

TOSHIBA

Leading Innovation >>>

Toshiba Thermal Power Systems Business in India



I . Introduction to Toshiba

II . Thermal Power Business in India

III . Toshiba JSW Power Systems Private Limited

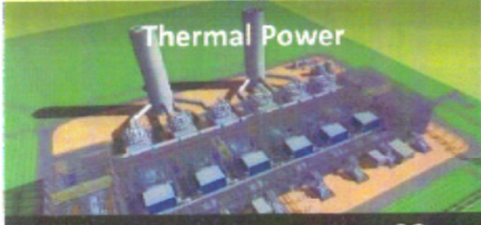
IV . The Generator for Kudgi#2

V . Support from Tamil Nadu Government
& Japanese Government

VI . Vision of TJPS

Energy Business Domain

- Aiming to be a top global company -

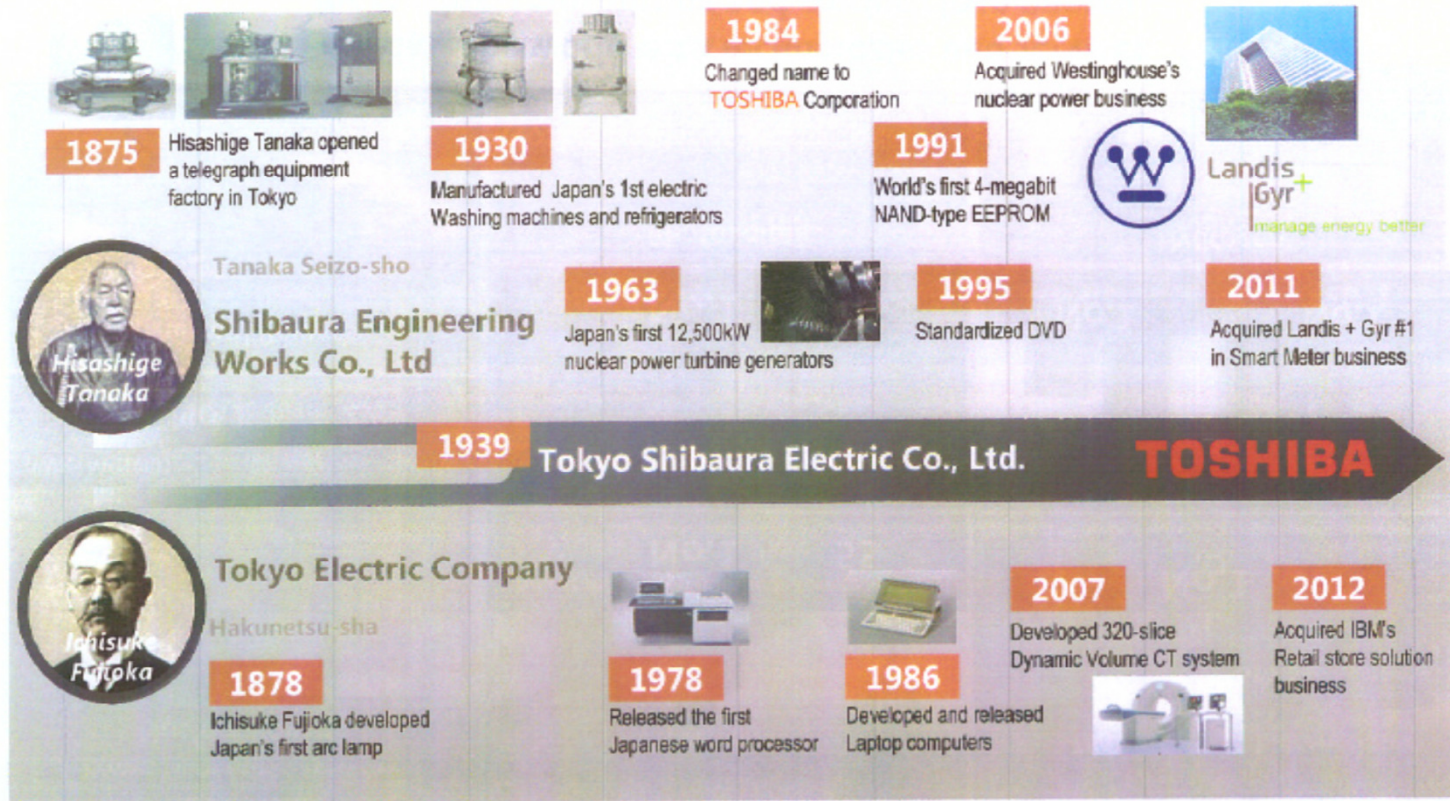
<p>Large-scale Power Generation systems Nuclear Power</p>  <p>PWR (AP1000) BWR</p> <p>World's No.1 share* 27% * Reactor main contractor, installed capacity base</p>	<p>Renewable Energy Hydro Power</p>  <p>Adjustable-speed pumped storage system World's No.1 share* 55% * Delivered units basis</p>	<p>Transmission and Distribution Energy Storage</p> <p>T&D Battery-based Energy Storage Systems</p>  <p>Japan No.1 Share* * T&D: Transformer, Protection Relay, Load dispatching center * Unit deliveries of large systems using lithium-ion batteries</p>
<p>Thermal Power</p>  <p>World's most efficiency CC system* 62% * LHV basis</p>	<p>Geothermal Power</p>  <p>World's No.1 share* 26% * Operating plant capacity basis</p>	<p>Fuel Cells Smart Meter Systems</p>  <p>Japan No.1 share* World's No.1 share* * Cumulative shipments in Japan as of end of FY2014 * Smart meters for residential use</p>
<p>Photovoltaic</p>  <p>No.1 constructor for utilities in the domestic market * Operating PCS Capacity basis</p>	<p>Hydrogen</p>  <p>H₂One</p>	

*based on Toshiba research

Providing the world with technologies and services for making, transmitting and storing clean energy

Realizing a low-carbon economy

History of Toshiba



India Toshiba Group Companies

Total manpower : Over 9,000 (as September 2016)

Mumbai

- Toshiba Johnson Elevators (India) Pvt. Ltd. (TJEI) :
- Westinghouse Mumbai Office:

Delhi

- Toshiba India Pvt. Ltd. (TIPL) :
- Toshiba Logistics India (TLGI) :
- UEM India Pvt. Ltd. (UEM):

Kolkata

- Landis+Gyr Limited:

Hyderabad

- TPSC India Pvt. Ltd.(TPCS(I)) :
- Toshiba Transmission & Distribution Systems (TTDI) :

Bengaluru

- Toshiba Software (India) Pvt. Ltd. (TSIP) :

Chennai

- Toshiba JSW Power Systems Pvt. Ltd.(TJPS) : Around 1,000
 - Chennai Factory:
 - Gurgaon Engineering Center

Manpower includes on roll + Contract + Advisors.

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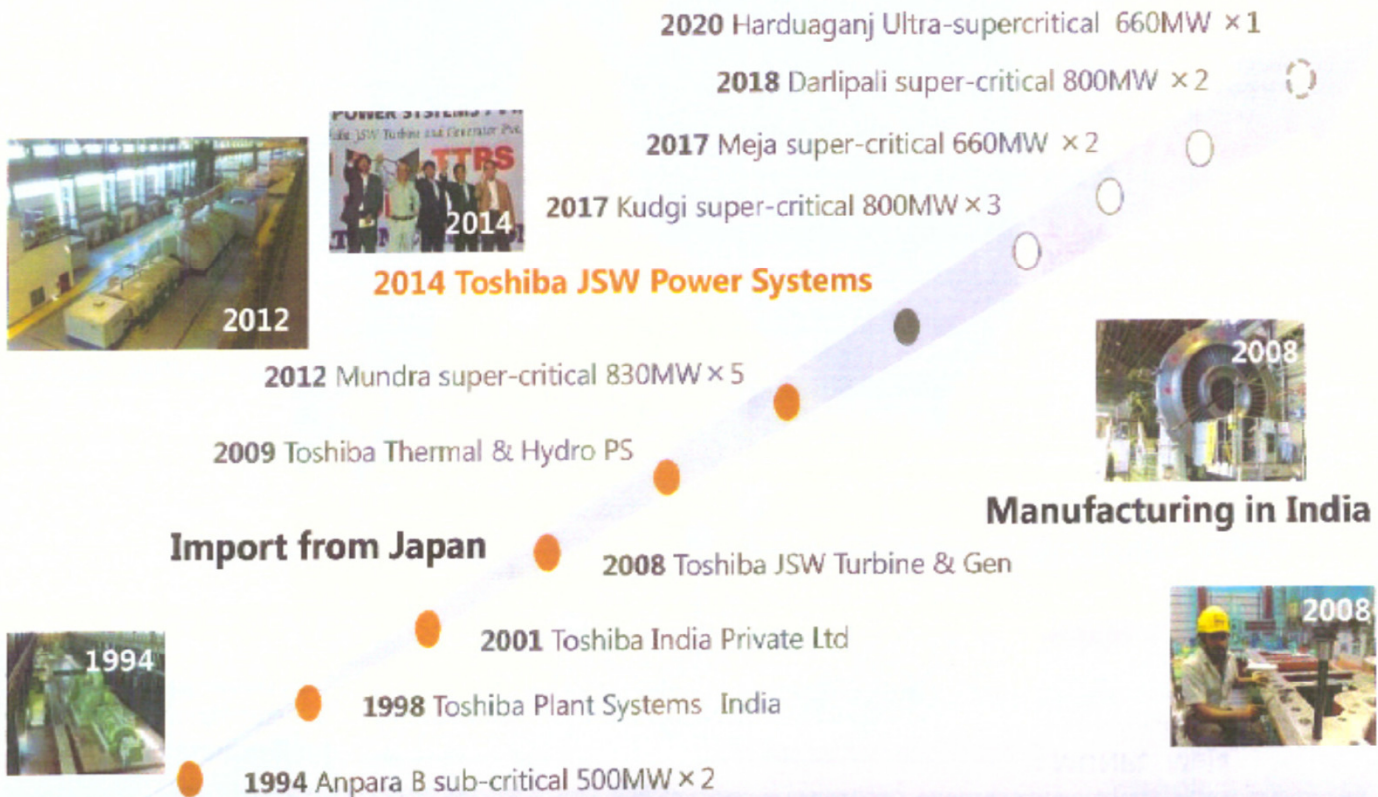
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Thermal Business Track Record in India



Expand Toshiba's Thermal Business from India

* Years indicated :Start of operation

Toshiba's Major Thermal Power Plants in India

Toshiba have been making large contribution to Indian economy

● UPRVUNL Harduaganj

1x660 MW (NOA : Sep. 2015)
First Turnkey EPC contract for
TJPS in India
TJPS

● MUNPL Meja

2x660 MW (NOA : May 2012)
First Bulk Tender utilizing PMP
in India
Toshiba + TJPS

● UPRVUNL Anpara

2x500 MW
(COD: #4 Feb. 1994 / #5 Oct. 1994)
One of Most Reliable Plant in India
Toshiba

● CGPL Mundra UMPP

5x830 MW
(COD: #1 Mar. 2012 - #5 Mar. 2013)
First UMPP & 800MW SC Turbine
in India
Toshiba

● NTPC Darlipali

2x800 MW (NOA : Feb 2014)
Newest Order from NTPC, Total 10
Nos of 800MW SC Turbines in India
TJSP

● NTPC Kudgi

3x800 MW (NOA : Feb 2012)
First indigenous 800MW SC turbine
TJPS

● AP-GAS Vijjeswaram CC

172 MW (COD: Dec. 1997)
World Record Level Shortest COD
by Toshiba EPC
Toshiba (TPSC)



- Conventional
- Combined Cycle

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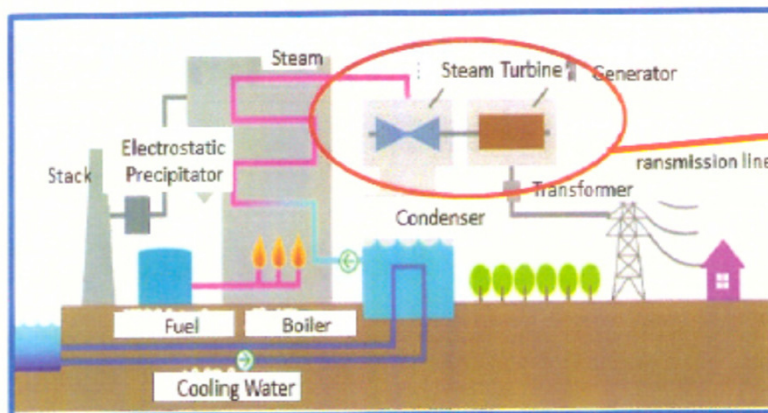
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Toshiba JSW Power Systems Pvt. Ltd.(TJPS)

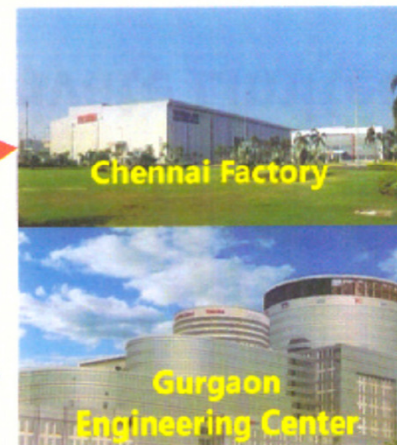
- **Foundation** : Sept. 2008
- **Location** : Gurgaon (Delhi) and Chennai
- **Managing Director** : Mr. Yoshiaki Inayama
- **Employees** : Around 1,000
- **Share Holding** : Toshiba: 75% ; JSW Group 25%



- **JV between Toshiba Corporation and JSW Group for Power business in India**
- **Aims to be No 1 EMPCS company**
- **Support "Make in India" with own manufacturing plant in Chennai**



Turbines & Generators



Chennai Factory

Gurgaon Engineering Center

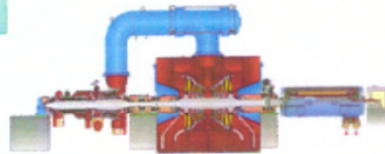
EPC

TJPS Chennai Factory Main Products

Steam Turbines & Generators for thermal power plants

AX300 Turbine

Output: 200-400MW



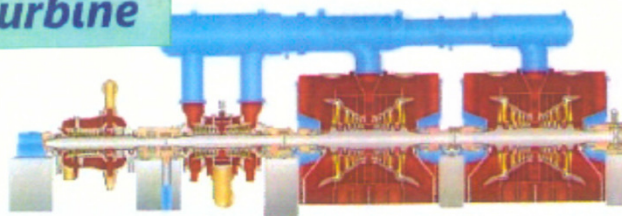
AX650 Turbine

Output : 350-800MW

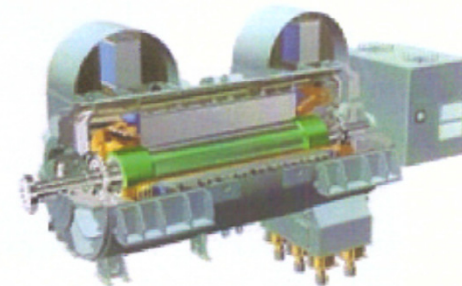


AX1000 Turbine

Output: 700-1100MW



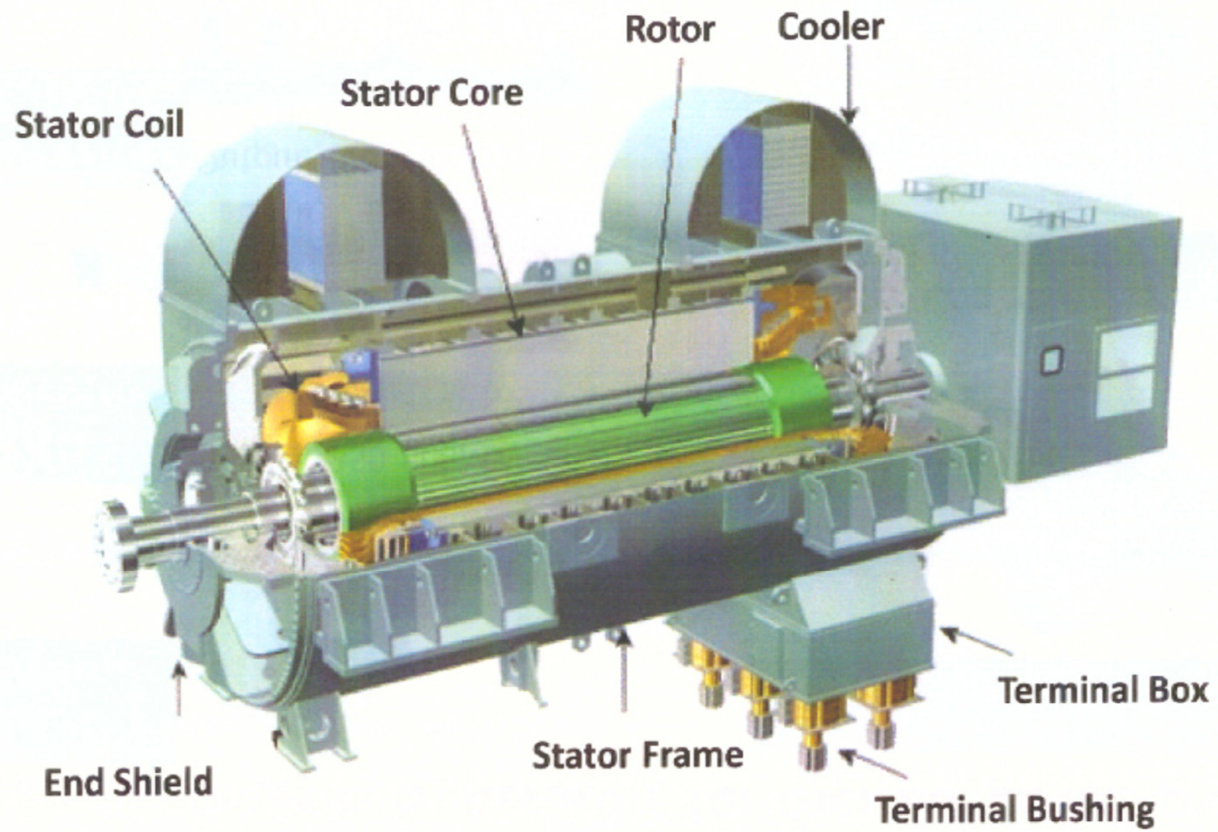
Hydrogen-Cooled Generator (200-750MVA)



Water-Cooled Generator (400-1200MVA)



Structure of Generator



The Concept of TJPS Chennai Factory

Fully integrated manufacturing from materials procurement to finished products

1. Procurement

2. Plate working welding & Machining

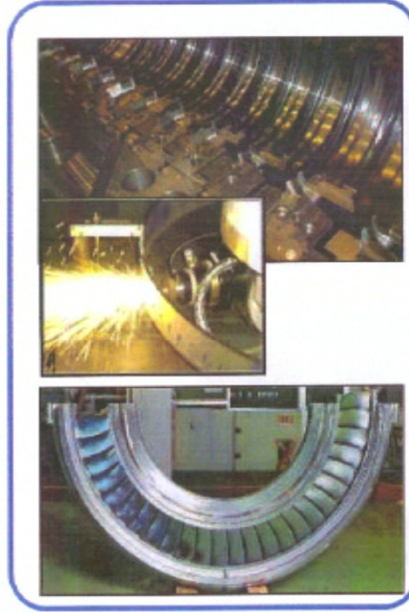
3. Assembly & Testing

4. Shipment & Installation

Blades



Nozzles



Casings



TJPS Chennai Factory Production Facilities



Large Lathe for Rotors



Grooving Machine for Gen Rotors



Large Gantry Miller



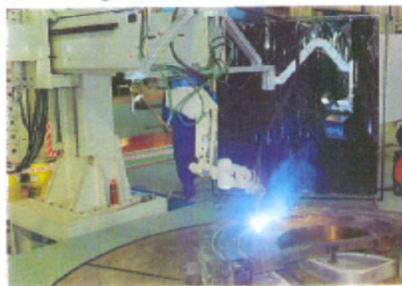
Large Turn Miller



Gen Core lamination machine



Gen Stator Coil taping machine



Welding Robot



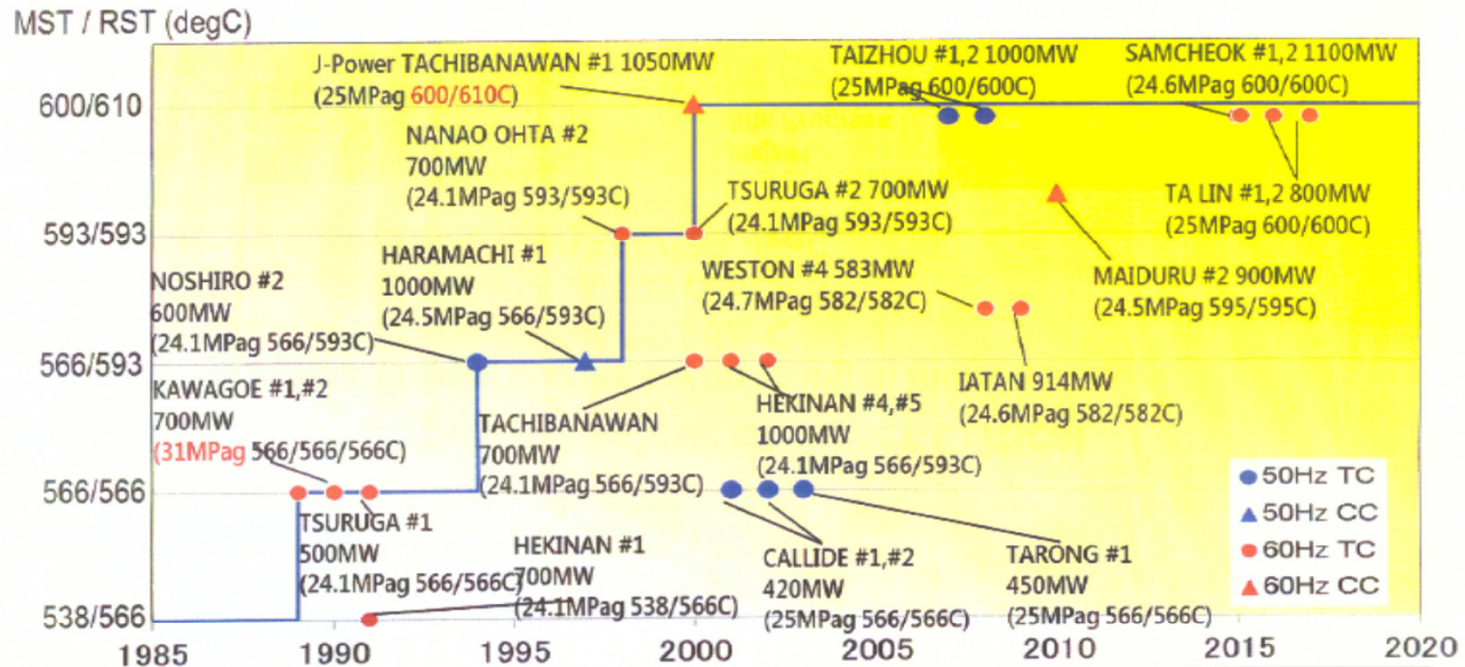
CMM machine for Turbine Blades



Rotor Balancing Machine

EXPERIENCE OF SC / USC TECHNOLOGY

TOSHIBA
EXPERIENCE



➤ **Toshiba has supplied many steam turbines according to upgrading steam conditions match to market requirements.**

Total 92 Super Critical & Ultra Super Critical Units

EXPERIENCE OF SC / USC TECHNOLOGY

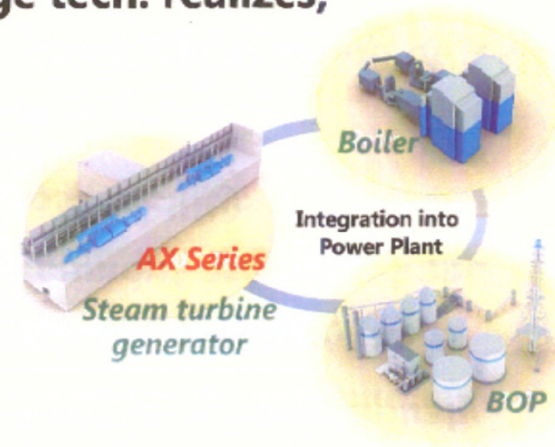
AX SERIES
USC PLANT

■ AX Series - Standardized High Efficiency STG Island Standardized design and cutting-edge tech. realizes;

- Shortening of the construction period
- High reliability
- High efficiency

Product Line-up

- AX1000 : 700-1100MW
- AX650 : 350- 800
- AX300 : 200- 400

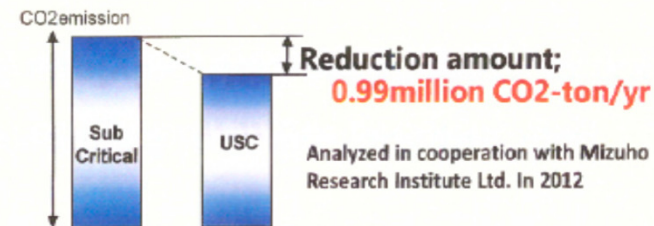


■ Indian USC plant

Environmental & Economic Estimation Comparing USC with Sub-critical Condition

Specification for USC

- 25~27 MPa, 600/600 degC
- 1,000 MW x 2 units



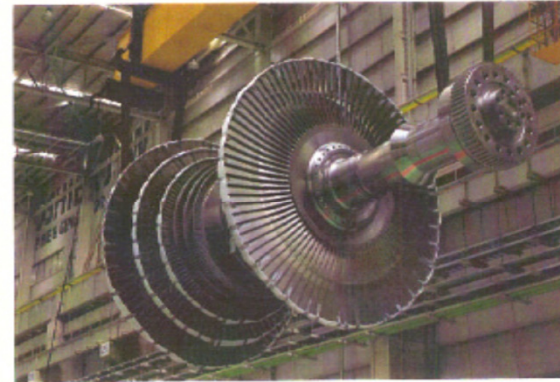
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Recent Shipment : Generator For Kudgi #2 (19th Aug 2016)



Generator Stator

Size: H 5 m x W 6 m x L 10 m / Weight: Approx. 400 t



Turbine Rotor

■ Project Outline

1. Plant:	Kudgi Super Thermal Power Project, Stage-I, 3 X 800 MW
2. Client:	NTPC Limited
3. Site:	Kudgi, Bijapur district, Karnataka state
4. Scope:	Three sets of Steam Turbine and Generator Island Packages

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Support from Tamil Nadu Government

- ◆ Signed MOU with the government of Tamil Nadu for the construction of manufacturing facilities on a site in Chennai

Role of the government of Tamil Nadu

- Lease land (for 99 years)
- Reinforce the roads and bridges for transportation of generators
- Supply water for the factory
- Stable supply of 110kVA power from TNEB
- Subsidy for investments and training costs

TOSHIBA JSW

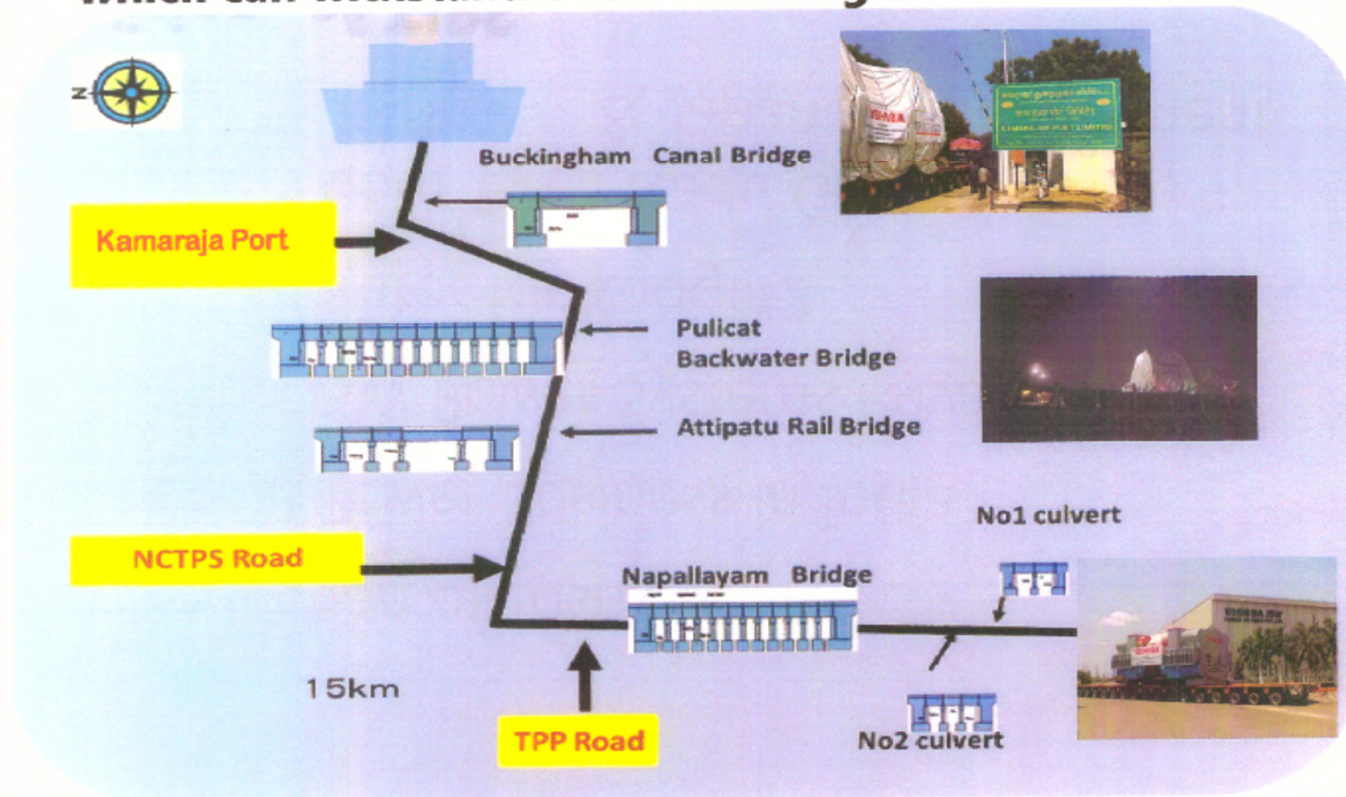
- Invest an agreed amount of money
- Create employment



- ◆ This MOU has been respected, and provided the basis for maintenance of the road from the facility to Kamarajar port by the government of Tamil Nadu.

Maintenance of Road to Kamarajar Port

- ◆ The first industrial highway in India including the bridge which can withstand over 540t weight

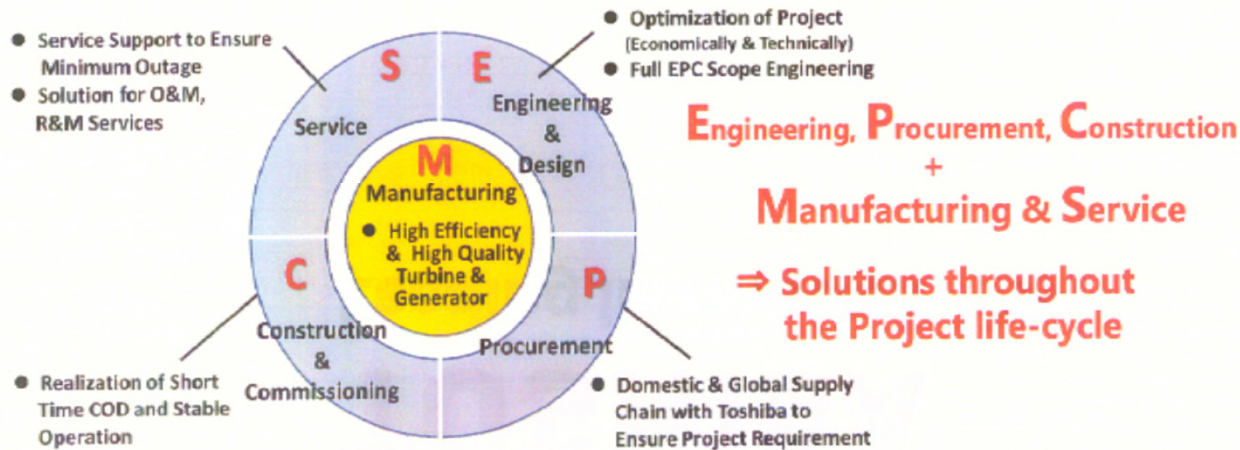


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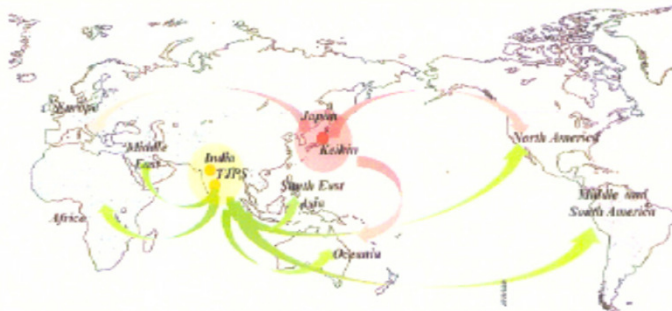
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Vision of TJPS

◆ No.1 EMPCS Company



◆ From India to All Over The World



Plan to export over 30% of output to the world market !!

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