AWE

Supercomputing

Following major upgrades in supercomputing resources at AWE, the focus during 2003 moved to increasing operational reliability. We achieved an average availability exceeding 97 per cent on our Blue Oak computer, which is capable of making three million million calculations per second. This was an exceptional level of availability for this scale of computing.

Supercomputing developments are allowing our scientists and engineers to perform groundbreaking simulations in diverse fields ranging from molecular dynamics to dense plasmas and massive finite element models.

In 2004 we plan to begin the two-year project that will introduce the next level of computing at AWE. We will also continue a programme of applied computer science research and development.

Advances in maintenance techniques

AWE has embraced research and development across all business areas.

For example, during 2003 our maintenance staff employed innovative techniques to support the Company's business-centred maintenance strategy. A number of new technologies were introduced to assess the condition of plant and equipment and to improve reliability.

A new, extremely successful strategy has been the introduction of condition monitoring rounds where craftsmen are actively encouraged to use these modern technologies to assist in condition assessment and fault-finding.

For example, infrared thermography provides a cost effective way to inspect the condition of flat roofs and to increase accuracy in high-precision machining. Ultrasound is used to identify leaks on pressurised gas and water systems as well as detecting distressed machine bearings. Ground pulse radar has been introduced to evaluate the integrity of flooring and condition of steel reinforcement, as well as the thickness of concrete.

Using Advanced Science and Engineering to help National Security

In today's complex world, AWE's science and technology expertise plays a key role in maintaining the UK national security through our integrated threat reduction programme directed towards supporting the intelligence communities, non-proliferation commitments and a capability to respond to national emergencies.

An AWE cross-directorate team played a crucial role in designing, developing and subsequently manning a mobile field laboratory in support of Operation Telic – the deployment of UK assets to the Gulf in support of the recent Coalition action.

Espial, a cross-directorate project to help formulate future threat reduction requirements for non-destructive evaluation capabilities, incorporated 'blind testing' of unknown objects comprising fissile material. These objects were presented to AWE teams and colleagues from the international community (including participation from six US laboratories).

Looking to the Future

Our capability programme provides the impetus for an enduring science and engineering base at AWE.

Disciplines such as theoretical and experimental physics, mathematics and modelling, materials science, chemistry and engineering, need to be integrated through common aims. Our development of systems thinking is key to bringing these disciplines together within a programme framework to allow key skills to develop for the future.

The AWE Discretionary Research Fund has been established to maintain and enhance AWE's technical excellence by providing opportunities for both young and established scientists and engineers to work on innovative ideas which are not specifically funded from the current programmes.

A continued strong element of discretionary research is encouraged to provide freedom for innovative thinking, strengthening of the research base and to widen awareness of the scientific and engineering excellence at AWE.

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1 'Blue Oak' supercomputer

2 Infrared thermography in use