

# Polymer Testing Laboratory

## Principal goals and activities

- Research and material analyses in the field of polymers.
- Research and development in new composite systems with a polymer matrix.
- Analysis of the plastics processing in terms of quality, structure and utility properties of the final products.

## Specific instruments and outcomes

- AND GF300 high precision milligram density balance.
- MAC 50/NH moisture analyzer.
- Melt flow tester Ceast.
- Hounsfield H10KT tensile testing machine, TIRA test 2300.
- Resil Ceast 5.5 pendulum impact tester – Charpy, Izod methods.
- HDT/VICAT heat deflection test systems.
- Instrument for determination of the linear thermal expansion coefficient.
- Mettler Toledo DSC1/700* differential scanning calorimeter.
- Qness Q30A micro hardness tester.
- Instron Shore A, D hardness tester.
- Leica DM2500P polarizing microscope and rotary microtome.
- Coesfeld ICP 4030 CNC cutter.
- Classic* baking oven, Venticell laboratory oven, Profi Master PMU 0450 laboratory freezer.

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

## General focus of laboratory

- Morphological analysis of polymers.
- Study of rheological, physical, mechanical and thermal properties of polymers, polymer blends and their composites for specific design applications at basic conditions, elevated temperatures or at subzero temperatures.
- Monitoring of properties of polymers and polymer parts in dependence of the conditions of their thermal-mechanical processing (stress).
- Thermal and oxidation stability of polymers, rate of chain formation.

## Offer of technology and expertise

- Input and final inspection of raw materials, semiproducts and finished goods as per international standards and industry regulations.
- Identification of polymers using the DSC method (ISO 11357) in collaboration with the Laboratory of Physics and Chemistry also using spectrum analysis (FTIR and Raman spectroscopy).
- Determination of content of ash / mineral and inorganic fillers (ISO 3451).
- Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics (ISO 1133-1/2).
- Determination of density of non-cellular plastics (ISO 1183-1).
- Determination of Charpy and Izod impact properties (ISO 179-1, ISO 180).
- Determination of hardness using methods Shore A, D (ISO 868).
- Determination of tensile, flexural and compressive properties (ISO 527, ISO 178, ISO 604 etc.).
- Determination of the friction coefficient (ISO 8295 etc.).
- Determination of moulding shrinkage of plastics (ISO 294-4).
- Determination of the Vicat softening temperature (ISO 306) and temperature of deflection under load (ISO 75-1/2).
- Determination of glass transition temperature, melting temperature, crystallization temperature, content of crystalline phase, thermal and oxidation stability (ISO 11357).
- Determination of specific heat capacity of polymers (ISO 11357).
- Preparation of test specimens as per international standards by injection moulding (ISO 294-1) or machining (ISO 2818).
- Training/seminars on topics: "Properties and analysis of plastics quality".