

FCAS

Future Combat Air System

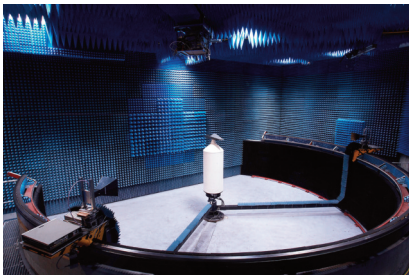


The FCAS program is a French-British program launched in 2012. It is based on the French experience of Dassault Aviation on the Neuron (or nEURon) and the British experience of BAE Systems on Taranis. **Neuron**: program launched in 2003. Dassault Aviation is the prime contractor, allied with European industrialists. Its first flight took place on the 1st of December 2012 in France. **Taranis**: a program awarded by London to BAE Systems in December 2006. The primary objective was to develop a drone with the best stealth performance, but not integrating weapons.

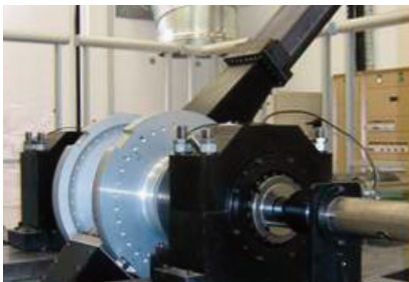
ONERA is a partner of the first-class French industrialists (Dassault Aviation, Safran Aircraft Engines, Thales) and state expert advising the contracting authority.



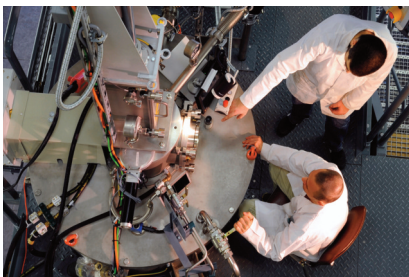
Visualization of the flow over the surface of the Neuron drone (ONERA's F1 wind tunnel)



ONERA's radar anechoic chamber BABI is used to validate stealth simulation software



Bathire bench: study of the turbine blade cooling circuits in rotation up to 1000 rpm



ONERA's atomization tower produces metallic or intermetallic alloy powders for more efficient materials

Aerodynamics/stealth compromise

- Basic study of an air intake to avoid infrared detection, previously studied in an ONERA Meudon research wind tunnel before the start of the FCAS program.
- The nozzle and rear body architecture has been the subject of several studies carried out for industries and is also the subject of tests in ONERA's large wind tunnels in Modane .
- Studies in the field of electromagnetism and radar, aimed at achieving a high level of stealth (metamaterials, stealth de-icing).

Engine hot parts

- Study carried out at ONERA for the sizing and optimization of the internal cooling circuits of the high-pressure turbine blades.
- A contribution to the experimental characterization of the turbine blade cooling circuit was made at ONERA.
- Studies on the development of new monocrystalline systems are being carried out at ONERA, the objective of which is to increase the temperature of the turbine inlet gases. This new superalloy has an extended life with regard to fatigue compared to the existing materials that constitute the Rafale engine turbine blades and discs to which ONERA contributed.

On-board intelligence and perception

- Analysis of navigation solutions for combat drones in the absence of a GPS link. This reconfiguration is aimed at ensuring that the drone is able to evolve on its own.
- Contribution to the architecture of the sensors onboard combat drones for maximum autonomy and quality of service.
- Study regarding in-flight refueling for drones, with the purpose of ensuring the position of the drone relative to the refueling aircraft.

Expertise and assistance to the contracting Authority

ONERA is particularly active in implementing an innovating partnership with the DGA, in the field of stealth for the FCAS program. This program will bring the expertise of the French State to the highest level in the field of electromagnetic and infrared stealth.

In parallel to the FCAS program

Architecture and performance analyses concerning the Future Combat Air System are being carried out by ONERA together with the DGA. The aim is to estimate, using the technical operational simulator BLADE (a software platform conceived through an internal project financed by ONERA), the strengths and weaknesses of a drone and its concept of use as a complement for other means (armed aircraft, cruise missile, etc.) for carrying out various missions in a non-permissive environment.