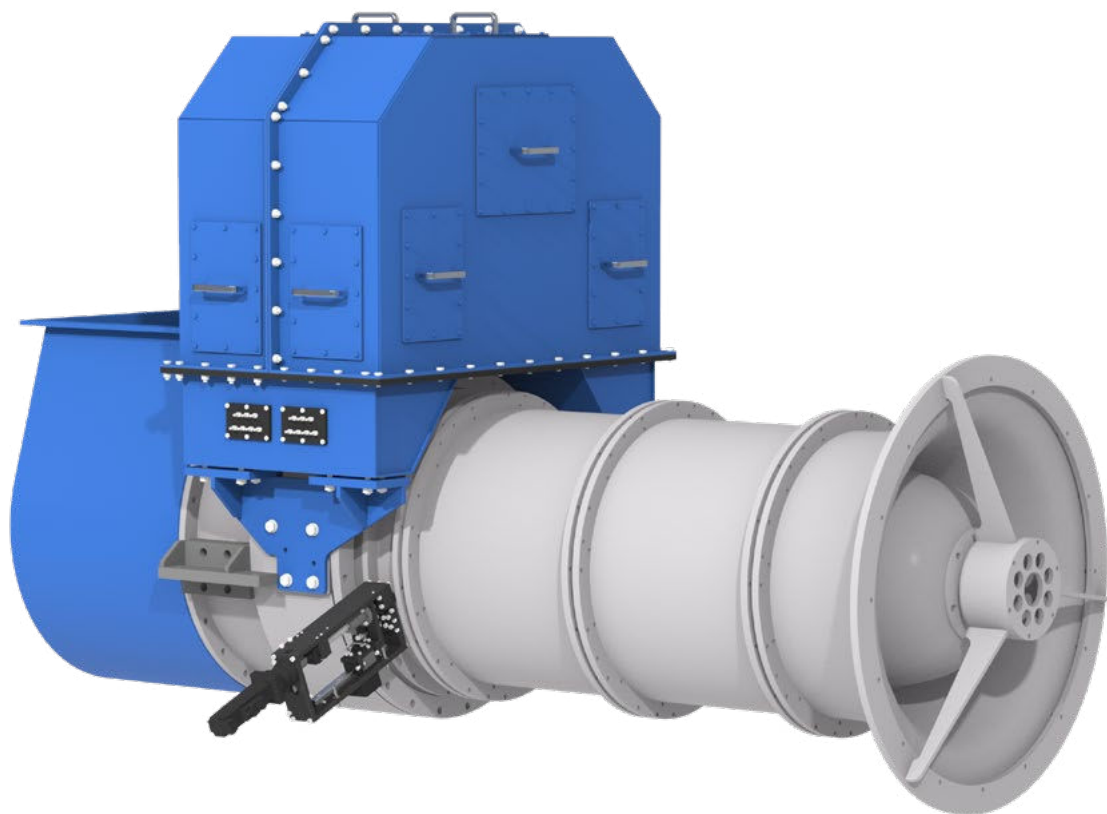


# EXPERIMENTAL FACILITIES FOR INDUSTRIAL RESEARCH AND DEVELOPMENT



# WTTECH.CZ SPECIALISTS IN THE DEVELOPMENT, DESIGN, AND SUPPLY OF TEST RIGS AND TEST EQUIPMENT

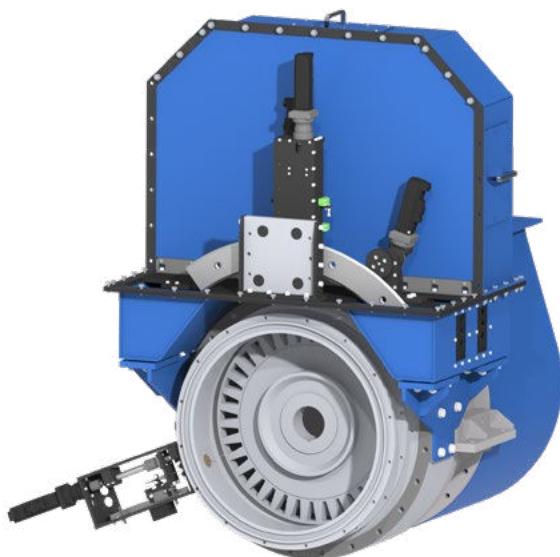
WTtech.CZ offers **unique test rigs and equipment**, including research and development equipment in mechanical engineering, hydraulic engineering, and aerodynamic testing—the WTtech.CZ team consists of committed designers, engineers, constructors, and mechanical specialists. Thanks to our expert know-how and many years of experience, we can offer solutions for **any specialized project** completed under difficult circumstances.

WTtech.CZ manufactures experimental facilities and test equipment for many industries. Our test equipment and components, as well as their implementation at customer sites, meet the highest quality, safety, and maximum test reliability requirements. In addition to hardware solutions, WTtech.CZ offers comprehensive support from initial design to implementation and operation.

We supply **experimental facilities developed and designed by us** with modifications and construction completely **tailored to customer conditions and requirements**. Our services are not limited to the facilities, we offer a comprehensive service, including delivering all equipment, programming the measurement and control software, project management, preparation of research projects, and expert consultation.

In addition to the design and construction of experimental facilities, WTtech.CZ is also well-versed in design using the **Creo 3D CAD system**, advanced aerodynamic calculations as well as **CFD and FEM simulations**. We also offer specific measurement and control software, data processing and analysis for design optimization, and effective solutions to challenges in aerodynamics.

**Founded in 2009**, WTtech.CZ became an official National Instruments system integrator and the exclusive representative of Scanivalve Corp. for the Czech Republic, Slovakia, and Poland. This allowed us access to the latest technologies and cutting-edge research and measurement tools.



# THE USUAL PROCESS OF TEST EQUIPMENT IMPLEMENTATION

WTtech.CZ provides customers with a comprehensive testing equipment implementation service. This process usually consists of the following steps:

## 1. Project analysis

- Project study, feasibility study, budget estimate

## 2. Assignment analysis

- Identification of the requirements and standards that the experimental facility must meet
- Technology design proposal for all parts (mechanical, propulsion, measurement, control)

## 3. Identification of the construction project and its requirements

- Definition of the building requirements for the laboratory (foundations, spatial layout, air conditioning, soundproofing, control room)
- Definition of resource requirements (electricity, water, air, hydraulics)
- Preparation of a detailed building design or detailed specifications

## 4. Design

- Design in the Creo 3D CAD system, FEM, and CFD analysis
- Selection of sub-components (mechanical parts, sensors, pneumatic and electrical parts, etc.)
- Simultaneous preparation of electrical documentation and pneumatic/hydraulic schematics
- Risk analysis

## 5. Purchase of materials and components, production

- After customer approval, purchase of material, components/parts, and production, basic assembly and partial recovery of subsystems at the WTtech.CZ premises begins

## 6. Production of electrical parts

- Production of switchboards, measuring, and control systems
- Programming of measuring and control software (PLC, DAQ systems)

## 7. Installation and launch

- Transportation, installation, and launch of the test equipment at the customer's site
- Electrical inspections
- Calibration of the measuring chain in an accredited laboratory

## 8. Trial operation and handover

- Trial operation and training of customer operators
- Launch of live operation

## 9. Documentation

- Preparation of operating documentation, operating and maintenance manuals
- CE certificate issuance

## 10. Support

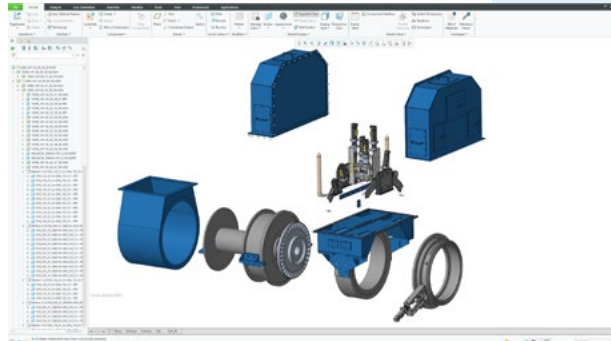
- After-sales support and consultation on all operation-related matters
- Remote device management and user support via a dedicated VPN connection

Structured management of each WTtech.CZ project ensures careful planning and execution of all steps and minimal risks, as well as excellent condition and reliability of the test equipment.

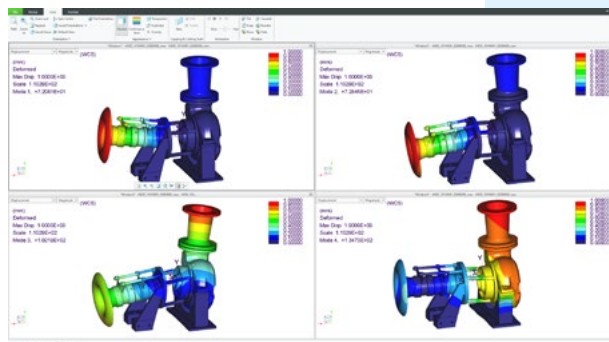
# TECHNOLOGIES USED TO DEVELOP AND CONSTRUCT EXPERIMENTAL FACILITIES

During development and construction, WTtech.CZ uses the latest technologies to ensure the test equipment's high quality, robustness, and accuracy.

1. Construction at WTtech.CZ is conducted exclusively in a **3D CAD** system using **Creo** software, which enables detailed design and modelling of all testing facility components. The design data is stored and managed in the **Windchill PDM system**, ensuring efficient product lifecycle management and easy access to all necessary information.



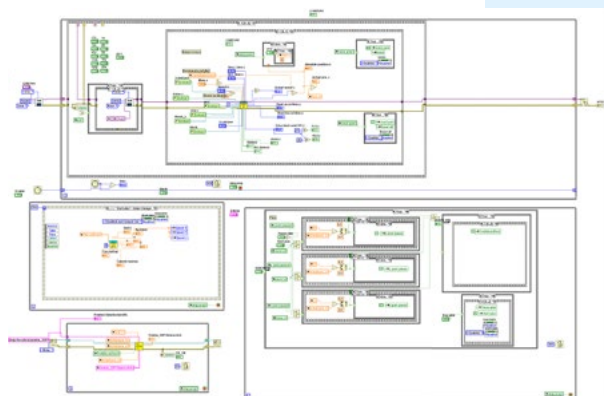
2. Design optimization includes **FEM** (Finite Element Method) and **CFD** (Computational Fluid Dynamics) analyses. These analyses allow the simulation of the mechanical and fluid behaviour of components before they are manufactured, resulting in high product quality and reliability.



3. WTtech.CZ control and measuring systems are based on the **PLC** (Programmable Logic Controller) technology and the measurement of selected parameters by industrial computers. This guarantees the resulting products' exceptional accuracy and reliability.



4. Testing facility control and measurement is usually implemented in the **LabVIEW** user interface. This enables efficient test automation, minimizes the need for human intervention, and increases efficiency and measurement accuracy while offering intuitive visualization and analysis of measured data.



All WTtech.CZ devices meet the standards corresponding to the testing facilities and relevant industry standards. WTtech.CZ is ISO 9001 certified and is regularly audited by customers.

# SELECTED COMPLETED PROJECTS

## EXPERIMENTAL FACILITY FOR TURBINE STAGE MEASURING CHARACTERISTICS

The experimental facility for measuring turbines' aerodynamic characteristics is equipped with technology that allows accurate and efficient testing of turbine stage performance. The experimental facility includes a single-stage turbine model located in the facility intake and connected to a dynamometer to measure overall performance parameters. Its recent upgrade focused on rebuilding the turbine measurement apparatus and included several key improvements:

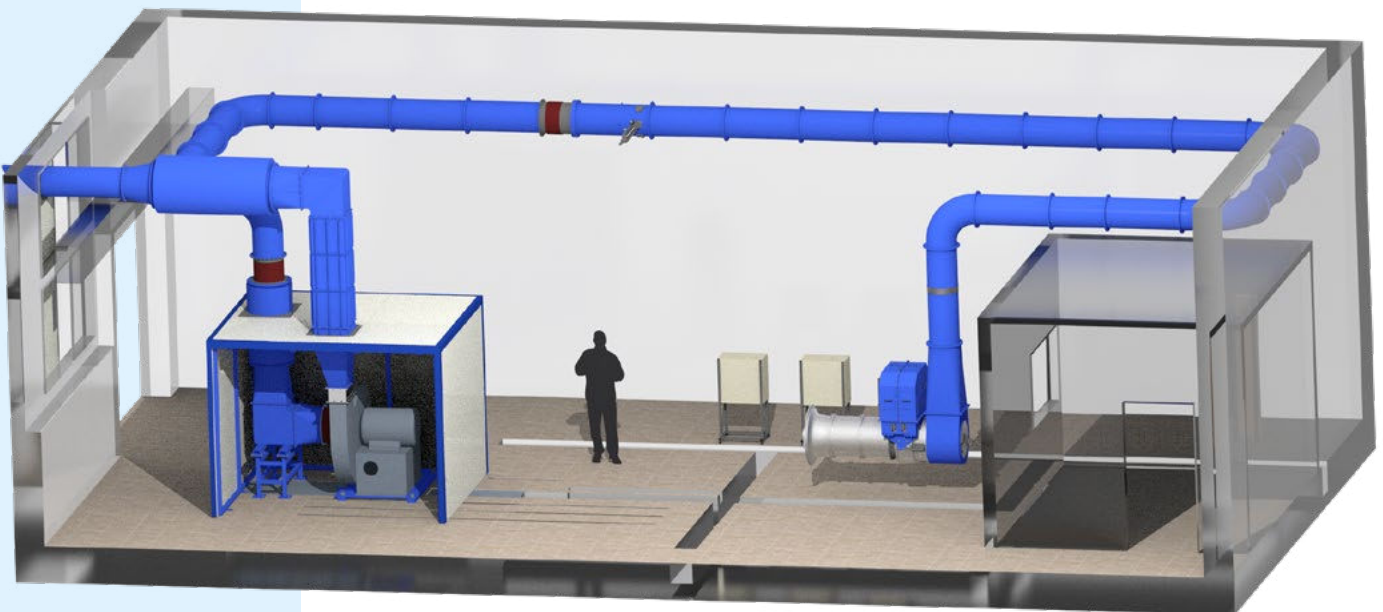
**Replacing the compressor with a powerful radial fan** - while maintaining the ductwork system, building footprint, and tighter noise limits

**Two new 3D traverse devices to measure turbine stage pressures** upstream and downstream including circumferential and radial displacement of the probe and its rotation relative to the stream direction

**Installing new probes** for both stationary and non-stationary measurements, including the necessary calibration

**Increasing the number of measured pressure channels** by adding 2 DSA (Digital Sensor Array) modules for pressure conversion, communicating via Ethernet bus

**Measurement and control centralisation** - all parts of the device are controlled by the same software, which includes fan monitoring, dynamometer, test process, control of all tracers, measurement of pressures from all sensors, and storage of all data



The project was implemented on a turnkey basis, including the dismantling and disposal of parts of the old equipment, integrating new components into the existing system, supply of complete technical documentation, and operator training for a seamless transition to the upgraded infrastructure.



## TESTING EQUIPMENT AND LABORATORY FOR AIRCRAFT ENGINE FUEL NOZZLES

The project to build a laboratory for **testing fuel nozzles of aircraft engines** was implemented on a turnkey basis. **The main measuring equipment is a PDA** (Phase Doppler Anemometry) system, a non-intrusive optical method for temporally and spatially resolved measurements in a two-phase environment. This system offers the ability to simultaneously measure the size, rate, and time of individual particle detection (droplets, bubbles, entrained particles) based on reflection and refraction of light in a small measurement volume.

2D Phase Doppler Analyzer performs point measurements and traversals in 2D or 3D grids, allowing the entire area of interest to be measured. The results can be used for a quantitative description of the flow and serve as input data for numerical simulations.

### Project components:

**Laboratory design in ATEX environment according** to explosive atmosphere standards

**Test set-up including a 3D traverser** for flexible probe handling

**Fuel management** for precise temperature control of the fuel tested to simulate realistic operating conditions

**Control and measurement system**

**Supplying a PDA system** including operator training



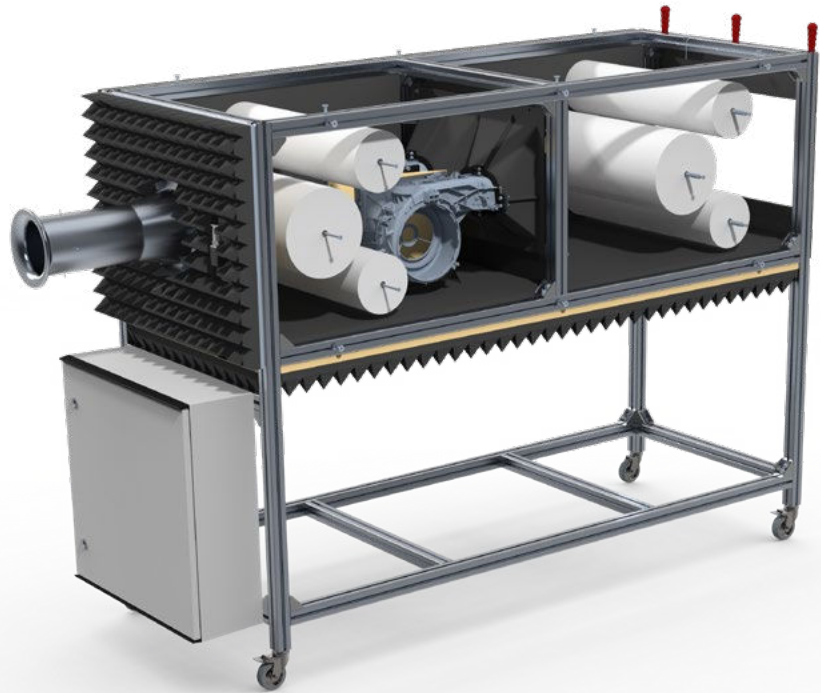


## EXAMINATION FACILITY FOR MEASURING THE AIR-CONDITIONING COMPONENTS CHARACTERISTICS (SOUNDBOX)

The examination facility was designed specifically for **measuring and testing air conditioning systems in the automotive industry**. The design includes a soundproof enclosure open on one side with an air intake nozzle on the other, allowing efficient regulation and measurement of airflow.

Radial fans are installed in the box to ensure the necessary airflow. Flow rate can be controlled roughly by a lever-operated flap and subtly by a stepper motor. The flow is measured by pressure sensors located on the nozzle and in front of the outlet. The data is evaluated by a measuring card and software developed in the **LabVIEW** environment.

The measurement results, including mass flow rate and air resistance, are displayed on the computer and stored in text files. SoundBOX provides accurate and reliable testing in a controlled environment, making it a highly effective development tool for automotive air conditioning systems.



**WTTECHCZ**

**DESIGN, CONSTRUCTION, AND DELIVERY OF TEST EQUIPMENT FOR YOU:  
TAILORED TO YOUR SPECIFIC REQUIREMENTS AND CONDITIONS!**

