NUCLEAR AMRC news

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# Vision for the future

## Nuclear innovation for Earth, sea and space

University of Sheffield

CATAPULT High Value Manufacturing

# Midlands facility prepares to open to industry

Expanded horizons: Nuclear AMRC Midlands at Infinity Park.

## The Nuclear AMRC is now fitting out its new research facility at Infinity Park, Derby.

**The Nuclear AMRC Midlands team collected the keys to their new home in April, after a year's construction.**

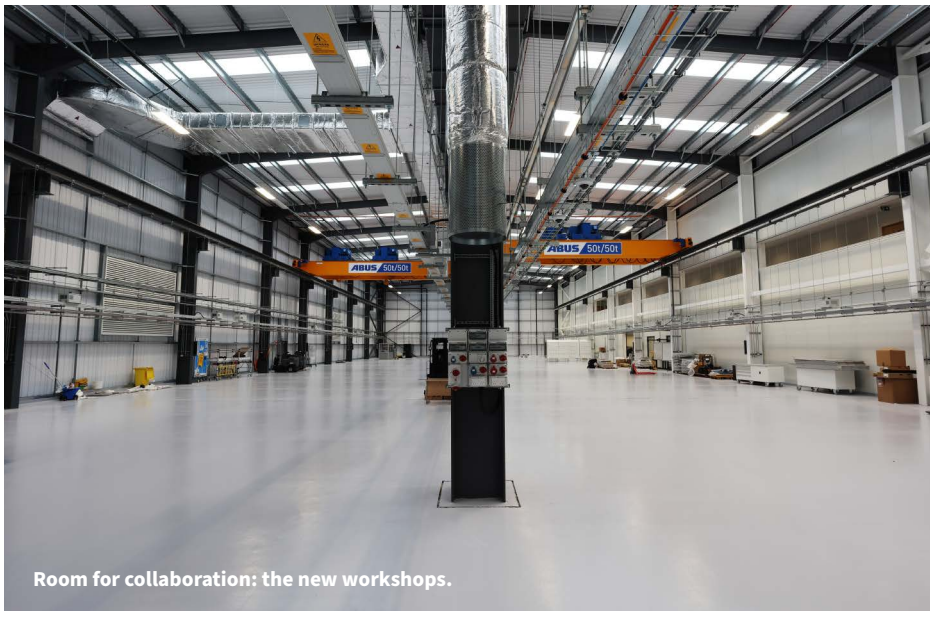
The £20 million building gives the centre a permanent base in Derby. The pilot Nuclear AMRC Midlands opened in 2019 in the iHub on Infinity Park – now the home of the Nuclear Skills Academy (see p20).

The new 4,300m² facility will expand the centre's capabilities in technology areas including digital engineering, control and instrumentation systems, and additive manufacturing.

The building, designed by Stephen George + Partners and built by Stepnell, is based around a large open-plan workshop with ten metre ceilings and 50 tonne cranes to allow work on large fabrications and assemblies.

Laboratory facilities include dedicated space for 3D printing and rapid prototyping, virtual reality and visualisation, and equipment qualification.

The building also provides a new home for the University of Derby's Institute for Innovation in Sustainable Engineering, which specialises in sustainable design and manufacturing of products in a range of sectors from transport to healthcare.




Room for collaboration: the new workshops.

As befits a building dedicated to low-carbon technology development, Nuclear AMRC Midlands has been designed and built to high standards of environmental sustainability. The facility features 590m² of roof-mounted solar panels, to generate around 83MWh of low-carbon energy a year. The building includes sustainable materials throughout, with site landscaping to increase biodiversity and green cover.

Construction has been supported by Derby City Council, and part-funded by the D2N2 local enterprise partnership.

The new facility will launch with an industry event in the summer.

# Micro-reactors on the moon

## The Nuclear AMRC is working with Rolls-Royce to investigate how nuclear power could support a future moon base.

**The research, funded by the UK Space Agency (UKSA), will develop Rolls-Royce's proposal for micro-reactor technology to provide the power needed for humans to live and work on the moon. Rolls-Royce plans to have a reactor ready for lunar deployment by 2029.**

All space missions depend on a power source for communications, life-support and science experiments. Nuclear power has the potential to dramatically increase the duration of future lunar missions and their scientific value.

The project is supported by £2.9 million funding from UKSA, and will deliver an initial demonstration of a lunar modular nuclear reactor. It follows a preliminary study funded by UKSA in 2022.

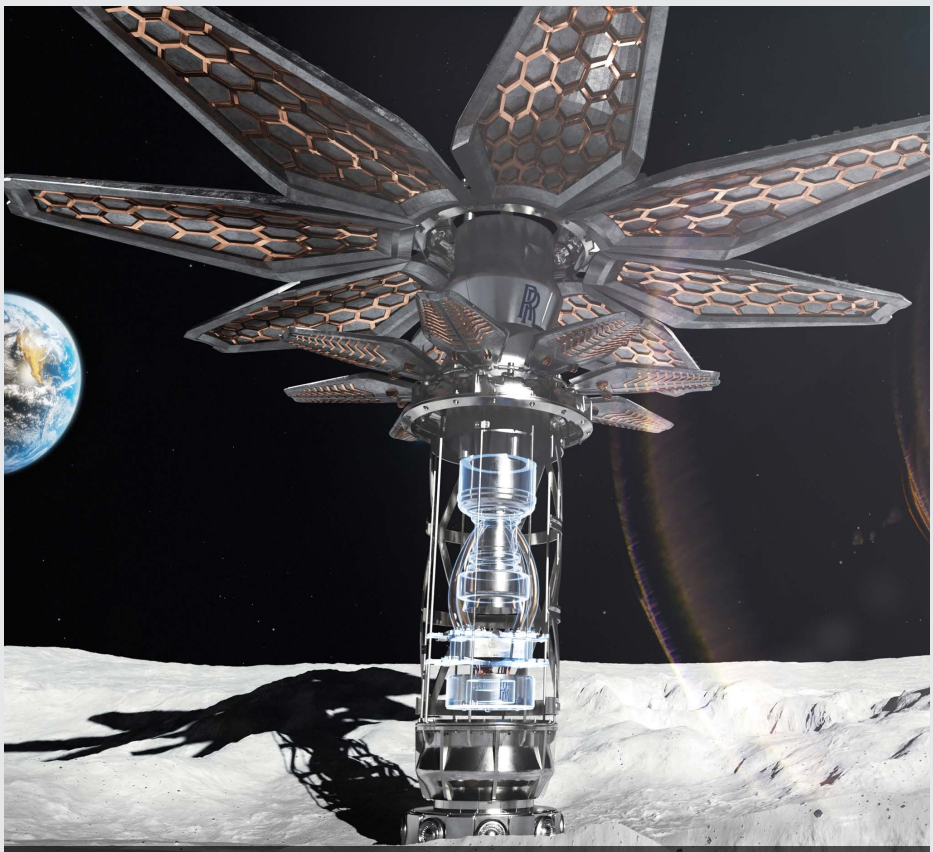
Other partners for the new phase of research include the University of Oxford, University of Bangor, University of Brighton, and the University of Sheffield AMRC.

"The new tranche of funding from the UK Space Agency means so much for the Rolls-Royce micro-reactor programme," says Abi Clayton, director of future programmes at Rolls-Royce. "We're proud to work collaboratively with the UK Space Agency and the many UK academic institutions to showcase the best of UK innovation and knowledge in space.

"This funding will bring us further down the road in making the micro-reactor a reality, with the technology bringing immense benefits for both space and Earth. The technology will deliver the capability to support commercial and defence use cases, alongside providing a solution to decarbonise industry and provide clean, safe and reliable energy."

Smaller and lighter than other power systems, a nuclear micro-reactor could enable continuous power regardless of location, available sunlight, and other environmental conditions.

"Nuclear power offers a stable and reliable source of heat and electricity for moon colonies and other extraterrestrial missions such as deep space probes, space propulsion, and missions to Mars and beyond," comments David Malley, senior research fellow at the Nuclear AMRC. "Micro-reactors offer long life and flexibility, as they can be stacked or connected together to provide a scalable output to match the needs of different applications, similar to the deployment of batteries in terrestrial applications."



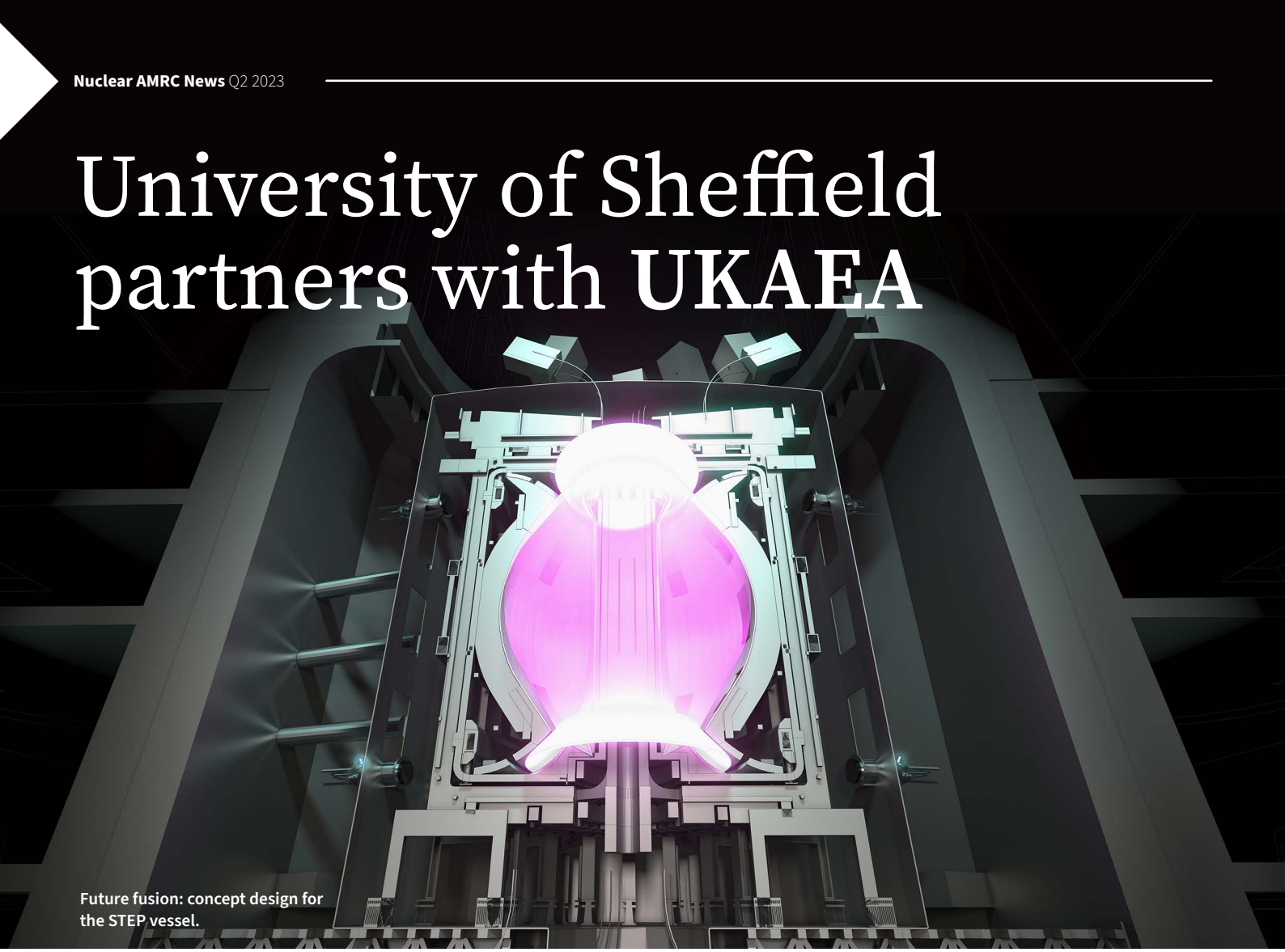
New frontiers: concept design for Rolls-Royce's micro-reactor.

Designing and engineering a compact reactor which can survive the extreme conditions of space will present some significant challenges. The new project will focus on three key features of the micro-reactor – the fuel used to generate heat, the method of heat transfer, and technology to convert that heat into electricity.

"This is a new environment for nuclear power, and challenges such as materials selection, fuel types, and qualification testing and proving methods will have to be considered carefully to give confidence in the final reactor design," Malley notes. "The consortium is well placed to tackle these challenges with a broad range of skills in all areas of manufacturing research, and decades of experience in the design, manufacture, testing and use of nuclear power reactors."

- *www.rolls-royce.com/innovation/space.aspx*

# University of Sheffield partners with UKAEA



Future fusion: concept design for the STEP vessel.

**The United Kingdom Atomic Energy Authority (UKAEA) and the University of Sheffield have entered a new partnership to drive the development of fusion technology.**

The collaboration will see the University of Sheffield appoint two chairs to lead ambitious new research programmes in materials for fusion and component qualification. Both will work closely with UKAEA staff and the Nuclear AMRC, which is already collaborating with UKAEA on a range of projects to develop manufacturing technologies and supply chain capabilities for the fusion programme.

"Fusion power will be an essential part of the UK's long-term energy future, but turning the science into commercial reality presents huge challenges to researchers, engineers and manufacturers," says Charles Carpenter, chief technology officer at the Nuclear AMRC. "This new partnership will help UKAEA to draw on the University of Sheffield's research excellence in engineering and materials, and its world-leading centres for advanced manufacturing innovation and industrial collaboration."

The two new chairs will be based at the University of Sheffield's Faculty of Engineering. UKAEA says it chose to work with Sheffield because of its expertise and strong track record in materials science, engineering and manufacturing research. The collaboration will also cover thermal hydraulics research, a key area for the development of fusion as an energy source.

"This partnership will help to address intrinsic engineering and materials challenges in order to make fusion energy commercially viable," says Dr Amanda Quadling, director of materials research at UKAEA. "It will also develop a pipeline of talent for the future of our thriving fusion industry."

The two chairs are expected to attract collaborations from a wider range of industrial partners who will sponsor students and work in partnership on research projects.

"The challenge of how we test and qualify components for future use in a fusion environment is critical for the delivery of a fusion power plant," says Stephen Wheeler, director of fusion technology at UKAEA. "Partnering with the University of Sheffield to launch a new chair in this field will accelerate the application of cutting-edge techniques from across all sectors of engineering, and the development of new experimental and digital techniques specific to fusion."


**Research cluster: UKAEA's Fusion Technology Facility on South Yorkshire's Advanced Manufacturing Park.**

UKAEA already operates a materials research centre on the Advanced Manufacturing Park between Sheffield and Rotherham, home to the Nuclear AMRC and University of Sheffield AMRC. Opened in 2021, the Fusion Technology Facility is leading the development of technologies and materials for fusion power stations, including UKAEA's STEP programme.

The STEP prototype power plant will be built at the West Burton site in North Nottinghamshire, around 30 miles east of Sheffield.

# New projects tackle fusion challenges

## The Nuclear AMRC is working with partners to investigate innovative manufacturing methods and technologies for commercial fusion power plant.

The projects are part of a suite of 18 feasibility projects in the latest round of UKAEA's Fusion Industry Programme. The projects, funded by the government's Small Business Research Initiative, are worth a total £3.1 million and aim to apply innovative technologies to the technical and physical challenges of fusion power.

"In the past 12 months, we have seen significant advances both in the UK and globally that demonstrate the potential for fusion energy to be a safe, low-carbon and sustainable part of the world's future energy supply," says Tim Bestwick, UKAEA's chief technology officer. "However, there are a number of significant technical challenges to address for fusion energy to realise its potential. The Fusion Industry Programme is helping engage organisations and industrial partners to stimulate innovation and address these important challenges."

The UKAEA funding round includes four projects to develop innovative heating and cooling systems which could enhance fusion power plant performance.

One project, led by international engineering consultancy IDOM, focuses on transferring jet impingement technology into the fusion sector. Jet impingement is a highly efficient cooling technique used to control the heat generated by gas turbines, heat exchangers and high-density electrical equipment. In a fusion reactor, it could be used to cool sub-assemblies such as the divertors which remove helium and impurities from the plasma chamber.

As part of the feasibility study, the Nuclear AMRC carried out a manufacturability assessment of IDOM's design of a critical component for a jet impingement system, and fabricated a mock-up using electron beam welding.

Other projects focus on novel materials, technology and manufacturing processes which could improving fusion power plant availability.

The Nuclear AMRC is working with Doncaster-based Laser Additive Solutions to investigate high-quality additive manufacturing techniques for fusion reactor components. The AM4F project uses high-power ultrasonics to improve the material properties of tungsten components.

The project builds on the earlier SonicSMR collaboration, which investigated the technique for the additive production of small modular reactor components.

Other new Fusion Industry Programme projects are led by industrial members of the Nuclear AMRC.

Jacobs is creating a liquid lithium testing facility at its Technology & Innovation Centre at Birchwood Park. Lithium is used in fusion reactors to produce the hydrogen isotope tritium, which is essential for the fusion reaction, but the metal's behaviour under reactor conditions and its reaction by-products are not fully understood.

Frazer-Nash Consultancy is meanwhile investigating more efficient methods for enriching lithium fuel using the drift-orbit technique for plasma separation. The project aims to help establish a UK supply chain for fusion-grade lithium, which is currently only produced in China and Russia.

## Manufacturing support for STEP

**A consortium led by the Nuclear AMRC has secured three projects for UKAEA under a manufacturing framework.**

**The £3.5 million manufacturing support services framework agreement was launched in late 2021 as part of UKAEA's programme to deliver the first prototype fusion energy plant, the Spherical Tokamak for Energy Production (STEP).**

**The Nuclear AMRC is one of five lead organisations appointed under the framework. The centre is backed by a consortium including international engineering group Jacobs, specialist pressure vessel manufacturer Vessco Engineering, the Science and Technology Facilities Council, and three other specialist R&D centres within the High Value Manufacturing Catapult.**

**The consortium has now completed its first contract, to review key components and equipment needed to deliver STEP, and develop a high-level manufacturing and assembly plan. The Nuclear AMRC completed a supply chain readiness assessment of 35 in-vessel components, and provided expert advice on material challenges.**

**Another two projects, due for completion in the summer, focus on specific manufacturing challenges. One involves manufacturing trials and joining tests for the thermal barrier limiter, to demonstrate the manufacturability of this vital component for the safe operation of the plasma chamber.**

**The second project is investigating the potential for producing divertor cassettes by hot isostatic pressing of specialist steel powders.**

# Heat treatment simulations point the way to real savings

**Digital engineers from the Nuclear AMRC have completed a set of complex simulations to help improve the efficiency of heat treatment processes.**

The work was part of a collaborative project called AI6S, which is developing a suite of process optimisation tools based on artificial intelligence and lean six sigma practices to reduce the energy used in heat treatment.

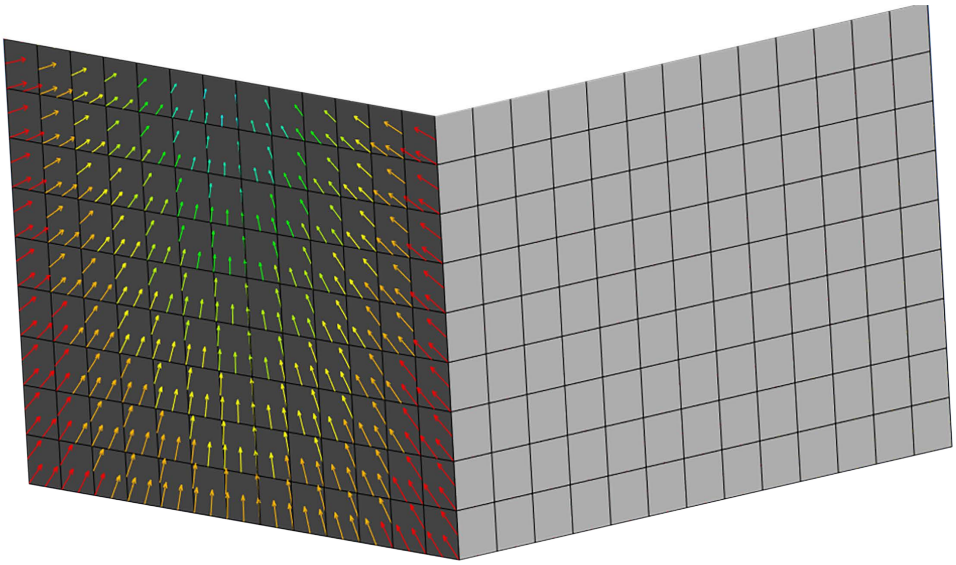
Heat treatment is widely used in industry to improve the material performance and integrity of components produced by casting, forging and other forming processes. Heat treatment processes are energy intensive in their own right, and any errors can lead to the component being scrapped with heavy additional costs in time, money and emissions.

The Nuclear AMRC's work focused on process simulation and verification, to support the development of machine-learning regression models for process optimisation. Training these models requires detailed data on how components behave under heat treatment, as well as information on process parameters, product quality and energy consumption.

To understand the effect of heat treatment parameters on material integrity and performance, the researchers developed detailed simulations of typical products from two of the project partners – a metal forging from Sheffield-based Abbey Forged Products, and a glass bottle from specialist consultancy Glass Technology Services.

The Nuclear AMRC team carried out finite element simulation of the heat treatment process on these digital twins, with the results validated against physical test data from the industrial partners.

The simulations allowed the researchers to collect the data needed to develop the models, without any interruption to the partners' production. "Collecting real data would have involved interfering with manufacturing, which would cost money and time to the manufacturer," says Arman Zonuzi, technical lead for machining simulations.



**Hot topic: the simulations show how heat energy moves through a component**

Giving manufacturers the ability to improve process efficiency without taking time out for trials is one of the key benefits of the AI6S approach.

"With current lean six sigma methods, efficiency is improved through an iterative approach which involves repeatedly stopping or reducing production for experimentation," Zonuzi explains. "Our aim is to digitalise this process and help partners achieve right-first-time production. Our simulations and the regression model help us understand where the bottlenecks in the process are, and allow us to optimise process parameters to reduce carbon emissions and save time."

Initial trials of the optimisation tool have demonstrated significant time and money savings, with reduced carbon emissions and increased production efficiency for both industrial partners.

"It was great to have support from the local Nuclear AMRC facility, as it's invaluable to have science-backed analysis to enable change decisions," says Steve Savage, strategic operations manager at Abbey Forged Products. "We look forward to the final development of the algorithm software."

The two-year AI6S project finishes in summer 2023. It is led by London-based industrial software developer HyBird, with £1.4 million funding from UKRI through the Transforming Foundation Industries Challenge. Other partners include Derby-based technology specialist Ivy Tech and the Brunel Innovation Centre.

The partners estimate that the tools, if applied across a range of foundation industries, could reduce annual emissions by the equivalent of 21,800 tonnes of carbon dioxide in the UK alone.

# Nuclear graduate with a vision for sustainable engineering

**Dami Shofoluwe joined the Nuclear AMRC as a mechanical engineer in October 2022, with the centre sponsoring her through the Nuclear Graduates scheme. *Nuclear AMRC News* asked about her experiences so far.**

Hi, my name is Dami and I am a mechanical engineer on the Nuclear Graduates programme managed by Energus on behalf of the Nuclear Decommissioning Authority.

I applied for the programme during my final year of studying aerospace engineering at the University of Nottingham, as I became increasingly interested in sustainability and energy.

Although I knew that I wanted to work in the nuclear sector, I was unsure of which type of engineer I wanted to be or where to start. The Nuclear Graduates programme offered me the chance to explore different areas of the nuclear sector and broaden my knowledge of nuclear engineering.

One of my main interests is research, which is why the Nuclear AMRC has been such a valuable sponsor and placement for me. At the Nuclear AMRC, I have been fortunate to work on a variety of internal and external projects, giving me the chance to gain experience in research and development, and collaborating with companies covering all stages of nuclear engineering.

The best part about working at the Nuclear AMRC is the abundance of fascinating projects that I can get involved in. Everyone is very open to my participation, and I have been able to work with multiple new technologies, such as micro-reactors and laser trackers. I am also eager to gain experience in welding.

One of the projects I worked on involved mixed reality technology, which combines virtual models with the real world. Prior to this, I had never heard of mixed reality, and had only heard of augmented reality in the context of games like Pokémon Go.

The project involved investigating the use of mixed reality in metrology. We demonstrated how a part inspection could be carried out using a Microsoft HoloLens 2 headset and PolyWorks AR software.

Mixed reality has vast potential in manufacturing, especially in metrology, as it allows for a completely hands-free operation using eye tracking technology and voice activation software. This will be particularly useful for inspecting larger components.

I am thrilled to be part of such exciting projects at the Nuclear AMRC, where I am constantly learning and expanding my knowledge of the nuclear sector.

- **Find out more about the Nuclear Graduates programme:** ***nucleargraduates.com***

**Real benefits: Dami Shofoluwe working with mixed reality technology.**

Touching from a distance: telexistence technologies allow a human operator to feel what a robot is doing.

# Robots reach for safe decommissioning

**The Nuclear AMRC is working with Sheffield-based software company BOW to develop robotic systems for the remote decommissioning of legacy nuclear facilities.**

BOW, formerly known as Cyberselves, has developed software which can control any robot and can be extended to cover a wide range of scenarios. The company has now secured funding to develop systems for tackling the safety requirements and specialist needs of nuclear decommissioning tasks which would be hazardous to human operators.

The TEL-ND project involves telexistence technology, which uses cameras, sensors, and other equipment to provide live feedback to a remote operator so that they feel like they are actually present on site.

"We are taking human expertise and transporting it into a robot in real time to make the experience safer for people, building on work we've already led on in explosives disposal in hazardous underwater environments," says Daniel Camilleri, founder and chief executive of BOW. "Our software can control many different types of hardware, which means we can use off-the-shelf components for these systems, making them easier to replace and keeping costs down."

Nuclear AMRC researchers will work closely with BOW and other project partners to ensure that the technology is meeting the needs of decommissioning clients.

The Nuclear Decommissioning Authority (NDA) has committed to moving humans away from potential harms. This will include the remote decommissioning of contaminated gloveboxes – specialist equipment used to inspect, handle or repackage nuclear materials – by 2025.

"The Nuclear AMRC has extensive knowledge in the nuclear decommissioning industry, and we have previously worked with NDA's subsidiaries on projects related to the glovebox applications," says technical lead Benjamin Rae. "We're pleased to have this opportunity to work with our partners to develop a telexistence platform for removing the possible contamination hazard to the human operator.

"The higher technology readiness level system will demonstrate the safer, secure environment for decommissioning operation, while improving productivity."

Other partners for the project include Touchlab, an Edinburgh-based firm which has created touch-sensitive artificial skin for robots, and Kent-based vision specialist i3D Robotics.

The project uses an off-the-shelf robot fitted with a gripper and a human-style hand covered in Touchlab's artificial skin. The robot is fitted with i3D's radiation-resistant cameras, while the operator uses a virtual reality headset and cockpit for a completely immersive experience.

BOW, a spinout from the Sheffield Robotics collaboration between city's two universities, has also secured funding for a related project to adapt the same technology for assessing injuries and providing first aid on a battlefield or other hazardous environment.

The two contracts are together worth £550,000 and were awarded through the Defence & Security Accelerator (DASA) with funding from the Defence Science & Technology Laboratory and the NDA.

- ***bow.software***

# Deep collaboration on waste canister prototypes

## The Nuclear AMRC is working with waste technology specialist Deep Isolation to develop corrosion-resistant canisters for the safe underground disposal of spent fuel assemblies.

Deep Isolation is developing a range of technologies to safely encapsulate and dispose of radioactive spent fuel within deep borehole repositories, located one to three kilometres underground.

The new collaborative project is funded by the Energy Entrepreneurs Fund, part of the government's Net Zero Innovation Portfolio, and aims to develop Deep Isolation's disposal canister designs to meet UK regulatory requirements.

"This canister provides an option for disposal in a deep borehole that brings greater flexibility and potential cost savings for disposal of spent nuclear fuel and high-level waste," says Chris Parker, managing director of Deep Isolation EMEA. "By giving the UK choice and flexibility in disposal, it helps ensure new nuclear as a vital component of the UK's 2050 net zero strategy."

According to a study completed by Deep Isolation for the Nuclear Decommissioning Authority, deep borehole technology will not replace the need for the UK's proposed Geological Disposal Facility, but could reduce costs and save time by disposing of heat-generating waste streams at a much greater depth.

"An added benefit is that the UK's advanced manufacturing capabilities provide us with an ideal supply chain with which to service the growing international demand for deep borehole disposal," Parker says.

The project is a collaboration between Deep Isolation, the Nuclear AMRC, material engineering specialists at the University of Sheffield, and fuel cycle specialist NAC International.

The Nuclear AMRC will manufacture full-scale prototype canisters tailored to UK requirements.

The prototypes will measure almost five metres in length, with an outer tube, internal structures to hold a fuel rod assembly, and end plates.

The new project builds on previous work by the Nuclear AMRC to carry out a high-level design for manufacturing review of Deep Isolation's preliminary canister.

The first stage of the new project will determine a baseline method of manufacture. The team will then identify the risks and opportunities for improvement, and optimise the design for production. Challenges include finding suitable methods of assembly, welding and inspection for such a long and narrow product.

The initial prototype will then be taken to the US for testing in a borehole demonstrator, with the aim of incorporating any modifications into a second prototype to be manufactured by the Nuclear AMRC. The project will be completed by late 2024.

The centre's supply chain specialists will also review the readiness of UK manufacturers to produce the canisters in bulk, and identify any potential gaps in capabilities or capacity. The project will give UK manufacturers an early mover advantage in the global borehole disposal market, which is potentially worth more than £100 billion in the coming decades.

The research is guided by a board of industry leaders including Alan Woods, strategy director at Rolls-Royce SMR. "The innovation they are bringing to market – small, modular disposal of radioactive waste in deep boreholes – will be an important enabler of the international SMR market, and a great export opportunity for UK manufacturers," Woods says.

- *www.deepisolation.com*

**Out of sight: the canisters will be inserted into boreholes of several kilometres depth.**

# Degree apprenticeship launched for nuclear engineers

**Aspiring nuclear engineers and scientists have a new route into careers in low-carbon energy, with the launch of a degree apprenticeship delivered by the AMRC Training Centre.**

The new Nuclear Scientist and Nuclear Engineer Degree Apprenticeship has been developed with the support of the Nuclear AMRC and industry partners including UKAEA, Westinghouse, Rolls-Royce, Sellafield and Jacobs, to produce graduate professionals who can work across the UK's current and future civil nuclear programmes.

The course has been designed to provide the engineering and management skills needed to ensure that nuclear systems and equipment can be operated safely and efficiently and in an environmentally sustainable way. Specialist modules include the principles of nuclear engineering, advanced manufacturing and materials for nuclear applications, and industry codes and standards.

Depending on previous experience, the course will take up to five years to complete. Graduates will qualify with a BEng (Honours), and be well suited for roles including design, operational management, project management, plant performance enhancements and maintenance of safety standards.

The Nuclear AMRC worked closely with the AMRC Training Centre to ensure the course will meet industry needs, coordinating input from nuclear employers and supporting development of the curriculum.

"We are committed to supporting our supply chain companies to obtain suitably qualified personnel to meet today's challenges and those of the future," says Liz Gregory, supply chain and skills director at the Nuclear AMRC. "There is a real shortage of staff in the nuclear sector, so we are working hard with our partner organisations to meet their needs for high-quality training, and to give young people the best possible start in the industry."

Apprentices will be employed by a company working in the nuclear supply chain throughout their training, with their employer paying the course fees plus a basic salary, supported by the apprenticeship levy. As part of their final year of study, the student will carry out an industrial project to tackle a real engineering challenge for their employer.

For people who want to work in nuclear but are not currently employed in the sector, the AMRC Training Centre can match applicants to a suitable employer.

Applications are now open, with apprentices starting the new course in September.

With an estimated 150,000 skilled people needed to meet the UK's target of 24GW of nuclear power by 2050, the Nuclear AMRC is currently expanding the support it provides to companies to support skills development.

As well as working with Rolls-Royce on the Nuclear Skills Academy in Derby (see p20), the Nuclear AMRC is collaborating with the other High Value Manufacturing Catapult centres on workforce development across the UK's advanced manufacturing sectors.

- *amrctraining.co.uk/apprenticeships/our-apprenticeships/nuclear-scientist-and-nuclear-engineer-apprenticeship*

**Careers start here: the AMRC Training Centre.**

# **Software specialist** to support welding development

## Manufacturing software specialist Kaizen PLM has joined the Nuclear AMRC to help develop new capabilities for automated welding, inspection and additive manufacturing.

**Based in Limerick, Ireland, Kaizen PLM specialises in product lifecycle management (PLM) systems which allow manufacturers to manage product data throughout the entire lifecycle from ideation, design, and manufacture to service and disposal. It is a smart expert partner for Siemens Industry Software in the UK and Ireland, with a focus on additive manufacturing and virtual commissioning applications.**

As part of its tier one membership, Kaizen PLM will support the deployment of new robotic platforms for welding, inspection and additive manufacturing of metal components for the nuclear sector and other quality-critical industries.

One platform involves a major upgrade of the Nuclear AMRC's bulk additive manufacturing facility, originally commissioned in 2015 with a gantry-mounted robot carrying a specialist arc welding tool within a ten by five metre cell for large-scale additive work. The upgraded facility, now dubbed the modular intelligent manufacturing and inspection cell, features two Kuka robots working in tandem to weld components and then inspect the joins using a variety of non-destructive inspection techniques.

The centre is also developing new automated additive capabilities for its ABB robotic arc welding cell, which was commissioned in 2019 for research into automated welding, cladding and additive manufacturing processes.

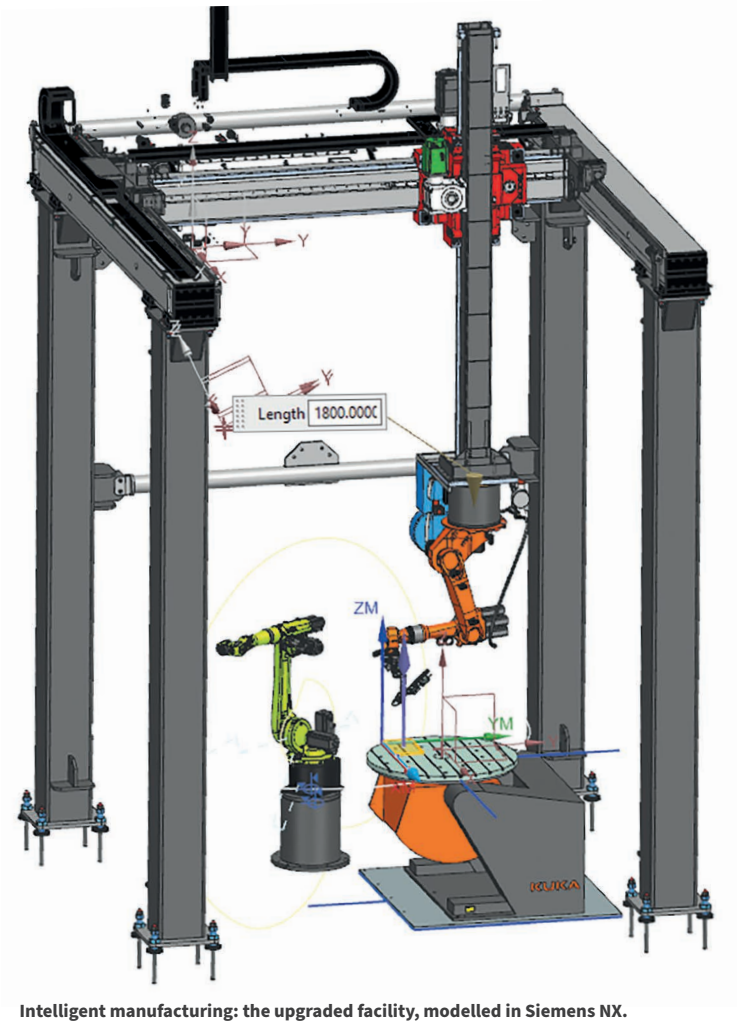
Kaizen PLM will work with the Nuclear AMRC to develop a comprehensive post-processor for offline programming of the cells, and provide training on Siemens NX CAM software and specialist additive modules.

"I'm delighted to welcome Kaizen PLM to the Nuclear AMRC, as their expertise in Siemens software can significantly improve the efficiency of our welding and inspection projects," says John Crossley, NDT technology lead for the Nuclear AMRC. "One big benefit for us is that we carry out all our modelling in Siemens NX, and Kaizen's solutions allow us to easily drag and drop our models into additive manufacturing software rather than having to reprogramme everything."

If Kaizen's technology meets expectations on the initial projects, the team plan to roll it out onto the centre's other welding platforms.

"Kaizen PLM, as a Siemens Industry Software SMART expert certified partner focused on virtual commissioning and additive manufacturing, offers manufacturers in the nuclear sector access to cutting-edge CAD, CAM, CAE, and PLM software solutions," says Anthony O'Riordan, managing director for Kaizen PLM.

"With our advanced technology and expert services, we enable manufacturers to continuously improve their processes and products, ensuring the highest standards of safety and efficiency. By working with the Nuclear AMRC to virtually commission large additive robotic cells, we demonstrate that manufacturers can test and optimise their processes before physical implementation, reducing costs and improving efficiency.

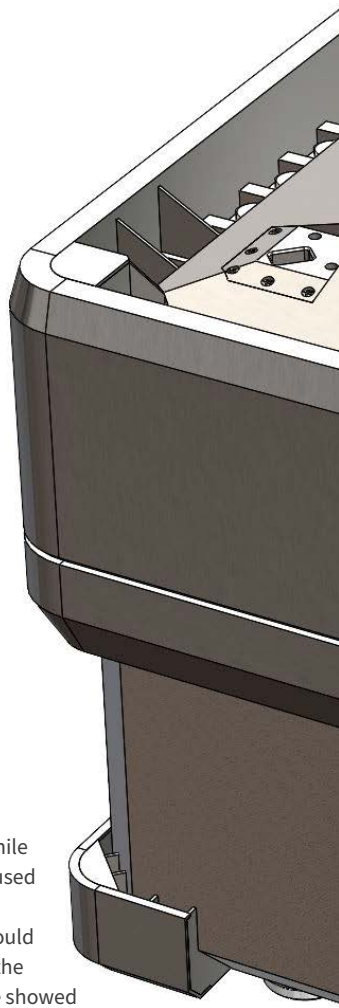



**Intelligent manufacturing: the upgraded facility, modelled in Siemens NX.**

"Through our partnership with the Nuclear AMRC, we are able to leverage both parties' expertise in advanced manufacturing and software solutions to help manufacturers in the nuclear sector overcome their unique challenges. With our combined focus on supply chain development and skills training, we empower manufacturers to stay competitive and drive innovation in the industry."

- *www.kaizenplm.ie*

# Manufacturability review brings waste transport container closer to production



## The Nuclear AMRC has completed a manufacturability review of a new waste transport container, which could significantly reduce the costs of producing a fleet of containers for the UK decommissioning programme.

**The review was commissioned by Nuclear Transport Solutions (NTS), part of the Nuclear Decommissioning Authority (NDA).**

NTS is developing a new version of its standard waste transport container (SWTC), a large and complex box made of cast martensitic steel, to safely carry a variety of canisters of radioactive waste from storage sites to the proposed Geological Disposal Facility. NTS plans to source a fleet of up to 150 such containers, to support the NDA's strategy for long-term disposal of radiological waste.

"There is sufficient resource within NTS and the wider supply chain to complete the detailed design of the package," says Sean Perry, lead design engineer in the NTS design and analysis team. "However, there will be significant challenges associated with the package substantiation, which involves a prototype manufacture followed by regulatory accident condition testing.

"Furthermore, there is only one UK company that has been identified as having the capability to complete the full package manufacture. This is a clear risk to the ability to deliver the package fleet, and will require strategic decisions to be made by the NDA to mitigate."

The Nuclear AMRC carried out a manufacturability study of NTS's initial design in 2016, which highlighted a number of areas where the design could be improved before it entered production.

After a comprehensive redesign and development review, NTS asked the centre for a full manufacturability review of the designs for its latest version, dubbed SWTC-255.

This kind of design for manufacturing study can significantly reduce the cost, time and difficulty of introducing new products, says David Anson, principal engineer at the Nuclear AMRC.

"It's ultimately much easier, much cheaper and much quicker to take the time out to have the design reviewed by some people who are independent but skilled in the required technical areas," he says. "An end-to-end three-month study can save huge amounts of time in getting a new product approved, as we can catch things which would be very difficult or even impossible to manufacture, and suggest improvements which will still meet the design intent."

The review investigated the full range of required manufacturing processes including casting, machining, fabrication, welding and metrology, with the team making a series of recommendations in each area.

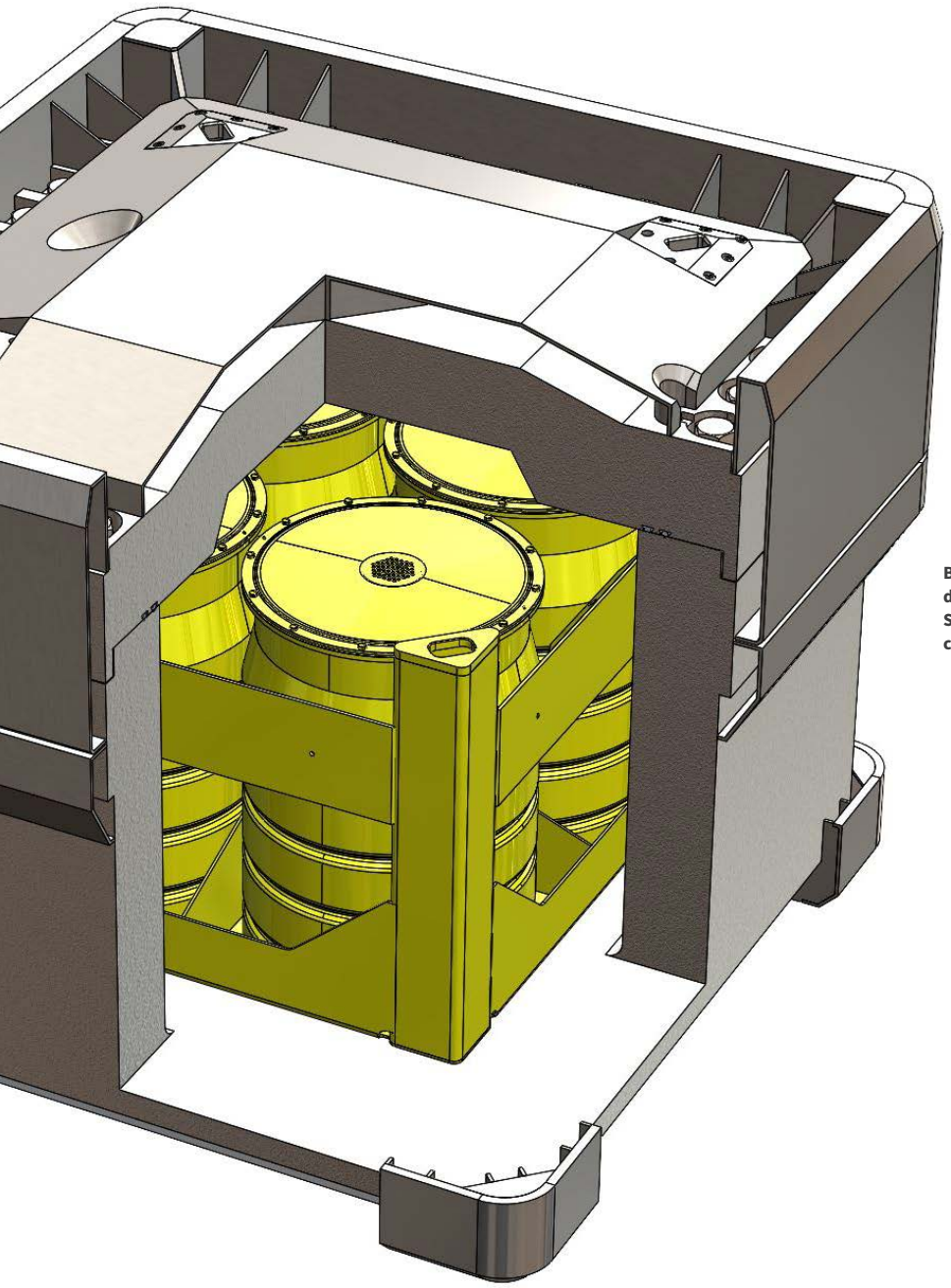
NTS had previously reviewed the container design using finite element analysis (FEA) to ensure it met requirements, but the project team identified a number of manufacturing challenges and potential changes to improve manufacturability.

"The container met the design intent for crash survivability, but the drawings were not yet production-ready so we were able to suggest design changes to make it easier and cheaper to manufacture. The client can then go back to their team and make sure that the design intent is still met," Anson explains.

"For example, just changing some of the internal radii in the box made the machining less challenging. And while the initial FEA was used to design the shock absorbers which would protect the load in the event of a crash, we showed that they were nearly impossible to manufacture as a solely welded construction. We're now looking at casting each of the complex corners, and then joining those together by welding."

To ensure that all aspects of manufacturing were covered, Anson's team drew on specialist expertise from other research organisations based on South Yorkshire's Advanced Manufacturing Park. Design specialists from the University of Sheffield AMRC examined the container design for potential issues which could affect manufacturing or handling, while experts from Castings Technology International focused on the casting of the main container body and the main lid.

The Nuclear AMRC was also asked to estimate costs and lead times for a prototype container and bulk production, and to review the UK supply chain's capabilities for producing the container in the required numbers. The team drew on the centre's company database to identify potential UK suppliers with the capabilities to cast and machine the container body and lid.



**Boxing clever: development design for the new SWTC for safely carrying waste canisters.**

After expert review of all the different aspects of the design, the Nuclear AMRC held an all-day workshop in November 2022 with NTS and the technology specialists to discuss the proposed changes.

"We all felt the benefit of having everyone, including the client, in the room to review the design," Anson says. "Having the technical experts bouncing ideas off each other is great for getting instant feedback from the client and sorting any issues."

"The results of the manufacturability assessment have been invaluable in progressing the SWTC-255 design," Perry says. "A number of specific activities will be completed in line with recommendations from the study, which should accelerate package development and reduce the number of iterations we need to assess. The cost and time estimates will also be used to inform strategic decision-making about engaging the supply chain for procurement of the packages once the design is complete."

"NTS used us at just the right time in their process for us to make a positive contribution and save them significant time and money," Anson concludes. "This project should have paid for itself just in producing the prototype, with many millions of pounds saved when producing the fleet of containers."

- *nucleartransportsolutions.com*

## Design for manufacturing

**The Nuclear AMRC offers extensive capabilities to help companies improve the manufacturing performance of a product at the design stage.**

Effective design for manufacturing (DFM) can significantly improve manufacturability and reduce production costs for a new component or system.

The centre's manufacturing engineers can analyse and optimise product designs to ensure that they can be efficiently manufactured. DFM studies typically start with a review of functional specification and business drivers, with the team working through a systematic approach using an array of industry-standard tools to identify where and how features can be improved for more efficient production.

DFM is best carried out at an early stage of design development, so that companies can avoid manufacturing problems and costly features.

**To find out more about the Nuclear AMRC's DFM services:** *namrc.co.uk/services/commercial/design-for-manufacturing*

# Brown & Holmes aims to grasp clean energy opportunities


Focus on collaboration: Kevin Ward, managing director.

**Workholding specialist Brown & Holmes has joined the Nuclear AMRC to collaborate on technology development and expand its presence in the nuclear sector.**

Tamworth-based Brown & Holmes was founded in 1939, and today provides advanced workholding solutions, prototyping and precision machining to customers in sectors including aerospace, automotive and power generation. It operates two sites in Tamworth, and is developing a new dedicated facility for clean assembly in Derby.

"We are absolutely delighted to have been accepted as members of the Nuclear AMRC," says Kevin Ward, managing director of Brown and Holmes. "The opportunity to sit alongside and collaborate with industry leaders will help us build on our past experiences working in the sector. We firmly believe this will be a major growth area in supporting the world achieve its goals for clean energy and sustainability, and one we wish to be a part of."

Brown & Holmes previously worked with the Nuclear AMRC through the Fit For Nuclear (F4N) supplier development programme, as part of a strategic move into the sector. Even before being granted F4N in late 2020, the company won new contracts from clients working in decommissioning and submarine propulsion programmes.

"We are pleased to welcome Brown and Holmes as members of the Nuclear AMRC," says strategic relationship manager Sean Murphy. "We look forward to supporting their continued exploration of the nuclear market, building on the exceptionally strong base they have today.

"I was personally very impressed with the operations at Brown and Holmes, and feel that the Nuclear AMRC has much to gain from collaborating. Their expertise in fixturing, assembly and machining will enhance our research board and other areas of work, and I see us working together to jointly solve problems or innovate with new ideas."

## Tier two membership of the Nuclear AMRC gives smaller companies access to the highest level of support.

Tier two membership is designed for manufacturers in the nuclear supply chain, specialist technology providers, and smaller companies with an interest in the sector.

Members gain access to world-leading R&D capabilities, business development benefits, networking and marketing opportunities, market intelligence and more. Members help determine the Nuclear AMRC's research priorities, and can leverage their R&D investment through the board-directed research programme.

Tier two membership costs £30,000 a year, paid in cash or in-kind provision of goods or services. For fee-paying members, two-thirds of their contribution is dedicated to the company's own R&D projects.

To find out more, contact *sean.murphy@namrc.co.uk*

As part of its tier two membership, Brown & Holmes will provide specialist design and technical services to support projects at the Nuclear AMRC, including consultancy on workholding solutions for the centre's array of production-scale machining and fabrication cells at its research factory in Rotherham.

- *www.brownandholmes.co.uk*

F4N
Fit For Nuclear

# KGD gains kudos and confidence in nuclear

Stainless capabilities: Andrew Price-Greenow with the company's new brake press.

**Process plant specialist KGD Industrial Services, which recently renewed its Fit For Nuclear status, has successfully completed a challenging fabrication project for Hinkley Point C. Engineering manager Andrew Price-Greenow explains how F4N helped the company secure and deliver the contract.**

Following successful attainment of Fit For Nuclear recognition in 2017, we pursued several Hinkley Point C leads with the support of our Nuclear AMRC industrial advisor Huw Jenkins. We were able to tap into a wealth of information relating to EDF's supply chain and approached several companies where we felt we had something to offer.

Having been through the F4N supply chain programme, we have gained kudos and more confidence in our abilities.

On a personal level, I was able to take advantage of Triple Bar Nuclear Manufacturing training which introduced nuclear awareness, behaviours and nuclear quality. This was a real eye opener, and brought a sense of focus onto the quality aspects of working in the nuclear industry with real-world examples of the challenges other manufacturers had faced supplying into the nuclear sector.

The F4N programme prepared us well for the challenging procurement stages, but there was still a steep learning curve! It was reassuring throughout this process to have our industrial advisor at hand as a sounding board to talk to about best practice and tap into their experiences.

Following contract negotiation, where quality and manufacturing control featured very prominently, we successfully won a contract for some large complex stainless steel sumps for the Hinkley Point C nuclear island, which were a first for complexity and size.

As a company, KGD had already taken significant steps with its facilities. We have a large dedicated well-equipped stainless steel fabrication workshop, which was a prerequisite to being awarded our first nuclear new build project. Following the contract award, significant additional investment was required. We utilised all our in-house skills and also drafted in additional inspection and quality control resource.

Significant investment was made in various processes including weld procedures and qualifications, welder codings, and welding equipment and tooling. This was essential, together with a level of welding automation, due to the high-quality repeatable results required. Production trials were conducted to prove these new processes.

Due to the complex nature of the fabrication, job specification tooling was designed, manufactured and trialled prior to deployment on the contract. To have greater visibility of the manufacture process, a four-metre 250-tonne CNC brake press with specific job tooling was installed in the stainless steel shop.

Having all equipment, tooling and job material under one purpose-built stainless steel fabrication facility meant nothing left the building for processing, and risk of contamination was exponentially reduced. It also offered repeatable processing to enable the stringent fit-up tolerance to be maintained.

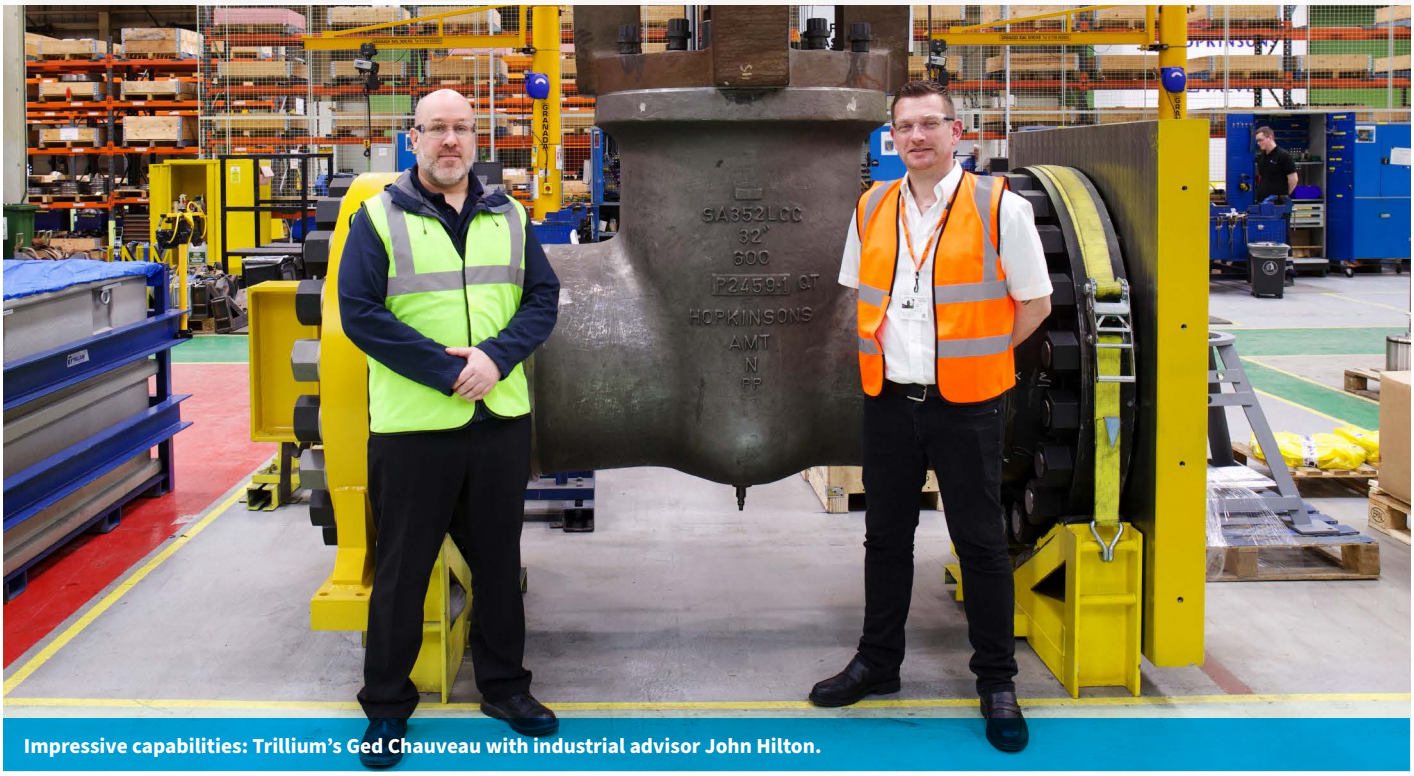
Throughout this, upskilling of the workforce was carried out. This enabled the volume of work to be completed that would not otherwise have been possible within the timeframe.

We feel KGD's ethos and USP as a one-stop shop – where design, procurement, manufacturing, NDT, blasting, painting, instrumentation, electrical and testing are all under one roof – offered some real advantage to this nuclear contract. We were able to have visibility and control of all stages of manufacture to ensure quality and traceability could be controlled to the exacting standards demanded by the nuclear industry.

Having completed an ambitious expansion plan with a new 5,400m$^2$ dedicated segregated manufacturing plant, including a purpose built shotblasting and painting facility, KGD is well placed to meet future challenges. We believe this particularly suits the move to modular construction and, with a 120-tonne lift capacity, offers some exciting opportunities and will appeal to nuclear contractors.

- *kgd.co.uk*

# Trillium targets new opportunities for historic valve brands




**Impressive capabilities: Trillium's Ged Chauveau with industrial advisor John Hilton.**

**Specialist manufacturer Trillium Flow Technologies is aiming to put its valves back at the heart of the UK nuclear industry after being granted Fit For Nuclear.**

Although the Trillium name only dates to 2019, the origins of West Yorkshire business date back 180 years to when Joshua Hopkinson set up shop in Huddersfield to serve the town's new steam-powered mills.

The Trillium Flow Technologies portfolio of brands now encompasses Hopkinsons isolation valves, Batley butterfly valves and Blakeborough control valves, with products used in the UK's nuclear power stations and submarine fleet, and nuclear plants globally. And they're still designed and manufactured at Trillium's modern factory in Elland, an ASME N-Stamp accredited manufacturing site located four miles from Hopkinson's original cottage workshop.

"We design, procure, manufacture, assemble and test here in Elland," says managing director Steven Brayley. "We have a machine and welding shop on site manufacturing components, but essentially 90 per cent of parts are bought within the supply chain and assembled on site."

Around 130 of Trillium's global workforce of 2,500 work at the Elland facility, formerly part of the Weir Group.

In 2022, the company looked at how it could secure more work in the domestic nuclear market, and identified the F4N programme as a way to benchmark and promote its capabilities.

"Our heritage is UK engineering," Brayley says. "We thought the Nuclear AMRC was a great place we could use to showcase our name within UK manufacturing."

The company had been driving continuous improvement for several years, and was rewarded with a silver supplier award from a prime customer for work in the submarine sector. That experience put them in good stead for the F4N assessment.

"The assessment went really well," recalls Ged Chauveau, head of engineering. "We'd done the pre-assessment and scored ourselves quite highly, at 97 per cent, and had great engagement from all the departments."

The self-assessment was confirmed by the formal review led by F4N industrial advisor John Hilton. "The engagement from all the employees we met on the day was very enthusiastic – it's a very impressive team" Hilton says. "One of the things that stood out for us was that their safety culture wasn't just about safety in the workplace. At the time of the assessment, their safety message was based on safe winter driving, which shows the culture extends beyond the factory."

The assessment did identify some actions to drive further improvement, in capturing lessons from both positive and negative feedback, promoting successes internally, and empowering employees to drive improvement through the Kaizen approach.




"They were welcome because they were all around that nuclear culture, and we recognised them as things that our customers want and expect," Chauveau says. "We've taken all that on board and put in some great improvements."

"One of the lessons was that we don't showcase ourselves enough about what we've achieved, so we're now showcasing our continuous improvement journey on the shopfloor," Brayley adds. "We started looking at timelines, and I was surprised how much we had achieved."

The team say that F4N has given them new enthusiasm to get out and talk to major players in the UK nuclear market, with the sales and engineering team now engaged with several tier one groups for the first time.

"When we're talking to our customers, companies are asking are we F4N?" Chauveau says. "People are pleased that we're F4N granted, because that's what they're looking for now."

The team are also looking to develop new technical capabilities, and are now scoping potential projects with the Nuclear AMRC and other High Value Manufacturing Catapult centres in areas such as additive manufacturing.

The team currently see strong opportunities for their products in the emerging market for small modular reactors.

"Success for me is being highly involved with SMRs, not just in the UK but globally," Brayley says. "We want to be more involved with new build in the UK."

The team also see growing opportunities in the submarine sector, following the announcement of the international Aukus programme (see p20). "That will be a challenge for the UK industry to keep up with the drumbeat of that 18-month turnaround, but we're up for the challenge," Brayley notes. "We have improved our on-time delivery to the drumbeat of our customers. It's quite exciting."

- *www.trilliumflow.com*

**Building on heritage: managing director Steven Brayley.**

# **Congratulations** to the latest companies to be granted Fit For Nuclear

## These companies have benchmarked their performance against the standards demanded by the nuclear industry's top tiers, and driven business improvements.

**Broder Metals Group** is a specialist steel and metal alloy stockholder serving manufacturing, precision machining and general engineering companies.
**broder-metals-group.com**

**Trillium Flow Technologies** is a global designer, manufacturer and aftermarket service provider of engineered valves and pumps.
**www.trilliumflow.com**

**MCE Group** specialises in valve shutdown and repair services for the power generation and process industries.
**www.mce-group.com**

**TTL** develops software to solve manufacturing challenges in the aerospace, industrial power generation, marine and medical sectors.
**www.ttl-solutions.com**

**Rockford Components** is the UK's largest independent provider of wiring, interconnect and system solutions for defence, aerospace, and industrial.
**www.rockford.co.uk**

### Congratulations also to

**AMS Nuclear Engineering, DPV-UK, FLI Structures, GA Engineering (North West), Hydrobolt, KGD, Landguard Engineering, LTI Metaltech, Parker Hannifin Manufacturing, Premaberg** and **Westinghouse Precision Fabrications** on being regranted F4N.

For details of all F4N-granted companies: **namrc.co.uk/services/f4n/companies**

# Severfield builds its capabilities for nuclear

Major projects: the group can process 150,000 tonnes of steelwork a year.

**Structural steel market leader Severfield is aiming to build its presence in nuclear with support from the Fit For Nuclear programme.**

With six sites across the UK, Severfield has an annual capacity of 150,000 tonnes of fabricated steelwork. Two of its specialist production sites have been granted F4N status by the Nuclear AMRC, and the group is now working to grow its nuclear capabilities in other locations.

Bolton-based Severfield Nuclear & Infrastructure was first granted F4N in 2019, under its previous name of Harry Peers Steelwork. Following its acquisition and integration into the Severfield Group, the business was regranted in late 2022.

For newly appointed head of nuclear quality Arwen May, managing the regranting process provided a solid grounding in the business and the specific demands of the sector.

"Going through the regranting process certainly helped me to refresh myself," she says. "What I like about the F4N approach is that it gives you a gap analysis of where you are – it lets you understand what nuclear clients are looking for, and helps you decide what you need to approach first."

With three fabrication bays totalling some 6,000m$^2$, the Severfield Nuclear & Infrastructure factory has the capacity and capabilities for major projects in the sector. It has supplied decommissioning projects on the Sellafield site for 13 years and, in February 2023, was one of the reasons why Severfield was appointed as a key delivery partner under Sellafield's new Programme and Project Partners scheme. Under the new contract, Severfield will provide steelwork for a variety of major projects over the next 17 years.

The business is also winning work in nuclear new build, including internal and secondary steelwork at Hinkley Point C.

Severfield's Products & Processing division, which specialises in modular buildings for critical plant such as switchgear, is also supplying to Sellafield. The division was inspired to enter F4N by the experience of the former Harry Peers business, and was granted in 2021.

The F4N programme scales well to groups like Severfield, May says, as its site-specific approach helps build experience and share best practice across different locations and divisions.

"Because each location has its operational needs, it's nice that you can break this down," she says. "I like the way the assessment can be used to compare and contrast your locations as well. It's useful as a management tool."

The group is now developing its capabilities at its largest site in Thirsk, with plans to dedicate a production line to nuclear projects. As well as continuing work with F4N industrial advisor Nigel Goodrich and the wider Nuclear AMRC team to help embed nuclear culture with production colleagues, May and the team are now engaging with Sellafield and other nuclear customers to better understand their specific expectations.

"With nuclear, it's not something you can switch on overnight, because there's so much behind the nuclear safety culture," she notes. "Structural steelwork is essentially the same in any sector but, with nuclear, it's less about what it is and more about what it's doing."

May says that F4N provides a useful way to demonstrate nuclear capabilities to clients without the demands of a formal accreditation such as ISO 19443, which can deter smaller companies from considering the sector.

"If you are a small company thinking about where you are best investing your time, I'd recommend the F4N route as a starting point because you can get the additional support around it," she concludes. "If you're starting out in nuclear, you might think you know what you're getting into, but until you do it, you really don't."

- *www.severfield.com*

# Sellafield shares new approach to volume products

## Sellafield has launched a new process for procuring volume products such as waste containers, which will involve manufacturers at an earlier stage of development.

**The new process is led by Sellafield's Manufactured Products Organisation (MPO), which is working to improve the supply of products where tens of thousands of items will be needed over decades of decommissioning.**

The MPO team set out the new product introduction (NPI) process at a supply chain event hosted by the Nuclear AMRC in March.

"We're going to be spending billions on volume products," Rob McGarel, supply chain intelligence customer at Sellafield, told the audience of around 80 manufacturers. "We want to do something different, as current arrangements have not met our expectations to provide security of supply and value for money."

The previous approach tended to treat everything as a bespoke product, leading to high levels of oversight throughout procurement and production of high-volume products.

The new process is based on best practice from other quality-critical manufacturing industries, using advanced product quality planning (APQP) methodology to drive quality assurance and ensure repeatable and predictable manufacturing.

It features six gated phases, starting with initial product development by an integrated project team, and working through design for manufacturing, manufacturing process design and validation, and into volume production.

Suppliers will be contracted at an early stage to reduce risks and costs for both sides, with manufacturing engineers from the winning companies joining the integrated product team and involved with design for manufacturing.

"You are the experts in manufacturing – we need to learn from you," McGarel emphasised. "We need to get you in early, and we need to develop new products and the manufacturing processes that come with them."

The MPO has produced a supplier manual detailing the expectations and requirements for manufacturers, covering 33 elements from detailed product design through to ongoing process improvements.

Essential requirements for suppliers include quality management to ISO 9001, and a nuclear safety culture embedded throughout the organisation.

The NPI process is also intended to allow longer-term contracts for volume products, allowing suppliers to invest in advanced manufacturing capabilities and other process improvements. It includes a flexible pricing model, which will be adapted for each new product type and at different stages of development – early phases will be based on reimbursed costs, moving to a guaranteed maximum price in volume production with any savings shared equally between Sellafield and the supplier.

"Transparency of cost is really important to us," said Mike Melia, category manager for the MPO. "We want to pay you based on outcomes, creating cashflow throughout the phases."

Products to be covered by NPI include the future supply of $3m^3$ containers for remote-handleable intermediate level waste containers; larger concrete containers for contact-handleable intermediate level waste; and cans for the Sellafield Product and Residue Store Retreatment Plant.

- **For more information and to request a copy of the NPI supplier manual, email *mpo@sellafieldsites.com***

**Securing supply: the new process will be used to procure large numbers of products across the Sellafield estate.**

# **Submarine pact** to bring wave of new jobs

**Rolls-Royce will provide the reactors for Australia's first nuclear submarines, with the promise of thousands of jobs created along the supply chain.**

The move is part of the Aukus pact between Australia, the UK and US, which will see new submarines built to a British design over two decades.

"The Aukus announcement is a real vote of confidence in UK nuclear engineering, and great news for our industrial member Rolls-Royce and its supply chain," said Tom Purnell, Nuclear AMRC business development director. "The naval propulsion market has a very large crossover in the manufacturing capabilities and skills required by the civil nuclear industry, with many of the same nuclear-ready manufacturers working in both sectors.

"To meet the requirements of Aukus and the UK's own submarine programme at the same time as we build a new generation of nuclear power stations, we need to invest and innovate to develop the capabilities and skills of the UK supply chain."

Last year, the Nuclear AMRC worked with Rolls-Royce and partners to launch the Nuclear Skills Academy to train apprentices for submarine work (see below).

Under the Aukus agreement announced in March, new nuclear submarines will be built in the UK and Australia, based on a UK design known as SSN-Aukus.

Construction of the UK's submarines will principally take place at BAE Systems' shipyard in Barrow-in-Furness, with the first delivered in the late 2030s to replace the current Astute-class vessels.

Australia will work over the next decade to build its industrial base for the sector. It will build its submarines in South Australia with some components manufactured in the UK, for first delivery in the early 2040s.

The multilateral programme is forecast to create thousands of jobs in the UK – mostly in Barrow, with further roles in Derby and along the supply chain.

Rolls-Royce's submarines business currently employs more than 4,000 people to design, manufacture and support the pressurised water reactors used across the UK's submarine fleet.


**British sea power: an Astute-class submarine built by BAE Systems with a Rolls-Royce reactor.**

# Honours for **Nuclear Skills Academy**

**The success of the new Nuclear Skills Academy in Derby has been recognised at the Nuclear Skills Awards 2023.**

Rolls-Royce and the University of Derby were named winners of the Employer & Training Provider Partnership Award for their ongoing collaboration at the Academy, which opened its doors to 200 new apprentices in September 2022.

The Nuclear Skills Academy aims to create a dedicated pipeline of talent for Rolls-Royce's submarine propulsion business. Teaching is led by the University of Derby, using material developed by the National College for Nuclear.

The Nuclear AMRC worked with the partners to establish the Academy in the former iHub facility owned by Derby City Council, and secured funding from Innovate UK for state-of-the-art training equipment.

In January, the Nuclear AMRC and partners celebrated the Academy's launch at the House of Lords, with more than 150 guests from Parliament and industry. The event was part of Nuclear Week in Parliament, organised by the Nuclear Industry Association to promote the opportunities of nuclear energy.

# Great British Nuclear launches with SMR competition

**Great British Nuclear has been launched by government with a mission to identify the best small modular reactor (SMR) technology for the UK.**

Originally announced in the Energy Security Strategy in April 2022, Great British Nuclear (GBN) is a government-funded arm's-length body to drive delivery of new nuclear projects.

As part of the government's Powering Up Britain proposals released in late March, GBN's first job will be to identify the best SMR technologies for development.

GBN held a supplier engagement day in April to outline the proposed selection process and build relationships with prospective technology suppliers.

A second selection phase will start in summer, with the aim of identifying the leading technologies by autumn.

The government says it will co-fund the selected technologies through their development, and work with successful bidders on financing and site arrangements. A roadmap setting out pathways for different nuclear technologies will be published later this year.

An earlier SMR competition, launched by government in 2016, closed after its first information-gathering phase.

GBN will be based in or around the Manchester area and operate through British Nuclear Fuels Ltd, which disposed of its previous operations in 2009. Simon Bowen, formerly head of Babcock's nuclear business, has been named as interim chair. Gwen Parry-Jones joins as interim CEO from Magnox. The government will set out a statutory role for GBN when parliamentary time allows.

"We are ready to work closely with the government to support the establishment of GBN and ensure that the UK has the manufacturing capability, innovation and skills needed to underpin the programme of new nuclear build," comments Chris Pook, director of government policy at the Nuclear AMRC. "Our ability to work across the whole industry means that we are well placed to work with all developers to help them access the capability they need to succeed."

The government also released its updated green finance strategy in March, confirming its intention to include nuclear in a new green taxonomy.

The taxonomy will define which economic activities should be labelled as green, with the aim of encouraging investment in low-carbon infrastructure projects including nuclear new build. Consultation is scheduled to start in the autumn.

# Rolls-Royce SMR completes initial design assessment

## Rolls-Royce SMR has entered the second phase of the regulatory assessment which will approve its compact power plant for construction across the UK.

The Generic Design Assessment (GDA) allows the Office for Nuclear Regulation and Environment Agency to assess the safety, security and environmental protection of nuclear power plant designs. It is intended to support the construction of new power stations by approving a standard reactor design which can be deployed in different locations.

"This is a huge stride forward for our project and, through the independent scrutiny of our regulators, further increases confidence in the viability of the Rolls-Royce SMR design," says Helena Perry, safety and regulatory affairs director. "We are using all the knowledge and learning from our uniquely skilled team to move at pace through the GDA process."

Rolls-Royce SMR has also announced partnerships with a number of European organisations to explore potential deployment overseas.

Poland's Industria has selected Rolls-Royce SMR technology as part of plans to produce low-carbon hydrogen. The two organisations visited the Nuclear AMRC in February to discuss potential support for the collaboration.

Rolls-Royce SMR is also working with Finnish energy group Fortum to explore opportunities in Finland and Sweden, and with Ukrainian energy company Energoatom to look at deploying SMRs as the country rebuilds its infrastructure.

- *www.rolls-royce-smr.com*

# £25k target for cancer support


Urgent support: Nuclear AMRC staff with Macmillan's Michaela Ryder.

## The Nuclear AMRC has committed to raising £25,000 for Macmillan Cancer Support as part of a new charitable drive.

**The team are carrying out a variety of fundraising activities through 2023, including special events at the Nuclear Manufacturing Summit in October (see right).**

"We are incredibly excited to be working with Nuclear AMRC this year," says Michaela Ryder, senior fundraising manager for Macmillan. "Right now, more than three million people are living with cancer in the UK, rising to four million by 2030. That means on average someone is diagnosed with cancer every 90 seconds.

"What we do has never been more important or urgent, but we are almost entirely funded by donations, so simply couldn't continue our vital work without the support of organisations like Nuclear AMRC. Together we will do whatever it takes to give people with cancer the support they need."

The centre will choose a different main charity to support each year, with the executive team selecting Macmillan Cancer Support for the first year of focused fundraising.

"I'm really pleased to be supporting Macmillan as part of our charity work in 2023," says Andrew Storer, CEO of the Nuclear AMRC. "The support Macmillan provides is excellent and essential for individuals and families, which is why we have committed to raising this money so they can continue their work. I'm sure we all know someone who has or is affected by cancer, so I really hope our network will support our efforts where possible."

The centre will also support a number of regional charities based in the communities around its facilities, including Treetops Hospice which provides nursing care and support in Derbyshire and Nottinghamshire.

Various teams within the centre will carry out a variety of challenges throughout the year, with sponsorship and donations collected through the JustGiving website.

The supply chain development team kicked things off with a commitment to swim, run, walk and otherwise propel themselves over the equivalent of the distance from Land's End to John O'Groats during March. The team exceeded their 837-mile target by over 400 miles, virtually making it back down into Cumbria, and are now encouraging Fit For Nuclear companies to follow their example.

In May, Storer and five colleagues from the executive team are entering the Keswick to Barrow charity walk with a mission to complete the 40-mile route within a day.

Donations from members, partners, Fit For Nuclear companies and other stakeholders will be most welcome.

- **For the latest information and links to donate:** ***namrc.co.uk/about/charity***

# Nuclear Manufacturing Summit 2023

## 11–12 October 2023

## Magna, Rotherham

**The Nuclear Manufacturing Summit returns for its third year, to share the latest information and insight with the supply chain as key programmes move towards delivery.**

**Again held at the Magna Science Adventure Centre in Rotherham, the 2023 summit will bring together hundreds of manufacturers with the leaders of the UK's major nuclear programmes.**

The programme will build on the previous summits, with a focus on driving towards delivery.

The two-day event aims to help UK manufacturers make the most of the opportunities in programmes worth hundreds of billions of pounds over the coming decades, supporting long-term growth, skilled jobs and innovation while moving the UK towards net zero emissions.

Register now for a packed programme of presentations, panel discussions, opportunities to meet one-to-one with buyers and suppliers, and a manufacturing showcase exhibition.

New for 2023 are the **UK Nuclear Manufacturing Awards.** Held on the evening of 12 October at a spectacular gala dinner, the six awards will recognise the best of the best in the nuclear manufacturing sector.

For the latest information and registration: **nuclearmanufacturingsummit.co.uk**

# Work with us

## The Nuclear AMRC helps UK companies win work in the nuclear sector.

We are here to support manufacturers and technology developers, from SMEs to global giants, which want to enhance and expand their capabilities for nuclear customers. If we can help your company, we want to hear from you.

We help companies through manufacturing innovation, supply chain development and skills support.

We can help you develop world-leading manufacturing processes and technologies. We have the facilities and expertise to help you improve quality, reduce time and costs, and bring new products to market.

We can work with you to raise your capabilities and competitiveness to meet the needs of the global nuclear supply chain.

And we are developing new services to help fill the skills and training gaps across the sector.

As part of the High Value Manufacturing Catapult, our capabilities and services are open to all UK companies.

We also offer full membership of our centre, giving you access to our generic projects and the opportunity to help determine our core research programme.

**To find out more about how we can help you win work,**
contact the Nuclear AMRC business development team:
**business@namrc.co.uk**

NUCLEAR AMRC
ADVANCED MANUFACTURING RESEARCH CENTRE

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## Tier 1 members:

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