

VOICE OF INDUSTRY REPORT

OVERCOMING UNCERTAINTY IN UK MANUFACTURING

CONTRIBUTORS

BARA - BRITISH AUTOMATION & ROBOT ASSOCIATION

XI ENGINEERING

RENISHAW

KAWASAKI

ATLAS COPCO

NOVOTEK

ADVANCED ENGINEERING



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ADVANCED ENGINEERING

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This report has been commissioned by Advanced Engineering, the UK's thought-leading conference and event for the UK advanced manufacturing sectors and supply chains.

THE VOICE OF INDUSTRY REPORT

Whether it's uncertainty in the marketplace, in your innovation strategy or in the choice of digital technologies available to you, overcoming uncertainty makes you stronger as a business. And that's exactly what manufacturers in the UK have done in the last few years.

The purpose of this report is to gauge the voice of industry and delve into the unique challenges that businesses have faced and explore the positive results they've had in overcoming uncertainty.

Here, we speak to companies in the engineering and high-tech sectors, delivering advances in everything from machine tools and additive manufacturing to robotics and digital twinning. We ask them about their anecdotes and the strategies they've used to prosper, both in the UK and further afield.

We hope this will help readers from other companies, both large and small, learn strategic lessons on how they can overcome uncertainty and continue to grow their businesses sustainably into the future.



FOREWORD FOR ADVANCED ENGINEERING INDUSTRY REPORT



Mike Wilson

Chairman of BARA
and MD of KUKA



The UK is well known as a source of excellent engineering and innovation. We are the home for leading global businesses such as Rolls Royce and BAE Systems as well as many much smaller, highly creative engineering companies; a large proportion of the world's Formula 1 teams are based in the UK. Despite all the challenges faced by our businesses we have the capability to develop world leading technologies and do compete on a world stage.

The current economic climate is uncertain but I have confidence the resilience of our engineering sector will weather the changing environment and may well become stronger as a result. Investment always suffers in times of uncertainty but it is often those businesses that continue to invest through difficult times that become more successful. It is a time to be confident in our expertise, to invest in advanced engineering technologies and aim to be the very best on the global stage.

We must capitalise on our strengths, cooperate where appropriate and invest in the future. We need all of engineering to work together, to learn from each other and to develop the skills of the next generation. We need all the stakeholders, not only the

companies and their employees but also government, the education system, the research and technology organisations, trade associations and the banks to come together to help build a strong and successful engineering sector for the future.

This is not just for us but also our children. I am sure we want UK engineering to continue to be a global success for many years to come.

Mike Wilson

Chairman - British Automation and Robot Association

Director - Processing and Packing Association

Managing Director - KUKA UK and Ireland



Xi ENGINEERING

HELPING COMPANIES INNOVATE FASTER WITH DIGITAL TWINS

Xi Engineering Consultants

Xi Engineering is a company that combines multi-physics simulations with real world data. The company uses the technology, more commonly known as digital twinning, to help its customers create virtual prototypes without the cost, time and complexity associated with full prototyping. Customers benefit from a faster time to market, cheaper R&D, lower risk and better quality.

Here, we speak to Mark-Paul Buckingham, Managing Director of Xi Engineering.

How do you help companies innovate faster?

We work with businesses across the globe, from start-ups, all the way to large multinationals. Our team is dedicated to solving engineering problems and our team's capabilities range from small-scale consumer products to large scale machinery.

We offer services like simulation to offer companies accurate models that represent the real world. These simulations offer a robust test-bed for companies to trial various scenarios that would take much longer if done manually.

Our clients typically benefit from a nine times reduction in development time, a

four times reduction in overall product cost, an 89 per cent decrease in warranty costs and a 2.5-times decrease in the number of changes to products released to manufacturing.

We also provide specialist support in other areas such as R&D, rotating machinery analysis, precision measurement and environmental impact analysis. This helps our clients manage each phase of their project, from planning to sign-off and consent, giving them the ability to launch products more quickly to market without the roadblocks typically associated with engineering product development.

The kinds of sectors we've targeted include high-end audio, automotive, renewable energy and transport. The nature of our

work in forecasting trends and research into innovation gives us the luxury of being able to gauge future trends and help companies to bring products to market that will make a real impact.

One example of this is how we've helped a leading automotive manufacturer bring high-end audio into their vehicles. While this is not currently common to pair the two, we hope that our work will make this standard practise across the industry.

How has investment in research and development changed for you in the last two years?

We live and breathe R&D and problem solving. Sometimes companies bring products to market, and then try to analyse why they haven't been successful. We work at the outset and assess risk. So, because we're so immersed in the process of R&D and it makes up a core part of what we do, our investment in this area will always grow.

For our customers, however, many have relied on innovation grants to fund projects. They've also made use of the UK's Manufacturing Technology Centre. These are facilities designed to foster

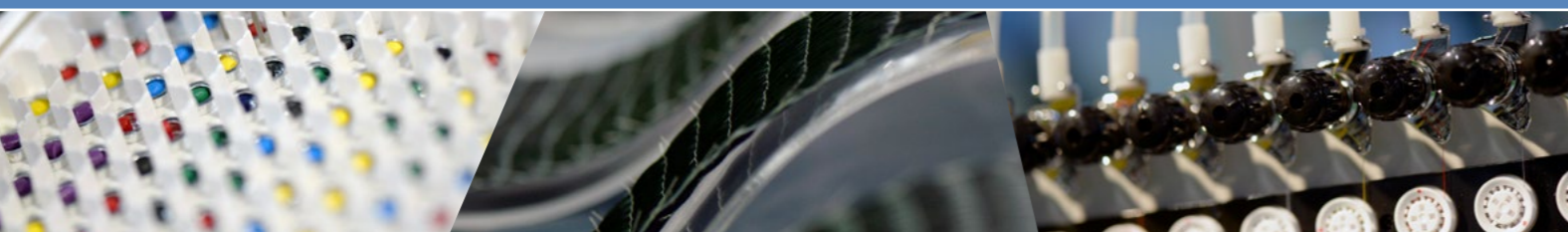
innovation and serve as incubation hubs to allow companies to access the latest manufacturing techniques to produce finished products.

What advice would you give to others on how they can face uncertainty?

Continue to strive to be the best. Be efficient and think on a global scale. This will not only allow you to take advantage of the weaker pound, it will allow you to lead your competitors in innovating, otherwise you'll be left behind.

What does the future hold for Xi Engineering?

As a business, we've been sitting in the digital space for over a decade. We've really made a name for ourselves in the area of digital twinning. While this was a technology that many were originally sceptical about, the market is now understanding the value it brings by the results we've delivered. By riding this technical wave, we hope to help our customers continue to accelerate innovation.



RENISHAW

A STORY OF DIVERSIFICATION



Renishaw is one of the world's leading specialists in high precision metrology technologies. The company helps manufacturers across the globe optimise their manufacturing processes, achieving new levels of precision, efficiency and profitability.

Here, we speak to Jonathan Archer, General Manager for UK sales at Renishaw. He looks after sales in Renishaw's UK subsidiary, heading up external and internal sales.

Renishaw has grown rapidly in the last five years, what do you put that success down to?

Yes, Renishaw now employs around 5,000 people globally, and around 3,100 in the UK. Those figures represent double the amount of people we had just eight years ago.

This is as a result of our continued investment in research and development, to develop the breakthrough technologies that help to transform our customers' operations. Around 14-18% of our revenue goes back into R&D. This is about ensuring that we remain a market leader and is typically two to three times higher than the industry average.

Another big reason for our success is our investment in our people, to ensure that we can continue to develop our innovative technologies and to continue to provide our customers with high levels of support. As part of this, we take on around 70 apprentices each year and a similar number of graduates. This is important for us as a future investment.

This means that recruiting and training the right type of engineer is crucial to us,

in design, manufacturing and customer service. We still carry out the majority of our manufacturing in the UK and in 2011 we purchased a 460,000 square foot manufacturing facility in Miskin near Cardiff, to help us tap into a wider pool of engineering talent.

You operate in so many diverse areas as a business, are there any sector specific challenges you've overcome recently?

Like all manufacturers, we've faced challenges in the last two years, however, one thing that's really helped us overcome this is the breadth of industries we serve, which ranges from the largest global aerospace manufacturer, to the smallest subcontracting manufacturer. Clearly, some of those industries have very long product and market lifecycles - take the aerospace industry, for example, where parts may be expected to last at least 15 years before redevelopment. This long-term trajectory means that many of the industry sectors we serve are unaffected by the short-term changes we've seen in the last two years.

While we've seen no direct UK impact in

terms of our capital projects from customers, one thing we're unsure about is whether stockpiling has impacted sales. We don't have the data to suggest that customers are gearing up with stock, but we haven't seen a drop-off in sales.

Our customers and competitors have also been relatively stable. While we have competitors in each product area, we're largely shielded by the sheer diversity of the sectors we operate in. We typically serve two types of customers: machine manufacturers that integrate our technology into their machines, and end-user customers both nationally and internationally. In both categories in the UK, we've not seen a slow-down.

Have you made use of the manufacturing hubs in the UK?

Yes, as a means of collaboration with our partners in the industry, rather than to use them for manufacturing capacity. This helps us to work closely with integrators to improve both our offerings.

What advice would you give to other businesses on how they can face uncertainty?

I think our success lies in the fact that we have diversified in so many sectors and

we continue to challenge ourselves in new ones. One example of this is in the medical sector, where we've used our additive manufacturing expertise to produce some truly ground-breaking implants that would otherwise be impossible.

What we learnt was that, ironically, the challenges that engineers face in the high-precision industrial sector are not too dissimilar to those faced by dentists and surgeons in the medical sector. So, being able to think laterally and applying your expertise in non-traditional sectors is key.

What does the future hold for Renishaw?

We feel positive about the future. We have an exciting pipeline of new and innovative technologies for the years to come. We intend to further grow our global reach, with offices opening shortly in two countries where we currently do not have a presence, and we will continue to challenge ourselves in new sectors. Ultimately, we hope that we can help our customers optimise their manufacturing offering for maximum impact.



KAWASAKI ROBOTICS

A LESSON ON OVERCOMING UNCERTAINTY



Kawasaki Robotics UK is the UK robotics division of Kawasaki Heavy Industries Japan. The company specialises in providing robotics for applications such as picking, packaging and palletising, as well as for the automotive welding, painting and medical and pharmaceutical sectors.

Here, we speak to Ian Hensman, Sales Manager for Kawasaki Robotics UK.

What changes have you experienced in the industrial automation sector in the last two years?

One of the major issues of our times is the nature of automation and work. One part of this is the ongoing skills gap, which has affected the manufacturing and technology sector for the best part of a decade. As such, with qualified labour becoming increasingly difficult to find, many of our customers are looking to automation for answers.

Market uncertainty has led many customers to be cautious about investing in new digital technologies. While market uncertainty is a short to medium-term issue, this really stems from a wider uncertainty about the benefits of automation technology and how they will work alongside a human workforce.

This is an ongoing issue and one that we really have to help our customers overcome. We're doing this by educating and supporting our customers more closely on how they can integrate digital technologies in a variety of applications such as welding, material handling, painting, and small parts assembly.

A key robotic innovation that we're really proud to have brought to the UK market recently is DuAro, a dual arm collaborative robot that is designed to work alongside human workers in a production environment. It can be taught by a person and helps to improve productivity by gently correcting positioning errors.

However, from a customer point of view, it's important to mention that we're not only a robotics specialist – we also lead in areas such as controllers, where we can match

them to specific applications like painting systems, as well as vision systems and software tools.

So, it's really a case of making customers aware of all the other areas that we can help with, to really prompt them to overcome any doubts they have. We've had really good feedback from customers with the support we've provided.

Finally, we faced a challenge for the on-time delivery of equipment as a result of market changes in the last two years. Currency fluctuations can prolong project quotes for new business and while this can be an ongoing challenge, we really benefited from being part of our parent company, Kawasaki Heavy Industries, a global high-tech group of companies that is well versed in the necessary logistics associated with the manufacturing industry.

What support do you gain from being part of a larger, multinational group?

We've always been fortunate in having dual

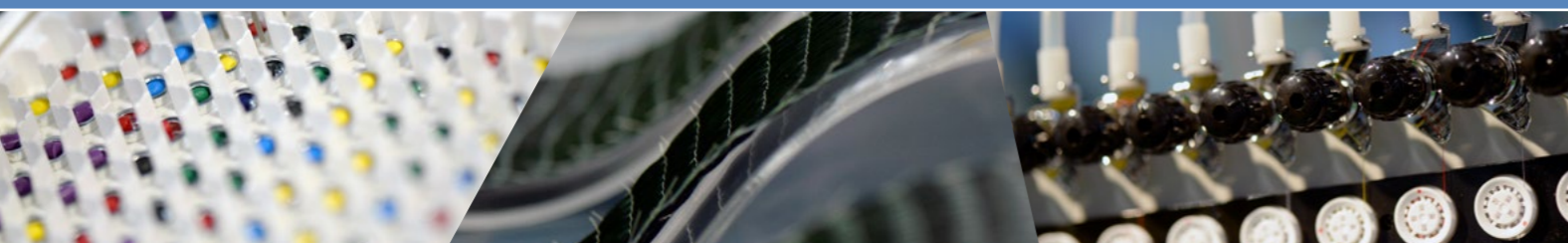
lines of machinery and equipment supplied to us from both Germany and Japan. This means that as the market dynamics change, we can draw on that infrastructure. So, we are able to mitigate a lot of market risk by relying on that part of our supply chain.

What advice would you give to others on how they can face uncertainty?

Don't fear it. There's something good in there somewhere, you just have to find it. Whether it's an opportunity to build a closer relationship with your customers, or strengthen your international offering, embrace change head on.

What does the future hold for Kawasaki Robotics UK?

Great things! Despite the overall uncertainty, we've actually seen an increase in good enquiries this year and hope to continue to see a rise in sales as more customers feel confident enough to invest.



ATLAS COPCO

COLLABORATING FOR SUCCESS



Atlas Copco is a leading multinational engineering company, headquartered in Sweden, which specialises in technologies such as Tools and Industrial Assembly Solutions, compressors and vacuum pumps.

Here, we speak to Clive Sharp, Business Line Manager for Atlas Copco's Motor Vehicle Industry business division in the UK.

How has the automotive industry changed in the last two years?

The sector has faced numerous challenges and, as a business, we've had to refocus our energies in response. Challenges from Brexit and the ongoing regulations around emissions means OEMs are relying more and more on battery technology. The sector is going through drastic change as it experiences a gradual move away from the production of diesel engine vehicles towards hybrid and electrification.

It's our view that demand for electric vehicles will continue to increase and we'll see more favourable conditions for their adoption. Government regulations on emissions are becoming tighter, the charging infrastructure is improving, the UK's use of renewable power generation is growing, and battery and electric motor technology is getting better.

This means that auto manufacturers are responding now. They're reassessing their future vehicle roadmaps and beginning to put the manufacturing technologies in place that will see them through this revolution. As a result, the pressure is on for engineering companies like Atlas Copco to stay ahead of industry developments and focus on delivering the latest assembly tools, error-proofing and quality assurance solutions that will help our customers succeed.

As a direct result of this, Atlas Copco's Industrial Technique division has merged its Tools and Industrial Assembly Solutions business areas together, in order to create a unique and innovative joining partner for

manufacturers. With products and expertise for all assembly applications, including adhesive dispensing, riveting, flow drill fastening, battery joining, sealing and quality inspection, we can meet future market demand, in particular within electric vehicle assembly.

As one encompassing business unit, therefore, Tools and Industrial Assembly Solutions combines decades of engineering expertise, industry knowledge and product excellence, all of which provides a compelling partnership proposition to both existing and new manufacturing customers.

How are you helping your customers in the automotive industry?

Most importantly, we are seeking to understand their challenges and proactively respond to them. More than ever, vehicle manufacturers are looking for long-term strategic partners, not just suppliers, who are able to support their manufacturing strategies with solutions that constantly add value.

With the ongoing uncertainty around Brexit, it's therefore particularly poignant that Atlas Copco UK has restructured, which will position us as a much more dynamic joining partner. As well as this, we have already put specific actions in place to mitigate economic uncertainty, which we believe will limit the impact on a customer's production operation in the UK.

In addition, Atlas Copco's global manufacturing facilities are also fully aligned, and the company as

a whole understands the challenges we face. For example, when a customer needs a product delivered the next day, we always aim to meet that demand. And if that means we need to stock critical components locally, we will. Stability is a priority for our customers, and we are fully equipped to provide this.

Customers also rely on Atlas Copco when it comes to supplying and maintaining a continuous stream of tools to keep their plants running. If a tool on an assembly line should fail, this has the potential to stop production unless replacements are immediately available on site.

Customer loyalty and being a strategic partner of choice is also important to us. We support our customers throughout the product lifecycle, to help them increase efficiency and wherever possible, profitability.

Quality assurance is another core area of focus, by helping customers build vehicles faster and smarter with minimal to zero errors in production. This enables customers to bring new vehicles to market more quickly without compromising on quality.

Have you made use of the manufacturing hubs in the UK?

Atlas Copco recently became a level two partner with the Manufacturing Technology Centre (MTC) in Coventry. We recognise that innovation and collaboration are key to success and MTC is pushing the boundaries for its customers, so we are proud to be on that journey with them.

We're also working with selected universities in cutting-edge research and development in the automotive sector. While much of Atlas Copco's R&D is done at

group level, we always look locally at areas where we can make a proactive difference, such as the integration of collaborative robots or 'cobots', as well as augmented and virtual reality solutions.

Over three years ago, we embraced Industry 4.0 with the implementation of our own Smart Connected Assembly philosophy and Data Driven Services. By helping customers understand data from their production facilities, we can help them improve productivity, quality and sustainability, as well as saving money from costly assembly line shut-downs through traceability and error-proofing.

What advice would you give to others on how they can face uncertainty?

First and foremost, it's critical to understand what your customers need and what their pressure points are. Aligning with them on strategies that will help you to help them is also fundamental. If they're facing specific challenges, it's much more effective to resolve these for mutual benefit if you are working as a strategic partner rather than a third-party supplier.

What does the future hold for Atlas Copco?

The future will certainly hold challenges, but challenge can be good. Atlas Copco has developed its reputation as a technical pioneer and we pride ourselves on innovation. As a market leader in assembly solutions, our evolving mix of products and data driven services will mean that we continue to adapt to changing conditions, especially in the EV market, which is challenging vehicle manufacturers in every way.



NOVOTEK

MODERNISING BRITISH MANUFACTURING



Novotek, headquartered in Sweden, is an industrial IT and automation systems specialist who is the sole distributor of GE Digital products in the UK & Ireland. The company provides a variety of automation technologies such as historian and SCADA software to help manufacturers improve their processes in industries such as food and beverage, energy and water treatment.

Here, we speak to George Walker, Managing Director of Novotek UK & Ireland.

At a time when manufacturers are really looking to make productivity gains, what are you doing to help?

One of the big breakthroughs that's really helped our customers is the way in which they manage the data that comes out of their processes. In the food and beverage industry, for example, traceability is a legal requirement, so everything from dairy to meat processing must demonstrate data integrity. To this end, Novotek and GE Digital are taking away the biggest barrier to getting started on using machine and process data.

Currently, the data that manufacturers generate is usually stored in a historian programme that allows manufacturers to export data to run trends and analysis. The problem is that this software is typically licensed, and it can cost up to £50 to export a single tag. What's more, because most manufacturers don't know what analyses

they'll need to run ahead of time, they don't know which data parameters to tag. This means they could end up exporting 50,000 tags, of which only 4000 may be useful, of which they only end up analysing 50.

Our alternative historian system has a fixed annual license fee of £6000, which includes support, and manufacturers can store up to 200,000 data tags. The first 200 tags are free to analyse, visualise and convert to reports and then there's a nominal £2/tag/year ongoing subscription cost.

This means that manufacturers can manipulate data retrospectively, going back to older data sets to find trends based on any number of parameters they choose, without the cost prohibitive nature of the current model. Because productivity is inextricably linked to the actions that manufacturers take in response to the insights they glean from data, it's absolutely vital they can do so in a sustained manner.

Novotek is obviously a Swedish company that has expanded into the UK in the last few years. What prompted this move?

In the Benelux and Nordic regions, Novotek already has a very good presence with a good market share. In the UK, Novotek saw the potential to develop this market from an automation perspective. Our goal is to modernise British manufacturing, using edge hardware to help manufacturers gain better insights, improve productivity, and ultimately become more profitable.

To show our commitment, we're investing in a new facility in Leeds. Not only will this be more centrally located in comparison to our UK headquarters in Glasgow, it will feature an innovation lab running demonstrations of all our software and hardware. This will help customers see the innovations that we're working on and give them a chance to learn more about the developments.

We chose Leeds because the local council was supportive in offering incentives for tech businesses to move into the area. As well as the innovation lab, the facility

will also be home to our newly recruited internal sales team.

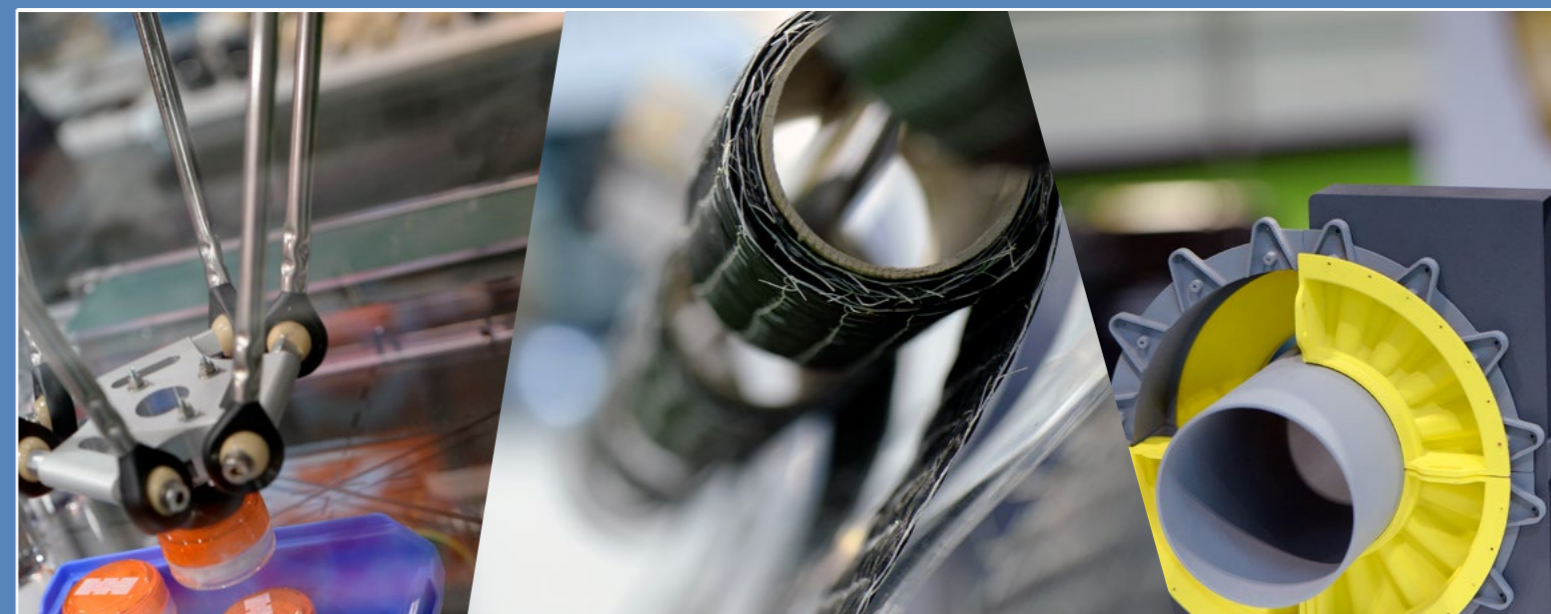
What advice would you give to others looking to overcome uncertainty?

Whether you're thinking about internationalising your business or trying to use automation to improve productivity, uncertainty is a fact of life, so having a good strategy in place and rolling this out sustainably is the route to success.

Part of this strategy would be to ensure you have the right systems in place. Engineering businesses with the right industrial automation systems and control processes in place operate more efficiently, which allows them to be more agile and adaptive to uncertain market conditions.

What does the future hold for Novotek UK & Ireland?

It looks positive. We want to modernise British manufacturing through technological innovation. Crucially, we want to ensure that businesses can operate with lower costs and high efficiency by getting to grips with the high volume of data they produce.



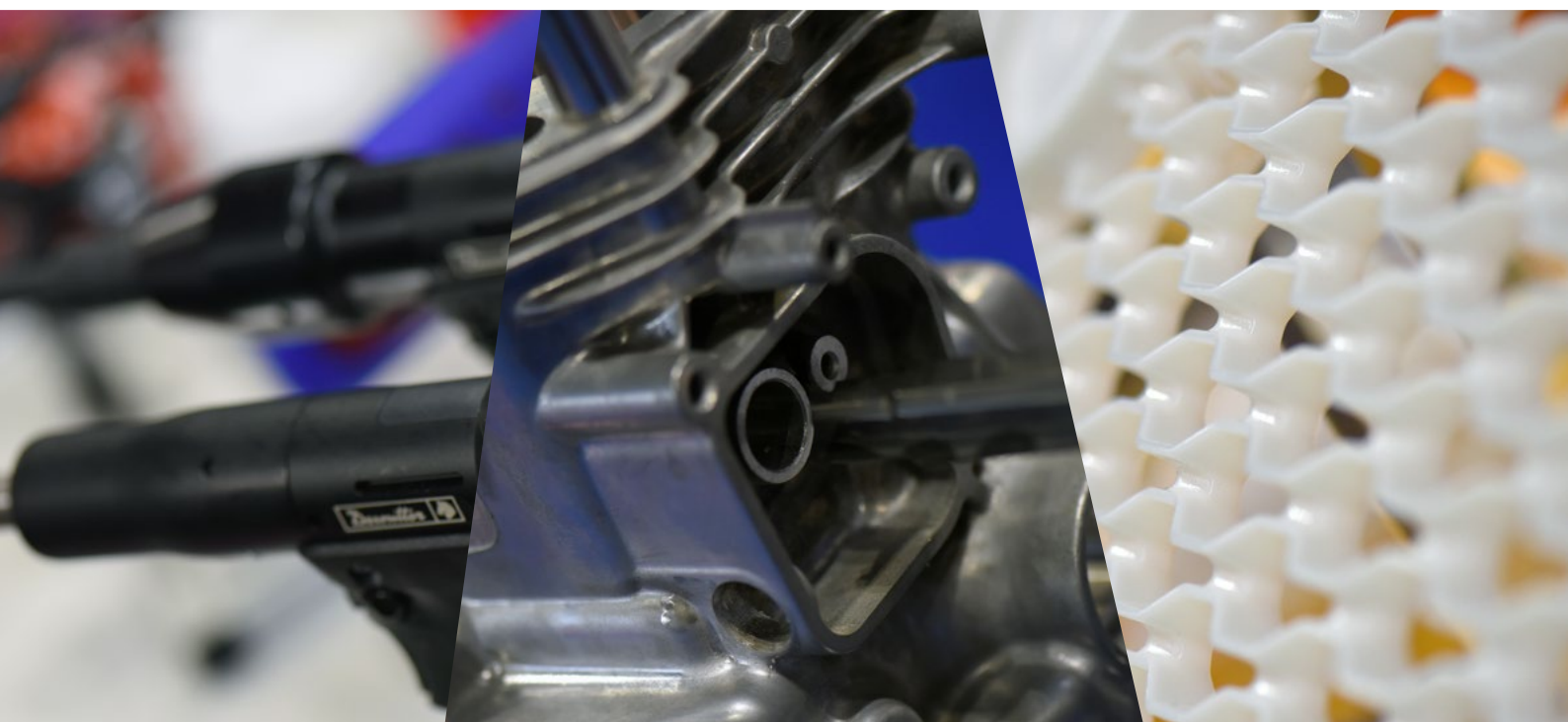
ADVANCED ENGINEERING

A VOICE THAT RESONATES

Having spoken to businesses both large and small for this report, we've learned that overcoming uncertainty can lead to prosperous results. Whether it's adapting to the advent of electric cars or using additive manufacturing to 3D printed implants for patients in the medical sector, the manufacturing and engineering industries are moving at break neck speeds.

A whole host of these technologies will be on show at the Advanced Engineering exhibition. The show will bring together 15,000 engineering professionals to promote sectors as diverse as aerospace and automotive, as well as medical technology and renewable energy.

We hope this report has helped to shed some light on the positive actions that manufacturers are taking to overcome uncertainty, and if you still have any doubts, come along and see for your self the technologies on show!



ADVANCED ENGINEERING



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Dan Burge, Commercial Director, Lotus Engineering & Technology

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Publication date October 2019

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