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## COBRA

### **COBRA (Innovative Counter rotating fan system for high Bypass Ratio Aircraft engine):**

COBRA is a 3.5-year FP7 collaborative research project between Europe and Russia (under grant agreement № 605379), commenced 1st October 2013. Coordinated by Onera (N. Ben Nasr), it associates 9 European partners with an overall budget of 3.5 M€.

The philosophy of the COBRA proposal is to use the complementarity of EU-Russian expertise in “ducted architectures”; it is expected that this will provide advantages in dealing with the noise and installation challenges required to overcome the insufficient noise performance of the counter-rotating fan tested in the [VITAL](#) project. Higher bypass ratio designs (use of gearbox becomes mandatory) with much lower blade tip speeds and blade counts will be explored, whilst at least maintaining and maybe increasing the very good aerodynamic efficiency already achieved.

The goal of COBRA is to promote an effective cooperation between EU and Russian scientists. The project is structured to benefit from the existing skills of EU and Russia in the design and the multi-disciplinary optimisation of UHBR<sup>1</sup> CRTF<sup>2</sup> architecture to assess at the whole engine level the capabilities of the UHBR CRTF in terms of performance and acoustic levels. Comparisons will be made with the VITAL CRTF results and with the strategy for the CROR<sup>3</sup>. These activities will include extensive CFD-CAA<sup>4</sup> and structural/mechanical computations and experimental studies.

COBRA will integrate the benefits and the results of:

- Previous EC-funded research projects such as:-
  - the VITAL project WP2.4 in respect of CRTF specifications, new fan architecture, test campaign expertise and validation of tools,
  - the [DREAM](#) project in respect of noise reduction within the design process of CROR architecture and validation of design tools, and,
- Russian knowhow in respect of UHBR CRTF architecture as in the NK-93 engine designed by JSC KUZNETSOV (partner in the COBRA project).

*Nabil Ben Nasr*

*e-mail:Nabil.Ben\_Nasr@onera.fr*

<sup>1</sup> UHBR = Ultra-High Bypass Ratio

<sup>2</sup> CRTF = Counter-Rotating TurboFan

<sup>3</sup> CROR = Counter-Rotating Open Rotor

<sup>4</sup> CFD-CAA = Computational Fluid Dynamics-Computational AeroAcoustics

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