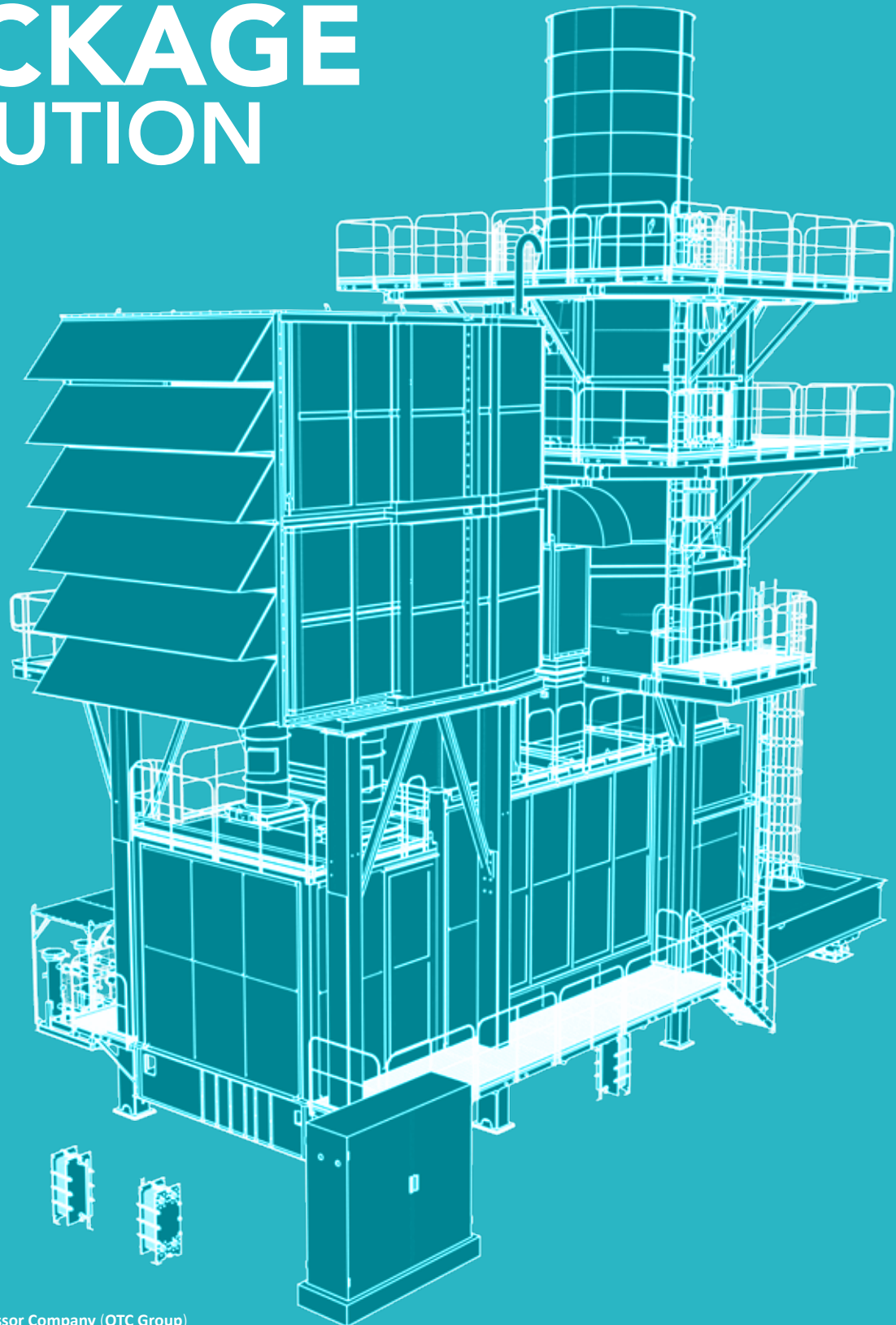
# IGT27F

## OTC

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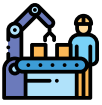
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## COMPANY INTRODUCTION

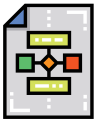
### OTC Profile

Oil Turbo Compressor Co. was established in Jan. 2001 in Tehran, Iran. The main goal of this establishment was to reach technology to manufacture turbo compressors in 25 MW in Iran. Besides to establish some equipped and well-furnished workshops, OTC succeeded to make some supply chains consist of more than 50 local vendors. OTCs State of Art new product is IGT27F . IGT27F is designed to accomodate with Offshore condition.



#### • Manufacturing:

- Turbo Compressors & Turbo Generators manufacturing in 25 to 28 MW.
- Electro Compressors as Ethylene Gas, Refrigerant and process applications in 2-8 MW.
- Gas Engines equipped with CHP in 1-1.2 MW.



#### • EPC Projects:

- Gas Boosting and Transporting Stations.
- Small and Medium Size Power Plants.
- Refineries Utilities.



#### • Services:

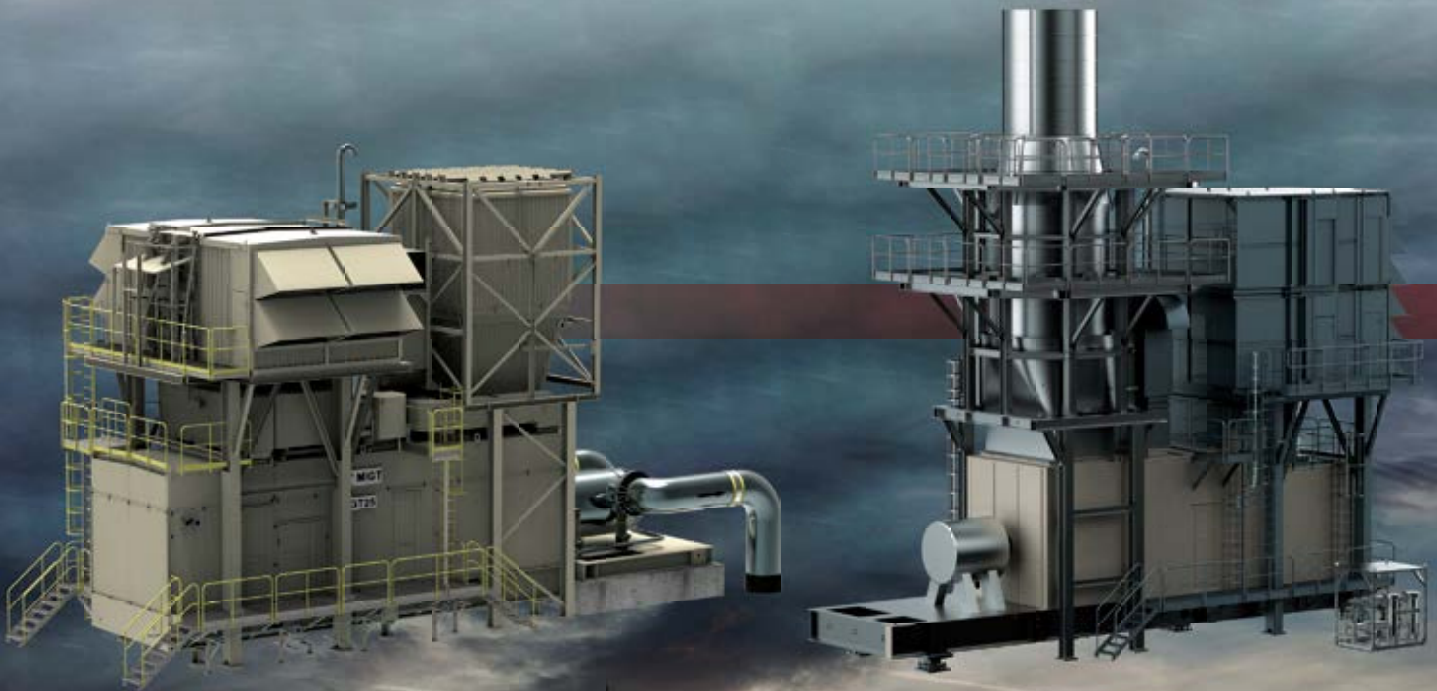
- Installation, Pre Com. and Commissioning of Turbo Compressors and Turbo Generators.
- Maintenance and Overhauling of Turbo Machineries.
- After Sales Services.





**CONTINUING EVOLUTION**  
Evolution timeline

# Continuing evolution that's smarter every time



# 2014

Footprint: **347 m<sup>2</sup>**

Weight: **~169 tons**

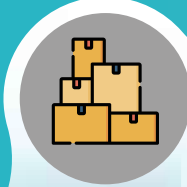
- Modular fluid systems incorporating
- Pulse cleaning air filtration

# 2020

Footprint: **210 m<sup>2</sup>**

Weight: **~158 tons**

- Modular fluid systems incorporating integrated auxiliaries with compact arrangement
- Remote I/O
- Composite inlet plenum
- Multi-stage HEPA air filtration
- Enhancement of F&G detection & protection
- Fast GG swap by new internal removal system
- Both off-line & on-line washing



## SEASMART OFFSHORE PACKAGE

Solution delivers

- New HEPA(E12) filtration system with

**99.95%** efficiency increase GT life.

- Increase turbine availability by using multi-stage & hydrophobic filtration.
- Eliminating water content by using Amer vane.

Lighter & stronger enclosure with

**85dB** noise level along with Single lift

- 3 point compact base frame
- on-skid package for offshore solution

- Siemens SIMATIC PLC-based with distributed control and processing capability
- Optional Allen-Bradley system
- Optional off-package systems

Two main lube oil circuits

- low pressure and high pressure line

**3x50%** HP and **3x50%** LP - AC drive

- Lube oil pump with DC backup

- Enhancement of F&G detectors from

**9 to 12**

- Following NFPA standard
- Extended gas release for

**20 min**

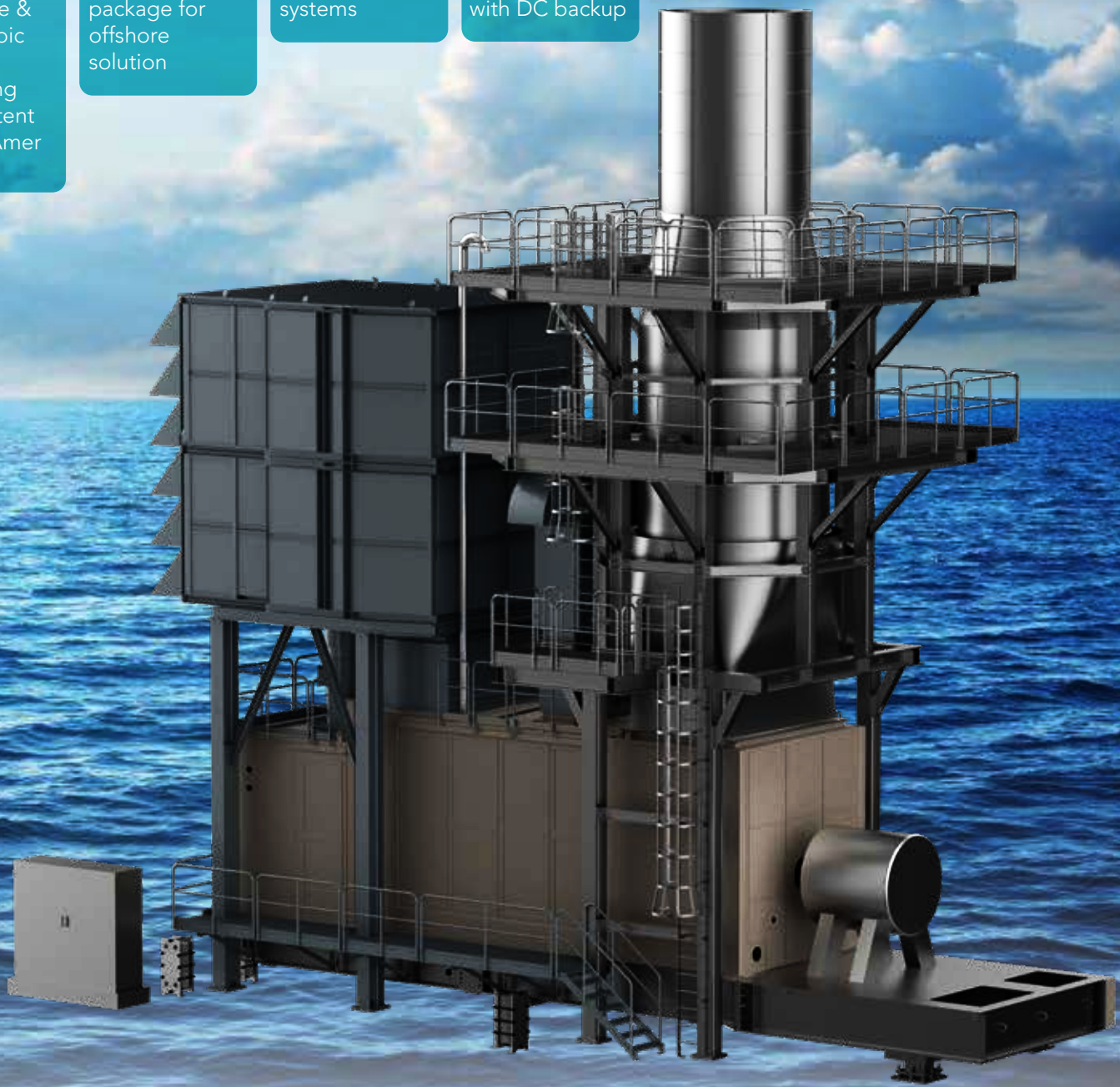
**40%** less foot print

**6%** less weight

**14%** increase in power to weight ratio

Significant low weight

Composite inlet plenum with aerodynamic shape result in lower pressure drop and higher power output





## DESCRIPTION

### IGT27F offshore package

Designed and built to accommodate with different well fluid mixtures, layout restrictions, specific objectives for power, emissions and maintenance. It utilizes higher levels of efficiency and success at any offshore condition, ultra-high reliability and availability, low maintenance requirements, integrated controls and auxiliaries, and the flexibility to grow.



In face of typical offshore challenging condition such as humidity, airborne contaminant, severe storm, sour gas fuel, hard to maintain and limitation of operating area, IGT27F gas turbine package has been specially designed to meet these requirements efficiently.

Its new HEPA(E12) filtration system with 5 step filtrations is 99.95% efficient at MPPS and extremely compact for significant weight and cost savings.

The E12 HF pre-filters are completely sealed and hydrophobic, eliminating 99% of water content. In addition to improving efficiency, the new filter system design decreases emissions and particle deposits.

Its new inlet plenum design achieves smoother air suction with minimum turbulence for overall optimized inlet flow. Built with composite materials for significant weight reduction.

For minimizing size and weight as critical factors in offshore application, the optimized design has fully integrated auxiliaries and compact package, result in the smallest footprint. It also eliminates significant tonnage through expanded use of advanced composite materials with proven corrosion resistance.

Other various features like fast turbine exchange, on line remote monitoring and on & off line washing system contribute to simplified maintenance as well as improved ergonomics and safety.

IGT27F engine is redesigned to have minimum performance degradation in hot ambient conditions. High efficiency rotary and stationary parts, advanced material and coating, fuel flexibility, low Emissions and minimum maintenance cost is some of the Outstanding specifications of this gas turbine.





## GENERAL SPECIFICATIONS

Further information



### KEY FEATURES

Robust industrial design



Excellent operational availability



Excellent reliability



Low emissions, **NOx ≤ 15 ppm**



Wide range of fuel capability



Low life cycle cost



High corrosion resistance in operation with sour gas fuel comprising H<sub>2</sub>S up to 15000 ppm in offshore condition



Small Footprint



### MAINTENANCE



No need for special workshop maintenance



**24-hour** gas generator exchange or Onsite maintenance



Modular build-up for easy maintenance on site



Standardized concepts for maintenance planning



Condition-based maintenance



Extended time between overhaul



Horizontal split compressor casing







## TECHNICAL SPECIFICATIONS

### Overview

GAS TURBINE TYPES	IGT25		IGT25+		IGT27F	
	15	45	15	45	15	45
AMBIENT CONDITIONS (°C)	15	45	15	45	15	45
MECHANICAL DRIVE (MW)	<b>24.5</b>	<b>19.5</b>	<b>27.6</b>	<b>21.5</b>	<b>26</b>	<b>23.1*</b>
SHAFT EFFICIENCY (%)	<b>33.90</b>	<b>31.60</b>	<b>35.8</b>	<b>33.10</b>	<b>35</b>	<b>33.50</b>
HEAT RATE (kJ/kWh)	10623	11405	10056	10863	10297	10733
TURBINE SPEED (rpm)	7700					
COMPRESSOR PRESSURE RATIO	14.9 : 1	12.8 : 1	15.4 : 1	13.0 : 1	15.6 : 1	14.1 : 1
EXHAUST GAS FLOW (kg/s)	83.5	72.1	84.4	71.8	85.8	77.6
EXHAUST TEMPERATURE (°C)	541	557.6	552.6	572.2	535	561.4
NOX EMISSIONS	with DLE corrected to 15% O2 dry					
GAS FUEL (ppmV)	≤25		≤15			
LIQUID FUEL (ppmV (wet))	≤ 42					



- 1

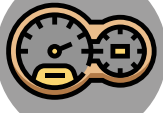
**Axial Compressor:**
  - 10 stage axial flow compressor
  - 2 stages variable guide vanes
  - Electron-beam welded rotor
  - Anti-Fouling Coating
  - Modern profile and 3D design for stationary blades
  
- 2

**Combustion:**
  - 18 dual-fuel 2nd generation
  - Dry Low Emissions (DLE) burners
  - Welded annular sheet metal design
  - Hot corrosion resistant coating
  
- 3

**Compressor Turbine:**
  - 2-stage axial flow compressor turbine
  - Both stages are air-cooled
  - Hot corrosion resistant coating
  
- 4

**Power Turbine:**
  - 2-stage free power turbine, uncooled
  - Electron-Beam Welded Rotor
  - Modern airfoils
  - Hot corrosion resistant coating
  
- Emissions control:**
  - DLE combustion system
  - liquid fuel operation
  - Fuel System
  - Natural gas – Liquid fuel – Dual fuel

\* : 25 MW by using inlet fogging

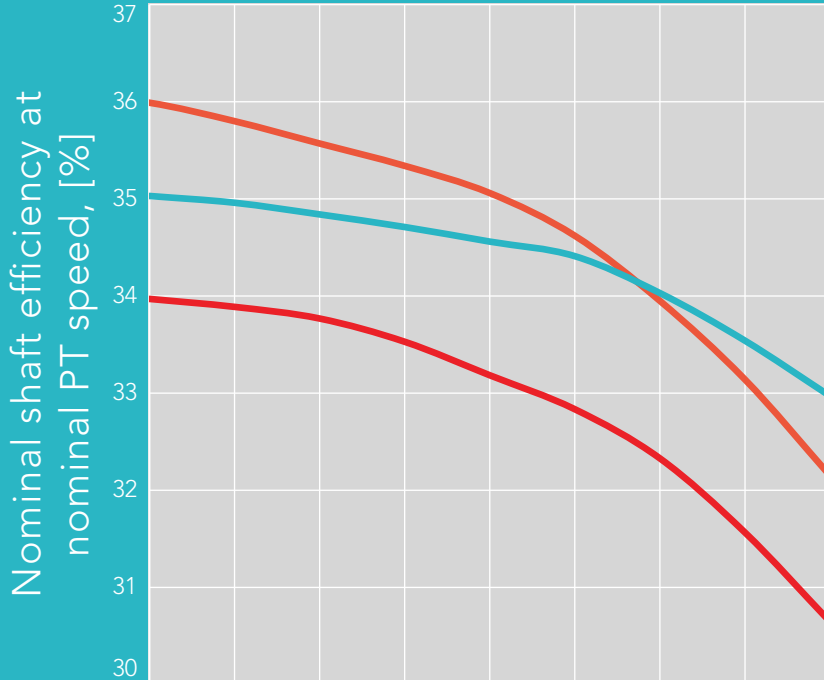
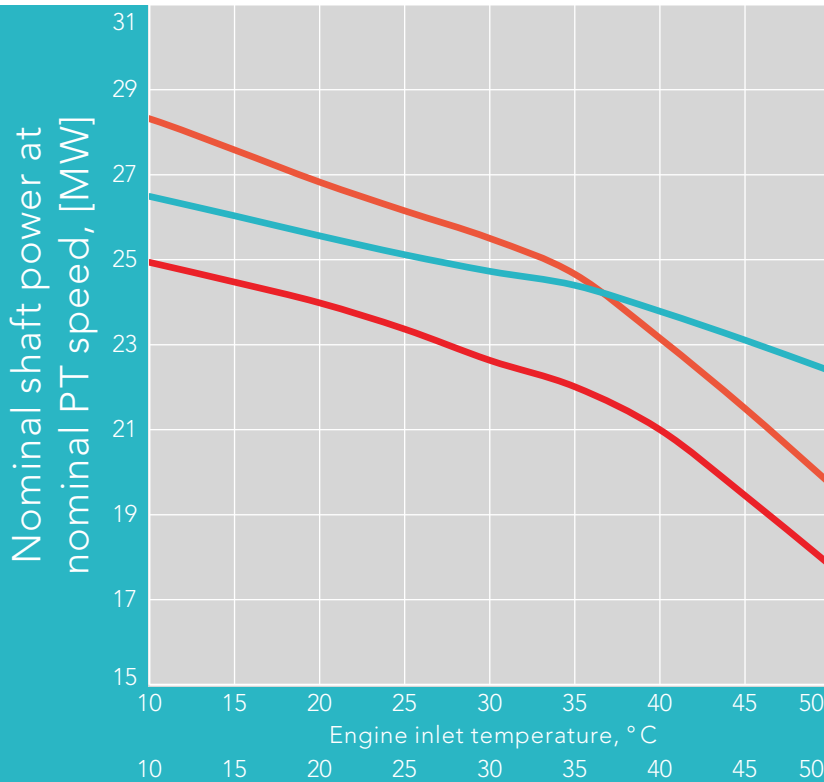


## PERFORMANCE

### Mechanical drive

- **IGT27F**
- **IGT25+**
- **IGT25**

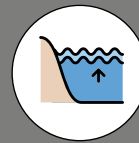
Output power at turbine coupling and engine inlet temperature



Output efficiency at turbine coupling and engine inlet temperature

## Mechanical Drive Performance

Conditions/assumptions:  
Direct drive – no output gearbox.



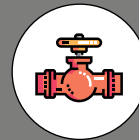
Altitude: ..... **Sea level**



Inlet ducting loss: ..... **0 kPa**



Exhaust ducting loss: ... **0 kPa**



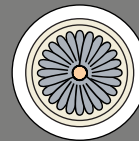
Sour gas fuel.



Ambient pressure: ..... **101.3 kPa**



Relative humidity: ..... **100 %**

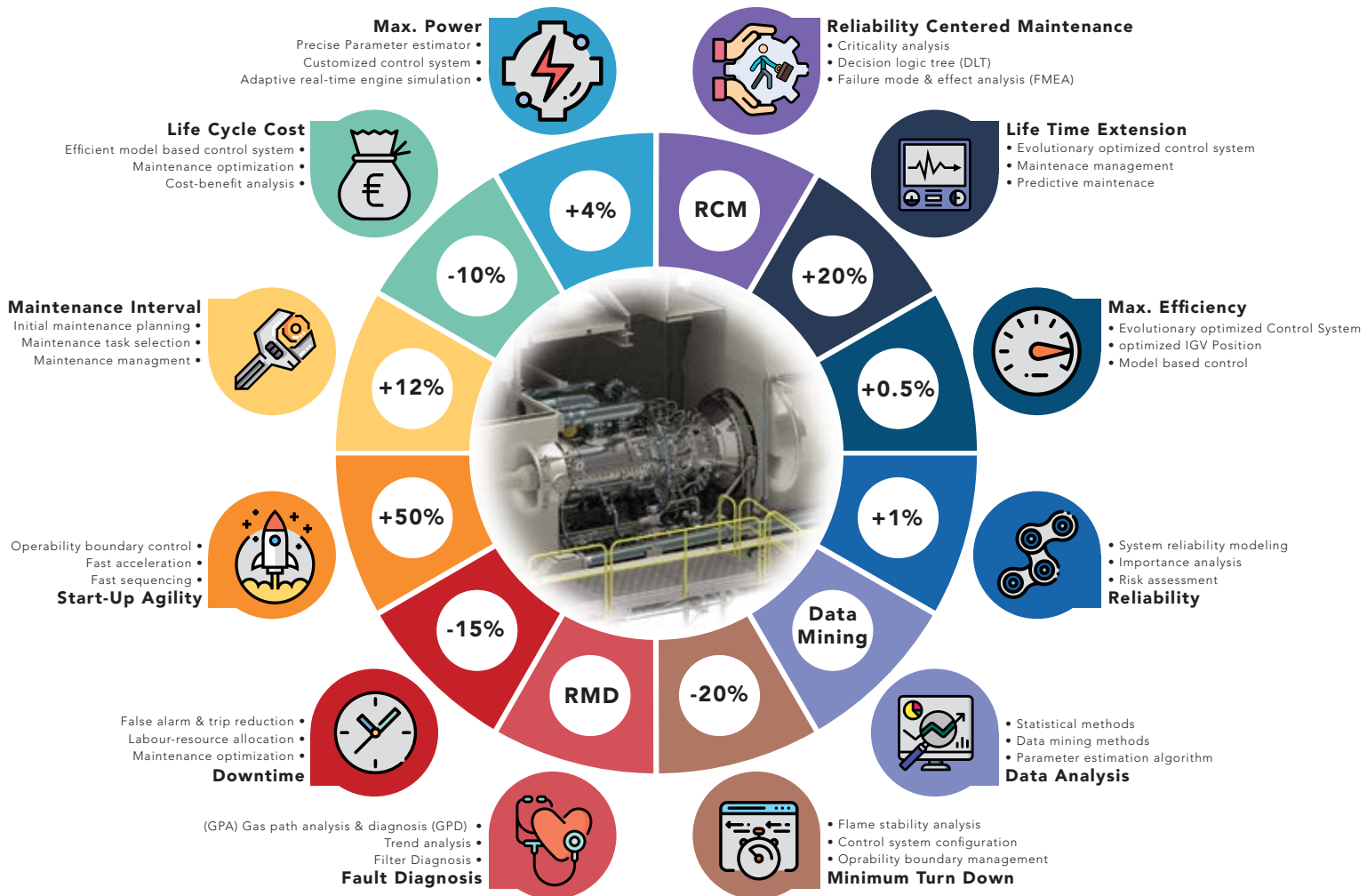


Power turbine design speed: ..... **7,700 rpm**



# INTEGRATED ASSET MANAGEMENT

## Gas Turbine Core Engine








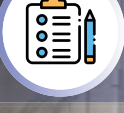







# INTEGRATED ASSET MANAGEMENT

## Gas Compressor Station



 <h3>Performance Maximization</h3>	<ul style="list-style-type: none"> <li>Full Load Power</li> <li>Full Load Heat Rate</li> <li>Full Load ISO Corrected (Power)</li> <li>Full Load ISO Corrected (Heat Rate)</li> <li>Increase Flow Capacity</li> </ul>
 <h3>Capability</h3>	<ul style="list-style-type: none"> <li>Turndown</li> <li>Ramp Rate</li> <li>Start-up Time</li> <li>Low Emission</li> <li>Start-up Fuel Consumption</li> </ul>
 <h3>Dispatch Optimization</h3>	<ul style="list-style-type: none"> <li>Incremental Capability with Incremental Cost</li> <li>Optimization of Load Sharing in Stations</li> </ul>
 <h3>Availability Improvement</h3>	<ul style="list-style-type: none"> <li>Commercial Availability</li> <li>Equivalent Availability</li> </ul>
 <h3>Reliability Improvement</h3>	<ul style="list-style-type: none"> <li>Equivalent Forced (Outage Rate)</li> <li>Starting Reliability</li> </ul>
 <h3>Intelligent Load Sharing</h3>	<ul style="list-style-type: none"> <li>Model Predictive Control</li> <li>Economic-Wise Control Decision</li> </ul>
 <h3>Flexibility Enhancement</h3>	<ul style="list-style-type: none"> <li>Start Flexibility</li> <li>Fuel Flexibility</li> <li>Maneuver Flexibility</li> </ul>
 <h3>Outage Planning</h3>	<ul style="list-style-type: none"> <li>Outage Decision Analysis</li> <li>Maintenance Event Management</li> <li>Commission and Decommission Planning</li> </ul>
 <h3>Performance Indicators</h3>	<ul style="list-style-type: none"> <li>Operational Flexibility Indicator</li> <li>Thermal Performance Indicator</li> <li>System Reliability Indicator</li> </ul>
 <h3>Plant-level Diagnostic Tools</h3>	<ul style="list-style-type: none"> <li>Root Cause Analysis</li> <li>Operating Insights</li> <li>FMEA</li> <li>RCM</li> </ul>
 <h3>Benchmarking</h3>	<ul style="list-style-type: none"> <li>Ideal Baselines for Performance : Availability, Reliability, Dispatch, Emissions and Financial Performance</li> <li>Economic Analysis</li> <li>ROI Estimator</li> <li>Cost/Benefit Analysis</li> </ul>








## REMOTE MONITORING & DIAGNOSTICS CENTER

Compressor Fouling & Erosion Detection  
Hot Gas Path Component Degradation  
Metal Corrosion Detection  
Burners Fault Diagnosis  
Online Life Monitoring  
Vibration Analysis

### How It Works?



-  Connect
-  Visualize
-  Analysis
-  Predict
-  Optimization

### 24/7 Online Monitoring



### Connectivity to Any Facility Devices



-  SCADA/DCS
-  PLC/Instrument systems
-  IT devices
-  Alarm systems






### Visualize



-  Time Series
-  Frequency Domain
-  Time Domain
-  Business Intelligence

### Analytics and Machine Learning



-  Industrial analytics library
-  Machine learning models
-  Detect anomalies
-  Direct controls
-  Predict maintenance

### Predict



-  Industrial analytics library
-  Machine learning models

### Optimize Asset Performance



-  Applying machine learning analytics
-  Applying model based methods



**P**rovides monitoring and fault diagnostic of Gas turbines with daily checks, automatic alarm notifications with powerful automatic data collection and analysis tools



**P**rovides continuous remote monitoring and historical trending for practically limitless operating parameters



**F**ormulate recommendations that assist gas turbine customers in making informed business maintenance and repair decisions



**A**chieve superior equipment availability, performance, and lifetime ownership cost



**S**upports asset management solution and keeps power plant's conditions under control



## CONTACT US










We will be happy to contact us.

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OTC



TURBOTEC



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# CONTINUING EVOLUTION