

<p style="text-align: center;">Research program: <i>“Analysis of Inlet flow angle effects on film cooled nozzle vane cascade performance”</i></p>

Annex C

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Research project

The experimental research activity is divided in the following steps:

1st Step: Wind tunnel set-up: the wind tunnel inlet section will be modified to realize the inlet flow angle variation in the range $\pm 20^\circ$. Preliminary tests will be carried out to check the achievement of the desired inlet flow angle.

2nd Step: Aerodynamic tests on the uncooled cascade: for every inlet flow angle secondary flows structure, profile and secondary losses and vane load distribution will be measured. This investigation will be carried out by means of a 5 hole aerodynamic pressure probe, an instrumented vane and oil&dye surface flow visualizations.

3rd Step: Aerodynamic tests on cooled cascade with both vane and platform cooling: for each inlet flow angle, secondary flows and losses will be measured for variable coolant injection conditions.

4th Step: Thermal tests on cooled cascade with both vane and platform cooling: for each inlet flow angle film cooling effectiveness will be measured both on the vane surface and on the platform for variable injection conditions. Thermocromic Liquid Crystal technique will be used for the platform investigation while Pressure sensitive paint will be used for the vane investigation.