Levelling Up Rochdale:

The case for innovation in towns

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AMPI
THE ADVANCED MACHINERY & PRODUCTIVITY INSTITUTE

NPL
National Physical Laboratory

Rochdale Development Agency

Metro Dynamics

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Foreword

The UK government is committed to a "levelling up" agenda, to reduce the substantial disparity in income per head and productivity between London and the South East and much of the rest of the UK.

This is a challenging task. There is a history of regional policies stretching back many decades, most of which have had little impact.

To be successful, innovation and productivity increases have to be generated, to use the jargon of economics, endogenously. The new innovations have to lead to new companies and new industries, that create jobs and prosperity. Government has a key role in terms of co-investment. But these cannot be "top down". The areas in which they are located must create the demand and partner with Government and industry to generate sustained, on-going development.

Boroughs like Rochdale need to innovate in how innovate. New models of innovation based local economic development are needed.

As the NESTA report in 2020 "The Missing £4 billion: making R&D work for the whole UK" argues, new institutions need to be set up to create new poles for innovation and productivity growth, attracting new private sector investment as well as supporting existing businesses.

The adoption of technologies that support automation and other smart technologies will play a crucial role in securing the UK's future growth and prosperity. Rochdale's manufacturers are engaged in the North West Made Smarter programme to support this.

Further, Advanced Manufacturing Innovation Districts in the satellite town of cities should bring together facilities for translational research, diffusion of innovation and the development of skills, attracting inward investment from international firms at the technology frontier.

Metrodynamics establish in this report that Rochdale is "ahead of the game". Innovation in how to innovate has already been taking place and this is the perfect time to build on that. The Advanced Machinery and Productivity Institute (AMPI), the topic of this think piece by Metrodynamics, is a major example of this thinking.

Rochdale and AMPI have responded to the Government's Research & Development Roadmap which seeks to take greater account of place-based outcomes. The idea was first put forward three years ago by local high-tech manufacturing companies. It arose from a perceived need by them for innovation.

With most innovation coming from the private sector, public sector funding must be spent in a way that stimulates activity by the private sector. Given the way AMPI has come about, created through a strong market demand – it provides a unique opportunity to deliver against the 2.4% target of GDP being spent on R&D by 2027.

It forms a key part of the strategy of Greater Manchester's Graphene, Advanced Materials and Manufacturing Alliance (GAMMA) to develop a major, international site for high technology manufacturing businesses in the Northern part of the Greater Manchester region, along the M62 motorway through Rochdale.

The plans also align with the ambitions of West Yorkshire to create a technology corridor along the M62. AMPI's location in Rochdale, at the intersection of Greater Manchester and West Yorkshire, between the cities of Leeds and Manchester means it is ideally located.

Several large bids are already in place to provide initial finance. Active collaboration has been developed between the borough's Further Education college, Hopwood Hall, a local training provider Rochdale Training Association, AMPI and the Rochdale Development Agency to ensure that the skills which will be needed are acquired by the students in appropriately designed courses.

The recent Place Matters report by Metrodynamics uses a model to measure and increase the potential for innovation in a place, which is called the 'Power of Three'. The 'Power of Three' model argues that for any place to have successful innovation, it must have in place an innovation district, an innovation ecosystem, and a wider place ecosystem. The three are mutually dependent upon one another for innovation to thrive.

The place ecosystem is well-developed through Rochdale Development Agency, Rochdale Council, local Combined Authorities, and the National Physical Laboratory (NPL) working together with industry and national partners.

The innovation ecosystem exists. There is a demand from companies within Rochdale itself for high technology in manufacturing and materials, and also from not only the rest of Greater Manchester but the West Riding of Yorkshire.

The Borough of Rochdale has fostered collaboration between researchers, industry and civic leaders to create something that will deliver local and national economic benefit and improved quality of life.

The missing link has been the lack of an innovation district. There has been no recognisable innovation district in which the private sector, academia, entrepreneurs can assemble to share ideas. The physical location for AMPI is available, the first part of the visionary Northern Gateway development of GAMMA and the Greater Manchester Combined Authority.

In short, AMPI is a crucial intervention at exactly this time and is ready to go. It offers not just a vision, but increasingly a practical example to other boroughs in the more deprived parts of the UK of how to "innovate in innovation and productivity".

I am delighted to support this initiative and commend the report by Metrodynamics on AMPI.

Juergen Maier, Former CEO of Siemens UK & Co-Chair of Made Smarter UK.

1. Introduction

Responding and recovering from COVID-19 is a main priority for central and local government. Alongside recovery, economic development policy making continues, covering areas of innovation, clean growth, and towns.

We have seen a big government push for greater investment in innovation, committing to increasing the percentage of GDP spent on R&D from 1.7% to 2.4% by 2027.

In the run up to the COP26 climate summit in Glasgow, the Prime Minister outlined a Ten Point Plan for a 'Green Industrial Revolution' to produce 250,000 highly skilled green jobs. Finally, as part of levelling up ambitions to address inequalities and disparity between the country's best and worst performing places, £1.6 billion was allocated to the Stronger Towns Fund.

These are three sensible and promising agendas, but they are often seen as separate. Academic excellence and existing infrastructure tend to dictate where investment in public research goes. It is the already successful innovation hotspots, the so-called 'golden triangle' of London, Oxford, and Cambridge, alongside our biggest cities and university towns which are the beneficiaries of investment. Research excellence is naturally rewarded, and the cycle remains unbroken.

The levelling up agenda has been driven by deprivation statistics and the so-called 'red-wall', exemplified through the Town Investment Plans currently being developed by 101 of England's more deprived places. Several Town Investment Plans have been made public, however only a handful have made innovation their centrepiece and even fewer have concrete proposals to deliver highly skilled green jobs in clean industries.

We need to think more creatively about how to combine these agendas. A report published earlier this year by Metro Dynamics, 'Place Matters: innovation and growth in the UK', looked at the UK productivity puzzle and the current state of innovation. It argued that while some places in the UK are innovation rich and driving the future of the British economy, there is a stark imbalance of innovation in towns and cities across the country.

In the first industrial revolution towns like Rochdale, Burnley, Huddersfield, and Smethwick led the way, but in recent times they have often been neglected within innovation policy and investment plans. But they were, and remain, manufacturing hives of activity. In a time where the UK faces the concurrent challenges of Brexit, COVID-19 and climate change, there is immense opportunity to invest in industry and reposition Britain as a global force in manufacturing and machinery.

For towns (and cities) to thrive in a post-COVID 'Global Britain', we need to unlock the innovation potential of these places once more and create multiple powerhouses of manufacturing and technology. We have seen what can happen when this works – so what is holding them back?

In this report, Metro Dynamics, commissioned by the Rochdale Development Agency in collaboration with the Advanced Machinery and Productivity Institute (AMPI), think about this in more detail.

We look at Rochdale, a town with a reputation for 19th century industrial innovation but now more known for its social and economic challenges. We explore how innovation could be part of the answer to Rochdale's future, centered around a new proposition that is being developed there AMPI.

This concludes with the wider impact of this proposal, asking the question – Can Rochdale provide the blueprint for a resurgence of innovation in towns?

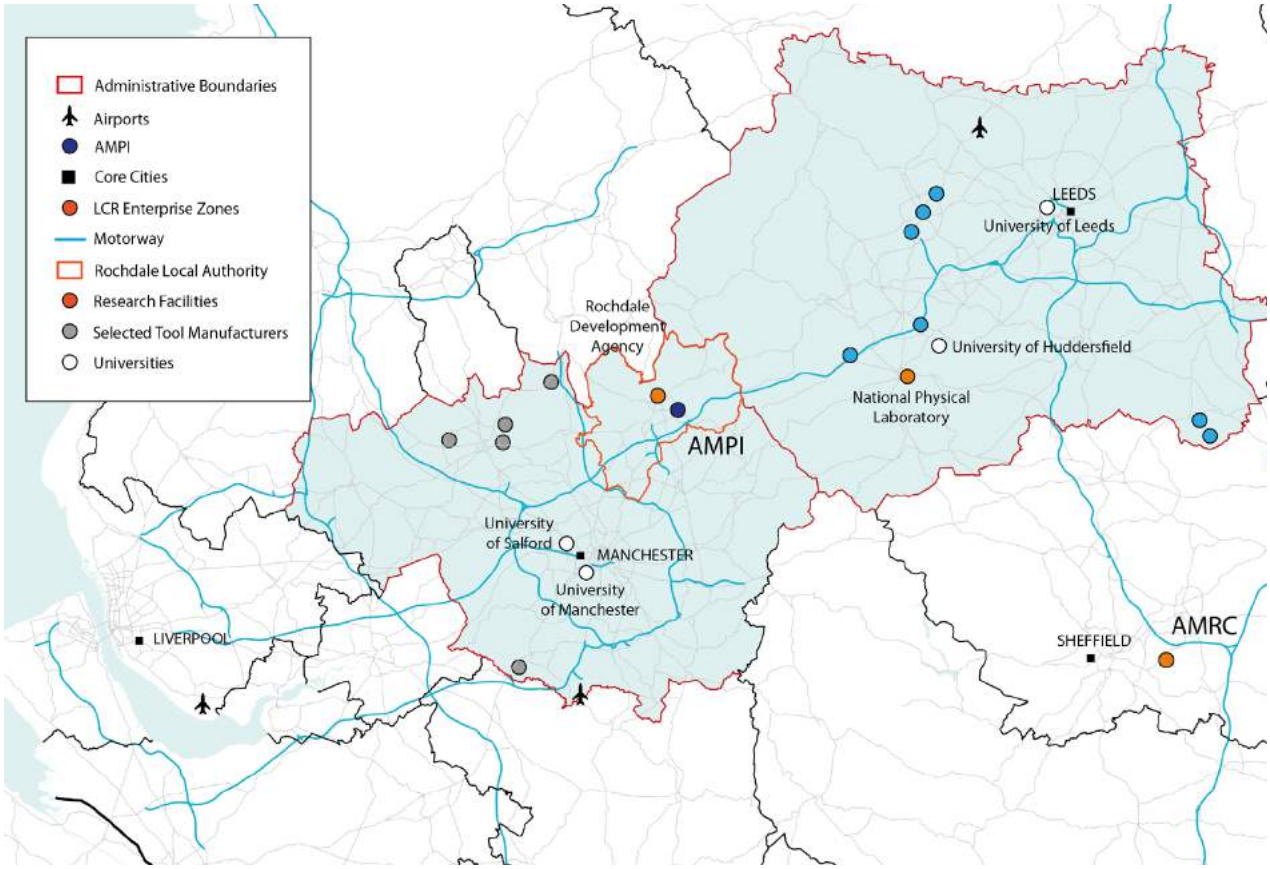


Figure 1. Overview map of AMPI.

2. A BOOMTOWN OF THE INDUSTRIAL REVOLUTION

Rochdale thrived in the first industrial revolution, and prior to that, as a wealthy market town trading primarily in woollen goods. While historical accounts cite factors of geography, access to raw material, capital, and labour supply as reasons for Rochdale's industrial success, these are perhaps only partial explanations.

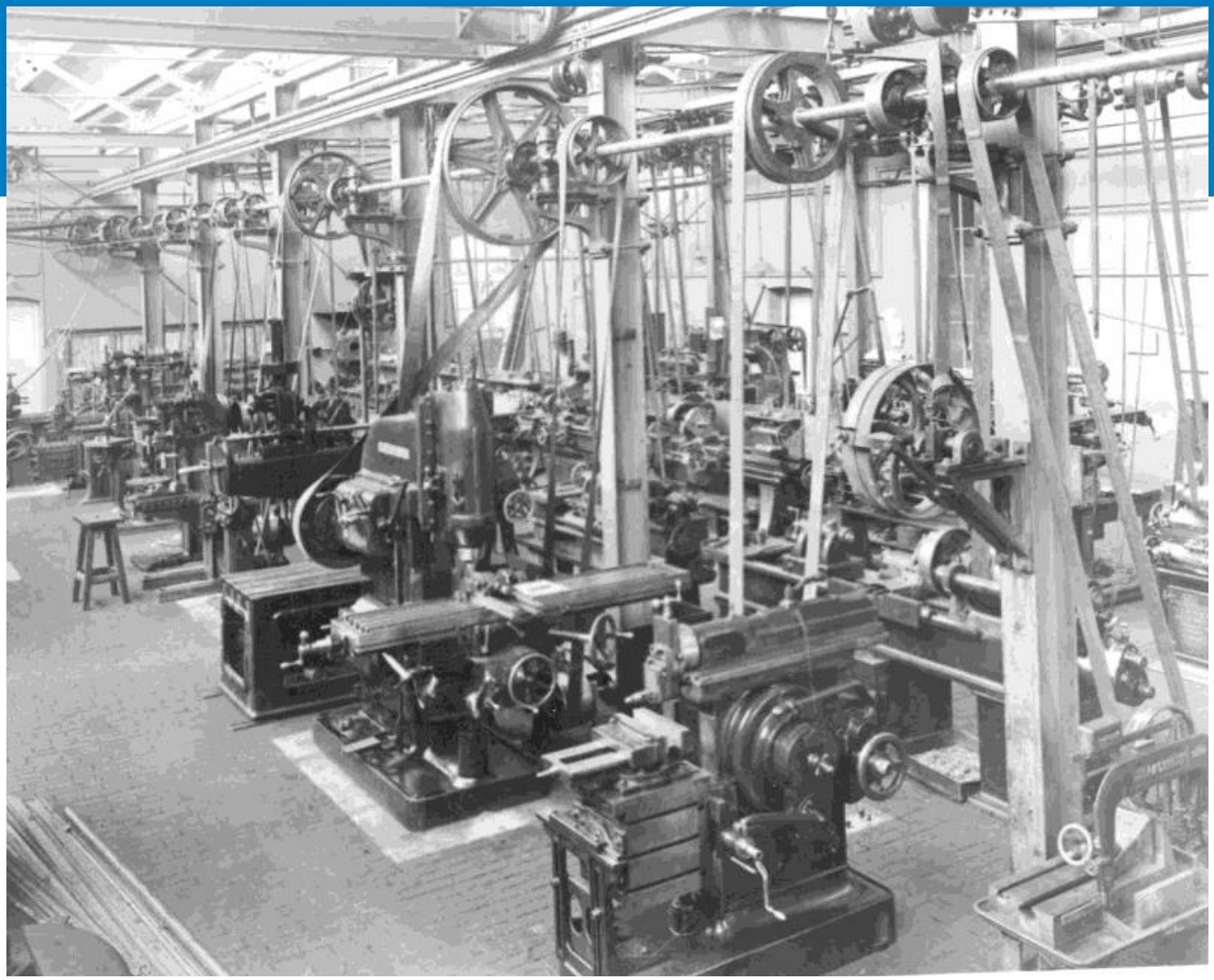
> *It was not the cotton or wool that made Rochdale and Manchester rich - it was the way it was spun in the mills.*

It was not the cotton or wool that made Rochdale and Manchester rich – it was the way it was spun in the mills. The micro-innovations developed in machinery made the North-West more productive at spinning and weaving. Clustering catalysed innovation, centralising industry in one place, resulting in thriving towns and cities.

Nevertheless, success often breeds complacency and we saw this across Britain, especially in places like Rochdale throughout the 19th and 20th centuries. Whilst the rest of the world invested in areas such as skills, education, and machinery in a bid to catch-up with Britain's industrial success, Britain hesitated. Before long, it was British industry playing catch-up having 'missed out' on the second industrial revolution. Britain's industry was still growing, but much slower than before. Innovation was still occurring, but less frequent than before.

More recently, a third industrial revolution has occurred – the digitisation of manufacturing. We have witnessed a similar pattern emerge of an inability of British industry to internalise the benefits of economic growth coupled with scientific advancement. When other nations were utilising digital technology to transform their infrastructure, Britain continued to rely on older machinery. We are still making the same mistakes.

Rochdale is an example of a town we typically see described in this way. But this is an oversimplification. Manufacturing in Rochdale accounts for 14% of total employment – the second largest sector in the town.



This lasting industrial legacy has provided a solid foundation for manufacturing and advanced machinery in Rochdale today, a by-product of historical success which continues to play a vital role in the economy. Agglomeration and industry links remain across the North, particularly between regions with similar industrial heritage, continuing to nurture ideas and innovation.

There are businesses situated in Rochdale which provide robust evidence of this. PTG Holroyd, Jones & Brook Ltd, British Millerain were all founded during the first industrial revolution, operating in machinery, printing, and textiles. This legacy continues and they remain open for business today.

The advanced machinery sector has emerged as a particular local strength, one with huge potential; its role within the broader industrial ecosystem underpins almost everything we do today. As we shift focus to the fourth industrial revolution – Industry 4.0 – Britain and places like Rochdale can be on the front foot to take advantage of the opportunities it brings and once again be the driving forces of industrial change.

3. ROCHDALE TODAY

Despite the industrial legacy and the strong manufacturing presence, Rochdale in 2021 is not the booming town it once was in the first industrial revolution. Rochdale's economy is one of the least economically complex parts of Greater Manchester , business growth is slow and GVA per head is 41% lower than the Greater Manchester average.

Whilst Rochdale's challenges are well-documented, its strengths are often disregarded or hidden to those unfamiliar with the area or history. As a result, this is a place where policymaking focuses on reacting to underperformance, rather than realising potential.

The business base within Rochdale's advanced machinery sector is a driving force of innovative manufacturing. Manufacturing contributes £562m total GVA to the town, amounting to almost a fifth of Rochdale's overall economy. Entrepreneurship is good - per capita Rochdale outperforms neighbouring towns on patents , driven primarily by its industrial private sector.

The legacy of manufacturing in Rochdale provided the foundation for advanced machinery to prosper. This industry is now a crucial factor influencing future growth potential of the town and the wider region's economy.

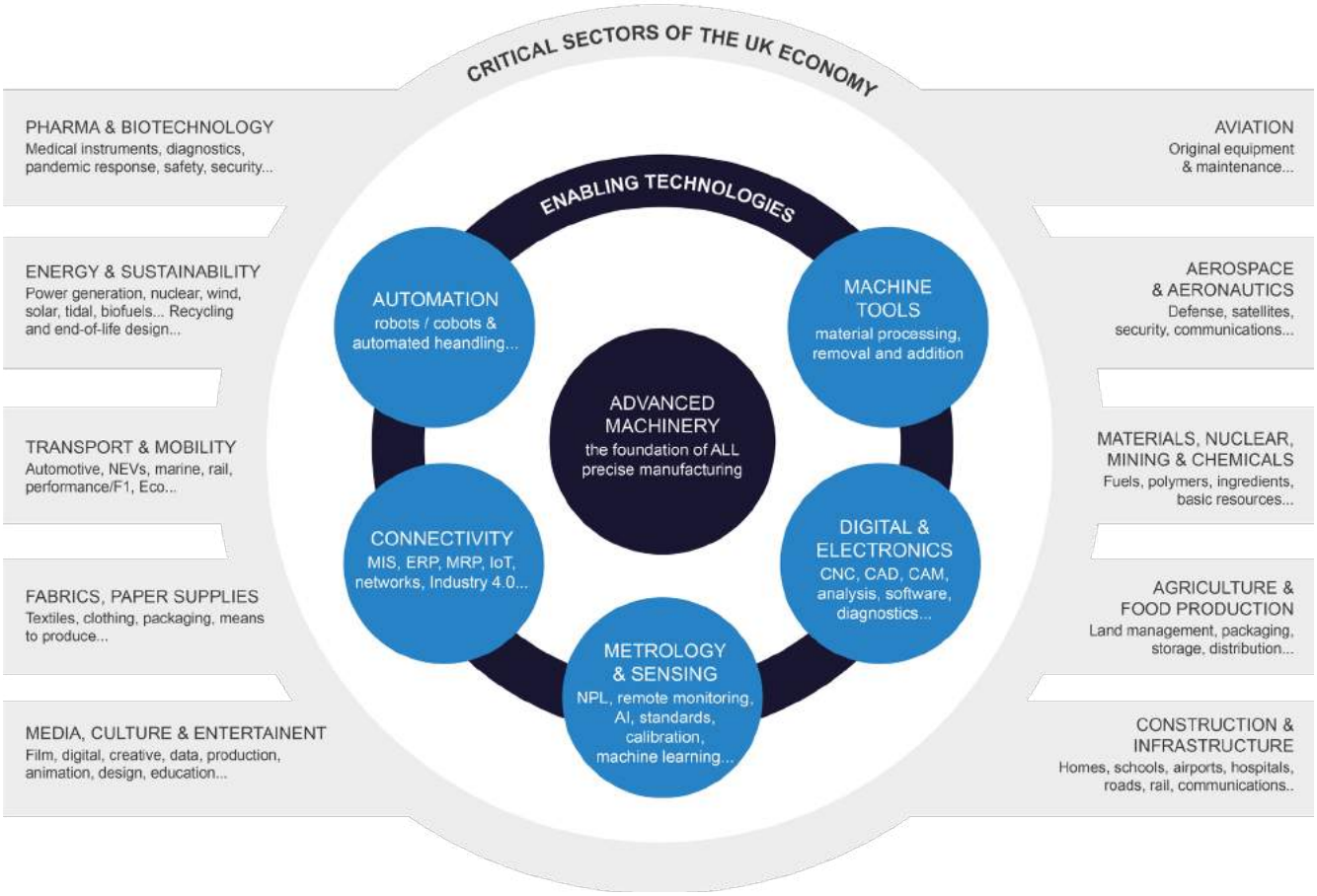
The advanced machinery sector

As indicated in Figure 2, advanced machinery acts as the support system underpinning many disciplines, from mechanical engineering to artificial intelligence, all of which are crucial to the national economy. Embedded within this is machine tools – the method in which machinery and systems for all applications are built.

Take a moment to consider the strategies and conversations around the future of the UK economy. The industries and opportunities regularly discussed are clean energy, infrastructure, transport, robotics, all of which underpin government strategy. Automobiles, satellites, telecommunications, buildings, they all rely on the manufacture of highly capable machinery. Advanced machinery is the foundation from which these products and services are derived. It is the industry the UK economy will be relying on to be at the forefront of industry 4.0.

> **"The business base within Rochdale's advanced machinery sector is a driving force of innovative manufacturing."**

Figure 2. Advanced Machinery, the foundation of all precise manufacturing technology.



The UK stands as the 9th largest manufacturer in the world by output and responsible for approximately 3% of global trade in machinery. There is room to grow this. The integration of automation and robotics is no longer on the horizon, it is happening now. In 2019/20, the UK installed ten times fewer robots than Germany and ranks outside the top 20 countries in robots per 10,000 manufacturing employees. The UK must prepare for next generation industry.

To further emphasise how important machinery is to the national economy, we can analyse UK trade figures. In 2019, machinery and transport equipment was vastly the largest exported commodity (£142bn – Figure 3). It was a similar story in 2018 and continues to be the case in the most up-to-date figures from 2020.

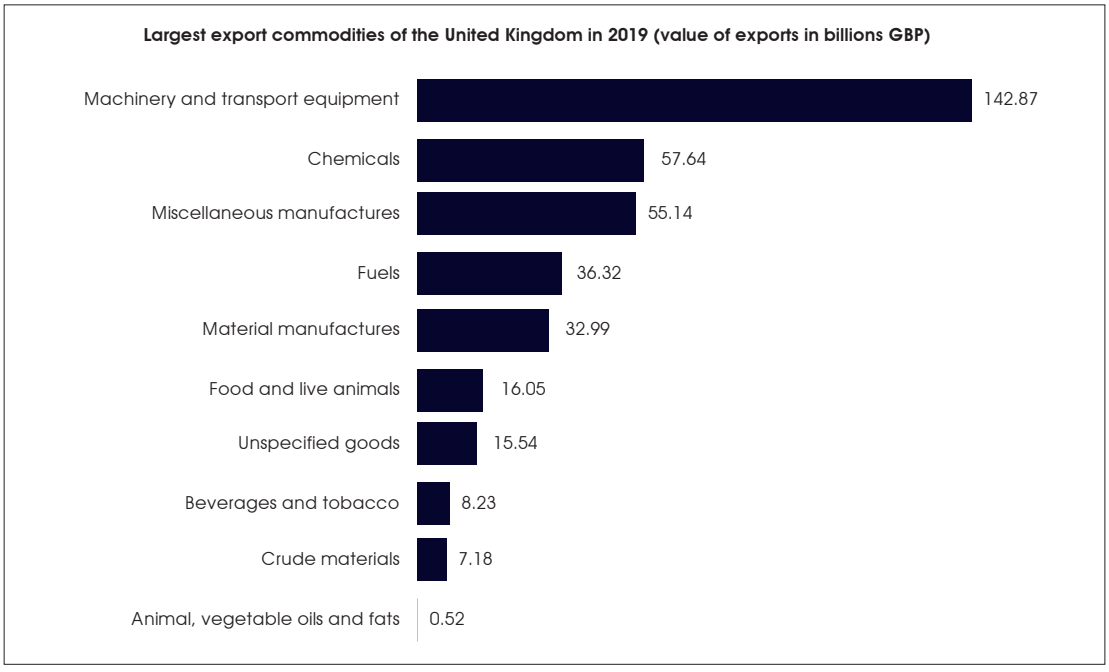
It is also proving to be a resilient sector. Despite the impact of COVID-19 and the patterns of decline, UK machinery exports have shown widespread recovery towards the end of 2020. With the Export Growth Plan announced by government in October 2020, advanced machinery is not only important in the transition to Industry 4.0, but crucial to COVID-19 recovery. But this will not happen automatically. The manufacturing sector needs the tools to make this a success.

The role of Rochdale

Rochdale is at the centre of this industry in the UK. The relationships formed by the private sector in recent years means the town now acts as a bridge, linking the Greater Manchester and West Yorkshire industries via an advanced machinery network. As the focal point of an industry, Rochdale is playing a pivotal role in helping Britain reach the fourth industrial revolution.

However, the readiness of businesses across the region varies. Several companies in Rochdale are already part this revolution, while other manufacturing firms lag behind. However, this still represents a great opportunity. In communications, the development of the mobile phone meant many third world countries leapfrogged the landline phase of the 20th century and moved straight into 21st century technology. Industry in Rochdale is not burdened by recent, expensive investment in technology that is becoming rapidly outdated. It can instead move directly to advanced technology, leapfrogging older processes.

Figure 3. Largest export commodities of the United Kingdom in 2019.




POWERSTIR

CR Solutions is an SME supplying robotic and automated solutions to blue chip aircraft and aero engine manufacturers, automotive manufacturers, and the life sciences industry. Founded in 1995 and based in Rochdale, the company build specialist machines spanning simple single axis indexing to large multi-axis systems with high level control and management systems. Their solutions have evolved from a national client base, to now deploying to companies across the world.

Farrel employ 178 people at their base in Rochdale, producing continuous mixing systems for the polymer processing industry. Producing specialist machinery for the rubber industry, many of Farrel's customers are international tyre manufacturers, technical textiles and businesses working with plastics.

Testometric is a company based in Rochdale that has been involved in the design and manufacture of testing machines and quality control equipment since its foundation in 1970. Forty years of continuing development has resulted in a main product line of universal strength testing machines for tension, compression, flexure, shear, and product testing. Testometric machines are used in over 100 countries worldwide with Testometric Intrusion machines used by Formula One racing teams.

Based in Rochdale, PTG Holroyd Precision is one of the international market leaders in high-precision, special-purpose machine tool design and construction. Their products include control software development, machine automation and equipment production. The company makes grinding and milling machines for production of compressor rotors, helical pump and vacuum spindles, and high-precision gears, alongside advanced Friction Stir Welding (FSW) machines for high-integrity welding of assemblies. The company employs 164 people, exports 95% of its products, and has a turnover of £87m.

The potential of Rochdale's advanced machinery sector is frequently unrecognised. We spoke to many companies, councils and institutions involved in this area over the past few months and a consistent theme emerged – the idea that Rochdale has learned "to go it alone" after experiencing limited public sector support.

Into this space has stepped a broad coalition of the private sector, supported by national partners, who in the past few years have established a credible idea to capitalise on Rochdale's past and current strengths.

A wider innovation ecosystem

Rochdale has an advantage over many other towns in the country – its location and linkages. Rochdale is sandwiched between two established innovation ecosystems, both with clusters of nationally important institutions and businesses.

As one of the ten local authorities within the Greater Manchester Combined Authority (GMCA), it benefits from devolved governance and funding. Located at the crossroads of Lancashire, West Yorkshire, and Greater Manchester, it has connections into a much wider innovation ecosystem. This reach will widen further as transport infrastructure improves. The construction of Northern Powerhouse rail will better connect Greater Manchester and Yorkshire, with Rochdale the link between the two regions, while HS2 will bring Rochdale closer to London and Birmingham.

Already at the forefront of innovation and high-skilled job creation, driven by the four pillars of its Local Industrial Strategy, Greater Manchester provides a strong ecosystem for innovation success. The Greater Manchester Independent Prosperity Review highlights the strengths in manufacturing, digital and creative industries, telecommunications, and health innovation. These manufacturing firms are recognised as being more productive in Greater Manchester than elsewhere in the UK. This is perhaps unsurprising given the assortment of innovation infrastructure across Manchester. The city looks to develop this, considering innovation districts at ID Manchester, the Northern Gateway, and Wythenshawe Hospital. Building on its local research excellence in advanced materials, the Greater Manchester Graphene, Advanced Materials and Manufacturing Alliance (GAMMA), is establishing a city-region strategy to address gaps in the commercialisation and adoption of graphene, advanced materials, and biotechnologies. This aims to support the wider development of advanced manufacturing and materials sites, ensuring the technical skills are available across the city-region and new technologies are easily accessible to enable greater innovation. Through collaboration with local and national assets, such as the University of Cambridge's Graphene Centre and NPL's National Graphene Metrology Centre, GAMMA looks to coordinate a response to the barriers hindering advanced materials commercialisation.

West Yorkshire Combined Authority (WYCA) have also placed innovation at the heart of their strategy with an Innovation Framework focused on supporting leading businesses and a greater diffusion of ideas and technology. This continues a history of rich innovation in textiles from the industrial revolution to present day. West Yorkshire and Greater Manchester represent almost 20% of the entire industry and are major hubs for R&D in textile innovation.

The University of Huddersfield is heavily involved in providing innovation services for business and is a leading European research hub in Metrology, while the University of Leeds boasts expertise in robotics and engineering. Elsewhere, the 3M Buckley Innovation Centre in Huddersfield is firmly recognised for its work in assisting businesses in innovating by providing tailored access to knowledge, support, and technology.

Location has always been recognised as an important factor in determining the success of innovation within a place, most notably by US academic Michael Porter's 'Cluster Theory' . Rochdale's location is of course important in linking the town into a wider ecosystem; however, innovation relies on much more than simply having research assets or businesses close together. It is a combination of factors – an innovation district hosting a base knowledge engine, access to finance and IP, physical space and supported wider networks and linkages.

The power of three

The Metro Dynamics 'Place Matters' report uses a model to measure and increase the potential for innovation in a place. We call this the 'Power of Three'.

This model argues that for any place to have successful innovation, it must have in place an innovation district, an innovation ecosystem, and a wider place ecosystem. The three are mutually dependent upon one another for innovation to thrive.

We can use this model to better understand the current state of innovation in Rochdale:

- **Innovation district:** there is no recognisable centralised innovation district in which the private sector, academia, entrepreneurs can assemble to share ideas.
- **Innovation ecosystem:** there are great businesses with strong roots and a reputation for making things such as PTG Holroyd and Fives Landis. There is also a wider advanced manufacturing and advanced materials ecosystem: Craftsman Tools, INX, Colchester tools, Wayland Additive, Addisol. However, there is a disconnect across the regions, stifling productivity and innovation.
- **Place ecosystem:** well-developed through Rochdale Council, the Combined Authority, Rochdale Development Agency, and the National Physical Laboratory (NPL) working together with industry and national partners. NPL's Strength in Places bid for AMPI are bringing together new coalitions of the public, private and third sector parties, enabling a more impact-led and inclusive future for Rochdale.

The 'power of three' model suggests that for Rochdale to successfully develop real innovation and for industry to deliver the fourth industrial revolution, there needs to be a concerted effort to strengthen the innovation ecosystem and establish a physical location – such as a Fraunhofer institute – as the epicentre of the town's innovation activity.

This was supported in our interviews with local stakeholders. Many mentioned that SMEs require greater and more sustained access to facilities, expertise, equipment, and talent. They cited an anchor institution as the missing piece of the puzzle to bring leadership, research, and advice together in one place.

4. Levelling up

Creating an innovation district with AMPI

On 15th November 2017, a group of senior representatives from the UK Advanced Machinery sector met for a 'futures workshop'. Participants reviewed the Industrial Digitisation "Made Smarter" report, discussing the necessary actions to instigate growth across the UK advanced machinery sector, capitalising on the fact that machinery is one of the primary exported products of the UK.

The challenges facing advanced machinery were reviewed in detail, highlighting the absence of a comprehensive manufacturing supply chain undertaking research or modern technology adoption; difficulties faced by businesses in finding the necessary skills in engineering due to the lack of specific educational programmes or dedicated research facilities; and an underdeveloped international footprint.

The meeting had an important output: the concept for an Advanced Machinery and Productivity Institute (AMPI) to address these industry-wide challenges and position the UK at the heart of the fourth industrial revolution.

This was the beginning of a local industry-led response to the lack of public investment in advanced machinery. AMPI was designed to act as the focal point for advanced machinery innovation and increase the performance of the UK in the international market.

Led by Dr Tony Bannan, Chief Exec of PTG Limited and Dr Paul Shore, Head of Engineering at NPL, a location for AMPI was identified in Rochdale. Based in the town, it will capitalise on the strong link between Greater Manchester and West Yorkshire industries, enabling greater collaboration, business growth and skills accumulation across manufacturing.

It must be appreciated that this initiative has been forged by the private sector responding to challenges faced across an entire industry. It demonstrates an awareness of the strong demand in the area for new, advanced technology in manufacturing.

> *"AMPI will be a pivotal UK intervention. It fulfils a presently unaddressed, yet critical aspect, of the UK's manufacturing innovation infrastructure, complementing rather than competing with existing investments and assets."*

Figure 4. Artists impression of what the AMPI institute could look like in Rochdale.

Developed and supported by industry leading businesses, AMPI is inspired by international examples of machinery innovation from institutions like Spain's Tekniker, Singapore's Institute of Manufacturing Technology and Germany's Fraunhofer Institute.

AMPI plans to deliver applied and translational research via a series of development programmes. These programmes are designed to stimulate and support rapid growth of the UK's advanced machinery and manufacturing sector as it transitions to digital solutions and autonomous robotic systems. Its specific goals are aimed at strengthening supply chains, creating high value jobs, and growing the sector locally, nationally, and internationally.

It will have a strong emphasis on SMEs, enhancing skills capabilities, generating business growth, and encouraging the creation of new, optimised technologies to strengthen supply chains with specialised machinery.

This will provide SMEs the opportunity to access the same type of R&D facilities bigger businesses have in-house, addressing the gap Catapults have been unable to fill. With a well-supported SME network, AMPI has the potential to act as a viable option for larger companies, like BAE Systems, to source UK-built advanced machinery.

In addition, AMPI will focus resources on providing services that unlock the industrial potential of emerging sectors, developing product enhancements, and incorporating new materials (e.g., graphene, composites). AMPI will work with institutions like the High Value Manufacturing Catapults, GAMMA, Manufacturing Technologies Association, and the Royal Academy of Engineering.

Over the past three years AMPI has transformed into a well-developed transformational proposal, backed by a prominent consortium of public and private sector led institutions. This culminated in a Strength in Places Fund submission, demonstrating the shift from a concept into a proposition ready for implementation.

Through the strong partnerships already developed through the creation of AMPI, Rochdale will deliver a sustainable programme of innovation and skills directly benefitting its own economy and that of UK industry export. It will fulfil a presently unaddressed yet critical aspect of the UK's manufacturing innovation infrastructure, helping industry to incorporate innovation into existing investments and centres for demonstration and exploitation. It aligns succinctly with wider advanced manufacturing plans in the Greater Manchester region, building on advanced materials and existing research strengths.

Figure 5. Public & private sector consortium supporting the development of AMPI.

Transformative potential for Rochdale

As government priorities shift towards greater investment in towns to reduce regional inequality, there is not yet an exemplar to showcase how towns should transform their local economy.

AMPI represents a first step towards addressing long-term social issues, focused on raising business's productivity, improving skills and labour diversity, and increasing the number of high value jobs. The provision of innovation space and a sustainable innovation programme looks to kickstart new skills production and enhance the existing talent pool. These skills will not only be beneficial for Rochdale, but the manufacturing industry in wider regions.

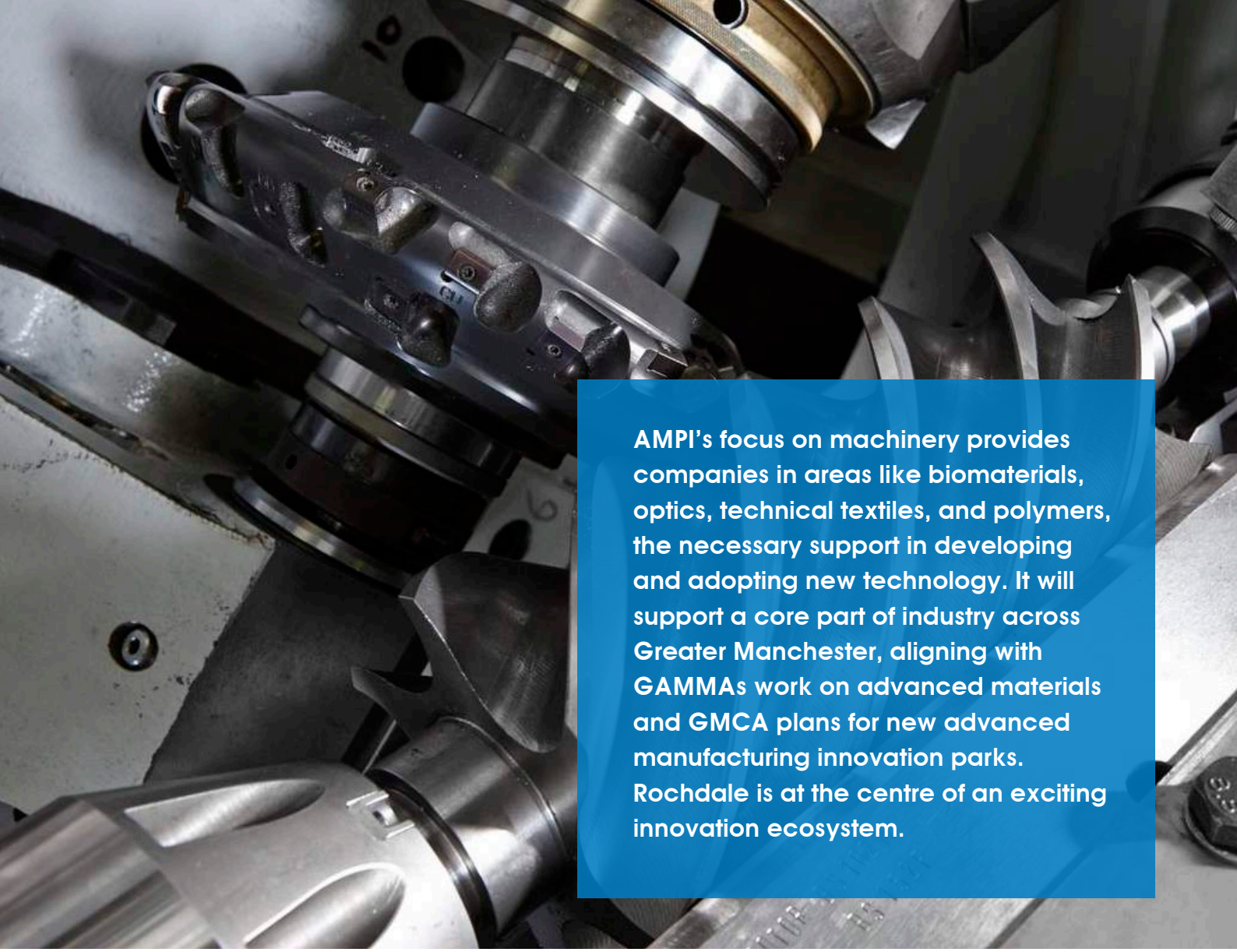
Looking back to the 'Power of three', AMPI has potential to form a new innovation district supported by a larger ecosystem of innovative companies. It looks to create new links by joining up existing innovation infrastructures across the wider regions under a common industry.

An innovation district can bring real, transformative benefits to a place. Acknowledging this, AMPI has set itself ambitious targets as a national institute. This includes quadrupling the size of the UK advanced machinery sector, creating 20,000 jobs, bringing the industry to the same level as Switzerland. It looks to address the scarcity of robotics in UK industry, stimulating growth in industrial robotics manufacturing output to £1 billion per annum, creating 5,000 jobs .

AMPI is not about creating a building that innovates in isolation, but instead, an anchor institution for an entire industry within a wider innovation ecosystem. Innovation will be encouraged to spillover outside of AMPI, leaking knowledge and skills into the surrounding geographies. AMPI will play an important role in the creation of a major innovation district, the Northern Gateway, situated mainly in Rochdale but also extending into Bury.

As an anchor institution, AMPI aims to link up local and regional industry strengths more effectively. Greater Manchester is home to a key part of Britain's advanced materials industry, but its growth is limited due to insufficient access to skills or adoption in technology. AMPI has been developed as a response to the needs of industry, with a view of creating the next generation of machinery in robotics, metrology, and advanced materials.

> *AMPI seeks to create the new machines, technology and people needed to manufacture tomorrow's products and materials.*



AMPI's focus on machinery provides companies in areas like biomaterials, optics, technical textiles, and polymers, the necessary support in developing and adopting new technology. It will support a core part of industry across Greater Manchester, aligning with GAMMAs work on advanced materials and GMCA plans for new advanced manufacturing innovation parks. Rochdale is at the centre of an exciting innovation ecosystem.

As part of AMPI's Strength in Places bid, a local economic assessment was required to demonstrate the impact, outputs, and outcomes of AMPI (figure 6). This assessment outlines the benefits the institute can bring to people, the supply chain, regionally and nationally.

To achieve the impacts set out below, AMPI must carefully align itself with local education providers to ensure they reach the right people to deliver skills in a consistent approach. This way, the proposed GVA outcome will be achievable and bring real change to a town that needs it. AMPI is already involved in discussion with the local Further Education College, Hopwood Hall, about the future demand for skills and how the college can participate in delivering this industry-led demand.

With SMEs a primary target under the remit of AMPI, they too must be included in the skills conversation, aligning the institute with industry needs. To achieve a wider, cohesive innovation ecosystem, both educational and innovation programmes must be designed for specific business requirements.

By ensuring initial success in reaching out and engaging with businesses, a greater number across the supply chain can then access the new technology, facilities, investment, and skills through AMPI. In doing so, the advanced machinery sector will be empowered to increase production, undertake exciting innovation, and unlock greater market opportunities that improves British manufacturing.

Figure 6. Expected impacts from AMPI identified in Rochdale's Strength in Places bid.

The big picture

There is a wider impact of AMPI to consider for GMCA, WYCA and beyond. The 2017 workshop highlighted that the difficulties faced by the advanced machinery sector were not only regional challenges but national challenges too.

Manufacturing in Britain is consistently cited as an economic strength by policy makers. As we move into a more 'Global Britain' post-Brexit, it is imperative our industries are adequately supported in maximising trade opportunities. The evolution of manufacturing relies on machinery and without sufficient support and investment, a national sector is at risk.

The growing capabilities of other countries like China, Germany, and Japan, should act as a warning to government. Manufacturing is at a critical tipping point. AMPI represents a step forward, a ready-made solution which increases innovation in machinery and contributes towards the positioning of Britain as a global manufacturing superpower.

Advanced machinery itself is a highly technical field, covering a diverse range of disciplines. As a new centre of industry-led innovation, AMPI has the potential to act as a beacon for advanced machinery, connecting the industrial expertise and services of two important economies, bridging the gap between business and innovation infrastructure across Greater Manchester and West Yorkshire.

The M62 is becoming an increasingly interesting proposition for manufacturing. The regeneration plans in North Manchester, specifically the Northern Gateway site, look to establish a new manufacturing innovation park focused on the application of advanced material research and sustainable manufacturing. With a greater emphasis being placed on the commercialisation of advanced materials such as graphene, AMPI will play a pivotal role in creating the machinery required for delivery.

Complementing the Northern Gateway development is a series of nine enterprise zones, managed by Leeds City Region, hosting a range of manufacturing, logistics and distribution companies. AMPI's location will help better connect Rochdale and Manchester with this wider industry. Longer-term aspirations seek the creation of a high-tech corridor, effectively linking Rochdale, Manchester, Huddersfield, and Leeds.

AMPI's wider goal looks to deliver a greater number of innovation jobs, and as its impact grows across the country, generate an increase of £565m in GVA due to increased turnover associated with the update and commercialisation of new machines. With a focus on supporting SMEs across the supply chain, AMPI will look to extend its reach to a greater number of towns and cities.

As this influence grows, it is the alignment of AMPI with other national manufacturing institutions that will have the greatest impact on job creation, product diversification and improving Britain's international footprint.

However, this facility is not about the benefits of one sector, it is about connecting machine tools and advanced machinery into the wider economy, such as advanced materials in graphene or providing the tools to enable the kickstart of a 'Green Industrial Revolution'. The benefits of AMPI provides the means to work across sectors and innovation infrastructure, whether it is the 3M Buckley Innovation Centre in Huddersfield, the Offshore Renewable Energy Catapult in Blyth, or the EPSRC Ultra Precision Centre in Cranfield. AMPI will be flexible in its approach, opening up new facilities and capabilities to whatever sectors of the UK need it most.

5. Conclusion

This report recognises that there is a strong case for the UK to invest in manufacturing to strengthen its supply chains and place a greater reliance on domestic based industry. A fundamental component of this is recognising the importance and capabilities of advanced machinery.

This means allocating additional resources into growing the national advanced machinery sector in order to unlock future manufacturing potential, enabling production of green technologies, and catapulting the UK towards the forefront of industry 4.0.

The next ten years will determine who the main players are in the industries of the future. AMPI represents a credible proposition which will allow Rochdale, and the UK, to greatly benefit from the fourth industrial revolution. The proposed innovation programmes look to mobilise advanced machinery production and better equip supply chains, diversifying the UK's machinery portfolio and laying the foundation for future industry.

AMPI has a wider goal outside supporting industry in transitioning to new, modern methods of manufacturing – it is a vitally important piece for Rochdale's evolution. It provides a new source of employment and skills development, giving those who are most at risk of job loss, an opportunity to adopt new skills and career paths. It will represent an important case study for towns across the UK, showcasing the benefits of investing in innovation linked to industrial heritage and economic strengths. Its national ambition sends an important message to government and levelling up – funding does not need to be allocated to places like Cambridge or London to have a significant economic impact.

However, it must be acknowledged that AMPI is not the single solution to all challenges faced by Rochdale. It will take much more than a new innovation centre to overcome the long-term social challenges of education, infrastructure, income, and health to reverse deprivation trends. Nevertheless, this is a prominent first step in raising the profile of the town and the obstacles it looks to tackle in the coming years.

The industry leaders that have brought AMPI to this stage must also continue to work hard. Achieving funding and support for new infrastructure is the first step, but guaranteeing its success is the second and more difficult step. There have been many innovation institutions that have not lived up to expectations and that is not due to a lack of trying. The next phase must ensure AMPI is effectively linked up to the wider manufacturing industry and positioned to work seamlessly with Catapults, universities, and other research-orientated institutions to ensure its success. AMPI is already working closely with the Graphene, Advanced Materials and Manufacturing Alliance, led by Juergen Maier, former Chief Executive of Siemens UK, to ensure that this is achieved.

Lessons for towns

The opportunity of AMPI provides invaluable lessons for towns across the UK looking to level up and embed innovation within their economy. These lessons are intended to help local leaders and businesses understand the principles behind achieving growth in their town:

- **Identify and understand local challenges** – the 2017 Futures Workshop was crucial to the creation of AMPI, taking the time to explore the challenges facing a national industry and identifying what needs to be done.
- **Embrace economic strengths and heritage** – Rochdale's industrial legacy and manufacturing core carves out the rationale for AMPI. Towns must look towards their strengths, using the local LEP-led Local Industrial Strategy to inform innovation and growth plans.
- **Establish strong networks** – AMPI was formed by a coalition of businesses and other stakeholders who understood the local challenges better than anyone, while regional networks with education providers, industry and research institutions are fundamental to future success.
- **Be creative** – there is no ready-made solution that guarantees success. The AMPI model emphasises SMEs and the supply chain – this is different to what we have seen in catapults.
- **Have ambitious targets** – AMPI's goals are large, unlocking £144m GVA and placing Rochdale at the heart of UK advanced machinery innovation.
- **Consider inclusive goals** – many towns across the UK are faced with difficult social challenges. Towns should consider how new opportunities bring greater prosperity to local people.
- **Plan for long-term success** – places need to be prepared when developing creative solutions, ensuring growth is sustainable, achievable and withstands the test of time.
- **One size does not fit all** – 'levelling up' our towns will require a myriad of policy and investment. Transport, education & skills, housing, early years – these are just some of the areas that must accompany capital infrastructure to ensure plans have a long-term transformational impact on the local area.