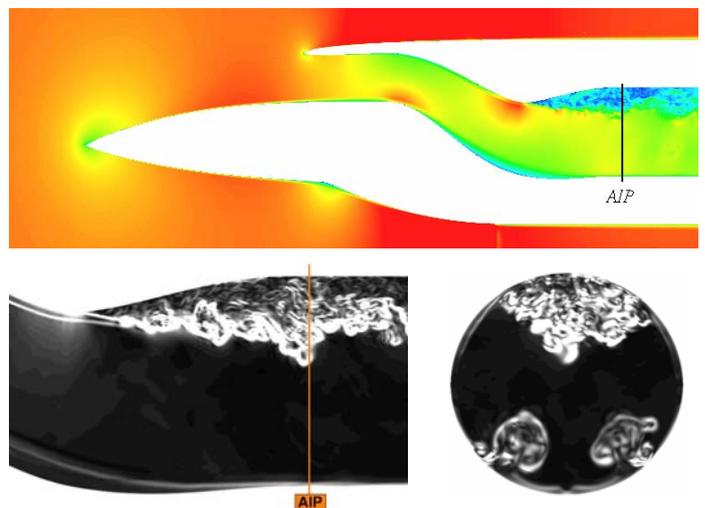


## INTAKE AERODYNAMICS – A GARTEUR SUCCESS STORY

Aerodynamic integration of intakes into the airframe of unmanned aerial vehicles assuring high performance and minimized aerodynamic drag is of vital importance for innovative vehicle configurations. The accurate prediction of the instantaneous total pressure distribution in the aerodynamic interface plane as the basic parameter for the assessment of dynamic intake distortion and engine/intake compatibility is a key for successful design and for reducing system development time and cost.



Modern Computational Fluid Dynamics methods such as Detached Eddy Simulation (DES) to analyze unsteady flow phenomena are a vital means for improving performance prediction capabilities and thus possess a great potential to support efficient design for highly integrated low-observable intakes of advanced aerial vehicles.

Based on a strong commitment of the AD-GoR to the application of CFD methods, several Action Groups have been addressing research areas within the field of intake aerodynamics with enhanced emphasis on dynamic simulations of internal flow fields applying hybrid methods:

**AD/AG-34 Aerodynamics of Supersonic Air Intakes**

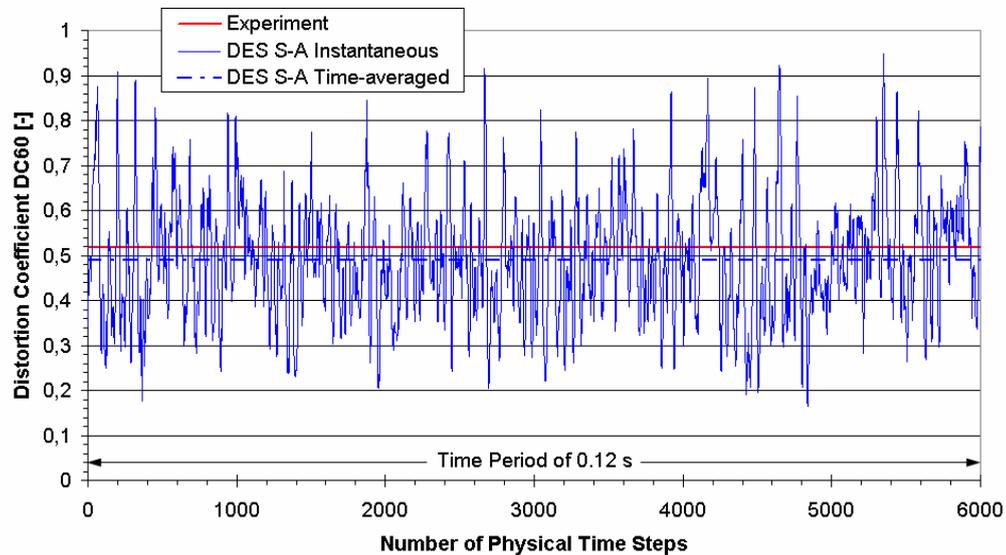
**AD/AG-43 Application of CFD to High Offset Intake Diffusers**

**AD/AG-46 Highly Integrated Subsonic Air Intakes**

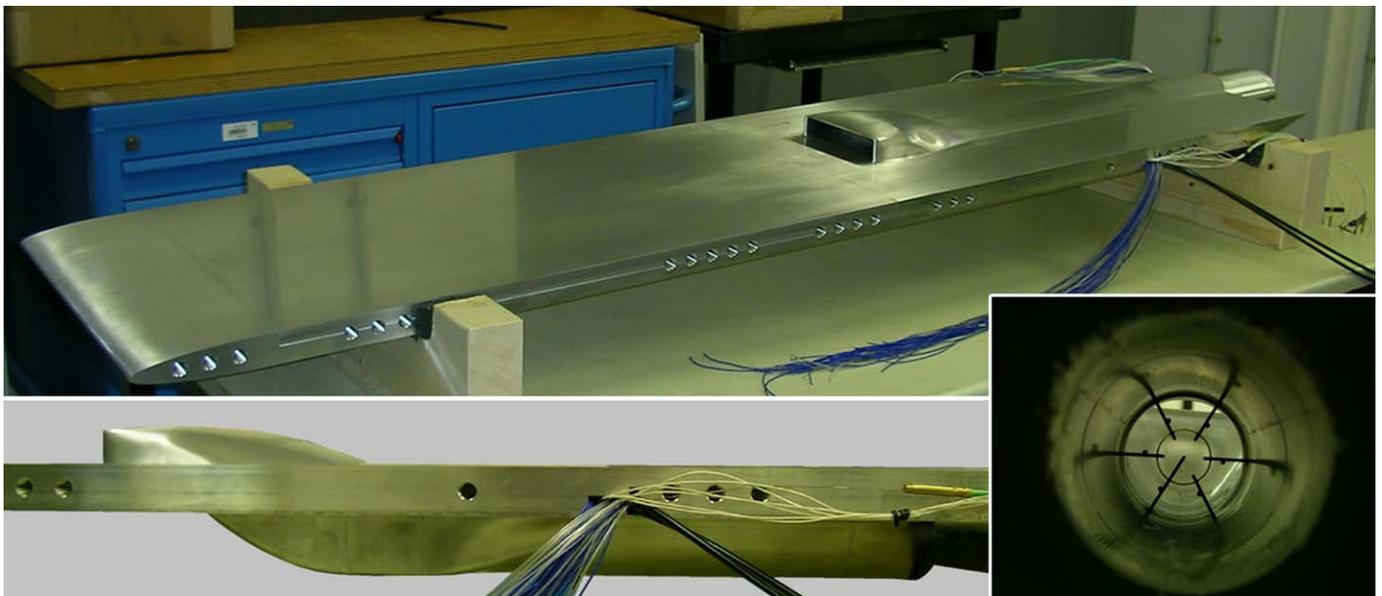
**AD/AG-49 Scrutinizing Hybrid RANS-LES Methods for Aerodynamic Applications**

These Action Groups investigated the capability of advanced CFD techniques for predicting complex internal flow phenomena and supported the improvement of numerical tools for time-accurate predictions of intake performance parameters. They essentially contributed to prepare the groundwork for engine/intake compatibility assessment with accuracy levels meeting industrial demands. Mid-term prospects for fulfilling these requirements and for successfully applying these methods for project oriented work are considered most promising.

Sharp Intake Cowl: Mach 0.80, Mass Flow 3.97 kg/s



Besides numerical simulations fundamental experimental investigations of decisive intake design parameters were performed, advancing the knowledge innovative configurations of compact air induction systems require.



In summary, dedicated joint European efforts coordinated by GARTEUR Aerodynamics Action Groups led to the advancement of hybrid numerical simulation methods and an improved understanding of complex instantaneous internal flow fields, thus preparing the basis for future time-accurate predictions of vital performance parameters, such as dynamic intake distortion and engine/intake compatibility, with accuracy levels meeting industrial requirements.