Success Story: INCAS participation to EU FP7 AFloNext Project

AFLoNext (2nd Generation **A**ctive Wing Active **F**low- **Lo**ads & Noise control on n**ext** generation wing) is a four-year EU FP7 L2 project (37 MEuro budget) with the objective of proving and maturing highly promising flow control technologies for novel aircraft configurations to achieve a quantum leap in improving aircraft's performance and thus reducing the environmental footprint. The AFLoNext concept is based on six technology streams which cluster the targeted technologies and their associated contributions to advanced aircraft performance:

- Hybrid Laminar Flow Control (HLFC) technology applied on fin and wing for friction drag reduction and thus performance increase in cruise conditions.
- Flow control technologies to enable more aggressive outer wing design for novel aircraft configurations, thereby improving the performance and the loads situation in low and high speed conditions.
- Technologies for local flow separation control applied in wing/pylon junction to improve the performance and loads situation mainly in take-off and landing conditions.
- Technologies to control the flow conditions on wing trailing edges thereby improving the performance and loads situation in the whole operational domain.
- Technologies to mitigate airframe noise during landing generated on flap and undercarriage and through mutual interaction of both.
- Technologies to mitigate/control vibrations in the undercarriage area which are caused by highly unsteady or inhomogeneous inflow conditions in take-off and landing conditions.

Based on a thorough assessment of the state-of-the-art of each technology, AFLoNext takes the next logical development and demonstration steps towards higher maturity following proven “Verification and Validation” (V&V) procedures. The maturity of each technology at a given milestone is to be assessed by means of the “TRL concept” which specifies for each maturity level the requirements for technology-, manufacturing- and integration readiness by TRLs.

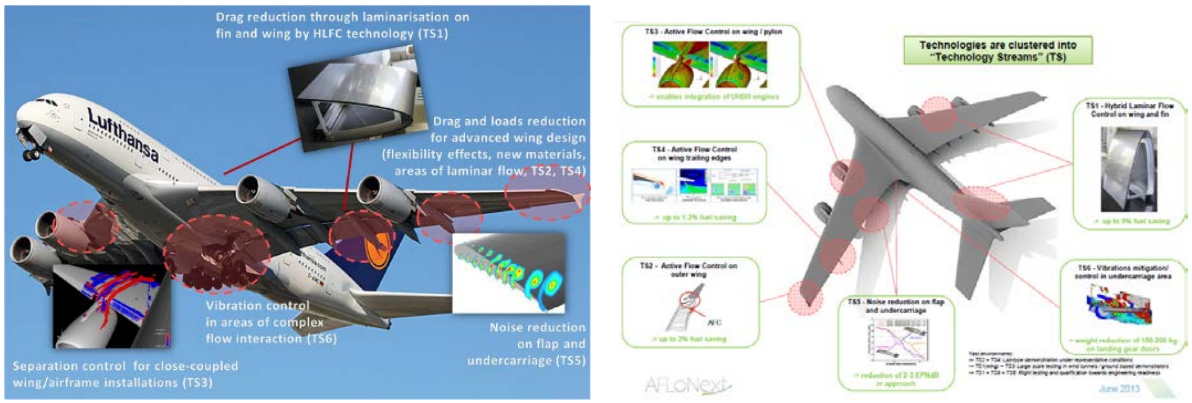

Figure 1 – Main technologies addressed in AfloNext Project and specific WPs

The project consortium is composed by forty European partners from fifteen countries. The Project Leader is Airbus DE. INCAS is one of the key members in the project, having a leading roles in 2 workpackeges in both low and high TRL developments.

INCAS work is based on previous achieved results and recognized competences in active flow control and systems integration for laminar wing. This is mainly linked to latest results for EU JTI Clean Sky, mainly SFWA – Smart Fixed Wind Aircraft ITD, where INCAS has developed a set of capabilities to be used in WP1, as follows:

- New Krueger leading edge flap concept to be used for a laminar wing, mainly with respect to space allocation requirements in the leading edge of a thin wing. This patent has been demonstrated on a biz-jet configuration together with Dassault in SFWA. In Aflonext INCAS will participate to an optimum definition and final concept selection with DLR and CIRA;
- Systems integration in the hybrid laminar wing, based on advanced requirements and new technological developments for the upper panel surface. This activity will enable the digital mockup for the leading edge, where systems to be integrated range from the optimized Krueger flap, wing anti-icing protection system (WIPS), suction system for the HLFC and "room" for all electrical subsystems of the future active wing.
- Ground demonstration of a scale 1 prototype for the leading edge of the active wing, where system functionalities will be fully evaluated so that the TRL is to be demonstrated.
- Participation to the wind tunnel testing of the mockup in CIRA icing wind tunnel. INCS will provide the fully equipped leading edge of the demonstrator and will assist for functional testing of the WIPS system in CIRA wind tunnel.

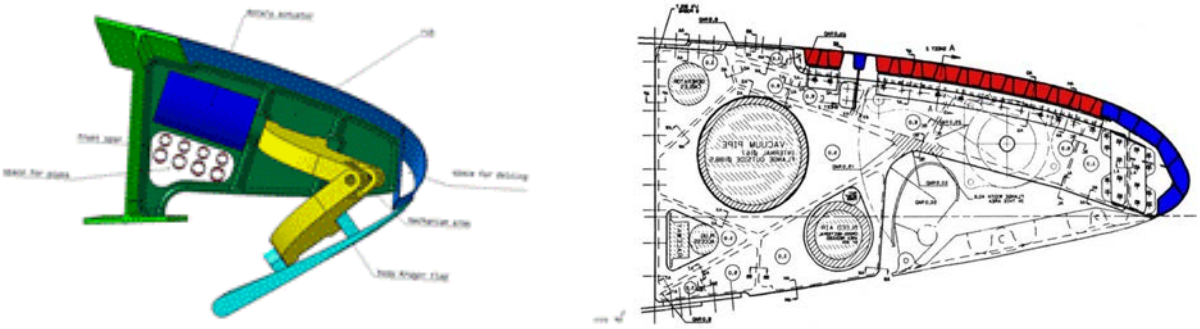

Figure 2 – INCAS patent (Krueger concept) for AfloNext hybrid laminar flow wing

In WP2 INCAS is the leader of the task that will demonstrate the TRL of the fluidic actuators to be used for active flow control in the outer wing-winglet section, reducing flow separation. This very complex activity will integrate new developments from BAe and Fraunhofer and will demonstrate harsh environmental testing capabilities in INCAS ground test rig.

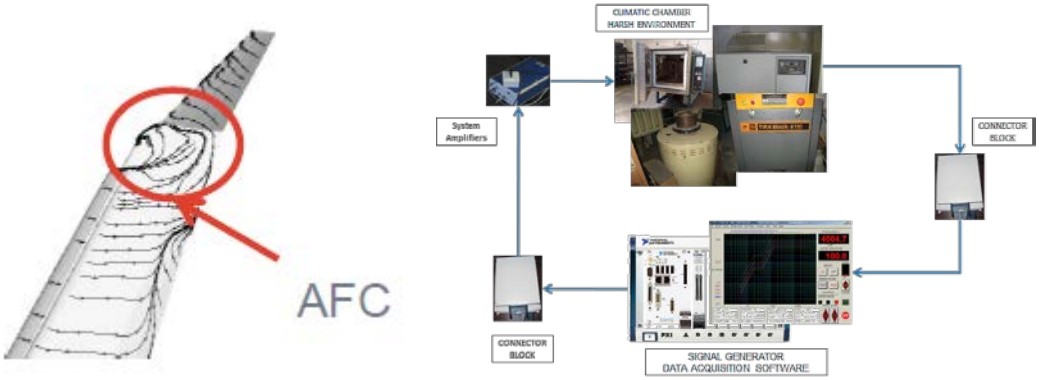

Figure 3 – INCAS harsh environment testing for active flow control actuators

AfloNext Project is a very relevant implication of a Romanian R&D company in an EU project in aeronautics. This emphasizes DOA capability at INCAS, integration with Airbus supply chain and enables the possibility to the Romanian industry to reintegrate at prime level in EU aeronautics.

INCAS has already achieved important IPR on technologies with huge potential in respect to green technologies, to be used in the new generation of aircrafts in 20 years from now. This enables a solid strategy for industrial technological transfer, at highest industrial level in EU aerospace industry.