



SIEMENS

With
Rolls-Royce
Aero Engine
Technology

The Industrial Trent 60 Gas Turbine

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



Industrial Trent 60 gas turbine

The most advanced aero-derivative gas turbine

The Industrial Trent with Rolls-Royce Aero Engine technology is among the most powerful, pure aero-derived gas turbine in its class on the market today. Designed for industrial use in both power generation and mechanical drive applications, the Industrial Trent 60 has established a new benchmark for power output, fuel economy and cost savings.

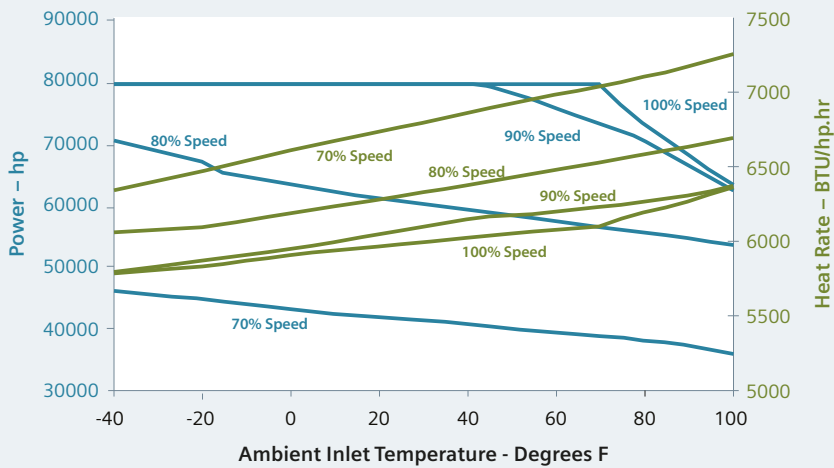
In addition to the unmatched power and efficiency of the Industrial Trent 60, customers also experience the benefits of its flexible operation, making it suitable for a variety of applications. Fast delivery and installation of equipment also provides a quicker return on investment for Industrial Trent 60 customers.



The Industrial Trent 60 MD - the best mechanical drive for LNG refrigerant compression

Siemens acquired the Rolls-Royce aero-derivative gas turbine and compressor business effective December 1, 2014. References to Siemens and products are intended to refer to such business as acquired and incorporated into Siemens as from such effective date.

Industrial Trent 60 Mechanical Drive Nominal Performance ISO Conditions, Zero Installation Losses, Natural Gas Fuel



“Designed for industrial use in both power generation and mechanical drive applications, the Industrial Trent 60 has established a new benchmark for power output, fuel economy and cost savings.”

Flexible operation for a variety of applications

Power Generation

One of the most efficient gas turbines on the market, the Industrial Trent 60 provides up to 66MW in simple cycle service at 42.5% efficiency. Its cold start capability and high cyclic life allow it to add power to the grid very rapidly to compensate for the fluctuations and variability of renewable and other power sources, making it ideal for peaking markets.

Key Features for Power Generation

- Meets stringent 25ppm NOx requirements
- Power generation at 50 or 60 Hz without a gear box
- Electric start motor: 175kW and 215kW peak
- Full train black start with 350kW on gas fuel, 450kW on liquid fuel
- High cyclic life meets daily peaking market
- Cold start to full power in under 10 minutes
- Designed for ease of installation and maintenance
- Flexible Combined Cycle
- Combined Heat & Power

Mechanical Drive

The Industrial Trent 60 has the most mechanical drive experience in its class and is ideally suited to meet the higher power, variable speed demands required by applications such as natural gas liquefaction, gas transportation, and gas induction for oil recovery.

Due to its three independent shaft design, the Industrial Trent 60 is capable of meeting driven equipment power demand at reduced speeds with minimal drop off in efficiency.

Key Features for Mechanical Drive

- Designed for 100 percent speed of 3,400 rpm
- Can directly connect to driven equipment or use a gear box
- Controls system supports a variety of driven equipment
- Speed range of 70 to 105 percent
- Full train starting with power as low as 350 KW
- Multiple daily starts with no extended wait time
- High breakaway torque capability
- High inert content fuel capability



Performance data

For power generation applications

Industrial Trent 60 – Dry Low Emissions (DLE)

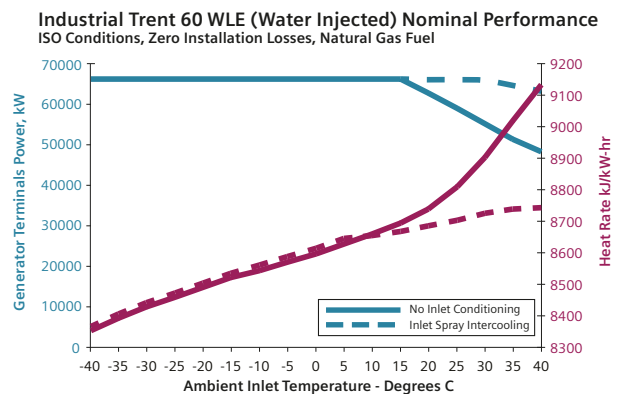
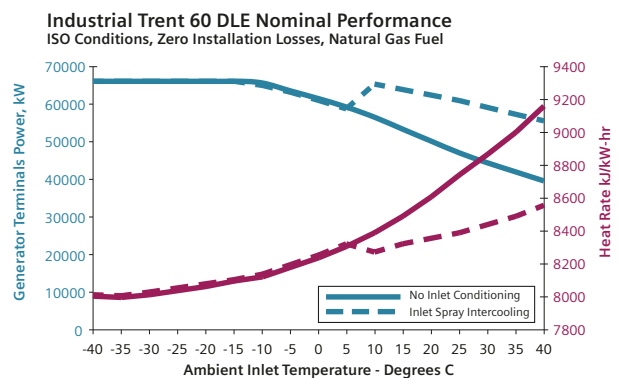
The Industrial Trent 60 DLE engine is designed to meet stringent environmental requirements. The use of eight radial staged combustors allows the successful operation of the engine in part load operation while still maintaining NO_x and CO compliance. The engine is designed to produce 54MW of power at ISO conditions.

Industrial Trent 60 – Wet Low Emissions (WLE)

The Industrial Trent 60 WLE uses an annular combustor system from the Rolls-Royce Trent aero engine but modified to operate with liquid and gas fuel. The injection of water is used to reduce emissions and boost performance. At ISO conditions the engine is rated for 66MW.

Inlet Spray Intercooling

The Industrial Trent 60 can be offered with an Inlet Spray Intercooling (ISI) system to reduce the ambient inlet temperature and decrease the energy required for compression. This results in higher power and efficiency at ambients above 7°C.



“The Industrial Trent 60 package is designed with a modular concept to allow for quick installation and ease of maintenance in the field.”

Modular for ease of installation and maintenance

Power Generation

The Industrial Trent 60 package is designed with a modular concept to allow for quick installation and ease of maintenance in the field.

Each of the modules is fully assembled and tested before shipment. The gas turbine base plate holds the required oil system to allow installation, testing and flushing in a shop environment. This greatly reduces site installation time.

The control system is designed to allow for easy site installation by using remote I/O technology to decrease the number of interconnect cables between the unit control panel and the equipment skids. All train control systems are then accessed by a Human Machine Interface (HMI) which can be located in the main control room.



Step 1

Install the main gas turbine skid baseplate. This includes all required engine lubrication and fuel systems as well as the remote I/O module.

Step 2

Install the gas turbine enclosure roof, ventilation system, and exhaust transit.

Step 3

Install air filter and support structure.

Step 4

Install auxiliary equipment skids.

Step 5

Install Industrial Trent 60 gas turbine.

Step 6

Install driven equipment. This can be done concurrently with the other steps.



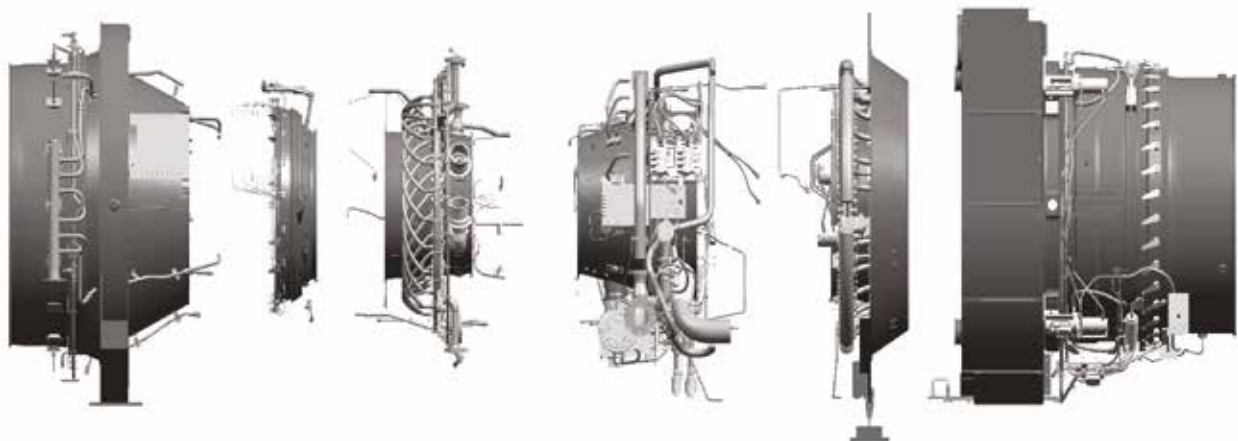
The Industrial Trent 60 engine on a test bed in Montreal, Canada

Maintenance

Quick and easy maintenance

Maintenance of the Industrial Trent 60 engine can be accomplished quickly and easily due to the aero engine design. The package can facilitate engine change out in under 24 hours of working time. Complete engine servicing can take place in a Siemens facility.

Siemens can also offer access to a lease engine or module program. The modular design of the Industrial Trent engine can allow for rapid exchange of components, while detailed work is carried out at a major overhaul facility. This can greatly reduce the turn time for engine maintenance at overhaul. Siemens can also offer access to a lease engine to support customer operations during maintenance.





UK power plant utilizes the efficiency and flexibility of the Industrial Trent 60

“The Industrial Trent 60 offers an innovative and diverse suite of service solutions tailored to customers’ specific needs.”

Comprehensive customer service

As the most powerful aero-derivative gas turbine in its class, the Industrial Trent 60 offers distinct advantages to the power generation and oil and gas industries. This competitive advantage is complemented by an innovative and diverse suite of service solutions tailored to customers’ specific needs.

Our ability to keep customers operational is a direct result of our focus to develop customized service solutions for their business. Our service solutions create partnerships designed to share risk and help control operators’ maintenance budgets while maximizing production.

This is accomplished through aligned metrics, priority service and support, and performance and availability guarantees. Utilizing Equipment Health Management (EHM), we can also diligently monitor equipment performance, avoid or minimize unscheduled maintenance, and increase the time between routine overhauls to consistently maximize its life cycle operational efficiency.

Other service options include on-site resident engineers, lease and exchange engine support, spare parts inventory management, and protection against unscheduled maintenance costs.

As equipment continues to operate over time, we are also constantly offering upgrades. These provide the latest technology to maximize output, efficiency, reliability and minimize maintenance, operational costs and emissions.

- Installation & commissioning services
- Spare parts
- Field services
- Technical support
- Customer training
- Repair and overhaul
- Lease and spare engines
- Long term service agreements
- Equipment upgrades
- Package refurbishments

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