



# MASCHINENBAU UNTERLERCHER GMBH

## HYDROPOWER



SMALL HYDROPOWER TURBINES

[www.maschinenbau-unterlercher.at](http://www.maschinenbau-unterlercher.at)



*"All is born of water, all is  
sustained by water"*

Johann Wolfgang von Goethe





# Company

## Advantage because of innovations

Since the company was founded in 1990, Maschinenbau Unterlercher could repeatedly excel by breaking new grounds in the business sector of small hydropower.

Years of experience, enthusiasm for technology, a motivated team and modern machinery are the basis and the reason for the success of the small, but competitive company.

Maschinenbau Unterlercher specialized in following business fields:

- **Hydropower plants**
- **Special mechanical engineering**
- **Automation and Controlling**





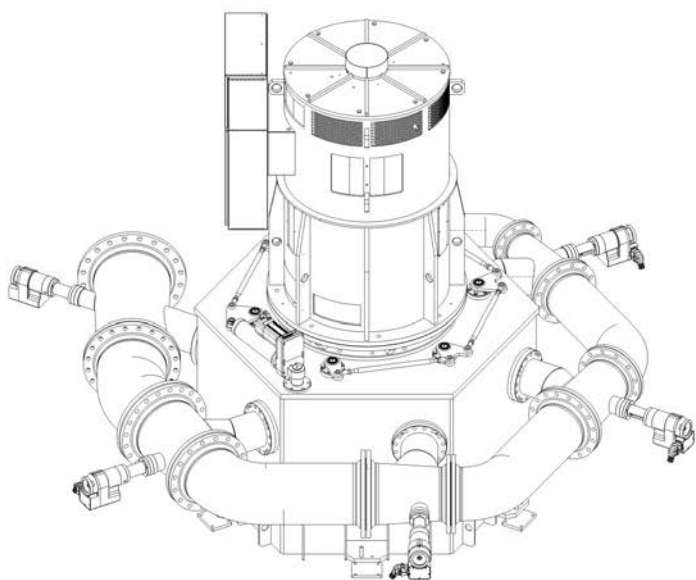
# Hydropower

## Advantage because of years of experience

We provide complete hydropower plants in terms of mechanical and electrical equipment.

Through ongoing development and years of experience in building turbines, a multitude of proven impeller- and turbine variations can be offered today. Each plant is planned and built individually. As a result, the best possible efficiency of the plants location can be achieved.

A hydropower plant by Maschinenbau Unterlercher GmbH is a sustainable long-term investment and provides clean, economical power for generations to come.





# Scope of Service

- Conception of the entire hydropower plant
- 3D-Design by use of modern CAD systems
- Manufacturing of Pelton turbines from 10KW up to approx. 3000 kW
- Manufacturing of spare Pelton impellers up to approx. 3000 kW
- Manufacturing of cross-flow turbines up to approx. 750 kW
- Refurbishment of aged power plants
- Assembly and commissioning of the plant
- CE-certification and documentation
- Service and repair
- Electric equipment
- Control technology





# Pelton Turbine

Under high pressure to top performances – the top athlete

Because of its high efficiency and good adjustability, the Pelton turbine is our most built turbine.

In 2010, we were able to vastly improve the manufacturing process of our Pelton impellers in the course of a development project, which resulted furthermore in an increase of durability. In further consequence, this novel manufacturing process has been patented.

(Patent Nr. EP2365209A2)





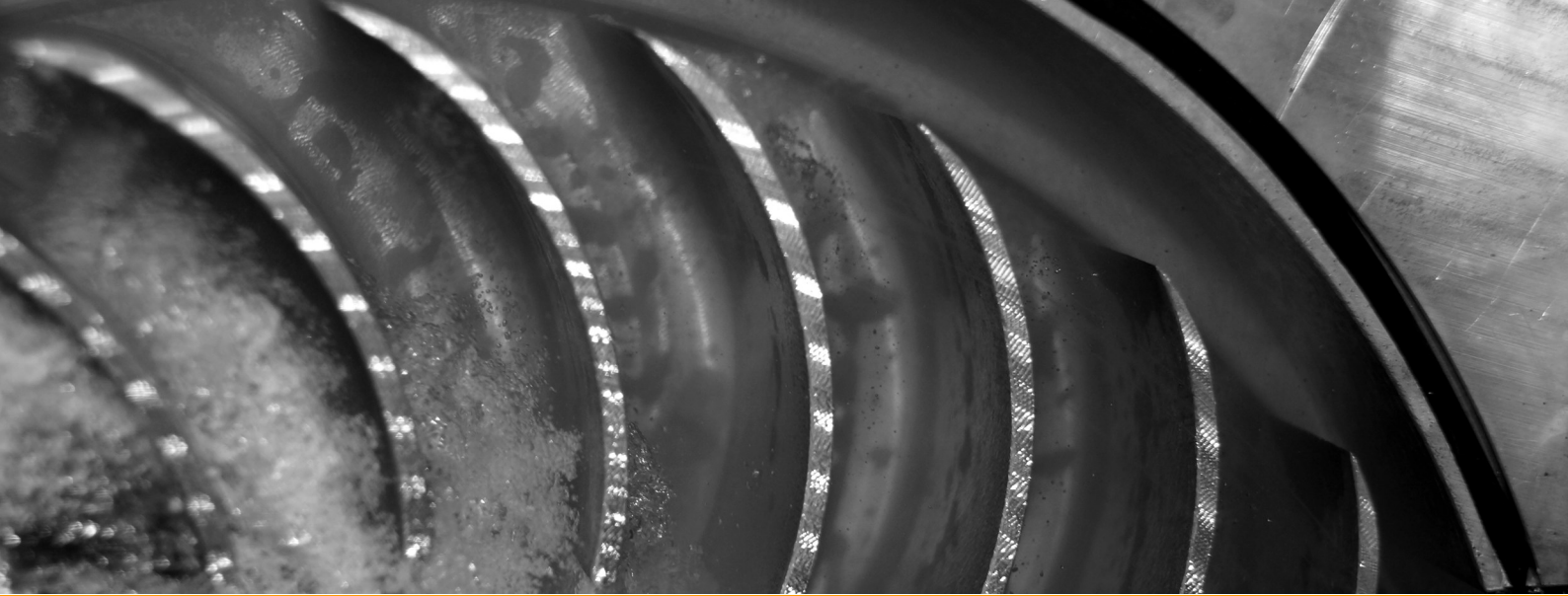
## Scope of Service

- Range of pressure altitude between 30 m and 1000 m
- Turbine performance from 10 kW up to 3000 kW
- Impellers up to approx. 3000 kW

## Design and Advantages

- One to six nozzles
- Horizontal or vertical generator shaft alignment
- Nozzle- and waterjet deflector drive either electrical or hydraulic
- Suitable for fluctuating flow rates
- Low maintenance and durable design





# Cross-flow Turbine – CFT

Strength lies in calmness – the robust slow runner

The major advantages of the CFT are its rather simple design and the minor error susceptibility. Due to the very flat efficiency curve, it has a high annual power output, even when there are fluctuating amounts of water.

The turbine configuration is tested and simulated at our internal turbine test stand before it is delivered to adapt the plant optimally to the given hydraulic situation.

In 2013, in the course of a research project in cooperation with the Institute of Hydraulic Fluid Machinery at the TU Graz, we were able to further refine our cross-flow turbines, thus raising the efficiency factor and improving our design substantially.









# Drinking Water Turbines

The gradient of drinking water pipes is still relatively rare used to generate energy. As the pressure pipeline already exists and the turbine can usually be integrated into existing buildings, running drinking water power plants is highly profitable.

## Advantages of drinking water turbines:

- **Cost savings through existing buildings and pressure pipelines**
- **Minimal impact on nature**
- **Drinking water flows unpressurised into the elevated tank (no pressure destroyer needed)**
- **Low maintenance due to robust design**
- **Food-safe, thus the drinking water quality remains unaffected**
- **High efficiency due to optimal turbine design**





# Scope of Service

- **Manufacturing of Pelton and cross-flow turbines in drinking water design**
- **All bearings, except generator bearings are maintenance-free and grease-free**
- **All materials used are made of stainless steel and NSF approved**
- **Electric nozzle drives**
- **Electrically-, water- or pneumatically driven waterjet deflector drive**
- **Impeller mounted one-sided on generator shaft or in 4-bearing arrangement**
- **A bypass nozzle or a hollow-jet valve can be included in delivery**
- **Individual adaptation of the turbine to the on-site building conditions**
- **Complete electrotechnical integration into the existing control technology**





# Impeller Production

Our patented manufacturing process (patent no. EP2365209A2) allows us to manufacture even large impellers at attractive prices. Especially the corner area between the individual Pelton buckets is ideally worked out by our innovative production process, which leads to an optimal bucket emptying.

## Technical data – Pelton impellers

- **Patented production in the factory in Hopfgarten in Deferegggen / Austria**
- **Ultrasonically tested stainless steel forged blanks in 1.4313 as raw material**
- **Alternatively, less costly steel wheels (S355J2+N) can also be manufactured**
- **Economic and cost-effective impellers for aged plants**
- **Pelton impellers for plant outputs up to 3 MW**





# Refurbishment

For the revitalization of an aged plant, the complete design of the turbine is re-calculated and the hydropower plant is adapted to the highest possible annual generation. Either single plant components, or the complete machine set can be replaced.

- **Inspection of the turbine design**
- **Impeller overhaul or replacement**
- **Revision of nozzle and waterjet deflector parts**
- **Maintenance and service of turbines**
- **Renewal of control technology**
- **Modernization of actuators**





# REFERENCES – HYDROPOWER

## Pelton Turbine

2x vertical 6 nozzles

performance: 2 x 300kW

rotational speed: 429 rpm

pressure altitude: 45 m

## Pelton Turbine

horizontal 2 nozzles

performance: 400 kW

rotational speed: 750 rpm

pressure altitude: 123 m

## Pelton Turbine

vertical 4 nozzles

performance: 500 kW

rotational speed: 750 rpm

pressure altitude: 118 m

## Pelton Turbine

horizontal 2 nozzles

performance: 800 kW

rotational speed: 1000 rpm

pressure altitude: 253 m



# REFERENCES – HYDROPOWER

## Pelton Turbine

### Drinking Water Turbine

performance: 100 kW  
rotational speed: 1500 rpm  
pressure altitude: 355 m

## Pelton Turbine

### Drinking Water Turbine

performance: 20 kW  
rotational speed: 1500 rpm  
pressure altitude: 105 m

## Crossflow Turbine

### 2 cells

performance: 300 kW  
rotational speed: 500 rpm  
pressure altitude: 42,9 m

## Crossflow Turbine

### 2 cells

performance: 45 kW  
rotational speed: 143 rpm  
pressure altitude: 4 m



# REFERENCES – HYDROPOWER

## Pelton Turbine

horizontal 2 nozzles

performance: 200 kW

rotational speed: 1000 rpm

pressure altitude: 130 m

## Pelton Turbine

vertical 4 nozzles

performance: 900 kW

rotational speed: 1000 rpm

pressure altitude: 260 m

## Pelton Turbine

vertical 5 nozzles

performance: 500 kW

rotational speed: 500 rpm

pressure altitude: 80 m

## Pelton Turbine

horizontal 2 nozzles

performance: 600 kW

rotational speed: 600 rpm

pressure altitude: 162 m





# REFERENCES – HYDROPOWER

## Crossflow Turbine

2 cells

performance: 80 kW

rotational speed: 500 rpm

pressure altitude: 17,5 m

## Crossflow Turbine

2 cells

performance: 165 kW

rotational speed: 186 rpm

pressure altitude: 9 m

## Crossflow Turbine

2 cells

performance: 200 kW

rotational speed: 428 rpm

pressure altitude: 30 m

## Crossflow Turbine

2x 2 cells

performance: 2x 300 kW

rotational speed: 500 rpm

pressure altitude: 19 m



## REFERENCES – HYDROPOWER

### Pelton Turbine

#### Drinking Water Turbine

performance: 210 kW  
rotational speed: 1500 rpm  
pressure altitude: 670 m

### Pelton Turbine

#### horizontal 3 nozzles

performance: 900 kW  
rotational speed: 1000 rpm  
pressure altitude: 320 m

### Pelton Turbine

#### vertical 4 nozzles

performance: 180 kW  
rotational speed: 750 rpm  
pressure altitude: 66 m

### Pelton Turbine

#### vertical 6 nozzles

performance: 600 kW  
rotational speed: 429 rpm  
pressure altitude: 63 m



## REFERENCES – HYDROPOWER

### Pelton Impeller

vertical 5 nozzles

performance: 2000 kW

rotational speed: 600 rpm

pressure altitude: 146 m

### Pelton Impeller

horizontal 1 nozzle

performance: 250 kW

rotational speed: 1500 rpm

pressure altitude: 700 m

### Pelton Impeller

horizontal 2 nozzles

performance: 1700 kW

rotational speed: 750 rpm

pressure altitude: 242 m

### Pelton Impeller

horizontal 2 nozzles

performance: 1800 kW

rotational speed: 1000 rpm

pressure altitude: 220 m



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