

AIRBUS Disruptive innovations in composite inspections in aeronautics

Airbus Research Center

The Airbus research and technology laboratories provide support for long-term technology innovation potential and are run by a worldwide network of technical skills centers.

The Airbus Research Center employs over 800 people and is established on two main sites in France and Germany. There are also several other research establishments in Europe and across the world.

The Airbus Research Center adopts a resolutely global approach to cooperation by working with the innovators of today and tomorrow to sustain the company's vision of a more mobile, safe and environmentally-friendly world. This collaboration extends from patronage to relationships with select industrial partners, and partnerships with institutes, universities, research centres and large and small organisations.

Doctor in Materials Chemistry, Sophie Senani is a Research Engineer in surface treatment at the Airbus Research Center.

"Over the past five years, the collaboration with OliKrom has been the source of two important innovations in the field of external stimuli-sensitive coatings: pressure or temperature. In my view, we are way ahead of the competition in the directions we have taken" she stresses.

The genesis of the R&D project initially concerned the **detection of impacts** on composite materials.

The risk of impact during transportation of the different parts of an Airbus from all over Europe to the final assembly line, or even during assembly, cannot be ruled out. Non-destructive testing by ultrasound guarantees the detection of any damage needing repair, but this phase is very long, as it takes approximately two hours per square meter.

The developed paint allows any impact over a defined threshold to be detected by the naked eye. The colour of the paint changes according to a change in pressure following an impact.

"The idea is to facilitate the detection of areas of impact during assembly. In time, inspection using ultrasound will be limited to key areas liable to present damage, compared with the whole structure today. This will lead to major savings in production time."

Alongside this initial project, a heat-sensitive coating for detecting even very localised **overheating** on parts located near hot areas, such as engine covers, has also been developed.



Flying tests running

Again, the aim is to improve safety and quickly identify minor incidents such as hot air leakage in order to plan maintenance work in case of potential risks of damage.

"Heat-sensitive technology already exists, but the chemistry developed by OliKrom provides a higher level of accuracy in terms of temperature transition thresholds, as well as more lasting performance, which is vital in aeronautics."

The design of the new paint aims to behave differently according to two temperature thresholds. The initial colour must change at 120°C and then again at 140°C. These two thresholds, while respecting the composite damage safety margins, constitute the first levels of warning for a part located near the engines.

"If we can identify areas of overheating, even small, we can facilitate preventive maintenance and further increase reliability."

For both innovations, the proof of concept is validated on real parts. Work is currently being conducted into adapting pressure and/or temperature thresholds according to the particular specifications of the parts in question, with the aim of going on to address the industrialisation phase.

"The value added of our partnership is an undeniable synergy. Our expertise in aeronautic materials combined with that of OliKrom in smart pigments generates highly innovative solutions to our needs. OliKrom is also an industrial company, which is clearly an advantage because their approach consists in proposing finished products to markets. This speeds things up in the search for solutions." concludes Sophie Senani.



Award for Innovation at Surfair Congress

Surfair Congress brings together the world's key players in the aerospace sector on the topic of surface treatments. During the last congress held in May 2016, Airbus Research Center received the Innovation Award for its presentation of the heat-sensitive coating developed in partnership with OliKrom.

Co-ownership patent applications

Each of these major innovations in coatings for improving the health-monitoring of composite materials is the subject of co-ownership patent applications between Airbus and OliKrom.

As part of its ongoing innovation process, OliKrom also submits patents in other industrial fields.

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