

Laboratory of Thermal Stress Testing of Materials

Principal goals and activities

- Research in grain growth kinetics.
- Study of processes occurring in the heat affected zone of welds.
- Study of thermal stress states and their influence on mechanical properties of materials.
- Study of recrystallization and recovery.
- Research of the influence of heat treatment and thermal cycling on materials.
- Research in accumulation of plastic deformation when thermal cycling is used.
- Research in the field of creep and dilatometry.

Specific instruments and outcomes

- Gleeble* thermal stress simulator.
- Pocket Jaw disposable unit for measuring material data in temperatures up to 1700° C.
- Hydrowedge disposable unit for simulation of hot rolling and forging.
- DiagWeld 1.1 instrument for measurement of thermal and deformation fields during welding and heat treatment.
- Heat treatment simulator that simulates the influence of motion velocity in the cooling medium.
- SYSWELD software for numerical simulation of welding and heat treatment.

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

General focus of laboratory

- Optimization of thermal-mechanic loading processes for technologies operating high temperature gradient.
- Measurement of material input data for simulation of welding and heat treatment.
- Determination of thermal heat transfer coefficient at the boundary between the cooling medium and processed material.
- Material testing on sensitivity to hot crack formation.
- Assessment of grain size and its growth kinetics.

Offer of technology and expertise

- Research in measurement and preparation of IRA and ARA diagrams (CCT, TTT).
- Testing of temperature and high-temperature fatigue in materials.
- Measurement of creep properties of material and studies of accelerated creep.
- Measurement of mechanical input data of materials in temperatures up to 1700° C.
- Simulation of real welding cycle influence on the material and TOO.
- Study of processes occurring in temperatures between the solid and liquid states, determination of those temperatures.
- Training/seminars for the industry in the topic of welding technology, metallurgy, influence of thermal cycling on changes in the material, quality management systems and non-destructive testing of welds.

