

# HYDROPOWER

## Solutions





Vaptech has extensive global experience in delivering complete hydropower solutions with integrated electromechanical systems based on Pelton, Francis and Kaplan solutions for small, medium and large hydropower plants.

Among the biggest advantages of Vaptech's solutions for the hydropower industry, are the vast in-house experience in development and production of hydro turbines, inlet valves and customized digital control systems that meet project site requirements.

From single components and electromechanical equipment to complete hydropower solutions, servicing, on site commissioning and training, modernization, maintenance, LifeCycle Management, Vaptech's experienced team of engineers and designers provide high quality solutions, ensuring complete client satisfaction.

## Vaptech at a Glance

**100+**  
years of  
experience

**100%**  
customized  
solutions

**40**      **6**  
countries on continents  
global presence

**250+**  
employees

**40 000 m<sup>2</sup>**  
production plant

**1**      **1**  
supplier = responsibility

Short delivery time  
Excellent product quality  
Performant hydropower systems  
Value added services

# Get the Most Out of Your Hydropower Potential

The success of your investment depends not only on the performance and the quality of the equipment, but also on the engineering of the complete system and the optimisation of the maintenance costs.

That's why Vaptech covers the entire lifecycle of your utility, from consulting, design, manufacturing, on-site installation and commissioning through value added after sales services.

## Products

Get the most of your hydro-power with products designed and optimised for your specific conditions.

- Pelton turbines
- Francis turbines
- Kaplan turbines
- Valves & Gates

## Solutions

Vaptech's experienced team of engineers and designers provide reliable and efficient solutions, ensuring the flawless operation of your application.

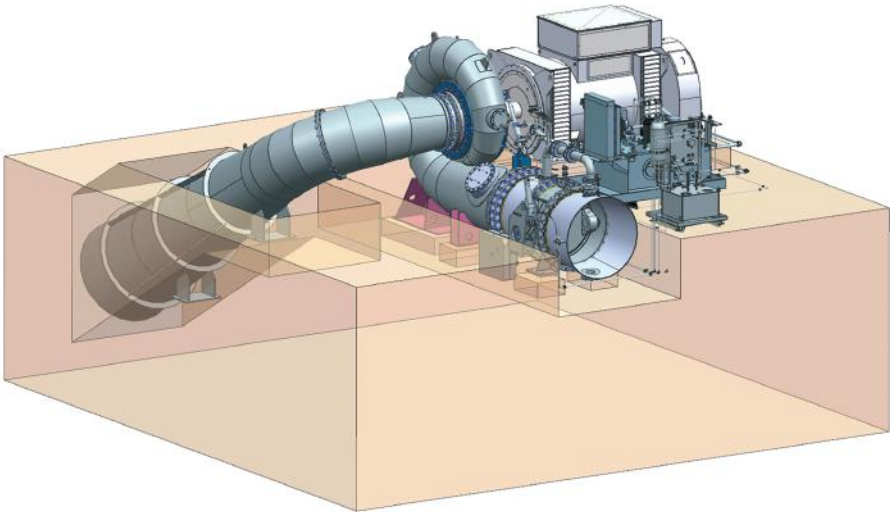
- Complete water-to-wire hydropower systems
- Automation and electrical engineering
- Predictive & Preventive Maintenance

## Services

Vaptech's comprehensive service offer helps you to build and maintain your hydropower plant optimizing both CAPEX and OPEX.

- Greenfield:**
  - Assessment and consulting
  - Custom design
  - Project management
  - Commissioning

- Operation:**
  - Dedicated Service Hotline
  - Spare parts
  - On-site service
  - Preventive and predictive maintenance
  - Modernisation and renewal







# Pelton Turbines

Vaptech’s Pelton turbines are excellent for high to medium heads and strong flow variations. Vaptech offers Pelton turbines with a horizontal and vertical shaft arrangement and with 1 to 6 injectors.

Within Vaptech’s closed production process, Pelton runners are CNC machined from one piece of high quality forged stainless steel. Each runner is dynamically balanced, measured and compared with computer models to assure the integrity of the physical part. The runner further passes through rigorous quality control and is certified according to IEC standards.

The injectors are equipped with individual hydraulically operated deflectors for immediate diversion of the water jet from the runner in case of emergency shutdown. Every injector is put through a series of in-house functional and pressure tests.

Typical characteristics (consult us for special requests)

Head range:	Up to 1000 m
Number of runner buckets:	18-25 pcs
Number of jets:	1-6 pcs
Specific speed range:	Up to 70 rpm



# Francis Turbines

Vaptech offers Francis turbine solutions for projects with medium heads and low fluctuation of water discharge. They are proven to be extremely efficient and high performing in terms of lack of cavitation and vibration in the complete specific speed range from ns 80 to ns 300.

Vaptech’s Francis runners can be manufactured according to the following technologies:

- From a forged mono block.
- From a high quality welded stainless steel construction
- Each runner is dynamically balanced, measured and compared with computer models to assure the integrity of the physical part.
- The runner further passes through rigorous quality control and is accepted according to IEC standards.
- Vaptech’s Francis turbine is fully assembled in our workshop and undergoes in-house functionality and pressure tests.

Typical characteristics (consult us for special requests)

Head range:	Up to 500 m
Number of runner blades:	16-18 pcs
Specific speed range:	85-400 rpm





In-House Design & Production  
 Low losses & Customized Solutions  
 Innovative Automation Systems  
 Guaranteed Quality  
 On-Site Services

## Kaplan Turbines

Vaptech's Kaplan turbine solutions are suitable for projects with low to very low heads and strong flow variations.

We offer classic vertical and horizontal (Pit-type) Kaplan turbines with 3 to 6 runner blades with, steel or concrete casings or Pit structures depending on the application.

For optimal operating efficiency, the runner could be coupled directly with the generator shaft or it could be coupled with speed increaser.

All Vaptech's runners are designed with an oil free hub in accordance with all applicable environmental standards.

The runner is manufactured from high quality stainless steel castings and with CNC machining. Each runner is dynamically balanced, measured and compared with computer models to assure the integrity of the physical part.

Kaplan runner further passes through rigorous quality control according to IEC standards.

Typical characteristics (consult us for special requests)

Head range:	3-40 m
Number of runner blades:	3-6 pcs
Technology type:	Classical double regulated
Specific speed range:	450-1050 rpm



## Valves & Gates

Vaptech has extensive experience and traditions in the design and manufacturing of a wide variety of valves and gates.

The company manufactures closing and isolating structures that are developed for the specific project parameters as well as standardized ranges of valves and gates based on their main input and design parameters.

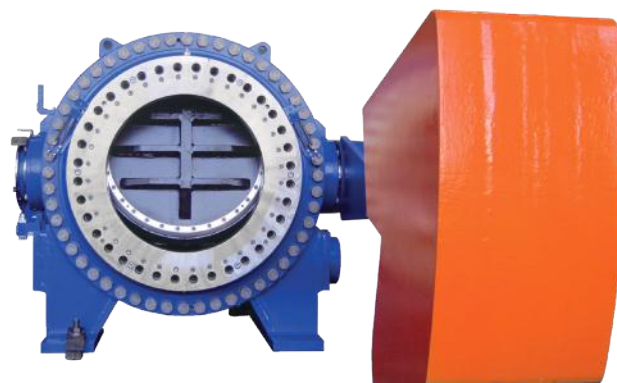
Vaptech offers a wide range of spherical valves used as gates and emergency devices. They are designed to securely close even under full flow and unbalanced pressure.

The company's wide range of butterfly valves are designed to securely close even under full flow and unbalanced pressure.

All of our valves and gates ranges follow rigorous in-house testing for strength, tightness and functionality.

Typical characteristics (consult us for special requests)

Spherical Valves:	From DN 250 - DN 3000 mm Up to PN 100 bar
Butterfly Valves:	From DN 300 - DN 5000 mm Up to PN 40 bar







## Custom Design: Latest Technologies for Shorter Design Time & Increased Output



### Custom design

Every project at Vaptech is developed specifically according to the unique natural and technical conditions of the application in order to deliver solutions with highest efficiency and productivity.

We combine the latest software with generational methodologies to create parametric models, allowing for shorter design time and guaranteed highest efficiency and quality control.

## LEAN Manufacturing for Highest Quality and Shorter Lead Time

Located in Pleven, Bulgaria, our workshop of 40 000 m<sup>2</sup> is equipped with consistently updated advanced machinery to allow for a closed production process for heavy welded and machined steel structures.

Our closed production process allows for strict quality control, shorter delivery times, faster and more efficient servicing and maintenance.

Further improving quality control and delivery times, Vaptech's highly trained engineers follow the principle of LEAN manufacturing in order for continuous improvement on efficiency and productivity.

### Abiding by the Best Standards

**ISO 9001:2015**  
Quality Standard;

**ISO 14001:2015**  
Environmental Standard;

**BS OHSAS 18001:2007**  
Occupational Health and  
Safety Standard





# Water-to-Wire Complete Hydropower Solutions

Vaptech’s hydropower experts and project managers work in your environment, overseeing the entire design, production, installation, and deployment of your specific solution. From assessment and custom designed systems to modernization, we help ensure optimal technical and business performance.

**Vaptech’s complete hydropower solutions include:**

Assessment services: analysis of project conditions and identification of the best technical and economic solution	Turbine equipment Generator equipment Electrical balance of plant Digital control system Integration of all systems	Supervision, installation and commissioning After sales services Services to maximize uptime and performance
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Each project follows a strictly defined cycle



## Project management

To ensure flawless and successful execution, each project at Vaptech is assigned to a qualified project manager.

Our project managers work closely with customers in order to achieve clear communication, adequate feed-back (through regular progress reporting) and realistic deadline agreements.



## Automation & Electrical Engineering

### Benefits

Reliable and efficient turbine control with advanced algorithms  
 Powerful monitoring and control – local HMI, SCADA, Ethernet  
 Timely actionable data for investors and operators  
 Robust automation architecture. Siemens inside

### Turbine Control Systems for Continuous & Optimum Operation

The quality of the produced power highly relies on the turbine control system. Vaptech's control systems provide fully automated regulation, interaction and synchronization of the hydromechanical sub-systems:

- Turbine regulation system
- Turbine inlet valve
- Bypass system
- Intake hydraulic steel structures

The automation algorithm is completely developed by Vaptech and delivers a smooth and intuitive operation of the entire electromechanical system. Based on the customer and grid operator requirements, the mode of the turbine regulator can be set according to the water intake level or the capacity of the generating unit.

### Industry 4.0 ready

All Vaptech hydropower systems are Industry 4.0 ready.

### Remote monitoring and troubleshooting

Through an internet connection, Vaptech's support specialists are able to run diagnostics and repair problems remotely. This way we help you minimize downtime and optimize onsite maintenance works.

### Preventive and predictive maintenance

Vaptech has developed award winning interconnected software modules for physical parameters monitoring, operational data analysis and early detection of equipment servicing needs.

We provide customers with up-to-date statistics of the machines, warnings of potential wear and tear of parts and timely actionable data to schedule maintenance works and prevent downtime.

The software also helps to improve the profitability by providing investors and managers with real time information about production and energy consumption.



**Award winning  
software DataFruit**





## Refurbishment & Rebirth Program

### Regain and improve your original project investment with Vaptech's Refurbishment & Rebirth Program

Hydropower stations are built to serve their owners for the long term. With the right maintenance program, the life of the electromechanical system can be extended for more than 100 years. Vaptech's Refurbishment & Rebirth Program gives added value to the investor by:

- Evaluating current and maximum possible annual energy production.
- Restoring and improving the overall power plant conditions to meet modern market requirements, environmental and safety standards.
- Restoring and Improving the overall plant function in order to extend its life-time and to optimize its operation.
- Increasing the overall profitability of the power plant.

### Benefits

- Improved efficiency and total output
- Maximized annual production and profitability

### Power plant Assessment

- Diagnostics
- Conditions report and audit
- Future investment analyses

### Maintenance Management

- Spare parts
- Repairs/Overhaul
- Trainings

### Power plant Modernisation

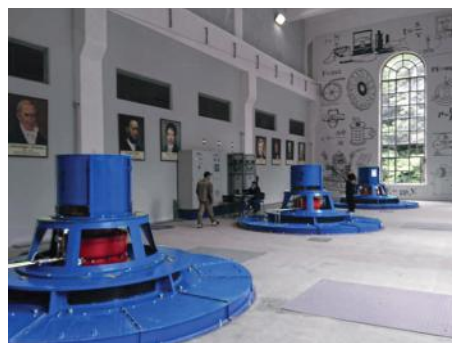
- Unit replacements and extensions
- Upgrades
- Refurbishment

### Sukhumi, Power Plant Modernisation project

Before



After



Complete Rehabilitation Solution for vertical Francis Turbines.

Results:

- Up to 5% increase in efficiency
- Up to 8% higher total output
- Up to 15% higher annual production





# Selected Projects

Type of project: Greenfield  
Scope of service: Complete Solution  
based on Pelton Turbine  
P (kW): 6 650 kW



Type of project: Greenfield  
Scope of service: Complete Solution  
based on Pelton Turbine  
P (kW): 18 600 kW



Type of project: Greenfield  
Scope of service: Complete Solution  
based on horizontal Francis Turbine  
P (kW): 3 170 kW



Type of project: Greenfield  
Scope of service: Complete Solution  
based on horizontal Francis Turbine.  
P (kW): 20 523 kW



Type of project: Greenfield  
Scope of service: Complete Solution  
based on Vertical Kaplan Turbine  
P (kW): 600 kW



Type of project: Greenfield  
Scope of service: Complete Solution  
based on vertical Francis Turbine.  
P (kW): 5 214 kW







## More Than 100 Years of Excellence in Machine Industry and Manufacturing

Founded in 1914, Vaptech has more than 100 years of excellence in machine industry and manufacturing. To date, the company has evolved into a highly appreciated global supplier of highest quality, innovative products, services and solutions in the Hydro Power, Metal Forming and Biomass industries.

Headquartered in Sofia, Bulgaria, with production facility located in Pleven, Vaptech has over 250 employees and over 40 000 m<sup>2</sup> of workspace. Vaptech has projects in over 40 countries on 6 continents.

Vaptech's philosophy is uncompromisingly focused on:

- Excellent product quality
- Integrity & Punctuality
- Innovation in every aspect
- Win-win experiences
- 100% satisfaction of the clientele
- Fastest return on investment for our clients



### Our business sectors

#### Hydro Power



#### Metal Forming



#### Biomass



## Dedicated Service Hotline

Through a global network of experienced and reliable longterm partnerships, Vaptech is able to provide you with dedicated service reactivity for all your questions and concerns.

Vaptech service centre is available to you on:

**+359 886 223 535**

**[service@vaptech.bg](mailto:service@vaptech.bg)**

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