

TECHNOLOGY CENTRE OF OSTRAVA

LABORATORY OF THERMAL PROCESSES

The laboratory carries out research in thermal processing of waste materials and alternative fuels with regards to the maximum efficiency of the overall process and its environmental aspects. The research aims at thermal processing of waste materials and the development of new units for energy and material utilization of a wide range of waste.



CONTACT:

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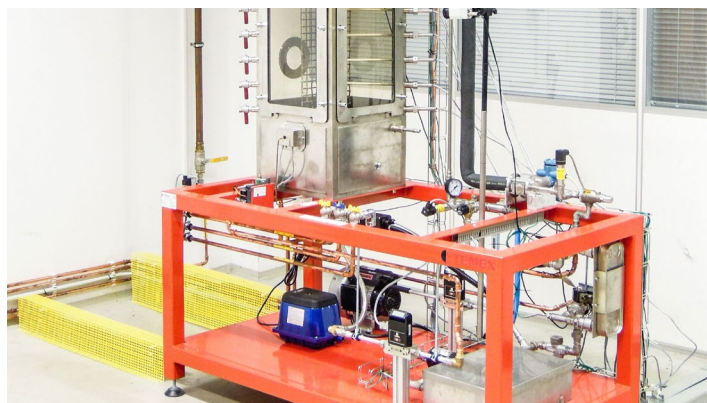
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LABORATORY OF THERMAL PROCESSES AND FLOWS

The laboratory focuses on research in combustion, flows, heat transfer, drying and sorption of pollutants. In detail, the laboratory investigates the optimization of the conditions of gaseous fuel combustion process, burners with regards to their construction element impact on combustion, reduction in emissions and fuel replaceability.



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LABORATORY FOR RESEARCH IN HIGH-TEMPERATURE PROPERTIES OF MATERIALS

The laboratory specializes in the research of reduction processes and testing of reducibility or disintegration of lump iron ore, agglomerate, pellets and iron-ore metallurgical waste under the high temperatures of technological gas media (CO, H₂, CO₂). It offers ISO tests and model predictions of optimum requirements for the properties of feedstock (reducibility) and coke (reactivity) in order to minimize coke consumption.



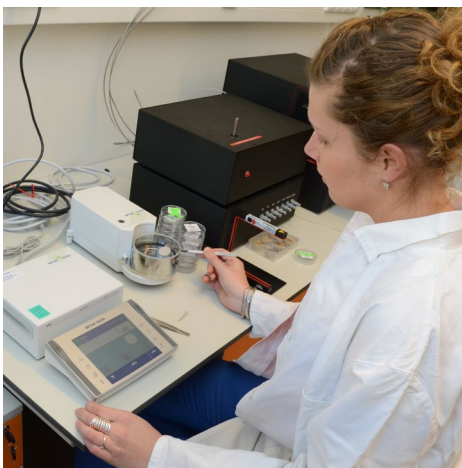
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LABORATORY FOR RESEARCH OF ENERGY BY-PRODUCTS**LABORATORY FOR ANALYTICAL PYROLYSIS AND THERMAL ANALYSIS
LABORATORY OF AIR POLLUTANTS****RESEARCH IN THE ENVIRONMENTAL IMPACTS OF ANTHROPIC ACTIVITIES
OF THERMAL PROCESSES.**

The laboratories investigate pollutant particles in the air, focus on the occurrence of organic substances and determine the secondary organic aerosol.

**RESEARCH FOCUS:**

- Identification of air pollution sources
- Determination of the character and formation of particles (anthropogenic and biogenic)
- Sampling of dust particles of different grain classes
- Chemical analyses (pyrolysis chromatography with mass detection) using organic markers
- Thermal analysis - TG/DSC
- Identification of combustion processes via carbon particle analysis (OC/EC/BC)
- Research in the properties of fuels and combustion products

SERVICE OFFER:

- Research in the dust particle samples ranging from 17 nm to 10 µm
- Research in OC, EC and BC in the air
- Research in the properties of various fuels

**CONTACT:**

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ACCREDITED WORKPLACE FOR DIAGNOSTICS AND OPERATION OF THERMAL POWER ENGINEERING EQUIPMENT

SERVICE OFFER:

- Diagnostics of power-engineering facilities
- Diagnostics and optimization of milling equipment and milling circuits
- Guarantee measurements of power generation units, boilers, turbines, pumps, heat exchangers and cooling towers
- Combustion tests of co-burning of coal
- Accredited measurements of gaseous emissions (CO, NO_x, SO₂, C_xH_y (TOC), HCl, HF, O₂ and solid pollutants
- Measurements of NO, NO₂, N₂O, and NH₃ emissions
- Measurements of Hg concentration in the combustion products
- Efficiency testing of power equipment and power units according to ČSN and EN Standards
- Assessments, expert statements and equipment adjustment proposals
- Monitoring of combustion stability
- Air balance of boilers and analogous technologies
- Boiler operation optimizations
- Measurements of exhaust fume dew-point



EQUIPMENT:

- IVECO emission laboratory van equipped with emission measuring analyzers (Hartmann & Braun, Siemens) working in the mode of infra-red spectrum absorption to measure CO, SO₂ and NO_x concentrations, including analyzers working on the principle of para-magnetic properties of oxygen to detect O₂ concentrations, and FID analyzer to measure C_xH_y
- Two laboratory vans Fiat Ducato equipped for specialized measurements and measurement of solid pollutants
- Special-purpose cooled probes with operational length up to 6 meters to measure velocity, concentration and temperature fields in the combustion chambers
- Devices to diagnose milling circuits and pulverized coal sampling
- Instruments by National Instruments, pressure sensors
- Thermovision diagnostic equipment, thermovision camera
- Rosemount and Yokogawa pressure sensors with Field Bus digital communication equipment
- Velocity probes (Prandtl, wedge and cylinder type), propeller and heat-proof anemometers for flow measurements
- Measurement of a broad range of temperatures; thermocouples R, B, S, K; precision Pt thermometers; continual records of measured values

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BULK SOLIDS CENTRE

Bulk Solids Centre is a research and development workplace of the ENET Centre of VŠB-Technical University of Ostrava. The research activities focus on all the processes related to bulk solids, i.e. from production, sorting, disintegration, via storage (silos, hoppers and discharge) to their transport.

The core of the research are unique and practically verified methods of the study of mechanical-physical properties and geometry of bulk solids, which is necessary for qualified evaluations of the initial point conditions for any engineering solution. Such an approach is grounded in the search for optimal relations among the bulk solids properties, geometrical configuration of the technical equipment, applied engineering materials and optimal course of the processes occurring in bulk solids during their production, transport and storage. The main objective is to achieve a reliable function of the equipment and to specify the possible risks.



SERVICE OFFER:

- “In situ” laboratory metering of geometry and mechanical-physical properties of bulk solids, including sampling
- Planning and consultation services
- Experimental testing, examination and evaluation of particulate solids
- Design of hoppers and silos, strategic solutions in order to achieve process continuity
- Diagnostics of troublesome engineering structures, metering of material flow parameters, verification of constructional details and elements
- Bulk solids conveyors and process facilities (crushing, milling, sorting)
- Guarantee tests and delivery tests

RESEARCH FOCUS:

- Mathematical modelling of properties and simulation of bulk solids movements using Discrete Element Method (DEM)
- Innovative engineering solutions, including patent protection
- Design supported by mathematical modelling
- Design and production of metering methods and equipment

CONTACT:

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SMART GRID LABORATORY

OBJECTIVE:

The objective of the research team is research, development and implementation of modern, sophisticated technologies and methods in smart energy systems.



SERVICE OFFER:

We offer complex power-engineering services (research, development, measurements, diagnostics or studies) to our partners from the industry.

RESEARCH FOCUS:

- Tools and models to make power-engineering predictions based on artificial intelligence
- Simulation methods for the design and optimization of smart grid operation
- Development and optimization of smart grid control algorithms
- Research in power accumulation
- Research in off-grid protection
- Pilot testing and verification of the developed tools, methods and models
- Construction of converters applied in power-engineering and modern smart grids
- Research in electromobiles and smart grids
- Design and implementation of measurement systems for smart grids, including communication dependencies
- Complex research in hydrogen technologies
- Research in power-engineering diagnostic methods

CONTACT:

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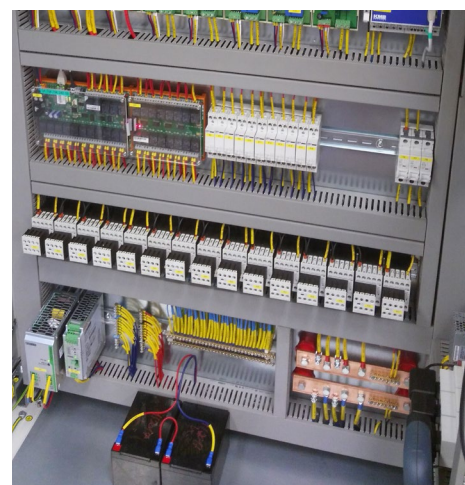
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Project:**Platform to share information on modern technology to control energy units**

The aim of the project is to create a virtual environment shared via an internet communication portal. The virtual environment will demonstrate real-time energy flows inside a test energy unit representing a house, created within the premises of VŠB-TUO. It will be used as a test polygon to develop new control technologies in line with the visions and strategies IoT and Industry 4.0 in energy units.

Project Investigator: ENET Centre, VSB-TUOCentrum ENET **Project Partners:** University of Alberta, University of Oviedo, University of Vigo, ENET Centre

The aim of ENET Centre is research and development in the field of renewable energy resources in order to reduce or eliminate harmful environmental impacts. The efforts focus on new technologies of transport and processing of energy raw materials, on their effective energy transformation and modern solutions of the so-called microgrids of electric power and thermal energy making use of accumulation.

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