



POWER ENGINEERING

We are a stable and innovative machinery company with more than 200 years of tradition.

A comprehensive supplier of power engineering solutions from design and implementation to maintenance, service, and modernisation.

www.pbs.cz



ABOUT PBS

In the field of power engineering, PBS is engaged in engineering and supply activity, in particular:

- It develops, produces and supplies steam and expansion turbines, turbine sets and implements the related operating and construction sets.
- It provides comprehensive services, in particular in the production of power generation and heating industry investment units.
- It develops, designs, and delivers proprietary industrial boilers using various types of fuel.
- As a supplier of investment units, in particular it implements heating units (cogeneration) and power generation units (condensing) including units using waste heat for power generation using gas engines, and it provides maintenance services including general maintenance and reconstruction/modernisation of existing energy plants.
- It supplies spare parts including turbine blades produced in-house from a proprietary design.

PBS is part of **PBS GROUP a.s.**, consisting of **První brněnská strojírna, a.s.**, a general supplier of power engineering equipment with a focus on industrial boilers, **PBS ENERGO, a.s.**, which focuses on the development, production and maintenance of industrial steam turbines and expansion gas turbines, and **První brněnská strojírna Velká Bíteš, a.s.**, which is successfully doing business in the aerospace industry, precision engineering, and precision casting, and which, among others, develops and produces a wide range of turbine blades.

HISTORY OF PRVNÍ BRNĚNSKÁ STROJÍRNA^(PBS)

PBS is one of the oldest engineering plants in Europe. The brand is renowned as a stable, high-quality, and innovative engineering company.

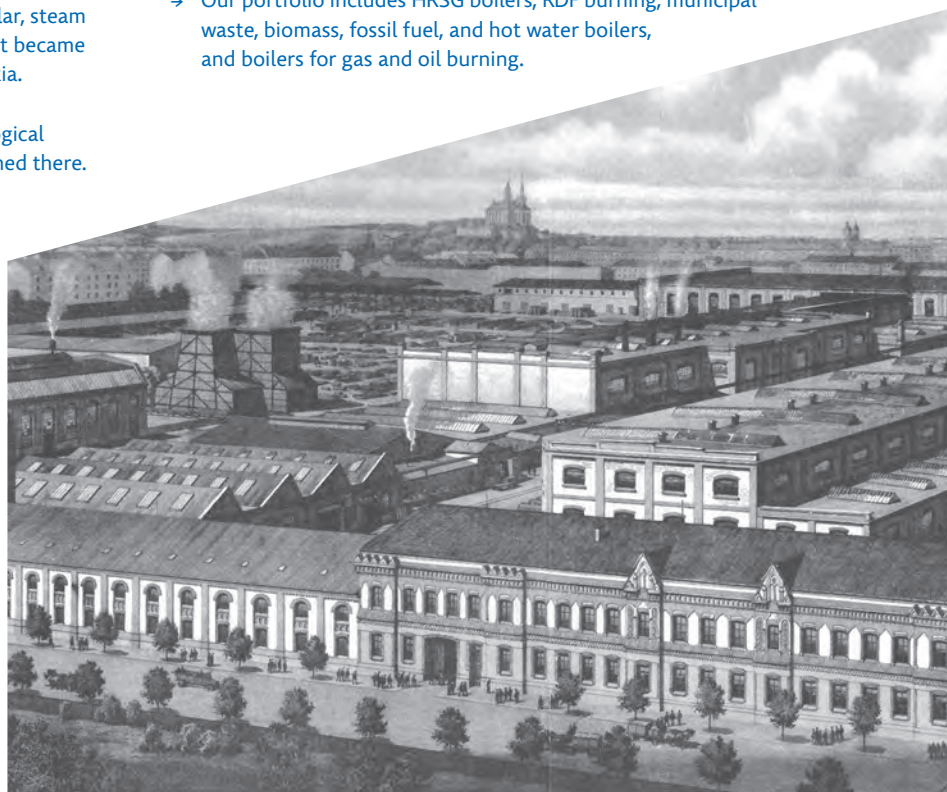
- **1814** – Jan Reiff established the machining factory in Šlapanice u Brna. In the beginning, it exclusively dealt with textile production and the manufacture of machines for the textile industry.
- **1824** – Production of the first proprietary steam engine.
- **1903** – The first turbine under the Parson licence was manufactured.
- **1906** – The first turbine was manufactured under the PBS name. Co-generation principle – the company manufactured the first dual-pressure turbines for the utilisation of waste steam from iron mills and the first back-pressure turbines supplying steam for technological purposes in addition to power.
- **1911** – The machining plant presents its own turbine design. They had higher efficiency and output compared to steam engines, and were more reliable and had lower maintenance costs. The production also placed extraordinary requirements on quality and precision.
- **1902** – Merger with Brno machine plant/foundry Friedrich Wannick & Co. PBS was one of the biggest companies in Austria-Hungary. The company was called Vaňkovka. In particular, steam turbines were manufactured there. The machining plant became the biggest manufacturer in the whole of Czechoslovakia.
- **1951** – A new plant in Velká Bíteš with a wide technological background. Turbines were manufactured and maintained there.
- **1956** – The first regeneration boiler was manufactured and commissioned.
- **1979** – Start of production of small steam power turbines.
- **2001** – In-house development of boilers for burning different types of biomass.
- **2006** – Start of production of small steam power turbines.

Reliable and economic PBS boilers are still used in many operations, not only in the territory of Czech Republic and Slovakia, but also in many other countries, such as Germany, Egypt, Iraq, Cuba, United Arab Emirates, and others. The delivered boilers vary not only in their performance but also in the type and quality of the burned raw material, from gas to biomass. You can also find the PBS brand on equipment used in nuclear power plants.

PBS in numbers and facts:

- Over 200 years of history.
- We have been designing and producing turbines for more than 100 years.
- More than five thousand turbines have been delivered to approximately 70 countries worldwide since 1901.
- Since the very beginning, power engineering has been one of the pillars of development and production in PBS.
- We have traditionally supplied boilers to a number of EU countries, and we provide engineering, reconstruction and modernisation including plant commissioning.
- Our portfolio includes HRSG boilers, RDF burning, municipal waste, biomass, fossil fuel, and hot water boilers, and boilers for gas and oil burning.

1921
PBS Brno



PRODUCTION PROGRAMME AND SERVICES

INDUSTRIAL BOILERS	TURBINES
BOILERS FOR BURNING BIOMASS (INCLUDING CONTAMINATED) Environmentally friendly proprietary boilers with superior protection against chlorine corrosion for grate combustion of hay, wood chips and other biomass. Application: Municipal heating plants Parameters: Pressure: < 10 MPa, Output: 10 – 100 t/hr Efficiency: 88 – 92.5 % Reference: MPEC Olsztyn, Český Krumlov, Kutná Hora, Žarnovica, Wicker, Mariánské Lázně, Krnov	STEAM CONDENSING TURBINES Low-pressure, medium-pressure to high-pressure multistage turbines. Application: Power engineering blocks Power generation (power generator drive) Mechanical drive of compressors, pumps and fans Parameters: Inlet steam pressure: 0.1 MPa – 11 MPa Steam temperature: < 545°C Output: 600 kW – 30 MW Reference: Jaroslavl, Kutná Hora, Kosit, CP Glass
GAS AND OIL BURNING Single, two, or multi-pass horizontal or vertical industrial gas boilers for burning heating oil and gas. Application: Municipal and industrial heating plants Parameters: Pressure: < 10 MPa Output: 200 t/hr Efficiency: 90 – 96 % (fuel oil), < 97.8 % (gas) Reference: Czenstochowa, Plzeň	STEAM BACKPRESSURE TURBINES One-stage turbines with one or two shafts, high efficiency and an affordable price. Application: Power engineering blocks Power generation (power generator drive) Mechanical drive of compressors, pumps and fans Parameters: Inlet steam pressure: < 6.5 MPa, Temperature: < 485°C Outlet steam pressure: < 2.5 MPa Output: 1 – 10 MW Reference: Sokolov
HOT WATER BOILERS Gas, oil, biomass and coal boilers with forced water flow for efficient heat generation. Application: Production plants, industrial operations Parameters: Pressure: < 10 MPa Efficiency: according to the calorific value Reference: Olsztyn	EXPANSION GAS TURBINES Turbines operated for gas or coke-oven gas, cold or hot air, nitrogen or carbon dioxide. They provide fast and exact control of the outlet pressure and minimum leakage. Application: Gas pressure reduction Gas networks (control and transfer stations) Chemical plants Suitable for various flow-through mediums and for operation in potentially explosive environments Parameters: Inlet gas pressure: < 6.5 MPa Temperature: < 550°C Outlet steam pressure: < 2.5 MPa Output: < 10 MW Reference: Pulawy, Nitrogenműveg
BOILERS FOR RDF BURNING Proprietary boilers with superior protection against chlorine corrosion for efficient combustion of sorted municipal waste with maximum emission reduction according to the new emission limits. Application: Municipal and industrial heating plants Parameters: Pressure: < 4.5 MPa Output: < 100 t/hr Efficiency: 82 – 90 % (depending on the calorific value of the sorted municipal waste)	
FLUE GAS BOILERS – HRSG Horizontal or vertical boilers using waste heat. They can be single pressure, dual pressure or triple pressure. Application: Industrial operations operating gas turbines, gas engines and other equipment producing steam or hot water. Parameters: Pressure: < 10 MPa Output: 30 – 200 t/hr Reference: Žiar nad Hronom, Krško	POWER TURBINES Simple one-shaft, one-stage turbines for long-lasting operation and standby operation with very quick start from standby mode and full load within several seconds. Application: Pump drives, turbochargers, fans, mills and grinders Parameters: Inlet steam pressure: 1 – 12 MPa Temperature: 200°C – 545°C Outlet steam pressure: 0.1 – 2.6 MPa Output: 10 kW – 2.2 MW Revolutions: 1450 – 4500/min Reference: Nitrogenműveg, Kralupy nad Vltavou, Pols
BOILERS FOR BURNING FOSSIL FUELS Boilers for traditional fuel (coal) meeting new emission limits. Application: Municipal and industrial heating plants Parameters: Pressure: < 10 MPa Output: 70 – 160 t/hr Efficiency: 86 – 90 % (coal), < 97.8 % (gas)	

PROJECT SERVICES

RECONSTRUCTION AND MODERNISATION OF TURBINES

Complete revision of the whole turbine set including accessories.

Services:

- Reconstruction and change of operating parameters
- Modernisation and automation of turbine sets
- Replacement of turbine sets with preservation of the construction and drive equipment

MAINTENANCE AND SERVICE

Repairs and maintenance of steam turbines, boilers and complete power generating units produced in-house, as well as products and solutions from other suppliers.

Services:

- Repairs
- Revisions
- Overhauls
- Commissioning
- Long-term service contracts

SPARE PARTS

We supply spare parts for all equipment supplied by our company. We guarantee the manufacturing of products according to the original documentation.

RECONSTRUCTION AND MODERNISATION OF BOILERS

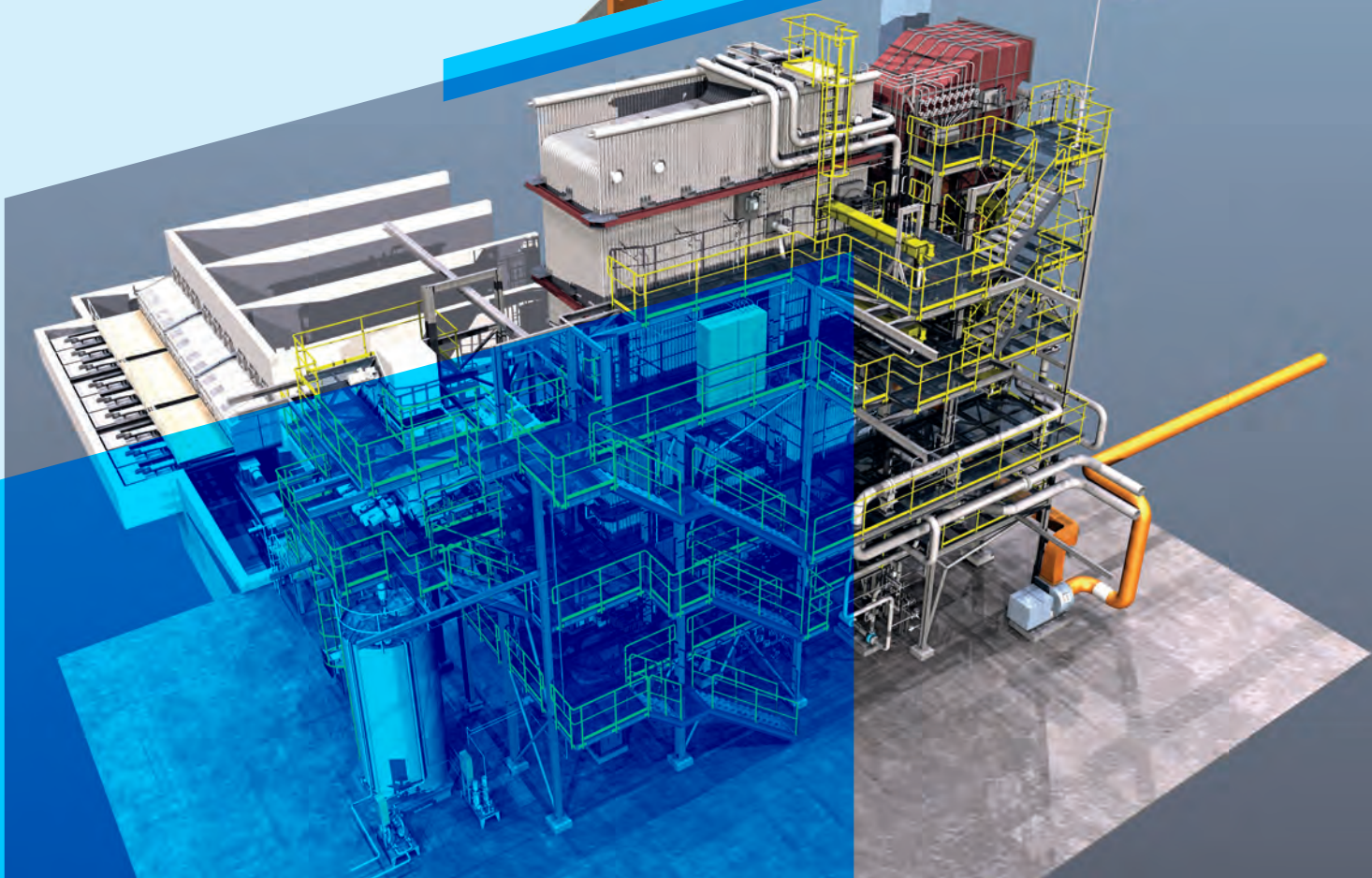
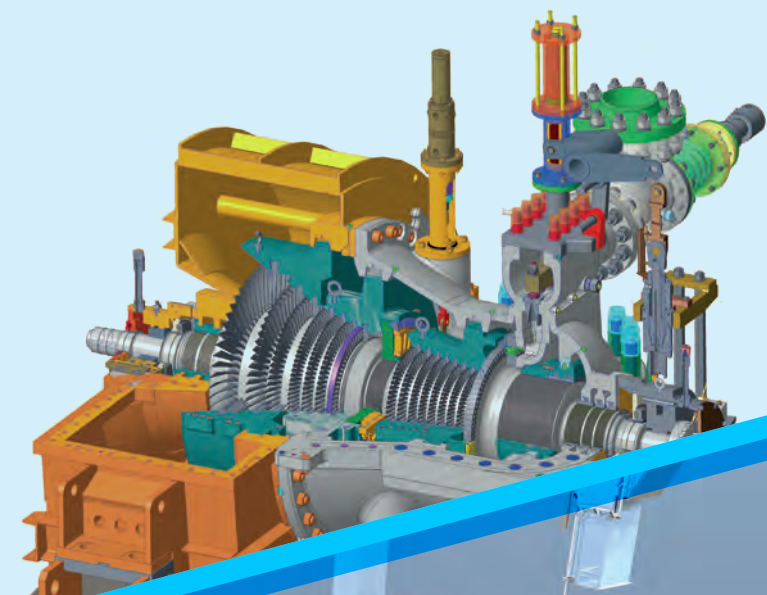
The complete reconstruction of boilers and accessories including the preparation of a feasibility study and draft efficiency solution.

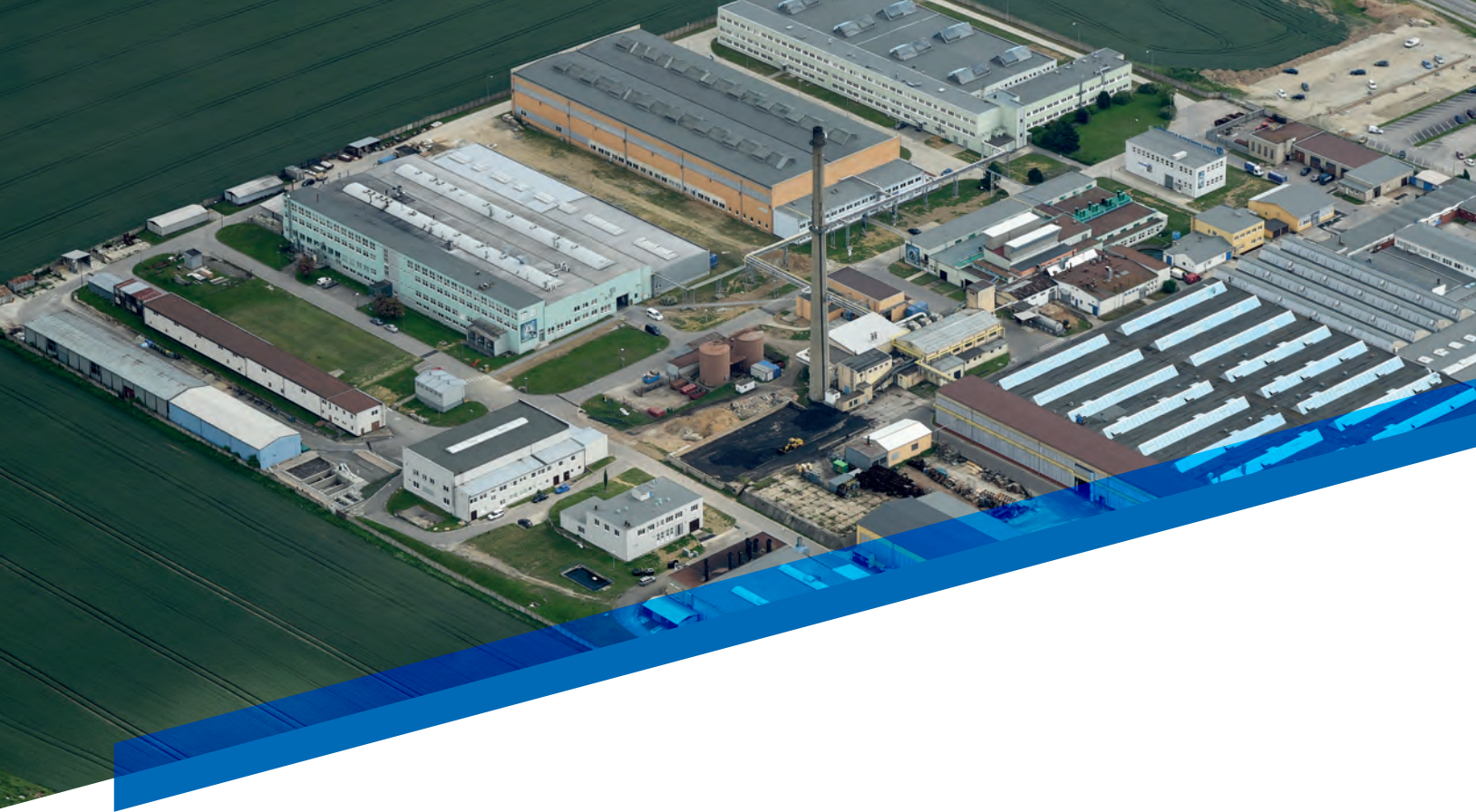
- Reconstruction and adaptations of non-pressure parts
- Increasing efficiency
- Adaptation and modernisation of combustion systems and control of combustion processes
- Modifying air ducts and flue gas ducts

ENGINEERING SERVICES

Design, construction, processing of calculations, and complete project documentation for energy equipment implementation.

- Turbine, boiler and EPC design
- Thermal calculations
- Assessment of the condition of operated equipment
- Preservation of power generation and industrial equipment





WHY WORK WITH US?

- **High quality and high reliability** (our equipment has been operating for decades in a number of countries around the world and in various climatic conditions)
- **Years of experience and our own know-how** (proprietary boilers and turbines)
- **An innovative approach** (continuous efforts to improve existing solutions, and introduce new technologies, science and research)
- **Customised solutions**
- **High-quality service and technical support**
- **Focus on high efficiency and ecological operation**
- **In-house design department**
- **Extensive background of the machinery company** (galvanising, machining, casting, precision inspired by production capabilities from the aerospace industry)
- **Quality verified by practice:** successful references and client case studies are the best proof of the quality of our work

Certifications and awards:

- **ISO 9001/ISO 14001**
- **Nadcap** – non-destructive testing
- Authorisation: **Testing laboratory with activity approved by Czech Testing Laboratories Association (CTLA)**
- Certificate: **nickel alloy casting** (Lloyd's, Bureau Veritas)
- **Responsible company**
(Prize of the President of the Vysočina Region 2018)
- **National Quality Award Czech Republic 2018**



PRODUCT PORTFOLIO AND OTHER MANUFACTURING CAPABILITIES OF PBS

AEROSPACE

We have developed, manufactured, and tested turbine engines (turbojet, turboprop and turboshaft), auxiliary power units (APUs), air-conditioning systems (ECS), gearboxes, starters, and other aviation devices and engine components in more than 40 countries worldwide. We are the holders of EASA certification for development, production and maintenance.

PRECISION CASTING

We produce precision castings made of superalloys for the manufacturers of turbochargers (turbine wheels, axial wheels), combustion turbines (blades, blade segments), aircraft components (turbine wheels), cryogenics (miniature turbine wheels), glass wool insulation material, as well as parts for the healthcare industry (joint replacements).

CRYOGENIC TECHNOLOGY

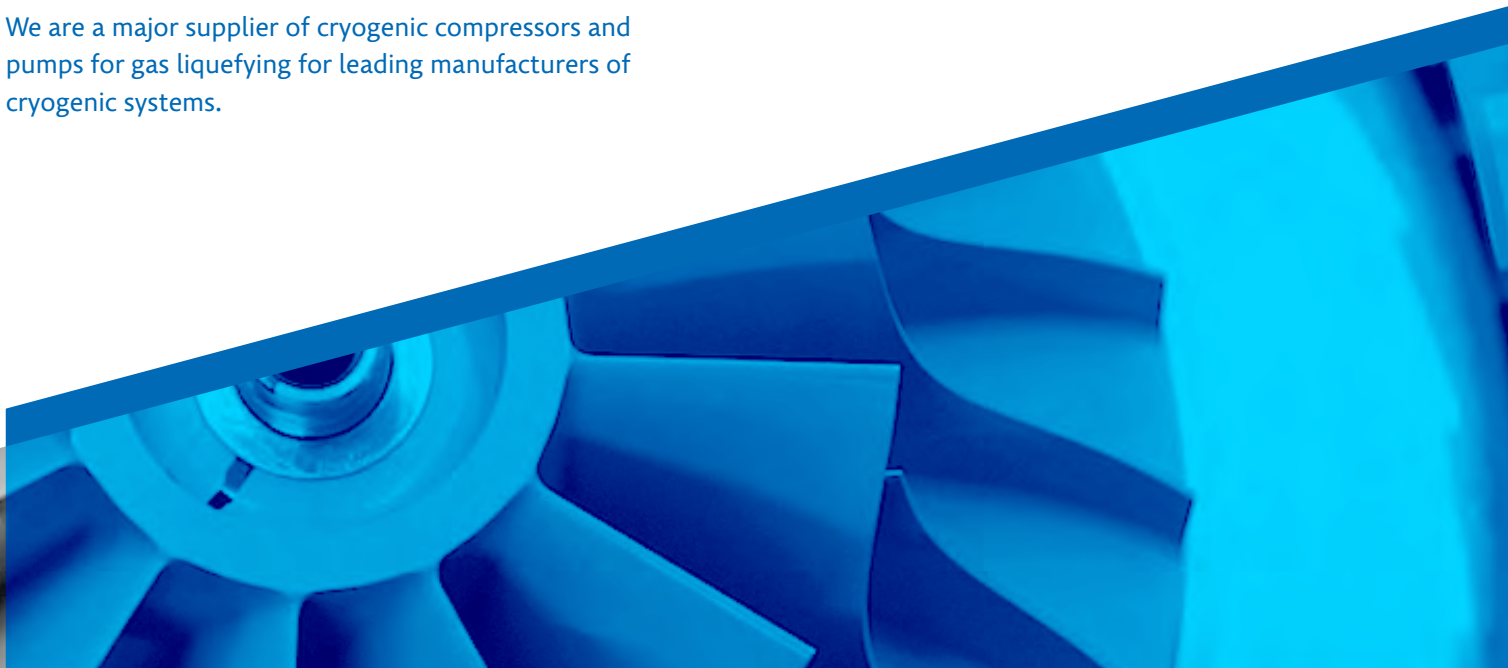
We are a major supplier of cryogenic compressors and pumps for gas liquefying for leading manufacturers of cryogenic systems.


PRECISION ENGINEERING

We provide a wide range of manufacturing operations and services in the field of precision machinery (machining, welding, industrial unit assemblies, grinding, heat treatment and brazing in a vacuum, etc.). We have extensive machinery equipment and modern technological equipment. Thanks to merging our specialised activities “under one roof”, we are able to save our customer money and production time. Our services also include measuring, testing and gauge calibration.

SURFACE TREATMENTS

We are a leading supplier of customised galvanic surface treatments with a comprehensive range of technologies and services (anodising, zinc coating, nickel coating, tinning, blackening, etc.).



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- **We deal with** the development, design, and implementation of turbine and industrial boiler delivery.
 - **We provide** complete maintenance services including modernisation.
 - **We have** experienced and qualified experts, superior technical facilities, and modern technologies.



PBS ENERGO, a.s.

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