

APT-PACK

Advanced knowledge
of Polymer deformation
for Tomorrow's Packaging



Scientific leader

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SPECIFIC TARGETED RESEARCH PROJECT
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ECOLE DES MINES D'ALBI
C A R M A U X

ABSTRACT

Long-term objective of the project is the definition of a global strategy for optimising stretched plastic packaging (thermoforming, stretch blow moulding). To compensate for the lack of basic understanding that strongly inhibits durable improvements, scientific objective is promoting attainments and applications of fundamental knowledge.

The strategy is to propose tools that are necessary for building straightforward correlation between the structure of polymers, its relevance to packaging and the end-use properties of products. This is achieved thank to fundamental studies of the material and of the role of its microstructure. Two of them aim at developing correlation between microstructure and final properties and on the evolution of microstructure during processing, respectively. Processing is known to enhance coupling between the processing and the microstructure, while boundary conditions are not totally controlled.

Consequently, specific researches are devoted to the understanding of the processing. Finally, as the rheology of polymer is a key issue, an important work is devoted to the proposal of constitutive models relevant for thermoforming and/ or stretch blow moulding. The project focuses on the three types of polymers used in this area: amorphous, semi-crystalline and initially amorphous that crystallise during forming. To allow long-term improvement, significant efforts are devoted to physically based approaches.

Main project direct outputs are:

- ▶ Advanced knowledge in the field of polymers stretching).
- ▶ Proposal of relevant physically based constitutive models
- ▶ Development of high velocity multi-axial loading tests in the range of thermoforming and blowing.
- ▶ Advanced knowledge in the field of microstructure development
- ▶ Proposal of physically based constitutive models for end-use properties.
- ▶ Advanced knowledge in the field of processing, including heating, stretching and cooling.
- ▶ Proposal for next generation numerical codes for design.



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SIXTH FRAMEWORK PROGRAMME

NANOTECHNOLOGIES AND NANOSCIENCES, KNOWLEDGE-BASED
MULTIFUNCTIONAL MATERIALS, AND NEW PRODUCTION PROCESSES AND DEVICES

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