

DESIGN | INNOVATE | ENGINEER

# Eureka!

## MATERIAL BENEFITS

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INNOVATION STRATEGY

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# Eureka!

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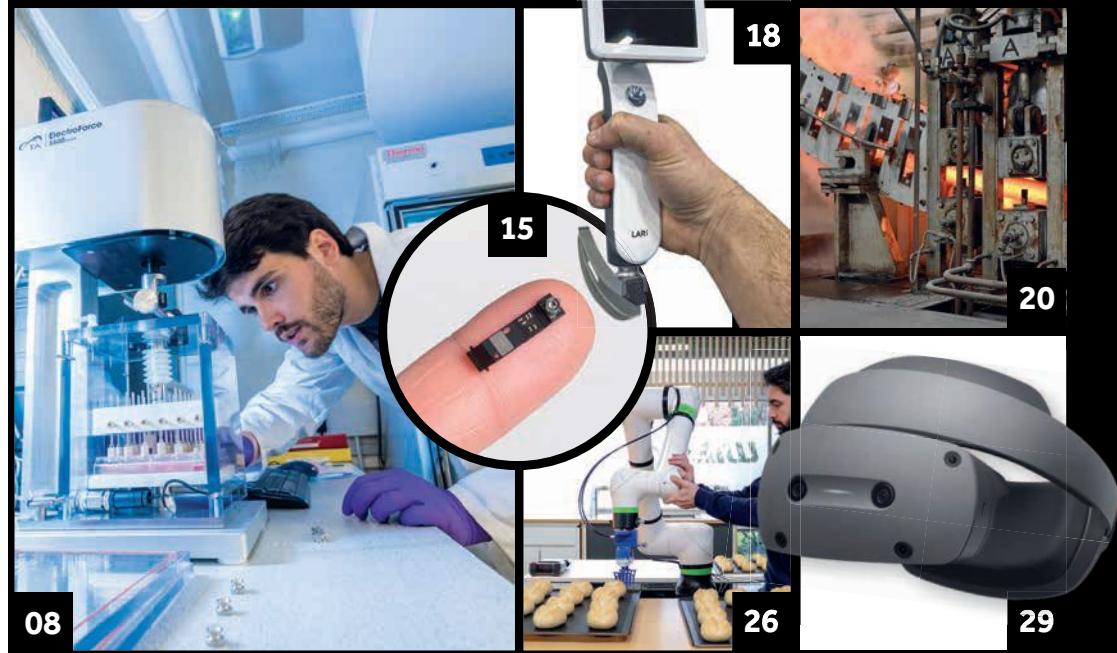
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COVER IMAGE: Henry Royce Institute

SOLUTION TO LAST ISSUE'S

## COFFEE TIME CHALLENGE

**THE SOLUTION** to last issue's challenge of how to devise a saliva substitute comparable to natural saliva is a novel aqueous lubricant technology developed by scientists at the University of Leeds to help people who suffer from a dry mouth

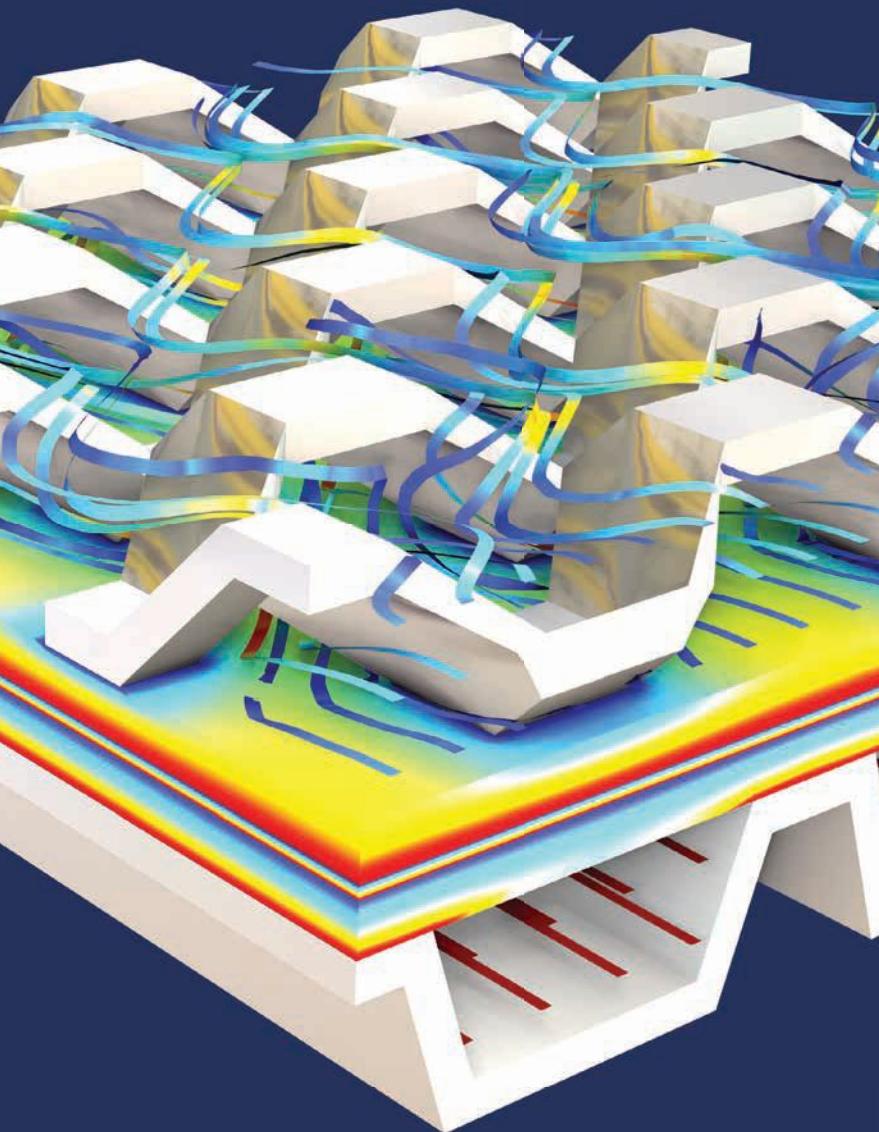
is up to five times more effective than existing commercially available products, according to laboratory tests.

Under a powerful microscope, the molecules in the substance – known as a microgel – appear as

a lattice-like network or sponge which bind onto the surface of the mouth. Surrounding the microgel is a polysaccharide-based hydrogel which traps water. This dual function will keep the mouth feeling hydrated for longer.

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# A DESIGN GREAT



**DECEMBER SAW THE** sad news of Sir David McMurtry's passing and fulsome tributes were paid to this giant of UK engineering and innovation - to which I would add *Eureka!*'s appreciation.

Sir David founded Renishaw in 1973 with John Deer, a fellow Rolls-Royce engineer, to commercialise the 3D touch-trigger probe for co-ordinate measuring machines. He had invented the probe the previous year to solve measurement problems faced in the manufacture of the Olympus engines that powered the Concorde. A brilliant engineer, he was employed at Rolls-Royce plc, Bristol, for 17 years, where he rose to become Deputy Chief Designer and their youngest ever Assistant Chief of Engine Design. He was responsible for 47 patents at Rolls-Royce and went on to be named on over 200 patents for Renishaw.

As co-founder of Renishaw, he oversaw the company's revolutionising of the development of co-ordinate measuring machines, shopfloor metrology and process control. Today it is hard to imagine a machine shop of any size without tool setting and inspection probes that automate laborious and complex setting and measurement tasks, yet in the 1970s, ideas for such applications were truly visionary.

Today, the company that he co-founded over 50 years ago is a globally respected business, employing over 5,000 people in 36 countries. Sir David said that from the start he and John Deer set out to create a company that was different to most others – different in how it applied technology to real world problems, in how it invested for the long term, in how it manufactured rather than outsourced, and in how it treated customers and local communities.

He received huge recognition from



around the world for his achievements, including Japan and the USA, where he received awards that had historically only been presented to citizens of those countries. His Knighthood was awarded "for services to Design and Innovation" and he was appointed a Royal Designer for Industry (RDI) in 1989.

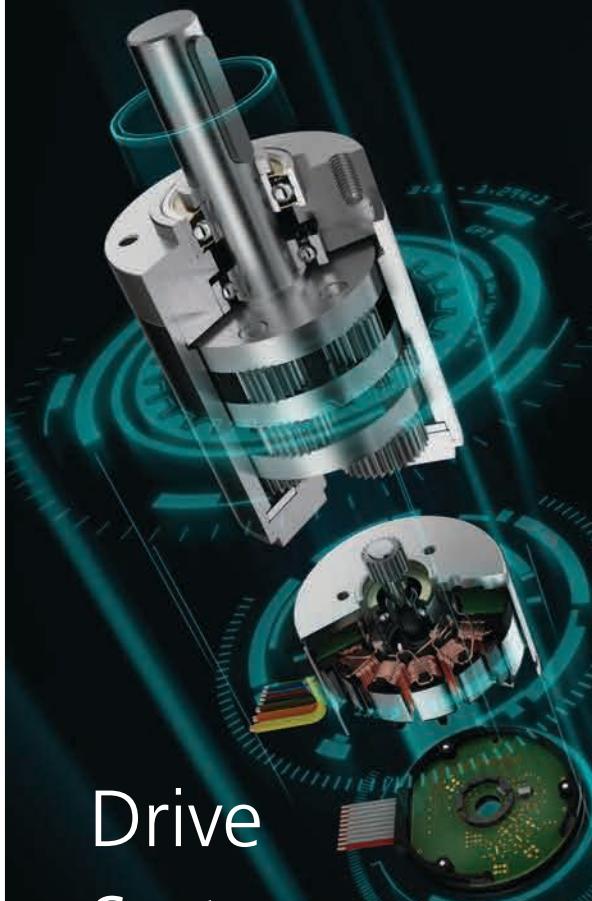
For all that, his true legacy is the ongoing success of the company he was instrumental in building.

**Paul Fanning,**  
Editor

## MISSION STATEMENT

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**WE CREATE MOTION**

# Open architecture AM system

## TO HELP MOTT CORPORATION

increase its design and production capabilities for filtration and flow control components, Renishaw supplied the RenAM 500 Flex. This new metal additive manufacturing (AM) machine has enabled Mott Corporation to reduce machine turnaround and setup times, while improving the performance metrics of components.

Mott Corporation specialises in solving filtration and flow control engineering challenges in integrated components, point of use subassemblies, and integrated subsystems. It offers an extensive material selection for the most critical operating conditions, such as highly controlled bioreactor environments, semiconductor, chemical processing/refinement, and aerospace

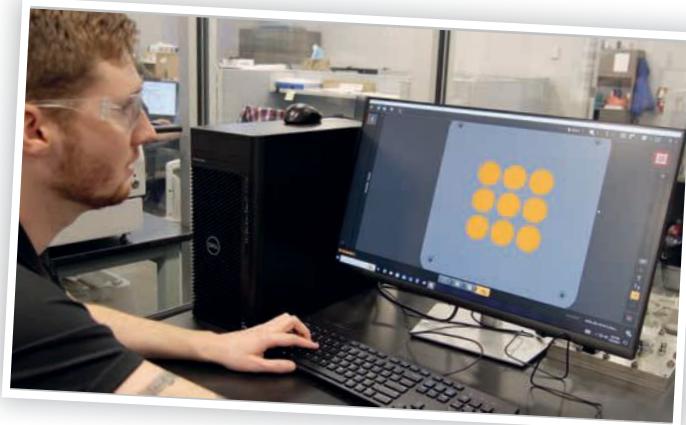
applications.

Historically, Mott Corporation produced components using three compaction methods: axial, isostatic, and rolling. However, there are some geometries these techniques are unable to produce. To expand its capabilities, Mott decided to investigate AM, identifying laser powder bed fusion as the best technique for its needs.

The most important consideration for Mott Corporation when choosing a machine was that it had open architecture, to enable the parameter editing that is so essential to research and development work. The organisation therefore approached Renishaw to purchase a RenAM 400.

For added control, the company then upgraded its system to the

new RenAM 500 Flex machine. This machine is configurable with one (500S) or four (500Q) high power 500 W lasers, and offers automatic or flexible powder and waste handling. The lasers can be used in either modulated or continuous wave regimes, adding an additional level of customisation. It uses the same industry leading gas flow system, safety, and precision digital optics as the rest of the RenAM 500 series but offers additional flexibility with the ability to swap the metal powder feedstock in a short amount of time. Incorporating the RenAM 500 Flex reduced machine turnaround and setup times by over 50 per cent, while improving the standard deviation of performance metrics by approximately 30 per cent in certain cases.



# Segway mowing strong

**SEGWAY NAVIMOW**, the robotic lawn mower arm of Segway, received seven awards at CES 2025 – hosted in Las Vegas at the start of this month – for its lineup of robotic lawn mowers. Showcasing a portfolio comprised of the X3 Series, i Series and H Series, the successes highlight the brand's position at the forefront of automated lawncare.

The X3 Series, which will launch in Spring this year, is designed to maintain up to 2.5-acre (10,000 m<sup>2</sup>) lawns with unparalleled efficiency by leveraging a self-developed EFLS 3.0 -enhanced RTK coverage system, vSLAM (Visual Simultaneous Localisation and Mapping), and VIO (Visual Inertial Odometry) technologies. The machine received

three awards at the show, including acknowledgements in the following categories: Geekspin's 'Best of CES 2025', The Ambient's 'Best in Show' and ZDNet's 'Best Robot Lawn Mower at CES 2025'.

Also recognised were the i Series and H Series, with the former earning accolades from The Gadgety Awards, Trusted Reviews and TWICE PICKS, and the latter for House Digest's 'Best of CES 2025'. Designed to tackle smaller lawns with precision to deliver flawless results, the H Series launched in the UK in 2023, while the i Series was introduced last year.

Commenting on the award wins, Segway Navimow CEO George Ren said, "It's incredibly rewarding to



see all of the team's hard work recognised at CES 2025 and we're delighted that the Navimow range picked up seven awards across the show. Our lineup of mowers has given back a significant amount of time to homeowners and reduced over 1.13 million kilograms equivalent of carbon emissions in the process.

# Mobile shore power from igus

**THE IGUS MOBILE SHORE POWER OUTLET (iMSPO)** is a mobile connection system for shore power supply that can be aligned to the ship's position at berth. With iMSPO already deployed at the Port of Hamburg, igus has received the 'Port Innovation of the Year' award at the Electric & Hybrid Marine Expo Europe 2024.

Cable specialist igus® has developed the igus® Mobile Shore Power Outlet (iMSPO) for exactly this: the world's

first movable power supply that is used to connect ships at any point along the quay. An iMSPO system can cover a ship berth of over 400 metres in length, meaning that in future, shore power will come to the ship and not the other way round. This gives port operators full flexibility while reducing operating, installation and maintenance costs.

The iMSPO system includes a mobile trolley fitted with a socket. An igus® energy chain system ensures safe and reliable guidance of the cables. The roller e-chain that is used allows long travel distances with heavy cables. The process is simple and smooth: Once a ship is moored to the quay, the iMSPO is moved to the connection point, then the connection process begins. The socket box is lowered, and the protective cover opens. The ship's cables can be connected directly and easily to the sockets. After that, the protective cover of the socket box is closed and locked to prevent access during operation and to ensure a safe power supply. The socket box is then retracted so as not to obstruct the berth while the power is supplied.



## King's Award for SFX tech company

A TECH SCALE-UP that has created special effects for Harry Potter and the Cursed Child theatre shows across the USA, Canada, Germany, Japan, and Australia, the Commonwealth Games and Disney's touring productions, has been recognised with a King's Award for Enterprise in International Trade. Luminous was awarded the accolade in recognition of its innovation and creativity which has delivered global success.

The events engineering business, based in Exeter, was the brainchild of founders Mike Badley and Edwin Samkin who launched Luminous at Exeter Science Park in 2017. Both qualified engineers, Mike's background was in film special effects including Bond, Star Wars and Batman and Ed was delivering special effects

for live events including London 2012.

Since 2017, Luminous has been responsible for devising stand-out concepts and creating world-record beating flames, creating jaw-dropping displays around the world with its bespoke technology developed in Exeter. The team continuously develop new hardware, ensuring user-friendliness and reliability for its operators in the events industry.

With its roots in science, Luminous specialises in manipulating physics and chemistry to bring live performance, experiences and projects to life. From super-sized water effects and digital rain to huge flames and smoke effects, the team engineers technology that lights up stages and performances across the world.



Luminous has recently launched cutting-edge, large-scale water and smoke effects including the HYDRA-TECH Digital Rain System creating controllable rain and water effects onstage and the SMOKE-TECH Cryo curtain generating large-scale smoke effects for live events. Both systems are modular, suitable for the largest events. Luminous plans to expand its product range with new systems in the next 12 months.

# MATERIALS STRATEGY BREAKS NEW GROUND

**A revolutionary National Materials Innovation Strategy has been launched to futureproof the UK's lead in materials innovation.**

Materials science touches almost every strategically important sector in the UK, powering the advancements urgently required for our modern world, and underpinning our aspirations for a sustainable future. It is the bedrock of a £45 billion economy, employing over 635,000 people nationwide.

It has previously been stated, in fact, that without adopting a clear, national strategy for materials, the UK will not be able to meet its net zero and wider sustainability commitments.

Furthermore, projections indicate that a commitment to materials innovation could double the number of materials-specific job roles by 2035, up from 52,000 people nationwide which currently adds £4.4bn in GVA to the UK economy.

Equally, materials innovation is fueling growth across the UK, unlocking opportunities for businesses of all sizes: of the 2,700 companies active in materials innovation in the UK, 70% are registered outside of London and the South East, and 90% are small and medium-sized enterprises (SMEs). It is in this context that In January,



The National Materials Innovation Strategy was launched to guide the next decade of materials innovation in the UK. Facilitated by The Henry Royce Institute – the UK's national institute for advanced materials – with the support of ScotChem, Perspective Economics, and Urban Foresight, it represents the first phase of a huge national effort to speed up materials development cycles and unlock untapped potential in the UK to extend its leadership in material innovation.

It represents a framework for harnessing the power of advanced materials in the UK to tackle the most pressing challenges of our time: from decarbonising energy systems and enhancing national resilience to revolutionising healthcare and boosting our circular economy.

Examples of the use of advanced materials in practice include a superconducting materials for more energy efficient supercomputers, implantable electrotherapy devices to treat brain cancer, and carbon neutral steel.

The Strategy aims to guide the national approach to materials innovation for the next 10 years, based on industry-led insights of materials science, engineering researchers and innovators, policymakers and industrial leaders.

Facilitated by Royce, this strategy seeks to leverage the UK's world-class expertise in materials science to address critical challenges such as sustainability, energy efficiency, and healthcare.

By fostering collaboration between industry, academia, and government, the strategy aims to accelerate the path from research to commercialisation, grow productivity, enhance national resilience, and create highly skilled employment opportunities.

Key focus areas include energy solutions, future healthcare, structural innovations, advanced surface technologies, next-generation electronics, and sustainable



**By fostering collaboration between industry, academia, and government, the strategy aims to accelerate the path from research to commercialisation**

consumer products. This initiative positions the UK as a global leader in materials innovation, paving the way for a prosperous and sustainable future, underpinning the UK's diverse industries' growth.

It has also begun the process of building a national consensus around the key areas where public and private investment should focus on the journey to a sustainable future – from R&D and scale-up facilities to skills development, regulatory frameworks, standards and digitalisation.

The background to the Strategy lies in 2023, when Royce commissioned a Materials Innovation Strategy Framework (the Framework) which provided a rigorous and robust way to:

- Identify priorities for materials innovation aligned with national priorities and industrial demands.
- Identify the required enablers to deliver results for industry and the nation more broadly, including the commissioning of research, skills training, regulatory frameworks, investment and infrastructure barriers to innovation.
- Develop a set of preliminary investment cases for materials

innovation so that industry, academia, financiers and Government can act in concert to deliver on the strategy in a progressive manner.

As UK Research and Innovation's (UKRI) national institute for materials research and innovation, the Henry Royce Institute for Advanced Materials (Royce) sought to establish a National Materials Innovation Strategy (to be developed in partnership with the entire materials community).

Clearly, this topic had considerable inherent breadth and complexity, meaning the challenge was to establish the priority impact areas

*Below: The Henry Royce Institute in Manchester*



and establish how the UK should take a leading role in the discovery, development, production, commercialisation and deployment of materials innovations at scale, recognising the constraints of sustainable use of our finite resources.

Now that it has come to fruition, the strategy outlines six 'Opportunity Themes' designed to drive high-impact innovation across the UK economy, fostering increased productivity, job creation and prosperity.

What sets this strategy apart however is its focus on transformative enabling technologies and approaches that will revolutionise the delivery and application of materials innovations across multiple sectors. These are captured in the Strategy's "Cross-cutting" Themes, which provide the essential foundations for sustainable growth.

Among these, Materials 4.0 and Sustainability stand out as truly game-changing, cross-cutting priorities with the potential to reshape the landscape of materials innovation. Their successful implementation will require an agile, systems-thinking approach that integrates diverse

» technologies and methodologies. This holistic perspective will enable a significant step change in how materials innovation is delivered, adopted, and scaled for impact.

The strategy will be implemented immediately via steering groups, with the Materials Innovation Leadership Group overseeing its delivery.

Steered by a dedicated Materials Innovation Leadership Group, the strategy consulted over 2,000 experts in materials science, engineering, innovation, policy and industry, identifying six diverse areas of opportunity for materials to make a transformative impact and unlock economic growth:

- Energy solutions - efficient and sustainable energy generation, storage, transmission and use to meet net zero. "Rising to the net zero challenge"
- Future healthcare - delivering beyond biocompatibility for active medical solutions
- Structural innovations - strengthening our infrastructure, built environment and transport systems.
- Advanced surface technologies - enhancing product functionality, performance, and lifetime.
- Next generation electronics, telecommunications and sensors - driving the future of high-performance connectivity and computing.



• Consumer products, packaging and specialist polymers - paving the way for a greener tomorrow As the first ever cross-sector strategy for materials innovation, it articulates the need for a more collaborative effort to ensure the UK remains a leading location for materials innovation, and to amplify the benefits of materials innovation activities that have traditionally been siloed across sectors.

The strategy identified two major cross-cutting areas spanning the entire materials sector that require common approaches and methodologies to develop them over the next decade: the digital revolution (Materials 4.0) and sustainability. Prioritising these could see the industry leap ahead if the materials community works together to develop collective solutions - such as a materials informatics framework, which incorporates AI and machine

**"Materials sit at the heart of addressing the major technological and economic challenges facing our society today"**

*Professor Julia Sutcliffe*

learning, life-cycle stimulation, and modelling.

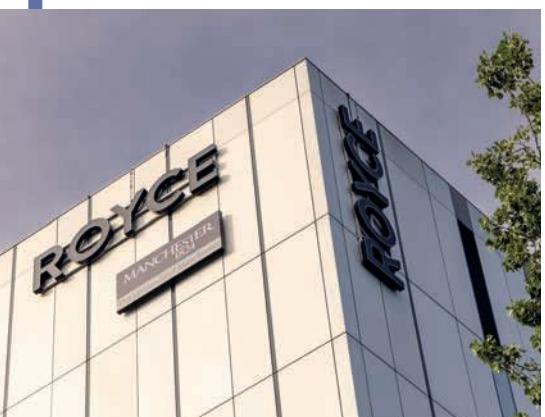
The strategy will be implemented immediately via steering groups, with the Materials Innovation Leadership Group overseeing its delivery. These will focus on the key opportunities and cross-cutting themes identified in the strategy to bind the community together and focus efforts on the largest opportunities for impact.

"This strategy is a call to action to deliver the transformation required to realise the true potential of materials innovation in the UK." said Professor David Knowles, CEO of the Henry Royce Institute "Advanced materials hold the key to finding and delivering solutions to some of the most pressing national and global challenges of today and directly contribute billions to our national economy. But to unlock the full value of materials we must break down traditional long-standing silos within the industry. This strategy has kickstarted that process, setting the UK on the path to becoming the global leader in materials innovation."

"Materials sit at the heart of addressing the major technological and economic challenges facing our society today" said Professor Julia Sutcliffe, Chief Scientific Adviser for the Department of Business and Trade, and member of the Materials Innovation Leadership Group. "As we strive to meet the UK's net zero and growth ambitions, the need for sustainable, next-generation materials has never been more urgent, and the launch of the National Materials Innovation Strategy marks a decisive moment for the UK on this journey"

"This Framework for Action over the next 10 years is clear. It is paving the way for the UK to deliver cutting-edge materials technologies that advance society, strengthen our economy, and secure a more sustainable future" Said Allan Cook CBE, Chair of the Materials Innovation Leadership Group "The contribution from the materials community has been fantastic, and I would like to particularly thank my colleagues within the Materials Innovation Leadership Group for their wholehearted dedication to the development of this transformational national strategy" 

## ABOUT ROYCE



Operating with its Hub at The University of Manchester, The Henry Royce Institute is a Partnership of nine leading institutions – the universities of Cambridge, Imperial College London, Liverpool, Leeds, Oxford, Sheffield, the National Nuclear Laboratory, and UKAEA. Royce's associate partners are the universities of Cranfield and Strathclyde.

Royce coordinates over £200 million of facilities, providing a joined-up framework that can deliver beyond the current capabilities of individual Partners or research teams.

The Henry Royce Institute is funded by the Engineering & Physical Sciences Research Council, part of UK Research & Innovation.

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**2**025 is the year humanity is expected to start transitioning into a new era called the 'Autonomous Society.' This evolution, rooted in the predictions of the SINIC Theory, marks the next phase in how society, science and technology interact. So what are the technologies of 2025 that will help to move humanity from an 'Optimisation Society' to an 'Autonomous Society'?

SINIC Theory — first created in 1970 by OMRON's founder Kazuma Tateishi and later refined by HRI — describes a change in human

attitudes that sees society go from optimisation to autonomy.

In the 'Optimisation Society,' the focus has been on streamlining processes and driving efficiency improvements over a period spanning 19 years (2005 - 2024). Whereas the 'Autonomous Society' heralds a change of tact, with systems becoming self-regulating, self-learning and capable of independent decision making.

According to HRI's updated interpretation of the SINIC Theory, people are no longer passive recipients adapting to societal systems. Instead, they seek active participation in shaping the technologies and structures that influence their lives.

With that in mind, let's explore the trends and technologies that are leading us into this new era.

#### ETHICAL AI

There's no other place to start than with the use of AI. 2023 was the year the world discovered generative AI before organisations began using and deriving business value from this new technology in 2024.

In the latest McKinsey Global Survey on AI, 65 per cent of respondents reported that their organisations regularly use gen AI, nearly double the percentage from the previous survey just ten months ago.

As a result, consumer expectations and evolving regulations have driven a "Do No Harm" approach, where

# FROM OPTIMISATION TO AUTONOMY

**Humanity is now approaching the next phase in how society, science and technology interact. Tom Cash, director, Foxmere looks at the technologies that will drive this transformation.**



AI systems are designed not only to perform efficiently but also to minimise societal risks.

For instance, the European Union's AI Act, implemented in late 2023, introduced stringent oversight for high-risk AI applications, setting a global standard for ethical governance.

In manufacturing, I expect AI to enable autonomous systems that optimise operations as well as ensuring transparency and accountability in decision making.

In 2025 and beyond, AI-driven technologies will automate routine tasks, enhance predictive maintenance and improve quality control, yet ethical AI will be crucial to ensuring that these systems are auditable and appealing to investors.

## ELECTRIFICATION – NOT JUST EVS

Industries are also under increasing pressure to reduce their carbon footprints. This is particularly true for the manufacturing and production sectors, which account for one-fifth of global carbon emissions and 54 per cent of global energy usage.

That's why we're seeing a broader uptake toward electrification. The transition from fossil fuel-based energy systems to electric-powered solutions is enabling systems to not only self-regulate but also to work toward minimising environmental impacts.

As industries electrify, optimising energy use is vital to cutting costs and environmental impacts. This calls for rethinking energy consumption through innovative designs and advanced materials that enhance efficiency and performance.

OMRON's Gallium Nitride (GaN) technology is just one example that delivers compact, energy-efficient power conversion with minimal energy loss to support electrified systems.

More than ever, renewable energy sources, such as solar and wind, coupled with energy storage solutions, will be essential as the

**Goldman Sachs Research estimates that data centre power demand will grow 160 per cent by 2030**

adoption of electrification will also extend to key areas, including industrial machinery, transportation fleets and energy generation.

What's more, the push for electric vehicles (EVs), driven by regulations mandating higher EV sales and bans on petrol and diesel cars by 2035, will further accelerate electrification efforts.

It won't be long before manufacturing operations become cleaner and more sustainable, helping to meet global decarbonisation targets and advancing the net-zero by 2050 agenda.

## BESS

To achieve this, energy storage systems will become the backbone of this infrastructure. In particular, the capacity of all Battery Energy Storage Systems (BESS) is projected to increase more than sevenfold by 2028, reaching 260 GWh.

Such growth is driven by innovations in battery technology, including lithium-ion and emerging alternatives like solid-state batteries, as well as advances in energy management software that enhance system efficiency and grid responsiveness.

By storing excess energy generated during peak conditions, BESS ensures a stable power supply even when renewable generation fluctuates. Data centres, which consume vast amounts of energy,

are also adopting BESS to provide backup power and manage demand peaks, improving energy efficiency and reducing costs.

As a result, Goldman Sachs Research estimates that data centre power demand will grow 160 per cent by 2030. Concerningly, carbon dioxide emissions of data centers are expected to more than double between 2022 and 2030 as a result, with AI gathering momentum.

As AI potentially adds 200 terawatt-hours to annual power consumption, the need for smarter energy management will continue to be a focus throughout the year.

## COLLABORATION

Europe will likely need to invest over \$1 trillion in upgrading its power grid infrastructure to deal with demand. A way to tackle this is by developing partnerships across industries to aid the transition into the 'Autonomous Society.'

This investment will be crucial for integrating renewable energy sources and enhancing energy storage capabilities to allow power systems to handle the growing consumption driven by technologies like AI and electrification.

Automation parts suppliers, like Foxmere, help to support companies leading this charge by supplying the essential components needed for these advancements.

By partnering with a trusted parts supplier, businesses can integrate emerging technologies and ensure a smoother, cost-effective societal transition from optimisation to autonomy. 



*Tom Cash, director of Foxmere*



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# AI-ENABLED SENSORS TO CHANGE LIVES

**On view at CES 2025 was an insight into how Bosch is creating software and AI sensing solutions.**

Sensor technology is transforming everyone's lives: whether by tracking our fitness, making our gadgets easy to use, and monitoring air quality, to mention just a few examples.

To provide all these sophisticated functions to consumers, Bosch Sensortec's sensors are evolving to be smarter – by integrating MEMS technology with embedded microcontrollers, software, and AI runs inside the sensor itself.

At CES 2025 in Las Vegas, Bosch Sensortec was showcasing its latest AI-enabled sensors, and highlighting

how software adds value not only to the sensor but to the entire system.

Stefan Finkbeiner, CEO at Bosch Sensortec, said: "Bosch's innovative cutting-edge sensor solutions are making an impact in diverse areas such as consumer health, smart homes and smart cities. AI and intelligent software are the key enabling technologies that make this possible."

This comes as part of Bosch's 'Vision 2030, whereby the company aims to vastly increase the number of intelligent sensors worldwide.

According to market research and strategy consulting company Yole

Group, Bosch is the market leader for MEMS for the fourth year in a row. In 2024 alone, Bosch Sensortec surpassed the milestone of delivering over 1 billion MEMS sensors featuring integrated microcontrollers and software. From 2027 onwards, 90% of the products will include these integrated features. By 2030, the company aims to achieve a remarkable total of more than 10 billion MEMS sensors sold with this advanced integration.

With AI running on the edge (meaning directly in the sensor), there's no need for constant cloud connectivity. This ensures data remains private, dramatically reduces latency, and cuts power consumption, all while delivering accurate real-time feedback to users. »



*Compact and power-saving sensors for use in consumer devices*

» State-of-the-art software solutions add value not only to the sensor but to the entire system, enabling new applications and forming the basis for AI inside the sensor itself.

### ALWAYS-ON AND READY TO GO

Always-on technology is essential in consumer electronics, enabling continuous access to features without the need to activate the device and wake up the main processor. This significantly extends battery life, and creates a more intuitive and effortless experience for users, especially in smartphones and wearables.

This is achieved with intelligent sensors combined with smart software, enabling quick access to voice assistants, health monitoring, and more, empowered by MEMS sensors with integrated microcontrollers. Examples of always-on use cases include voice activity detection and keyword triggering to activate voice assistants in wearables, fall detection in smartwatches for faster emergency assistance, and automatic orientation sensing in smartphones to adjust modes and enter sleep mode when inactive.

### SMART CONNECTED SENSORS

Can you imagine having unlimited access to a professional fitness trainer, with feedback at any time? This is the future of exercising – made possible by the Smart Connected Sensors platform from Bosch Sensortec.

The platform gives users

qualitative feedback on the movement execution, as well as measuring movements and repetitions.

Specifically designed for full-body motion tracking, the SCS platform provides a fully integrated hardware and software solution (based on the BHI380, a programmable IMU-based sensor system with AI) that dramatically cuts development costs and time to market.

Wireless headsets have transformed how we listen to music, podcasts and audiobooks, providing free, unhindered movement – as well as new features enabled by sensors, such as activity recognition and indoor navigation. But shifting to voice control can cause problems, when the system is triggered unintentionally because it reacts to ambient noise.

To fix this issue, Bosch Sensortec has come up with a software-based innovation: a new type of acceleration sensor, the BMA550, detects sound through bone vibrations. Intelligent algorithms then ensure voice control activates only when the wearer of the headset is actually speaking.

### TAKE A BREATH

Poor indoor air quality is a problem: the concentration of PM2.5 particulates from domestic cooking can reach levels 100 times higher than acceptable limits. Localized, actionable data from Bosch's

particulate matter sensor for PM2.5 and PM1 enables effective responses to poor air quality. A software update coming soon will activate PM10 measurement in addition.

Almost the entire global population (99%) breathes air that exceeds WHO air quality limits, and threatens their health. Bosch's BMV080 sensor uses software and intelligent algorithms, in a tiny, fanless design which is more than 450 times smaller than any comparable device on the market.

Bosch can't do all this alone and offers a framework that supports customers in creating movement classification algorithms specific for their own application. These models can then run on a smart motion sensor, such as the BHI360.

For example, Bosch Sensortec and Doublepoint have partnered to develop a powerful microgesture control solution for smartwatches, using the BHI360. This enables always-available, reliable control, such as allowing users to adjust light brightness with an intuitive pinch gesture.

Doublepoint's advanced algorithms are seamlessly integrated into Bosch's compact, low-power IMUs via a new software tool. Compared to camera-based solutions, this IMU-based approach enables obstruction-free gesture detection, offering greater reliability and efficiency.

"This collaboration exemplifies Bosch Sensortec's commitment to innovation in the IoT and wearable markets, empowering manufacturers to bring advanced, user-friendly products to market more quickly," said Lucas Ginzinger, Vice President Marketing and Business Strategy at Bosch Sensortec. 



**Bosch Sensortec and Doublepoint have partnered to develop a powerful microgesture control solution for smartwatches, using the BHI360**



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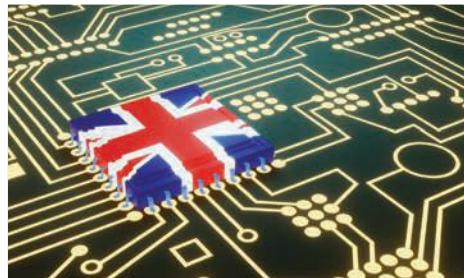
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# BETTER PRODUCTS, BETTER CARE



**A**s healthcare demands continue to rise, MedTech companies face increasing pressure to innovate quickly while meeting complex regulations and embracing advancing technologies.

MedTech requires both innovation and rigour when developing next-generation devices to ensure compliance with stringent medical device standards. Both of these are evident in the latest product developed and launched by Cambridgeshire-based 42 Technology (42T)

42T has launched an innovative,

*LARI is a low-cost, single-use video stylet that works exactly like conventional intubation stylets routinely used by anaesthetists to shape endotracheal tubes and help guide them through a patient's vocal cords.*

video-capable medical device at CES (Consumer Electronics Show) 2025 that is designed to improve the speed and safety of patient intubation during surgery and emergency care.

LARI is a low-cost, single-use video stylet that works exactly like conventional intubation stylets routinely used by anaesthetists to shape endotracheal tubes (ETT) and help guide them through a patient's vocal cords. The new device integrates seamlessly into their existing workflow, while providing a real-time video feed of the entire intubation process to help navigate difficult airways and ensure proper placement in the patient's trachea.

LARI is one of four pioneering innovations 42T was showcasing at CES (7 to 10 January, Las Vegas, US). The others include:

- Indi, a microfibre filter system for home washing machines developed with Cleaner Seas Group. The system has received multiple industry awards for improving the health of our oceans.
- FuseOhm, a low-cost, remote and



**A new, low-cost, video stylet for easier intubation was launched at CES 2025 by UK consultancy 42 Technology.**

real-time monitoring system to help electricity network operators to extend asset lifetimes as they continue upgrading to smart grids.

- HYBRID, a new range of gas leak detection products featuring breakthrough sensing technology, and developed for US company Heath Consultants.

42T is also distributed printed copies of its latest annual technology trend report, Shaping the Future of Technology, at CES. This year's report builds on the 2024 edition by highlighting three transformative megatrends helping to drive business competitiveness: usability, sustainability, and digital-physical convergence.

These trends and an understanding of them are providing actionable insights to help businesses create innovative new products and experiences that resonate with people, protect the planet and generate measurable value. 42T's new report can be downloaded free from here.

LARI is being developed with



Turning Mode, an innovation lab for healthcare and medical devices, with 42T showing the first working prototype on its booth at CES (LVCC, North Hall, #8871). The two companies are working together on a commercialisation strategy to help bring LARI to market.

Many intubations are now considered as complex procedures – because of a patient's anatomy, weight or other injuries – which can delay proper oxygenation in emergency scenarios or cause damage to a patient's vocal cords, oesophagus and other upper airway structures.

Although existing video-enabled tools can help, they often have significant limitations. Many require specialist training, involve reusable components that need cleaning and sterilisation, and provide limited visual feedback. For example, bronchoscopes allow anaesthetists to see into a patient's trachea but the scope has to be removed before inserting the ETT, increasing the risk of misplacement.

LARI is the first video stylet specifically designed to integrate with an anaesthetist's existing tools and workflows to help with fast and

*The device provides a real-time video feed of the entire intubation process to help navigate difficult airways and ensure proper placement*

**The video feed from the tip of the ETT is displayed on either a customised laryngoscope-mounted display or an external monitor**

more accurate tube placement. It provides a continuous real-time view of the entire intubation process, as well as being easy-to-use and requiring no additional training.

The video feed from the tip of the ETT is displayed on either a customised laryngoscope-mounted display or an external monitor.

42 Technology (42T) is a product design and innovation consultancy, based near Cambridge (UK), that helps create technically advanced new products and enhanced manufacturing processes for some of the world's best-known brands, as well as start-ups and SMEs. It works across three key sectors: consumer, industrial, and healthcare and life sciences.

The company was founded in 1998 and has established a strong reputation for partnering with its clients to solve complex technical problems and develop brilliantly successful products. The team comprises engineers, scientists and designers, and offers a diverse range of skillsets that includes ethnographic research and usability engineering, product and system design, device testing and regulatory compliance.



42T is fully committed to innovation and sustainability at every stage: from generating its initial ideas and concepts for clients through to supporting them towards net-zero. It also has particular expertise in optimising manufacturing processes. For example to improve energy efficiencies, reduce waste, and to reconfigure existing production assets to accommodate sustainable materials or new product formats.

Developing innovative medical devices requires tackling challenges in safety, efficacy and regulatory compliance, while ensuring products meet user needs and deliver exceptional patient care.

42T collaborates with medical device companies, startups and innovators to bring groundbreaking products to life. Its expertise covers device development, regulatory support, human factors engineering and usability studies, ensuring your products meet the highest standards for both patients and regulators.

With the shift from clinic to home care, companies must innovate whilst enhancing usability. Whether developing advanced home care devices or creating sustainable solutions, we provide the expertise needed to deliver products that truly make a difference. 

# FUSION-READY STEEL IS UK-FIRST

**Another step towards fusion energy has been taken with the development of reduced activation steel costing ten times less to produce than previously.**

**A** United Kingdom Atomic Energy Authority (UKAEA) working group has successfully demonstrated the industrial scale production of fusion-grade steel.

This achievement has the potential to reduce production costs by an order of magnitude and improve the efficiency of future fusion powerplants.

In just its first year, the NEURONE (Neutron Irradiation of Advanced Steels) consortium has achieved a UK-first breakthrough. The group successfully produced fusion-grade reduced-activation ferritic-martensitic (RAFM) steel on an industrial scale, using a seven-tonne Electric Arc Furnace (EAF) at the Materials Processing Institute (MPI) in Middlesbrough.

David Bowden, Group Team Leader for Materials Science and Engineering at UKAEA and NEURONE programme lead, said: "One of the major challenges for delivering fusion energy is developing structural materials able to withstand the extreme temperatures (at least up to 650 degrees Celsius (°C)) and high neutron loads required by future fusion powerplants."

The high temperatures and radiation levels caused by the high neutron loads arise as a result of the fusion reaction. The structural materials therefore serve an important role maintaining the integrity of the fusion powerplant under these conditions.

Based on EAF technology, with enhanced purification and

thermomechanical protocols, this approach has the potential to dramatically decrease production costs by up to 10 times compared to conventional RAFM counterparts, utilising existing and readily scalable infrastructure within the supply chain.

MPI led the trials which enabled the manufacture, testing and analysis of specialist high temperature steels initially at laboratory scale leading to industrial scale trials in their EAF.

Richard Birley, NEURONE project lead at MPI said: "As the only sovereign UK steel research facility able to produce RAFM steel at this scale this is a groundbreaking moment for nuclear fusion R&D."

"The production of 5.5 tonnes of fusion-grade RAFM steel lays the foundation for cost-effective



**NEURONE plans to produce advanced variants of RAFM steel, capable of operating up to 650°C**

a ~£12M collaboration between UKAEA's Materials Division and academic and industry partners across the UK, as well as international partners, which provide access to neutron irradiation facilities.

NEURONE was established to research, test and develop steels to operate at higher temperatures compared to conventional counterparts. This will maximise the capacity of fusion machines to extract heat, which is used to power

ferritic-martensitic (RAFM) steel alloy for analysis. New approaches have been established for analysing damage to materials, and data has been compiled on the performance of small initial lab-scale melts of material which range between 100 to 400 grams in mass.

There is potential opportunity for specialist UK steel manufacturers to be involved with the NEURONE Consortium's activity in future, considering different aspects of RAFM steel manufacture such as forging, rolling, and developing optimised process parameters.

UKAEA is the national organisation responsible for the research and delivery of sustainable fusion energy. It is an executive non-departmental public body, sponsored by the Department for Energy Security and Net Zero.

UKAEA runs the fusion machine MAST-Upgrade (Mega Amp Spherical Tokamak) and is delivering the transition of JET from plasma operations to repurposing and decommissioning. The insights gained from this process will contribute to the advancement of sustainable future fusion powerplants.

STEP (Spherical Tokamak for Energy Production) is a major technology and infrastructure programme that will demonstrate net energy from fusion, fuel self-sufficiency and a route to plant maintenance. UKAEA is STEP's fusion partner and will work alongside STEP's industry partners – one in engineering and one in construction – expected to be announced at the end of 2025/early 2026.

The STEP programme is being delivered by UK Industrial Fusion Solutions Ltd (UKIFS) a wholly owned subsidiary of UKAEA Group. UKIFS will lead STEP's integrated delivery team to design and build the prototype plant at West Burton site in Nottinghamshire, targeting first operations in 2040.

UKAEA is now engaging in Fusion Futures, a programme that aims to foster world-leading innovation whilst stimulating general industry capacity through international collaboration and the development of future fusion powerplants.

manufacturing of these types of fusion steel for future commercial fusion programmes," Dr Bowden explains.

"NEURONE plans to produce advanced variants of RAFM steel, capable of operating up to 650°C – a stretch target, given the solid-state physics of irradiated materials behaviour. Developing these types of steel could also benefit adjacent industries that require high-strength, high-temperature structural steels, such as nuclear fission or petrochemicals. The programme also intends to produce an optimised advanced RAFM alloy using the electric arc furnace at a similar multi-tonne scale to the best EU developmental fusion (RAFM) steel (EUROFER 97)," he concludes.

The NEURONE Consortium is

turbines and create electricity, improving the overall efficiency of fusion powerplants.

The NEURONE Consortium consists of representatives from universities and organisations around the UK. Universities include the University of Swansea, University of Sheffield, University of Birmingham, Imperial College London, University of Manchester, University of Bristol, University of Strathclyde Glasgow and University of Oxford. Two industry partner organisations – the Materials Processing Institute and Sheffield Forgemasters – are involved as well as The Australian Nuclear Science and Technology Organisation (ANSTO). NEURONE is also supporting a range of PhD students and summer student placements to upskill the next generation of researchers.

NEURONE has also produced more than 50 different variants of advanced reduced-activation

# Mark Allen

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**The widespread adoption of additive manufacturing as a front-line capability for the UK's armed forces has seen another major step forward.**



# THE FUTURE OF DEFENCE PROCUREMENT

Ensuring that the critical services and assets of our armed forces are readily available, affordable and long-lasting is a vital task and overcoming the challenge of outdated and inadequate manufacturing methods has never been more important.

The nature of modern warfare means the need for spare parts is endless, meaning that the use of additive manufacturing to produce spares quickly and in-situ is potentially a game-changer. As a result, our Armed Forces and allies have access to global hubs where quality parts can be 3D-printed and rapidly dispatched, or even designs securely

**The goal for those involved in Project TAMPA was supporting industry in the Defence supply chain and giving them the confidence and expertise to adopt 3D-printing**

transmitted directly to users on platforms who have the technology to print them there and then.

This is the remit of Project TAMPA, which was set up in 2021 as the MOD's accelerator programme focused on the use of additive manufacturing to increase material availability across defence assets, to overcome obsolescence of parts, reducing cost and improving performance and availability to enhance defence capabilities.

Charlotte Robinson, UK Strategic Command Defence Support Innovation Team Leader, who has headed up Project TAMPA since its inception describes the vision behind it: "There would be a series of global hubs that can

rapidly print and provide assured quality parts for us and our allies. Not only could this be crucial in terms of platform availability if we did find ourselves in a conflict but brings with it a host of other benefits including quick access to spares, reduction of the need to stockpile as well as significant cost savings and environmental benefits."

The goal for those involved in Project TAMPA was supporting industry in the Defence supply chain and giving them the confidence and expertise to adopt 3D-printing.

Charlotte said: "We quickly identified four 'problem areas' that needed addressing if we were to stimulate industry in adopting Additive Manufacturing (3-D printing) at scale. Those issues were a lack of system to securely transfer »



critical assets.

As an innovator within the UK Defence sector, Babcock has focused on increasing its capability in the 3D printing of metal parts. Through innovation and technology it is working smarter so we can print components on demand from a digital library.

As a long-term partner to the British Army, Babcock maintains their armoured vehicles including their Titan and Trojan fleets, which are already benefitting from these innovative capabilities. Using additive manufacturing, we are producing parts of the fleet's periscope system, helping to maximise the availability of these platforms.

The process to print parts that are obsolete or required in low quantity, such as the periscope clamp, can now be completed in days instead of months, significantly increasing efficiency for our customer.

In fact, Babcock has now successfully delivered the first package of work within Project TAMPA for the UK Ministry of Defence (MOD). Since the MOD awarded the Project TAMPA contract in April 2023 to Babcock (along with NP Aerospace, RBSL, Thales and AMFG), the focus has been exploring

» print files, Intellectual Property or Design Rights, certification and qualification (of parts to ensure they're fit for use) and robust inventory management; we set up collaborative working groups with industry to tackle these constraints in 2022 and those remain ongoing.”

DE&S set up a framework for industry and together they delivered the first challenge or 'spiral' which was to produce and fit metallic non-safety critical parts with Thales, Babcock, AMFG, NP Aerospace and RBSL engaged in the process.

Following this, a second 'spiral' was launched for metallic safety critical parts with recent events dictating that industry offering air domain or parts for Ukraine gifted platforms would be given priority consideration.

In tandem to the 'spirals', the Future Capability Innovation delivery team have supported other advanced manufacturing challenges in Defence and looked at how the holistic MOD spare-part availability and supply chain obsolescence could be improved.

Babcock is one of those leading the way in pioneering additive manufacturing techniques to overcome obsolescence, reduce cost, improve performance and availability to enhance our customers' defence capabilities and



*The project included complex components for the L118 Light Gun, and 4.5 inch gun*

**As an innovator within the UK Defence sector, Babcock has focused on increasing its capability in the 3D printing of metal parts.**

how additive manufacturing can help transform material availability across defence operations.

A team from Babcock has been working across multiple domains to deliver solutions for complex parts across a variety of platforms.

The project included complex components for the L118 Light Gun, 4.5 inch gun on the Type 23 frigate, and the torpedo launch system for both the Astute and Dreadnought class submarines.

The Light Gun eye shaft has been recommended for adoption into the defence inventory by MODs Defence Equipment & Support team and is ready to be ordered through Babcock's Material Availability Service.

Kate Robinson, Managing Director, Babcock's Land Sector, said: "Delivering the first package of work for Project Tampa is a significant milestone for our customer, as we continue to move forward to increase material availability across the sector."

"Working collaboratively with industry partners and our customer has enabled us to explore the challenges and opportunities together to deliver the right solutions. We are now engaged in delivering the next work package in this programme".

Charlotte Robinson said: "It's been great to see the progress made by the Babcock team on Project TAMPA's first spiral of work. Through collaboration with the other Project TAMPA suppliers and DE&S Delivery teams, Babcock has demonstrated that Additive Manufacturing can play a key role in improving Defence part availability." 

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**The BSI has recently reviewed the changes to the standards ahead of them being released later this year. What will this change mean for cobot users and integrators?**

By Matt Androsiuk of Cobots and Machinery Safety

# NAVIGATING COBOT SAFETY

**K**nown for their ability to share the same workspace as human employees, collaborative robots (or cobots) are now a mainstay of the industrial robotics sector. Lightweight, simple to programme and flexible enough to be moved around a factory with ease, unsurprisingly they have proved popular with manufacturers. The most recent IFR statistics show that cobot installations worldwide grew by 31% year-on-year in 2022 to 54,868 units, representing 10% of the total robot installations.

By their very nature of being collaborative with humans, cobots are also considered a safer option than traditional industrial robots. Until now, cobots have fallen under the technical specification ISO/TS 15066, which has left some users falling short of meeting their safety obligations. A recent project by the ISO working group has seen the robot safety standards ISO 10218-1 and ISO 10218-2 updated

## ABOUT THE AUTHOR

*Matt Androsiuk of Cobots and Machinery Safety (FANUC UK's cobot safety partner) is an experienced machinery safety consultant and cobot safety specialist, who also sits on the BSI robot technical committee.*

to take account of the technological changes and advancements in collaborative robots.

## ASSESSING RISK

Any changes to the regulatory landscape can seem daunting to a manufacturer. It is not only a finished product that needs to meet

required safety standards, but also the components which form part of the application. Now that the area of cobot safety is being improved to align it with industrial robot safety standards, end users need to be aware of the potential implications. Once the standard is released, it will provide integrators and end users with the information they require to ensure a safe application. Once the standard is harmonised to the

Machinery Directive, it will support the requirements for CE/UKCA marking.

Integrators and end users are required to complete a detailed risk assessment to

identify the risks that both the robot and the application present. Where integrators and end users are not familiar with the risk assessment process, support from independent safety specialists should be sought. It is important that integrators and end users move away from the 'cobot' analogy and start to think of cobots as robots for collaborative applications. By generating an audit trail via a fully traceable risk assessment, manufacturers will be able to demonstrate to the HSE that they fully understand the risks involved with cobot integration, have measures in place to control them, and are therefore compliant with the new standard.

## IDENTIFYING POTENTIAL HAZARDS

The risk assessment should cover a number of stages in regard to identifying hazards, to enable integrators and end users to achieve their ultimate goal of UKCA/CE Marking. These may include, but are not limited to:





**Whilst removing hazards or risk can be done in various ways, technology is also playing its part more and more in collaborative applications**

#### PROMOTING BEST PRACTICE

As with any area of machine safety, it is always best to seek advice from your cobot supplier or an independent safety consultant if you are in any doubt as to your cobot or application's compliance with the proposed new safety standard. This is relevant not just from a CE/UKCA Marking point of view, but also because the end user or cobot system integrator has a legal responsibility to show compliance to PUWER (Provision and Use of Work Equipment Regulations). If your cobot or associated processes do not meet the new safety standard, then you will not be PUWER-compliant, either.

While cobots may continue to be seen as the 'friendly face' of robotics, increasing in popularity across a variety of manufacturing sectors, it is important to remember that they are still industrial robots. The upcoming alignment of the cobot safety technical specification with those pertaining to industrial robots reflects this, and end users and integrators are advised to take their safety responsibilities seriously.

- Validation and verification – Using calibrated force sensors to measure the collision forces in the event of a collision with the cobot and documenting the results.
- Guarding – Determining if physical or virtual guarding is required, or if risk can be mitigated through power and force limitation, or whether a combination of risk reduction measures is required.
- Permissible force values – Using the body model and the risk assessment to identify the areas of the body which could be struck in the event of a collision. This will then be validated.

#### USING TECHNOLOGY

Whilst removing hazards or risk can be done in various ways, technology is also playing its part more and more in collaborative applications. The

use of a cobot's internal force and pressure monitoring is one option but other easy to validate solutions exist and can be used not only with cobots but also industrial robots.

The FANUC Dual Check Safety (DCS) software function that monitors a robot's speed and position is a good example of technology that enables safer operation and reduces risk in system design. The use of external sensors (light guards or floor scanners) along with DCS is affording system designers a new method when human/robot collaboration is needed.

"Making higher payload collaborative applications safe requires specific hardware and software solutions that can be validated and ensure risk-free operation. We have successfully implemented these types of solutions with robots with over one tonne payload. It's the technology that makes this possible," says Oliver Selby, Head of Sales at FANUC UK.

# Mark Allen FOUNDATION



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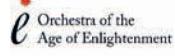
## A brighter, fairer future for all

Mark Allen Foundation partners with a variety of amazing charities to support their work in the UK and internationally. The Foundation was established by Mark Allen Group to enable its employees to coordinate and amplify their fundraising efforts, as well as to raise significant funds for charity through its portfolio of client events.

Some of the charities and organisations supported previously include:  
YoungMinds, Blind Veterans UK, The Felix Project,  
The Trussell Trust, BeeKind, Orchestra of the Age of Enlightenment,  
NSPCC Childline, ANDYSMANCLUB and KidsOut.

**We would like to extend our heartfelt thanks to everyone who very kindly supports our charity fundraising.**

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# IMMERSIVE ENGINEERING

Immersive technology has been around in the engineering – and specifically in the design – space for some time, with Virtual Reality and Augmented Reality solutions now fairly widely available.

However, things have gone one step further with the announcement that Siemens Digital Industries Software and Sony will be delivering on their next-generation immersive engineering roadmap that brings together Siemens' NX software for product engineering with Sony's breakthrough head-mounted display (HMD) to enable the industrial metaverse.

The XR HMD (SRH-S1) features Sony's high-definition 1.3-type OLED Microdisplays with 4K resolution, and its proprietary rendering technology enables real-time, high-definition and realistic rendering of 3D objects. It also has a pair of controllers optimised for intuitive interaction with 3D objects and precise pointing. The head-mounted display is also optimized for extended creative use, designed with comfort and stability in mind.

"We embarked on this collaborative project with Sony to deliver the power of the industrial metaverse to our community

**Two giants of the technology world are combining to deliver breakthrough Immersive Engineering for the industrial metaverse.**



of designers, engineers and manufacturers directly in our flagship product engineering software," said Bob Haubrock, senior vice president, Product Engineering Software, Siemens Digital Industries Software. "After previewing the HMD at CES last year, our collective teams have built a set of tools that revolutionize how mixed reality is used in the engineering space - to not only support global collaboration based on high-fidelity 3D models,

but to enable co-creation directly on vital 3D CAD data in a managed, secure environment. Today, we are making this next generation set of technologies available to our customers."

"Since announcing our collaboration with Siemens at CES 2024, we've had opportunities to get direct feedback from Siemens' customers about the technology, and as Siemens' NX users ourselves, we were excited that many of them share our enthusiasm for the potential of Immersive Engineering," said Seiya Amatatsu, Incubation Center, XR Technology Development Division, Sony Corporation.

"We envision the industrial metaverse as a virtual world that is nearly indistinguishable from reality, enabling people — along with AI — to collaborate in real time to address real-world challenges," stated Siemens CEO Roland Busch back in January 2024. "This will empower customers to accelerate innovation,



*Sony envisions the industrial metaverse as a virtual world that is nearly indistinguishable from reality*

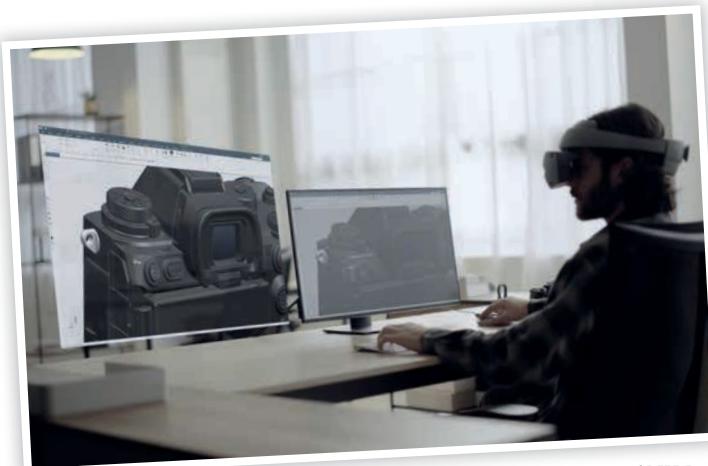
precise 3D geometry manipulation, designers and engineers can interact directly with product prototypes, NX commands and menus.

NX Immersive Designer supports augmented, mixed reality environments to place virtual objects in the real world, conduct design sessions in a high-fidelity virtual design review space and/or through large scale, high-resolution virtual monitors to extend and supplement the virtual design session. For even more efficient interaction, users can take advantage of NX Voice Command Assistant in the immersive environment to navigate multiple levels of menus and clicks with simple, easy-to-use spoken keywords.

NX Immersive Collaborator: NX Immersive Collaborator builds on the capabilities

of NX Immersive Explorer and Designer to allow organizations of all sizes to take advantage of both co-located and remote design review with multiple participants. NX Immersive Collaborator requires Siemens' cloud-enabled NX X to host design collaboration and review sessions – participants can join using local VR or desktop view for broad collaboration options. Value-based licensing tokens are used for only hosting sessions, with participants able to join remotely for free.

NX Immersive Designer is available for all NX customers with the latest updates and through Siemens' value-based licensing. NX Immersive Collaborator will be available later this month with the NX X update and also through value-based licensing. The NX Immersive Engineering tools have been developed to exclusively work with Sony's HMD offering that include 4K OLED Microdisplays and dedicated controllers.



*NX Immersive Designer supports augmented, mixed reality environments to place virtual objects in the realworld*

and manufacturing community, enabling high-fidelity mixed reality and 3D-focused collaboration. Siemens' Immersive Engineering solutions include:

NX Immersive Explorer: A headset-agnostic solution that designers and engineers use to conduct informal design reviews and collaborate using 3D CAD data derived from Siemens' NX software for product engineering.

NX Immersive Designer: Designed from the ground up to take advantage of the capabilities of Sony's HMD and creative controllers, NX

Immersive Designer enables designers and engineers to interact, manipulate and collaborate around graphically rich 3D product models natively in NX, without the need for additional preparation or software. Using Sony's Ring and Pointer controllers for object interaction and

**Siemens' Immersive Engineering toolset brings the power of mixed reality to the product engineering and manufacturing community**

» enhance sustainability and adopt new technologies faster and at scale, leading to a profound transformation of entire industries and our everyday lives. Together with our customers and partners, Siemens is proud to announce new products that will bring the industrial metaverse a step closer to all of us."

"Siemens is making the industrial metaverse more accessible so that our customers can use it to solve their real-world problems faster, more sustainably and with greater efficiency – and we will make it available to companies of all sizes, so that everybody can turn their big ideas into world-changing innovations," said Cedrik Neike, Member of the Managing Board of Siemens AG and CEO of Siemens Digital Industries.

"Siemens' Immersive Engineering technology helps our designers and engineers see, design and edit parts more easily with the unique controllers, enable our customers to experience their car at human-scale before it is built and help stakeholders from production easily collaborate with designers and engineers to validate parts before manufacturing," said Ian Briggs, Founder and Head of Design, Briggs Automotive Company (BAC).

Siemens' Immersive Engineering toolset brings the power of mixed reality to the product engineering

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**High-quality bearings reduce downtime and save cost. Here, Chris Johnson, managing director at specialist bearing supplier SMB Bearings, discusses the economic benefits.**

# INVESTING IN QUALITY

The cost of unplanned downtime is staggering, with global estimates suggesting unplanned downtime costs manufacturers \$50 billion annually. A critical yet often overlooked component in preventing such losses is the bearing – the small but vital part that keeps industrial operations running smoothly.

Despite their small size, bearing failures can have massive financial implications. When a bearing fails, it can lead to unplanned downtime, costly repairs and in severe cases, the complete shutdown of production lines. In fact, studies show that up to 40 per cent of industrial machinery breakdowns are caused by bearing issues. This can result in substantial losses in revenue, especially for industries that operate on tight schedules and cannot afford delays.

Moreover, the direct costs of replacing a failed bearing are often just the tip of the iceberg. The indirect costs, such as lost production time, emergency

repairs and expedited shipping for replacement parts, can quickly add up. For industries like automotive manufacturing, aerospace and heavy machinery, where precision and uptime are highly important, even a small disruption can have a ripple effect across the entire operation.

Another significant challenge is the lack of predictive maintenance.

Many companies still rely on reactive maintenance strategies, meaning they only address bearing issues once a failure occurs. This approach not only leads to frequent breakdowns but also results in higher long-term maintenance costs.

Additionally, in industries where bearings operate in harsh conditions – such as extreme temperatures, heavy loads, or corrosive environments – standard bearings may wear out more quickly, further increasing the likelihood of failure.

## INDUSTRY BARRIERS

To address these challenges, many industries are shifting towards more proactive maintenance strategies,

particularly predictive maintenance. By utilising advanced monitoring technologies, companies can now track the performance of their bearings in real-time. Sensors can detect early signs of wear, lubrication issues, or misalignment, allowing maintenance teams to address potential problems before they lead to catastrophic failures.

For example, the automotive industry has seen significant advancements in the use of Internet of Things (IoT) technology to monitor bearing health. By integrating IoT sensors into their systems, manufacturers can collect data on bearing performance, temperature and vibration levels. This data is then analysed to predict when a bearing is likely to fail, enabling timely maintenance and reducing the risk of unplanned downtime.

In addition to predictive maintenance, industries are also turning to higher quality bearings that are designed to withstand the specific demands of their applications. Bearings made from advanced materials, such as ceramic or high-grade stainless steel, offer superior durability and performance in extreme conditions. These





bearings can handle higher loads, resist corrosion and operate at higher temperatures, making them ideal for industries like aerospace, oil and gas and heavy machinery.

### LONG-TERM SAVINGS

SMB Bearings has long recognised the importance of investing in high-quality bearings to ensure the longevity and efficiency of machinery. Its range of bearings is designed to meet the rigorous demands of various industries, offering enhanced durability, precision and performance. While the initial cost of high-quality bearings may be higher, the long-term savings can far outweigh the upfront investment in certain applications.

For example, in industrial conveyor systems, frequent bearing failures can occur due to high loads, dust contamination and temperature fluctuations. These issues often lead to production delays and significant maintenance and replacement costs.

Investing in high-quality, precision-engineered bearings designed for heavy-duty applications can address these challenges effectively. Bearings with enhanced load

capacities, advanced sealing to protect against contamination and improved thermal resistance can significantly improve the reliability of conveyor systems.

Another example comes from the renewable energy sector, where wind turbines are subjected to extreme loads and constant movement. Bearings in wind turbines are critical components that must operate flawlessly to ensure energy production.

With the upgraded bearings, there is a substantial reduction in unplanned downtime and maintenance needs. This results in a dramatic decrease in repair costs and fewer production stoppages. Additionally, the improved reliability contributes to smoother production processes and higher overall efficiency.

In addition to opting for high-quality bearings, it is equally important to select the bearing type that is most suited to an application's specific conditions. Different applications may require bearings that can withstand high temperatures, corrosive environments, or heavy

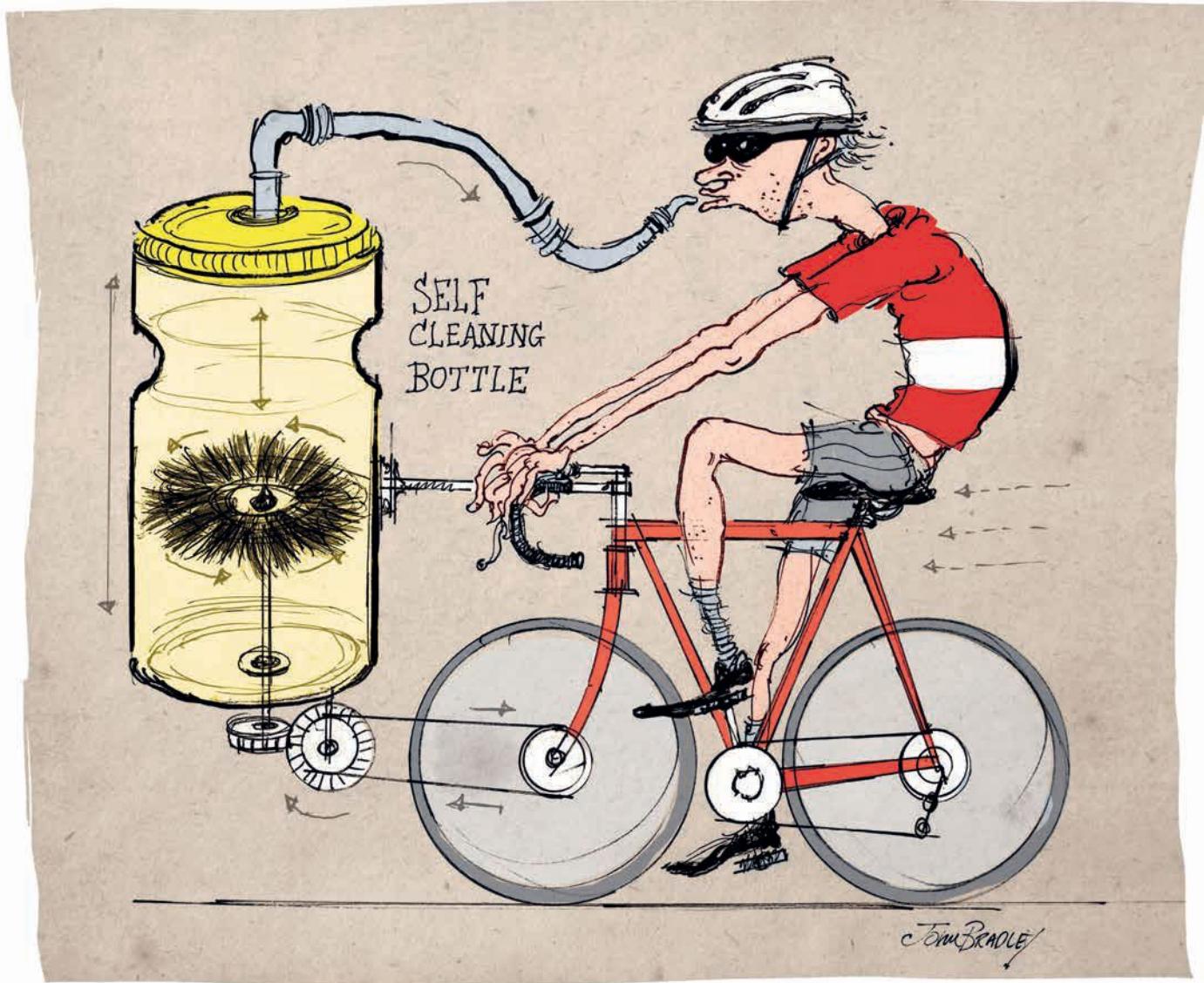
**SMB Bearings has long recognised the importance of investing in high-quality bearings to ensure the longevity and efficiency of machinery**

loads. For example, bearings used in high-speed machinery will have different requirements than those operating in harsh marine environments. Your choice must always begin with a clear understanding of the application and the environment in which the bearing will be used.

### THE CASE FOR QUALITY

While the initial cost of high-quality bearings may be higher than their standard counterparts, the economic benefits of investing in better bearings that are specifically matched to the application conditions are clear. By reducing the frequency of bearing failures, minimising downtime, and extending the lifespan of machinery, companies can achieve significant cost savings over time. Moreover, the shift towards predictive maintenance and the use of advanced monitoring technologies further enhances the value of investing in high-quality bearings.

In today's competitive landscape, where efficiency and uptime are critical to success, companies cannot afford to cut corners when it comes to their equipment. Bearings may be small, but their impact on the overall performance and reliability of machinery is immense. By investing in high-quality bearings, companies can not only improve the performance of their equipment but also protect their bottom line. ☀



# CLEAN AND GREEN

**O**ne of the words that those of us of a certain age almost never used to hear, but now do regularly is 'hydration'. Those of us who generally drank only when thirsty and then usually cups of tea or coffee (or even the odd pint of beer) are sometimes bemused by the habit of younger people to carry large, reusable bottles of water around all day every day and at all times of year.

But who is to say they are wrong? Medical advice now is that we all need between 2 and 2.5 litres of fluid a day and some sources suggest that

remaining fully-hydrated can have positive impacts on everything from brain performance to increased energy levels to weight management and even heart health.

The advent of the reusable water bottle era, however, does raise a certain issue: namely, how to keep these bottles, which by their nature usually contain intricate components such as valves, clean.

The fact is that, when tested, water bottles have been found to contain 20.1 million bacteria per ml – and while most of those aren't harmful, it's still a serious

concern, so being able to clean your bottle properly is clearly imperative.

Of course, this can be done manually, but this is time-consuming and laborious and not always effective. Dishwashers are more effective, but use a lot of energy and not everyone has one.

## THIS ISSUE'S CHALLENGE

The challenge this issue, then, is to devise a reusable water bottle that can be easily, quickly and effectively cleaned to cut down bacteria levels. We have a solution in mind, but can't wait to see what you come up with.

As ever we have an idea in mind that we will reveal in the **Apr/May** issue of Eureka! Until then, why not let us know how you would tackle the problem by leaving your thoughts in the comments section of the Eureka! website or by emailing the editor: [paul.fanning@markallengroup.com](mailto:paul.fanning@markallengroup.com)



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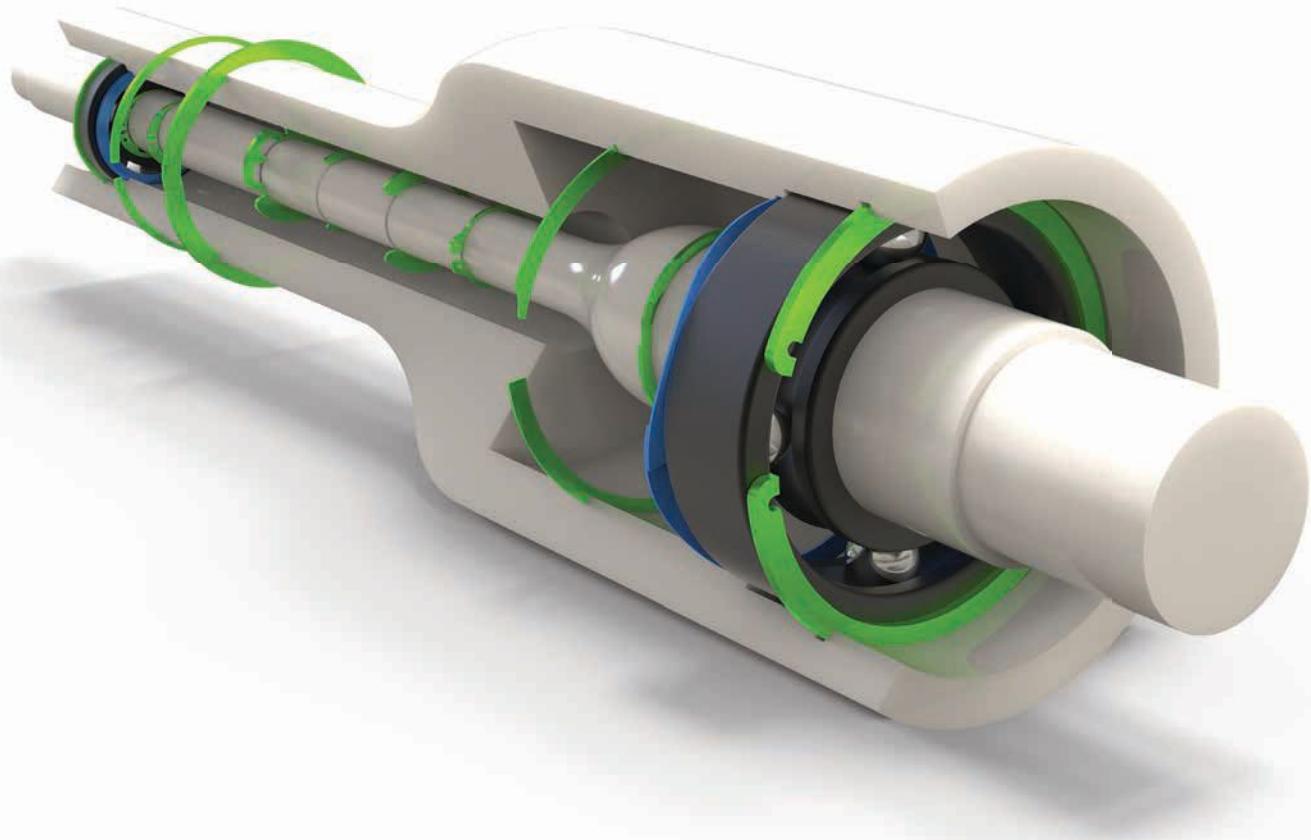
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