SST-700 industrial steam turbines

Up to 175 MW

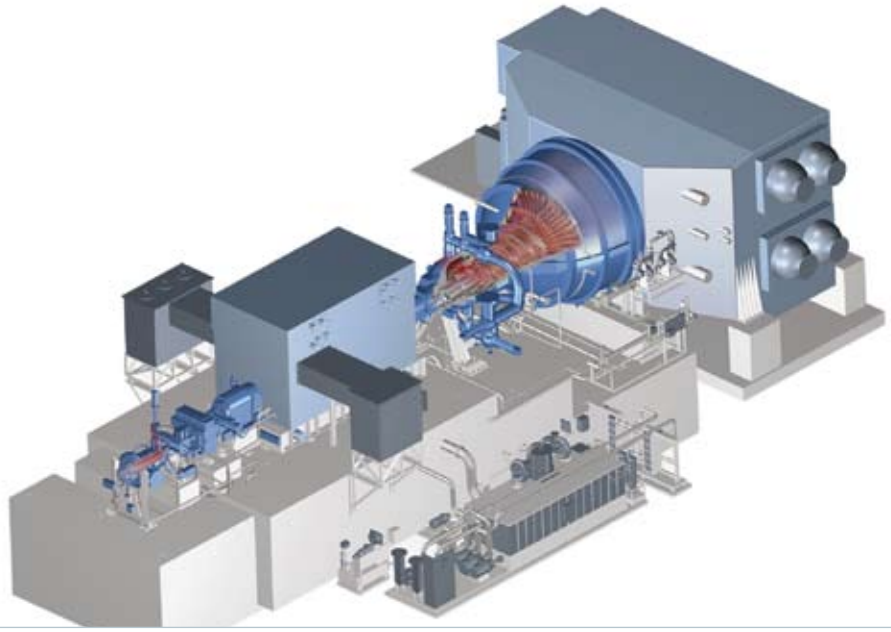
The SST-700 is a mid-range dual-casing turbine designed and manufactured to meet the specific demands of power generation in condensing and back-pressure applications.

SST-700 IP turbine at the Solnova 1 CSP plant near Sanlúcar la Mayor, Spain.

Typical applications for the SST-700 include:

- Combined-cycle plants
- Solar thermal plants
- Fossil-fuel steam plants
- Waste-to-energy plants
- District-heating plants
- Oil and gas industry
- Industrial plants

For increased efficiency, the SST-700 can also be used in a reheat configuration, where heat is added in a single or double reheat configuration to the steam cycle at a higher average temperature than to a non-reheat cycle.



Industrial Steam Turbines

Answers for energy.

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Design features

The SST-700 is a dual-casing turbine consisting of one high-pressure turbine (HP) and one low-pressure turbine (LP). The two modules can be combined to provide the optimal configuration for a specific application, or each module can be utilized independently, e.g. the high-pressure module can be used as a separate back-pressure unit. As an alternative to the HP turbine, a high-pressure/intermediate pressure (HP/IP) turbine can be used, specially developed for daily cycling and ultrarapid starts, as demanded by the solarthermal process. Optionally a double reheat can be realized, for increased efficiency of the water-steam cycle.

This division of the SST-700 steam expansion into two different modules optimizes the use of large changes in volumetric flow from inlet to outlet. The use of two separate modules operating at different and optimized speeds is the most successful design for large expansion coefficients, as is the case for both high live-steam data and large low-pressure exhaust steam flows.

SST-700 LP module for the Andasol CSP plant in Spain.

SST-700 HP Turbine module in the German workshop.

Turbine casing

The configuration of the SST-700 turbine permits considerable operational flexibility. Its symmetrical casing and small hot-part dimensions result in low thermal and mechanical inertia and enable the SST-700 to accept very short start-up times and rapid load changes, corresponding perfectly to the needs of the industrial user or the requirements of a solarthermal plant.

Each SST-700 turbine is built from a series of proven standard modules, each contributing to high reliability and availability. The resulting versatility enables the turbine to cover a wide field of applications and a broad power range, by selecting optimal size from standard HP and LP modules.

Shaft-line arrangement

The turbine arrangement can meet any project-specific requirement on shaft-line layout, but the standard arrangement is an "in-line arrangement" where the HP turbine and the speed-reducing gear are on one side of the generator and the direct-drive LP turbine and the condenser on the other side.

The speed-reducing gears are taken from the existing ranges of world-class gear manufacturers and have proven high reliability and performance.

Inlet systems and steam extractions

Although the modules are standardized, the steam path, extraction / admission location, size and inlet systems are customized to fit the specific requirements of each project.

Optimum performance is assured by choosing dimensions for each cylinder appropriate to volumetric flow and by using two different and optimized speeds for the HP and LP turbines. Internally controlled process steam extraction provides a constant extraction pressure over a broad range of steam flows, a feature that makes the SST-700 steam turbines both flexible and easy to operate. Bleed extractions are available and can be equipped with external pressure control valves.

Blading

The use of the latest blading manufacturing technology enhances the performance capability. The use of advanced and proven condensing last stage blades, covering a range of 1.7 – 11 m^2 (18.3 – 118.4 sq.ft.), is another factor in achieving high efficiency.

Exhaust

Condensing turbines feature as standard an axial exhaust connected to an in-line water-cooled condenser or connected to an air-cooled condenser. The axial exhaust saves foundation height and cost and improves efficiency.

Downwards-directed exhausts for underslung condensers are available as an option. Although the modules are standardized, the steam path, extraction/admission location, size and inlet systems are customized to fit the specific requirements of each project.

Technical data

Technical data

- Power output up to 175 MW
- Speed 3,000–13,200 rpm
- Live steam conditions:
  Pressure up to 165 bar / 2,395 psi
  Temperature up to 585° C / 1,085° F
- Bleed up to 120 bar / 1,740 psi
- Controlled extraction (single or double):
  Pressure up to 40 bar / 580 psi
  Temperature up to 415° C / 780° F
- Exhaust steam conditions:
  Back pressure up to 40 bar / 580 psi
  Condensing up to 0.6 bar / 8.5 psi
  District heating up to 3 bar / 45 psi

All data are approximate and project-related.

Design features

- Dual-casing
- Modular
- Flexible
- Customized steam path
- Axial or radial exhaust
- Thermoflexible design
- Double reheat*
- Proven

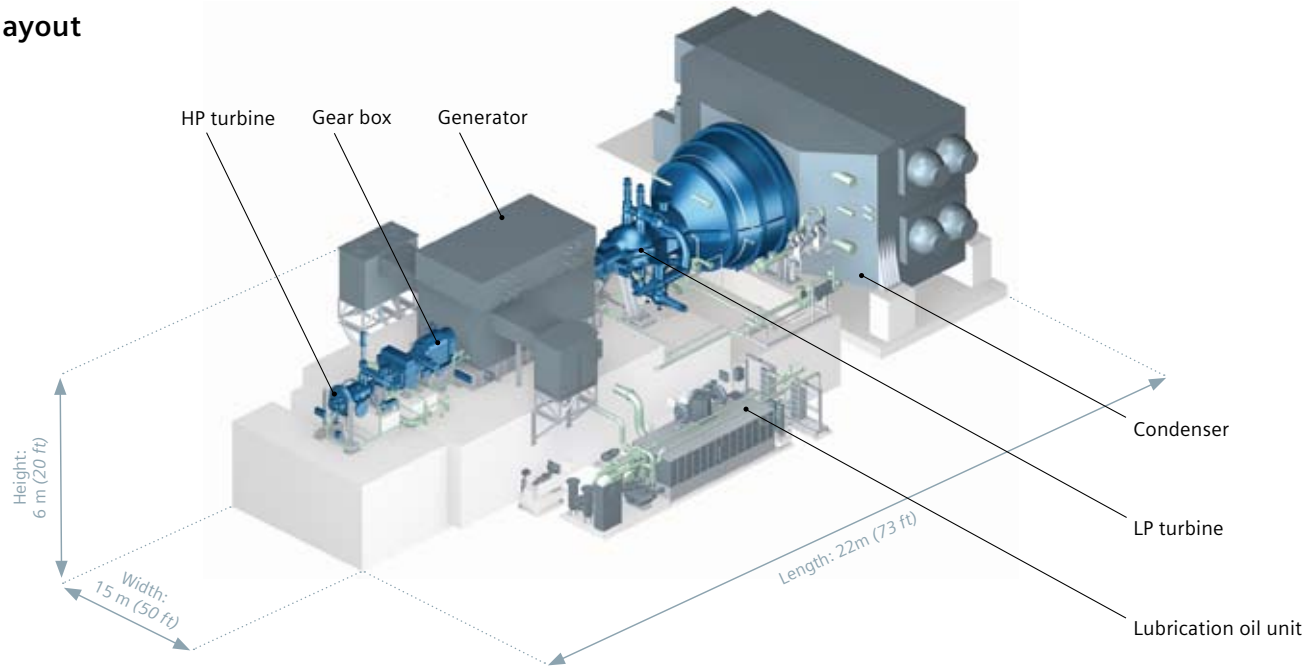
Benefits

- Compact plant layout
- Wide application range
- High efficiency
- High reliability / availability
- Simple foundation
- Short start-up time

*1% higher efficiency than the traditional model

Final rotor assembly for the SST-700 to serve in the Amsterdam Waste-to-Heat facility

Turbine layout



Installation and maintenance

Our proven installation and maintenance concept lowers maintenance cost by enabling easy access to the installed components – the turbine, gearbox, generator and auxiliaries.

The arrangement with all components, such as steam turbines, gears, generator and condenser in one plane, reduces foundation and building costs considerably. Turbines, gear and generator are all completely assembled when leaving our factory, minimizing the time and manpower needed for field erection. The availability of equipment is enhanced by the simplicity in design and minimum requirement for maintenance. Bearings, for example, can be inspected without lifting the turbine casing.

As all SST-700 turbines are prepared for remote monitoring, Siemens offers service contracts for condition-based maintenance, customized for the specific operating status of each machine to reduce outage and overhaul costs. The remote monitoring technology gives customers fast telephone and online help from expert personnel.

Additionally, we offer comprehensive and rapid spare-part service, repairs and maintenance solutions designed to increase the reliability and availability of the plant. Long-term maintenance contracts assure prolonged plant operation at predefined costs.

Our service solutions are based on long experience gained from a substantial global fleet. This experience is incorporated systematically into our design and manufacturing as well as our service and maintenance practice, ensuring that we remain your reliable partner.

Installing the SST-700 LP turbine on the concentrated solar power plant in Boulder City, Nevada, USA.

Reference examples

SST-700 has been sold for a rich variety of applications around the world. The following references exemplify this versatility of application.

Amsterdam, Netherlands: AEB's waste fired power plant uses a 74 MW(e) extraction condensing turbine in reheat configuration.

Lebrija, Spain: The Andalusian concentrated solar power (CSP) plant is one of the more than 40 CSP projects worldwide, where a SST-700 reheat steam turbine was chosen.

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Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens AG, Energy Sector
Oil & Gas Division
Wolfgang-Reuter-Platz
47053 Duisburg, Germany

Siemens Energy Inc.
10730 Telge Road
Houston, Texas 77095, USA

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

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