

TRANSMISSION BUSINESS



Transforming Today for a Better Tomorrow

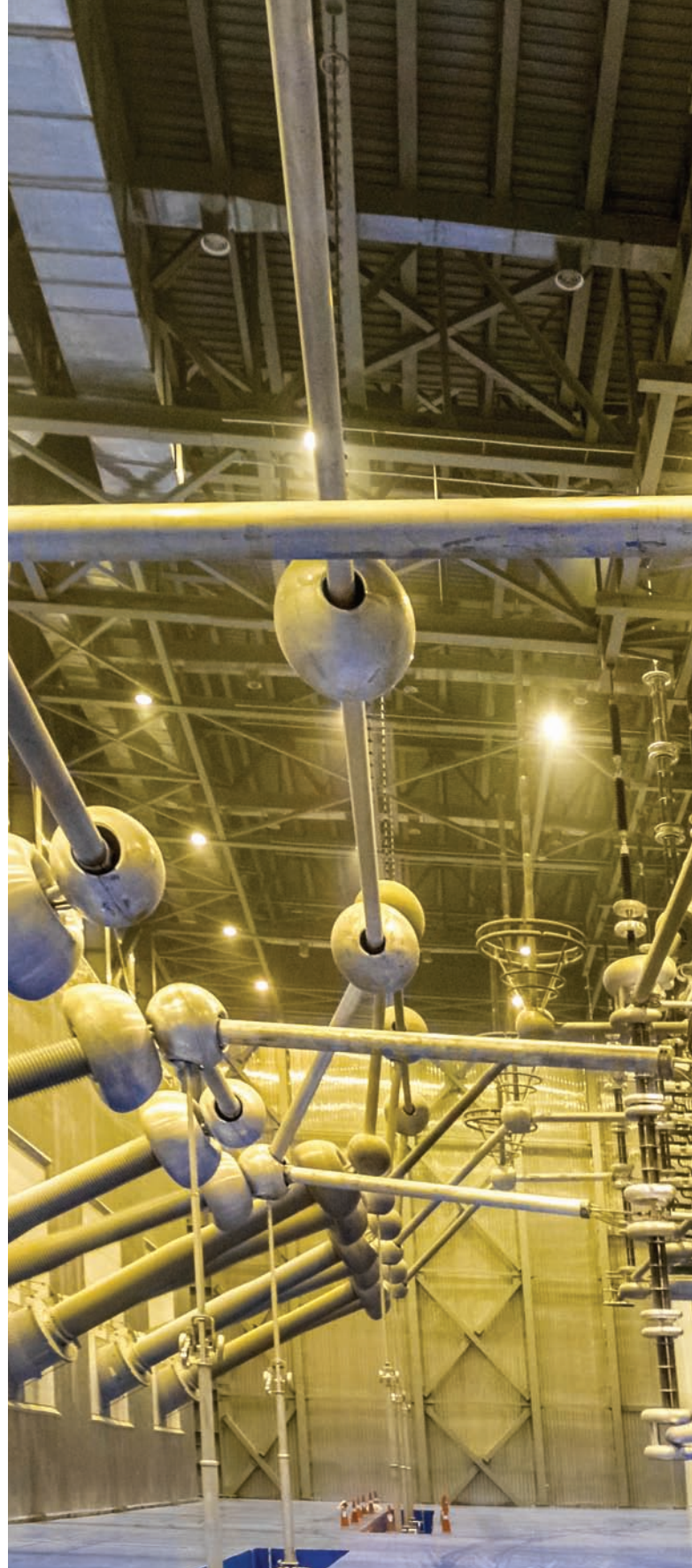
About BHEL

Established in 1964, Bharat Heavy Electricals Limited is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing companies of its kind in India. The company is engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products, services and systems for core sectors of the economy viz. Power Generation, Transmission, Industry, Transportation, Renewable Energy, Oil & Gas, Water, Defence & Aerospace, and e-Mobility & Energy Storage Solutions.

BHEL's mammoth size of operations is evident from its widespread network of 17 manufacturing units, 2 repair units, 4 regional offices, 8 service centres, 1 subsidiary, 3 overseas offices, 5 joint ventures, 15 regional marketing centres and more than 150 project sites across India and abroad. BHEL has references in 82 countries in all the inhabited continents, with a global installed capacity of over 180 GW.



400 kV Switchyard at 2x800 MW Yeramarus TPS



40+

Years

of EPC Experience in
Power Transmission

Commissioned

200+

Electrical Substations &
5 Major HVDC Projects

Supplied

5,00,000+
MVA

Transformer/Reactors



Valve hall at Agra converter station for ± 800 kV, 6000 MW North-East Agra HVDC project

BHEL in Power Transmission

A Powerful Presence of Over Four Decades

BHEL is the leader in the field of power transmission in India offering a wide range of transmission systems and products conforming to international quality standards.

Concept to Commissioning and Beyond...



Practising the philosophy of concept-to-commissioning and beyond, BHEL is committed to provide customer-oriented cost-effective transmission solutions and services as an EPC contractor for EHV substations, High Voltage DC (HVDC) converter stations and Power Quality & Stability Solutions (FACTS) backed by expert Power System Studies.



765 kV Substation at Raichur

EHV Substations:

In the field of substation projects, BHEL has a rich experience of more than four decades in setting up of EHV & UHV substations, switchyards both AIS and GIS types ranging from 33 kV to 765 kV for utilities and industries covering a vast array of applications:

- Grid Substations
- Industrial Receiving Substations
- Switchyards for Thermal, Hydro, Nuclear and Renewable Energy based Power Generating Stations



400 kV GIS Switchyard at North Chennai TPS

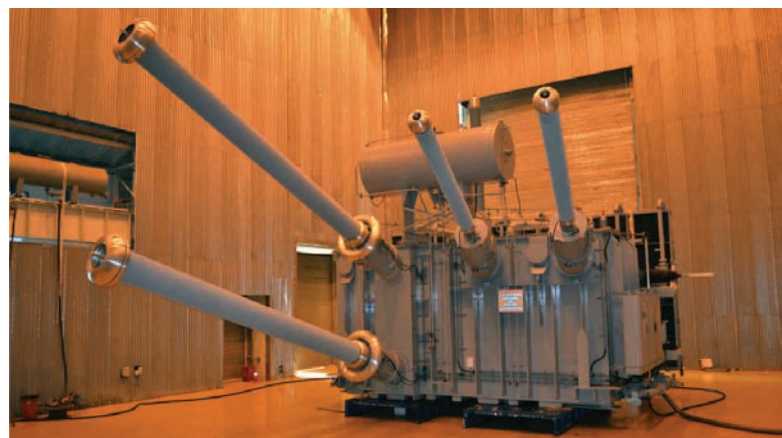
- HVDC Converter Stations and associated Switchyard

HVDC Systems and Products:

BHEL has executed numerous HVDC projects in India and has supplied own make major products like converter transformers, reactors, thyristor valves, control panels, capacitor banks, instrument transformers, insulators, SCADA etc.

Major HVDC projects executed by BHEL are:

- 1500 MW, \pm 500 kV Rihand-Delhi HVDC project.
- 1500 MW, \pm 500 kV Chandrapur-Padghe HVDC project.
- 200 MW, + 200 kV National HVDC Experimental Line.
- 2500 MW, \pm 500 kV Balia-Bhiwadi HVDC Project
- 6000 MW, \pm 800 kV North-East Agra UHVDC Project (World's largest multi terminal HVDC System).
- Currently executing 6000 MW, \pm 800 kV Raigarh-Pugalur UHVDC project.



498 MVA, 400 kV Converter Transformer for Balia-Bhiwadi HVDC Project

Flexible AC Transmission System (FACTS) solutions

BHEL provides turnkey solutions for Reactive Power Management systems for both grid and industrial applications.

BHEL undertakes the complete feasibility studies, system studies, system design and installation on turnkey basis. The major FACTS solutions offered by BHEL are:

- Fixed Series Compensation (FSC)
- Static VAR Compensation (SVC)
- IGBT based Static Compensators (STATCOM)
- Thyristor Controlled Shunt Reactor (CSR)
- Phase Shifting Transformer (PST)



Fixed Series Compensation Scheme at Ballabgarh

Innovations & Solutions...

Phase Shifting Transformer (PST)

An innovation of BHEL's in-house R&D, PST is a combination of Shunt & Series transformer units that control real power flow between the two networks by providing desirable phase shift between the systems. BHEL has designed, manufactured, installed and successfully commissioned India's first and the only 400 kV PST at Kothagudem TPS of TSGENCO (Telangana State Power Generation Corporation Limited).



India's first 400 kV Phase Shifting Transformer at Kothagudem

Thyristor Controlled Shunt Reactor (CSR)

BHEL indigenously developed and commissioned India's first Controlled Shunt Reactor for application in 400 kV system which offers all the advantages of a permanently connected shunt reactor while overcoming its disadvantages through thyristor valves based control system to operate it on continuous mode. With this, the required amount of reactive power (from zero to full capacity) can be controlled based on grid requirements.



India's first 400 kV Controlled Shunt Reactor at Itarsi Substation

Gas Insulated Switchgear (GIS)

BHEL has indigenously developed Gas Insulated Switchgear (GIS) up to 400 kV class. BHEL offers prompt after-sale services by its expert engineers and assures ready availability of crucial spares for the GIS.



BHEL make 400 kV GIS

Manufacturing Capability and Offerings

BHEL has state of the art manufacturing facilities and offers the following in-house manufactured products:

Power Transformers/Reactors

- HVAC Power Transformers for voltage up to 1200 kV
- HVDC Converter Transformers up to 800 kV
- Series and Shunt Reactors up to 765 kV
- Dynamically Controlled Shunt Reactors up to 400 kV
- Phase Shifting Transformers for EHV & UHV applications
- Special Transformers including Dry type Transformers up to 15 MVA

Instrument Transformers

- Current Transformers up to 400 kV
- Electro-Magnetic Voltage Transformers up to 220 kV.
- Capacitive Voltage Transformers up to 1200 kV

Control & Protection Equipment

- Control & Relay Panels
- Substation Automation System (SAS)
- SCADA/Bay Control Unit/Merging Unit complied with IEC 61850 protocol

Switchgears

- Vacuum Circuit Breaker (3.3 kV - 33 kV)
- Gas Insulated Switchgear (GIS) up to 400 kV

Capacitors

- HVDC and FACTS applications
- SVC as Shunt capacitors, AC filter capacitors
- Series capacitors in FSC/TCSC

Bushings

- Wall bushings up to 245 kV
- Oil cable box bushings up to 400 kV
- Bushings for higher creepage, cantilever load & altitude (145 kV-420 kV)
- OIP condenser bushings-52 kV to 525 kV for transformer application



500 MVA, 765/400 kV Auto Transformer at Greater Noida Substation



India's first 1200 kV Transformer at Bina Test Station



80 MVAR, 765 kV Shunt Reactor at Greater Noida Substation

Thyristor Equipment

- Thyristor Valves for HVDC transmission up to 800 kV



Thyristor Valves (for UHVDC application) under testing at STRI, Sweden

Insulators

- Disc insulators up to 1200 kV AC (530kN) & 800 kV DC (420kN) application.
- Hollow Porcelain up to 765 kV.
- Solid core insulators up to 400 kV.
- Long Rod Composite Insulators up to 765 kV AC (210kN) & ± 800 kV DC (420kN) application.

Power System Studies

BHEL has a team of experts who have vast experience with utilities and manufacturers in India and abroad. BHEL undertakes Power System Studies, Feasibility Studies and Insulation Coordination Studies, etc. using the latest hardware and software tools.

Testing Facilities

BHEL has ultra high voltage laboratory at par with international standards and is one of the largest screened testing facilities in the world for testing Transformers, Valves (Thyristor, IGBT) attached to its manufacturing plants.



Ultra High Voltage Testing Laboratory at Bhopal

A Trusted Partner

- A rich experience of more than four decades in Power Transmission.
- Proven performance in multiple profiles- EPC contractor, equipment supplier, consortium partner and service provider
- Dedicated infrastructure and experienced manpower for manufacturing and commissioning of transmission equipment.
- An enterprise with a wide-spread manufacturing base, regional centres and offices across the country to respond with minimum turnaround time and to provide after-sales-services and spares on long term basis.



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Powering Progress...Brightening Lives. Touching Every Indian Home