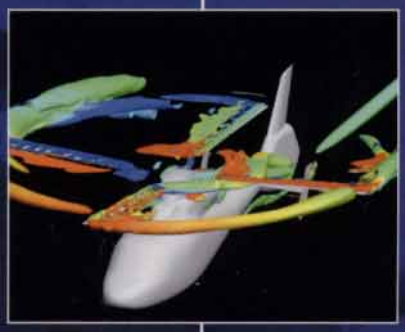
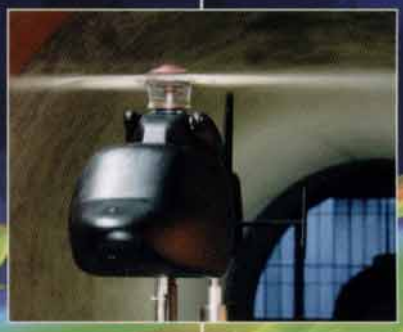
Helicopter research

Flight path to innovation





ONERA

THE FRENCH AEROSPACE LAB

return on innovation

Yesterday, today, tomorrow... Onera anticipates industry's needs

Drawing on over 30 years of intense research on rotors, the key part of the helicopter, European rotorcraft now set the global standard for noise and vibrations. Research is continuing and innovative new solutions are already in the pipeline.

Rotor research

Key to helicopter performance

Computer-designed airfoils and blade tips

Onera designed the blade airfoils for the Aerospatiale Ecureuil helicopter in the 1970s. Today, most of the civil and military helicopters produced by Eurocopter use blade airfoils and tips designed by Onera. Our scientists call on powerful aerodynamic computation codes, constantly refined in light of research results.

Aerodynamic computation of the Erato blade model

New blade shapes

With the advent of new materials, plus the latest advances in aerodynamics and dynamics, designers can now consider variable shape blades (airfoils, chord, etc.). For example, the Onera-designed Erato blade has shown significant noise reduction in wind tunnel tests. Flight tests are planned in 2007 to validate an evolution of the previously studied blade design. Once its performance capabilities have been confirmed, Eurocopter can begin to prepare for integration in its next-generation rotorcraft families.

Active-control blades: a major technological breakthrough

Onera is working on the development of a rotor with active-control blades, which would be a major technological breakthrough. A closed-loop control system is used to change the shape of the blade, depending on its position in each revolution, thus ensuring maximum efficiency.
Two main concepts are being studied in conjunction with German counterpart DLR: active flaps, and active twist blades. Wind tunnel tests to date have generated very positive results.

A piezo-electric actuator embedded in each blade controls the trailing edge control surface

Tests of the active-blade rotor in the S1 wind tunnel at Modane-Avrieux, using trailing edge control flaps; the rotor is 4.2 meters in diameter