

DURAPOLYMAT

Durability of Polymer Based Composite Materials and Structures



Inspiration

Petroleum products are becoming more and more prevalent in many applications, including within the automotive and aeronautics industries, and within toys, adhesives, furniture, ducts, household appliances, clothes, etc. The combination of increasing demand for cutting-edge materials and rarefaction of raw materials with recycling constraints is leading us to approach the development of materials from the angle of performance and durability.

To date, limited mechanical characterization facilities have been available to LIST for characterizing polymer and polymer-based composite materials. The project goal is to acquire mechanical characterization equipment, specially adapted to polymer and polymer-based composite materials. This will make it possible to study the lifespan of materials from their creation, through to their application and later recycling.

Innovation

DuraPolymat focuses on mechanical testing which makes it possible to identify the mechanisms responsible for the mechanical failure materials and hence to optimize their development. Attention is focused on the following material families: i) thermoplastic polymers and their derived composites and blends, ii) thermosetting polymers and their derived adhesive assemblies, iii) elastomeric polymers and their derived composites, and iv) fibre and long-fibre polymer structural composites.

Emphasis will first be placed on monotonous load techniques that will be implemented in order to determine specific parameters of deformation behaviour and resistance to quasi-static sollicitation. Attention will be then turned to cyclic load techniques to study fatigue behaviour of materials and hence to upgrade their ability to endure repeated mechanical sollicitations. To ensure complete validation in compliance with the real end-use conditions of materials, some properties will be determined under a controlled environment (especially temperature).

Impact

This acquisition of equipment and new knowledge will provide support to research projects focused on improving mechanical properties by validating the properties of new materials all along their lifecycle and by obtaining experimental data required for research on the numerical modelling of materials and structures.

The project will benefit the following ongoing or upcoming projects at LIST. Furthermore, it will provide research and development support to the industry in the fields of durability studies and materials exploitation.

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