# Next Generation Combat Aircraft Technologies - NGCAT

**ACRONYM: ROCALIF**

**Title: RemOte CArrier LIght Fuselage**

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

**Key words:** Remote Carrier, Fuselage, Low Cost, Low Observability, High Rate Production

**Budget:** 3.523.169 €

**of which RHID contribution:** 3.234.000 €

## PROJECT DESCRIPTION

The RoCaLiF project aims at developing disruptive technologies in support of the fuselage structure of the future remote carriers (RC) for the Next Generation Weapon System. Due to the high number of such remote carriers expected to be used in the future, the major objective will be cost reduction and production rate increases. Another important objective will be low observability and high maneuverability range, thanks to high aerodynamic performance for a low weight. This project will therefore investigate several disruptive technologies for those objectives as described below.

Remote carrier fuselage - Advanced materials and structural designs

New fast curing composite resins are interesting since they reduce the composite part curing time by a factor of 2-4, this curing takes place in expensive presses and is therefore a significant cost driver for such composite parts and a penalty for the high production rates of those ones.

Highly integrated composite fuselage reduces the number of parts and therefore the cost (less fasteners, less assembly, less parts to be cured) and weight of the fuselage.

Modularity of the fuselage design and the payload will be investigated. Remote carriers perform several missions. The idea is therefore to investigate the interest of one single chassis with potential quick adaptations between missions, and/or adaptative radomes with integrated payloads quickly replaceable and dedicated to the said mission.

Antennas integrated into the structure will enable to reduce the vehicle radar signature and aerodynamic drag. The idea is to investigate impact of new structures and materials on antennas performance, best placement on the fuselage and improve its steering capabilities and robustness against external jammers for several applications (Satcom, Radiocoms, GNSS, Radar, …) and RF frequency bands (Ku-band, C-band, …). With regards to the results, some original antenna designs will also be evaluated by printed electronic process. Printed antenna integration at the surface of the fuselage offers the strong advantage to optimize the volume ratio and lightless of devices integration.

Harnessing integration in or on the fuselage composite structure, will reduce the time for assembly (therefore increasing production rates), and will increase fuselage compactness, reducing its signature and increasing the aerodynamic performance of the remote carrier. One approach could be to print the circuits on the skin. Another approach is to make a circuit by printing or by using traditional PCB fabrication techniques, but using a substrate material that is compatible with the composite materials and the composite structure manufacturing processes for integration during this structure production process.

Remote carrier fuselage - Low observability

Infrared (IR) decoys and adaptive camouflage based on deception strategies — through electronic control of a deliberately misleading thermal signature — will be developed using printed electronics. The goal is to design heating thermal cells with this technology, then integrate them into a controllable matrix. Each pixel in this matrix can be individually controlled in order to generate a specific infrared signature on demand.

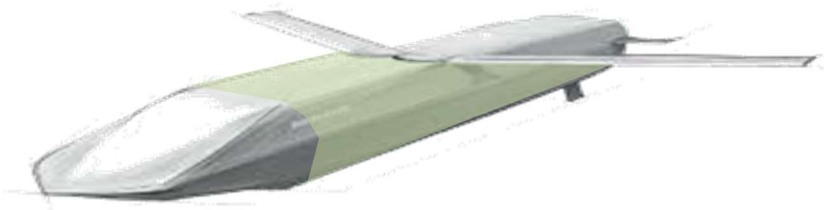
Two approaches will be demonstrated in the laboratory:

- Integration of the devices onto a thermoplastic substrate (e.g., COMPOLAM)
- Direct printing onto an internal composite fuselage element by spraying, using a stencil-based process.

In addition, a passive thermal effect solution will be studied to optimize infrared camouflage. This approach aims to reduce the emissivity of the exposed surface as much as possible, in order to limit its detection by IR sensors.

The RF (radar) reflectivity (Radar Cross Section) will also be assessed by simulation, considering as well the shape of the fuselage as the type of material and the placement of the antennas on the surface of the fuselage. In addition to aerodynamic constraints, this will guide the shape of the fuselage.

To achieve those objectives, the consortium gathered together partners with strong expertise in design and industrial manufacturing of aerospace components (SONACA) and related molds (FERONYL), partners with deep knowledge of stealth / observability simulation (RMA), telecommunications (MULTITEL) and partners proposing innovative solution for systems to structure integration (CRM, COMPOLAM). The target Technology Readiness Level (TRL) will be 4, with different levels of testing expected like material tests, observability testing of scaled elements, and reduced size manufacturing demonstrator.



## CONTACT INFORMATION

**Coordinator**
Nicolas, VAN HILLE
SONACA/R&T Defense
nicolas.vanhille@sonaca.com

**Partners**
Philippe, GUAINO
CRM/A3S
philippe.guaino@crmgroup.be

Xavier NEYT
RMA/CISS
xavier.neyt@rma.ac.be

Charles Edouard DENDONCKER
FERONYL/R&T
dendoncker.ce@feronyl.com

Stephane DEKETELAERE
MULTITEL/Embedded Systems
deketelaere@multitel.be

Koen HOLLEVOET
COMPOLAM/R&T
koen.hollevoet@compolam.com

## LINK(S)

No website to be mentioned at this time