

PARTNER PROFILE

Wroclaw University of Technology (WROC), Poland

The Energy Engineering and Technology Division is part of the Wroclaw University of Technology (WROC) located in the Lower Silesian region of Poland. A major part of the division's research involves a co-ordinated program on the clean and efficient use of biomass in power generation. The main research fields of the division are:

- Optimization of conventional power plants;
- Co-combustion of biomass and waste;
- Prevention of operational problems (fouling, slagging, corrosion, spontaneous combustion, fuel degradation or improving the properties of fuel);
- Environmental protection (NO_x, SO₂, particulate, other emissions);
- Studies on fundamental combustion, gasification and pyrolysis;
- Characterization of the (co)combustion performances of coal/biomass/waste and blends.

The following installations are offered for technical access through the BRISK initiative:

Thermogravimetric analyzer (TGA)

This is equipped with a differential scanning calorimetry (DSC) sensor and a Fourier transform infrared spectroscope (FTIR).

The rig is used to investigate characteristics of fuels during combustion/pyrolysis with low heating rates (<2 deg/s). TGA/DSC/FTIR techniques enable the determining of the degradation temperatures, the absorbed moisture content, the level of inorganic and organic components, the mineral matter transformations, the qualitative and quantitative analysis of formed compounds.

3.5m long plug flow reactor (PFR).

This rig is used to study combustion/pyrolysis processes with a high heating rates (>104 deg/s) under staged and unstaged conditions. Construction of the reactor offers the possibility of investigation of burnout, emissions, slagging, fouling and mineral matter transformation during one or two stage combustion processes. The reactor is equipped into several terminals distributed along the flame height which allow gas and solid particles sampling.

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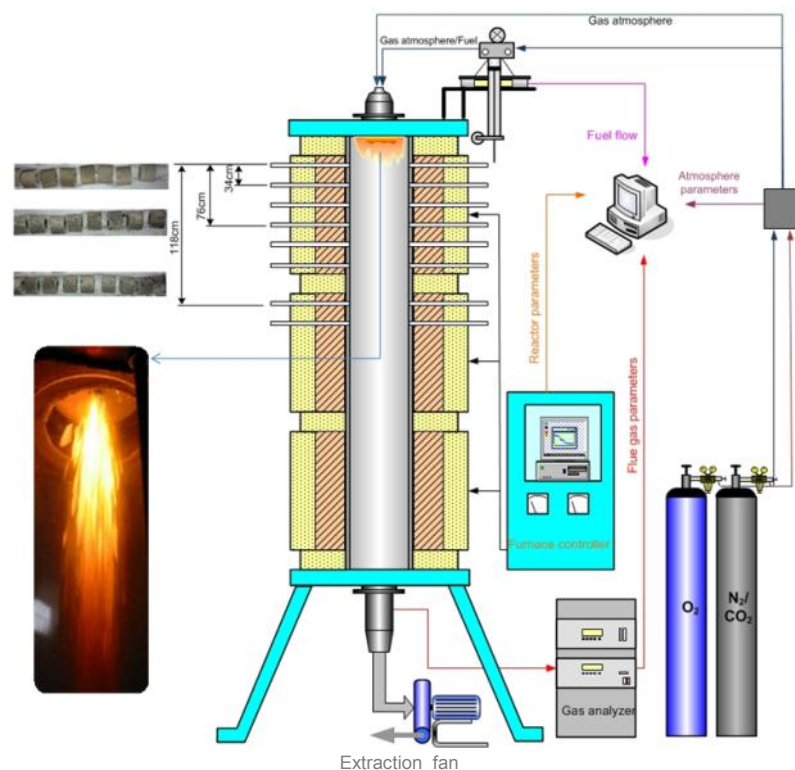
Figure 1: Thermogravimetric analyser TGA.



Figure 2: Plug flow reactor.

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Additional laboratory equipment includes:

- Fuel preparation devices (Retsch CryoMill, mill Retsch SK100, mill Retsch SM2000, sieve shaker Retsch AS200);
- ASTM characterization devices (LECO TruSpec CHNS analyzer, AMA 254 Mercury analyzer, Carbolite muffle oven, IKA Werke C2000 calorimeter);
- Ash characterization devices (ash sintering non-standard tests – strength, pressure, resistance method, Drop Tube Furnace 1700°C);
- Set of ignition and self-ignition rigs (single particle ignition, cloud particle ignition, hot surface ignition, crossing-point method); dust explosiveness rigs (20 litre sphere, 1000 litre sphere).

Figure 3: Schematic outline of the plug flow reactor.



Figure 4: 1000 litre sphere.



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Plug Flow Reactor

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Thermogravimetric analyser

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