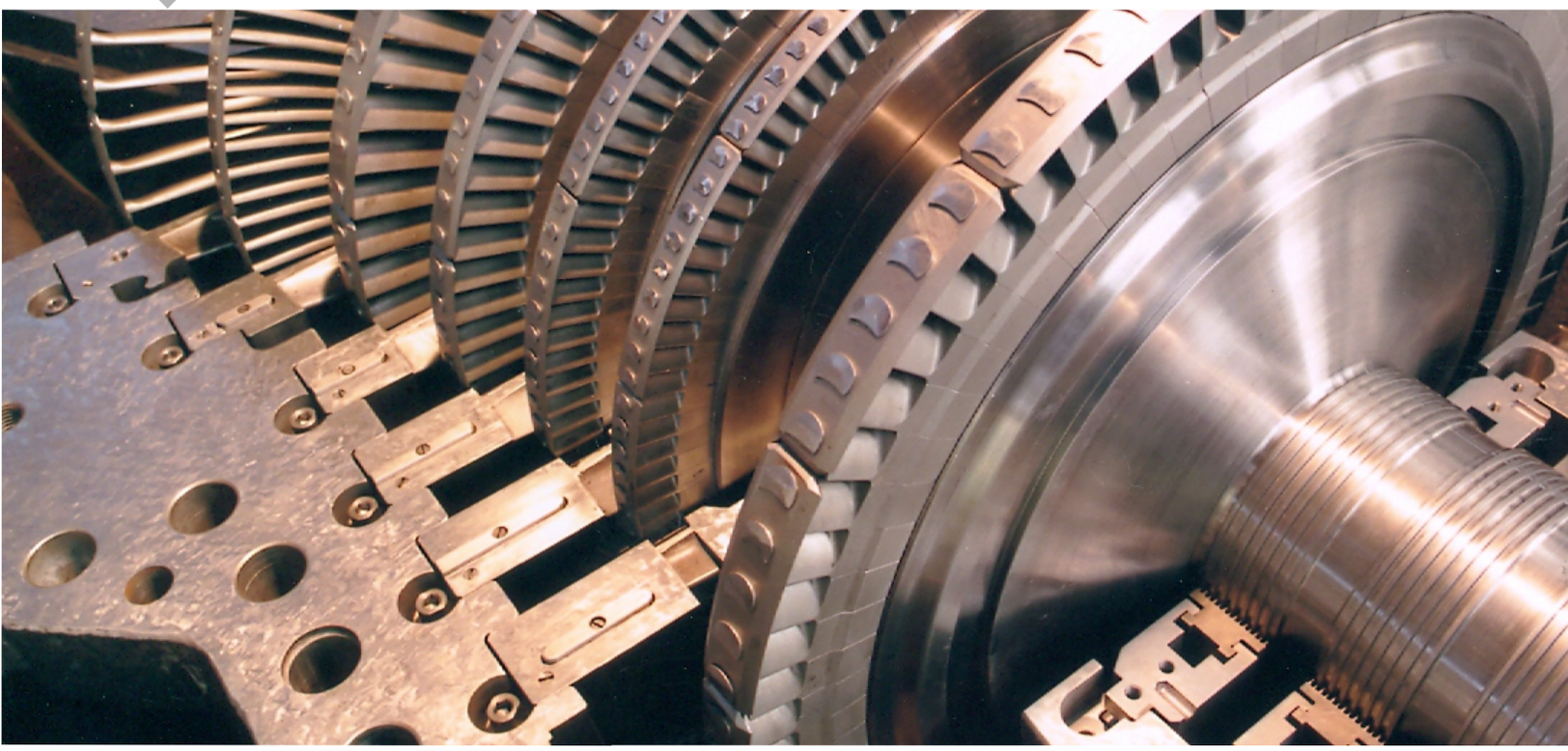
Industrial Steam Turbine

Introduction

Beijing Power Equipment Group Co., Ltd. (BPEG) has started developing and designing boiler feed-water pump turbine (BFPT) since 1983, and has formed the serialized products to equip 200MW to 600MW unit. The first BFPT was put into operation in Shanghai Shidongkou Power Plant in 1987. Currently we have approximately 500 sets of turbines under operation domestically, and are well known for high market share and great customer acceptance. Besides typical BFPT, we can also design according to customers' requirements.

TGQ type turbine adopts design of single chamber, impulse type, dual steam supply, variable speed,and condensing type. The product has the advantages of light weight, small axial thrust force, adaptive to quick load change, and little leakage in blade tip and shaft seal. Meanwhile, utilization of inner-switch of steam supply, and nozzle controlling system enable more reliable operation, as well as more smooth switching of steam supply.



Development

1952 Started maintaining turbines.

1958 Independently produced the first 2MW Hongqi-brand turbine unit of Beijing.

1952

1983 Based on GE prototype, began to develope 6MW BFPT to equip 300MW unit. The first was put into operation in Shanghai Shidongkou Power Plant in August 1987.

1998

1998 Launched serialized development and manufacturing of BFPTs, and has accomplished 5 models 10 specifications of products within 6 to 14MW.

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Characteristics

Impulse Type

- Less hubs on rotor blades, smaller size, lighter body. The turning gear is of centrifugal sliding key detachment type and avoids using of gears, so as to lower the failure rate.
- Low differential pressure between front and back of rotor blades, little air leakage on blade tips and shaft seals. Leakage has little influence on efficiency.
- Axial direction thrust force is weak, so there's little loading on bearings, lower oil consumption, and little loss.
- Big transition fillet of rotor, low stress concentration factor, low thermal stress on rotors,and more adaptive to quick loading change.

Inner Switch of Steam Supply

Utilization of inner steam inner switch mode enables smooth operation in 0 - 100% loading, and has characteristics as follows:

- Simplified steam supply system makes the operation more stable by smoothing steam switching without vibration.
- High pressure steam inlet system is separated from the turbine itself so as to reduce thermal shock to the turbine.
- Can be started with high pressure steam and operates flexibly.
- Relatively low humidity in high pressure steam operation.

High Standard Materials

BPEG abides by the principle of using high-standard materials on key parts, so as to guarantee service life of turbine exceeding 30 years, repair cycle not less than 6 years, and materials do not deform after long time operation.

Parameters

Model	TGQ06/7		TGQ07/7		TGQ08/7		TGQ10/6		TGQ14/6	
	N	K	N	K	N	K	N	K	N	K
Type	Single chamber, dual steam supply, inner switch, variable rotary speed, variable power, impulse condensing									
Low Pressure Steam Pressure Mpa	0.6–1.4		0.6–1.5		0.6–1.5		0.6–1.5		0.6–1.5	
High Pressure Steam Pressure Mpa	11–17.5		–		–		11–17.5		11–17.5	
Reheat Steam Pressure Mpa	3.49–4.0		3.4–5.0		3.4–5.0		3.4–5.0		3.4–5.0	
Exhaust Steam Pressure	N(Outlet to water– cooler condenser)						6.1–7.5			
	N(Outlet to water– cooler condenser)						13–47			
Design Power kW	6000		7000		8000		12000		15000	
Application Scope	200MW full capacity		350MW critical half capacity		–		350MW full capacity		350MW full capacity	
	200MW half capacity		660MW half capacity induced fan		350MW critical half capacity		600MW half capacity		600MW half capacity	
	350MW half capacity induced fan		–		–		–		1000MW half capacity induced fan	

Scope of Supply

Turbine Main Body

All parts from high and low pressure main valve to low pressure cylinder outlet (including parallels, foundation plate, and anchor bolt).

Oil System

Includes oil tank, AC oil pump, DC oil pump, oil cooler, oil filter, smoke extraction fan, oil level and temperature gauge, electrical heater, and oil pipelines and auxiliaries above the operation floor.

Steam-Water System

Consists of shaft sealing and draining system vales, restrictive elements, steam-water pipelines and auxiliaries above the operation floor, blow-off line, and vacuum valve.

Speed Modification and Control System

Include MEH electro-hydraulic system, servomotor, and steam supply device.

Protection System consists of TSI monitoring and protection system, ETS emergency and trip protection system, emergency interruption device, electromagnetic trip device, and various gauges for monitoring, protection and interlocking.

Spare Parts and Special Tools

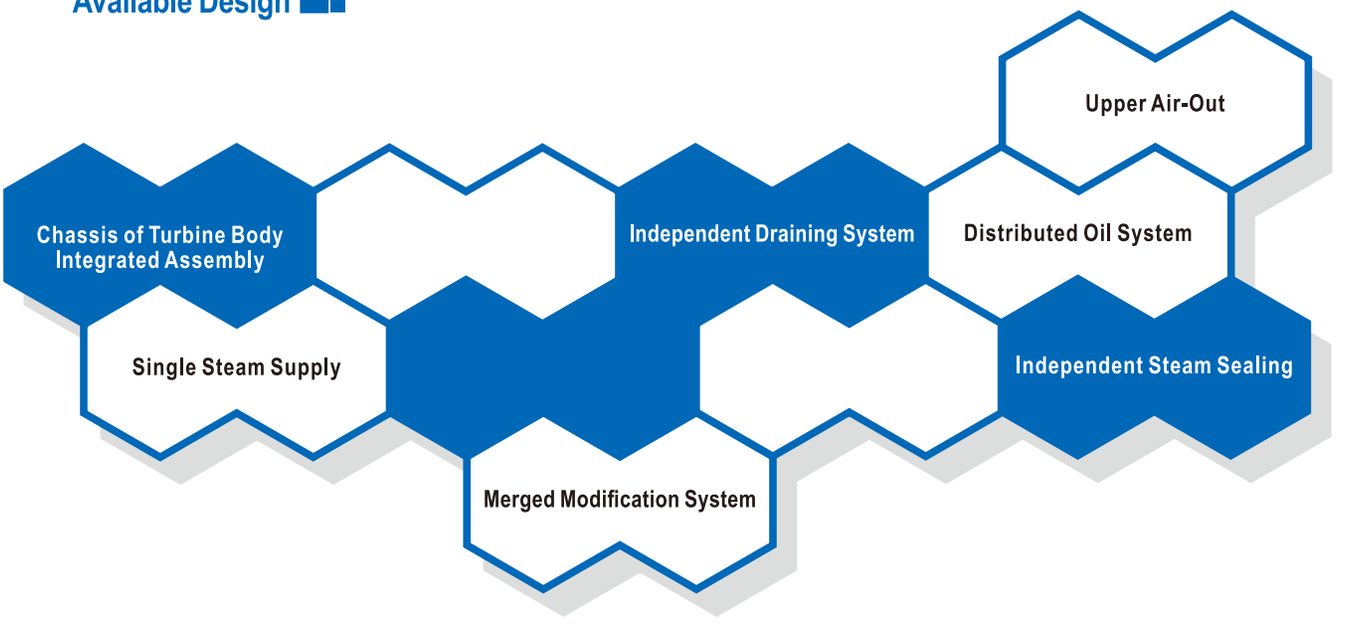
Main Body

Oil Station Assembly

Vacuum Valve

TSI System

Available Design



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Retrofit & Maintenance

Retrofit

Additional to supplying high quality feed-water pump turbine, we also provide specified retrofit services to customers, including:

- increase feed-water pump turbine power and efficiency
- optimize the hydraulic system
- alter motor-driven pump to turbine-driven pump

Maintenance

BPEG has started turbine maintenance services since 1952 and accumulated quantity of experiences. The overhauling of turbine rotors has become our characteristic services that we provide to power plants.

Achievements

Achievements of Draft Fan Turbine

Project	Customer	Unit Capacity	Quantity	Date
SDIC Xinjiang Hami Power Plant Project	SDIC Hami Power Generation Co., Ltd.	660MW	4	2012.11
CPI Guizhou Chayuan power plant Project	Guizhou Jinyuan Chayuan Power Generation Co., Ltd.	660MW	4	2014.01
Datang Shaanxi Yanan Power Plant Project	Datang Shaanxi Power Generation Co., Ltd. Yanan Thermal Power Plant	350MW	2	2015.05
Chinalco Pingguo Thermal Power Plant Project	Guangxi Hua Leixin Material Co. Ltd.	350MW	6	2016.07
Hebei Construction Investment Zunhua Thermal Power Plant	Guangdong Electric Power Design & Research Institute Co Ltd	350MW	4	2017.02

Achievements of Draft Fan Turbine

Project	Customer	Unit Capacity	Quantity	Date
Huarun Henan Jiaozuo Power Plant	Huarun Electric Jiaozuo Co., Ltd.	660MW	4	2012.12
Datang 803 Thermal Power Plant	Huarun Electric Jiaozuo Co., Ltd.	350MW	2	2015.04
Shanxi Chongguang Jiexiu Thermal Power Plant	Shanghai Electric Group Company Limited	350MW	2	2015.10

Achievements of Draft Fan Turbine

Project	Customer	Unit Capacity	Quantity	Date
Datang Baqiao Power Plant BFPT Retrofit	Datang Baqiao Power Plant	330MW	2	2014.06
Datang Baoding Qingyuan Power Plant BFPT Retrofit	Datang Baoding Qingyuan Power Plant	330MW	4	2015.10
Maanshan Dangtu Power Generation BFPT Retrofit	Maanshan Dangtu Power Generation Co., Ltd.	660MW	4	2016.05