



NUCLEAR AMRC

NUCLEAR AMRC NEWS

THE NEWSLETTER OF THE NUCLEAR ADVANCED MANUFACTURING RESEARCH CENTRE

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Research factory nears completion



The size of a football pitch: the Nuclear AMRC's main research facility on the Advanced Manufacturing Park, South Yorkshire, July 2011.

Construction of the Nuclear AMRC's landmark facility is on schedule to complete in late September.

Six months after the first parts of the steel framework went up, the structure and exterior cladding of the 8,000m² building are now virtually complete. Work continues over the summer on fitting out the interior workshops and office space.

Designed by Sheffield-based architects *Bond Bryan*, the Nuclear AMRC sits alongside the established AMRC with *Boeing* on the Advanced Manufacturing Park, South Yorkshire. The building is just slightly smaller than a football pitch.

Building work has been led by *BAM Construction*. The project is funded by

UK Government, the *European Regional Development Fund*, and regional development agency *Yorkshire Forward*.

The Nuclear AMRC building includes a large general workshop plus dedicated space for machining, robotics and automation; assembly; welding and heat treatment; cladding; and non-destructive evaluation. To support the largest machining centres, the workshop floor is based on concrete slab of up to 2.4 metre thickness.

Accommodation over three storeys includes laboratory and technical support space, virtual reality facilities, office space and secure meeting rooms.

The Nuclear AMRC is built to the highest BREEAM environmental standards,

exploiting natural light, heating and ventilation. The development also features 320kW capacity of ground source heat pumps and a 850kW wind turbine.

- Plans to establish a **Manufacturing Skills for Nuclear hub** at the Nuclear AMRC have received support from the UK government.

The hub will be part of the proposed *National Skills Academy for Manufacturing for Nuclear*, a collaboration between the National Skills Academy for Nuclear, National Skills Academy for Manufacturing, and Nuclear AMRC.

Business Secretary Vince Cable MP announced backing for the academy's initial proposal to the Growth and Innovation Fund. A detailed bid is being prepared.



The Nuclear AMRC workshop covers the area of four Olympic swimming pools. The largest machining centres to be installed weigh up to 80 tonnes apiece.

In this issue: Research director Q&A; Fit For Nuclear; Areva seeks global suppliers; new members

Take the *Fit For Nuclear* test



Manufacturing companies wanting to join the civil nuclear supply chain can now test their readiness online.

Delivered exclusively by the *Nuclear AMRC* with the *Manufacturing Advisory Service (MAS)* and other partners, the Fit For

Nuclear (F4N) programme helps companies understand the requirements and challenges of the nuclear energy market.

Following pilot trials with invited companies, the F4N assessment is now available to all engineering manufacturers which want to measure their operations against the standards required to supply the UK's new generation of nuclear plant.

The initial assessment involves an online questionnaire covering key areas of business operation and performance.

The results help identify any gaps that the company can address. The Nuclear AMRC and partners can then help companies to fill

those gaps and enhance their operations, processes and capabilities.

Fit For Nuclear can provide a direct route for companies to be considered by industry leaders for entry into their own supply chains. Under a collaborative agreement announced in March, the Nuclear AMRC will act as a route for companies which do not have an existing relationship with French reactor provider *Areva*, but which have the potential to provide products within *Areva's* scope of supply. Identification of potential suppliers will be carried out through F4N.

To take the Fit For Nuclear assessment, go to <http://namrc.co.uk/work-with-us/f4n/>

Areva seeks ambitious companies to supply worldwide

Areva is looking for ambitious companies to join its supply chain for new nuclear projects in the UK and worldwide.

Speaking in Sheffield, *Areva UK's* head of industrial strategy Ana Ramos told manufacturers that the group is looking to build long-term relationships with suppliers.

"We start locally and, when companies have acquired the skills, we hope they will have the ambition to become part of our global supply chain for future EPR projects," Ramos said. **"It's not a one-shot deal. There's a number of projects coming up, and we want to build relationships with companies that can follow through on our projects in the UK and beyond."**

Areva hopes to be commissioned by *EDF Energy* and *Centrica* to provide the nuclear steam supply system for two EPR reactors at Hinkley Point, Somerset, and then another two at Sizewell, Suffolk. EPRs are currently under construction in Finland, France and China, and the UK programme will benefit from lessons learned at those projects.

Over 400 UK companies have already registered online to supply *Areva's* UK projects. **"We now have nearly 60 suppliers qualified and ready to work for *Areva* on EPR projects, and another 60 that we have visited and shortlisted for pre-qualification,"** Ramos noted.

"Up to 70-80% of the scope for auxiliary component manufacturing could be covered by UK companies, if they meet our nuclear requirements including quality, health and safety, and project



Ramos: Almost 60 UK suppliers are now qualified and ready to work with *Areva*.

management."

Ramos was speaking at the Advanced Manufacturing Forum, a regular industry-led event organised by the *University of Sheffield AMRC* with *Boeing*. The June event focused on the support available to manufacturing companies interested in the nuclear supply chain, and was attended by managers from around 50 companies.

The forum also heard from Dr Glen Little, director of nuclear new build for *Doosan Power Systems*, about the support available from the *Nuclear Industry Association (NIA)*.

The NIA is working with industry leaders

to help suppliers through its SC@Nuclear programme and website. The second edition of the NIA's *Essential Guide* to the nuclear supply chain will be published this summer.

"It's important to understand your position in the supply chain – it's unlikely you'll be selling to the technology providers," Little said. **"You have a real opportunity to move into the new-build program, but you must start preparing for this market now."**

Links:

- <http://suppliers.areva.com/>
- <http://www.nuclearsupplychain.com/>



Q&A: Professor Mike Burke, research director

Mike Burke is the newly appointed director of research and technology for the Nuclear AMRC, responsible for leading collaborative research across the Sheffield and Manchester facilities.

A Lancashire native, Burke studied for his PhD at the University of Sheffield. He has spent three decades in the US working in industrial manufacturing research, most recently as manager of *Westinghouse's* Materials Center of Excellence.

Nuclear AMRC News asked him about his research interests and experience.

What are your own areas of research expertise?

"I've been involved with developing materials for power generation applications for the past 30 years, for both fossil fuels and nuclear. I've worked on advanced robotic welding methods, and own a patent for an adaptive weld pool viewing system. In non-nuclear, I've worked to develop single crystal alloys for large gas turbines – taking these processes from aerospace and scaling them up, and working with manufacturers to get these into *Westinghouse's* products.

"Most recently, I've been involved in understanding how material processing affects long-term performance in reactors, particularly with regards to stress corrosion cracking and fracture toughness.

"My work is about bridging the gap between the guys who want more performance out of their materials, and the manufacturing guys who are going to make that for them."

What industrial experience do you bring to the Nuclear AMRC?

"I've worked with materials and



Burke: bridging the gap between design and manufacturing

components suppliers to the large OEMs – in my case, *Westinghouse* and *Siemens* – and understand all that goes into incorporating new processes into power generation equipment.

"Recently, I've been running a commercial Hot Cell where we test materials from operating reactors. Parts come back after up to 30 years service. We look at them and ask how is this material degraded, what has happened to its properties since the part was installed? By understanding the changes in the material, we can work with the field services people to develop new processes to optimise repair and mitigate those failings."

What other research areas will you be working on?

"I'm keen to work on advanced metals joining and coatings processes for key components in the reactor. I'm particularly interested in looking at how advanced machining processes can enhance the

surface properties of materials.

"I think that's an area that has been neglected. If we are to speed up our processing, we need to understand how that affects the fatigue and stress corrosion cracking properties of the materials we're putting into plant."

Are there any projects or research facilities that you're particularly excited by?

"It's the fact that we're going to have this collection of machining, joining and materials capabilities in one place. To be able to go into the lab and have the facilities available to try this wide range of approaches is fantastic – for someone who's often had to try and get equipment in the middle of a project, it's really exciting that we're getting the labs set up at the beginning so we have all the equipment in place.

"This is particularly important in the large plant fabrication area, since fabrication and joining is often separated from design activity. The Nuclear AMRC will have the capabilities at hand to reduce the costs and difficulties of the early stage demonstrators and minimise technical risks."

Do you think UK manufacturers are in a good position to compete in the global market?

"UK manufacturers have the skills, equipment and infrastructure, but we must be aware that there are incumbent suppliers. The nuclear industry has been ticking over in the rest of the world, and they're the guys we have to compete with.

"I think there are the capabilities here and, with the help of the Nuclear AMRC, companies can develop the quality systems that they need. I am impressed with the people I've met, who appear keen to develop the technologies and processes they're going to need to compete in this market."

What's your message for manufacturers interested in the nuclear sector?

"It's an opportunity to produce a high value product. There are a lot of regulations and quality practices that need to be implemented, but the help is there. Through the Nuclear AMRC, we can provide that support, not just for the first set of nuclear plant but for the future. Bring your questions to us."

First cut for machining robot

Cutting trials have begun with the Nuclear AMRC's experimental robotic machining cell.

The cell uses a small hexapod robot operated by state-of-the-art adaptive control techniques. The first phase of research aims to demonstrate that machining accuracies can be maintained with a robot which has less structural stiffness than a traditional machining centre.

The system will be used for the

machining and joining of large nuclear components such as pressure vessels. This traditionally requires a large gantry mill, with repeated moves between the milling area and welding and evaluation bays.

The project aims to streamline this process to provide significant savings in cost and time. The system was provided by *Nikon Metrology*, and features a *Fanuc* Hexapod body, *Delfoi* BoxJoint reconfigurable fixturing and *Nikon* iGPS.



New members boost research capabilities

Another 13 companies, including world-leading equipment and material suppliers, have been accepted as full members of the Nuclear AMRC.

The new members will help ensure that the Nuclear AMRC can apply the latest manufacturing technologies to support the UK's nuclear supply chain.

Firms joining as Tier One members include two of the world's leading developers of innovative machining centres, *Mori Seiki* and *StarragHeckert*, who are providing their latest centres to the Nuclear AMRC. Further machining capability comes from cutting tool specialist *Sandvik*.

ITW Welding Products will meanwhile support the Nuclear AMRC's joining and

cladding research. *Carpenter*, a supplier of specialist metal powders and materials, and manufacturing software specialist *Dassault Systèmes* have also signed up.

The centre's capabilities are further expanded by the new Tier Two members, who work in a range of specialist areas. Machining and materials research will be supported by the experience and resources of *Houghton* in specialist machining fluids, *Johnson & Allen* in innovative non-destructive testing, *Nikken* in precision tooling and workholding, *Nikon Metrology* in measurement and robotics, and *Wheelabrator* in surface preparation technologies.

Newburgh Engineering, a manufacturer of

large engineered parts and assemblies, and *Serco Technical Consulting Services* are also joining as a Tier Two members.

Professor Keith Ridgway, programme director of the Nuclear AMRC, said: **"We're delighted to welcome these world-leading companies into the Nuclear AMRC. By contributing equipment, materials and expertise, they increase the value of the centre for all the companies we will be working with. And in return, we will help them develop their own capabilities to meet the requirements of the industry leaders and seize the opportunities of nuclear new-build."**

Further member companies will be announced shortly.



NUCLEAR AMRC
ADVANCED MANUFACTURING RESEARCH CENTRE

About the Nuclear AMRC

The Nuclear Advanced Manufacturing Research Centre is a collaborative initiative led by The University of Sheffield, The University of Manchester, and a consortium of industrial partners. The Nuclear AMRC aims to be the focal point for the civil nuclear manufacturing industry in the UK. It works with members to develop new manufacturing technologies to meet the needs of the new generation of nuclear power stations, to help companies join the nuclear supply chain, and to provide support in skills and accreditation. For more information call 0114 222 9900 or visit <http://namrc.co.uk>
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