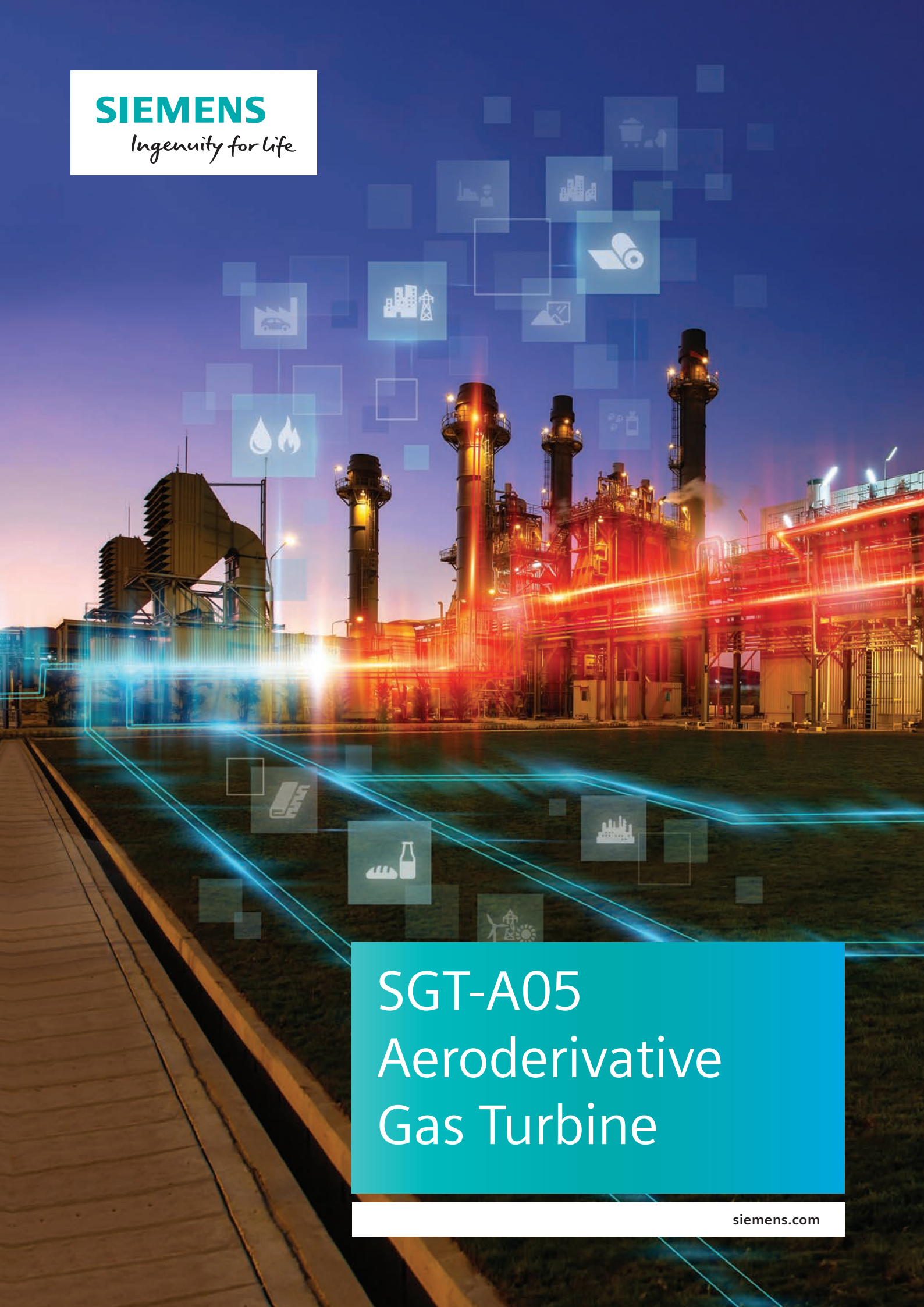


**SIEMENS**

*Ingenuity for life*



# SGT-A05 Aeroderivative Gas Turbine

[siemens.com](https://www.siemens.com)

# SGT-A05 Aeroderivate Gas Turbine

Dependable, flexible design for CHP applications

**More than 1,690 SGT-A05 gas turbines have been sold for industrial use to more than 500 customers in 55 countries, accumulating an impressive 127 million operating hours since its introduction in 1963.**

Today, these engines are delivered to our customers through a network of distributors who incorporate the engine into complete generator sets, both stationary and mobile.

All Siemens distributors are carefully chosen for their engineering and manufacturing capabilities and commitment to adhere to Siemens standards for quality and delivery.

## Industrialized Aeroderivative Gas Turbine

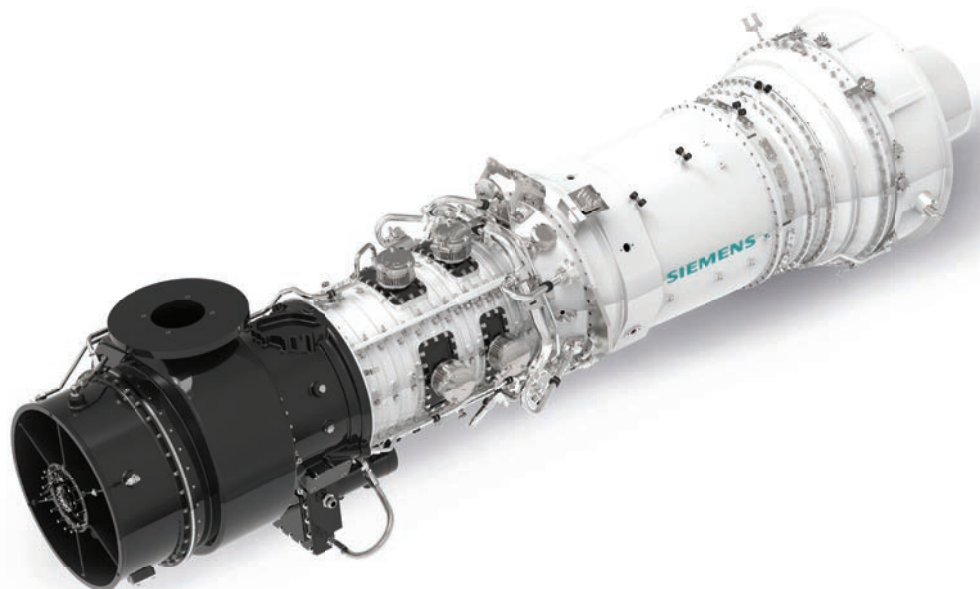
Fast start-up and flexible generation including multiple starts, fast ramp-up and down.

Originally developed for use in aviation, SGT-A05 gas turbines are flexible, compact and lightweight designs that are ideally suited for decentralized power generation offering high efficiency and fast start up capabilities.

Designed for use in power generation and oil & gas applications, features of the SGT-A05 gas turbine include:

- Lightweight modular construction
- Ease of field repair
- Black start capability
- Hot start capability
- Full power available within 60 seconds
- Load following
- Wide range of fuels in any environmental condition
- High electrical efficiency

SGT-A05 KB7HE  
aeroderivative gas turbine



# Major Engineered Solutions Offerings

Understanding the rapidly-changing nature of today's industrial and commercial environment

**At Siemens we understand the rapidly-changing nature of today's industrial and commercial environment, in which market requirements and operating conditions can vary significantly – and often unpredictably. So we design and shape our products and services to help ensure Siemens customers maintain and increase performance and profitability throughout the life of their power generation project.**

## SGT-A05 Aero derivative Gas Turbine variants

The SGT-A05 gas turbine variants produce electrical power output between 4 and 6 MW for applications such as base load, co-generation, combined heat and power, mobile power and emergency power.

SGT-A05 variants are fulfilling the requirements of a wide spectrum of applications in terms of efficiency, reliability, flexibility and environmental compatibility.

SGT-A05 gas turbine variants offer low life-cycle costs and an excellent return on investment.

## Low emissions as a gateway to our customers

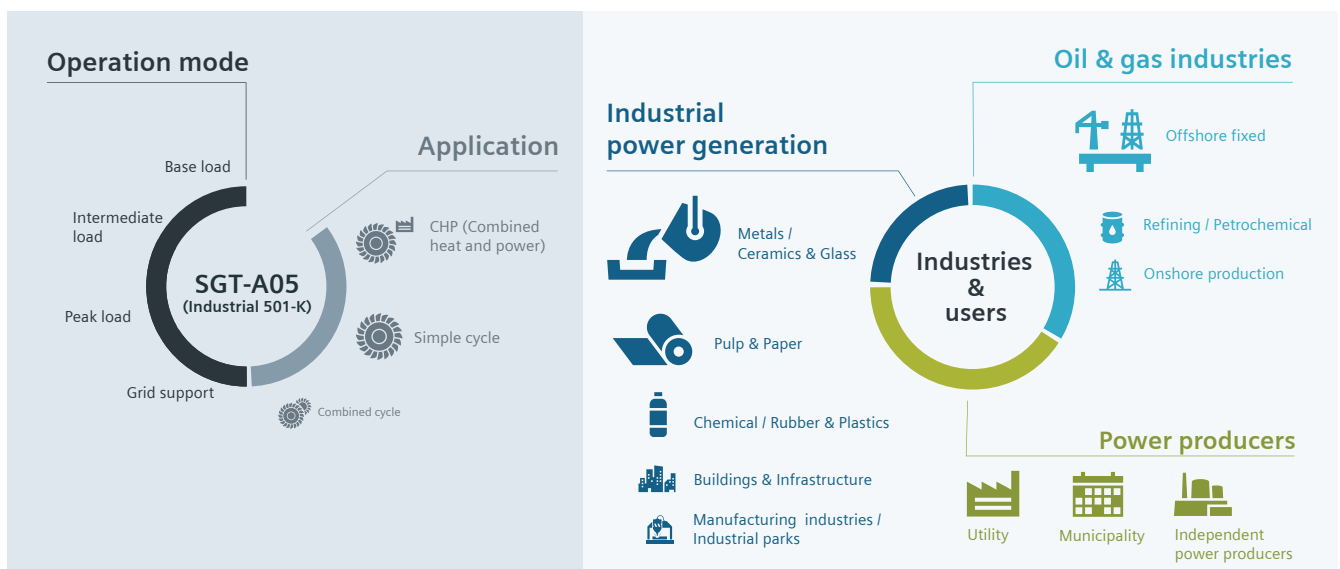
Advanced lean-burn combustion technology: The well-proven and reliable Dry Low Emissions (DLE) system offers clean combustion for gas turbines in power generation applications. It achieves emission levels better than 25 vppm NOX and 50 vppm CO.

More than 125 DLE systems have entered service since its introduction in 1994. This system is also available for upgrade during routine overhaul of the SGT-A05.

The Wet Low Emissions (WLE) system utilizes nozzle steam or water injection for gas and liquid fuel operation in order to meet the most stringent environmental requirements.

SGT-A05 gas turbine variants produce low emission levels that meet and exceed customers requirements as well as emission standards around the world.

The SGT-A05 is suitable for the following applications and industries:



# SGT-A05 Gas Turbine Variants

Now even stronger with SGT-A05 KB7HE

Our current offering includes variants of the proven KB5 and KB7 engines:

**SGT-A05 KB7HE, SGT-A05 KB7S and SGT-A05 KB5S**

- Added value to our customers – Leveraging proven technology and reputation
- Improved electrical efficiency reduces fuel usage
- Increased power output increases revenue from the sale of electricity or reduce cost of buying additional electricity off of the grid
- Increased exhaust temperature and flow improves usable exhaust for steam production or direct heat processes

**SGT-A05 variants based on trusted technology**

- Includes latest DLE fuel system improvements
- 50% turndown capability
- Increased durability through liner improvements

**New High Efficiency (HE) Compressor Hardware Upgrades Provide Opportunity to Increase Power and Fuel Economy:**

- Vanes – abradable inner bands
- Case – blade track radius for reduced tip clearance
- Improved interstage sealing
- Includes new generation DLE liners

**SGT-A05 Gas turbine variants specification\***  
Simple cycle power generation

	SGT-A05 KB5S	SGT-A05 KB7S	SGT-A05 KB7HE
<b>Power Output</b>	4.0 MW(e)	5.4 MW(e)	5.8 MW(e)
<b>Fuel</b>	Natural gas, liquid fuel, dual fuel; other fuels on request; automatic changeover from primary to secondary fuel at any load		
<b>Frequency</b>	50/60 Hz	50/60 Hz	50/60 Hz
<b>Gross Efficiency</b>	29.7%	32.3%	33.2%
<b>Heat Rate</b>	12,137 kJ/KWh	11,152 kJ/kWh	10,848 kJ/kWh
<b>Turbine Speed</b>	14,200 rpm	14,600 rpm	14,600 rpm
<b>Pressure Ratio</b>	10.3 : 1	13.9 : 1	14.1 : 1
<b>Exhaust mass flow</b>	15.4 kg/s	21.3 kg/s	21.4 kg/s
<b>Exhaust Temperature</b>	560 °C (1,040 °F)	494 °C (921 °F)	522 °C (972 °F)
<b>NOx emissions</b>	≤ 25 ppmvd at 15% O2 on fuel gas (with DLE)		

\*Nominal engine performance, ISO, No losses, gaseous fuel 20,400 BTU/lb

# SGT-A05 Gas Turbine Variants

## SGT-A05 KB7HE

Taking advantage of the already proven and trusted SGT-A05 KB7S gas turbine, the SGT-A05 KB7HE provides performance enhancements using a High Efficiency Compressor upgrade.

Based on the proven aeroderivative gas turbine technology, the SGT-A05 KB7HE is an outstanding solution for power generation application.

Existing SGT-A05 KB7S easily retrofits to SGT-A05 KB7HE at a cost competitive investment.

SGT-A05 KB7HE is the highest horsepower version (simple cycle) of the SGT-A05 series of engines.

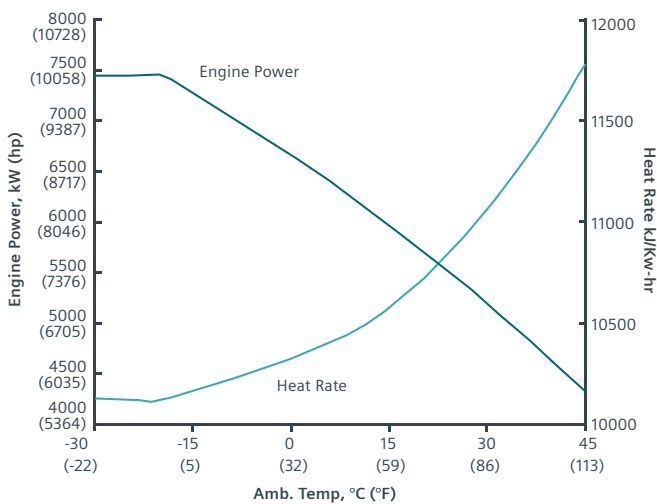
- Higher Power – 8% power increase (8000 SHP) at ISO conditions
- Lower Fuel Burn – 34% Fuel Efficiency (Uninstalled)
- Fuel Flexibility – Same fuel options as current SGT-A05 KB7S Model Specification
- Proven Dual fuel configuration and combustion system
- Heat Rate – 2.6 % improvement

The aeroderivative SGT-A05 KB7HE engine has an overall improvement in fuel consumption

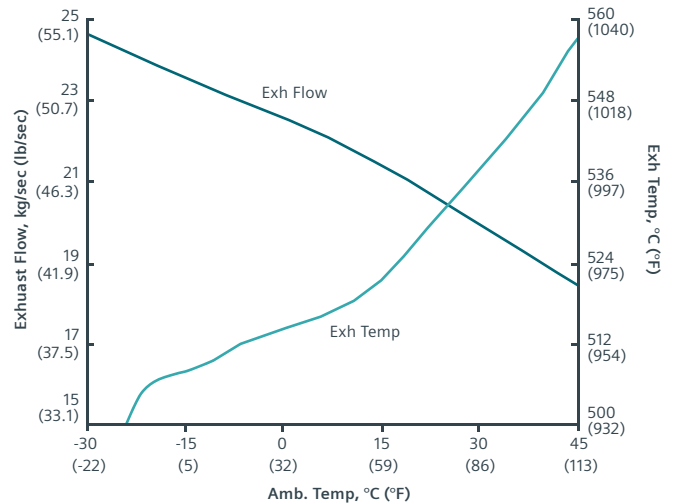
**33.2%**  
electrical efficiency



Engine Power and Heat Rate vs. Amb. Temp



Exhaust Flow and Temp vs. Amb. Temp



# SGT-A05 Gas Turbine Variants

## SGT-A05 KB7S

A single stage boost compressor, improved vane cooling, higher strength turbine blades and many other enhancements have been incorporated for improved performance, durability and operating cost.

The aeroderivative design of the SGT-A05 series engine provides a lightweight, modular product that helps lower operating costs through reduced fuel consumption, extended hot section life and ease of maintenance.

Siemens knows there is more to customer satisfaction than manufacturing a quality gas turbine. Beginning with the finest designs, the most advanced manufacturing techniques and rigid verification testing, our team continues to serve our customers with a global network of support.

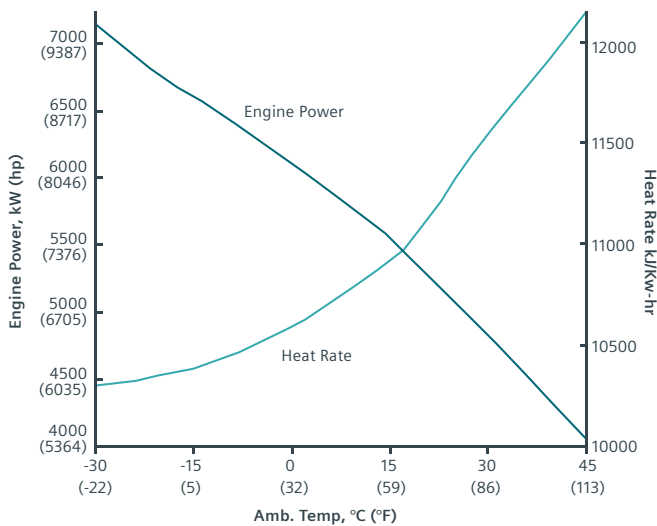
- Effusion cooled combustion liners
- Core engine commonality with SGT-A05 family
- Addition of single stage compressor boost module
- Natural gas, mid-BTU gas options, liquid and dual fuel configurations
- 5 MW power class
- Competitive operating cost

The aeroderivative SGT-A05 KB7S engine has an overall improvement in fuel consumption

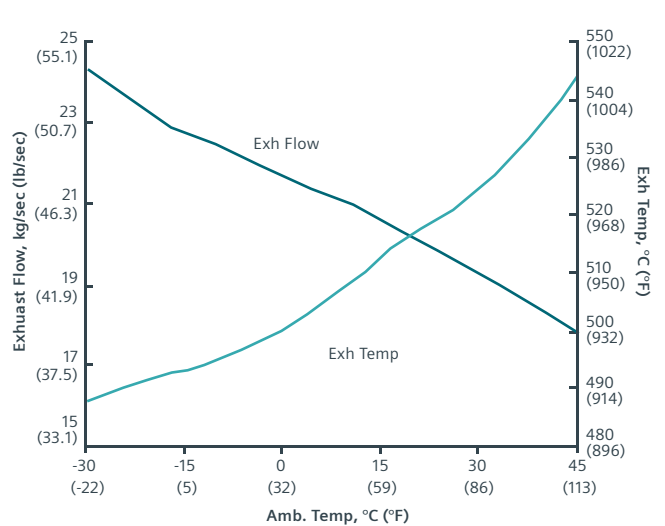
**32.3%**  
electrical efficiency



Engine Power and Heat Rate vs. Amb. Temp



Exhaust Flow and Temp vs. Amb. Temp



# SGT-A05 Gas Turbine Variants

## SGT-A05 KB5S

The current engine design is the evolutionary result of continuous improvements since the first release in 1963.

This continued product enhancement concept has improved the reliability, performance, power, and efficiency of the SGT-A05 to better serve the needs of our customers.

The aeroderivative design of the SGT-A05 engine provides a lightweight, modular product that helps lower operating costs through improved fuel consumption, extended hot section life and ease of maintenance.

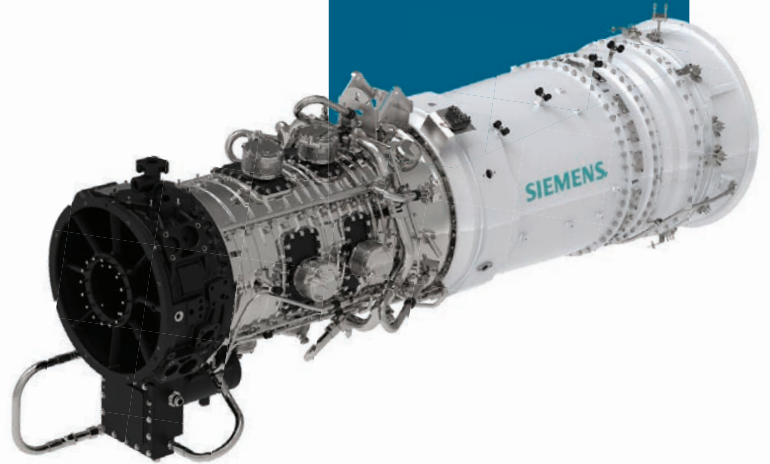
Siemens knows there is more to customer satisfaction than manufacturing a quality gas turbine engine. Beginning with the finest designs, the most advanced manufacturing techniques and rigid verification testing, our team continues to serve our customers with a global network of support.

The SGT-A05 KB5S has accumulated millions of hours of operation since its introduction.

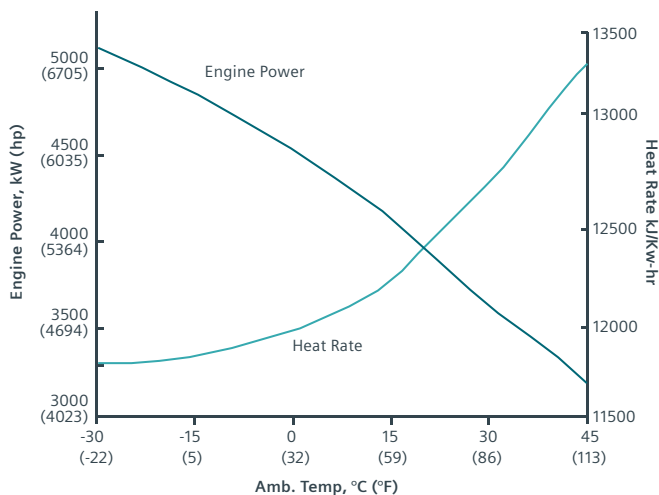
- Competitive operating cost
- 4 MW power class
- Single shaft cold end drive
- Standard effusion cooled combustion liners
- Core engine commonality with SGT-A05 family
- Natural gas, mid-BTU gas options, liquid and dual fuel configurations

SGT-A05 KB5S based on proven technology

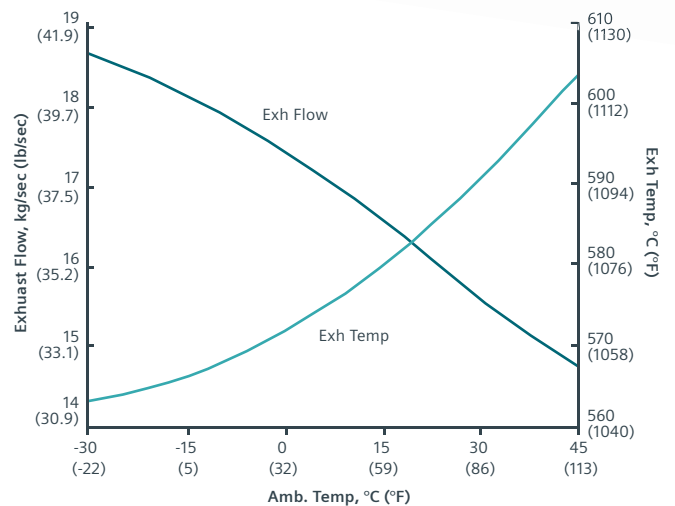
**29.7%**  
electrical efficiency



Engine Power and Heat Rate vs. Amb. Temp



Exhaust Flow and Temp vs. Amb. Temp



# Reference Case: HERA Cogeneration Plant in Bologna

The company operates in the distribution of gas, water, energy and waste disposal in various provinces throughout Italy, including Bologna, Modena, Ravenna, and Rimini.

## Location

Bologna, Italy

## Commissioning Date

Autumn 2017

## Packager

Centrax Gas Turbines, Ltd.

## Application

Cogeneration

## Gas Turbine Model

2 x SGT-A05 KB5S

## Electricity Generated

7.8 MW

## Customer Benefits

The new equipment helps to achieve an annual reduction of around 21,000 kg of NO<sub>x</sub> and 2500 tonnes of CO<sub>2</sub>



Photo credit: Centrax Gas Turbines



# Increased Operating Benefits

Improved performance through advanced engineering

The SGT-A05 is known for its high fuel flexibility, which will accommodate a wide variety of possible application scenarios and requirements.

Fuels include, but are not limited to natural gas, liquid fuel (or both) and mid to low BTU gas fuels. Fuel system options include dual fuel, steam and water injection.

**Dry Low Emissions (DLE) technology is also available.**

In addition to the fuel flexibility, SGT-A05 accommodates a wide variety of customer requirements. The compact design of the engine permits application versatility and ease of removal and replacement. The SGT-A05 measures less than 2.7 meters (8 feet) long and weighs less than 766 Kg (1,690 pounds).

The SGT-A05 is proven to operate in various challenging conditions and locations around the world including the North Sea, West Africa, Siberia, Brazil, Alaska, South East Asia and the desert regions of the Middle East.

The SGT-A05 engine has been shock qualified to Mil-S-901C, which makes it particularly suitable for areas with frequent or severe seismic activity.

## Advanced Engineering

Core engine commonality of all SGT-A05 variants

- Highest power density in weight class
- Advanced materials including leading edge additive manufacturing.
  - All SGT-A05 engines are built to meet stringent industry standards including ISO 9001 and AS9100
  - Full power available within 60 seconds from all conditions, including hot restarts, with no need to go to an idle condition
  - Black Start capability
  - Modular gas turbine configuration optimizes spares requirements, minimizes cost of ownership and simplifies engine maintenance

## Low Emissions Options

Three combustion systems are available, based on customer need:

- Standard combustion system can operate on liquid or gas fuel
- Wet Low Emissions combustion system utilizes nozzle steam or water
- Dry Low Emissions combustion system achieves better than 25vppm NOx and 50vppm CO (gas fuel only)

## Reliable, Easy Installation and Maintenance

Our comprehensive portfolio of services provides low life cycle cost and optimum performance throughout the turbine's life cycle: Long Term Programs (LTP), Overhaul service, field service, spare parts, service exchange, remote diagnostic service and modernization and upgrades.

The modular, compact design of the SGT-A05 facilitates onsite maintenance, since the modules can be quickly replaced. A direct core engine exchange is possible and can be executed in as little as 12 hours. The proven lightweight industrial design allows an easy and economical transport.

- Simple, inexpensive to maintain
- Rugged, reliable performance with up to seven years baseload duty between full overhaul
- Over 98% demonstrated availability/reliability
- Lightweight and aero derivative design



Photo credit: Centrax Gas Turbines

# SGT-A05 Mobile Power Unit

Power on-site in a single package

## SGT-A05 mobile unit

This mobile power unit offers class leading gross electrical efficiency performance in a single trailer package. The SGT-A05 core engine, based on the aero-derivative technology, offers a rugged and robust design which is capable of operating on a wide range of liquid and natural gas fuels.

The unit can be operated in remote locations and can be effective as a micro-grid power source or could be connected to an existing grid network.

- Up to 5.8 MWe of electrical output
- Various configurations and voltage output are available
- Total set up time on site of less than 4 hours
- Rapid power demand response, MPU can deliver full power within 1 minute of starting

## SGT-A05 Mobile Power Unit

### Fast power

- Ready in less than 4 hours. Rapid deployment time on site

### Superior value

- Fuel flexibility: liquid and gas

### Trusted technology

- Proven, flexible turbomachinery

### Noise Emissions

- Near and far field noise abatement options available



- Based on SGT-A05 aero-derivative gas turbine
- Single-trailer, self-contained design
- On site commissioning time is <4 hours
- Available as DLE or gas /water injection as customer option
- Low-noise option for < 85 dBA near-field and < 65 dBC far field
- Designed for in field servicing including gas turbine exchange

**Application modes of operation:**

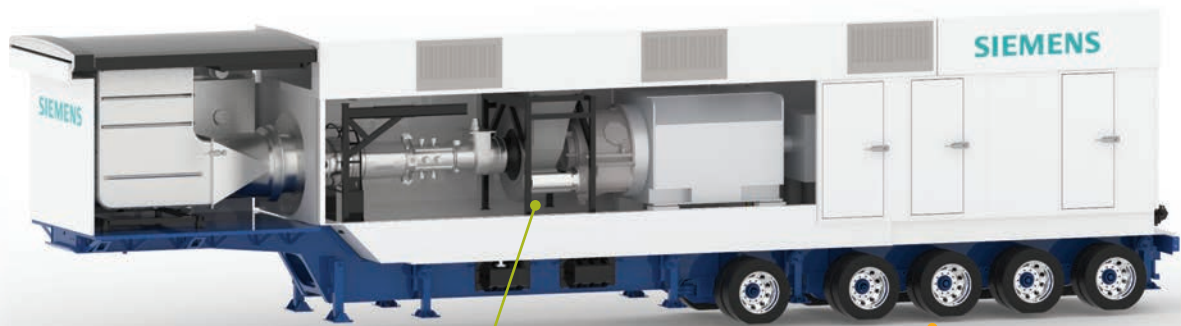
- Prime power for remote operations such as O&G and mining
- Temporary power demand, e.g. military, government, construction, utilities, drilling areas
- Peaking, transmission congestion relief, renewable contact hedging
- Standby emergency power
- Replacement of aged power plants in developed countries (temporary outages)
- Critical process power supply- chemical, pharmaceutical, data hubs, hospitals, universities etc.
- Distributed generation for grid support

**Exhaust enclosure**

- Exhaust enclosure cover
- Enclosure ventilation exhaust
- Lubrication oil cooler

**Switchgear enclosure**

- Switchgear
- Unit control panel
- Motor control center
- Starter control panel
- Auxiliary transformer
- Purge air cooler
- Instrument air compressor



**Ventilated enclosure**

- Gas turbine
- GT lube oil (synthetic)
- Air inlet silencers
- GT enclosure ventilation
- Fire protection system
- Dual gas fuel inlets
- Ventilation air inlets
- Gearbox
- A/C generator

**Trailer**

- Five axle unit
- Steerable forward two axels
- Lifting forward axle
- Cross wind rated design
- Ten landing legs

**Customer supplied**

480 V starting generator

# Packaged for Success

Package features for industrial power generation applications

“All Siemens distributors are carefully chosen for their engineering and manufacturing capabilities and commitment to adhere to Siemens standards for quality and delivery.”

The SGT-A05 packages are designed with noise suppression, access doorway, as well as safety interlocks supporting the health and safety of the operation and maintenance staff. The packages are compact and easily transported, installed and maintained.

## Lubricating Oil System

- Common synthetic lube oil system for both engine and package
- Main “engine” lube and scavenge oil pump is driven off the engine accessory gearbox for normal operation and shutdown
- Oil system components are skid-mounted and designed to industry standards
- Optional heaters/coolers to meet the climate needs of the application

## Fuel System

- On-skid fuel system includes all components needed to control fuel during start up and operation
- Operates on natural gas, liquid, dual fuel, and low BTU gas with steam and water injection

## Low Emissions

Dry Low Emissions (DLE) system is available for all SGT-A05 gas turbine variants

## Baseplate

- Sturdy, but small, lightweight footprint
- Design allows easy access for maintenance
- Jib boom provides easy installation or removal of gas turbine

## Electrical

Available to meet local standards as needed

## Air Intake System

- Provides clean, uniform airflow to the gas turbine
- Includes filter assembly, silencer and flow direction geometry
- Site-specific design minimizes disruption of inlet air
- Filtration systems are available to handle extreme environments – arctic cold, salt water spray, severe heat and dust
- Single to multiple stages handle offshore, coastal and inland sites

## Gas Turbine Enclosure

- Acoustic enclosures meet a wide range of requirements and environments
- Factory-completed enclosure can house all auxiliary equipment on engine skid, with piping and wiring completed and tested at the factory
- Completed enclosures shipped with connections intact for simplified installation and commissioning

## Water Wash System

- Maintains performance by preventing build-up of contaminants in the engine compressor
- Pump or compressed air system includes storage tanks, pressure gauges, valves and piping

# Complete Customer Care for the SGT-A05 Gas Turbine

Customer support throughout the life of the engine

The global infrastructure of Siemens and its distributors provides customers with the support they need at any time, anywhere in the world. Service centers in every region of the world, combined with a responsive spares program and expert field service representatives, all unite to provide a comprehensive system of service to keep our customers' equipment running reliably.

## Engine Lease

Engine lease programs are as varied as our customers' needs. Whether for routine maintenance, or in an emergency, engines can be made available to minimize disruptions to daily operations.

## Spares

A worldwide spares inventory allows parts to be delivered anywhere in the world, and as the original equipment manufacturer, Siemens is committed to supplying only the highest quality parts, whether new or refurbished.

## Field Service

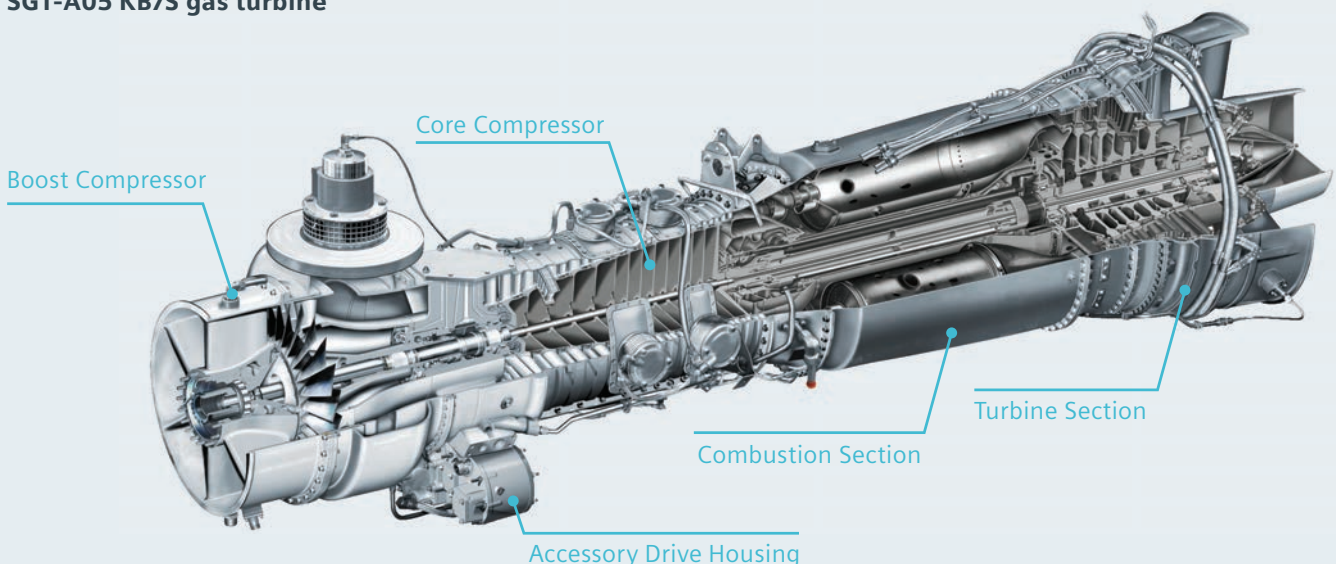
Twenty-four hours a day, seven days a week, expert field service engineers work to install, maintain and service customer equipment. Their high level of skill allows them to

respond rapidly and effectively to a range of situations that may arise. They also provide training and equipment monitoring. Field service is provided by the distributor network or Siemens.

## Modernizations and Upgrades

Upgrades to existing equipment are an attractive option for many customers, and a dedicated team of engineers and project managers work to ensure that the customer's equipment is providing the most power, efficiency and reliability possible. There are currently more than ten different upgrades available for the SGT-A05 gas turbine. Upgrades include SGT-A05 KB7HE upgrade, a conversion to Dry Low Emissions (DLE), dual fuel conversion and more.

## SGT-A05 KB7S gas turbine



# A Global Network

SGT-A05 packagers and Siemens maintenance, repair and overhaul centers

Our customers may be located in diverse regions around the world, but they all have one thing in common. They all require timely and accurate support to purchase, install and maintain their SGT-A05 gas turbines and equipment. That's why we continually invest in our global infrastructure from distributors to repair and overhaul facilities.



- Packagers / Heavy Maintenance Centers (HMC)
- SGT-A05 Packagers
- Maintenance, Repair and Overhaul Centers (MROC)
- Aeroderivative Business Locations & Service Centers
- Small Engine Business Headquarters

## General SGT-A05 and Aftermarket Inquiries

**Siemens Energy Inc.**  
Small Engine Business  
201 S. Capitol Ave Suite 910  
Indianapolis, In 46225 USA  
Phone: +1 (317) 677-1340  
Fax: +1 (317) 677-1341

## Packagers / Heavy Maintenance Centers (HMC)

**Centrax Limited, Gas Turbine Division (Europe)**  
info@centraxgt.com  
+44 1626 358 000

**IHI Jet Service (Japan)**  
ijs\_eigyoubu@ijs.ihico.jp  
+81 3 6204 7718

**Hitachi Zosen Corporation (Japan)**  
ene-siemensgt@mml.is.hi-tachizosen.co.jp  
+81 6 6569 0209

**Kobelco**  
<http://www.kobelco.co.jp/english/machinery/inquiry/index.html>  
+81-3-5739-6772

## Packagers

**OnPower, Inc. (North America)**  
info@onpowerinc.com  
+1 513 228 2100

**Jereh Oil & Gas Engineering Corporation**  
energy@jereh.com  
+86-535-676 5332

## Maintenance, Repair and Overhaul Centers

**RWG Inc.**  
501sales@rwgroup.com  
+1 713 538 9700

**Standard Aero Ltd.**  
energysales@standardaero.com  
+1 204 318 7301

**Hindustan Aeronautical Ltd. (HAL)**  
mktg.imgt@hal-india.com  
+91 80 2232 6803

## Spare Parts Distributor

**Tominaga & Co., Ltd. (Japan)**  
general-affairs@mail.tomco.co.jp  
+81 3 3639 5360



Published by and copyright © 2019:  
Siemens AG

Power and Gas  
Freyeslebenstrasse 1  
91058 Erlangen, Germany

For more information, please contact our Customer  
Support Center.

Phone: +49 180 524 70 00

Fax: +49 180 524 24 71

(Charges depending on provider)

E-mail: [support.energy@siemens.com](mailto:support.energy@siemens.com)

All rights reserved. Trademarks mentioned in this  
document are the property of Siemens AG, its affiliates, or  
their respective owners. Product Mark 501 is a trademark  
of and used under license from Rolls-Royce plc.

Subject to change without prior notice. The information in  
this document contains general descriptions of the  
technical options available, which may not apply in all  
cases. The required technical options should therefore be  
specified in the contract.

