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DEPARTMENT OF MECHANICS, MATERIALS AND MACHINE PARTS

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Our department focuses to the production and development of materials, manufacturing technology, product design and life of the equipment. Department has a wide range of equipment for evaluating of the properties of materials. We have possibilities to the evaluation of microstructure and mechanical properties of materials. We can perform simulation computations of strength and durability for component or manufacturing units.

3. Education

Department teaches Jan Perner Transport Faculty students in courses in

- mechanics
- elasticity and strength
- finite element method (FEM)
- materials science
- (manufacturing) technology
- machine parts.

We teach courses at all levels of study. We provide lessons from the theoretical side of view (lectures, training) and in practical education (laboratories). For practical training we have a PC classroom with FEM software and laboratories for practice in materials engineering and engineering technology. All of our equipment, students can use in the preparation their theses.

Our staffs also teach foreign students in the English language (LLP ERASMUS program). Our staffs are the leading bachelor and master theses. We also tutor students in the doctoral program.

4. Science and research

In the research area focuses on the FEM calculations and investigation of properties of structural materials. This knowledge are also used in the study of contact processes in the railway wheel/rail.

Main topic of scientific works - Mechanics section

Research

- Research on bearing parts of modular locomotives (bogies, wheels, cabins, suspension, etc.).
- Research on loss of stability of thin-walled structural parts of road and rail transport vehicles.
- Research on change of structural material properties due to high-speed loading (percussive hammer).
- Research on wheel-rail contact wear (tests stand in laboratory).
- Research and development of strength and fatigue of ballistic testing bomb (for tests of propellants).

Practical applications

- Computational FEM analyses of strength and life span of machinery and equipment in transport and engineering industry, especially
- Transport engineering (road and rail transport vehicles, transport structures).
- Energy industry (classical energy, nuclear energy).
- Process industry (chemical, food and consumer industry).
- Light engineering and electrical industry (instrumentation, laser welding).
- Armaments industry.

Main topic of scientific works - Materials section

Research

- Development of new materials with higher contact-fatigue resistance for railway applications.
- Research of structural and phase destabilization of stainless steel due to welding.
- Research of deformation and fracture behavior of materials under high speed loading.
- Research of rolling-contact fatigue in materials for railway applications.
- Development and experimental verification of new welding and hard surfacing technologies.
- Research of phase heterogeneous welded joints, focusing on degradation processes associated with temperature load.

Practical applications

Comprehensive material analysis, analyses of heterogeneous welding technology, analyses of creep and corrosion damage, testing of material quality, evaluation of flash butt welding technology, etc., for

- Railway industry
- Automotive industry
- Machinery manufacturing.

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