

INNOVATIVE POLYMERS
MATERIALS AND
PROCESSES

15 M€

TURNOVER

150

**ENGINEERS &
TECHNICIANS**

7000m²

**LABORATORY
FACILITIES**

2

**MANUFACTURING
UNITS**

CONDUCTIVE POLYMERS FIELD

TRANSPORTATION COMPETITIVITY DRIVE TO NEW NEEDS:

Reduce SIZE, WEIGHT and PRICE of embedeed systems keeping MECHANICAL + AGEING properties, and RELIABILITY

ACTUAL PATH:

Introduce or replace metals by plastics or composites for structural or electronic parts.

Plastics and composites are not conductive materials ; Thermal or Electrical ; as well as metals

ELECTRONIC SYSTEMS :

Electronics boxes or batteries boxes have to exhaust thermal energy and electrostatic charges.

No market solution, the opportunity is to modify or find new polymers

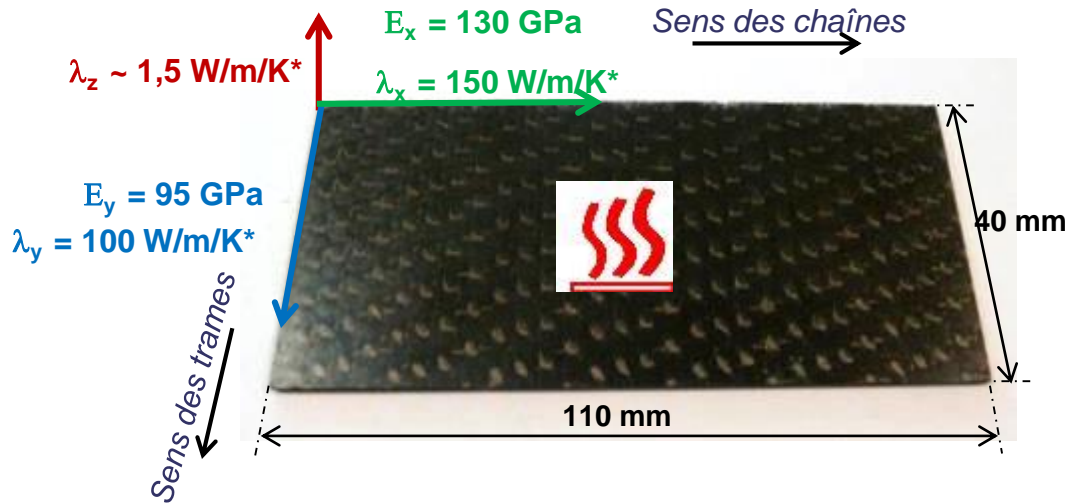


THERMAL CONDUCTIVE COMPOSITE

STRUCTURAL COMPOSITE HIGH PERFORMANCE :

RESCOLL has developed a multidirectionnal thermal conductivity composite

- special weaving of high modulus carbon fiber
- Thermoplastic and thermoset resins with thermal conductive additives



	Objectif / Aluminium
Thermal Conductivity	≈
Density	- 30 %
Young Modulus	+ 10 %

CONDUCTIVE ADHESIVE



COMPOSITES ASSEMBLY :

New composites with ESD, thermal dissipation, or electrical conductivity properties have to find new assembly technologies and adhesives

RESCOLL has developed and manufacture two references of structural epoxy adhesive with equal electrical and thermal conductivity than substrates



	Raw adhesive	Rescoll Metal based Adhesive tech	Rescoll Cabon based Adhesive tech	Rescoll <u>Ceramic</u> based Adhesive tech
Thermal conductivity	0,2 W/m.K	Up to 4 W/m.K	Up to 4 W/m.K	Up to 4 W/m.K
Electrical conductivity	insulative	Up to 10^{E5} S/m	Up to 1 – 10 S/m	Insulative



CONDUCTIVE THERMOPLASTICS



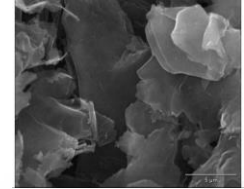
ELECTRICAL and THERMAL CONDUCTIVITY :

RESCOLL has developed PEAK, PEI, PA conductive thermoplastics

Exemple of properties results for PEAK formula:

	Méthode d'essai	Unités	PAEK/Graphene
Conductivité électrique	4 pointes alignées	S/m	$2 \cdot 10^{-1}$
Conductivité thermique	λ	W/m.K	0,86
Transition vitreuse (Tg)	DSC (ISO11357) / DMA	°C / °C	158 / 153
Module de traction	ISO527 23°C 0,2mm/min 1BA	GPa	11,6
Contrainte max en traction	ISO527 23°C 50mm/min 1BA	MPa	82
Contrainte max en flexion	ISO178 23°C 2mm/min	MPa	107
Masse volumique	ISO1183	g/cm ³	1,37

Compound
for injection



Powder or
liquid for
coating



Film



ELECTRICAL CONDUCTIVITY



POLYMER ADDITIVE : $10^{-10} < \sigma < 100 \text{ S/cm}$

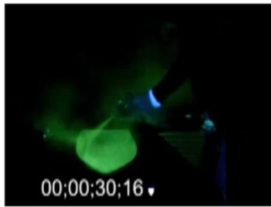
RESCOLL has a patent for paniplast synthesis which could be used in many types of liquids (organic or water solvent) up to 30% of mass.

Possibility to set the conductivity by concentration and thickness of the coating:

Electrostatic painting



DEMOCRAT inactivé



DEMOCRAT activé

Smart heating



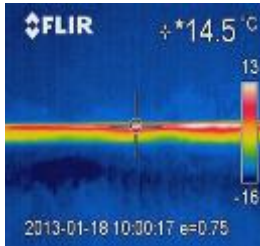
Windmill Deicing



Electronic printing 2D



3D printing



QUESTION ?



THANK YOU FOR YOUR ATTENTION

To contact us:

etienne.lecomte@rescoll.fr

Tel: 06 75 71 17 52

www.rescoll.fr