UNIVERSITY OF
Southampton
School of Engineering Sciences

Spitfire High-performance Computing Cluster

Technical Computing @ Microsoft

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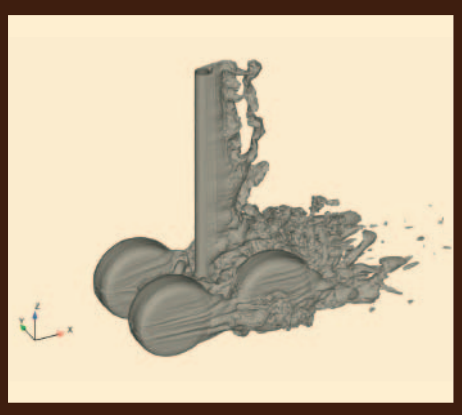
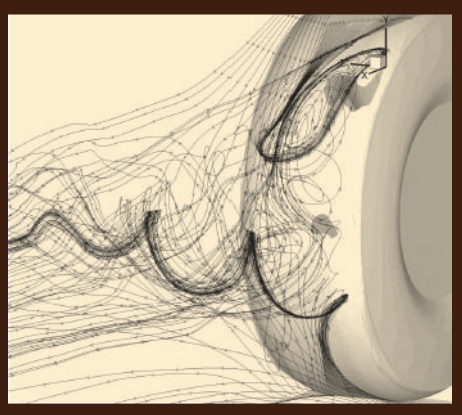
In summer 2006 the University of Southampton acquired the Spitfire Computing Cluster with US$1.1m of support from the Microsoft Corporation. This funding was part of Microsoft's Technical Computing programme which has three core strands:

- **Advanced Computing for Science and Engineering**
  Application of new algorithms, tools and technologies to scientific and engineering problems;
- **High Performance Computing**
  Application of high performance clusters and database technologies to industrial and scientific applications;
- **Radical Computing**
  Research in potential breakthrough technologies.

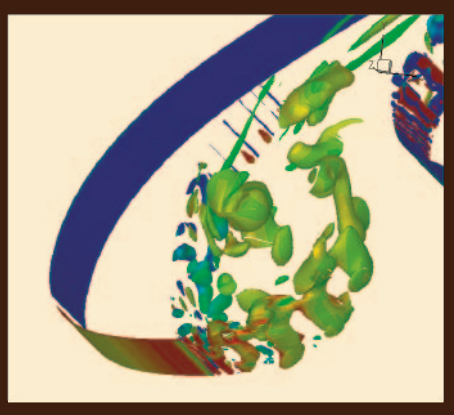
Vorticity behind a single wheel



Isosurface of vorticity magnitude



Flow paths behind a wheel

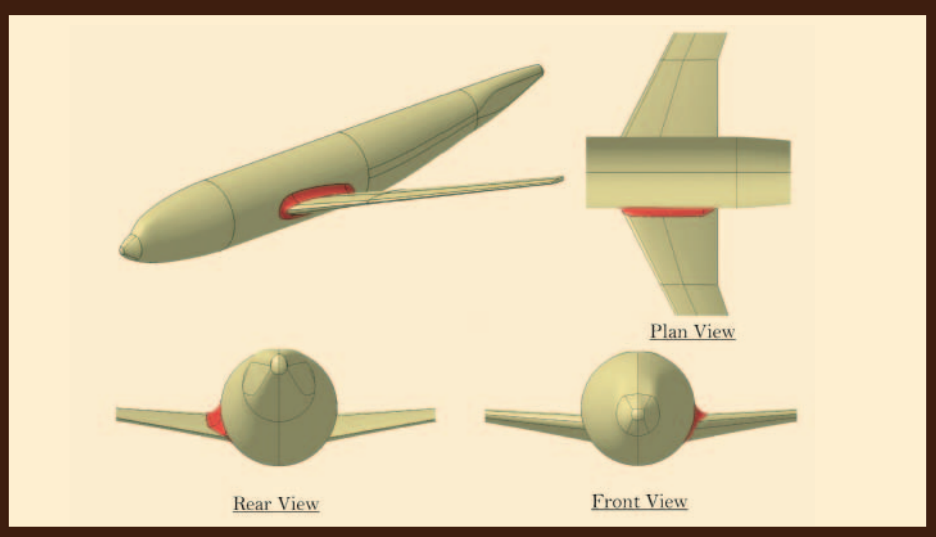


Q ISO surface coloured with z-vorticity in the slat cove region of the high-lift system.

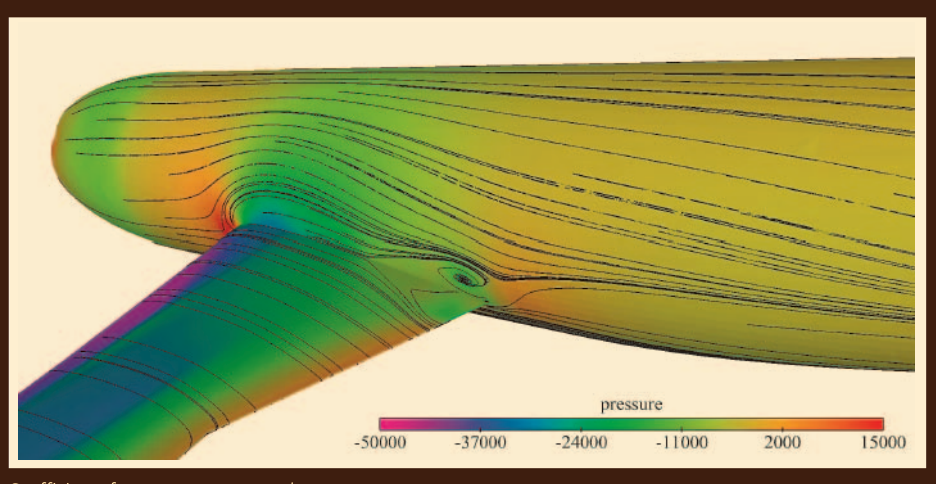
The Spitfire cluster allows industry and academics to work on their codes in collaboration on a machine operated using the Microsoft Windows 64 bit high-performance computing (HPC) platform, MS Compute Cluster Server (CCS). The project aims to demonstrate the use of such clusters for the support of complex engineering calculations, for example geometry changes to aircraft features and aeroengine components using computational fluid and structural mechanics. Typical work carried out at Southampton in this area includes research into internal and external flows around aircraft jet engines, aeroplanes, Formula 1 race cars, and the hulls of yachts as well as the structures of biomedical implants and novel nano-scale photonic crystal devices.

The cluster is named after the legendary World War Two Spitfire fighter plane which was designed in Southampton in 1935 by R J Mitchell. The Spitfire had a Rolls Royce engine and the Company has strong research links with the University today. Users of the Spitfire Computer cluster include a range of engineers in the University's School of Engineering Sciences, including those from the Computational Engineering and Design Group (CEDG), as well as collaborators from industry and other academics logging in over virtual private networks (VPN) or web-based interfaces.

The Microsoft Corporation has a long-standing relationship with Southampton, particularly in relation to high performance computing and Southampton has well-known expertise in the use of computational methods in design and analysis, both with Windows systems and Microsoft products. The University was also an early-adopter of web services for grid computing with acknowledged expertise in this area.



Base geometry with initial radial fairing



Coefficient of pressure contours on base geometry

www.soton.ac.uk/ses/research/ced/posters.html | email: andy.keane@soton.ac.uk
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