



Laboratory of Vehicles and Engines

Principal goals and activities

- Research and development of environmentally friendly units with optimized transmission and conversion of energy in transportation, mobile machines and power engineering systems.
- Innovative solutions and optimization of current concepts of propulsion systems for transportation, site machinery and power engineering systems with low manufacturing and operation costs.
- Use of alternative fuels for internal combustion engines, use of new fuels prepared from renewable sources, development of gas engines.
- Optimization of the combustion process and reduction of exhaust gas pollutants.
- Research and development activities in the chassis components of automotive powertrain, axle couplings and differentials, efficiency of permanent drives and transmissions.

Specific instruments and outcomes

Special measuring instruments in the laboratory: visualization technology of the combustion process inside the cylinder, HW and SW for high- and low-pressure indication of pressure inside the cylinder and fuel delivery system, sets of exhaust gas pollutant analyzers, spectrum analyzer of hot exhaust gases*, dilution tunnel and analyzer of solid particle size, measuring systems with automated data collection for engines and vehicles.

General focus of laboratory

Experimental research and development of engines for transportation and industry, with a focus on optimization:

- Cost-efficiency and exhaust gas properties in petrol and Diesel engines operating on liquid, gas (traditional and alternative) fuels and their mixtures (petrol, Diesel fuel, LPG, CNG, hydrogen, oil methylesters, methanol, ethanol) designed for propulsion systems in transportation, site machinery and power engineering systems.
- Transmission chains of energy transfer from the traditional and hybrid arrangement of the internal combustion engine, electric motor, fuel cell, rechargeable battery, electrolyser to the wheels of the vehicle, or the drive shaft of site machinery.
- Accessories: especially Common-Rail injectors for gas and liquid fuels, components for reduction of passive resistance in engines and transmissions, systems of direction controls of vehicles, etc.

Offer of technology and expertise

Testing equipment of the laboratory: 4 engine stands (700, 240, 190 and 150 kW), vehicle exhaust gas testing station 4×2 (100 kW), flexible powertrain (500 kW) 4×4 with 4 high-performance electric dynamometers*. Special testing station for research and investigation of selected issues in vehicles and vehicle engines

**in cooperation with the Department of Nanomaterials, Advanced Technology and Innovation at TUL*

