

## 9 Industry

### 9.1 INTRODUCTION

The Fusion and Industry programme has two main tasks which are pursued via a wide range of activities:

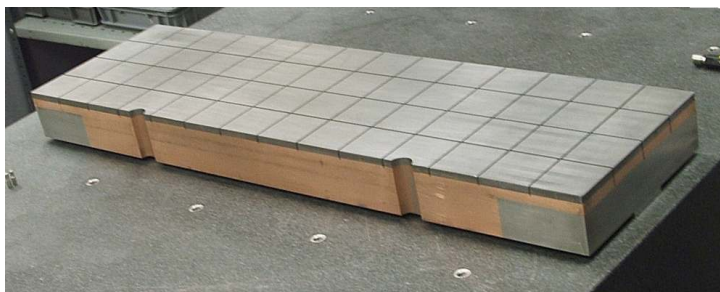
- to encourage UK companies to bid for a larger share of the work available from the international fusion programme, especially ITER;
- to facilitate technology transfer from fusion research into the UK commercial sector.

The first of these tasks continues to be the primary focus for the Fusion and Industry programme; encouraging UK companies to bid for ITER contracts from both (a) the European ITER Domestic Agency known as 'Fusion for Energy' (F4E) in Barcelona, and (b) the central ITER Organisation in Cadarache, France. The Fusion and Industry team has continued its awareness programme and encouraged companies to register their capabilities on F4E's Industrial Database for ITER at <http://eidi.f4e.europa.eu/index.php>.

### 9.2 FUSION CONTRACTS FOR UK COMPANIES

The Fusion and Industry programme has continued to identify UK companies for tender actions in fusion. Following similar activity in earlier years, during 2007/08 several companies were awarded hi-tech ITER- and JET-related contracts.

For example, AMEC was awarded a contract to scale up the innovative HIP (Hot Isostatic Pressing) process to manufacture a full size tile of the type which may eventually be used in the high heat flux, ITER torus divertor region (Figure 9.1). Meggitt Aircraft Braking Systems secured a development deal that will enable it to work towards becoming a supplier of carbon-based components for ITER; the company is initially providing 150 kg of a special type of carbon-carbon composite that may ultimately form part of the ITER divertor. First Sight Vision Limited has a contract to colour and monochrome Firewire cameras with optical repeaters, cabling and software for the JET diagnostics, and Morson Projects is designing and manufacture a JET conduit assembly jig for diagnostics cabling. There are many other examples relating to the JET 'EP2' enhancement programme and to ITER R&D. Now that the ITER Organisation in France is starting to place contracts, there are already examples from the construction project itself and in areas like computing and remote handling.



*Figure 9.1: Full-scale ITER first wall panel*

### **9.3 WORK WITH GOVERNMENT AND REGIONAL ORGANISATIONS**

The Fusion and Industry team continues to work in partnership with UK Trade and Investment (UKTI) and the Regional Development Agencies and Devolved Assemblies in raising awareness among UK companies of business opportunities in fusion research in general and ITER in particular, giving them timely information and alerting them to procurement processes and deadlines.

In March 2008, the British Consulate in Barcelona and UKTI asked UKAEA for assistance with a small Trade Mission to Fusion for Energy in Barcelona. Our primary aim was to provide a flavour of UK plc to senior management of F4E. We invited three UK companies (Atkins Global, Lloyds Register and Halcrow) whose skills/expertise would be needed in the very near future; and representatives from One North East Regional Development Agency provided an overview on how they are ready to help encourage companies based in their region. The representative from UK Trade and Investment attended to demonstrate that UK Government is keen to support the realisation of the ITER. The Trade Mission met the Director and Chief Engineer of F4E and was considered a success. More missions are intended both to F4E in Barcelona and also to the ITER Organisation in Cadarache, and these will be planned in line with forthcoming procurement opportunities.

UKAEA also works with the UK Sensors and Instrumentation Knowledge Transfer Network (KTN) which includes within its remit the task of networking industrial liaison activities across all 'big science'. Among other activities including awareness events, this KTN has a website (<http://www.qj3.co.uk/sktn>) and 'Research Facilities Opportunities Bulletin' available to registered companies, which features projects in fusion as well as in other areas such as astronomy, particle physics, synchrotron sources.

### **9.4 EVENT ON ITER BUSINESS OPPORTUNITIES FOR UK INDUSTRY**

On 28 June 2007, the day the European ITER Domestic Agency 'F4E' was officially launched in Barcelona, 150 representatives from UK industry met at Culham to prepare for ITER business opportunities. The focus was on near-term contract opportunities such as civil engineering, and the long-lead time items (vacuum vessel and magnets). Also, UKAEA is involved in the design of some of the ITER specialist systems (Chapter 8) and used the event to look for companies to assist with these projects.

Representatives from the ITER Organisation, F4E and UKAEA briefed delegates on issues such as the ITER procurement process and schedule, civil engineering opportunities and mechanical engineering opportunities in specialist ITER systems (Figure 9.2).

The Technology and Innovation Exhibition which Culham hosts every year was run in parallel with this ITER Event (see Section 9.8.2).



**Figure 9.2:** Akko Maas from the ITER Organisation describes procurement to delegates at the ITER Event

## 9.5 INDUSTRY LIAISON MEETINGS

Facilitating the close co-operation of European companies in consortia is part of the role of Europe's fusion Industry Liaison Officers (ILOs), who were represented in strength at UKAEA's ITER event (Figure 9.3). Fusion and Industry Manager Dan Mistry was recently appointed Deputy Chairman of the ILO Group. The role of the (presently 16) European ILOs for ITER is to help European companies interested in contracts from ITER obtain the best benefits from this project and to facilitate companies in finding European partners for joint bids, subcontractors, and collaborators for common R&D efforts. Recently, this ILO initiative has been made more formal through adoption by F4E.



**Figure 9.3:** Dan Mistry from UKAEA's Fusion and Industry team (far right) with other European ILOs

The Fusion and Industry team have, at the request of F4E and ITER engineers, identified and organised meetings with appropriate UK companies, in technologies such as vacuum vessel and assembly. The aims of these meetings were twofold: for engineers to understand the key skills and expertise in UK industry; and for companies to connect with the engineers. In future, our aim is to do more to show to F4E and also to ITER engineers that UK companies have a lot to offer to ITER and the fusion community in general.

At the request of a major French company, the Fusion and Industry team organised meetings with several UK companies. The French-based company had specific requirements; they were looking for UK companies with whom they could

partner for forthcoming ITER work packages in the areas of remote handling, CODAC and systems engineering. A number of UK companies were introduced and all parties considered that the meetings were very useful. Further dialogues are planned which may lead to the formation of pan-European consortia. We aim to build on these efforts, especially in conjunction with Europe's Industry Liaison Officers, to help form consortia which are appropriate for F4E and ITER contracts.

## 9.6 ITER BUSINESS FORUM

In collaboration with UK Trade & Investment, UKAEA's Fusion and Industry team organised a UK delegation to the ITER Business Forum (IBF), held in Nice in France on 10-11 December 2007. More than 830 representatives of industrial companies, Fusion Associations and Government organisations attended the IBF. Fifty-seven UK delegates attended from thirty-two companies, UKTI and UKAEA.

The objectives of the IBF were to:

- establish contacts between contractors, manufacturers and other representatives of the ITER project, via the organisation of business meetings, thematic workshops and an industrial exhibition;
- disseminate the latest information about the progress of the project and future calls for tender by a series of conferences by senior ITER management;
- present an industrial vision of the technological challenges for ITER, during the thematic workshops structured around the principal components and systems of the installation;
- promote exchanges between contractors, manufacturers and fusion scientists for ITER on specific technical issues (for example, plasma wall components, blanket, and vacuum vessel).

This forum was aimed at improving European industry's understanding and awareness of the requirements and issues relating to the ITER programme which would enable companies to identify the areas of particular interest and relevance, where they can offer the best added value, and plan the actions they may need to take to strengthen their performance in specific areas. The forum also offered opportunities to make appropriate contacts, and allowed companies to assess potential joint venture partners and raise awareness of their business in a European context. Many large companies and small and medium enterprises (especially from France) attended the event to seek partners from other countries.

In addition to encouraging dialogue between representatives from industrial companies and fusion experts, the forum included a fusion and industry exhibition. The UK had a stand sponsored by UKTI and UKAEA, and a number of British companies also took stands to the event (Figure 9.4). Our stand featured information on British technology expertise, as well as material from many UK companies who were keen to seek international partners to help build ITER by forming national/European consortiums.



**Figure 9.4:** UK stand at the ITER Business Forum in Nice, December 2007

## 9.7 TECHNOLOGY TRANSFER

The Culham Innovation Centre is part of a network of business incubators managed by Oxford Innovation and is home to a wide range of pioneering technology-focused companies, providing start-up companies with a professional infrastructure and image to grow their business, along with a range of business support services needed during the first vital years of operation. A total of 17 companies currently occupy office space or have taken advantage of Oxford Innovation's 'OxiFlex' virtual office service. These companies work in a wide range of sectors from electronics engineering to marketing.

The UKAEA Technical Support Package (TSP) offered by the Fusion and Industry programme continues to assist suitably qualified start-up companies in the Culham Innovation Centre. Through a combination of technical know-how and practical engineering, UKAEA is successfully transferring fusion technology and expertise to the UK businesses. Depending on their needs this could include technical advice or access to engineering, scientific and computing skills and technologies. The TSP has assisted several start-up companies in the Innovation Centre with product development and problem solving, usually via the assistance of UKAEA's Special Techniques Group.

Five companies currently benefit from access to fusion expertise through the TSP and all are enthusiastic in their praise for the scheme and endorse its value to the growth of their business. For example, Magnetic Resonance Imaging specialist, Laplacian Ltd, has developed a scanner for conducting resonance imaging of tree trunks subjected to drought and deluge conditions, as part of a tree physiology project at the University of Surrey. Developed with the assistance of UKAEA's Technical Support Package, the scanner can be used on tree trunks up to 200 mm diameter and provides complete imaging of the trunk (see Figure 9.5).

The scheme is now being offered to other suitably qualified companies based at Culham.



**Figure 9.5:** Laplacian's final magnet, ready for lab tests

## 9.8 PROMOTIONAL ACTIVITIES

### 9.8.1 FUSION AND INDUSTRY WEBSITE AND FUSION BUSINESS E-ZINE

The Fusion and Industry web site <http://www.fusion.org.uk/industry> has been updated to reflect the increasing pace of ITER developments. The transition of our *Fusion Business* from a paper-based newsletter to electronic format (an 'e-zine') is the most visible change through which we plan to increase the frequency and topicality of news stories, at the same time as reducing costs. The e-zine enables companies to access the latest up-to-date news and more details on stories as well as useful web links for further information.

Many of the changes have been designed to make the site easier to use for visitors. Database registration has been made more comprehensive allowing us to improve our assistance to UK industry. We now have over 1,400 companies registered on our database (<http://www.fusion-industry.org.uk/register.asp>).

The new *Fusion Business* e-zine was first issued in July 2007 and since then has featured a wide range of articles including ones on UK companies who have been awarded ITER, JET and MAST contracts. Also covered are the activities of the Fusion and Industry team, and progress on technology transfer including the Technical Support Package to Culham Innovation Centre companies. Special Exhibition e-zine issues report industry exhibitions taking place at Culham and reflect the exhibitors' feedback on the day. Current and back issues of the *Fusion Business* e-zine can be found on our website <http://www.fusion-industry.org.uk/newsletter.asp>.

As well as *Fusion Business* we now send out regular 'e-news' to enable companies to be kept informed of contract opportunities from fusion and developments on the ITER project.

### 9.8.2 EXHIBITIONS AND EVENTS

Company exhibitions continue to be a successful feature of the Fusion and Industry events programme and demand remains high. Over 46 companies exhibited at Culham during the past year and companies are booking up to 12 months ahead. The promotion of joint exhibitions by non-competing companies is becoming increasingly popular, especially for companies who are requesting a return visit every year. For most companies a tabletop exhibition in the Culham

main reception area will suffice, but this year two companies used a mobile exhibition trailer.

Exhibitors are drawn from a wide cross-section of industries including power supply solutions, electronic packaging systems and components, vacuum equipment, data acquisition products, photonics components and test and measurement equipment. In addition to meeting fusion scientists and engineers, exhibitors are able to meet staff from the many technology companies that share the Culham Science Centre site.

The Technology & Innovation Exhibition, which promotes 'Engineering Equipment and Associated Services' to the UK nuclear industry, returned to Culham for its seventh year on 28 June 2007 (Figure 9.6). In a marquee specially erected for the occasion, the exhibition, with its record number of exhibitors, attracted many visitors, including delegates attending the ITER event. Exhibiting companies also had the opportunity to meet the UKAEA Contracts Procurement team at Culham, and learn about how UKAEA procures products and services, as well as having an opportunity for a one-to-one meeting with a UKAEA buyer.



**Figure 9.6:** Exhibitors and visitors at the Technology and Innovation exhibition

On 13 March 2007, Culham hosted for the first time the Residual Gas Analyser (RGA) Users' meeting (Figure 9.7). This was a workshop-style one-day meeting bringing together industrial, academic and research-based RGA companies with suppliers of RGAs. The talks covered a wide range of topics related to RGAs and throughout the day there was ample opportunity to question the speakers, both formally and informally. As well as stimulating inter-group discussion, the meeting was considered by many as a unique networking opportunity and a highly-valued forum for interaction between engineers and scientists with practical vacuum experience. The meeting also included a mini exhibition by vacuum equipment companies.



*Figure 9.7: Exhibitors and delegates at the RGA Meeting*

## 9.9 FUTURE PLANS

The Fusion and Industry team will continue to encourage UK industry to ensure that they are aware of the contract opportunities available from fusion in general, and ITER construction in particular. Our activities will include:

- encouraging UK companies wishing to supply to fusion in general and ITER in particular, alerting them to contract opportunities via our website and e-news system;
- organising meetings on specific technologies between F4E/ITER engineers and appropriate UK companies;
- encouraging UK companies to identify partners, both in the UK and, with the assistance of other Industry Liaison Officers, elsewhere in Europe;
- facilitating technology transfer opportunities where possible, particularly via the Technical Support Package.