



# Siemens Steam Turbine SST5-9000

For applications in conventional islands of advanced pressurized water reactors



SST5-9000 steam turbine in the nuclear power plant (NPP) in Unterweser, Germany

As part of our Siemens Steam Turbine (SST™) portfolio, the SST5-9000 is a highly reliable steam turbine for applications in the conventional islands of advanced pressurized water reactors, with a power output up to 1,900 MW.

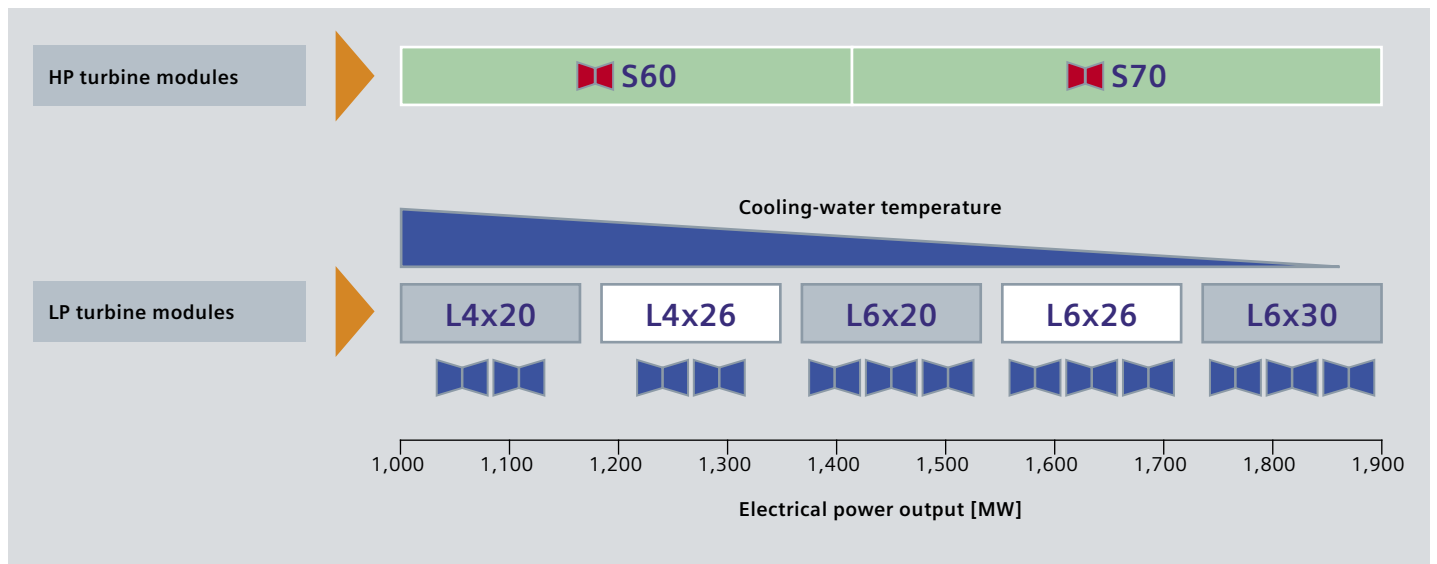
The half-speed SST5-9000 features a double-flow saturated steam HP cylinder and up to three double-flow LP cylinders with shrunk-on disk rotors.

Turbine modules of different sizes provide a broad range of power ratings. To meet specific project requirements, Siemens offers the appropriate modules and customizes the individual blade paths.

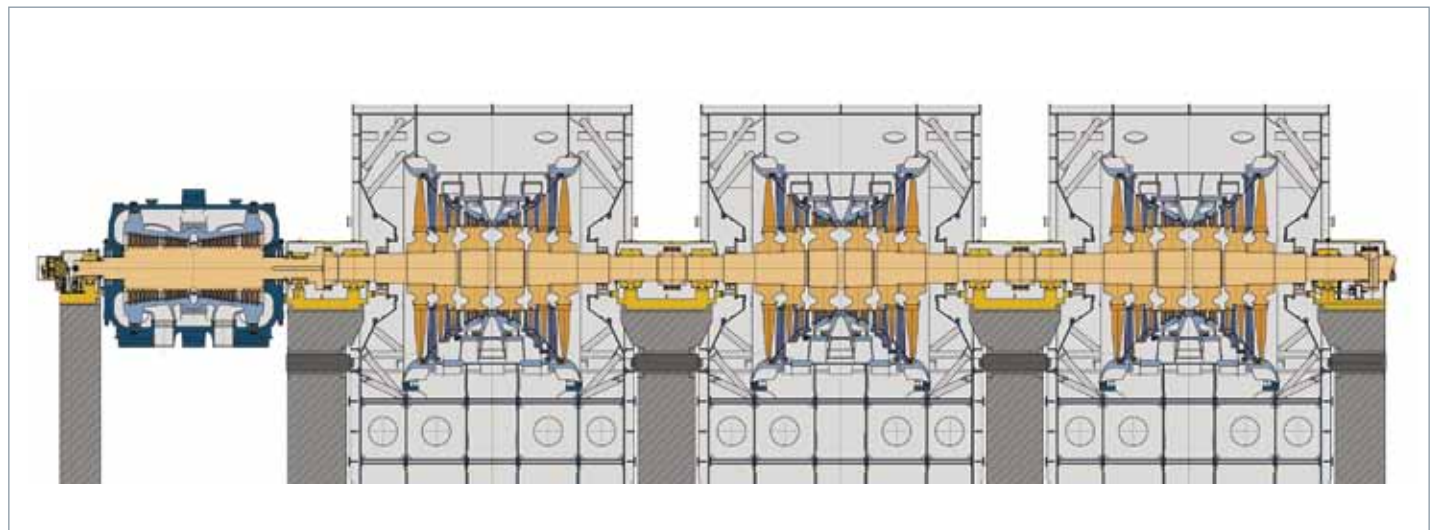
Proven pre-engineered modules reduce site assembly and commissioning time as well as technical risks. Their high reliability is demonstrated by a forced outage rate that is less than half of the North American Electric Reliability Council (NERC) average.

Thanks to their power generation capabilities, Siemens steam turbines have consistently occupied the top positions in worldwide ranking lists for many years.

The design of the modular steam turbine platform provides the flexibility to manage a power range from 1,000 MW to 1,900 MW and diverse site/cooling water conditions in all advanced pressurized water reactors.



## Technical parameters



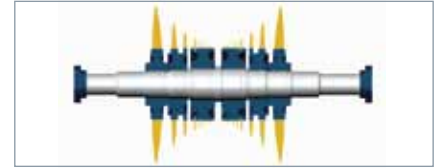
|   |   |
|---|---|
| <b>Turbine series</b>                       | One double-flow saturated steam HP cylinder and up to three double-flow LP cylinders with shrunk-on disk rotors |
| <b>Plant type</b>                           | Advanced pressurized water reactor  |
| <b>Output range</b>                         | 1,000 MW to 1,900 MW  |
| <b>Main steam</b><br>(Typical parameters)   | Temperature: Up to 290 °C<br>Pressure: Up to 75 bar   |
| <b>Reheat steam</b><br>(Typical parameters) | Temperature: 275 °C   |
| <b>Exhaust areas</b>                        | 4x 20 m <sup>2</sup> to 6x 30 m <sup>2</sup>  |
| <b>Last blade profile length</b>            | 1,400 mm to 1,830 mm  |

# Shrunk-on disk design features proven technology: no stress-corrosion cracking that could require replacement of LP rotors or disks

Millions of disk service hours have been accumulated without any indication of stress-corrosion cracking

More than 4 million total fleet operating hours

- More than 60 million disk operating hours
- In operation for up to 250,000 hours
- More than 1,000 disk inspections



## Leading technology for efficient, flexible and reliable power generation

The SST5-9000 steam turbine



### Customer benefits

- Wide application range from 1,000 MW to 1,900 MW, with sufficient margin for future NPP power increase without changing the steam turbine modules
- Flexibility to meet customer- and site-specific needs based on standardized and certified steam turbine platform modules
- Compact and cost-efficient plant layout, thanks to optimized arrangement concept
- High-efficiency HP and LP turbine, thanks to high-performance blading, optimal number of stages, and minimal radial clearances of symmetrically arranged double-flow steam paths
- Short start-up times/high operational flexibility
- Maximum reliability and availability
- Certified manufacturing quality and experienced project management
- Reduced maintenance expenses with > 10-year major inspection intervals
- Extended lifetime of up to 60 years, thanks to state-of-the-art engineering and advanced service concepts
- Low lifecycle costs as a result of world-class efficiency
- Low-maintenance components, coupled with the years of experience that Siemens has as a product and solution provider
- Short installation and outage times due to modularity, automation and optimized processes

# Manufacturing of shrunk-on disk rotors is a key knowledge area for Siemens



Crane transport of heated-up disk



Assembling heated-up disk onto rotor



Shrink fit by cooling down of disk on turning rotor



Completed shrunk-on disk rotor



Bladed shrunk-on disk rotor

## SST-9000 series steam turbine: a success story

With almost 1,000 large-scale steam turbine units in operation, the Siemens fleet contributes about 380 GW of power generation capacity and represents 17 percent of the world's operating fleet. The following example is one of a total of 29 nuclear power plant applications using the SST-9000 series steam turbine, and has just recently been installed. In addition, numerous modifications and upgrades have been successfully performed – including a significant number of non-OEM turbines.



Siemens experience in the engineering and manufacturing of large-scale steam turbines for NPPs

### Performance

Net plant output: 1,600 MW

### Major components of conventional part

Steam turbine: SST5-9000

Generator: SGen5-4000W

### Typical steam-cycle parameters

Main steam: 290 °C / 75 bar

Reheat: 277 °C / 9 bar

Steam turbine power output: 1,700 MW

For more information please contact your local Siemens sales representative.

Published by and copyright © 2011:  
Siemens AG  
Energy Sector  
Freyeslebenstrasse 1  
91058 Erlangen, Germany

Siemens Energy, Inc.  
4400 Alafaya Trail  
Orlando, FL 32826-2399, 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

Fossil Power Generation Division  
Order No. E50001-G210-A169-V1-4A00  
Printed in Germany  
Dispo 34802, c4bs 7478  
TH 214-110320 BR 431420 DB 09113.0

Printed on elementary chlorine-free bleached paper.

All rights reserved.  
Trademarks mentioned in this document are the property of Siemens AG, its affiliates, or their respective owners.

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.