Research program:
"Analysis of Inlet flow angle effects on gas turbine nozzle vane cascade with showerhead cooling"

Annex C

Department of Engineering and Applied Sciences

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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 +/-10°. Preliminary tests will be carried out to check the achievement of the desired inlet flow angle.

2nd Step: Aerodynamic tests on the cooled cascade (vane showerhead cooling): for every inlet flow angle secondary flows structures and related losses will be measured. Two showerhead cooling schemes will be investigated, both featuring a shaped exit section but with different hole spacing in the streamwise direction. This investigation will be carried out by means of a 5 hole aerodynamic pressure probe traversed downstream of the cascade.

3th Step: Thermal tests on cooled cascade with vane cooling: for each inlet flow angle and both the cooling schemes film cooling effectiveness will be measured for variable injection conditions. Thermocromic Liquid Crystal (TLC) technique and Pressure sensitive paint (PSP) will be used for this investigation.