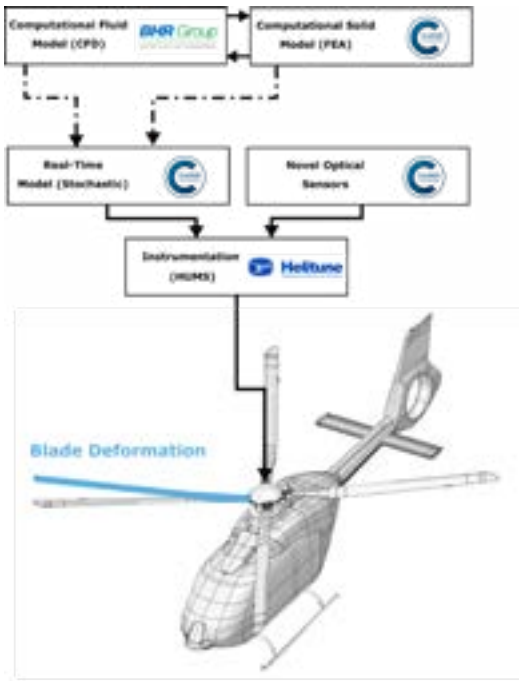
framatome

BHR

Dynamic Rotor Blade Deformation

AIRBUS HELICOPTERS, UK

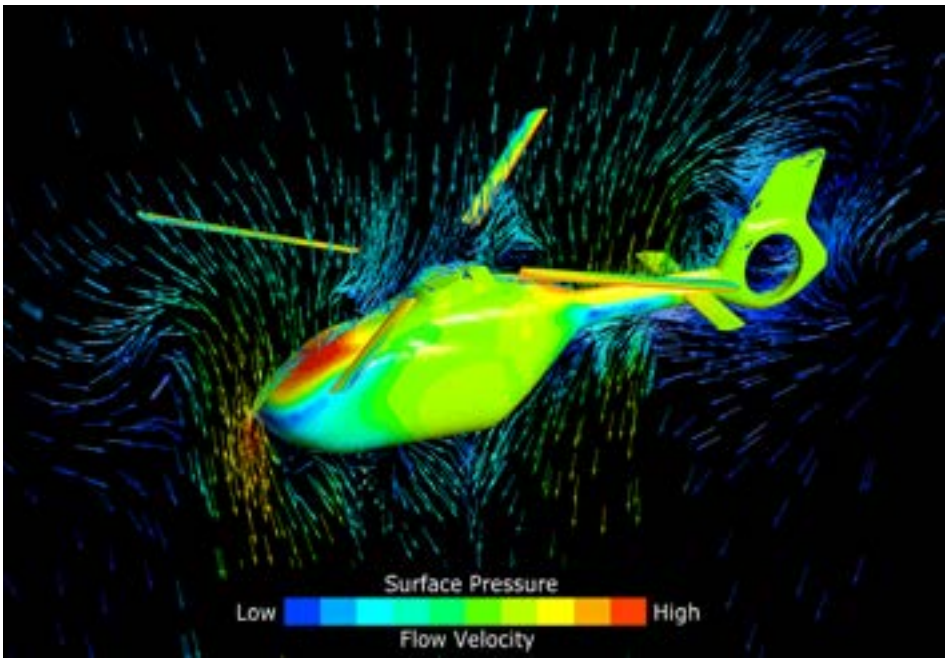


AIRBUS HELICOPTERS

The Bladesense project is an Aerospace Technology Institute (ATI) funded collaboration between Airbus Helicopters, the UK's leading turbine helicopter company, Cranfield University, BHR Group and Helitune Ltd.

The aim of the project is to develop accurate and robust measurement technologies for real-time measurement of rotorcraft blade deformation during flight.

This will reduce future design costs, leading to improved predictive maintenance, higher operational reliability and enhanced safety.



BHR Group engineers are providing the aerodynamic loads on the rotor blades for various flight conditions using CFD simulations on a full-scale helicopter model. With these blade loadings, FEA simulations are being run by Cranfield University to predict the blade stresses and deformation. This coupled approach to Fluid-Structure Interaction (FSI) modelling results in a dataset of blade deformation predictions for various flight conditions, which is being used to develop and calibrate a stochastic model for real-time health monitoring of the helicopter rotor system.

"Working with the BHR Team has given us confidence in the design concept. The accurate modelling undertaken enabled the testing of scenarios that would have been difficult and costly to replicate in the live environment"

Richard Atack
HEAD OF DESIGN AND CUSTOMISATION
AIRBUS HELICOPTERS UK

The stochastic model will be one of the components of the onboard health and usage monitoring system (HUMS) being developed by Helitune and will provide the predictions for blade deformation based on the flight conditions. The diagnostic system will also include Cranfield University's novel fibre-optic instrumentation sensors which will measure the actual blade deformation of the rotor blades in flight. Any difference in the actual blade deformation and the prediction from the stochastic model will indicate an anomaly in the blade health, which can then be addressed timely and in a cost-effective manner. This novel system could transform the regular, conservative, interval-based maintenance strategy of the helicopter rotor system to an adaptive, need-based maintenance strategy.

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