NUCLEAR AMRC news
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New year resolution

State-of-the-art CMM brings sub-micron accuracy

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Powder power: the Nuclear AMRC's hot isostatic pressing cell

Researchers seek insight into powder metallurgy

An international research consortium wants to talk to manufacturers who are interested in developing powder metallurgy techniques for the nuclear industry.

Techniques including powder-based additive manufacturing and hot isostatic pressing can potentially help improve the long-term performance of reactor pressure vessels and other safety-critical components. These processes are already used in sectors such as aerospace, but are yet to be embraced or approved by the civil nuclear industry.

The PowderWay consortium brings together reactor developers, manufacturers and research institutions, to explore how powder metallurgy can be developed and deployed in the European nuclear industry.

PowderWay is led by the Nuclear AMRC and funded by the European Commission through Nugenia, the European association for R&D in nuclear fission technologies. Partners include reactor developer Areva, utility group EDF, French nuclear suppliers association PNB, French energy commission CEA, and Swedish materials research group Swerea.

"Powder metallurgy processes can produce near-net shape parts with excellent material properties, which avoid many potential weak points such as welds," explains Mark D'Souza-Mathew, metallurgy researcher at the Nuclear AMRC. "Such parts can meet and often exceed the performance of wrought parts under test conditions, but there are still areas for improvement.

"We are now consulting with end users to better understand the benefits of power metallurgy over conventional manufacturing methods, the acceptance criteria for standardisation, and the current state of the art. Crucially, the research will also reveal any obstacles preventing the uptake of powder metallurgy methods."

The PowderWay researchers have identified three promising techniques for maturity and potential application in the nuclear industry – hot isostatic pressing, additive manufacture and spark plasma sintering.

The team now aims to produce and evaluate a series of representative parts using these techniques. Materials of interest include austenitic stainless steels, nickel-based superalloys and ferritic steel.

To make sure that the research delivers real value, the team is consulting with manufacturers to define part requirements for candidate pressure vessel parts, including typical dimensions and material characteristics. Companies in the project partners' own networks are already providing information, but the researchers would also like to hear from other manufacturers and technology developers.

"We are keen to talk to established members of the powder metallurgy industry, to help us focus on high priority areas and avoid recommending R&D that is already being carried out elsewhere," D'Souza-Mathew says. "If you can help us bring the benefits of powder metallurgy to the nuclear industry, please do get in touch."

To find out more about the PowderWay project, contact Mark D'Souza-Mathew: **mark.mathew@namrc.co.uk**

New year brings extreme resolution

The Nuclear AMRC already offers the largest-scale metrology capabilities of any centre in the UK's High Value Manufacturing Catapult. Now, it also offers the most accurate.

The new Leitz PMM-C 12.10.7 is an ultra-high precision coordinate measuring machine (CMM) providing sub-micron resolution of large parts and samples.

"By better understanding the component form and topography of a machined surface, we can predict its functional performance, and the long-term behaviour of the final component or product," says Carl Hitchens, head of machining and metrology for the Nuclear AMRC. "We can also use this understanding to inform and improve the manufacturing process, helping companies to demonstrate that parts made by new processes can meet all their customer's quality requirements."

The Leitz machine can inspect parts or samples of up to 1.2 metres length, one metre width and 700mm height, and weighing up to 1,750kg. It has been supplied by Hexagon Manufacturing Intelligence, a Tier One member of the Nuclear AMRC.

The Nuclear AMRC has a comprehensive installation of CMMs for the validation of experimental components and test pieces, including the largest gantry CMM available in any research centre – the Hexagon DEA Delta, capable of measuring parts of up to six metres.

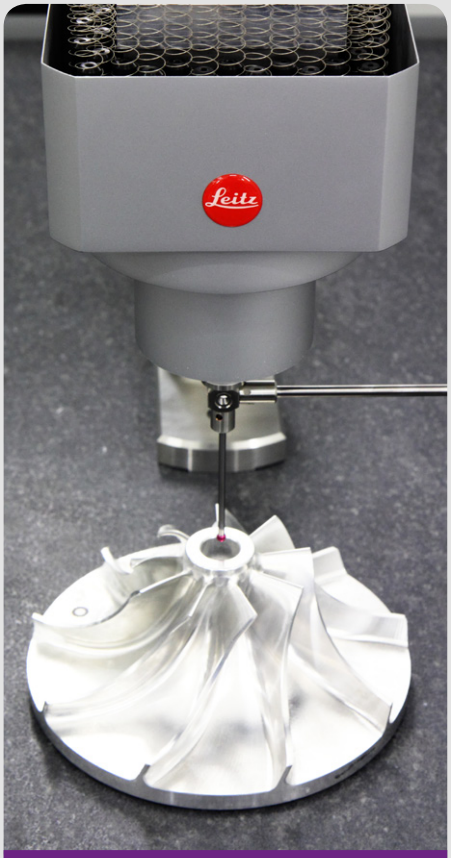
The new Leitz also features the UK's only Precitec LR chromatic confocal probe, capable of non-contact measurement of critical faces to nanometre resolutions, plus automated tactile surface roughness measurement.

The Nuclear AMRC metrology team have also invested in new x-ray diffraction equipment to investigate residual surface stresses in large machined samples. Residual stress in a component can cause serious effects including fatigue and stress corrosion cracking. The new Proto LXRD system is a laboratory unit that quickly and automatically maps surface stress on samples of up to 1.5 metres.

"Unlike portable systems, the LXRD is powerful enough to analyse large parts and can also handle work-hardened metals including ferritic steels and super-alloys," notes Agostino Maurotto, senior research fellow. "By understanding the causes and effects of residual surface stresses, we can optimise machining parameters to minimise the risks of material failure."

This new capability supports the centre's research into advanced machining technologies such as cryogenic machining which can reduce residual tensile stresses to zero.

namrc.co.uk/capabilities/innovation/inspection



Ultra-precision: the new Leitz CMM is capable of sub-micron resolution of large parts.

Carl Hitchens has been promoted to head of the Nuclear AMRC's machining group

Hitchens was previously deputy head of machining, and continues as head of the metrology group. He has over 25 years of experience in manufacturing engineering, and last year was awarded Fellowship of the Institution of Mechanical Engineers.

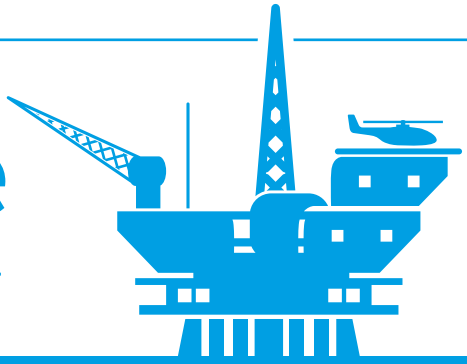
"I'm honoured to be given responsibility for the Nuclear AMRC's machining activities," says Hitchens. "The machining workshop is now fully commissioned and we have a world-class team of engineers and researchers. We'll continue to develop our capabilities to make sure we can tackle large-scale machining problems for our industrial partners.

"The combined strength of a machining and metrology group is very positive, and we are working on a range of capability development projects that will have great benefits for UK manufacturers."

Hitchens succeeds Jay Shaw, head of machining since 2014, who is taking a new role as senior business development manager.

"Our world-leading machining capabilities are in more than capable hands with Carl," Shaw says. "In my new role, I'll be working with companies in the energy and defence sectors to identify ways we can help them increase their competitiveness, and I hope to find some challenging problems for Carl and his team."

Design expertise
helps ensure subsea safety



The Nuclear AMRC's machining experts provided vital design support for a new subsea wellhead produced by Plexus Ocean Systems.

Aberdeen-based Plexus is a leader in the design and supply of wellhead products for the global oil and gas industry. The firm's patented POS-GRIP technology significantly improves the reliability and safety of high-pressure high-temperature wellhead systems, and has been widely adopted for surface wellheads.

In 2012, Plexus decided to expand the market for POS-GRIP technology by designing and developing an innovative subsea wellhead – the Python.

The firm produced concept designs during 2013. While working with its supply chain to plan production of the new wellhead, Plexus identified the potential for help from the Nuclear AMRC on design for manufacture.

"Design for manufacture can significantly reduce the cost and risk of bringing innovative new products to market," explains Jay Shaw, the Nuclear AMRC's lead engineer on the project. "Because our engineers have a deep understanding of how large, complex components can be machined and fabricated, we can help make sure that new designs can actually be manufactured efficiently while meeting all the quality requirements and the design intent."

Three full-size housings for the Python wellhead had to be designed and manufactured for qualification testing. The test housings were designed to qualify various aspects of the wellhead design, and relied on new and novel components never before manufactured by Plexus.

"Plexus has no in-house machining capability, and relies on a robust supply chain of machining suppliers in the UK," says supply chain manager Matthew Thorpe. "The need to get the best design for manufacture is essential to ensure that the most economic solution is found that meets the design requirement but is also able to be manufactured successfully."

Plexus and the Nuclear AMRC began working together in 2014, using the centre's machining expertise to help review critical components in terms of the manufacturing process and supply chain capability.

"A series of design for manufacture review meetings were set up with the Nuclear AMRC to look at the design and machining requirements of critical items," says Thorpe. "Risks were identified in terms of machining tolerance, surface finish and potential distortion issues. After identifying areas of concern, proposals were discussed with the Plexus engineering team, with the objective of maintaining the design integrity but allowing a solution that could be manufactured economically."

Suppliers were also included in the review meetings so that their capabilities could be considered. The Nuclear AMRC engineers visited a number of companies to assess their machining capability for the new Python design, as well as for Plexus's existing surface wellheads.

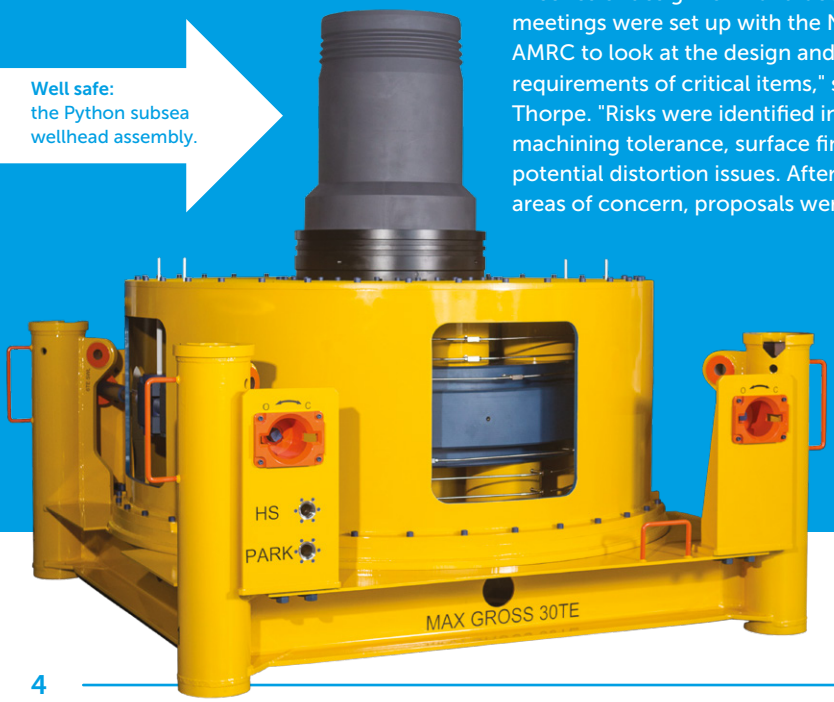
The team found that one of the Python components would be particularly challenging to machine – a large two-piece clamp which mechanically locks the wellhead when in operation. The clamp was manufactured from a single forged ring of over two metres diameter which had to be split, and featured complex end profiles for the closing mechanism.

"The net result was a clamp with a complex geometry obtained by the removal of a significant amount of metal," Thorpe says. "The potential risk of distortion in terms of the clamp twisting was identified, and a recommended machining method including stress relieving, sequence of milling and turning and splitting was developed.

"I am pleased to say that the manufacturing strategy developed worked very well, and the split clamp was produced with no issues."

A fully operational Python wellhead was designed and manufactured using the knowledge gained during the test housing project, and unveiled at the SPE Offshore Europe exhibition in Aberdeen in September 2015.

www.plexus.co.uk



Well safe: the Python subsea wellhead assembly.

The Tynan view

A year of **progress**

I am very much looking forward to 2016; I think it will be a momentous year for the UK civil nuclear industry.

I have some big expectations that I hope will be met. For the long awaited nuclear new build programme, I expect EDF to make a final investment decision (FID) for the Hinkley Point C project early in the year – hopefully sometime before April.

I anticipate that Horizon and NuGen will move forward with confidence in the GDA process for the design approval confirmation of their ABWR and AP1000 reactors. I also think that we will see significant local stakeholder activity in North Wales for the Wylfa Newydd project, as well as decommissioning and potential new investment in small modular reactors (SMRs) for Trawsfyndd.

It will be equally busy in West Cumbria, where a new organisation for Sellafield Ltd will take control at the UK's largest decommissioning site, and there will be increasing activity with NuGen and Westinghouse for the Moorside development.

If we do get the expected FID for Hinkley Point then there will be a major mobilisation of resource and effort in Somerset. This is an exciting prospect and the beginning of a huge investment in that region.

The decommissioning programme in the UK was given a real vote of confidence by the government in November 2015, and the Nuclear Decommissioning Authority (NDA) has been able to publish its draft long-term strategy for site clean-up and restoration in the UK. This is a major milestone, and these documents have been published for public consultation. I expect we will see major progress at key NDA sites such as Sellafield and Dounreay.

In the existing operating fleet, the end of 2015 saw the closure of the last remaining Magnox nuclear power station at Wylfa on Anglesey. The Magnox fleet has been the workhorse of the UK civil nuclear industry and, together with the AGR fleet, has consistently produced about 20 per cent of the UK's electricity needs for the past six decades. These stations have been a safe, reliable, and efficient source of low carbon energy for the UK. I expect we will see EDF make the case for continued safe operation of the AGR and PWR stations in the UK, aiming for an average nine-year life extension to these reactors. Safety will remain the number one priority in any case for a life extension.

The emerging market for advanced technologies will see a strong focus on SMR technology for the UK, with the government commencing a competition to select a specific technology for development in the UK. Expect to see many more technology vendors showing interest in a UK SMR programme.

All of the opportunities in these markets will be attractive to both home and overseas suppliers into the UK civil nuclear industry. It is vital that the Nuclear AMRC continues its work to develop the UK civil nuclear supply chain and to help UK companies win work in the civil nuclear industry. I expect that the tremendous success we have had at Nuclear AMRC during 2015 will continue though 2016.

Of key importance to us will be the continuation of our supplier development programmes, including our unique Fit For Nuclear scheme. These programmes provide focus and improvement planning for participating organisations, and the benefit of this work should not be underestimated.

For me, 2016 is a year of expectation for the UK civil nuclear industry. I know that the Nuclear AMRC will play an increasingly important role in the development of a new era of civil nuclear power in this country.

Mike Tynan, CEO, Nuclear AMRC

The Nuclear AMRC has signed up to the new Women In Nuclear industry charter

Women In Nuclear UK aims to improve diversity and increase the skills base in the nuclear industry by encouraging gender balance.

Its charter, launched in November 2015, allows companies and organisations to commit to 10 practical steps. Founding signatories include Rolls-Royce, the Nuclear Decommissioning Authority and the Nuclear Industry Association.

womeninnuclear.org.uk

Critical capacity: the Nuclear AMRC's Soraluce FX12000

Extreme challenge for deep hole machining

The Nuclear AMRC has worked alongside member company Sandvik Coromant to develop and demonstrate a new tooling solution for extreme deep hole machining.

Sandvik Coromant is a leading manufacturer of tools for turning, milling and drilling, and a Tier One member of the Nuclear AMRC. The firm was challenged by a major customer operating in the oil and gas sector to produce a machining strategy for a particularly demanding component used in undersea exploration – a drill collar, which sits between the drilling rig and drill bit, and allows drilling fluid to flow through the system.

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The seven-metre cylindrical part is made of a difficult-to-machine non-magnetic stainless steel, with a precise bore along its length, and a number of concentric steps leading to a smaller diameter at the far end. The part also needed offset features to be machined several metres down the hole, at a challenging length-to-diameter ratio of around 70:1.

"The customer was asking for some unbelievable features which were very hard to machine," recalls Ian Tromans, development engineer at Sandvik Coromant. The part had previously been produced for the client, but the Sandvik team were able to show that they hadn't actually been made to the specification.

"It's the most complex component that we've ever seen," adds development engineer Maurizio Minutolo.

Developing a machining strategy for the bore fell squarely into the capabilities of Sandvik Coromant's engineering competence centre for deep hole machining in Halesowen.

"What we class as deep hole drilling is anything with a length to diameter ratio of greater than 10:1 – up to 10:1, a lot of operations can be done with boring tools," says Tromans. "When we're talking about deep hole machining, we're talking about not only moving in the z-axis but moving in the x-axis as well. That's where it gets a bit more complicated."

The hole was prepared in a sequence of steps, each requiring specialist tooling. Drilling the initial hole, of around 95mm diameter through seven metres of steel, took almost five hours to remove around 400kg of metal.

"On this component, even the first operation is not so easy," notes Minutolo. "We have a very challenging material and a very long component. To keep any deviation to a minimum, we drill half one way, and half the other way."

The hole was then expanded to 110mm using pull boring, which provides greater stability over this length than push boring. This stage also removed any deviation in the initial hole, to a tolerance of 0.1mm over the length of the part. The hole was then skived with a high feed reaming head to finish the internal surface to a high quality.

Deep knowledge: Wayne Mason, Ian Tromans and Maurizio Minutolo of Sandvik Coromant.

"It's fantastic to know that we have this sort of collaboration with some of the best machines and equipment anywhere in the world."

The long wider section was counterbored to 149mm diameter, using a bespoke counterboring cutter with front pilot. The stepped diameters were then cut to precise chamfers using multiple cutting tools. The team used hydraulically activated tools with retracting cartridges, to avoid the risk of the cutting inserts damaging the bore while the tool is inserted and withdrawn.

"The challenging area for us was that all the tolerances depend on our tools," Minutolo says. "If it's external machining, it depends on the operator and the machine – but here, it all depends on the accuracy and setting of our tools."

The final stage of machining was the most challenging – cutting a number of scalloped features at two to eight metres down the part, with very tight tolerances on both size and relative position.

The Sandvik team identified that the features could be produced using a plunge milling technique, in which cutting is performed by feeding the tool axially rather than radially, but developing and proving the solution on a representative-sized part was beyond even the capabilities of the engineering competence centre.

Sandvik Coromant called on the machine tool and fixturing expertise of the Nuclear AMRC, and the unique capabilities of its largest machining centre – the Soraluce FX12000 horizontal boring centre, capable of a range of machining operations over a working volume of 300m^3.

"We knew the capabilities of the Nuclear AMRC, and it's fantastic to know that we have this sort of collaboration with some of the best machines and equipment anywhere in the world," says Wayne Mason, R&D and application solutions manager for deep hole machining at Sandvik Coromant.

To prove the process, the team made a demonstration piece of around two metres, and installed the full-scale plunge milling tool on the Soraluce.

Even though the part will be produced on a different make of machine at an overseas contractor, the nature of the project meant that it could be proved on the Soraluce. "Because all the tolerances are in the tool, not the machine, we can transfer the process off this machine and onto another," Minutolo notes.

The team had to overcome a range of milling challenges to achieve the required tolerances in a secure machining process, while avoiding vibration in the piece and evacuating chips without damaging the bore surface.

The team used a special rough milling cutter with 8mm depth of cut, followed by finish milling with 0.5mm depth of cut. After all the preparation and planning, machining time for each step was less than a minute.

The team then used the Nuclear AMRC's large-scale metrology capabilities to record that the features met specification.

"Only the Nuclear AMRC had the equipment, expertise and collaborative approach to conduct the proof of concept manufacture and inspection of the plunge milled features," says Stuart Dawson, Nuclear AMRC operations director. "It's an excellent example of working with a Tier One member to solve extreme technical challenges in an oil and gas component."

The project could lead to new deep hole machining applications for oil and gas and other demanding sectors.

"It opens up deep hole machining as not just being drilling – we've proven we can mill two to eight metres deep on the inside of a bore," Mason says. "Oil and gas companies are incredibly imaginative in coming up with ever more complex components, but sometimes these features are very challenging to accomplish.

"Some of the feature requirements being put to us as a tooling supplier are incredibly difficult, but we like that because we are able to support that. But if we didn't have this centre of excellence as a capability, we'd often have to say no to these enquiries. That's why the Nuclear AMRC is important to us."

Mason brought his customer's lead engineer to the Nuclear AMRC following the project. "They'd never seen this before, and the feedback they had was they were extremely impressed with the whole set-up," he says. "It's been a great collaboration in machine resource and capability, and also the huge requirement for measurement. We couldn't have got it to that stage anywhere else."

Flamgard Calidair gets fit for nuclear new build

Specialist manufacturer Flamgard Calidair has had its fire dampers approved for nuclear new build with support from the Fit For Nuclear programme.

Flamgard Calidair designs and produces specialist dampers for a wide variety of industries. These are safety-critical stainless steel fabrications which sit within the heating, ventilation and air conditioning (HVAC) ducts of power stations, oil refineries, transport tunnels, submarines and other complex environments, and which automatically snap shut to stop the spread of fire, fumes or blast forces.

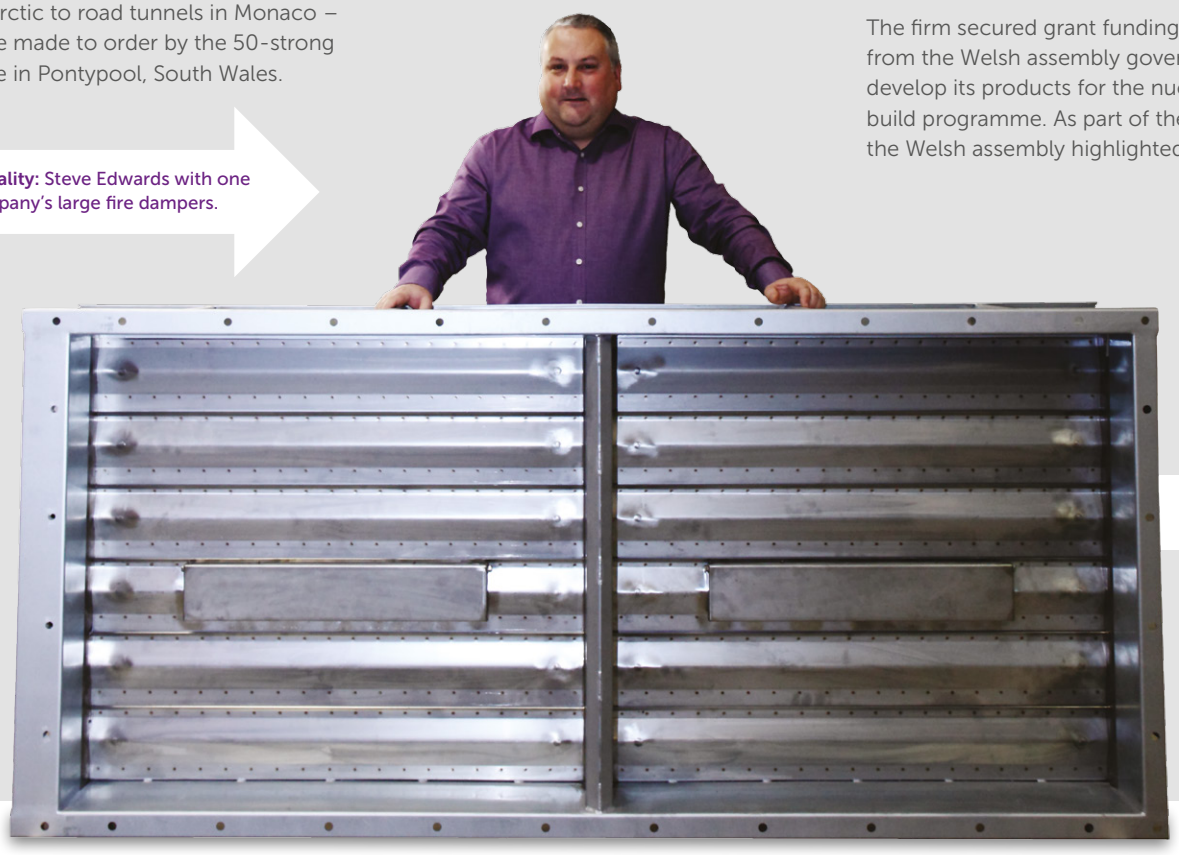
The firm's dampers are protecting lives around the world, from oil platforms in the Russian Arctic to road tunnels in Monaco – and all are made to order by the 50-strong workforce in Pontypool, South Wales.

"The products we make save lives," says managing director Steve Edwards. "There's no compromises. Everything we do stops the spread of harmful airborne chemicals or fire."

Founded in 1981, Flamgard Engineering focused on the oil and gas industry but moved into nuclear when it acquired rival Calidair Engineering in 2007. Calidair had produced dampers for UK reactors including Sizewell and Hinkley Point. The merged group has since worked with ducting specialist Hargreaves to supply major projects at Sellafield and other sites.

Flamgard Calidair is now quoting for work in the UK's new build programme. "We see a lot of growth potential for our company within nuclear," says Edwards. "We looked at the market three or four years ago, knowing at the time that the French companies were the most prominent. Looking at standards and the competition within France, we decided that our existing products, even though compliant in the UK, didn't meet the European legislation."

The firm secured grant funding and support from the Welsh assembly government to develop its products for the nuclear new build programme. As part of the support, the Welsh assembly highlighted the



Pride in quality: Steve Edwards with one of the company's large fire dampers.

business development support available through the Fit For Nuclear (F4N) programme and organised a visit to the Nuclear AMRC. "We were extremely impressed with what we saw – the technology was brilliant," Edwards recalls.

Edwards' team completed the online F4N assessment, and worked with Huw Jenkins of the Manufacturing Advisory Service on a follow-up site visit. "We had a pretty good score because we were already in the nuclear market and used to the audit trail, so a lot of what was required was already in place," Edwards says. "There were some key areas from the business perspective that we didn't have in place that were highlighted. We've turned around and addressed that through training and a couple of focus groups, and that seems to be giving us a benefit at the moment.

"We've introduced a 5S training policy into the business, and are having a lot of useful training and discussion. I'm purposefully picking areas of the factory that are the worst for people to get into and understand the need for change. There are good areas, but if we hit the worst first, it gives us the biggest benefit."

Flamgard Calidair has put its profits back into the business over the past few years, investing in new workshop facilities and IT infrastructure at its 3,500m² manufacturing facility.

"The manufacturing processes have changed – in the past, it used to be very manual oriented machines, and everything had to be checked," notes Edwards. "We're now using computer-controlled machines and laser cutters, and we know everything is 100 per cent accurate coming off the machines. That's given us the confidence and ability to take cost out of the product while ensuring quality."

Staff have embraced the new ways of working, Edwards says. The firm invests heavily in staff development, as demonstrated by walls filled with training certificates.

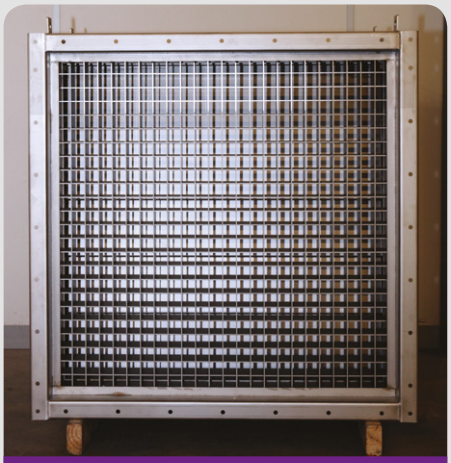
"When we bring customers in, we like to show them the pride that people here take, and that's reflected in the quality of the product," Edwards says. "All our product is identified by the people who made it– it's like Aston Martin, where the people who build the engine put their names on it. We have exactly the same system, where people put their names on our dampers."

With support from F4N and the Welsh assembly, the company has now redeveloped its fire dampers for nuclear new build applications, passed all the necessary testing, and is the first UK manufacturer to produce an EN 1366 qualified damper which meets the standards for integrity, insulation and smoke. What that means, Edwards emphasises, is that the firm can supply Areva and EDF with British-made products that have the same qualifications as their French suppliers.

The company continues to invest in product development, and is currently working on an R&D project to improve the performance of its blast dampers for applications including nuclear decommissioning. By developing new markets in nuclear, oil and gas, defence and marine, Flamgard Calidair aims to double its turnover in the next five years.

"We'd like to be suppliers of choice for every individual site in UK new build, and in decommissioning. We're the only company that's done the testing and validation," Edwards says. "Being a Welsh company, we'd like the opportunity to be doing some of the work at Wylfa. And with Hinkley Point only 40 miles away as the crow flies, we think we're positioned very well for supporting EDF."

www.flamgard.co.uk



Safety-critical: Flamgard Calidair is an authority on blast dampers.

100 per cent accurate: the firm has invested in new laser cutting capabilities.

F4N
Fit For Nuclear

F4N
Fit For Nuclear

F4N grants deliver real value

Over 100 companies have secured business improvement grants as part of their Fit For Nuclear journeys.

Over the past year, the Nuclear AMRC has offered an enhanced F4N programme with support from the Regional Growth Fund, offering match-funded grants of around £10,000 to manufacturers to help them meet industry standards and compete for work in civil nuclear.

Participating companies have reported that the funding will help create over £33 million of added value in their businesses and over 400 jobs.

The grants supported business improvement projects involving quality management systems, lean manufacturing, strategy and leadership training; and R&D projects including design, prototyping, tooling and testing.

Applications for the grants have now closed, and the enhanced F4N programme will come to an end this summer. The Nuclear AMRC will continue to work with companies through F4N, and companies which are already progressing through the programme can still access the full support of the centre's industry specialists.

The Nuclear AMRC is now working with government to develop the next generation of supplier development programmes, with the support of the UK's nuclear new build developers and the Nuclear Decommissioning Authority. Full details will be announced shortly.

namrc.co.uk/services/f4n

Stronger together: four companies formed a new consortium to bid for nuclear work.

South West engineers come together

Four precision engineering companies from South West England have formed a new consortium to bid for work at Hinkley Point C and other large infrastructure projects.

CAM Machine Components (CMC), Berry & Escott Ltd, TMB Patterns Ltd and Metaltech Precision Ltd together form the Advanced Precision Engineering Consortium (APEC), a new one-stop shop that can deliver a comprehensive range of skills and capabilities across a variety of engineering fields.

The four companies met at Nuclear AMRC Local events held in collaboration with Somerset Chamber's Hinkley Supply Chain Team.

"Early on, it became apparent that the potential size of projects required for Hinkley Point C could be much larger than any one of our companies could handle," says Chris Escott of Berry & Escott. "After conversations at Somerset Chamber events, it was decided that forming a new consortium would better equip us to manage these opportunities, as well as share knowledge and experience."

Each of the four businesses has specific core skills, notes Bill Colquhoun from TMB Patterns. "Trying to win contracts or business from any large organisations can be a difficult task if you are perceived as not having the resources to cope. I think you need to take a proactive stance to look at ways to secure new business," he says.

The companies are already benefiting from the collaboration. "By talking to each other – something we may not have done previously for fear of competition – we are now exchanging drawings on which to quote," says Gervase Winn from CMC. "The open approach, whilst initially of some concern, is proving to be the correct one."

Getting ready to supply into nuclear new build has been a lengthy process, but it's still not too late for smaller companies to get involved.

"Getting your company ready to supply the Hinkley project is quite a lengthy process but it's definitely not too late to get involved," says Escott. "Although it might appear that potential opportunities for your sector are a long way off, it pays to get involved early on so you are fully prepared for when that day does come."

All four companies have completed or are currently on the Fit For Nuclear (F4N) programme, ensuring they have the correct procedures and accreditations to be able to work in the demanding nuclear sector.

"F4N is a must for anyone looking at supplying into this industry," notes Andrew Riste from Metaltech Precision. "It fine-tunes your internal plans and processes to ensure you are prepared for any potential client coming through your door."

Berry & Escott: **www.berryescott.co.uk**

CMC: **www.cam-machine.com**

Metaltech Precision: **www.metal-tech.com**

TMB Patterns: **www.tmb-patterns.co.uk**

Hinkley Supply Chain Team: **www.hinkleysupplychain.co.uk**

Strengthening **Chinese links**

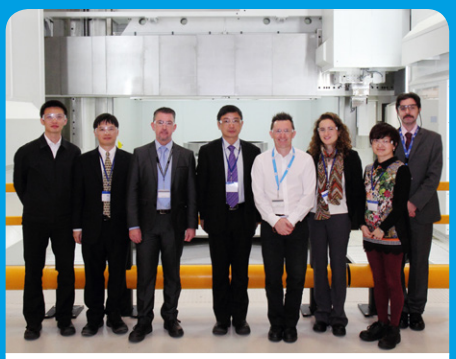
The Nuclear AMRC welcomed delegations from two major Chinese nuclear groups in January.

Senior figures from China General Nuclear Power Corporation (CGN) and China National Nuclear Corporation (CNNC) separately visited the Nuclear AMRC to discuss cooperation in current and future nuclear programmes and access to the UK supply chain.

CGN is investing alongside EDF Energy in the proposed new reactors at Hinkley Point C, and also aims to build its own reactor at Bradwell in Essex.

The Nuclear AMRC is also working with CNNC and the UK's National Nuclear Laboratory on the new £50 million Joint Research & Innovation Centre, announced in September 2015.

"It is in the UK's interests to maximise the local content of any overseas supply chain activities," says Nuclear AMRC business development director Pete Handley. "We look forward to working more closely with CGN and CNNC to develop major long-term prospects for the UK's advanced manufacturing industry."



International welcome: Delegates from CGN visit the Nuclear AMRC.

New company to drive **Wylfa new build**

Reactor developer Hitachi has launched a new UK subsidiary to lead work on the proposed Wylfa Newydd reactors.

The new company, Hitachi Nuclear Energy Europe Ltd, will manage engineering, procurement and construction of two advanced boiling water reactors (ABWRs) at Wylfa on Anglesey.

Hitachi also announced "significant further progress" with potential joint venture partners Bechtel of the US and JGC of Japan. The proposed joint venture will work as a Tier 1 contractor to Horizon Nuclear Power, another wholly-owned subsidiary of Hitachi.

Horizon aims to start construction at Wylfa in 2019, with commercial operation by 2025.

Before construction can begin, the ABWR has to pass the UK's generic design assessment (GDA) process managed by the Office for Nuclear Regulation (ONR) and Environment Agency. The ABWR completed the third phase of this assessment in 2015, and is now moving into detailed technical assessment.

Westinghouse's AP1000 reactor, which developer NuGen plans to deploy at its Moorside site in West Cumbria, is still progressing through the final stages of its GDA. The ONR says it expects to issue final approval in January 2017.

The ONR also confirmed that it expects China General Nuclear Corporation (CGN) to submit its reactor design for assessment later this year.

Competition to identify **best SMR for UK**

A government-backed competition will select a small modular reactor (SMR) design for development in the UK.

In his autumn statement, chancellor of the exchequer George Osborne announced funding of at least £250 million over the next five years for a nuclear R&D programme. The programme will include a competition to identify the best value SMR design for the UK.

Full details of the competition, which is intended to pave the way to building one of the world's first SMRs in the UK in the 2020s, are expected to be released early in 2016.

Reactor developer Westinghouse has already submitted a proposal to government to jointly develop its 225MWe SMR in the UK. In January, the group also announced that its Springfields facility in Lancashire is ready to produce fuel for the proposed reactor.

"Manufacturing Westinghouse SMR fuel at Springfields will secure the future of a strategic national asset of nuclear fuel manufacturing capability and safeguard highly skills and highly paid UK jobs," said Mick Gornall, managing director of Westinghouse Springfields.

Rival SMR developer NuScale has meanwhile announced a fuel manufacturing contract with Areva.

The French nuclear group will supply the initial cores for NuScale's SMR modules, as well as subsequent reloads. NuScale proposes to deploy its 50MWe PowerModules in clusters of up to 12, allowing power generation to continue while individual modules are refuelled.

www.westinghousenuclear.com/new-plants/small-modular-reactor

www.nuscalepower.com

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