



NUCLEAR AMRC

NUCLEAR AMRC NEWS

THE NEWSLETTER OF THE NUCLEAR ADVANCED MANUFACTURING RESEARCH CENTRE

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REVOLUTIONARY TECHNOLOGY: STARRAG ENGINEERS WORKING ON A PTM DEVICE

Machining centre is a planetary first

The Nuclear AMRC has placed an order for a state-of-the-art machining centre which will be the first of its kind in commercial operation.

The StarragHeckert HEC 1800 will be the first machine outside Starrag's own facilities to be equipped with the new planetary turning and milling (PTM) technology. The PTM device combines an extendable boring spindle with two radial turning tools, adding milling and turning capabilities to a horizontal boring machine. Together, the HEC 1800 and PTM provide seven axes of movement.

"The idea behind the PTM is to change the way large components are manufactured today," says Lee Scott of StarragHeckert UK. **"You'd usually have a multi-machine process – a vertical turning machine, milling machine, and dedicated boring machine. This allows you to do large components on one machine. It's a game-changing technology."**

The PTM system is gaining strong interest from companies producing large casings and vessels for the power industries, oil and gas, and heavy transportation.

"This could potentially revolutionise pump and valve manufacture," says Stuart Dawson, machining group manager at the Nuclear AMRC. **"You're getting very close to being able to do all your machining operations on one machine. It could cut cycle time by up to 60% and improve accuracy by establishing all the geometric features in one set-up."**

The HEC 1800, which measures some 15 metres in length and is capable of taking components up to 20 tonnes, will also include other advanced features such as a 200 bar through-spindle coolant delivery system. The machining centre will be installed in the Nuclear AMRC building in South Yorkshire when it is completed, giving member companies an exclusive opportunity to work with this new technology. In the meanwhile, a Starrag HEC 1600 horizontal boring machine is being installed in the centre's interim workshops on the Advanced Manufacturing Park.

The Nuclear AMRC has also ordered novel equipment for the machining and welding of large pressure vessels, another key research area for the centre.

The traditional approach to working on vessels of 10 metre length or more is to use a very large and expensive gantry mill, in a multi-stage process involving cumbersome moves between the milling area and welding and evaluation bays. The Nuclear AMRC aims to streamline this system to provide significant savings in cost and time.

"Our vision is to develop a single automated system to carry out the four stages of pre-weld machining, welding, dressing the weld, and non-destructive examination," says Dawson.

"The concept is to use a single robot system with interchangeable heads, mounted on reconfigurable fixturing and guided by indoor GPS. By tracking the relative positions of robot, tools, workpiece and all the other components of the process, we will be able to maintain accuracy to fractions of a millimeter."

The first phase of research aims to demonstrate that the required machining accuracies can be achieved with a robot which has less structural stiffness than a machine tool. Robotics group Nikon Metrology is supplying a machining robot system featuring a Fanuc Hexapod body, Delfoi BoxJoint reconfigurable fixturing and Nikon iGPS.

The Nuclear AMRC continues to place orders for machining centres and other research equipment, to ensure that member companies have access to the latest manufacturing technology. Other initial acquisitions include a six-metre Mori Seiki mill-turn centre. For more information, see the 'Research equipment' page on our website.

Manufacturers can access the next generation of engineering talent at the new University of Sheffield AMRC Industrial Doctorate Centre (IDC). From Autumn 2011, the IDC will provide engineering doctorate training with a focus on machining science. Talented postgraduates will work with companies along the supply chain to solve business problems and apply innovative processes. The IDC is based on the Advanced Manufacturing Park, and will be open to companies involved with the Nuclear AMRC.

Workshops offer supply chain insight

Manufacturing companies interested in entering the nuclear supply chain can gain invaluable insight at a new series of workshops at the Nuclear AMRC.

Launching in early March, the one-day sessions will help delegates deepen their understanding of the requirements and challenges of manufacturing for nuclear new-build. Attendees will be equipped with practical tools to help them prepare their own businesses to enter the supply chain.

The workshop begins with an introduction to the nuclear market, including a review of reactor technologies and components, and a look at how manufacturing can affect material performance within a nuclear environment.

Delegates will have the opportunity to tour the Nuclear AMRC's facilities on the *Advanced Manufacturing Park*, South Yorkshire, before splitting into specialised break-out sessions to examine areas in more details. Topics on offer include nuclear codes and standards, supply chain structure, skills development, working with universities on R&D projects, and tendering for contracts in the nuclear industry.

The initial events on 1 and 2 March are limited to 15 companies per day. For more information, contact **Andrew Clarke** on **0161 275 4338**, or email

Andrew.Clarke@manchester.ac.uk

The workshops follow a day-long event organised by the *Manufacturing Advisory Service (MAS)* in association with the *Nuclear AMRC* and *Nuclear Industry Association*.

The 'Winning business in the nuclear renaissance' event takes place at Doncaster Racecourse, South Yorkshire, on Thursday 17 February, and aims to help small and medium sized enterprises (SMEs) prepare to enter the nuclear supply chain through a series of in-depth presentation and discussion sessions.

The Nuclear AMRC team will provide an introduction to the nuclear product development cycle, explaining how the centre can help companies prepare products for the market, and how SMEs can prepare to meet the tough quality standards of the industry.

Other sessions will cover contracting and tendering, quality codes and standards, and auditing and assurance.

Attendance is free for all UK SMEs. For more information, call **MAS** on **0800 458 9585** or visit

www.mas-nw.co.uk/events/lc11-01

MAS is also offering DVDs of presentations from its nuclear supply chain opportunities conference in September. The event in Manchester resulted in 110 SMEs requesting a nuclear-related review from MAS.

Manufacturing businesses can also gain exclusive insight into the nuclear supply chain at the next event in the AMRC's successful *Advanced Manufacturing Forum*. The event on 22 March will provide an update on progress in the UK's nuclear new-build programme, including presentations from *EDF Energy* and *Rolls-Royce*. For more information, contact **amf@amrc.co.uk**



QUESTIONS AND ANSWERS: MANAGERS AT A PREVIOUS SUPPLY CHAIN WORKSHOP

Industry news

NPD strengthens supply chain
Nuclear Power Delivery UK, the new-build consortium headed by reactor provider Westinghouse, has signed new supply agreements with BAE Systems, Doosan Power Systems and Rolls-Royce.

The agreements build on the memoranda of understanding (MOUs) signed by *Westinghouse UK* and the three top-tier suppliers in 2008. *Westinghouse* subsequently formed the *NPD* consortium with partners *Shaw*, *Toshiba* and *Laing O'Rourke*.

Rolls-Royce said it will provide engineering, manufacture and supply of critical components for the AP1000, and explore the potential for nuclear engineering, technical support and supply chain management expertise.

NuGeneration launch
Utility groups Iberdrola, GDF Suez and Scottish and Southern Energy (SSE) have formally launched their joint venture for nuclear new-build in the UK.

The new company, *NuGeneration Ltd* (NuGen), aims to develop a nuclear power station of up to 3.6GWe generating capacity, on land near *Sellafield* in Cumbria. NuGen is now preparing detailed plans for development of the site, and intends to make a final investment decision around 2015. The consortium is waiting for the results of the *Generic Design Assessment* before choosing between *Areva's* EPR and *Westinghouse's* AP1000.

Energy reforms welcomed
All three groups planning to build new nuclear power stations in the UK have welcomed government proposals to reform the electricity market.

The proposals, which are open to consultation until February, include plans to introduce a carbon floor price to allow low-carbon generation to compete for long-term investment on a level basis with fossil fuels. Utilities have identified this as a necessary step to allow the construction of new nuclear plant and other low-carbon generators.

EDF Energy, *Horizon Nuclear Power* and *NuGeneration* all welcomed the plans.



COMMAND PERFORMANCE: PROF. KEITH RIDGWAY, NUCLEAR AMRC PROGRAMME DIRECTOR, PRESENTS THE PLANS



A ROYAL SPECTACLE: HRH SAMPLES VIRTUAL ENGINEERING

Real benefits from virtual research

Photos of the Queen in 3D spectacles proved hugely popular in the media, but virtual reality is much more than an entertaining gimmick for visiting monarchs. It's a practical tool for manufacturing R&D.

The *Nuclear AMRC* facility in South Yorkshire will include two VR systems, provided by Cheshire-based *Virtualis*.

One will be a fully immersive cave-like environment, with images projected on three walls and floor. This will open new horizons for training, assembly research and simulation. Users will be able to fly through a detailed model of an entire power station, and see how all the systems and components fit together.

The *ActiveCube* system has initially being installed in the interim workshop.

The new building will also include a power-wall VR system. This is a larger version of the system used by the Royal visitors aboard the *MANTRA* lorry, and will be used for public demonstrations and workforce training.

The *AMRC* is also using VR technologies to help *Rolls-Royce* design its new civil nuclear manufacturing facility, as part of the *Copernico* collaborative research project. The *Copernico* researchers are using virtual simulation to model the complete factory environment, with the aim of improving workflow and optimising production capacity.

Royal start to centre construction

Construction of the *Nuclear AMRC*'s flagship facility was officially launched by Her Majesty The Queen, during a visit to the *University of Sheffield AMRC* with *Boeing*.

Accompanied by *The Duke of Edinburgh*, The Queen donned a set of virtual reality glasses to remotely activate a digger from within the *AMRC*'s *MANTRA* (*Manufacturing Transporter*). *MANTRA* is a customised lorry designed to give young people a taste of modern manufacturing technologies, including 3D VR systems (see opposite).

As a signal went out to the real digger on the site overlooking the *AMRC Factory of the Future*, the Royals saw an animation of the new building rising from the virtual ground.

Images of Her Majesty in VR glasses proved a hit with the press. As well as being featured in national newspapers, TV and industry media, the *Nuclear AMRC* gained unexpected publicity in the US, Canada, South Africa and beyond.

Construction of the 8,000 sq m building is proceeding on schedule for completion in

September 2011, with steelwork going up over the winter months. The £25 million development is being led by project managers *Turner Townsend* and *BAM Construction*, to a design by *Bond Bryan Architects*.

During their visit on 18 November, the Royals also met with representatives from the *Nuclear AMRC*'s key partner companies, and viewed plans for the new building and other developments.

Over £20m ERDF funding has been secured to support development in and around the *Nuclear AMRC*, including further specialist research equipment, a 850kW wind turbine and a new *Knowledge Transfer Centre* to engage with businesses along the supply chain.

While the new building goes up, the *Nuclear AMRC* is operating from interim premises on the *Advanced Manufacturing Park (AMP)*, South Yorkshire, and at the *Dalton Nuclear Institute*, Manchester. Keep an eye on the 'Facilities' page of the *Nuclear AMRC* website for the latest pictures of construction.

Keep reading the *Nuclear AMRC* website for the latest news on developments, research capabilities, business support and events. Qualifying companies can now register for the *Members Area*, and access the discussion forum, document library, and other exclusive features. You can also follow us on **Twitter** – @*NuclearAMRC* – for alerts on the latest news. **Tim Chapman**, Communications Manager, *Nuclear AMRC* – t.m.chapman@namrc.co.uk



New members of the Nuclear family

The Nuclear AMRC continues to build its ability to support manufacturing businesses. New staff in both Sheffield and Manchester bring new skills and experience to help our member companies through targeted research and business support.

Dr. John Francis has joined the *Dalton Nuclear Institute* as senior lecturer in welding technology. John is responsible for developing and coordinating research for the *Nuclear AMRC*, with a focus on welding and cladding technologies for nuclear new-build, and will also lead industry workshops on areas such as advanced welding processes and metallurgy. John joined from the Open University, and has worked extensively at CSIRO in Australia.

Dr. Fabio Scenini joins as lecturer in nuclear materials manufacturing, from the University of Manchester's Materials Performance Centre.

Fabio will focus on how manufacturing technologies influence the performance of materials in nuclear environments, and will lead industry workshops on areas such as nuclear materials and environmentally assisted degradation.

In Sheffield, *Stuart Dawson* has been appointed head of the machining group. Previously chief engineer for the aerospace product development team at tools group Unimerco, Stuart leads the *Nuclear AMRC's* core machining R&D programme. He will work with companies to help them overcome their manufacturing challenges through machining process development and innovation.

Steve Clements has joined as programme manager in Sheffield. Previously sector manager for advanced engineering and materials at

Yorkshire Forward, where he played a leading role in creating the *Advanced Manufacturing Park*, Steve will drive the *Nuclear AMRC's* programme of engaging with manufacturing businesses across the UK.

And *Paul Bunting*, previously at Ericsson Mobile Communications, joins as quality manager. As well as being responsible for quality systems at the *Nuclear AMRC*, he will support member companies on the quality aspects of nuclear manufacturing.

Further key appointments, including a permanent research director to be based at the *Dalton Nuclear Institute*, will be announced in the coming months. By the end of 2011, we expect to employ around 75 people in South Yorkshire and 25 in Manchester.

Career opportunities

The *Nuclear AMRC* continues to recruit talented engineers, researchers and industry experts. To find out about current vacancies in both South Yorkshire and Manchester, go to www.jobs.ac.uk and search for 'Nuclear AMRC' or 'NAMRC'.



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, help companies join the nuclear supply chain, and provide support in training and accreditation. For more information call **0114 222 9900** or visit www.namrc.co.uk
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The University of Sheffield.



The University of Manchester
Dalton Nuclear Institute

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