

## **AFDAR - Advanced Flow Diagnostics for Aeronautical Research**

**REFERENTE: prof. Giuseppe Cardone, Dip. Ingegneria Aerospaziale**

The objective of AFDAR is to develop, assess and demonstrate new image-based experimental technologies for the analysis of aerodynamic systems and aerospace propulsion components. The main development focus is on new three-dimensional methods based on Particle Image Velocimetry (PIV) to measure the flow field around aircraft components, and on the high-speed version of the planar technique for the analysis in time-resolved regime of transient/unsteady aerodynamic problems. The progress beyond the state of the art with respect to current technologies is summarized by three aimed breakthroughs: 1) three-dimensional volumetric measurements over wings and airfoils; 2) time-resolved measurements and aerodynamic analysis several orders of magnitude faster than today; 3) turbulence characterization in aerodynamics wind-tunnels at resolution orders of magnitude higher than today by Long-Range Micro-PIV. The project ultimately aims to support the design of better aircraft and propulsion systems by enabling the designer to use experimental data during the development cycle of unprecedented completeness and quality. The work also covers the simultaneous application of PIV-based techniques and other methods to determine aeroacoustic noise emissions from airframe and to improve combustion processes to lower NOx, CO2 and soot emissions from engines. The consortium is led by a Dutch Technical University and lists 10 partners including a Russian research Institute and an Australian University. Three industries are involved in this work either as participant or contributing under subcontract and providing testing facilities. As final results of the project, a detailed analysis of the new measurement systems will be delivered and a number of demonstrations will be performed to validate the concepts in industrial environments. Special emphasis is given to the dissemination of results by meetings, publications, workshops and other initiatives, based on the long experience of seve.

### **Coordinator**

**TECHNISCHE UNIVERSITEIT DELFT (Netherlands)**

### **Other participants**

UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II

MONASH UNIVERSITY (Australia)

UNIVERSITAET DER BUNDESWEHR MUENCHEN. (Germany)

KUTATELADZE INSTITUTE OF THERMOPHYSICS - SIBERIAN BRANCH OF THE  
RUSSIAN ACADEMY OF SCIENCES - IT SB RAS (Russian Federation)

VON KARMAN INSTITUTE FOR FLUID DYNAMICS (Belgium)

DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV (Germany)

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (France)

LAVISION GMBH (Germany)

STICHTING NATIONAAL LUCHT- EN RUIIMTEVAARTLABORATORIUM (Netherlands)

**Start date** 01/11/2010

**End date** 31/10/2013

**Duration** 36 mesi

**Project cost** 4.02 million euro

**Project Funding** 2.66 million euro

**Subprogramme Area** Propulsion, Flight physics

**Contract type** Small or medium-scale focused research project