Development and Manufacture Scoop
Intake and Channel incl. ice and debris protection and acoustic absorbers

Results in Brief

Decreasing noise and emissions of future aircraft

EU-funded scientists are developing novel technology for ice protection and noise abatement in a system that enhances engine efficiency. Compatibility with all-electrical control will round out the benefits for next-generation aircraft.

Aircraft have an environmental control system (ECS) that manages air supply, temperature and cabin pressurisation.

As part of that system, the ram air scoop exploits airflow created by aircraft motion (ram air) to increase engine power and cooling for greater efficiency. The EU's Clean Sky aeronautical research programme has set ambitious targets for future all-electric aircraft with reduced emissions.

An advanced ram air scoop and ducting system for an all-electric ECS under development by the EU-funded project SIPAL is addressing both those objectives.

The system is based on geometrical specifications supplied by a major aircraft manufacturer.
SIPAL is incorporating ice and noise abatement compatible with an all-electric ECS. The ram air scoop requires electrothermal ice protection.

Partners simulated icing conditions using tailor-made software.

They then developed the design concepts for the specific heating elements and required power in order to maintain ice accretion at acceptable limits.

Icing behaviour of the scoop and duct corresponded closely with analytical results of simulations, highlighting the success of the novel software in ensuring energy-efficient heating coverage in the ducting. In addition, future noise restrictions make noise abatement (acoustic absorption) a critical design consideration.

The team evaluated the possibility of integrating ice protection and noise abatement in the same ducting surface.

Preliminary results suggest it will be possible.

However, given the time constraints of the project, partners proceeded by incorporating the noise abatement in locations free of ice protection. SIPAL technologies for ice and noise abatement in the ram air duct of a new-generation electrical ECS combine many of the targets of the EU’s Clean Sky initiative and are poised to make an important addition to future aircraft.

The ram air system enhances engine efficiency for fewer emissions.

Integrating noise abatement technologies and electrical control bring the EU one step closer to all-electric aircraft with reduced noise and pollutant emissions.

Keywords

Aircraft, environmental control system, ram air scoop, electrothermal ice protection, noise abatement, all-electric
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