



Fusion Business

tomorrow's technology for today

MAJOR CONTRACT FOR LONG TIME FUSION RESEARCH SUPPLIER

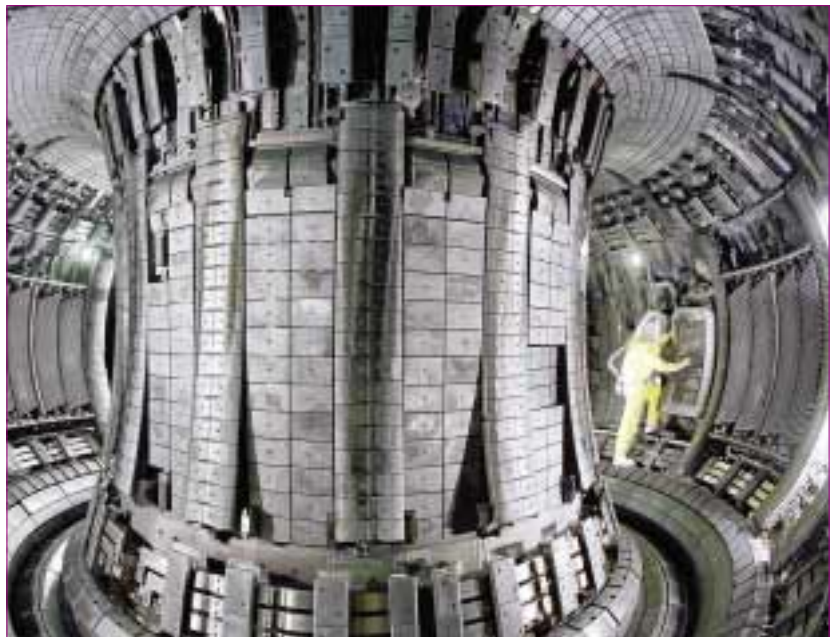
Dunlop Aerospace of Coventry has won a contract worth more than 500,000 Euros to supply materials for the European JET fusion machine at the Culham Science Centre.

Dunlop Aerospace will supply 150 high purity Carbon-Carbon (C-C) composite tile blanks to clad metallic parts of the wall. The tiles will prevent plasma contact with the vessel wall and other devices protruding from the wall such as antenna structures.

Since the mid 1980s, Dunlop Aerospace has worked closely with fusion projects in Europe and North America to develop and manufacture C-C for plasma facing components for first wall and divertor applications. Their work with fusion has been in environments where the properties required are similar to those needed in aircraft friction materials, namely, the ability to transfer large heat fluxes, retention of strength at elevated temperatures, and low density.

Dunlop Aerospace has supplied approximately 6 tonnes of C-C tile blanks to fusion facilities at JET, UKAEA and other projects worldwide, and taken part in European funded work to develop C-C with improved thermal properties to meet the expected service requirements of next generation fusion machines. C-C consists of carbon fibres in a matrix of carbon. For most applications, friction and fusion included, the C-C is heat-treated at temperatures in excess of 2400°C to optimise thermal properties.

Dunlop Aerospace manufactures C-C materials primarily for use as friction discs in aircraft brakes, but also for non-aviation friction applications,



including train brakes and brakes and clutches for Formula 1 racing cars. C-C is also manufactured for non-friction applications such as high temperature furnace furniture, furnace heating elements and heat sinks for satellite electronics systems.

ITER TALKS MILESTONE

An historic milestone for fusion was achieved during negotiations on the next step ITER international fusion energy research project. Delegations from the People's Republic of China and the United States joined the four existing ITER parties, Canada, the European Union, Japan and the Russian Federation.

For full details and the latest news on progress on ITER see inside.

ITER TALKS MILESTONE

(Continued)

In February, delegates from the People's Republic of China and the USA joined the ITER parties at the negotiations meeting in St. Petersburg, Russia, and confirmed their countries' commitment to participate in ITER.

The Head of the Chinese Delegation indicated that China, as one of the largest developing countries in the world, has a great need to pursue alternative energy sources. China believes that ITER can potentially lead to a new form of energy and contribute to the peaceful and sustainable development of the world in the long-term. The United States Head of Delegation noted that President Bush had announced in January 2003 that his country would rejoin ITER.

The participation of China and the USA will be of great benefit to the project, enhancing prospects for its early success in developing fusion as a future energy source.

At the meeting, negotiators also approved the Report of the Ad Hoc Group on the Joint Assessment of Specific Sites (available at www.iter.org/jass) which confirms that all four potential locations – Cadarache in France; Vandellós in Spain; Rokkasho-mura in Japan and Clarington in Canada – meet the criteria established for the location of the ITER project, although there are different strengths and weaknesses for each site.



The Fusion and Industry team is compiling a directory of company profiles (see example above) for the ITER procurement team and engineers and scientists in European fusion laboratories. The directory will give a quick reference source on the skills and technologies available from UK companies, including contact details, examples of products, specific expertise, industrial experience, R&D capabilities, quality assurance and process technology. Suppliers who would like to feature in the directory should contact denise.willis@ukaea.org

GOVERNMENT VIEW ON FUSION

Fusion was the subject of favourable comment in the long awaited Government White Paper on Energy, published in February. The full document is available at www.dti.gov.uk/energy/whitepaper/index, but the extract on fusion said: "In the long term, nuclear fusion could provide power generation from an abundant fuel source with zero carbon emissions and without the problems associated with long-term highly radioactive waste. We are a long way from a commercial power plant, but the technical feasibility of fusion power generation could be demonstrated within 25 years given adequate resources, possibly leading to full-scale power generation within 30 years.

The next step towards this is the construction of ITER and the International Fusion Materials Irradiation Facility (IFMIF). We expect ITER to lead, by the middle of this century, to the commercially viable production of clean, safe and renewable energy without the emission of greenhouse gases. The UK has considerable expertise in fusion and a complementary national fusion programme will also be needed to maximise the benefit from this expertise."



Electrical engineers were given an insight into the challenges and joys of starting their own business at a recent meeting of the Oxfordshire Branch of the Institute of Electrical Engineers (IEE), held at the Culham Innovation Centre.

Supported by Oxford Innovation, and sponsored by the Southern Oxfordshire Enterprise Hub (SOEH), presentations included the basics of starting a business and information on support agencies, together with case studies. IEE Oxfordshire chairman Peter Wherritt, himself a veteran of two start ups, says: "The meeting was aimed at people thinking of starting a technology business or those who already have. We wanted it to be both informative and thought provoking."

For further details contact Peter.Wherritt@tssi.co.uk

NEW TENANTS, NEW PROJECT, AT CULHAM INNOVATION CENTRE



Ken Richards

Culham Innovation Centre has two new start-up companies: Success Unlimited, a specialist in identifying and dealing with workplace bullying, and motivation training and engineering company, KenCAD.

Founded by Ken Richards, KenCAD offers design and supply services for electromechanical engineering projects. His background includes power generation and magnet design among other things. "The Innovation Centre is an ideal place to base KenCAD given the need for high quality engineering services in Oxfordshire and the Thames Valley," said Ken.

Meanwhile, Culham Innovation Centre-based Toumaz Technology is playing a key role in a Government sponsored LINK project 'Ubiquitous Computing for Healthcare in the Community', developing ways of using technology to improve healthcare.

Toumaz low power technology is being used to power a body sensor which is positioned next to the skin and will monitor vital body functions. Measurements can then be transmitted to, for example, a mobile phone. With the advent of 3G communications it will be possible for the phone itself to process sensor signals and trigger a call to emergency services should a problem arise.

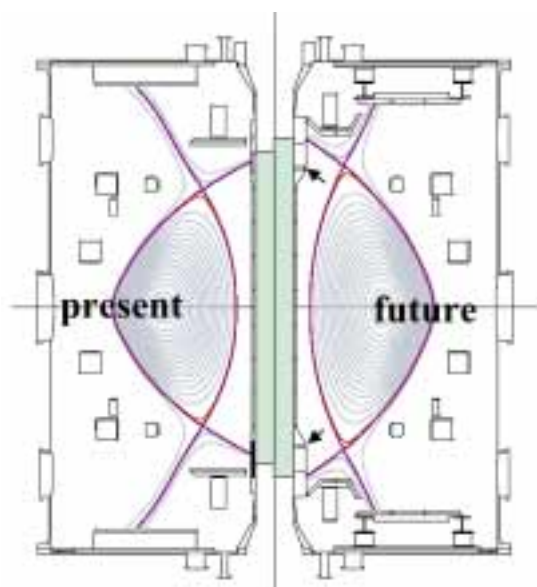
The 'Ubiquitous Computing for Healthcare in the Community' project is being led by the computing department of Imperial College. Toumaz is responsible for two parts: signal processing for the sensors and transmission of the signal over radio links. Until now heart monitoring has been done using an implant, which means surgical intervention, or using a matchbox-sized external sensor with a very short battery life. The Toumaz device is expected to be the size of a 20p piece and have a battery life of 10 years.

For more on these companies visit: Toumaz Technology at www.toumaz.com, Success Unlimited at www.bullyonline.org, KenCAD at www.kencad.co.uk

MAST MODIFICATIONS FOR IMPROVED PERFORMANCE

UKAEA's fusion research flagship, the Mega Amp Spherical Tokamak (MAST) at the Culham Science Centre, will be subject to significant changes during a nine month shutdown beginning in July. The changes will include a new central solenoid and an upgrade to the divertor and in-vessel armour, as MAST is prepared for a new experimental programme of higher power, longer pulse lengths.

In parallel with modifications to the MAST machine, the neutral beam injector heating system is being upgraded for longer pulse operation at high power. This follows the installation in Autumn 2002 of a 60GHz microwave antenna for a new heating scheme at the 1 MW power level. "As we increase the heating capacity so we need to increase MAST's power



Changes to MAST machine configuration as a result of the new modifications

handling ability", says Brian Lloyd, Tokamak Development Programme Manager.

The longer pulse lengths at high power, together with the divertor improvements, will allow fusion researchers to better address steady state issues.

"Our research dovetails with the development of ITER," explains Brian Lloyd. "The MAST spherical tokamak allows access to extremes of plasma parameters in operating regimes common to ITER and in so doing provides improved insight into the

underlying physics and helps to improve predictions of how plasma behaviour will scale to ITER."

Your view: Are there topics you would like to see covered in Fusion Business; do you have comments on this edition? If so, please contact **Deniese Willis** on **01235 466608** or email deniese.willis@ukaea.org.uk

TECHNOLOGY 2003 EXHIBITION

This year's Nu-Tech Associates, Technology 2003 exhibition at the Culham Science Centre attracted a large number



Pictured left to right is UKAEA's CEO, Dr John McKeown talking to John Smith from Alstec Ltd. of scientists and engineers from Culham and Harwell.

The exhibition began with an evening VIP reception and preview held by Nu-Tech for UKAEA directors and guests. In total 30 exhibitor companies offering a wide range of engineering and services, including vacuum systems and instrumentation through to decommissioning, waste management and process control, were on hand to



present their solutions.

Rob Buckingham, managing director of OC Robotics, a UK-based manufacturer of snake-arm robots, welcomed the opportunity to exhibit at Technology 2003. "The snake arm robot is ideal for any working environment where you want to perform hazardous tasks remotely. A specialist show such as this is great because it attracts visitors who are faced with overcoming the types of problems our robotic arm was designed to handle safely," he said.

The Technology Exhibition builds on the success of the individual supplier exhibitions that are now a regular feature at Culham. Planning is already underway for next

Rainbow Seed Fund

year's Technology Exhibition which will also include a BNES seminar at Culham.

Fusion scientists at Culham have already come up with a number of projects which could benefit from the Rainbow Seed Fund. The Fund was set up to help government researchers take new ideas to market. A team of Fusion & Industry 'champions' is helping to identify potential opportunities and encourage the generation of business ideas.

A team at CCLRC's Daresbury Laboratory in Cheshire has become the first to enter into an exploitation agreement with Rainbow for a project involving fluorescence lifetime-based



CCLRC's Dr David Clarke and Professor Gareth Jones who have been responsible for the project report

cholesterol assays. Rainbow funding of £13,000 will help to bring the technology closer to exploitation.

Cholesterol is essential to body function; in blood it is coated with proteins so that it can be moved around. These coated particles form products called lipoproteins. CCLRC, in collaboration with several Russian scientists, has developed a rapid method of determining the full lipoprotein panel in blood. There is a link between the level of cholesterol in blood and heart disease, but the overall level of cholesterol is a poor predictor of risk. In fact, risk is closely linked to the relative concentrations of lipoproteins present.

Culham Industry Liaison Co-ordinator, Miriam Mason, says: "This first Rainbow funded project sends a very positive signal to potential inventors that their ideas will be taken seriously. It shows that ideas offering new market opportunities can look forward to funding during the development stage. Here at Culham we hope to make our first Rainbow application soon." For

***Miriam Mason was invited to present a paper on "Educating for Innovation: Encouraging an Entrepreneurial Climate" at the 20th (IASP) International Association of Science Parks World Conference in Lisbon, Portugal, June 1-4, 2003.**