

Workplace exposure assessment during the spray application of nanostructured coatings designed in ReSiSTant Project

Rosanna PILEGGI & Teresa BEONE, *RINA-CSM*

With the objective of implementing new surfaces for Aircraft Turbofan Engines and Industrial Compressors, H2020 ReSiSTant Project is focused on the development of nanotextured surfaces for drag reduction. Riblets are tiny streamwise grooved surfaces which reduce the drag in the turbulent boundary layer that could act on efficiency, CO₂, and noise reduction, with a positive economic and ecological impact. The Project aims at developing riblet coating that presents several desirable properties such as corrosion protection, durable hardness, and a self-cleaning mechanism.

In ReSiSTant nano functionalized coatings containing SiO₂ NPs (nanopowders) and MWCNTs (multi-walled carbon nanotubes) were developed. Safety concerns arising from the use of nanomaterials were object of study, as well, motivated from scientific evidence that exposure to nano objects might have epidemiological findings on workers.

The criticalities concerning airborne dust developed during the work phases of laying and drying the modified coatings have been highlighted in 4 days of activity carried out in collaboration with INAIL, in an indoor analysis at RINA-CSM Finishing and Bonding Laboratory. An integrated and multi-technique approach was done by INAIL for the measurement and characterization of occupational exposure to nanoclays and multi-walled carbon nanotubes by inhalation during spray coating operations. The effect of the application of modified coatings developed in the Project is presented: in laboratory tests airborne nanoparticles were identified in the designed DEMO 1 and DEMO 2 paints. TEM investigation carried out on impactor air filters collected during the spray-coating phases showed that some aerodispersed nanoparticles are present in paints.