



Multifunctional layers for safer aircraft composite structures



swerea | SICOMP



LAYSA  
ACP7-GA-2008-213267



## OBJECTIVE

To establish the scientific and technological basis for the development of a new multifunctional layer, **based on nano-reinforcements with**

- ice protection**
- fire protection**
- and health monitoring capacity**

to be integrated into composite structures.

## FROM NANOTECHNOLOGY BASED PROJECTS

- Synthesis of CNTs
- Functionalisation Treatments
- Compatibilization Methods
- Dispersion Optimisation
- Adhesion Assessment
- Characterisation Procedures

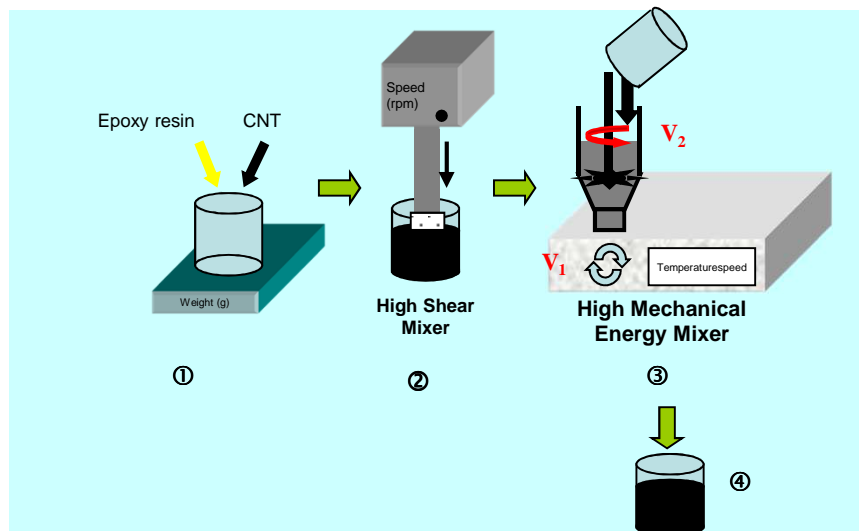
## FROM COMPOSITE BASED PROJECTS

- Integration in composite structures
- Adaptation and Optimization of manufacturing processes
- Characterization Procedures
- Validation of parts



## Electro/Thermal Functionality. Materials

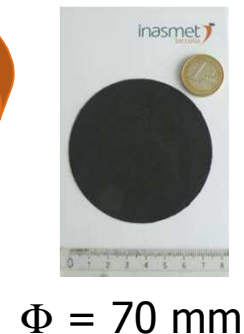
### UPPA-CANBIO 10%CNTs dispersions



**ACG** produces

7,5% CNT epoxy flims

CNTs doped  
Gelcoat from  
**HUNSTMAN**



$\Phi = 70 \text{ mm}$



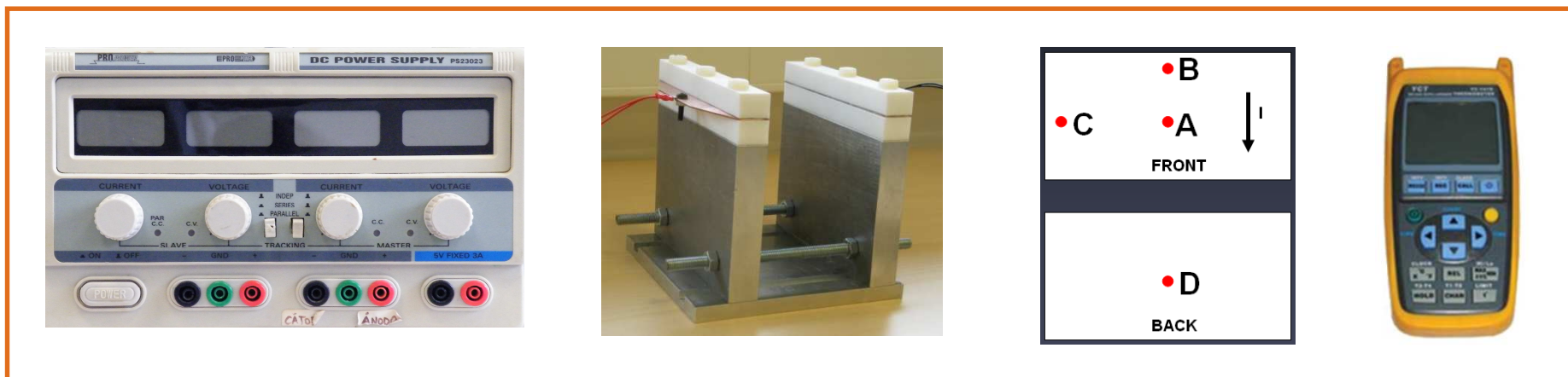
$\Phi = 280 \text{ mm}$

### TECNALIA set-up of buckypapers production

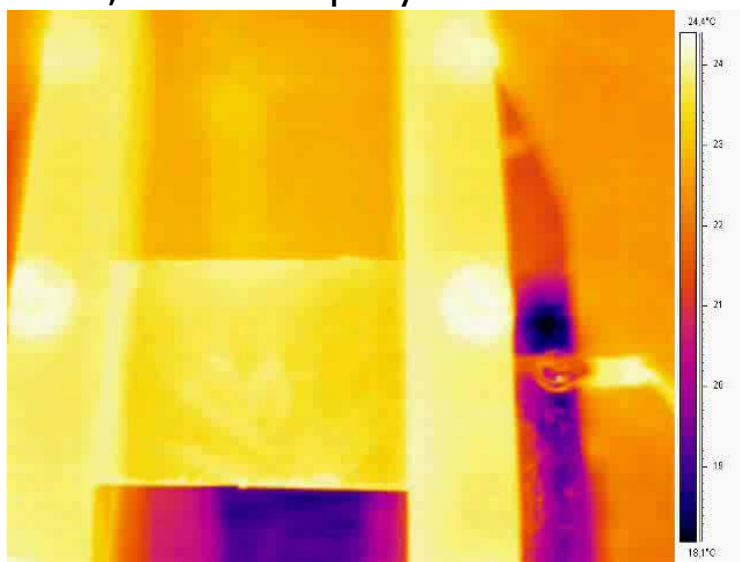


## Electro/Thermal Functionality. Tests *TECNALIA/CU*

### TEST SET-UP



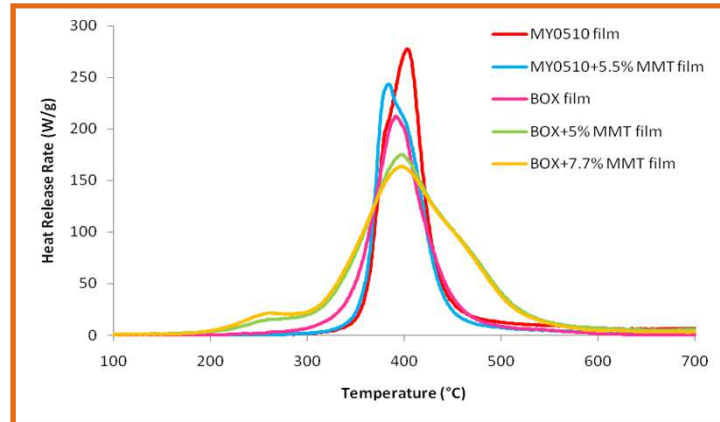
7,5% CNTs epoxy film



Epoxy infiltrated CNTs Buckypaper



## Fire Functionality. *UPPA-CANBIO/ACG/ENSCL*



Need of a Thermal and  
Electrical insulating  
layer to protect  
composite structure

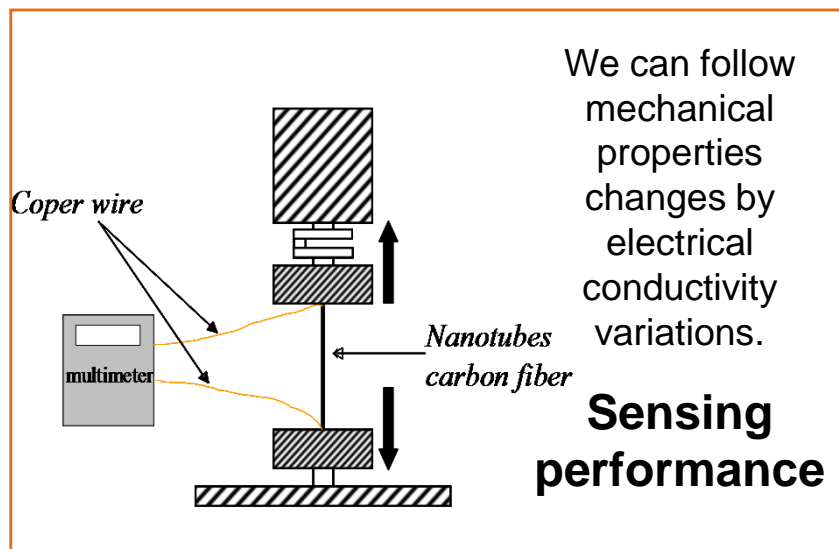
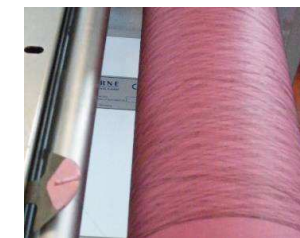
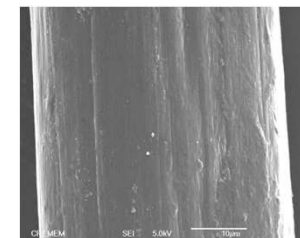
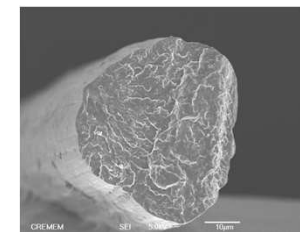
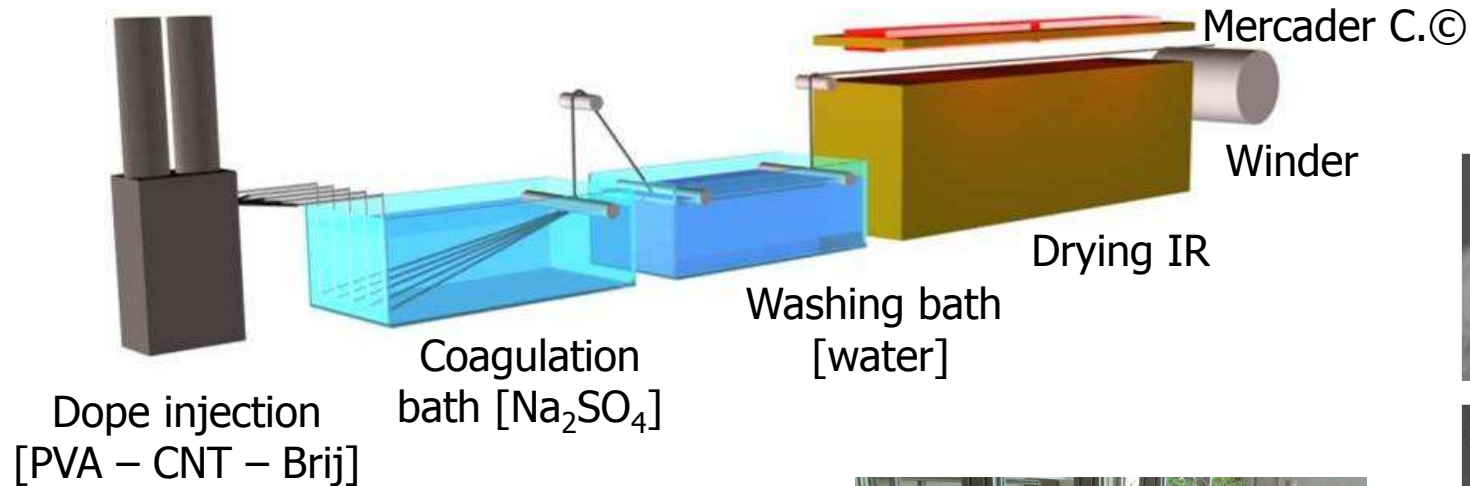
**MMT** has been  
selected



Cone calorimeter fire test

## Sensing Functionality. *CNRS-CRPP/INASCO*

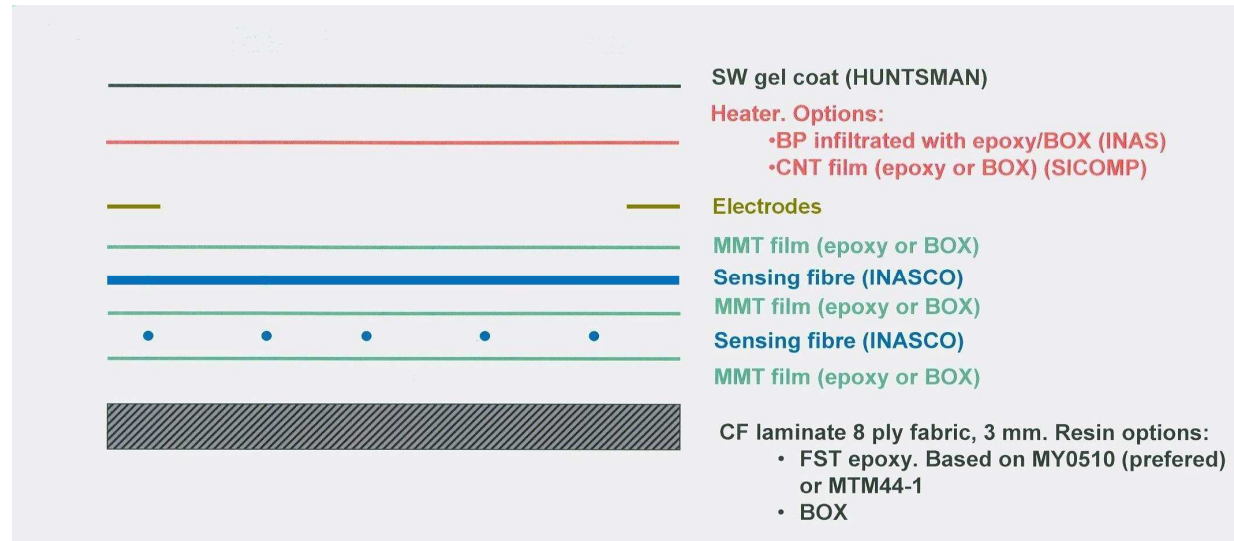
### Wet spinning process



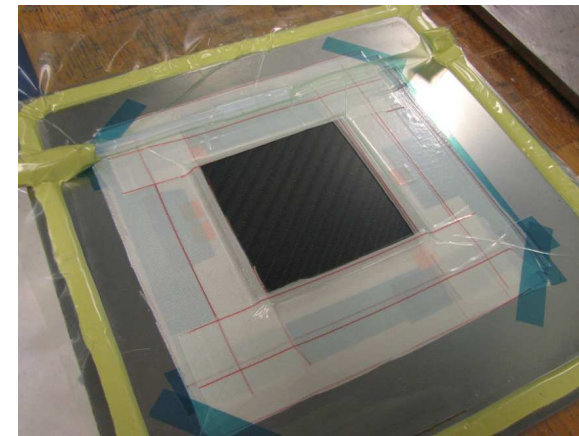
Pilot production plant at CNRS-CRPP Facilities

**CNTs Fibres**

## Final Nanocomposite Multilayer Approach. *SICOMP/TECNALIA*



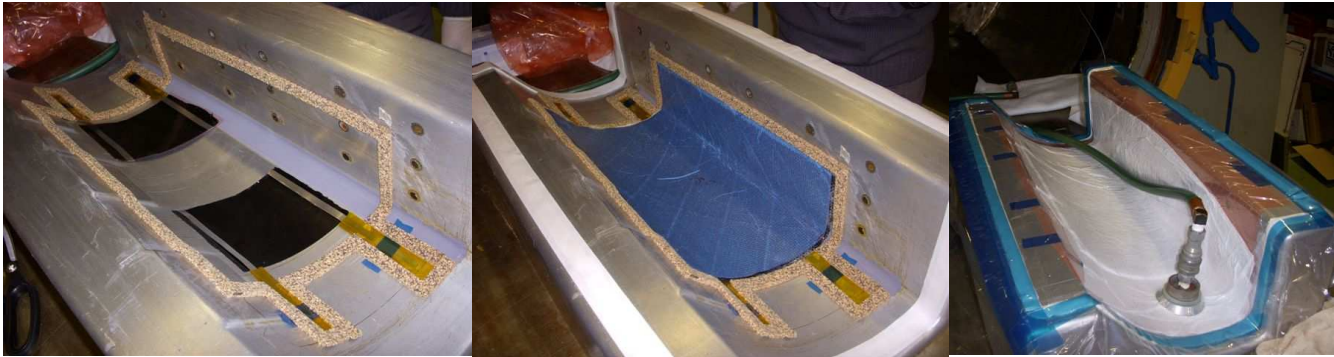
TECNALIA-Autoclave



SICOMP-Vacuum assisted oven



**Multilayer Prototype. *ARIES COMPLEX/TECNALIA***



## Prototype Characterization. CU/ENSCL/INASCO/AERNNOVA



**Experimental set-up in icing tunnel**

$$-2 \text{ }^{\circ}\text{C} \leq T \leq -15 \text{ }^{\circ}\text{C}$$

$$0.3 \text{ g/m}^3 \leq \text{LWC} \leq 0.7 \text{ g/m}^3$$

$$1.04 \text{ A} \leq I \leq 8.14 \text{ A}$$

$$1.7 \text{ W} \leq U \leq 17.8 \text{ V}$$

$$P \sim 20 \text{ kW/m}^2$$





HOME

OBJECTIVES

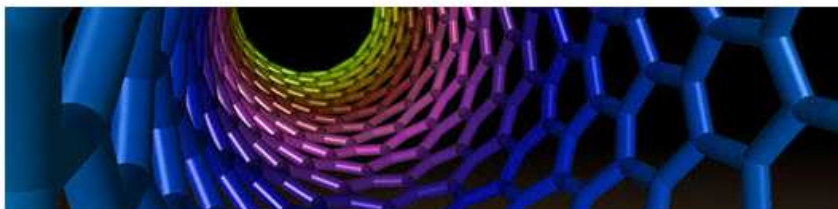
PARTNERS

STATE OF THE ART

PROJECT STRUCTURE

NOVELTIES

CONTACT US



Project Description

Main Objective

LAYSA is a research project founded by the European Commission. It is a small or medium-scale focused research project within the 7th Framework Programme, Theme 7: TRANSPORT (including AERONAUTICS).

Call ID: FP7-AAT-2007-RTD-1  
Project Number: 213267  
Project Starting Date: 01/09/2008

Based on needs to provide an efficient **safety and security system for aircraft composite structures**, the main objective of LAYSA project is to establish the scientific and technological basis for the **development of a new multifunctional layer with ice/fire protection and health monitoring capacity to be integrated into composite structures.**

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