

# Microsoft Institute for High Performance Computing

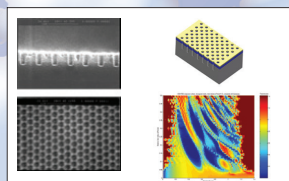
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The creation of the Microsoft Institute for High Performance Computing (which is one of only ten worldwide) at the University of Southampton was announced by Microsoft's Bill Gates during his conference keynote speech at Supercomputing 2005 in Seattle. Located in the School of Engineering Sciences, the Institute pushes state-of-the-art technologies to engage in the solution of complex scientific, computational and engineering problems.

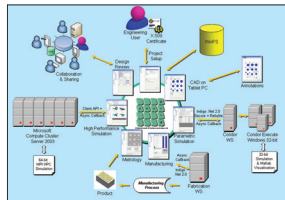
World-class researchers in the School of Engineering Sciences work closely with industrial partners that span the aerospace, automotive, bioengineering, marine, and telecommunication sectors.

**Professor Simon J Cox:**  
*'Our aim is to demonstrate why, where, and how we are exploiting current and future Microsoft tools and technologies to make the engineering design process faster, cheaper and better.'*

**Engineering design**  
Engineering design is an iterative, multidisciplinary process that is often data intensive and computationally expensive due to the application of high fidelity analysis models for the simulations of multi-physics phenomena.



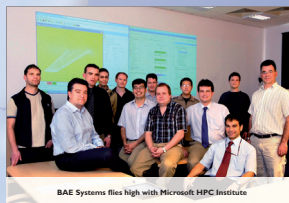
Computational Electromagnetics in Photonic Crystal Research



Microsoft tools and technologies for secure, high-performance engineering design search

The application of high-performance numerical optimisation techniques in engineering design using sophisticated modelling and analysis tools also provides a vital competitive edge to both, companies and research institutions. Engineering design has become increasingly dependent on computing and IT to underpin the process of design from initial modelling and analysis through optimisation to fabrication and testing of prototypes.

**Research & Development**  
Early developments and demonstrations include secure service-oriented high-performance compute access to compute cluster server web-services from a Tablet-PC client software program initiating 64-bit MPI applications.

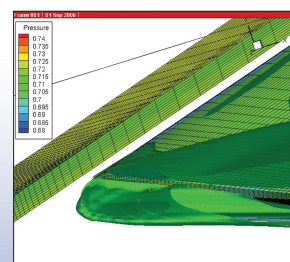


Microsoft supported a proof-of-concept demonstrator for BAE Systems, for which the Institute provided resources and knowledge in these new technologies.

The PoC demonstrator highlighted the potential of workflow-based high-performance CFD applications with SQL Server backed persistence in BAE's industrial aerospace engineering environment.

In addition, the institute carries out Grid computing research which has led to the development of a Globus interface for the Microsoft Compute Cluster Server which provides interoperability between pre-existing Grid-based workflows and Microsoft-based applications.

**Applications**  
Research applications currently in use on the high performance cluster include global earth weather system modelling, aerospace engineering, aeroplane noise reduction, electromagnetic design optimisation, and Biomolecular projects.



High-order computational aerodynamics simulation of 3D flap-side edge vortex, vorticity iso-surface shown

**Resources**  
Research projects are carried out on the Southampton High Performance Compute Cluster with 152 processor cores, which have a combined memory of 400 Gigabyte RAM and a back-end filestore of 4 Terabytes which provides backed-up data facilities for results from the high-capacity (high-throughput) and high-capability (high-performance) computational simulations.

**Dennis Crain of Microsoft:**  
*'It's an exciting opportunity to have a top engineering school such as Southampton use Microsoft software to solve tough engineering research problems. In this way Southampton will help refine future versions of our new high performance computing product, Windows Compute Cluster Server.'*