



Strojírny Brno

Water Turbines & Hydro - Mechanical Equipment



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Strojírny Brno company is renowned Czech manufacturer of **Water Turbines and Hydro-mechanical Equipment** for reliable and safe operation and control of hydro power plants.

Besides Designing, Manufacturing, Supervision, Testing, Commissioning and Servicing of a new Water Turbines and auxiliary equipment. Rehabilitations, Overhauls and Up-grading of existing hydro power technologies are also an important part of our activities.

Our supply experience reached more than two thousand hydro power projects supplied worldwide ensuring technical improvements and proving our know-how. Obtained quality certificates and skills of our workers guarantee high quality of installed equipment. All types of Strojírny Brno turbines have been also certified for installations in drinking water treatment plants.

Karel Mikulášek
Managing Director



CERTIFICATES



TDS Brno – Sekce řízení jakosti a certifikace, p. s.

U vlečky 29/5, 617 00 Brno
Certifikační orgán pro systémy managementu č. 3105
akreditovaný Českým institutem pro akreditaci, o.p.s. podle ČSN EN ISO/IEC 17021-1:2016

CERTIFICATE

No. TDS 62/2018

The TDS CERT
certification body
for management systems

confirms

on the basis of a positive result of certification audit No. 213/2018
that the company

Strojírny Brno, a.s.

Blanenská 1278/55

CZ – 664 34 Kuřim

has established and applies an Occupational health and safety
management system
in accordance with

ČSN OHSAS 18001:2008

in the line of

**Production and complete overhauls of water turbines and hydro technical gears
and machines building with driving gear.**

Company has been certified since 2012.

Further explanation as to the subject and certificate as well as to applicability of requirements referring to
Standard ČSN OHSAS 18001:2008 can be obtained at the indicated organization.

Brno 11. 7. 2018



Ing. Jiří Noss
Director of certification body



TDS Brno - Sekce řízení jakosti a certifikace, p. s.

U vlečky 29/5, 617 00 Brno
Certifikační orgán pro systémy managementu č. 3105
akreditovaný Českým institutem pro akreditaci, o.p.s. podle ČSN EN ISO/IEC 17021-1:2016

CERTIFICATE

No. TDS 103/2017

The TDS CERT
certification body
for management systems

confirms

on the basis of a positive result of certification audit No. 24/2017
quality management system and the welding process,
that the company

Strojírny Brno, a.s.

Blanenská 1278/55

CZ – 664 34 Kuřim

has established and applies a quality management system
in accordance with

ČSN EN ISO 9001:2009

in conjunction with the requirements

ČSN EN ISO 3834-2:2006

in the line of

**Production and complete overhauls of water turbines and hydro technical gears
and machines building with driving gear.**

Further explanation as to the subject and certificate as well as to applicability of requirements referring to
Standard EN ISO 9001 and EN ISO 3834-2 can be obtained at the indicated organization.


Brno 31. 7. 2017



Ing. Jiří Noss
Director of certification body

The list of activities welding process is given in Appendix of this certificate.

CERTIFICATES

 **TDS Brno - Sekce řízení jakosti a certifikace, p. s.**
 U vlečky 29/5, 617 00 Brno
 Certifikační orgán pro systémy managementu č. 3105
 akreditovaný Českým institutem pro akreditaci, o.p.s. podle ČSN EN ISO/IEC 17021-1:2016

Annex to certificate no. TDS 103/2017

WELDING PROCESS SPECIFICATION

Certificate No.: **TDS 103/2017** confirming the introduction and use of a welding process in accordance with the requirements of EN ISO 3834-2 applies to the following specifications:

1. Type of product
 water turbines, hydro technical gears, machines with driving gear

2. Product standards
 ČSN 73 2603; ČSN EN 1090-2

3. The Group of base material (according to CEN ISO/TR 15608)
 Group 1.1, 1.2, 1.4, 8.1

4. Welding and related processes (according to EN ISO 4063)


Svařovací procesy (dle ISO 4063)	Skupiny základních materiálů (dle CEN ISO/TR 15608)
111	1.1, 1.2, 1.4
135	1.1, 1.2, 1.4
141	8.1
311	1.1, 1.2, 1.4



5. Officials welding coordinator (according to EN ISO 14731)

Name	Qualification	Job function and level
Ing. Vladimír Suchý	IWE	Welding supervision; specific requirements according to EN ISO 14731, section 6.2 point a)

This annex is valid with the certificate No.: TDS 103/2017 only and is valid only for the duration of this certificate.

Brno 31. 7. 2017


 Ing. Jiří Noss
 Director of certification body

 **TDS Brno - Sekce řízení jakosti a certifikace, p. s.**
 U vlečky 29/5, 617 00 Brno
 Certification body for management systems no. 3105 accredited
 by the Czech Accreditation Institute according to ISO/IEC 17021:2011

CERTIFICATE

No. TDS 51/2016

The TDS CERT
 certification body
 for management systems

confirms

on the basis of a positive result of recertification audit No. 107/2016
 that the company

Strojírny Brno, a.s.
Blanenská 1278/55
CZ – 664 34 Kuřim

has established and applies an environmental management system
 in accordance with

ČSN EN ISO 14001:2005

in the line of

**production and complet overhauls of water turbines
 and hydrotechnical gears and machines building with driving gear.**

Company has been certified since 2007.

Further explanation as to the subject and certificate as well as to applicability of requirements referring to standard EN ISO 14001:2004 can be obtained at the indicated organization.

Brno, 09.08.2016


 Ing. Jiří Noss
 Director of certification body



Strojírny Brno

COMPANY PRODUCT PORTFOLIO

• WATER TURBINES

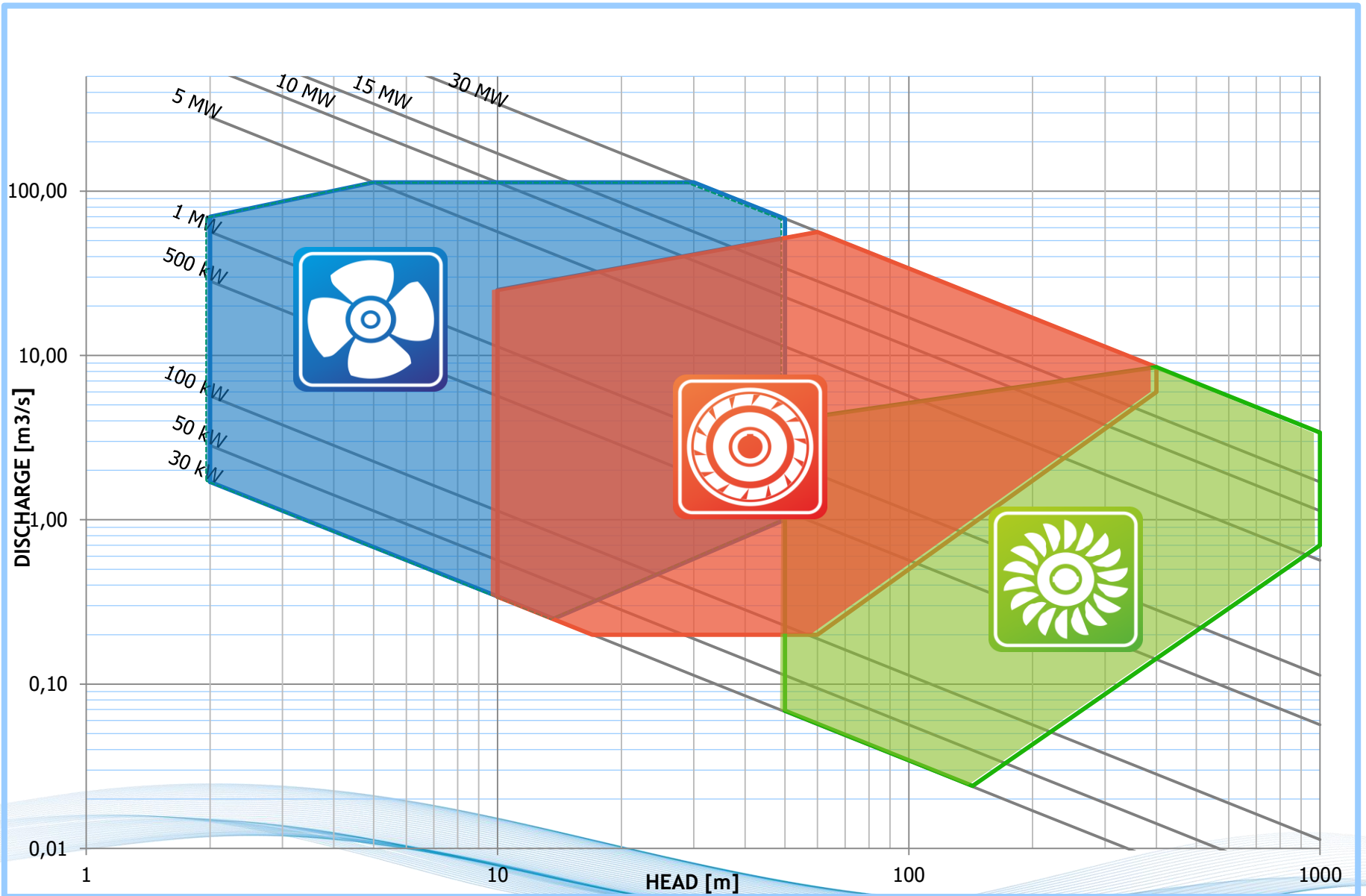
- KAPLAN TURBINES
- PELTON TURBINES
- FRANCIS TURBINES

All turbine types are also certified for installations in potable water systems

• HYDRO-MECHANICAL EQUIPMENT

- REHABILITATIONS, OVERHAULS & UP-GRADING

HYDRO POWER PLANTS RANGE



KAPLAN TURBINES

Horizontal Straight-Flow Kaplan Turbine

is applied for Low Heads and High Discharges. We design our Kaplan Turbines with adjustable Guide Vanes and Runner Blades during operation ensuring optimisation of efficiency at varying head and discharge.

Design Parameters:

Range of Heads:	1 – 20 m
Range of the Runner diameters:	350 – 6 000 mm
Range of power per 1 unit:	50 – 25 000 kW

Kaplan Z – type Turbine

is applied for Low Heads and High Discharges. We design our Kaplan Turbines with adjustable Guide Vanes and Runner Blades during operation ensuring optimisation of efficiency at varying head and discharge.

Design Parameters:

Range of Heads:	1 – 40 m
Range of the Runner diameters:	350 – 4 000 mm
Range of power per 1 unit:	50 – 25 000 kW

Vertical Kaplan Turbine

is applied for Low Heads and High Discharges. We design our Kaplan Turbines with adjustable Guide Vanes and Runner Blades during operation ensuring optimisation of efficiency at varying head and discharge.

Design Parameters:

Range of Heads:	1 – 45 m
Range of the Runner diameters:	350 – 6 000 mm
Range of power per 1 unit:	50 – 25 000 kW



KAPLAN TURBINES REFERENCES

HPP LOBKOVICE, Czech Republic
Two Units Vertical Kaplan Turbines
Installed 2016

Head:	2,5 m
Runner diameter:	3 500 mm
Power max:	2 x 1 200 kW



KAPLAN TURBINES REFERENCES

HPP MIŘEJOVICE, Czech Republic
Four Units Vertical Kaplan Turbines
Installed 2010

Head:	3,71 m
Runner diameter:	2 850 mm
Power max:	4 x 1 320 kW



KAPLAN TURBINES REFERENCES

HPP GUMATI, Georgia

One Unit Vertical Kaplan Turbine

Installed 2010

Head: 26 m

Runner diameter: 3 000 mm

Power max: 13 MW



KAPLAN TURBINES REFERENCES

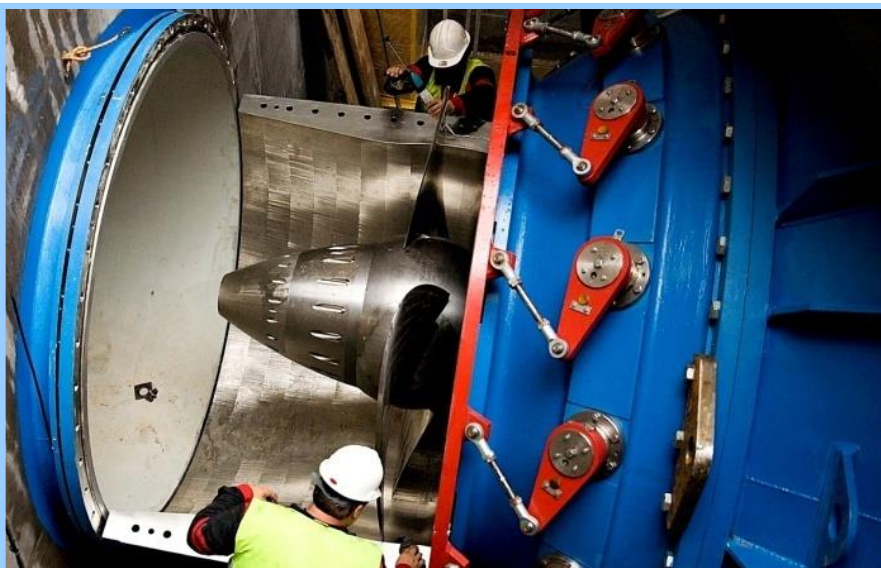
SHPP KNISLINGE, Sweden

One Unit Straight Flow Kaplan Turbine
Installed 2012

Head: 4,3 m

Runner diameter: 2 100 mm

Power max: 949 kW



KAPLAN TURBINES REFERENCES

SHPP Podtureň, Slovakia
Two Units Straight Flow Kaplan Turbine
Installed 2018

Head:	6,5 m
Runner diameter:	1 600 mm
Power max:	2x710 kW



KAPLAN TURBINES REFERENCES

SHPP LAC, Republic of Liberia

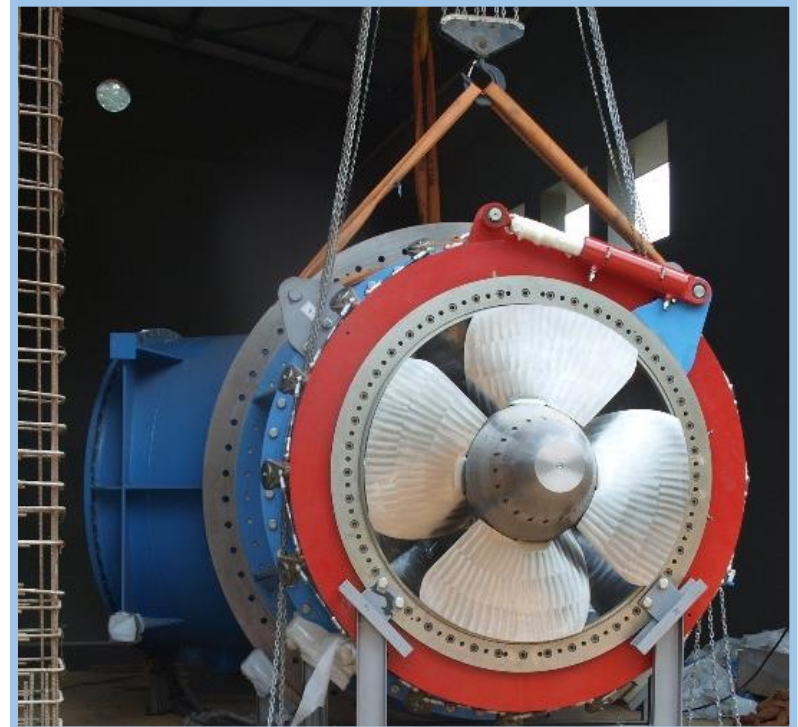
Kaplan Z – type Turbine

Installed 2014

Head: Unit 1 = 8,95 m, Unit 2 = 9,37 m

Runner diameter: Unit 1 = 1 750 mm, Unit 2 = 1 100 mm

Power max: Unit 1 = 1 244 kW, Unit 2 = 571 kW



KAPLAN TURBINES REFERENCES

HPP SEVILLA, Philippines

Two Units Vertical Kaplan Turbines
Installed 2004

Head: 10 m

Runner
diameter: 1 575 mm

Power max: 2 x 1 329 kW



KAPLAN TURBINES REFERENCES

SHEPP SKÄPANÄS, Sweden

One Unit Vertical Kaplan Turbine

Installed 2007

Head: 16,5 m

Runner diameter: 3 050 mm

Power max: 8 860 kW



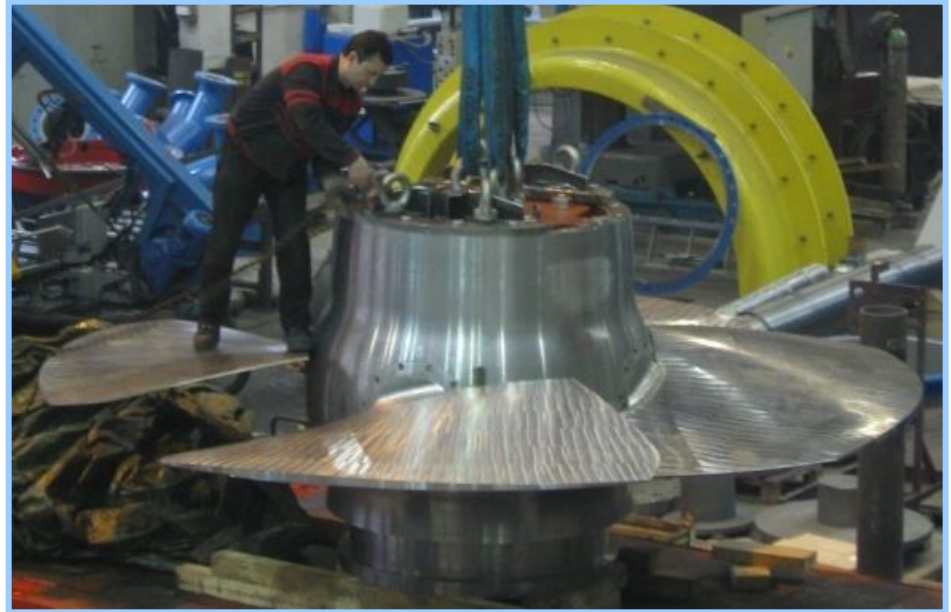
KAPLAN TURBINES REFERENCES

SHPP TRI CHALOUPKY, Czech Republic
One Unit Vertical Kaplan Turbine
Installed 2013

Head: 2,84 m

Runner diameter: 3 900 mm

Power max: 1 200 kW



FRANCIS TURBINES

Francis Turbine

Is applied for middle/high Heads and moderate/high Discharges. We design our Francis Turbines with adjustable Guide Vanes during operation ensuring optimisation of efficiency at varying discharge.

Horizontal Francis Turbine

Design Parameters:

Range of Heads:	3 – 250 m
Range of the Runner diameters:	200 – 2 500 mm
Range of power per 1 unit:	20 – 30 000 kW



Vertical Francis Turbine

Design Parameters:

Range of Heads:	3 – 250 m
Range of the Runner diameters:	200 – 2 500 mm
Range of power per 1 unit:	20 – 30 000 kW



FRANCIS TURBINES REFERENCES

HPP ATSI, Georgia

One Unit Vertical Francis Turbine
Installed 2014

Head: 45,30 m

Runner diameter: 1 900 mm

Power max: 10 629 kW



FRANCIS TURBINES REFERENCES

PLTM CILAKI 1B, Indonesia
Three Units Horizontal Francis Turbines
Installed 2017

Head:	79,45 m
Runner diameter:	700 mm
Power max:	3 x 3 403 kW



FRANCIS TURBINES REFERENCES

PLTA PAKKAT, Indonesia
Three Units Horizontal Francis Turbines
Installed 2015

Head:	143 m
Runner diameter:	1 020 mm
Power max:	3 x 7 000 kW



FRANCIS TURBINES REFERENCES

SHPP ŘÍMOV, Czech Republic
Two Units Horizontal Francis Turbines
Installed 2010

Head:	38 m
Runner diameter:	Unit 1 = 600 mm, Unit 2 = 430mm
Power max:	Unit 1 = 780 kW, Unit 2 = 400 kW



FRANCIS TURBINES REFERENCES

SHEPP SAN LUIS, Philippines

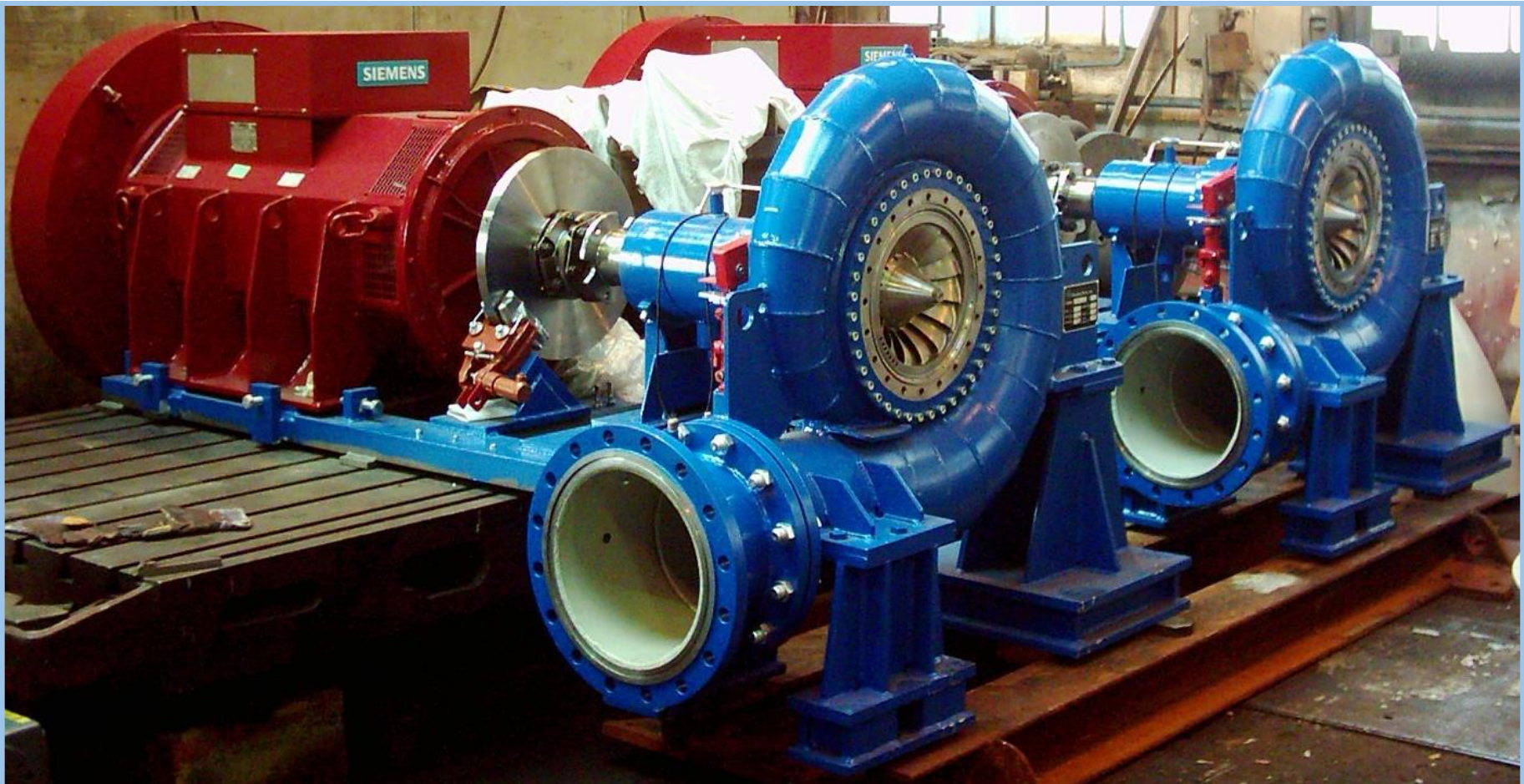
Two Units Horizontal Francis Turbines

Installed 2004

Head: 95 m

Runner diameter: 350 mm

Power max: 2 x 400 kW



FRANCIS TURBINES REFERENCES

SHEPP DUSLO SALA, Slovakia
One Unit Horizontal Francis Turbine

Head:	40 m
Runner diameter:	350 mm
Power max:	124 kW



PELTON TURBINES

Pelton Turbine

Is non-pressure turbine suitable for very high heads and low discharge. Water is supplied by nozzles equipped with adjustable needles and deflectors to the runner buckets.

Horizontal Pelton Turbine

Design Parameters:

Range of Heads:	30 – 1000 m
Range of the Runner diameters:	300 – 2 500 mm
Range of power per 1 unit:	50 – 30 000 kW



Vertical Pelton Turbine

Design Parameters?

Range of Heads:	30 – 1000 m
Range of the Runner diameters:	300 – 2 500 mm
Range of power per 1 unit:	50 – 30 000 kW



PELTON TURBINES REFERENCES

HPP CORANI, Bolivia

One Unit Horizontal Pelton Turbine
Installed 2017

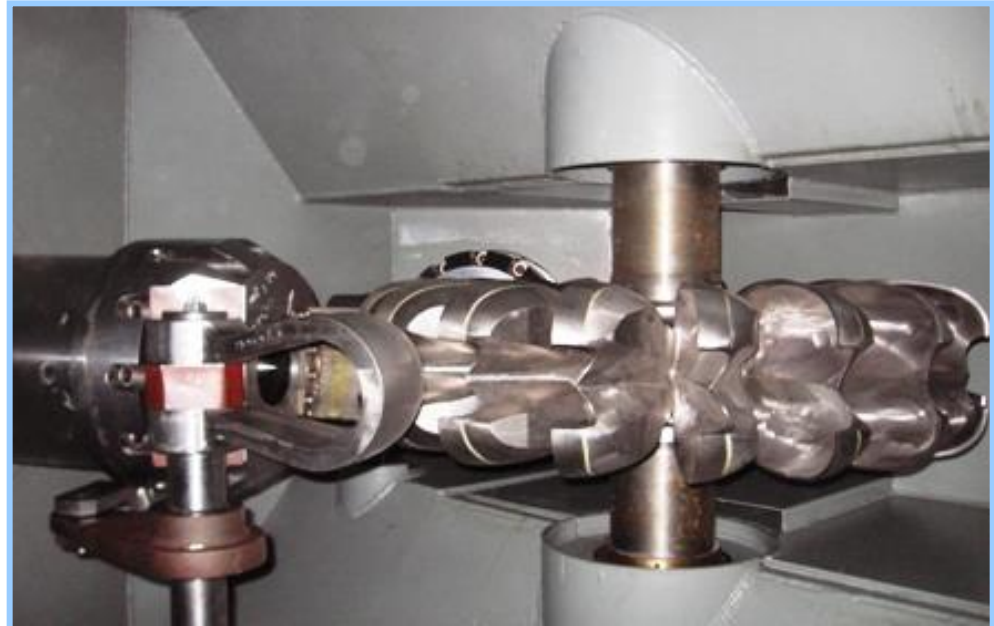
Head:	625 m
Runner diameter:	1 620 mm
Power max:	15 450 kW



PELTON TURBINES REFERENCES

SHPP FOSSA, Norway
One Unit Horizontal Pelton Turbine
Installed 2009

Head:	296 m
Runner diameter:	700 mm
Power max:	1 769 kW



PELTON TURBINES REFERENCES

SHPP LIFFJELKRAFT, Norway
Two Units Vertical Pelton Turbines
Installed 2006

Head: 95 m

Runner diameter: 520 mm

Power max: 457 kW



PELTON TURBINES REFERENCES

HPP SHAORI, Georgia
Two Units Horizontal Pelton
Turbines
Installed 2009

Head: 478 m

Runner diameter: 1 871 mm

Power max: 10 MW



PELTON TURBINES REFERENCES

SHPP BLADID, Norway
One Unit Vertical Pelton Turbine
Installed 2006

Head: 90 m

Runner diameter: 580 mm

Power max: 565 kW



HYDRO-MECHANICAL EQUIPMENT

We Design and Manufacture Hydro-Mechanical Equipment to Provide Proper and Reliable Operation of Water Turbines and Hydro Power Plants:

- **INTAKE TRASH RACKS**
- **TRASH RAKE MACHINES WITH CHAIN OR HYDRAULIC DRIVES**
 - **GATES FOR INTAKE**
- **FLUSHING SLUICE OR DAM LEVEL CONTROL (RADIAL SEGMENT GATES)**
 - **WEIR FLAPS**
- **INLET AND BOTTOM OUTLET VALVES**

Our Company is Specialized in Designing and Manufacture of HYDRAULIC GOVERNORS to Control Turbine Guide Vanes (Kaplan, Francis), Runner Blades (Kaplan), Nozzle Needles (Pelton) Inlet Valves and Intake Gates.

Last but not Least we also Design and Manufacture our own Oil-Lubrication Units to Ensure Reliable Lubrication of Sleeve Bearings with Turbine-Generators Units Supplied.

HYDRO-MECHANICAL EQUIPMENT REFERENCES

NPP DUKOVANY, Czech Republic

**Type of
Equipment:**

**Travelling Trash-Raking
Machine
with Telescopic Beam**

Installed:

2003, 2004



HYDRO-MECHANICAL EQUIPMENT REFERENCES

HPP NECHRANICE, Czech Republic

Type of Equipment: Radial Segment Gates and Stop Logs

Dimensions: 5 600 mm x 13 000 mm

Installed: 2003



HYDRO-MECHANICAL EQUIPMENT REFERENCES

SHP ŠTVANICE, Czech Republic

Type of Equipment: Stationary Two-Arm Hydraulic Trash-Raking Machine

Installed: 2006



HYDRO-MECHANICAL EQUIPMENT REFERENCES

SHPP PŘELOUČ , Czech Republic

Type of Equipment: Travelling Trash-Raking Machine with Telescopic Beam



HYDRO-MECHANICAL EQUIPMENT REFERENCES

SHPP NÝRSKO, Czech Republic

**Type of
Equipment** 2 pcs Howel-Bunger Valves DN600 PN6
:



REHABILITATIONS, OVERHAULS & UP – GRADING

In Order to Ensure Most Efficient and Economical Operation our Company Strojírny Brno, a.s. Provides UP-GRADE of Existing Water Turbines and Other Components of HYDRO POWER PLANTS



Existing Turbines are Completely Replaced for The New Ones or Properly Renovated and Modernized to Achieve Higher Efficiency and Therefore Higher Production.

REHABILITATIONS, OVERHAULS & UP – GRADING REFERENCES

HPP NOVÉ MLÝNY , Czech Republic Rehabilitation

Head: 8,9 m

Runner diameter: 2 400 mm

Power max: 2 300 kW

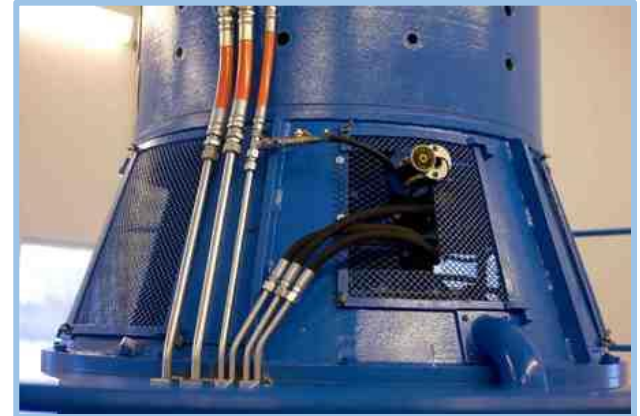
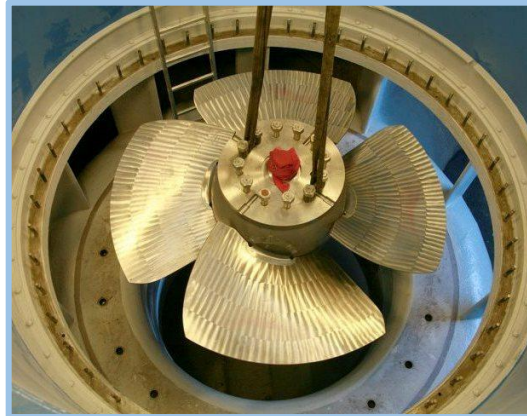


REHABILITATIONS, OVERHAULS & UP – GRADING REFERENCES

HPP NJURA, Sweden

General Overhaul of Vertical Kaplan Turbine

Runner diameter: 2 200 mm



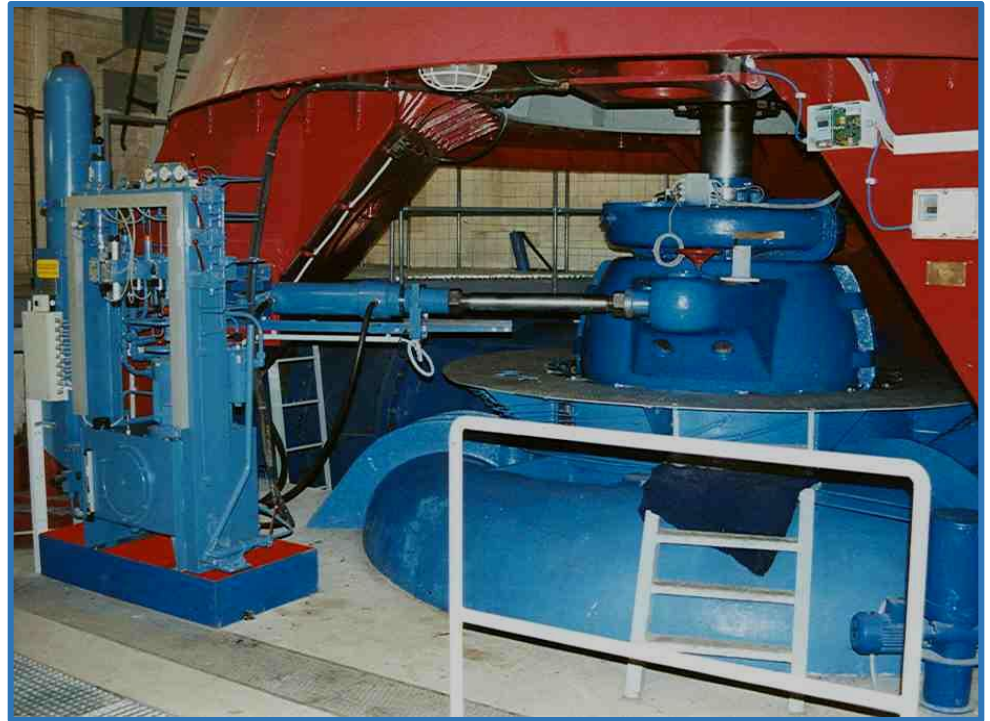
REHABILITATIONS, OVERHAULS & UP – GRADING REFERENCES

HPP PASTVINY, Czech Republic Rehabilitation

Runner diameter: 1 560mm

Head: 28 m

Power max: 2 820 kW



MECHANICAL EQUIPMENT DESIGN PROCESS

Elaboration of Mechanical Part Design Documentation (Autocad)

•

Elaboration of Water Turbines, Hydraulic Governors and Oil Lubricating Sets Design

•

Elaboration of Workshop Drawings by 3D Modelling (ProEngineer, Unigraphics)

•

Hydro – Mechanical Machines Strength Calculation Check (Ansys, WorkBench)

•

Calculation and Preview of Transient Effects of Hydro Power Plant Hydraulic Systems

•

Mathematical Modelling of Hydro Power Plant Regulation Circuits



VIRTUAL PROTOTYPE

We use the technique of **virtual prototyping** and **reverse engineering**. This is connected with model experimental verification in hydraulic laboratory.

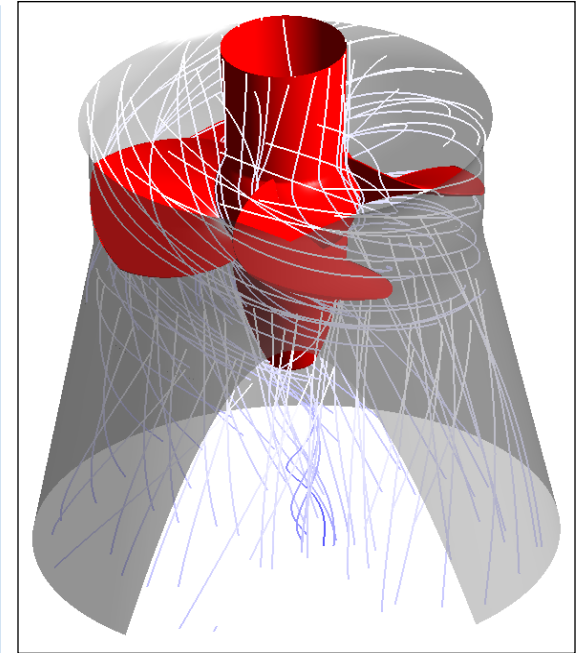
Virtual prototype is given by 3D model from hydraulic design to construction design and manufacturing.

This enables:

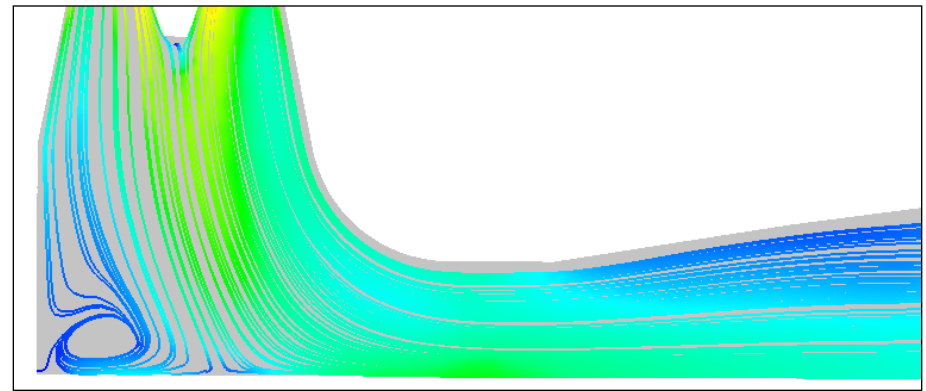
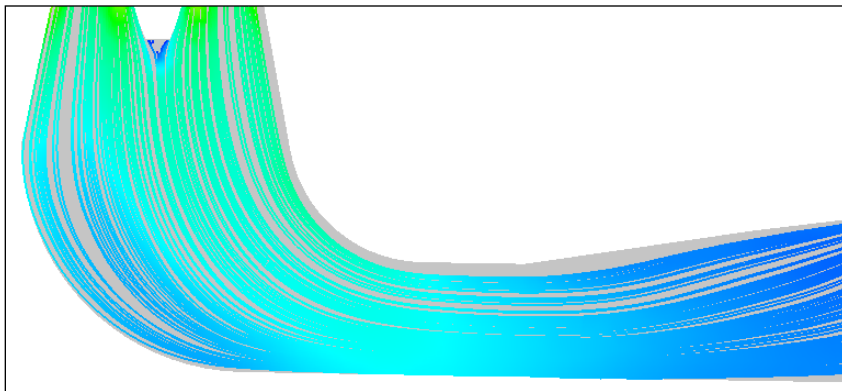
- design of the water machinery parts by means of CFD simulation
- advanced design supported by FEM simulation with feed back to the design
- programming CNC machines.

In this way we optimize a machine and fulfil requirements of a new or refurbished machine.

By means of **virtual prototyping** and **reverse engineering** we are able to evaluate an increase in efficiency and power output of a refurbished turbine already at the phase of an offer.



Kaplan Turbine virtual prototype



Flow in the runner and draft tube



Strojírny Brno, a.s.

Water Turbines & Hydro-Mechanical Equipment

Adress:

**Blanenská 1278/55, 664 34 Kuřim,
Czech Republic**

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<http://www.strojirnybrno.com>



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