Next Generation Combat Aircraft Technologies - NGCAT

ACRONYM: AMOSKA

Title: Advanced MOvable Structure, Kinematic and Actuation

Duration of the project: 01/05/2025 - 01/02/2028

Key words: Control Surfaces, Morphing, Structure, Actuation, Kinematic

Budget: 4.626.556 €

of which RHID contribution: 4.201.000 €

PROJECT DESCRIPTION

The AMoSKA project aims at developing disruptive technologies in support of the morphing technology for flight control surfaces (FCS), for the next generation defence aircrafts and drones, embedding technology building blocks beyond the state of the art.

The components will include a high level of integration of composite parts, in order to reduce the weight and cost of those elements, and to improve the aerodynamic performance by reducing the number of fasteners.

Innovative composite materials will be investigated, being flexible as required de facto by the high deformations induced in morphing components, but also strong in order to sustain the aircraft loads with light structure.

The different partners will investigate several designs and concepts in order to select the solution presenting the optimum balance between stealth, aerodynamic performance, weight, and cost, also considering the space allocation constraints which will be very challenging for such thin wing profiles. In the constrained space allocation of a thin wing-like structure, the integration of systems and equipment is adding complex requirements on the interfaces between equipment, like actuators, and the backing structure (e.g. spar-like structures). On top of the constrained space allocation, the aerodynamic and low-observability benefits of the trade-offs between the extent of morphing and amount of deflection need to be investigated. It will include the FCS box, kinematics and actuator backing structure. The major benefit for military aircraft is to reduce the observability of the vehicle

thanks to the reduction of apparent edges and gaps. At this stage, the reference flight control surface will be a loyal wingman flaperon.

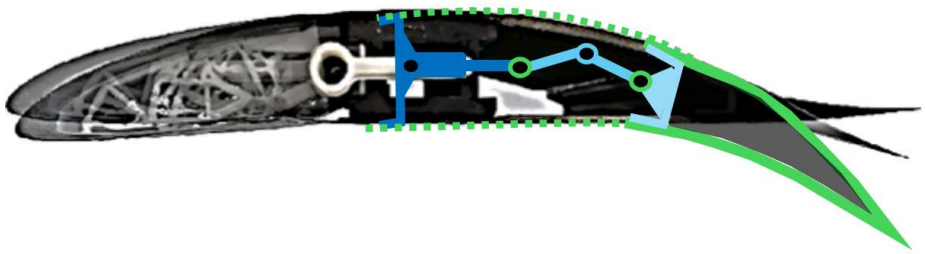
In this project, SABCA will be in charge of the backing structure (i.e: a Spar-like component) and the purpose of the project will be to focus on the development of design and analysis capabilities:

- to move away from black metal by considering composite asymmetric lay-up and explore their potential benefits in terms of weight saving, diffusion of concentrated loads, damage tolerance,…
- to take into account part integration, battle damage, reparability and system (actuation) interface requirements.

Beyond the focus on developing design and analysis methods, the project will include the manufacturing of a limited-size demonstrator with the intent to use the combination of out-of-autoclave (e.g: SQRTM) and near net shape process to obtain a backing structure with a high level of integration, yet meeting assembly, interface tolerance, survivability and reparability requirements. Furthermore, to explore the performance of the concept, the project could potentially use the Rotary Electro-Mechanical Actuator (EMA) proof-of-concept developed in the other R&T project: PFC-REA.

ASCO will perform the design and sizing of a next generation metallic spar of the morphing movable structure, as well as the disruptive kinematics that will contribute to the morphing behaviour of the movable structure. An innovative hybrid manufacturing process will be developed for metallic spars with a strong potential to reduce the “buy-to-fly” ratio and that enables a full integrated design leading to a minimum part count and associated assembly efforts. The project will consider an optimized raw material billet (example extrusion) on which complex 3-D features can be printed using the additive manufacturing direct energy deposition technology. A specific study on the interface surface activation and the resulting bond between the material billet and the printing will be performed.

In that view, the consortium integrated partners with strong expertise in aircraft parts design and manufacturing (SONACA, SABCA, ASCO), and related processes and equipment (COEXPAIR, FERONYL, VUB, KUL), partners with deep knowledge of the aerodynamic simulation (RMA) and testing (RMA, VKI) as well as stealth /observability simulation (RMA). SONACA will coordinate the project and take care of the FCS skin, as well as the integration of the structure, kinematics and actuation.



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LINK(S)

No website to be mentioned at this time