

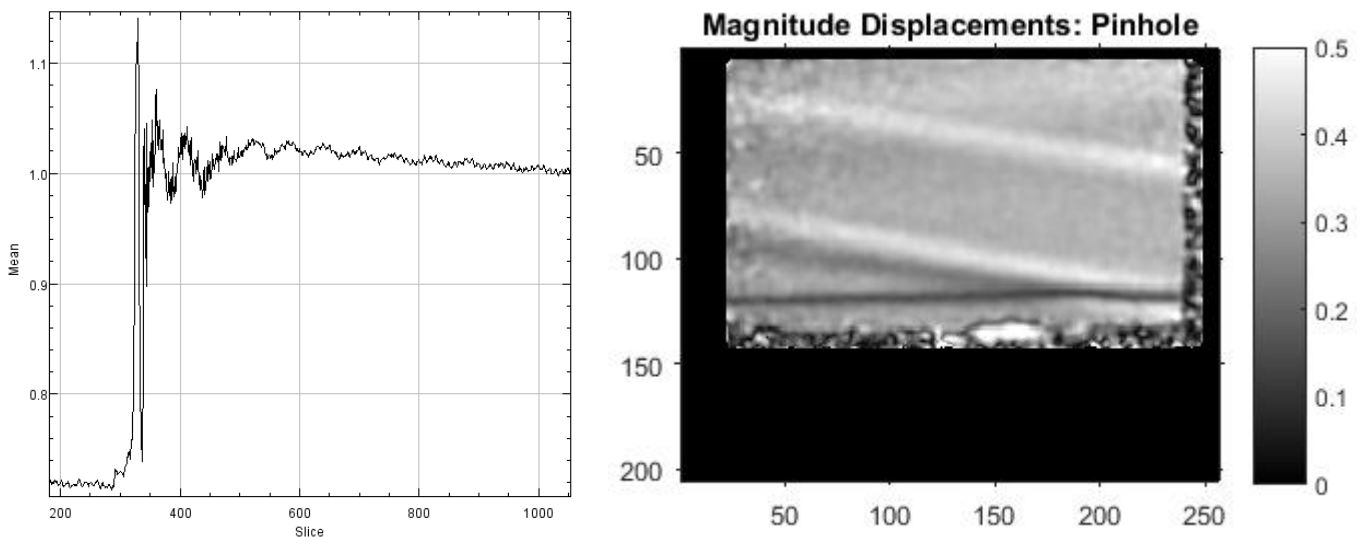
Investigation of pressure-sensitive paint applications to high-speed cooling flows

SRV by Dr Mark Quinn and Mr Tom Fisher to work with Prof Matt McGilvray and Prof Peter Ireland

The purpose of this visit was to apply optical fluid measurement techniques developed and refined at the University of Manchester (UoM) to challenging flow environments at Oxford University. Several runs of the High Density Tunnel were conducted to evaluate if Background Oriented Schlieren (BOS) was a suitable technique to use in this facility. Initial results look good and just using a basic Matlab-based processing algorithm, flow features were clearly discernible.

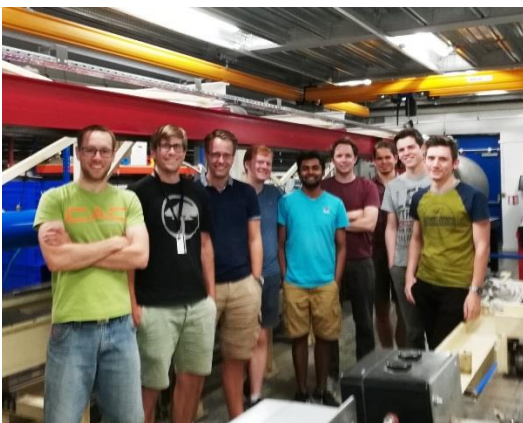
In addition to BOS, pressure-sensitive paint (PSP) was discussed at length in both a turbine cooling context and in high speed external aerodynamic measurements. Given the short timescales of such a visit, it was not possible to complete successful tests; however, masters-level research projects are about to begin to improve the chances of successful collaborations in this area too. Improved processing of existing PSP data was discussed and trialled yielding significantly better results.

Given the improvements that can be generated through optimisation of such an optical arrangements, there are plans to collaborate together in the future on subsequent tests.



PSP response as the High-Density Tunnel shuts down (left) and BOS of flow field (right).

The PSP response displays the stopping process of the high-density tunnel, showing the fast response of the PSP to measure the oscillating pressure field. The BOS data shown on the right has been processed as if it were a pinhole schlieren image (the colourbar shown on the right is of displacement magnitude in pixels).



Most of the research team for the week