

# Progress in Optical Measurement Methods in Cryogenic Conditions

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## Abstract

In the project DESIREH the development of aerodynamic measurement methods aimed at improving the capability to use in an industrial way, such advanced measurement techniques within the same test campaign. In parallel with conventional techniques (balance and pressure measurement) these advanced techniques are:

- *Model deformation measurement*: high Reynolds are partly obtained at the expense of high pressure increasing model deformations. Resulting geometry changes affect the local flow and any comparison with sophisticated CFD methods has to be based on an exact knowledge of the geometry during testing.
- *Boundary layer transition detection by either TSP or hot films*, as the transition position has also an impact on achieved aerodynamic performance.
- Flow visualisations *Particle Image Velocimetry (PIV)*, in particular downstream the wing trailing edge, enhances the aerodynamic behaviour understanding and potentially enables to assess the local drag.

A particular concern is to run such advanced techniques in accordance to industrial development constraints. Indeed, nowadays, providing additional measurement capabilities or systems generally extends the testing period and, hence, test cost. The DESIREH project orientates the measurement techniques development taking care to limit such productivity and cost impacts. The main idea was to develop systems (including tunnel main control and data acquisition systems) targeting for a more or less simultaneous operation of all techniques to be applied in the scheduled wind tunnel entry. The model itself shall be designed in accordance with all this techniques at the same time.