

Tesla Wins First ITER Contract

Specialist in the design and manufacture of electromagnetic systems, Tesla Engineering Ltd has been awarded its first ITER contract by the European Fusion Development Association (EFDA).

Tesla is to fabricate a poloidal field conductor insert (PFCI) superconducting model coil that will give scientists an insight into the behaviour of high current niobium-titanium (Nb-Ti) cable-in-conduit conductors and related joints under operational conditions designed to simulate the ITER poloidal field coils.

Using superconducting cable supplied by the Russian Federation Participant Team which has been jacketed into square stainless steel tubes, Tesla will wind the jacketed conductor into a single layer coil with superconducting terminations to connect to electrical and liquid Helium supplies in the test rig. The coil will be equipped with various diagnostics such as inductive heaters, temperature and pressure transducers and other sensors to measure the performance of the conductors and joints under large magnetic fields.

International Connections

This is a truly international project. The coil will be tested at the SULTAN facility at the Paul Scherrer Institute in Switzerland. Here the coil, which represents a small sample of the poloidal field coil that will eventually be used in ITER, will be subjected to



Model of the PFCI insert coil and support structure

a large magnetic field up to 6 Tesla – ITER conditions. It will then be shipped to the JAERI test facility in Japan where it will be inserted inside the bore of the ITER central solenoid coil for testing up to 13 Tesla. During the tests liquid helium will cool the coil while stainless steel supports and tie rods will be added to strengthen the coil in the face of the

Based at Storrington in West Sussex, Tesla Engineering was established in 1973. The company now employs approximately 150 people. Tesla Engineering specialises in the design and manufacture of electromagnetic systems for Magnetic Resonance Imaging (MRI), particle accelerators used in semiconductor, medical and scientific instrumentation applications and nuclear fusion.

tremendous stresses generated under ITER simulated conditions.

Mike Begg, Chief Executive, Tesla Engineering Ltd, welcomes the opportunity to work on Nb-Ti superconducting cable. He said "Working on this project has given us a valuable insight into Nb-Ti fabrication issues and has presented us with numerous technical challenges which we have met successfully. In particular the requirements of the superconducting joints, forming the large stainless steel jacketed superconductor to tight tolerances and material requirements for composite/coil assembly."

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Fusion and Industry ITER Suppliers Directory – Call for Phase 2

In the May edition of Fusion Business we reported on the ITER directory of company profiles the Fusion and Industry team were compiling for the ITER procurement team and engineers and scientists in the fusion laboratories across Europe.

The directory is designed to give potential purchasers a quick reference source on the skills and technologies available from UK companies. Each company profile includes a description of the company and contact details, examples of products, specific expertise, industrial experience, R&D capabilities, quality assurance and process technology.

We are pleased to report that Phase 1 of this directory is now complete with approximately 50 company profiles (see photo below). This directory can be accessed on our website very soon. www.fusion.org.uk/industry.

Would you like your company to appear in Phase 2 of the directory?

We already have several companies signed up for Phase 2 of the directory, which will begin production very shortly. Suppliers who are interested in being included in the next phase of the directory should contact deniese.willis@ukaea.org.uk



South Korea joins ITER

At the end of May, South Korea indicated its intentions to current ITER participants that it would like to join in the ITER negotiations on joint implementation. Following on from this the Korean Ministry of Science and Technology announced that Korea had earned an ITER membership at working-level talks in Vienna, Austria, June 19. The ITER delegation discussed the extent of Korea's financial contribution to the project at a meeting on July 22 in Tokyo, Japan. It is anticipated that the Korean involvement will mostly comprise the supply of machinery and accessories for ITER.

Promoting Education for Innovation

Miriam Mason was recently invited to attend the International Association of Science Parks (IASP) World Conference at Estoril Portugal in her role as champion of innovation for the UK Fusion & Industry programme.

Miriam presented a paper entitled 'Encouraging an Entrepreneurial Climate' under the Educating for Innovation theme. "My reasons for presenting this paper were two fold" said Miriam. "To raise the profile of Fusion & Industry in an international arena and to network with other science park representatives to identify development opportunities and learn from best practice."

The paper outlined the approach being taken at Culham to encourage commercialisation of research - promoting cultural change and encouraging staff involvement in entrepreneurial activities. It also

emphasised the importance of Fusion & Industry taking a leading role in establishing a 'technical support network' serving science parks nationwide.

Miriam concluded, "Fusion & Industry is seeking to raise its profile outside the UK and to learn from the policies and practices of European institutions and science parks throughout the world. For this reason I was delighted to be invited to present a paper at the IASP Conference in Portugal in June. This was well received and the contacts made will be instrumental in expanding our networks for potential collaboration in serving the needs of industry."

People Spin Off

Profiling people who started their careers in fusion and are now using the skills they developed in other areas

Part Eight

Dr James Eastwood

James Eastwood began working with fusion at Reading University where his Post Doc included work in computer simulation for Culham. A graduate from Imperial College, London University James moved to Culham in 1978 working initially on computational physics, drift wave studies and tearing mode studies. Later he combined his fusion work with commercial work for outside organisations including coastal modelling for Anglian Water, wave/current interaction modelling for North Sea rig licensing and vacuum electronic device modelling for EEV.

Dr Eastwood now works for the Chelton Group as Manager of the Electromagnetics Division at Culham Electromagnetics and Lightning Ltd. This company is located at the Culham Science Centre, so he is able to stay in touch with many of his former fusion colleagues. Also for the last 20

years he has been Principal Editor of the journal Computer Physics Communications, and has kept in touch with fusion through teaching computational physics at the Culham Plasma Physics Summer School.

Dr Eastwood told Fusion Business, "Computational electromagnetics skills are vital for the advanced avionic and space component design performed by Chelton. I, and several others of my team, benefited by developing these skills whilst working on the fusion programme at Culham. We now have the satisfaction that our expertise is creating economic benefit through its application to real-world engineering."



As JET celebrates 20 years from first plasma, new innovations continue

June 25 1983 was the day that JET came to life with the first plasma. There were great celebrations even though a plasma of only 19 kA was achieved - JET was in operation. Twenty years later in 2003 JET is the physics model for ITER and enhancements and experiments with JET continue apace.

JET Enhancements

Enhancements are currently being conducted on JET - an upgrade of the heating and fuelling systems, divertor and diagnostics. Five additional MW of neutral beam (NB) heating power are being commissioned. An ITER-like antenna for Ion Cyclotron Resonance Heating (ICRH) is to be installed at the end of 2004 for use in 2005. The modification of the divertor will allow JET



Culham Innovation Centre

City Challenge expands with eight new locations

The popularity of City Challenge's stimulating and motivating corporate team building events away from the confines of the hotel conference room and boggy fells has allowed them to expand and add eight new city locations to their programme.

Based at Culham Innovation Centre City Challenge provides practical learning activities for the corporate sector without pushing participants to physical extremes but by exploiting general knowledge and orienteering skills. Corporate teams of eight to twelve members devise strategies for navigating around historic city centres while competing against the clock and each other.

City Challenge founder, Jane Read, said, "Oxford was our original location for the first City Challenge. This concept has proved so popular that we have now expanded into eight new locations including London, Bath, Cambridge, Chester, Dublin, Edinburgh, Stratford-upon-Avon and York to give our clients far greater choice. Many managers are now choosing City Challenge for their team building events as we sit comfortably between the two options of struggling through boggy fells and static conferences with power point

presentations. We offer a comfortable yet challenging experience spent both indoors and outdoors."

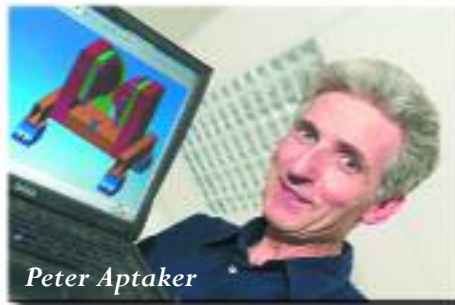
More information can be found at www.citychallengeuk.com or by calling 01865 408370.



Magnet Company attracted to Culham Innovation Centre

Laplacian, an innovative and award winning start up company that designs, manufactures and installs novel magnet systems used for Magnetic Resonance Imaging (MRI), has recently located to Culham Innovation Centre.

Laplacian Director Peter Aptaker has 30 years' experience in magnet technology. "We chose the Culham Innovation Centre for a couple of reasons," says Peter. "The site has an excellent reputation in science and engineering circles and we can benefit



Peter Aptaker

from the interaction with companies on the site who, like us, are interested in the application of magnets. We also hope to benefit from the UKAEA Technical Support

Package and access to the special engineering techniques used by fusion engineers."

The company's magnet systems are developed to address high technology magnet applications ranging from thin-film material studies such as watching paint dry to improved brain imaging through MRI. Earlier this year, Laplacian won a SMART award to develop technology for designing the next generation of gradient windings for MRI systems. This will allow Laplacian's product range and market to broaden considerably.

Mission to the Red Planet

Amid a blaze of publicity the Beagle 2 lander was launched on June 2 on the start of a six-month journey to Mars. As readers of Fusion Business will know, Fusion's Special Techniques Group has been working with the Open University's Planetary and Space Sciences Research

Institute over the past couple of years on the special bonding techniques used to develop the lander's Gas Analysis Package (GAP). GAP is part of a miniature laboratory that will search for evidence of life on Mars. Beagle 2 is expected to land on Mars on Christmas Day.



The Beagle 2 lander

to operate with up to 40 MW of heating.

Several of these projects involve US laboratories. The JET operational domain will be enlarged and better

diagnosed plasmas will be run with the ITER shape at higher power and plasma density, extending the exploration of key parameters, such as the normalised Larmor radius, closer to ITER.

Operation with Tritium

On 29th September 2003, JET Campaign C11 begins for five weeks. This marks a return to operation which will capitalise on two unique facilities of the JET device – the capability to run plasmas using tritium fuel and the use of tritium NB injection. JET has not operated with mixed deuterium-tritium

(D-T) plasmas since the record-breaking experimental DTE 1 campaign in 1997. The new campaign will focus on plasmas where the tritium is introduced into the plasma in 'trace' quantities. The presence of the tritium can be monitored to provide important information on thermal particle and fast particle transport. Twenty experiments are scheduled. The main topics are fuel-ion transport, fast-ion particle transport, comparative studies of fuel and helium transport, fuelling of internal transport barriers, ICRF heating of tritium minority ions and fast particle physics.



High power prototype of ICRF antenna being tested at ORNL

Culham hosts International Memorial to Derek Robinson

Senior fusion research scientists from all over the world joined colleagues, Culham staff and friends to take part in a day-long seminar, held as a memorial to Dr Derek Robinson FRS, who was the Culham Director at the time of his death in December 2002. Fulsome tributes were paid by leaders of the fusion community to Derek's work in international fusion research during his career of almost 40 years.

Derek's early work was described by Lord Flowers, Langworthy Professor of Physics at Manchester University where Derek studied and by Dr Bas Pease, former Culham Director. His

championing of an alternative line of research - the so-called "spherical tokamak" pioneered at Culham and subsequently taken up around the world - was detailed by Dr Martin Peng from the USA and Dr Alan Sykes of Culham.

Russian colleagues acknowledged the importance of his work in their country. Derek spent a year there in 1968 as part of a Culham team confirming Soviet claims for their fusion experiment. This work led to the subsequent development of the Russian "tokamak" machine as the main line of fusion research throughout the world.

His important role in the preparation for the next internationally funded fusion experiment ITER was recognised by speakers from Japan, China, the USA and mainland Europe. The decision on whether to go ahead with this multi-billion project is hoped for in early 2004.



"Derek would have felt all his efforts in pushing fusion research forward in both political and scientific spheres had been worthwhile if fusion energy became a reality for the next generation."

Benchmarking Exercise Highlights the Benefits of Shared Learning

Over the last few months Miriam Mason, Culham's Industry Liaison Co-ordinator, has been involved in a benchmarking exercise with selected European fusion associations and other comparable UK organisations to gather data on their entrepreneurial practices and policies.

Miriam said, "This exercise has provided a valuable source of learning in areas such as the strength of management leadership, promotion of commercial awareness and entrepreneurial training, and the perceived benefits of commercialising research, all of which will provide guidance for the

setting up or refining of our own policies in line with good practice."

"The results of the benchmarking exercise highlight particularly the significance of the human element in innovation and the role of a learning culture in encouraging entrepreneurial values."

New Contractors – New Look

Welcome to the first edition of the new look 'Fusion Business Newsletter'.

If you have any comments about the new layout, editorial or general comments on this edition we would be delighted to hear from you. Please contact Deniese Willis on 01235 466608 or e-mail - deniese.willis@ukaea.org

Fusion Support for UK Science Parks

Culham is hosting the September 2003 meeting of the UK Science Parks Association (UKSPA). This 2-day event will be held on 18/19 September, for representatives of science parks and the business community.

Culham's Industry Liaison Co-ordinator Miriam Mason said, "Delegates will be offered an entertaining and varied programme including talks on the theme of innovation and the opportunity to see at first hand the excellent facilities which the Centre has to offer. As a member of UKSPA, Culham Science Centre has been using networking activities with other member science parks to promote the use of fusion technology in industry."

In addition to representing UKAEA Culham Division at UKSPA meetings, Miriam Mason is a member of the panel reviewing a research project designed to gather valuable data on science park performance and trends. It is hoped that this project will enable Fusion & Industry to identify the specific technology needs of companies on science parks and to set up a technical support network to provide fusion-based solutions where appropriate.

A full report of this event will appear in the November issue of Fusion Business.



New Fusion with Industry Brochure

Watch out for our new Fusion with Industry Brochure summarising the technology transfer activities undertaken by the Fusion and Industry team. This will be sent to all Fusion Business readers with the next issue.

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