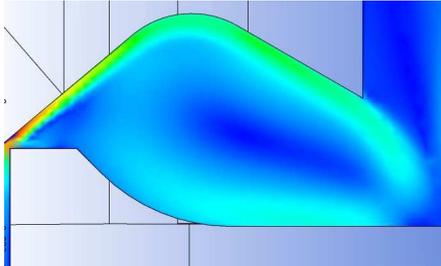


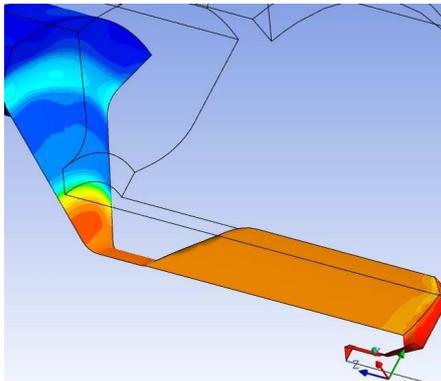
Consultancy Project

MODELLING OF A RELIEF VALVE



Engine control valves

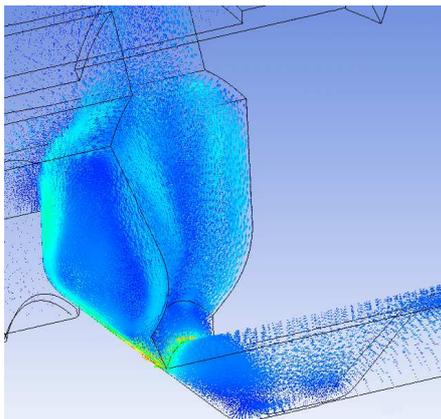
Relief valves are used in aerospace applications as part of the control system regulating the supply of fuel to the engine. The dynamic behaviour of such valves can influence the response of the aircraft. It is important for a relief valve to have performance appropriate for its application.



Valve simulation

In a consultancy project, PTMC experts have investigated a new type of relief valve using numerical simulations. A CFD model of the valve was produced using ANSYS CFX and the flow and force characteristics determined. The sensitivity of the results to differences in flow rate and other parameters was also explored.

A dynamic simulation model of the valve was produced using data from the CFD studies. Variations in flow rate and pressure drop were predicted over typical operating cycles. The stability of the valve following cracking was of particular interest to this investigation. Results were compared with experimental data from related studies.



Simulations were carried out for several variations in valve geometry. For each case the fluid mechanics were evaluated and the results integrated with the dynamic model. Comparisons were made between the post-cracking behaviour of the different designs. Inferences were made about the influence of geometry features on valve behaviour.

Results

Comparison with supplied experimental data has allowed CFD to be evaluated as a design tool for relief valves. Particular attention has been applied to how accurately system characteristics can be captured where the solution is sensitive to small changes in valve geometry.

Simulations have given insight into the physical causes of the relief valve behaviour. The effect of geometry parameters on valve performance has been evaluated, and it has been determined how solutions can be extended to different sized valves and operating conditions.

