Hydro power is not only environmentally friendly, but also cost-effective. Hydro power plants have the highest operating efficiency of all known generation systems. They are largely automated, and their operating costs are relatively low. Hydroelectric power plants also play an important role in water resource management, flood control, navigation, irrigation and in creating recreation areas.

Voith Hydro is an industry leader in the production of generators, turbines and the associated control systems to put the power of water to work. A range of services, from engineering through manufacturing and project management to commissioning, completes our portfolio as a leading product and service provider.

Generating energy from the power of water represents large amounts of clean, renewable energy. 71 percent of the earth’s surface is covered by water. The world’s hydro power potential amounts to 20 billion Mega Watt hours per year and only 30 percent of this has been developed so far.

As part of our international network each Voith Hydro facility operates under the same cutting edge platform and is equipped with consistent best-in-class processes and tools. This network also ensures that we can meet special customized requirements: from individual components to project planning, through project management and plant maintenance. With branches and production facilities for electrical and hydraulic machines and components in Europe, Asia and North and South America we are close to our customers and all major hydro power markets.

Voith Hydro is also a trend-setter in the field of “new renewables”. Wave and ocean current power technology from Voith Hydro are amongst the pioneering initiatives for the commercial development of the power of the oceans in the foreseeable future.
Our promise to the customer. Precise and creative. Our products and services are designed specifically for our customers’ needs. Always efficient and economical, and, above all, following our values and visions for a sustainable solution.

Competence and capabilities

- Consulting, engineering, erection and commissioning
- System/plant assessments
- HyService – global, fast and effective for modernization and rehabilitation of existing hydroelectric power plants
- Complete equipment, installation and services for hydroelectric power plants
- Francis, Pelton, Kaplan, bulb turbines, pump-turbines, standard and custom
- Storage pumps, radial, semi-axial and axial-flow pumps
- Generators and motor-generators for constant and adjustable speed, excitation systems
- Frequency converters, protection systems, switchyards for all voltages, transformers
- Power plant automation, control centers for hydro power plants and cascades, including plant management and diagnostic systems
- Shut-off valves
- Integrated Management System to safeguard excellence and quality

Engineered reliability.

Our promise to the customer. Precise and creative. Our products and services are designed specifically for our customers’ needs. Always efficient and economical, and, above all, following our values and visions for a sustainable solution.
From the beginning, the development of Pelton turbine technology has been synonymous with Voith. Since the turn of the 19th century, thousands of Pelton turbines have been supplied by Voith Hydro, including large and powerful machines. These turbines are in service around the globe in numerous hydro power plants.

Characteristics and latest technology

Pelton turbines involve a number of special flow characteristics which are extremely difficult to simulate. The jet-to-bucket interaction is fully transient and depends on the geometry of the moving buckets. Even more challenging is the multiphase system of air and water that governs the formation of the free jet and the flow through the buckets. In the past, developing a flow simulation that would allow a realistic analysis of these phenomena seemed to be an impossible task.

The flow simulation of Pelton turbines is by far the most complex and difficult of all hydraulic turbo-machinery simulations.
A broad manufacturing program offers an economical solution for any requirement. Large, custom-built Pelton turbines for high output ranges are our speciality, but we also offer a full line of cost-effective standard machines for small hydro power plants.

Voith Hydro’s numerical development group has overcome the major problems of simulating typical free water jet and bucket flow for Pelton turbines. Simulation results and experimental data have shown a remarkable congruence. Today, designers have new insights into complex jet, bucket and casing flow phenomena providing a solid foundation for the development of new bucket profiles that result in improved performance.
References and milestones

1870  Hydro turbine manufacture began.

1903  First Pelton turbine.

1924  Walchensee power plant, Germany:
First high-head power plant in the country
with 18 MW Francis double-spiral turbines
and twin 15 MW Pelton turbines.

1960  Naturns, Italy:
Pelton turbine at a head of 1129 m.

1964  New Colgate, USA:
Largest Pelton turbines at that time with
5.44 m outside runner and 1.1 m bucket width.

1972  Chivor, Colombia:
Largest Pelton power plant in the country
at that time with eight 151 MW units.

1977  Largest Pelton power plant in the country
at that time with eight 151 MW units.

1985  Carona, Italy:
Three horizontal Pelton turbines were
replaced by one 48 MW vertical machine
while preserving historical structures.

1998  San Giacomo sul Vomano, Italy:
One of the most powerful Pelton turbine
at that time with an output of 282 MW,
with a runner diameter of 4.4 m, a jet diameter
of 315 mm and a bucket width of 1.1 m.
2001 – Breakthrough in 3D-simulations for Pelton turbines.

2002 Gilgel Gibe II, Ethiopia:
Four vertical, six-jet Pelton turbines, each with a rated output of 105 MW at a net head of 487 m.

2003 Sedrun, Switzerland:
Large rehabilitation project with seven runners and 12 nozzles.

2007 Extensive modernization of Pelton test facility at Corporate Technology Center in Heidenheim, Germany.

2008 Akköy II, Turkey:
One of the highest head Pelton applications worldwide with two 117 MW Pelton turbines at 1220 m head.

2008 Zaramag 1, Russia:
Two 176.5 MW Pelton turbines with runner diameters of 4.2 m at a head of 635 m.