

Laboratory of Mechanical Testing and Tribology

Principal goals and activities

- Research and analyses of mechanical properties of materials selected for forming.
- Research of materials forming properties and definition of deformation limit states.
- Analyses of metal processing technological processes in terms of quality, structure and utility properties of the components being formed.
- Tribological tests, assessment of lubricants, surfaces and substrates.
- Assessment of adhesives bonded joints and adhesives used in the automotive industry.

General focus of laboratory

- Identification of mechanical properties and structural analyses of the materials subjected to forming.
- Deformation development monitoring in the formed component and identification of deformation limit state.
- Experimental identification of FLC curves.
- Materials forming properties technological tests (hole expansion test, cupping test, hydraulic bulge test, earing test, etc.).
- Static and dynamic contact-less analyses of technological forming processes using the ARAMIS system (also with HS cameras).
- Tribological tests to evaluate lubricants, substrates, surfaces and tool.
- Measurement and assessment of adhesive bonded joints and adhesives.

Specific instruments and outcomes

- TIRA test 2300 for tensile tests and cyclic loads up to 100 kN.
- Equipment for special stress deformation tests of components according to the specification provided by the customer.
- ARAMIS system for contact-less analyses of deformation in static and dynamic processes.
- Photron SA3 high-speed cameras (frame rate up to 100 kHz).
- Instron Ceast 9350 for dynamic testing*.
- HPO 250 hardness meter (Brinell, Vickers), micro-hardness meter Qness Q30 A (Vickers).
- Equipment for determination of materials technological properties.
- Machine SOKOL 400 for tribological tests (strip drawing test).
- Thermal chamber (temperature control in RT range up to 90 °C and moisture from 20 to 100 %).
- Charpy hammer for testing of impact resistance in bonded joints.

Offer of technology and expertise

- Verification of mechanical properties in formed materials acc. to international standards and industry regulations.
- Metallic materials. Tensile testing. Method of test at ambient temperature (ČSN EN ISO 6892-1).
- Metallic materials. Tensile testing. Method of test at elevated temperature up to 250 °C (ČSN EN ISO 6892-2).
- Bend (ČSN EN ISO 7438) and compression test (ČSN EN 24506).
- Compression test (ČSN EN 24506).
- Determination of plastic strain ratio (ČSN ISO 10113) and tensile strain hardening exponent (ČSN ISO 10275).
- Determination of tensile strain hardening exponent (ČSN ISO 10275).
- Determination of FLC curves acc. to standard ISO/DIN 12004-2.
- Hardness and micro-hardness tests (EN ISO 6506, EN ISO 6507)
- Test method for V- and U-notches (ČSN EN 10045-1).
- Dynamic tests (ASTM D3763, ASTM D7136, ASTM D7192, ISO 6603, ISO 11343, ISO 8256).
- Analyses of structural changes after forming using light microscopy.
- Processing of input material data for numerical simulations.
- Training/seminars on topics: „Materials used in forming“, „Technology of forming of metallic materials“, „Tribology in metal forming“ and other special workshops in the field of metal forming.

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

