Julien Escobar, IRT Saint-Exupéry

Title: "Development of anti-erosion and anti-icing coatings by suspension plasma spray for aeronautical parts"

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Absract
In the field of aeronautics, the external parts of aircraft are subjected to significant stresses and harsh environments that cause material degradation. These in-service stresses can be thermal, chemical, or physical. The development of coatings and other surface treatments has notably addressed these issues and thus enhanced the durability of the parts.

In the frame of the FREEzING project, the objective was to create coatings that protect parts from erosion (due to water and solid particles) and also from ice accretion, which can respectively damage engine blades and lead to aerodynamic performance losses.

One of the strategies considered is the development of a ceramic coating based on a mixture of alumina-titanium dioxide through suspension plasma spraying. This technique involves spraying a suspension and allows the creation of coatings with highly varied microstructures (dense, columnar, etc.), whose optimization is likely to meet the dual protection requirement.

The first part of this work focused on understanding and influencing the process parameters on the microstructure and composition of the deposits created using diagnostic tools (collecting particles in flight, etc.).

The second part was focused on evaluating the performance of the various coatings produced through standardised tests, as the Pulsating Jet Erosion Test PJET to characterize water erosion. The icephobic properties were characterised by measuring the force required to remove ice previously formed on the coatings thanks to a pull-off test.

Promising results were obtained, notably dense microstructures exhibiting superior erosion resistance. The icephobic properties also proved to be interesting but still somewhat distant from the required standards.

Biography
Julien ESCOBAR is a R&T engineer in surface treatment at IRT Saint Exupery in Toulouse. He has a PhD in Material Science achieved in the CIRIMAT laboratory in Toulouse working on lubricating coatings for aeronautic applications. He then proceeds to make post-doctoral researches in Mons, Belgium on self-healing paints on a European project.

Since 2016, he is working at IRT Saint Exupery in the surface treatment team and he is involved in several research projects regarding wet and dry surface treatments for aeronautic and space applications.