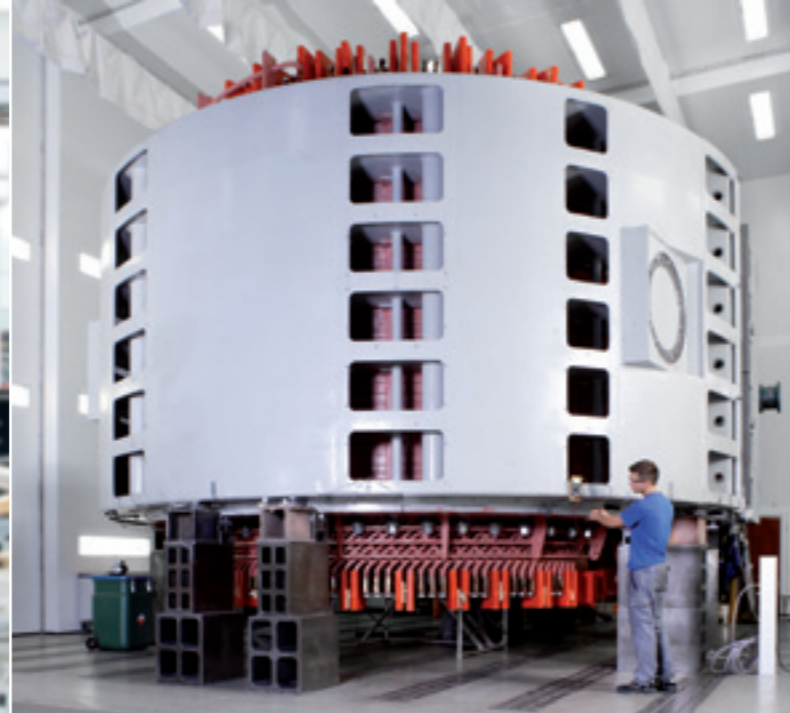


VOITH

Service at your door steps.
Hydropower Service in India





Voith Hydro

Voith Hydro, a Group Division of Voith, is a world-wide leader in the field of hydropower equipment and solutions. The company employs a workforce of more than 5,300 employees for its operations across the globe. Hydropower is the largest source of renewable energy generation and storage, with 930 GW of globally installed capacity - and 80 percent share of all installed renewable energy sources.

Hydropower has been in use for over one hundred years. Its contribution to a low-emission, reliable and safe energy generation will remain indispensable all around the world. It provides clean, safe, robust, and highly efficient energy in large quantities. In both large and small hydropower plants, this proven technology is essential to the world's economic and social development.

Worldwide, Voith Hydro is leading supplier for hydropower technologies.

Today, Voith Hydro's business activities cover the whole life cycle of a hydropower project:

- Development of the power unit (turbine and generator)
- Design of the power plant according to customer-specific requirements
- Automation and control systems
- Services during the plant's complete life cycle
- Modernization of existing plants

Voith is capable of providing Large hydropower plants as well as Small hydropower plants with unit sizes up to 30 MW.

Quality and reliability, corner stones of our corporate philosophy, are maintenance of financial solidity and long-lasting customer relationships, which in many cases have continued over 100 years.

Voith Hydro History

Starting point for Voith in the hydropower business was the manufacture of the first hydropower turbine in Heidenheim in 1870. The company has deep roots in India and over the years, Voith has built a strong presence in the country.

In 1911, Voith supplied three power units for the Khopoli hydropower plant in Maharashtra. Soon after the nation became Republic the hydropower market in India started to grow rapidly: Voith equipped the Machkund plant with six turbines in 1949 and a year later, delivered the Hirakud project with four turbines in total. Both plants are located in the Indian State of Odisha. Many other projects followed over the years. In 2002, Voith Hydro established its working unit in India to be closer to its customers. It is presently located in Noida near New Delhi and this was followed up by establishment of a state of the art manufacturing facility at Vadodara, Gujarat in 2010. Commissioning the 520 MW Omkareshwar hydropower plant in the state of Madhya Pradesh in a record time of 48 months has been a major achievement for Voith in India.

Voith Hydro's major Milestones in India:

- 1911** Khopoli: 3 units of 24 MW/ Tata Power Company
- 1949** Machkund: 3 x 17 MW + 3 x 21.5 MW / APGENCO

- 1950** Hirakud II: 2 units of 25.5 MW
- 1952** Hirakud I: 2 units of 27 MW
- 1985** Upper Indravati: 4 units of 172 MW/ Government of Orissa
- 1994** Nathpa Jhkri: 6 units of 250 MW Generator / NJPC
- 1999** Baspa II: 3 units of 100 MW / Jaiprakash
- 2000** Baglihar I: 3 units of 150 MW / JKPDC
- 2002** Setting up of Voith as an Operating Unit in India
- 2003** Order received for Omkareshwar: 8 units of 65 MW / NHDC
- 2007** Order received for Karcham Wangtoo: 4 units of 250 MW / JP
- 2007** Commissioning of Omkareshwar: 8 units of 65 MW / NHDC
- 2008** Commissioning of Baglihar I: 3 units of 150 MW / JKPDC
- 2010** Voith sets up state of the art manufacturing facility at Vadodara, India
- 2011** Commissioning of Karcham Wangtoo: 4 units of 250 MW / JP



State of the art high precision turbine components.

Voith heritage

Voith Hydro today holds a unique position being the **Original Equipment Manufacturer (OEM)** for Hydropower equipment supplied by the following companies:

- AEG / Hydro
- Allis-Chalmers
- Fuji Electric / Hydro
- Kössler
- Riva Hydroart
- S. Morgan Smith
- Siemens
- VG Power
- Westinghouse

Hydro Services in India

Voith is a full line service provider for turbines, generators and automation systems.

Whether it is parts replacement, repair, inspection, upgrades or full rehabilitation, Voith has customized solutions to meet your needs. Voith has installed over 40,000 turbines and generators worldwide. We have experience in dealing with a diverse range of challenges that may arise at your facility or with your equipment. We provide innovative solutions to enhance equipment/plant performance as well as to optimize down time.

The Hydro Services difference:

- Efficient and customized solutions
- Reduced outage time and longer-running machines
- Components restored to meet OEM standards
- Environmentally-safe and compliant procedures
- Safe, on-site work with professional project management
- Customer training

Hydro Services in India

Our services cover the full range of services for hydropower plants

Turbine AMB	Generator AMB	Automation AMB
Spare parts	Spare parts	Spare parts
Repairs	Repairs	Governor upgrades
Inspections	Inspections	Excitation upgrades
Upgrades	Upgrades	Control system / SCADA upgrades
		Vibration & Air Gap Monitoring



1-8 Manufacturing Facility Vadodara, India



Voith in India: Manufacturing and Testing Facilities

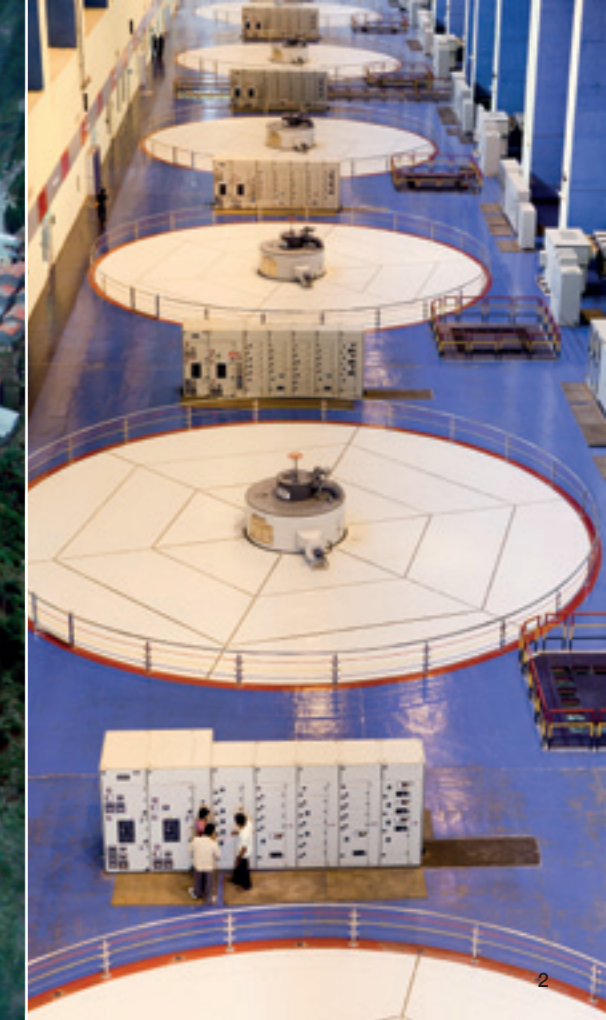
Manufacturing Facility Vadodara

Voith has a fully equipped state of the art manufacturing facility at Vadodara, India, to cater to all requirements of the local and export markets. The facility is equipped with best in class, latest technology machines including a 5 axis CNC machine. The facility has manufactured and supplied many turbines and other components to hydropower projects in India and abroad. Furthermore, parts and components are being overhauled in the facility at Vadodara.

Automation Workbench Noida

Voith has a fully equipment equipped Automation Workbench in place at its Noida facility to carry out software and hardware engineering for hydropower project including carrying out of FAT and Customer Trainings.





1 Hirakud, India
 2 Manufacturing Facility Vadodara, India
 3 Omkareshwar, India

1 Baglihar, India
 2 Omkareshwar, India

References

Modernization Example

Voith Hydro has successfully carried out renovation, modernization and upgrade of two units (unit no. 3 & 4) of 24 MW Francis machines of Hirakud (Burla) HEP for Odisha Hydro Power Corporation Ltd. The Turbines were uprated from 24 MW to 33 MW and generators are uprated from 27 MVA to 35.76 MVA.

HyService: AMB (After Market Business)

Nathpa Jhakri – Supply of Upper Labyrinth Seals

Voith Hydro has supplied 16 nos. (10 sets of Stationary Rings and 6 sets of Rotating Rings) Upper Labyrinth Seal Rings for 250MW Francis Turbine for SJVN Limited. This was the first time SJVN Limited procured this labyrinth from India and Voith has successfully manufactured these high precision turbine parts at its Vadodara facility.

Other Major HyService References include:

- Nathpa Jhakri HEP; Upper Labyrinth Seal (10 Nos.); Inspection of Generator; Upgradation of Excitation System
- Baglihar I HEP; Operation & Maintenance Support; Repair of Generator Earth Fault; Repair of 400kV XLPE cable
- Baner HEP; Supply of spare Pelton runner
- Western Yamuna Canal HEP; Supply of discharge ring and regulating ring
- NHPC; Baira Siul – Supply of Guide Vanes

New Projects (Recent References)

In Operation

- 8 X 65 MW Omkareshwar
- 3 X 150 MW Baglihar I
- 4 X 250 MW Karcham Wangtoo
- 3 X 8 MW Bhilangana III

In Execution

- 2 X 50 MW Sorang
- 2 X 48 MW Rongnichu
- 3 X 33 MW Singoli Bhatwari
- 2 X 50 MW Sainj
- 3 x 150 MW Baglihar II
- 2 X 27.5 MW Bhasmey

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