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Is reshoring always good?



There are few politicians with a bad word to say about “reshoring” – the return of the jobs, particularly manufacturing jobs, that left the UK and other advanced economies in vast swathes as globalisation gave companies access to cheaper workers abroad. In 2014, the Conservative MP Mark Pawsey told the House of Commons that reshoring could create 200,000 jobs over a decade; Vince Cable, then the business secretary, warmly agreed. “The British textile industry,” he enthused, “almost disappeared years ago. A significant amount of reshoring is taking place because companies want to be close to the market and regard the business environment as attractive.”

However, investigations by Channel 4’s *Dispatches* – the first of which took place in 2010 – and a 2015 study by the University of Leicester outlined exactly what made the business environment in Leicester, a city that was once home to some of the largest clothing factories in Europe, so attractive to the clothing industry once more. The answer was not pretty. An unregulated and exploitative network of “dark factories” had arisen in the dilapidated buildings of the city’s garment district, paying workers around half the minimum wage to produce clothing as quickly as possible to meet the demands of Britain’s online “fast fashion” retailers.

Dark factories are a disaster not only for the people who work in them but for the wider economy, as responsible manufacturers lose their competitive edge against those who have simply imported the worker exploitation of other nations. More positive attempts to bring back manufacturing to Britain, such as the new Clarks shoe factory that was announced – amid much political backslapping – in Somerset in 2017, have been lauded by government but not supported. In January, it was announced that the Clarks factory would close.

The UK has perhaps the best claim of any country to have invented industrial production. It should be the UK, then, that has the best memory for the human and environmental cost of making things in the wrong way. In a time of approaching economic turbulence, this country must now choose between bringing back the old days, as has already happened in Leicester, or creating a future in which industries and their workers are regulated and protected.

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WINNER

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News



UK injects £3.7m into advanced drug manufacturing

Rohan Banerjee

UK Research and Innovation (UKRI), has announced a £3.7m investment in advanced manufacturing projects specifically related to gene, cell or engineered tissue drugs and therapies. Businesses and universities have been invited to pitch their products, with details of their “process mechanisation” and how they could be manufactured at scale, before 25th September. Projects must be collaborative, between at least two UK-based institutions or companies.

“The aim of this competition,” UKRI explained in a statement, “is to encourage inventors of advanced therapies to introduce affordable technology during early innovation stages. This technology will enable them to reproduce the manufacture of their product at a commercial scale.” Applications should detail the technologies required and how their use will make the manufacturing process “less dependent” on humans.

Robots cut cake in Cumbria

Rohan Banerjee

Penrith-based bakery Bells of Lazonby is one of 11 firms to sign up to the government’s manufacturing technology accelerator initiative, Made Smarter. The Made Smarter programme, which allocates a £20m pot of funding to eligible partners, is targeted at small to medium-sized enterprises in the North West. It aims to help them to implement technology, including robotics, 3D printing and data analytics tools, in order to boost their productivity.

The bakery intends to use its share of

Weak pound fails to boost exports

Jonny Ball

A survey by the British Chambers of Commerce (BCC) has shown that contrary to normal expectations of a weak pound boosting exports by making British goods and services more competitive, export growth actually weakened in the second quarter of the year.

The organisation’s Quarterly Economic Survey, which is the UK’s largest survey of private sector business sentiment, found that the number of companies reporting increased export sales fell to a three-year low, despite the dip in sterling resulting in cheaper British exports for foreign buyers. The

survey also found that export orders were at their lowest in four years. Some people, including director general of the BCC, Dr Adam Marshall, have blamed Brexit and political uncertainty, which has led to “many businesses and investors... [putting] off major decisions... hoping for a breakthrough in the Westminster impasse.”

Many British exporters rely on sales in mainland Europe, which is itself suffering economic woes as Germany nears recession. Rising global trade tensions, including tariffs imposed by the US and China, are contributing to fears of a global slowdown in 2019-20.

the funding (£50,000) to purchase two cutting robots to speed up the process of shaping its products. The robots will be connected via WiFi to a centralised digital hub from which they can be programmed. Bells of Lazonby estimates the robots can increase output by 25 per cent. Michael Bell, the company's managing director, told *Spotlight*: "We are delighted to be part of the Made Smarter campaign. This will help enable the sustained growth of our company as we embrace technology as part of our manufacturing process. The [robots] will improve processing time and lead to increased profitability."



Titanic shipyard faces closure

Jonny Ball

Last month the Harland and Wolff shipyard in Belfast, famous for building the Titanic as well as numerous White Star liners and warships, was placed into administration, threatening 120 jobs. The firm's parent company, Dolphin Drilling, based in Norway, put Harland and Wolff up for sale last year and filed for bankruptcy in June. The Unite and GMB unions have organised round-the-clock protests at the yard, and have promised to stand against the Democratic Unionist Party in upcoming elections if they don't

do more to help the yard's employees. The government has said the crisis is a "commercial issue" and will not intervene.

Harland and Wolff was established over 150 years ago. It flourished during the Second World War and declined in the postwar years as demand for ocean liners fell steadily with the advent of air travel. Much of the work on the yard now focuses on the production of offshore wind farms, as opposed to ships.

The Labour Party's shadow chancellor, John McDonnell, called for the yard to be nationalised and prioritised when it came to giving out new Royal Navy and public sector contracts.

Despite the problems in the yard, workers remain optimistic that a new buyer can be found.

Toyota plans Brexit pause

Rohan Banerjee

Toyota has announced that it will stop production at its Derbyshire plant for 24 hours on the day after Brexit. The Japanese car manufacturer, which accounted for just over 8 per cent of the 1.5 million cars built in the United Kingdom in 2018, said in a statement that it would give factory staff a day off on 1st November, while executives used the time to "assess and react" to leaving the European Union.

Toyota anticipates disruption to deliveries and has planned to stockpile certain vehicle parts. A spokesperson for the company also confirmed that it expected to make up the hours from the break later in the month, so no overall production value would be lost. The planned pause will mean that Toyota will have a two-day supply of parts onsite rather than the usual four hours' worth.

Unite, the union representing many of the 2,600 workers at Toyota's plant, has warned the government that this temporary closure could be "the first of many consequences" of a no-deal Brexit.



British Steel rescued by Turkish military

Jonny Ball

Last month, investment fund Ataer Holding rescued British Steel, the UK's second biggest steelmaker – after Tata Steel – from bankruptcy. Ataer is a subsidiary of Oyak, the Turkish military pension fund, which holds assets of almost £15bn. British Steel employs over 4,000 people at its Scunthorpe works.

After rescue talks with the government broke down in May, the firm was liquidated, threatening both the livelihoods of direct employees and 20,000 jobs in the supply chain. It has been reported that prior to the buy, Oyak signalled to the business secretary, Andrea Leadsom, that it intended to double the capacity of British Steel in five years, framing Brexit as an opportunity to reverse the fortunes of the company. The shadow steel minister, Gill Furniss, promised to hold the government to account over working conditions at British Steel plants. Oyak has been embroiled in frequent labour disputes at its car plants in Turkey, and some have raised ethical questions over the company's proximity to the Turkish government and the authoritarian leadership of Recep Tayyip Erdogan.

Industry should embrace technology responsibly and consult workers on where and how it is used, writes **Yvette Cooper**, chair of the Home Affairs Select Committee

Manufacturing must leave no one behind



From aerospace to medicines, electric cars to Burberry macs, British manufacturing isn't just a proud part of our economic history; it's a crucial aspect of our modern economy. The 2.5 million jobs in the sector include some of the most highly skilled science, design and tech positions in the world. But to stay cutting-edge and to get stronger in future, British manufacturing needs to keep pace with new technological trends such as automation and AI. That means committing to investment, adaptation, and, crucially, making sure the manufacturing workforce is able to make a positive contribution to that process.

Against the backdrop of Brexit uncertainty, too little attention is being given to huge industrial shifts taking place in Britain and across the world that could have potentially profound consequences for the workplace. The so-called fourth industrial revolution is already

transforming work and people's lives, and new technology could bring amazing benefits – creating better-quality jobs, improving our environment and generating cures for terrible diseases. But innovation can also lead to disruption, create winners and losers, concentrate power and lead to exploitation.

Past waves of industrial revolution often involved new inequalities, injustices and exploitation alongside new wealth and new opportunities. That's why we need to actively shape the way technology is used so that it narrows rather than widens inequalities. It took decades for new legislation, the growth of trade unions and the emergence of the welfare state to tackle some of the injustices of the first industrial revolution. We can't afford to wait that long this time round. That's why, a year ago, I agreed to chair the Commission on Workers and Technology, a joint research initiative of the Fabian Society and the Community



trade union which has been looking at the impact of new technology from the point of view of the workforce, sector by sector. We've spent the last year visiting companies and taking evidence from workers and experts in a range of sectors, including manufacturing. We've listened to the hopes and concerns of employees in vulnerable sectors and discussed the practical steps that can be taken to enable their participation in a modern, machine-led economy.

The commission is not due to report for another year, but already some things

Jobs should be enhanced, not replaced

have become clear. For example, we are finding that although there is huge potential for technology to improve jobs and lots of workers are positive about change, too often when new technology is deployed, it undermines the quality of jobs and day-to-day experiences in the workplace.

We've visited plants that were at risk of closing down before new technology was adopted that helped them become more competitive. And we've seen remarkable virtual reality simulations improve product design and also allow workers to redesign their own processes and workspaces. And we've seen examples of technology used to improve the quality and skill of jobs by removing repetitive, routine tasks. The commission visited a manufacturing plant in June where members of staff play a crucial role in determining how robots are integrated into production processes.

But we've also heard evidence of new technologies in other sectors removing the most enjoyable elements from jobs – such as retail and hospitality workers who say that self-service machines are taking away the human interaction and customer relationships that they enjoy at work. We've seen examples of technology introduced to replace jobs and cut staff, or technology used to monitor staff and make jobs less rewarding.

We've heard concerning evidence about employers such as Amazon using technology for workplace surveillance and monitoring. Far from relieving workers of menial tasks, new technology can be used to force humans to work as if they were machines. Harnessing technological change for the good requires vigilance and action to prevent new technology being used to control rather than emancipate the workforce.

The commission also found that many workers feel powerless when it comes to technological change. Even though 80 per cent of workers who responded to our recent survey said technology had affected their jobs, six in ten don't feel as if they don't get any say in how that happens. Workers need to be involved and consulted about

technological change at work; they should be in the driving seat, not an afterthought. Workers need the chance to shape technological developments, increasing the chance that they will be effective.

Most worryingly, the commission found that the benefits that do come with new technology are not being evenly distributed across the country. A report from the Office for National Statistics, which looked at data from 2011-2017, found that certain groups of people are at a disproportionately high risk. People with no degree currently do almost all of the jobs at risk of automation; women's jobs make up 70 per cent of those at high risk; and workers aged between 55-65 are more than twice as likely to be in high-risk jobs than workers in their 30s. The ONS found that if you're a worker in Boston in Lincolnshire, then there is a 57 per cent chance that your job will be automated. If you're a worker in the London borough of Wandsworth, however, there's only a 33 per cent chance. And of the 26 local authority areas in England where a worker is more likely than not to see their job automated, only one of these areas is within a city – all the others are made up of towns or villages, with none in London or the South East.

Our manufacturing towns have already seen the impact of previous waves of technological change. Manufacturing jobs were lost in the towns or replaced with lower-skilled warehouse or distribution jobs, while new skilled or service jobs were created in the cities. If we're committed to embedding fairness in our economy, the government must ensure that new opportunities from technology are spread evenly and the jobs of the future aren't just sucked into cities at the same time as jobs in our industrial and manufacturing towns are at disproportionate risk of automation.

Towns in the North – the backbone of our traditional manufacturing industries – need a good deal, and they need their fair share of investment. Technology should be used to help close the gaps between men and women, young and old, North and South. It shouldn't be making them worse.



GETTY IMAGES / BRENDAN SMIALOWSKI

Trumponomics is boosting US manufacturing

Jonny Ball

Donald Trump, in his inaugural address, declared that in recent decades “Washington flourished but the people did not share in its wealth. Politicians prospered,” he said, “but the jobs left, and the factories closed... rusted-out factories scattered like tombstones across the landscape.”

In parts it could have been delivered by the left-wing Democrat Bernie Sanders, or, minus the Trumpian eccentricity, ripped from Labour’s last election manifesto. Trump positioned himself as a champion of the “left behind” areas of the US, advocating a renaissance in high-waged, high-productivity manufacturing jobs. It’s a rich vein to draw on in a country that has lost five million manufacturing jobs since 2000. And it is a political narrative that will be familiar to many in Britain, where decades-long trends of industrial decline and regional inequality are singled out as catalysts for the vote to leave the EU.

Trump ended with a promise: “This American carnage stops right here and stops right now.” And looking at the data, Trump is delivering.

According to the Reshoring Initiative – a non-profit campaign group – a record 1,389 companies announced the return of 145,000 manufacturing jobs in 2018. It reports that the number of companies engaging in “reshoring and foreign direct investment was at the highest level in history, up 38 per cent from 2017.” New reshoring in 2017 was up 50 per cent

from 2016. And reshoring from China was 59 per cent of the total.

The trend has been attributed to Trump’s tax and regulatory cuts, including a reduction in the corporate tax rate from 35 per cent to 21 per cent, causing a stock market surge as companies use extra funds to buy back shares. It’s a corporate giveaway that Boris Johnson and his libertarian cabinet may want to emulate post-Brexit.

One of the companies opening new US factories is Foxconn, the controversial producer of Apple products in China, which is opening an advanced manufacturing facility in Wisconsin, wooed by tax cuts and huge taxpayer subsidies offered by the state’s Republican governor. Apple is also reshoring 20,000 jobs, increasing its investment in domestic manufacturing by 400 per cent to \$5bn. Last year, the company announced that it would bring \$285bn held overseas back into the US.

But not all of the reshoring success can be attributed to Trumponomics. Nudged by the increasing costs of doing business in China – wages and prices have risen significantly in the last decade, and fears over intellectual property play a part – US manufacturing jobs have been on the increase since 2009. Trump’s trade wars also provoked a slowdown in August. In advance of the 2020 presidential election, the Democrats will be hoping that as tariffs begin to hit US importers, the reshoring trend could soon stall.



Innovation 4.0 – a digital revolution for R&D

Matt Reed, strategic director of the Materials Innovation Factory at the University of Liverpool, discusses the need for academia and industry to apply the principles of Industry 4.0 to accelerate research, innovation and product development for economic growth



The fourth industrial revolution is rapidly transforming the UK's manufacturing sector. Through harnessing the power of advancements in AI, machine learning and virtual reality technologies, it's a disruption built on digitalisation. However, to maximise its potential to drive economic growth, we must apply the principles of Industry 4.0 across the entire innovation value chain. By using robotics and high-performance computing to revolutionise the way in which research and development (R&D) is carried out, we've developed a new ground-breaking approach for both academia and industry – Innovation 4.0.

Innovation 4.0 aims to transform the scale, quality and impact of translational research by re-engineering the traditional innovation process in order to accelerate academic discoveries

and commercial product launches. Currently, most R&D labs will rely on spreadsheets and notebooks to record manually produced data. Typically, a researcher working in a chemistry lab at a UK university will spend the bulk of their time investigating a narrow range of materials in detail, manually inputting experimental data into a computer for analysis. It's labour-intensive and leaves little time for experimental creativity.

By leveraging the digital technologies that underpin Industry 4.0, and applying them in the innovation process, traditional R&D is being transformed into Innovation 4.0. We are using the internet of things (IoT) to create digital lab benches that automatically capture everything a scientist does, without changing what they do. This helps them to produce detailed experimental datasets with

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an increased resolution of what they actually did, compared to manual recording methods. This data is then automatically stored using cloud computing systems for more secure and effective data management. Automated workflow systems and co-operative robots (cobots) are being used in labs to perform long, high-frequency tasks that humans cannot execute with high levels of reproducibility. Cobots reduce monotonous and repetitive work, and this partial automation of the R&D process provides scientists more time to think creatively about what the data is telling them and focus on how to reach their next big insight or discovery.

Machine learning and AI techniques are harnessing cutting-edge mathematical algorithms to provide R&D teams with deep scientific insights. This information is then used to publish results in

high-impact journals, file patents, create new software platforms, and design and improve future research programmes. Also, digital twins are being used to design, create and simulate virtual experiments before they're implemented in the real world for a fraction of the costs of traditional R&D. Applying these emerging areas of digital technology to traditional R&D processes, in combination with highly sophisticated feedback control loops, is creating the first generation of Innovation 4.0 research labs.

Recognising the importance of Innovation 4.0 for both academia and industry, the £81m Materials Innovation Factory (MIF) opened for business in late 2017 with a vision to be the world's leading centre for computer-aided materials science. Located in the heart of Liverpool's thriving Knowledge Quarter, the MIF was co-founded through strategic innovation partnerships between the University of Liverpool, Unilever and UK Research and Innovation (UKRI). The MIF has since attracted funding from the Henry Royce Institute and a range of commercial partners. Through the integrated use of Innovation 4.0, we're developing new approaches to advanced materials, chemistry and formulations, re-thinking potential applications and driving R&D forward.

The MIF is an 11,600m² facility containing one of the world's largest collections of scientific equipment for materials chemistry research. The building is "open by design" and its labs are available for use by academics and industry specialists alike, with a dedicated team of technical experts available to assist with experiments and train scientists on how to use our cutting-edge kit. We provide a unique template for translational research, bringing together world-leading material science, some of the world's biggest multinational companies, and a suite of dynamic SMEs from across the local and national chemical industry to create a diverse Innovation 4.0 ecosystem. The MIF also houses

Royce@Liverpool, our contribution to the £235m Henry Royce Institute, bringing together the University of Liverpool with eight other leading research organisations across the UK to create a national centre of excellence for advanced materials.

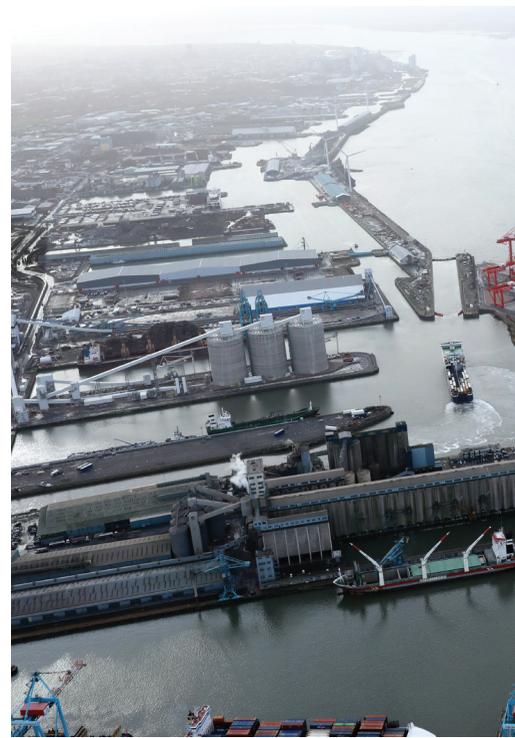
The academic expertise of the University of Liverpool is at the heart of the MIF. The university has the second best chemistry department for world leading research in the UK according to last Research Excellence Framework process, with 99 per cent of our outputs ranked as either world-leading or internationally excellent. The MIF is home to a number of the most pioneering and highly decorated materials scientists and chemists of our generation. Professor Andy Cooper, a Fellow of the Royal Society and a world leader in the area of computer-aided materials discovery, is using cobots and high-powered computing systems in the MIF to accelerate the creation of materials for a variety of applications including energy capture and storage.

Another Fellow of the Royal Society, Professor Matt Rosseinsky, is a pioneer in the design and discovery of solid-state materials, which have wide-ranging applications, from catalysis to superconductivity. Professor Rosseinsky and his research group are using the facilities available in the MIF to develop new methods of identifying functional materials, with a focus on integrating their experiments with the latest computational methods. Researchers in the MIF are also interested in the medical applications of materials chemistry. Professor Steve Rannard is applying novel polymer chemistry and organic nanoparticle production to the field of nanoscience to combat diseases such as HIV.

The MIF is a dynamic and growing Innovation 4.0 ecosystem, creating a crucible for accelerated discovery and economic growth. The potential that new, large-scale aggregations of automation, control and cognitive computing can offer academic and commercial R&D is simply limitless.

Frank Field, independent MP for Birkenhead, outlines his programme for the revival of UK manufacturing

Ten steps to a new industrial revolution



The wealth, independence, and security of our country are all linked with the health of our manufacturing industry. In towns such as Birkenhead, a healthy manufacturing sector creates opportunities to gain new skills, get and keep jobs, earn good wages, and to make the innovative new products and services that our country needs. For far too many people, however, such opportunities have been restricted. That is why I have submitted a ten-point plan to the Prime Minister for turbo-charging British industry and creating a million new manufacturing jobs.

Procurement

I have asked Boris Johnson to commit to a “Buy British” preference post-Brexit, to apply to all new ships, trains, and other manufactured goods being procured by central and local government. If one were to combine all of our country’s publicly owned ships, which together account for more than 60 vessels, and add them to the current and future Royal Navy fleet, there

would be enough overall demand to create a renaissance in shipbuilding. But we need the rules around procurement to reflect this major opportunity.

Research

According to the House of Commons Library, our country’s total expenditure on research and development has stayed relatively constant, at between 1.5 per cent and 1.7 per cent of GDP, since 2000. I have asked the PM to make a commitment to raise this expenditure to 2 per cent of GDP within a decade, which would take us above the EU average of 1.9 per cent. In Merseyside, our manufacturers’ attempts to create new innovations are supported by an agglomeration with Liverpool’s universities through the Liverpool City Region 4.0 initiative. We need a guarantee of longer-term funding for this initiative and, in return, a requirement for it to offer all manufacturing firms in the region support from, and formal contact with, a university department that’s best placed to meet their needs.



Exports

There is a lot of untapped potential in Merseyside for our small and medium-sized enterprises (SMEs), in particular, to export their products to overseas markets. Success on this front would expand the number of jobs available within those firms. I have therefore proposed a new Exporters' Tax Credit to incentivise SMEs to increase their net exports.

Skills

If SMEs are to be able to expand their operations, and offer more high-waged jobs, it is vital for manufacturing firms to have access to a skilled workforce. However, there is huge concern around the effectiveness and availability of the Apprenticeship Levy. It runs the risk of being viewed as a tax on businesses, rather than a dedicated source of funds with which to train or retrain people. We need the government to fund employee wages during training, as well as build greater flexibility into the Apprenticeship Levy by enabling firms to pass funding

down their supply chains, and pool funds with other local employers or nationally as an industry.

Infrastructure

Interconnectivity is vital if our small and medium-sized manufacturers are to expand and prosper. In Merseyside, we are hamstrung by inadequate road and rail connections. We need investment as a matter of urgency in high-speed rail which links Merseyside with Tyneside, via Manchester, Leeds, and Hull.

Business rates

The current system of business rates, in some cases, penalises firms for investing in new plants or equipment. Taking the steel industry as an example, sites in this country pay between five and ten times more than their counterparts elsewhere in Europe. Counterintuitively, the more they invest to enhance and improve facilities, the heavier the penalty they must pay. If sectors such as the automotive industry, construction, aerospace and fabricated metals are to thrive, they will need to be backed up by a productive steel industry. We therefore require a package of incentives for firms, including those in the steel industry, to make continuous investments in their factories and equipment. This would involve removing plant and machinery from business rates and reintroducing tax relief on industrial buildings.

Collaboration

Where industrial policies have been most successful overseas, they have entailed a statutory requirement for all manufacturers to join chambers of commerce. In turn, each chamber is given statutory powers and responsibilities to guarantee minimum service levels to each manufacturer, in consultation with trade unions. I have asked the PM to embrace this reform and ensure minimum service levels incorporate vocational training, information and guidance, marketing, product development, technology transfer, law, energy efficiency, exporting, and co-operative purchasing of high-cost goods and services.

Access to finance

A healthy manufacturing industry is only likely to be possible if it is backed by patient capital and can access the finance it needs to expand. I have asked the PM to examine the case for a tax reduction on dividends from longer-term shareholding in manufacturing firms, stronger voting rights for shareholders who are longer-term investors, and a requirement for banks to lend a certain proportion of their money to productive manufacturers. One existing policy that is proven to be effective, particularly in helping manufacturers create more jobs, is the provision of credit or loan guarantees. We need the government to commit to an increase in the number of manufacturers supported by such guarantees.

Energy policy

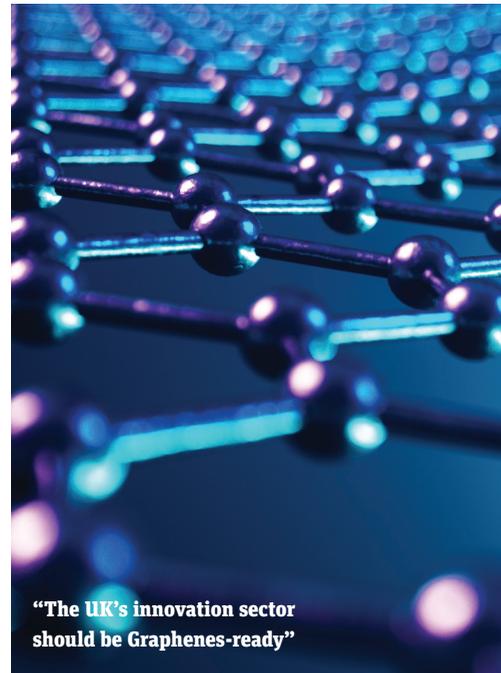
Heavy industry is particularly susceptible to high energy costs. This country's electricity prices for large industrial energy users are higher than those in any other EU country. UK steel producers pay 51 per cent more than German producers and 110 per cent more than French ones, even after the compensation and exemption schemes already provided by the government. We need the government to bring electricity prices for heavy industry in this country into line with those in other European countries, perhaps by requiring energy companies to offer more competitive rates to manufacturers that guarantee certain levels of employment in deprived areas.

Free ports

Finally, over the past year, I have been making the case for free ports to be established after Brexit as a means of attracting manufacturing jobs to deprived areas. Now the Prime Minister has adopted this policy, there is much enthusiasm in Merseyside for our region to be included within his initial raft of ten new free ports. I will shortly be submitting to the Treasury a proposal which would see our region using a new free port to become a global enterprise and trade zone, delivering economic benefits for the whole of the North West.

The start of the Graphene Age

James Baker, CEO of Graphene@Manchester, discusses the radical potential of a new era of advanced materials in manufacturing



“The UK’s innovation sector should be Graphenes-ready”

Graphene is only 15 years old but is already recognised as a superstar. This single-layer material, originally isolated at the University of Manchester in 2004, has inspired great science and potentially disruptive innovation. Graphene has been adopted into a range of manufactured products. One of the most recent has been the BAC Mono R supercar. This iconic British marque is made by Liverpool-based Briggs Automotive Company Ltd and is the world’s first production car to fully incorporate graphene-enhanced carbon fibre into every body panel. In this instance, the reason is to make the car much faster but there are also some potential productivity benefits in terms of reduced material use and manufacturing time.

Another step forward has been taken by inov-8, the sports shoe brand, which has worked with graphene scientists at Manchester to develop rubber outsoles that deliver the world’s toughest grip. They have successfully launched the G-Series range of footwear that has taken the market by storm.

These examples point to a tipping

point in the adoption of graphene and related materials.

And it all began when graphene was isolated by professors Sir Andre Geim and Sir Kostya Novoselov who, in 2010, were awarded Nobel Prizes. Their success has been galvanising and researchers worldwide have criss-crossed the Periodic Table on intrepid quests to find other similar nanomaterials. And they have succeeded to the point where we now have distinct categories of 2D materials, such as a graphene analogs called Xenenes or the metal carbides dubbed MXenes.

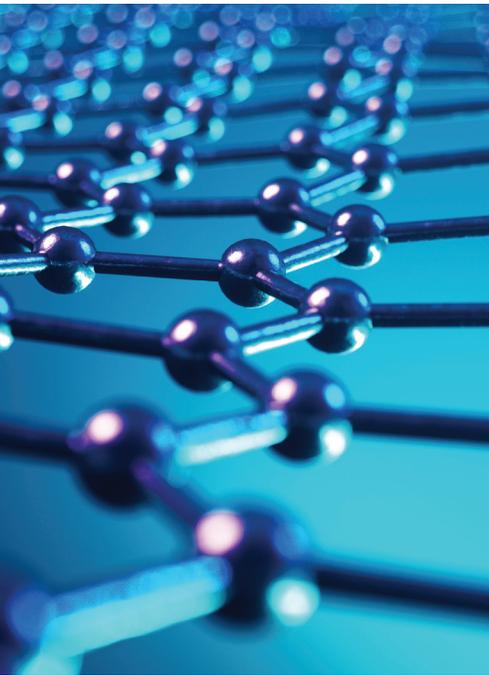
These many graphene-inspired 2D materials – which I call the “Graphenes” family as a helpful shorthand – are all exciting in their own right, each offering advantages in terms of conductivity, filtration, thermal management, lightweighting or sensor capabilities. But far more important is the way we use various types of 2D materials as building blocks to create “designer materials” with truly novel features.

According to my Manchester colleague Regius Professor Phil Withers from the Henry Royce Institute, the

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Fail fast, learn fast – pioneering a new model of innovation

A range of sectors are impatient for the innovation they need to be economically and environmentally sustainable. A new generation of advanced materials are the most likely candidates to make the necessary difference to businesses. We can accelerate innovation without compromising safety, thanks to the advent of increased digitalisation in the industrial and manufacturing sectors – for example, adopting sophisticated modelling techniques, such as digital twin technology, to replicate ideas and quickly help identify and reduce potential risks.

To meet this demand, a more agile, “fail fast, learn fast” approach needs to be adopted across the advanced materials community. This method focuses on short-term pilot projects and echoes the advice from Apple’s Steve Jobs on being prepared to make mistakes, admit them quickly and get on with improving the innovation. It departs radically from the mainstream innovation model, because rather than trying to pick (and spend time and money on) a potential winner, we could instead spend much less time on running 10 plausible projects all at the same time, but at a much earlier stage of their development. As we learn from our failures, we select or combine innovations that look to be winners.

This more agile approach should work well for the model innovation community now being led by the University of Manchester, which features a “science value supply chain” that runs seamlessly across academia and commercial end-users.

For us, this journey begins in research groups based in the University and where blue sky thinking can be nurtured in centres of excellence like the National Graphene Institute. When the science is mature enough,

we can transition it into projects based in the nearby business-facing Graphene Engineering Innovation Centre (or GEIC for short). The GEIC proactively engages with business partners for whom 2D materials could prove transformational, including lightweighting, energy storage and membrane technology.

These flagship facilities are part of a wider innovation eco-system including the Henry Royce Institute, the UK body for innovation in advanced materials that we call Graphene City. This unique community features a critical mass of scientists, manufacturers, engineers, innovators and industrialists centred around fully integrated lab-to-market capability.

If we are to remain competitive at a global level I recommend that the UK’s strategic innovation community need to consider in their plans:

- The need to have an ‘innovation stream’ within the Industry Strategy Challenge Fund that introduces and adopts the ‘fail fast, learn fast’ approach.
- A cultural shift in national funding and policy thinking with a recognition that the UK should be nurturing innovation winners based on the “fail fast, learn fast” approach and not just “picking winners”.
- The need to identify and support exemplar innovation eco-systems that enable the fail fast, learn fast way to innovation (Graphene City would be a good example).

Our economy, our daily lives and our planet stands to gain, and the sooner we start, the sooner we’ll reap the benefits.

To find out more, read [On Materials: policyatmanchester.shorthandstories.com/on_materials/index.html](https://policyatmanchester.shorthandstories.com/on_materials/index.html) and graphene.manchester.ac.uk

materials industry in the last century had been driven by “drop-in” substitution as new materials, such as synthetic polymers and plastics, have resulted in the formation of important materials-based industries. But the focus has since moved from substitution to the creation of customised materials having tailored functionality, from super-smart composites with inbuilt sensor and visualisation technology to magnetic materials for data storage.

Historically game-changing materials have defined their time (such as the Iron Age, and more recently the Silicon Age) and I suspect the “Graphene Age” is now fast approaching. The tailored functionality of this new generation of graphene-based materials will significantly impact on advanced manufacturing and how we manage the value chain.

The UK’s innovation sector should act to prepare manufacturing for a huge transformation in its processes – and to be Graphenes-ready. It will likely be advanced materials that will produce a real paradigm shift in the sector rather than digitalisation.

MANUFACTURING

The latest contracts, jobs and training

THE LARGEST PUBLIC SECTOR CONTRACTS NOW OPEN FOR TENDERS

1. University of Strathclyde, Glasgow

Construction of the National Manufacturing Institute for Scotland

Bid deadline: 17th September

Tender value: £35m

The University of Strathclyde is seeking construction partners to work on the main hub of its Advanced Manufacturing Innovation District – a cluster of purpose-built manufacturing and engineering facilities.

Contact: lauren.leitch@strath.ac.uk

2. Plymouth Community Homes

Supply of Insulated Glass Units

Bid deadline: 27th September

Tender value: £750,000

This independent housing association in the South West seeks a long-term partner to manufacture and supply glass panes to be used in its properties.

Contact: phil.blackmore@

plymouthcommunityhomes.co.uk

3. Leicester City Council

Manufacture and supply of welfare buses

Bid deadline: 23rd September

Tender value: £620,000

Leicester City Council is inviting tenders for the construction and supply for ten disabled-friendly community vehicles – with six to be new coaches and four to be van conversions.

Contact: Siobhan.hole@leicester.gov.uk

4. UK Atomic Energy Authority

Manufacture, inspection and testing of electrical cubicles, electrical harnesses and mechanical components

Bid deadline: 1st October

Tender value: £550,000

UKAEA, the government body which researches fusion energy, is looking for a new long-term partner to manufacture and supply its equipment and develop its facilities.

Contact: Robert.franklin@ukaea.uk

Total value: £37.5m

THE LARGEST PUBLIC SECTOR CONTRACTS OPEN FOR BIDS SOON

“Pre-Information Notices” give advance warning of contracts that will soon be open for tenders.

1. NHS Supply Chain, Alfreton

Imaging, radiotherapy and ancillary devices

Over the next few years, this East Midlands Trust will be looking for technology partners to manufacture and construct new x-ray and related devices.

PIN value: £1.4m

2. Ministry of Defence

Supply of knitted garments

The MoD will look to strike a deal with a clothing manufacturer, specialising in wool and cotton materials, to supply uniforms and accessories on a long-term basis.

PIN value: £2m

3. Leidos Europe Ltd

Supply of berets

Leidos, which specialises in defence and security technologies, is looking for a clothing partner to supply berets on behalf of its client, the MoD.

PIN value: £200,000

Total value: £3.6m

MANUFACTURING JOBS NOW OPEN FOR APPLICATIONS

Product design engineer, Cambridge Consultants

Salary: Competitive, with annual review

Location: Cambridge

Closing date: Ongoing

This Cambridge-based robotics firm is seeking an experienced design engineer to work on developing new products to be used on assembly lines and in the healthcare, energy and defence sectors.

Professor of project management, London South Bank University

Salary: £63-248-£71,367

Location: London

Closing date: 22nd September

LSBU's School of the Built Environment wishes to recruit an experienced academic to lead its teaching in undergraduate and postgraduate courses.

Manufacturing manager, Hovis

Salary: Competitive

Location: Mitcham

Closing date: 30th September

The successful candidate will be required to manage relationships through Hovis's supply chain and lead the site's engineering team on maintenance and safety issues.

Manufacturing and planning manager, Nobia UK

Salary: £40,000

Location: Darlington

Closing date: 22nd September

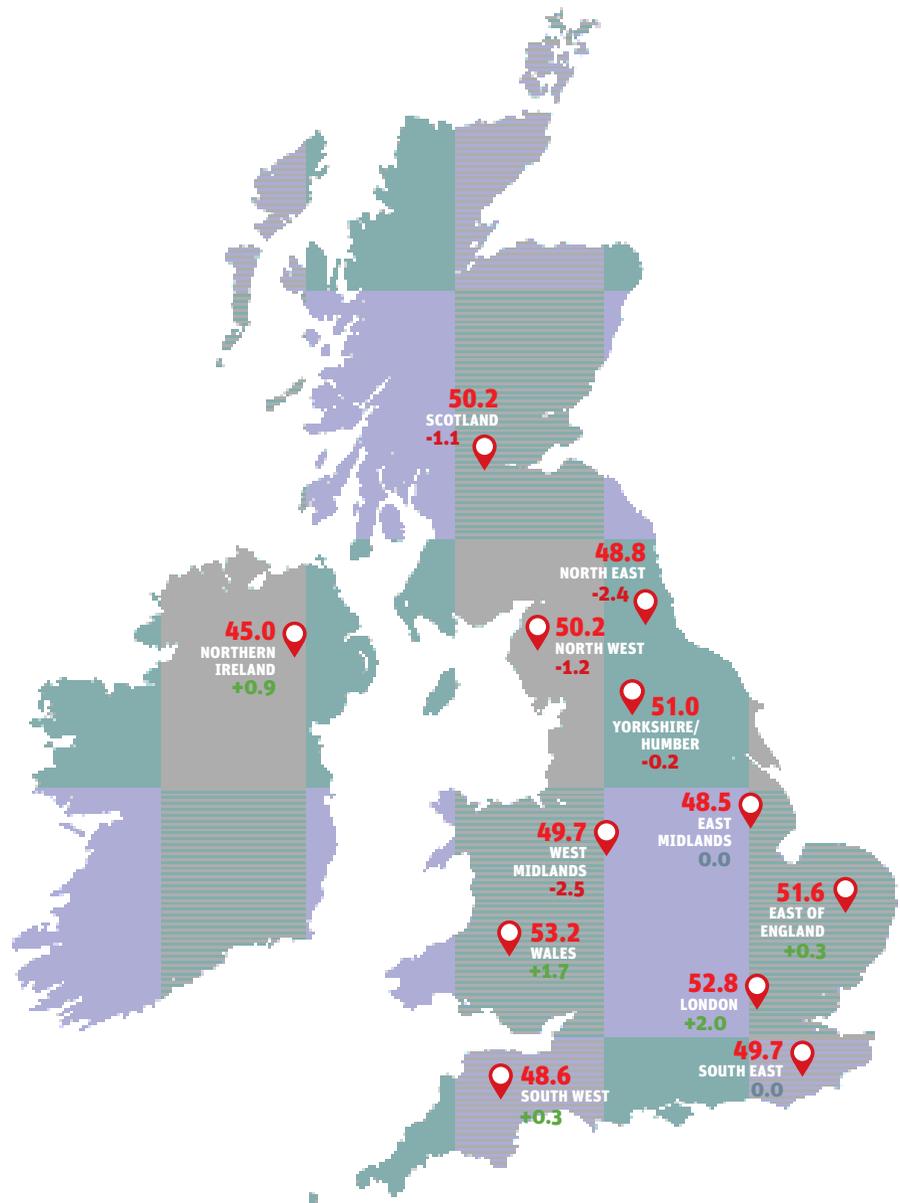
This cabinet manufacturer and kitchen fitter seeks a manager to plan and direct its supply chains, while devising time-saving and cost-cutting initiatives in the production process.

Tender and framework data
supplied by

tussell

REGIONAL PMI INDEX

The Purchasing Managers' Index (PMI) is an indicator of economic health for the manufacturing, engineering and technology sectors. Banks carry out regional surveys to provide an advance indication of what is happening in the private sector by tracking variables such as output, employment and prices. The higher above the neutral 50.0 threshold, the faster the rate of expansion is signalled. The map illustrates the regional scores recorded by NatWest for July-August 2019, and their increase or decrease since June-July 2019.



TRAINING OPPORTUNITIES

MSc Design and Manufacturing Engineering, Newcastle University

This taught one-year postgraduate course, accredited by the Institution of Engineering and Technology, covers sustainable energy in factories, software-led engineering, additive manufacturing and composite material science.

Manufacturing and production management courses, Institute of Supply Chain Management

The IoSCM offers a range of short online courses aimed at mid-career manufacturing professionals. The courses cover the latest factory technology and material science.

MSc Advanced Material Sciences, University College London

UCL's one-year postgraduate programme, which includes a six-month independent research project, aims to equip students with a comprehensive knowledge of advanced manufacturing techniques, composite materials and nanotechnologies.

Advanced welding course, Cranfield University

Cranfield University, the specialist technology and engineering institution, is offering a four-day introductory course to the latest technological advancements in additive and welding processes.



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Factory-made buildings and the planet

Offsite manufactured buildings cut carbon emissions at every stage of the build, says **Debra Colley**, marketing coordinator at Wernick Group

Modular construction (otherwise known as offsite or volumetric construction) is known for its speed. Manufacturing a building in a factory setting, while building work takes place onsite, reduces construction programmes by around 60 per cent. Compare this to the “traditional” route where the time taken to complete a building has changed very little in the last 30 years.

This speed, as well as the cost savings resulting from it, is why the UK government consistently supports offsite construction. But while speed is a major advantage, modular’s eco-credentials are often overlooked.

Research by Swansea University’s SPECIFIC Innovation and Knowledge Centre led them to a modular solution for their pioneering “Active Office”. Their innovative building design combines readily available technologies to generate and store heat and electricity in one integrated renewable energy system. The building, which was funded by Innovate UK with support from the European Regional Development Fund through the Welsh Government, also supplies electricity to the local network and electric cars.

Working with Wernick Buildings, a modular specialist with 85 years in the industry, SPECIFIC ensured sustainability was at the heart of the building’s construction. “The desire to reduce the energy consumption of the building before considering energy generating technologies was fundamental to the project,”

commented Joanna Clarke, architect and head of design.

It was this dedication that impressed Education Buildings Wales judges who awarded it the “Delivering a Sustainable Education Facility” prize at this year’s awards event.

The project is particularly important when you consider that 10 per cent of the UK’s carbon emissions are derived from construction. Unsustainable materials, waste which ends up in landfill, transportation of materials and labour and onsite generators are the largest areas of concern. However, inherent in the modular industry are substantial carbon savings.

Materials are locally sourced where possible and modules are built with standard material dimensions in mind, ensuring there is little waste.

Manufacturing buildings on a production line means that materials are delivered in bulk and excess materials are simply passed down the line to the next module.

Onsite, less operatives are needed as 90 per cent of the build is in the factory. That means fewer cars and deliveries. Disruption to the site’s surroundings is also minimised.

Carbon savings don’t simply end once the building has been handed over. Modular buildings are literally wrapped in insulation, making them far easier and much cheaper to heat. With the addition of solar technology, modular buildings can easily achieve carbon neutral and even carbon negative status, as demonstrated at Swansea University.

Stuart Wilkie, managing director at Wernick Buildings remarked: “We are committed to lowering carbon emissions for our clients. Modular buildings are the buildings of the future, and they’re here today.”

Reducing the impact of construction means big changes in the industry and a shift in the perception of modular buildings in society. Modular is ready to take over as the number one building method and we don’t have a minute to waste.

IN ASSOCIATION WITH

Wernick
BUILDINGS

John Stevenson, chair of the all-party parliamentary group on food and drink manufacturing, discusses the importance of the sector to the UK economy and its role in improving public health

The industry everyone needs



The largest manufacturing industry in the UK is so big that it is larger than the aerospace and automotive manufacturing industries combined. It is an industry that produces goods which almost everyone uses every single day. It is one of the oldest industries we have, but also one of the most innovative and modern. It has a presence all over the country and its products have the power to evoke childhood memories and bring people together. Indeed, its products keep us alive and healthy.

The industry is, of course, the food and drink manufacturing sector. I have been chair of the all-party parliamentary group on food and drink manufacturing for nine years now, since my election in 2010. This has afforded me a great deal of insight into the industry, the way it works, the concerns it has, and the potential there is for the future. And there is great potential. But first I think it



is important to put into context just how essential the sector is. In the UK, according to the Food and Drink Federation (FDF), food and drink manufacturing has a turnover of over £100bn and makes up nearly 20 per cent of all manufacturing. It has a presence in nearly every part of the country – helping to provide more than 400,000 jobs – and of course it supports all sorts of industries such as agriculture, logistics, and packaging.

In my own constituency of Carlisle there are a number of major food and drink manufacturers including Nestle, McVitie's, 2 Sisters Food Group and others. These aren't just places that happen to be in Carlisle; they have been providers of employment for local families for decades. People from Carlisle talk about the biscuit smell of the city, with some locals claiming to be able to tell you what biscuit is being cooked in the



factories just by sniffing the air.

And almost every other constituency in the country will have similar stories. The food and drink industry is important because food is a great unifier, and the production of food requires love, skill, and a real community business chain. It is also an important industry because of the increasing concern the public have over food security. And this is why the outcome of the ongoing Brexit negotiations is so vital to the food manufacturing industry.

The FDF – which represents more than 300 companies – believes that a disorderly exit from the EU would be disastrous for UK food and drink. It paints a picture of significant and adverse changes to product availability from a consumer point of view within weeks. From an export point of view, it says that on day one there would be massive disruption, with some products being

shut out of Europe completely until the EU grants approval. Given that the EU27 are responsible for buying more than 70 per cent of exports, this will have a harmful effect.

World Trade Organisation rules mean higher tariffs, but the issues aren't just about tariffs – which themselves will have a huge impact – but also about regulations and requirements. Many people like to talk about the importance of the “just in time” supply chains of advanced manufacturing industries like aerospace or vehicles; but timings are just as important in the food and drink manufacturing industry. Quite simply, food cannot afford to be left standing around waiting for checks or approval. So, the first and best thing the government can do for the industry is to come to an agreement with EU.

As time quickly runs out, the chances of the UK leaving the EU without a

withdrawal agreement are now higher than ever. I still hope that something will change, and, for the sake of food and drink manufacturing, as well as a whole range of industries across the UK, that the issue of the Irish backstop can be resolved to the satisfaction of the European Union and Parliament.

The industry's skills gap could also be exacerbated by Brexit. Currently, more than a quarter of the industry's workforce is made up of EU citizens. These workers are valuable members of our society, and the government needs to ensure that they are made to feel absolutely welcome, whatever happens on October 31st.

But I think the industry itself would like to be in a position where it was able to train and recruit more from the existing British workforce. So many of these jobs require a huge amount of skill, and food and drink has to be part of a nationwide strategy to work with the government to improve the skills of the workforce and prepare for automation.

Moving beyond Brexit, the move to healthier eating needs to be addressed, with the government and the industry working together. Food and drink manufacturing companies are going to play a vital role in delivering the government's laudable aim of halving childhood obesity by 2030, and there are a variety of methods that need to be employed for it to happen. Portion sizes, reformulation, sugar reduction, packaging and marketing changes will all play a part, but the government has to be careful that it doesn't fall for the idea that there is a silver-bullet solution to the issue and it has to work with the industry to bring about these changes.

The largest manufacturing industry in the UK is a success story to be proud of. It is the where the solution to our country's food-related health issues will be found. It is where future skills and export opportunities can be grown. It is astonishingly advanced and resilient, but also one of the most vulnerable to a disorderly Brexit. The government should be looking at the food and drink industry as a national opportunity and ensuring that the success story continues.

Spotlight



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Minimum salaries for migrants are just for show

The UK's manufacturing workforce would be "decimated" if the government followed through on its white paper proposals to introduce a minimum salary threshold of £30,000 for EU migrants after Brexit, according to Make UK, the industry's trade body. There are currently 300,000 non-UK EU nationals working in the manufacturing sector, accounting for 13 per cent of the industry's employees. Make UK suggests that nearly 90 per cent of the EU migrant manufacturing workforce would fail to qualify for the threshold, despite occupying a number of skilled roles, which would lead to a labour shortfall. While that does sound concerning, it is also unlikely to happen.

The idea – and at white paper stage that's all it is – of introducing more stringent requirements for migrants to enter the UK satisfies two points of view within the wider Brexit debate. For those in favour of leaving the EU and against freedom of movement, anything which results in a shift towards a greater domestic bias in the workforce might be viewed as a positive. But for those in favour of remaining, many of whom would point to the embedded relationship that EU migrants have with various UK employment sectors, the action of deporting thousands of workers probably won't be attractive from their economic or cultural position.

The government knows it must appear to be committed to a hard line on migration, as per the pro-Brexit ticket, while also protecting the manufacturing sector, which accounts for 45 per cent of the country's total exports (£275bn). It makes sense for the Conservatives to put



A £30,000 salary threshold for migrants in the manufacturing sector would be a disaster, which is why the government won't impose it, writes Rohan Banerjee

out a message that says the UK is in control of its borders – the £30,000 threshold is an eminently printable headline – but it would also make sense for them to caveat that policy.

The Home Office already has a minimum £30,000 salary threshold for migrant workers coming from non-EU countries, but makes many exceptions. If the person is going to work in an area identified as understaffed, then they can be granted a visa despite earning less than £30,000 a year. Different "tiers" of visa are available to migrants, some of which are assessed against the going rate for these professions, and exceptions are also already made for "new entrants" to the workforce (people aged 18-25). In 2018, 90 per cent of migrant nurses from outside of the EU earned less than £30,000 a year.

Should the government choose to introduce a salary threshold for EU workers, for the manufacturing sector's sake, it would do well to mirror the exceptions in place elsewhere; unless they do genuinely view a dip in productivity as a price worth paying for fewer foreign accents on factory floors.

In my view, Make UK is right to stress the value of EU migrant workers to UK manufacturing. But the panic seems overstated. In his first statement as Prime Minister, Boris Johnson gave an "unequivocal guarantee to the 3.2 million EU nationals currently living and working among us... that under this government, they will have the absolute certainty for the right to live and remain." This does not sound like a prelude to the decimation of UK manufacturing, nor is it likely to be.

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