9HA Gas Turbine
World's Largest, Most Efficient Gas Turbine
Smart Innovation

Natural gas is becoming the fuel of choice globally and for customers who operate larger blocks of power, the desire for increased operating efficiency and flexibility has never been greater. This dynamic, combined with increasingly stringent environmental regulations, is increasing the demand for highly efficient, H-class gas turbines in order to recognize a more cost effective conversion of natural gas to electricity.

GE introduced its high efficiency H-class technology to the power generation industry ten years ago; today, with 200,000 hours of operation and counting, the technology continues to evolve with the 9HA air-cooled gas turbine.

The 9HA Gas Turbine provides GE’s most cost effective conversion of fuel to power in the 50 Hz H-class industry. It offers the reliability, flexibility, and availability of the F-class fleet and utilizes advanced materials (thermal barrier coatings (TBCs) and single-crystal super alloys) from GE’s H-class gas turbines and aviation business. And, with more than 100 million hours of single-crystal experience and 15 years developing and testing TBCs, GE continues to use these materials to enhance its turbines’ high efficiency architecture.

Combined cycle plants with 9HA Gas Turbines achieve more than 61% net/62% gross combined cycle efficiency based on Gas Turbine World basis.

Two Sizes to Serve Wide Output Needs

The 9HA.01 Gas Turbine model has a simple cycle output of 397 MW, the 9HA.02 Gas Turbine model offers 470 MW for larger block size needs. All HA gas turbines share:

• 14-stage compressor validated in 2011
• 16-chamber DLN 2.6+ combustion with more than 1 million hours and 18,000 starts
• 4-stage, air-cooled hot gas path using proven alloys

The 9HA.02 Gas Turbine model is flow-scaled (similar to speed scaling) from the 9HA.01 Gas Turbine model preserving system architecture, including blade counts, with updates to accommodate higher mass flow at the same efficiency. The 9HA.02 Gas Turbine model represents the largest 50 Hz gas turbine currently available in the industry.

Life Cycle Benefits with the Customer in Mind

GE’s H-class machines deliver industry-leading life cycle value through proven technologies and maintenance strategies which reduce asset and performance degradation.

The 9HA gas turbines and their accessory systems are engineered with innovations that translate to lower operation and maintenance costs over the long term. These include proven single crystal alloy turbine components and super finish compressor blades, along with controls and maintenance solutions to help reduce heat rate and output degradation over the life of the turbine.

Employing a condition-based maintenance program can also extend component life by tailoring a service schedule that aligns with the maintenance needs of each customer’s unique operating profile. Additionally, data-driven maintenance procedures and advanced tooling reduce combustion inspection, hot gas path and major inspection durations.

With a GE Contractual Service Agreement (CSA) comes performance guarantees for output, fuel efficiency and degradation rate on H-class gas turbine technology. Spare parts including compressor blades and stators, hot gas path components, and controls and accessories are also at the ready, and field replaceable to reduce both up-front expenditures and downtime.

Knowledge services, including monitoring and diagnostics, provides the visibility to assess parts health and identify potential issues before they lead to trips, failures or hardware damage. In 2013, GE customers saved ~$100 million in operating costs with assistance from monitoring and diagnostics support.
Improving Operational Flexibility
• Full plant load in less than 30 minutes from the start command
• 60 MW/minute ramping capability in emissions compliance
• Low turndown … as low as 40% of the combined cycle output
• Fuel flexibility … gas and liquid fuels, with wide gas variability including high ethane (shale) gas and LNG
• Fuel transfer from gas to liquid up to 90% gas output
• Modular design for more efficient inspection and maintenance

Features and Benefits
• Modern 4-stage air-cooled hot gas path with advanced cooling and sealing technologies improves efficiency and allows more starts per inspection interval. Advanced materials and coatings, including single-crystal super alloys in the turbine section promote durability and extended parts life.
• Proven Dry Low NOx (DLN) 2.6+ dual fuel combustion system maintains low emissions, provides wide fuel capability, and superior turndown as low as 40% of baseload. System has more than 1 million hours and 18,000 starts.
• Advanced 14-stage compressor leverages GE’s proven aviation and power generation technology, increases reliability and maintenance. All blades are field replaceable and multiple variable vanes provide for high part load efficiency and operability.
• GE’s patented Mark VIe* Distributed Control System (DCS) connects plant components with a single, high-performance, control architecture, enabling comprehensive plant automation schemes.
• Ease of installation and modularity combined with a shorter commissioning cycle provides improved life cycle value and 1 percent more reliability than previous technologies.

Technology Validation and Insurability
Technology validation is performed in GE’s unique full speed, full load facility with extensive instrumentation. This approach is recognized as providing full product validation superior to 8,000 hours of operation and is a key aspect of the commitments of insurability GE has secured from major insurers.

Applicability
The 9HA Gas Turbine serves 50 Hz baseload and cyclic operation in combined cycle and simple cycle applications.
To find out more about this offering, contact your GE Power & Water sales representative or visit www.ge-energy.com