

Press release

Innovative coatings for aeronautics

▶▶ *IK4-TEKNIKER is developing multifunctional coatings to protect natural laminar flow wings on planes against erosion produced by rain*

(Eibar, Basque Country. 15 March, 2019).- The need to reduce aircraft weight to save fuel has forced the aeronautical sector to use lightweight materials such as polymers reinforced by carbon fibre (PRFC) due to their excellent relationship between resistance and weight. The level of resistance of these materials, however, when dealing with erosion produced by dust, volcanic ash or rain is much lower compared to heavier materials such as steel. Therefore, it is necessary to develop protective systems to deal with erosion properly.

The systems used nowadays based on paint are associated with high maintenance costs and are not suitable for new aerodynamic concepts that make the most of the natural laminar flow around wings that require extremely accurate surface finishes. It is also necessary to deliver solutions that can eliminate ice, particularly the ice that forms on the front edge of wings as this affects aerodynamics and safety and also provides other properties such as protection against lightning.

In this context, and within the framework of WINNER, a Clean Sky 2 project, [IK4-TEKNIKER](http://www.tekniker.es) is developing new multifunctional coatings according to Saab AB specifications. These coatings will provide protection against erosion produced by rain, reduce maintenance operations and provide different electrical properties with thermal resistive functionalities to eliminate ice and provide conductivity for protection against lightning.

Specifically, IK4-TEKNIKER will develop **advanced coatings by means of PVD technology** (*Physical Vapour Deposition*), an excellent alternative whose protective capacity has already been demonstrated on several component protection applications that can also deposit coatings made up of different metals and nitrides to achieve different levels of conductivity.

PVD processes consist in a evaporating a solid and transforming it into atoms or molecules that are moved under conditions of vacuum to be condensed on the surface of a substrate until a fine layer with specific properties is formed.

Polymeric substrates, however, pose challenges that make coatings used on other metallic components unsuitable for this application. Consequently, new specific coatings must be developed for it.

In aeronautics, erosion resulting from rain in aeronautics means that working conditions are very extreme considering the speeds at which airplanes can fly. In order to achieve the level of protection required, IK4-TEKNIKER is developing **multi-layer coatings** that combine hard nitride layers with metallic layers to lessen impacts.

One of the major changes is focused on obtaining coatings with thicknesses of tens of microns. These are very innovative coatings as they stand at the frontier of knowledge with regard to PVD because, with less thickness, impacts against water or sand deform soft polymeric substrates and the coating could be detached.

In order to address this problematic issue, IK4-TEKNIKER is developing surface procedures and process parameters that guarantee low residual stresses on high thickness coatings to ensure adherence in multilayer combinations characterised by suitable protection against erosion and optimum electric properties.

Concerning IK4-TEKNIKER

With more than 35 years of experience in applied technology research that has been transferred to companies, IK4-TEKNIKER has achieved a high degree of specialisation in four major areas (Advanced Manufacturing, Surface Engineering, Product Engineering and ICTs). This means that its cutting edge know-how has been made available to customers to meet their requirements.

Further information

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