

HITACHI
Inspire the Next

STEAM TURBINE

www.power-hitachi.com

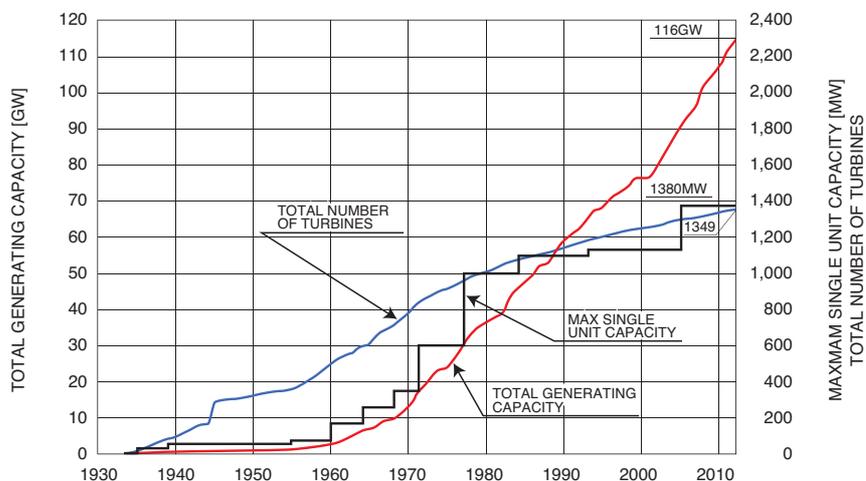
HITACHI Steam Turbine



HITACHI Ltd. has supplied numerous steam turbines with high efficiency and high reliability to various nations of the world since we manufactured the first unit in 1933.

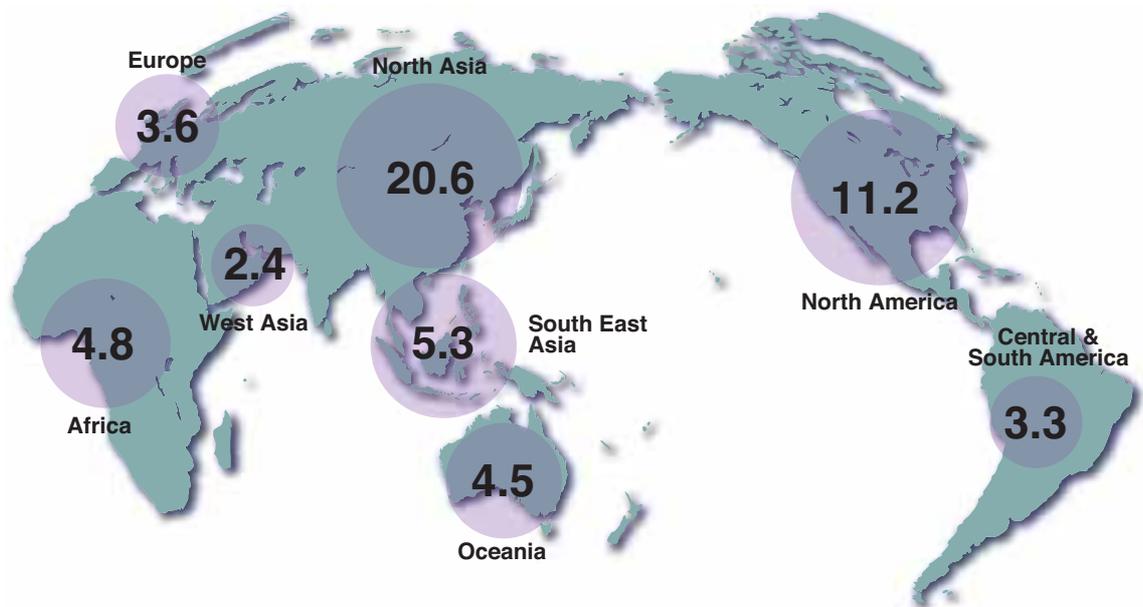
Hitachi steam turbine plays an important role as a main facility of generating electricity business. Hitachi steam turbine has many features such as high-performance long blades and the ultra-high temperature condition (600°C/620°C), which has firstly been developed, in the world.

History of HITACHI Steam Turbine



HITACHI Steam Turbines in the World

TOTAL CAPACITY: 108GW (Including 64GW in Japan)



Steam Turbine for Combined Cycle

Hitachi supplies the Steam Turbine for various kinds of Combined Cycle Power Plant.

- Single shaft application combined with Gas Turbine
- Multiple shaft application separated from Gas Turbine
- Axial flow type - Low Pressure Turbine
- Down flow type - Low Pressure Turbine



Kawagoe Thermal Power Station (Japan)
85 MW x 7, TCDF-26, 3600rpm
10 MPa, 538/538°C



Andres Project (Dominica Republic)
121 MW, TCSF-40, 3600rpm
12.2 MPa, 566/552°C



SK Power (Korea)
200.9 MW x 2, TCDF-40, 3600rpm
12.7 MPa, 565/565°C



Cairo North Power Station (Egypt)
259.2 MW, TCDF-40, 3000rpm
11.9 MPa, 560/558°C



Steam Turbine for Thermal Power Plant

Hitachi supplies the Steam Turbine up to 1300MW class.

- High efficiency based on High Pressure and High Temperature steam condition
- Reliable long blade

Output and Application

Followings are the typical applications of Hitachi steam turbines,



200 to 700 MW class

300 to 800 MW class

800 to 1300 MW class

Experiences

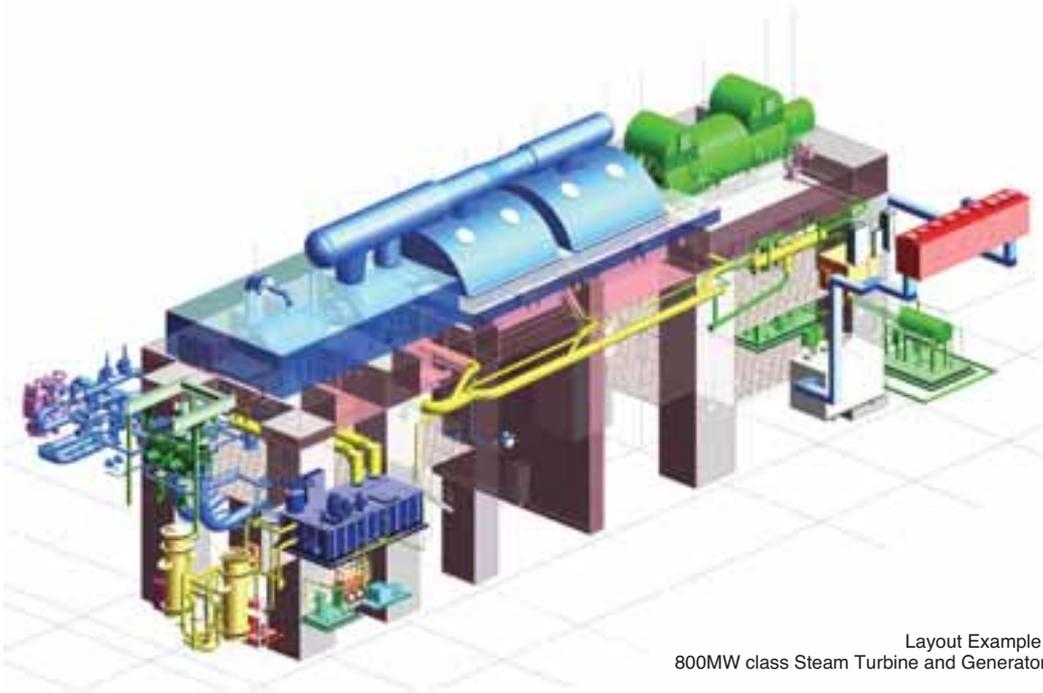


Genesee Power Station No.3 Unit (Canada)
495 MW, TCDF-40, 3600rpm
24.1 MPa, 566/566°C

>>Best Coal Fired Projects of the Year Award 2005 / Power Gen International <<



Tomato-Atsuma Power Station No.4 Unit (Japan)
700 MW, TC4F-43, 3000rpm
25.0 MPa, 600/600°C



Layout Example;
800MW class Steam Turbine and Generator



Water Scott, Jr. Energy Center No.4 Unit (USA)
870 MW , TC4F-40, 3600rpm 25.3 MPa, 566/593°C
>>2007 Plant of the Year / Power-USA<<
>>Best Coal Fired Projects of the Year Awards 2007 / Power Gen International <<

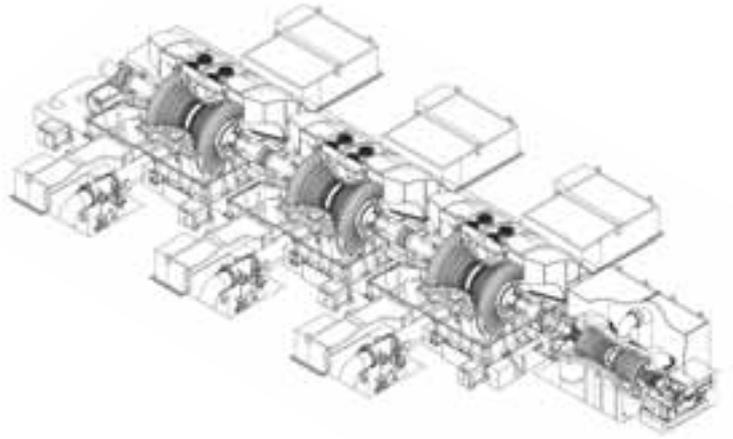


Zouxian Power Station Unit No.7 and No.8 (China)
1000 MW , TC4F-43, 3000rpm
24.9 MPa, 600/600°C

Steam Turbine for Nuclear Power Plant

Hitachi supplies the Steam Turbine up to 1500MW class.

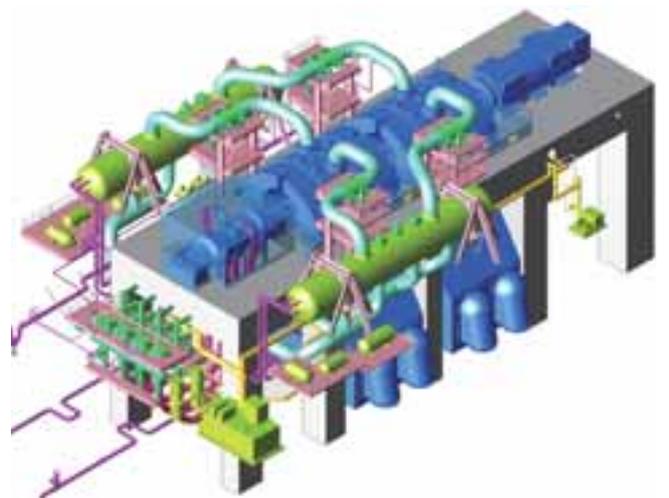
- Mono-block forged rotor
- Reliable long blade
- 50Hz/60Hz applications and experiences



Mono-block forged rotor



Experiences



Qinshan III Power Plant Unit No.1 and No.2 (China)
728 MW, TC4F-52, 1500rpm
4.41 MPa, 257.6/243.4°C



Shika Power Plant Unit No.1 (Japan)
540 MW, TC4F-38, 1800rpm
6.55 MPa, 282°C



Kashiwasaki Kariha Power Plant Unit No.4 (Japan)
1100 MW, TC6F-41, 1500rpm
6.55 MPa, 282°C



Hamaoka Power Plant Unit No.4 (Japan)
1137 MW, TC6F-43, 1800rpm
6.55 MPa, 282/251°C



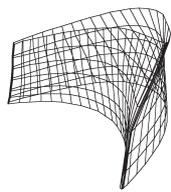
Hamaoka Power Plant Unit No.5 (Japan)
1380 MW, TC6F-52, 1800rpm
6.69 MPa, 284/253°C

Research & Development

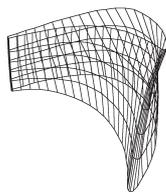
Hitachi makes a continuous effort to obtain even higher efficiency and reliability with analytical and experimental approach. Our excellent research staffs are developing new technology to provide more advanced design and manufacturing technology.

Analysis

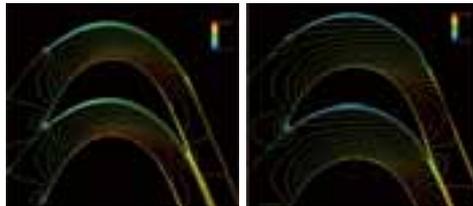
Blade Profile Development



Conventional



New Profile



Mach number contours



Structural



Tip fin seals & covers in HP Section



Leakage Flow Analysis

Steam Path Flow Analysis

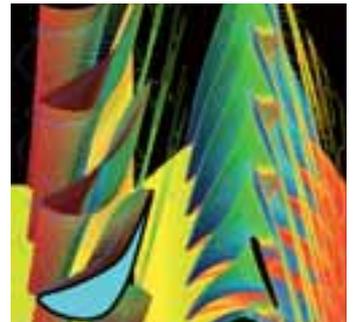


Streamlines in a meridional plane



Application to the Products
(Sample: Advanced Vortex Nozzle)

Around Last stage area

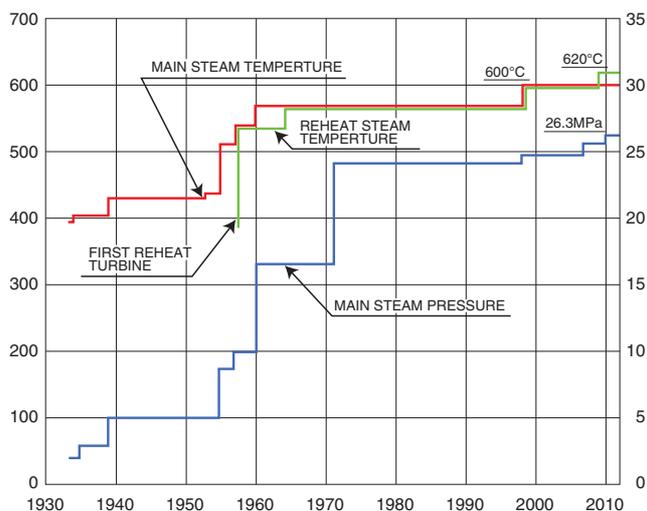


Nozzle

Bucket

Pressure and Temperature Application

Hitachi develops our own material for high pressure and temperature applications.



Test Facility

Hitachi keeps the test facility for the elemental development and the assembling testing. Each result is applied to the products.



Last Stage Blade Selections

Frequency (Hz)	Rotation Speed (rpm)	Last Stage Blade Length (inch)
50	3000	23 / 26 / 33.5 / 40 / 43 / 48
	1500	41 / 52
60	3600	23 / 26 / 30 / 33.5 / 36 / 40 / 45
	1800	38 / 43 / 52

The development of longer last stage blades for steam turbines is one of the most effective solutions to achieve a compact and highly efficient turbine design at large unit capacities. As such, Hitachi has successfully developed multiple kinds of long last stage blades based on its own proven technology and processes.



Manufacturing Facilities

Hitachi, Ltd. was founded in 1910 with the aim to establish a national industrial technology. Hitachi Works is marked as the first major factory by achievement to manufacture and supply variety of products around the world.

Hitachi Works

Kaigan Factory of Hitachi works is the main factory to product steam turbines.

It was established in 1931.



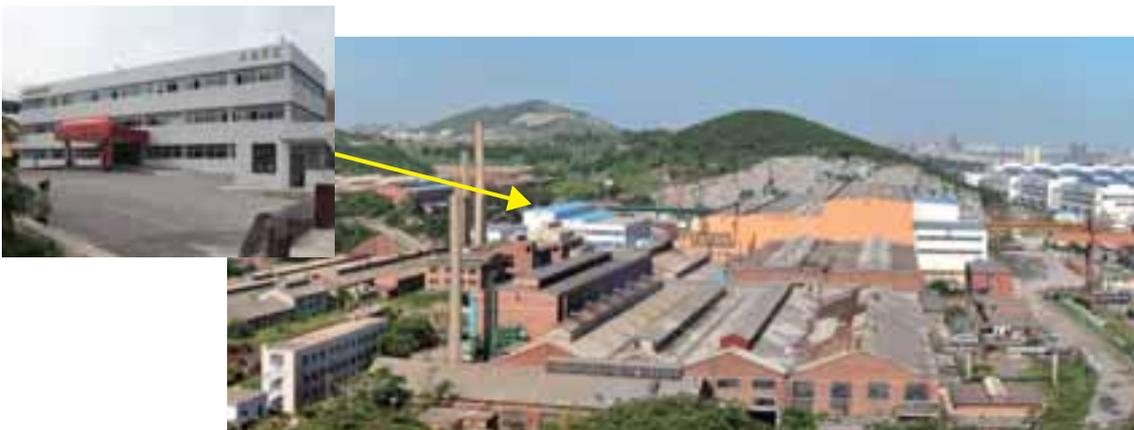
Hitachi Canadian Industry, Ltd. (HCI), Canada

HCI was established in 1998.



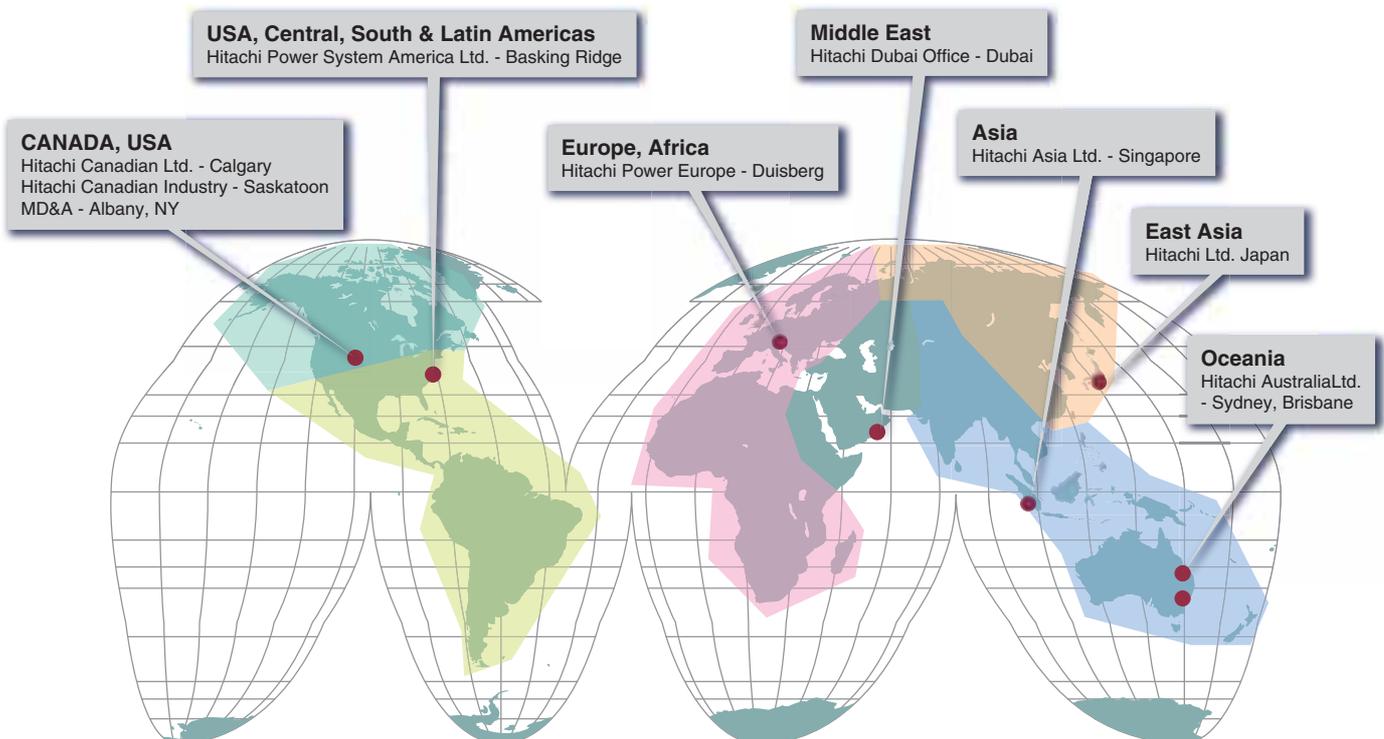
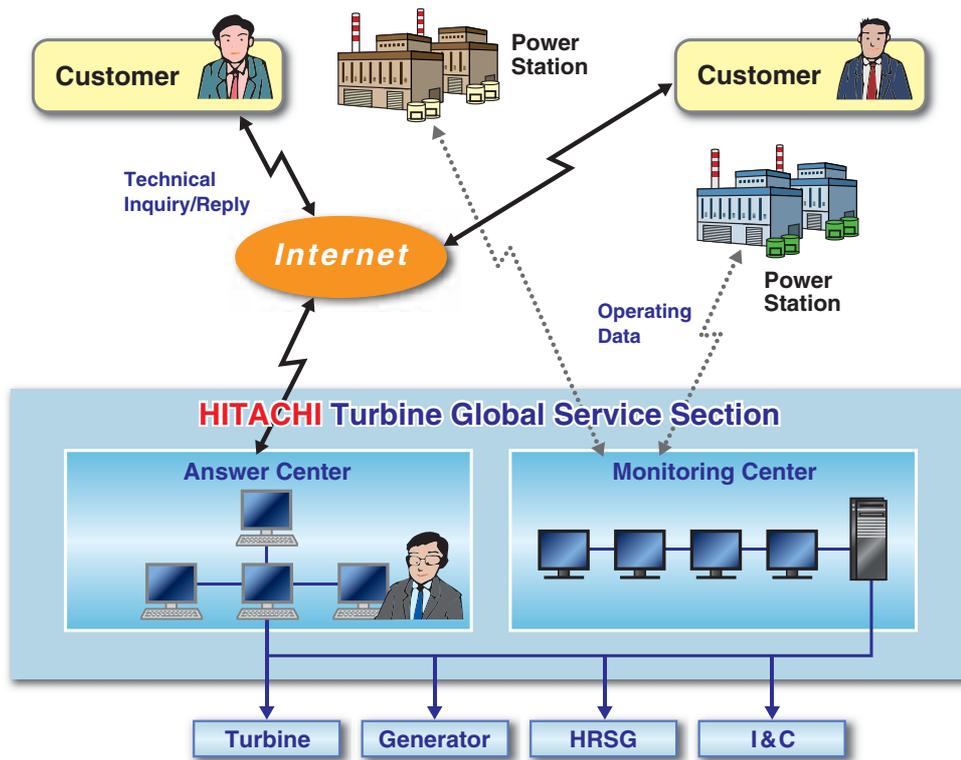
Dalian Hitachi Baoyuan Machinery & Equipment Co., Ltd. (DHME), China

DHME was established in 1997, and merged in 2005.



Global Service Network

Answer Service is an Internet Service System, which provides proper technological support for effective maintenance, high availability, and high efficiency toward power generating facilities.



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