

ALFA Seal Project - NATEP: helping SMEs innovate in aerospace Autumn 2020

The ALFA Seal project (ALFA Seal - **A**dvanced **L**aminar **F**low **s**n**A**p-fit Seal) builds on previous UK government and industry funded projects aiming to make air travel more environmentally sustainable through the enablement of wing laminar flow, supporting the Government to committing to net zero greenhouse gas emissions by 2050.

Turbulent Wing design has evolved over the past 50 years introducing relatively small incremental changes to reduce drag and improve efficiency. To meet airlines requirements for reducing operating costs, and to respond to societal pressure for sustainable flight, a step change in technology is required.

Laminar flow wing innovation enables such a step change, reducing fuel/energy burn, which in turn results in improved operating costs, improved profitability for the operators, and reduced environmental impact.

In the future, component assembly will be increasingly smart and automated, and the novel laminar-flow-friendly ALFA Seal system champions this ambition.

The ease of assembly of the innovative ALFA Seal system removes the need for sealant between joints (steps and gaps) balancing the conflicting requirements of tight aerodynamic tolerances, against cost-effective, easy-to-repair structures. In short, it solves and manages the stubborn legacy challenge of marrying laminar flow and mechanical fit.

Moreover, as a replacement for traditional sealant, the ALFA Seal system would contribute to a ramp-up in aero-structure production rates, which will also be a differentiator with an upturn in aircraft demand.

This project:

- seeks to mature a novel laminar-flow-friendly assembly sealing solution for the key issues around space allocation and structural joining (steps and gaps) that meets aerodynamic tolerances, a ramp-up in production rates, and in-service operability requirements
- contributes to laminar flow exploitation on future wings -- natural laminar flow for short-range aircraft and hybrid laminar flow for long-range
- addresses priority areas within the ATI "Accelerating Ambition" (2019) Aerostructures Roadmap and aligns with the Future Flight Challenge of the Government's Industrial Strategy, the UK Jet Zero Council objectives, and the ATI's FlyZero initiative in accelerating improvements in environmental performance of future aircraft
- exploits the City, University of London transonic wind tunnel as part of the National Wind Tunnel Facility (NWTF) infrastructure to obtain crucial test data that allows model validation and improved computational modelling, which will lead to a TRL4 seal product at the conclusion of the project