INNOVATION PLASTURGIE COMPOSITES

MATERIAL ONTOLOGY

Brussels, June 29th

INPUTS REGARDING POLYMERS AND COMPOSITES MODELLING AND CHARACTERIZATION

Product development value chain

Closed to the industrial need

Material choice > Concept study > Design & 3D finalisation > Technico-commercial validation > Calculations & validation > Development of tools & processes > Full development of the product/ process > Transfert to industry

Characterization and material modelling use

Experimental validation

Our Skills

PLASTICS AND COMPOSITES EXPERTISES

MATERIAL	DESIGN AND MODELLING	COMPOSITE PROCESSING	PLASTIC PROCESSING	TRAINING	TECHNOLOGICAL WATCH
		COLLABORATIVE PROJECTS			
		COLLECTIVE ACTIONS			
		PRIVATE R&D			

Plastics vs Composites languages

Plastics

- Polymer : more than 5000 references
  - NF EN ISO 11469 et NF EN ISO 1043
  - NF EN ISO 1629 for rubber

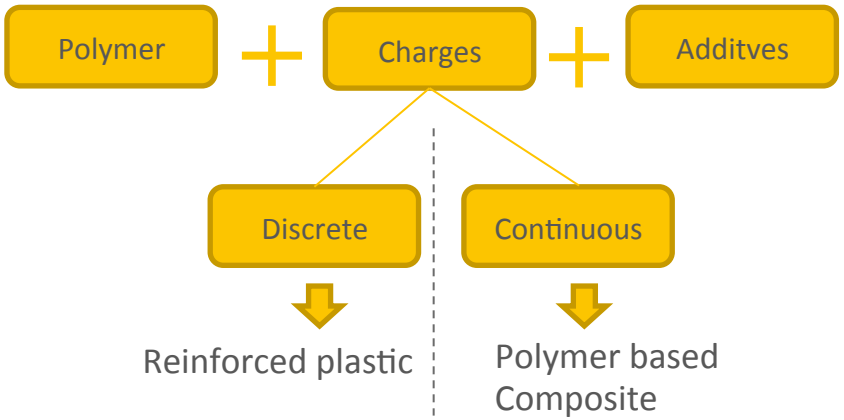
Ex : PA66-(GF20+MD15)FR(52)

base charges additives

- In practice,
  - standards are used to qualify the polymer base and the charges. Additives are rarely defined because they could be numerous and present at a very low rate and they represent a part of the recipe that could be kept secret
  - Academics and industrial prefer using the supplier reference because missing additives have an impact on the polymer behavior

Composite

- No standard classification of composite materials but some proposition exists :
  - Classification based on matrix material
    - *Metal Matrix Composites*
    - *Ceramic Matrix Composites*
    - *Polymer Matrix Composites*
  - Classification based on reinforcing material
    - *Particulate Composites*
    - *Fibrous Composites*
    - *Laminate Composites*



=> **Bottleneck** : A frontier still exists between Polymer based Composites and Reinforced plastics whereas they have a common base. They need to be more related regarding ontology.

Experience with classification regarding Characterization and Modelling

- IPC has classified polymer properties needed for modelling and link with standard testing
  - 4 materials (Thermoplastic, Thermoset, TP Composite, TS Composite)
  - 4 classes of physical properties : thermal, mechanical, rheological, chemical
  - Link with legacy software

  - Extract for thermoplastics:

Rheological Properties

Measures	Deduced parameters	Data	associated Material Relation	Process	Fiber	Characterization Standards
Viscosity=f(shear Rate,T,P)		Data Set		Injection Molding	No Fiber, Short Fibers	
	viscosité.n	Scalar	Cross WLF			
	viscosité.tau	Scalar	Cross WLF			
	viscosité.D1	Scalar	Cross WLF			
	viscosité.D2	Scalar	Cross WLF			
	viscosité.D3	Scalar	Cross WLF			
	viscosité.A1	Scalar	Cross WLF			
	viscosité.A2	Scalar	Cross WLF			
	C1	Scalar	Juncture Loss ou correction de bagley			
	C2	Scalar	Juncture Loss ou correction de bagley			
Temps de désengagement (relaxation maximale)		Scalar	Reptation	Injection Molding	No Fiber, Short Fibers	
Evolution of G' et G'' = f(w) (Courbe maitresse)		Data Set		Injection Molding	No Fiber, Short Fibers	
	Relaxation Time Spectrum	Vector	Lodge Model			
	C1	Scalar	WLF Law (amorphous)			
	C2	Scalar	WLF Law (amorphous)			
	Energy of activation	Scalar				