

A seminar for industrialists
"Non-destructive quality testing of materials and structures
from rigid cellular plastics" (*Annotation*)
17.09.2019.

The seminar will be devoted to development of methods for non-destructive testing (NDT) of products from rigid polyurethane (PUR) foams. As a thermal insulation material widely applied in industry, PUR foams require effective methods for inspecting the quality of manufactured items.

Prototype of a new product ó a multi-functional tester for non-destructive testing of rigid cellular plastic materials will be demonstrated. The tester is a portable apparatus, based on dielectric spectrometry with integrated artificial neural network processing unit for computing of user-interested physical characteristics from dielectric spectra, such as density, elastic modulus and thermal conductivity coefficient. The tester is completed with a capacitive sensor of one-side access type, by which dielectric spectra are measured with placing the sensor on an object being examined and exciting it by weak electrical field.

The seminar will provide **two presentations on:**

- (i) General principles and role of non-destructive dielectric testing for determination of physical parameters of non-metallic materials (in direct way ó dielectric spectra, in indirect way ó other physical parameters of a material correlating with the dielectric spectra: volume fraction of components, composition, internal stresses, humidity, density, aging, cure degree, radio transparency or parameters of structure and geometry etc.), and
- (ii) Development and application of artificial neural networks for determination of physical and mechanical characteristics of rigid cellular plastic materials from dielectric spectra.

Experiments of measuring dielectric spectra of rigid PUR foams and other materials will be demonstrated by means of the multi-functional tester.

In principle, the tester could be applied for examination of any cellular plastics: polystyrene, polypropylene, polyvinylchloride etc. foams, as well as for testing other non-metallic materials.

The research is performed in the European Regional Development Funds project No. 1.1.1.1/16/A/008 "*Development of multi-functional tester for non-destructive quality testing of materials and structures from rigid cellular plastics*" (University of Latvia, Institute of Mechanics of Materials).