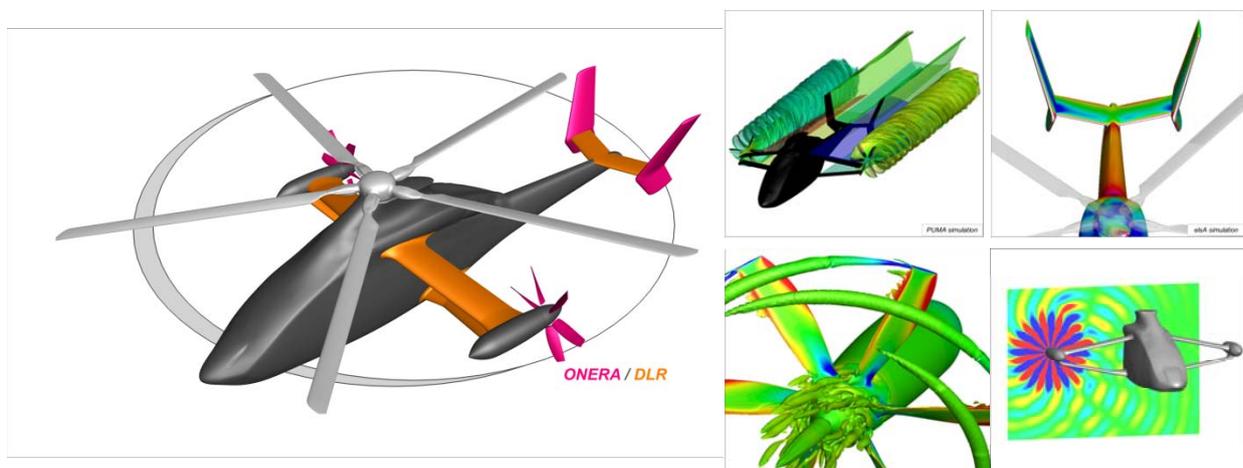


## ONERA participates in Racer

### ONERA helicopter skills bring decisive elements to the Racer, the fast rotorcraft demonstrator of Airbus Helicopters

ONERA contributes towards improving the aerodynamic and aeroacoustic performances of the Racer

The Racer high speed rotorcraft demonstrator revealed by Airbus Helicopters at the Paris Air Show on Tuesday 20 June 2017 contains ONERA's DNA. Since July 2015, ONERA has been a partner of Airbus Helicopters in improving the aerodynamic performance and noise reduction of the successor demonstrator of the X<sup>3</sup>. ONERA's contributions are to be found in propellers (or lateral rotors), for which ONERA participated in their design and optimization for the various flight phases of the rotorcraft, enabling a significant gain in consumption, both in hover and cruise flight conditions, while ensuring significant noise reduction (of the order of 3 dBA) compared to the design of the preliminary design phase. ONERA also contributed to the design choices and aerodynamic optimization of the rear parts and in particular the vertical tail planes and their "X" shape. Finally, ONERA has carried out acoustic analyses of the demonstrator in a wide range of flight conditions, that will be used to identify the least noisy procedures.

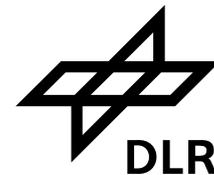


Large figure on the left: Racer with contributions from ONERA (red) and DLR (orange).

*Small figures: Examples of simulation results, lateral rotor, wing and tail aerodynamic interaction (top left), main rotor/tail interaction (top right), Lateral rotor aerodynamic simulation (bottom left), noise simulation (bottom right).*

These activities were carried out jointly with the DLR as part of a call for tender won in the ITD AIRFRAME of the CleanSky2 platform. The DLR was in charge of the aerodynamic performance of the wing, and of the horizontal stabilizers, as the acoustic analysis is done jointly with ONERA. The particularity of the project was to work on each component individually, taking into account the many aerodynamic interactions between wing/propeller, propeller wing, rotor/propeller/wing /tail parts, requiring numerous and frequent exchanges between the partners.

ONERA's major contribution is made under the NACOR (New Innovative Aircraft COnfigurations and Related issues) project, a joint and coordinated proposal between the two French and German research centers. Since 1998, the strong partnership between ONERA and DLR integrates studies in the field of helicopters in a common research program. Naturally, the helicopter part of the NACOR project benefits from this dynamic.



In addition, ONERA long term partnership with Airbus Helicopters is based on the physical knowledge and on the simulation tools of ONERA, in particular the elsA software.

Clean Sky 2 enables European aeronautical prime contractors to develop new technologies demonstrators. As part of the development of high speed vertical takeoff and landing aircraft, Airbus Helicopters develops a concept combining the performance brought by a main rotor with additional propulsion: the Racer.



## **ONERA — the French aerospace lab**

ONERA is the French national laboratory for aeronautics and space R&T, staffed by more than 2,000 people. Under the supervision of the French Ministry of Defense, ONERA has an annual budget of 207 million euros, of which more than half comes from commercial contracts. As the French expert in aerospace technologies, ONERA prepares tomorrow's defenses, meets the aerospace challenges of the future, and contributes to the competitiveness of the European aerospace industry. ONERA masters all the disciplines and technologies in its aerospace fields. All major civil and military aerospace programs in France and Europe contain "DNA" from ONERA: Ariane, Airbus, Falcon, Rafale, missiles, helicopters, engines, radars, etc

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