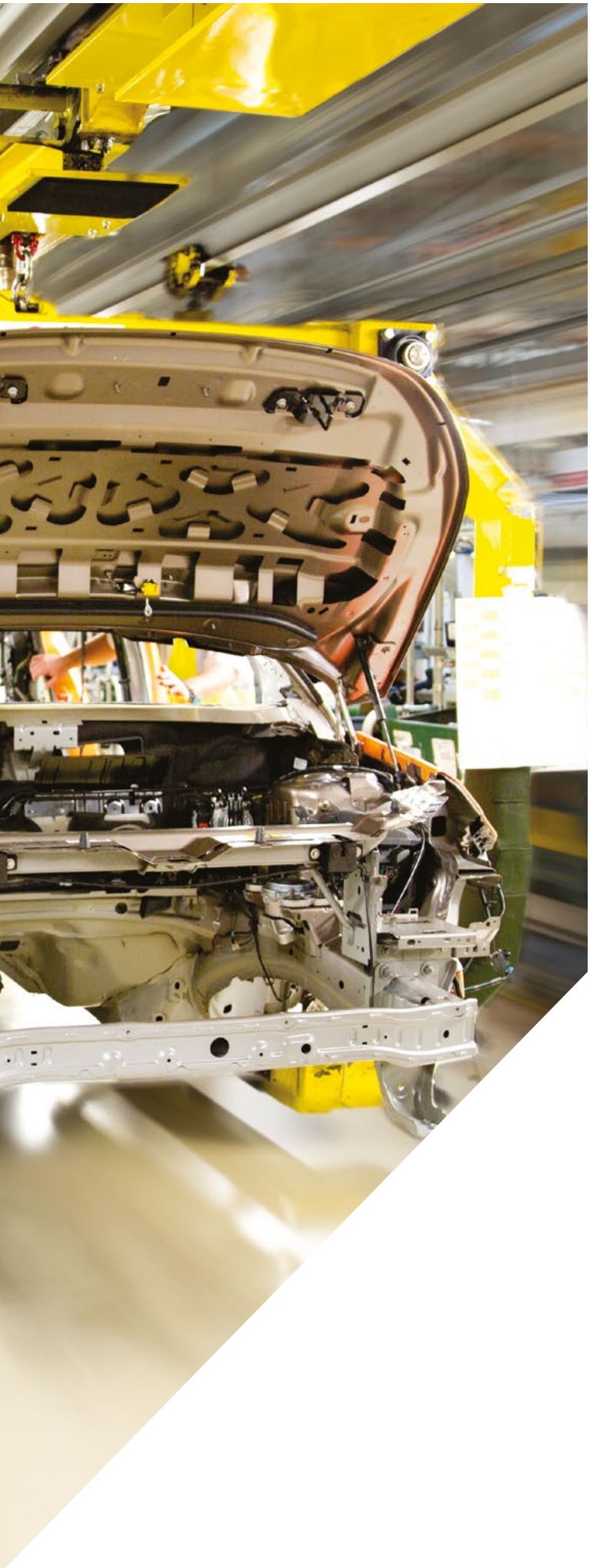
INVESTLIVERPOOL
ADVANCING THE CITY REGION

ADVANCED **ENGINEERING & MANUFACTURING**

WE ARE **MAKERS.**

Manufacturing has always been at the heart of the city region's economy. From our excellence in ship-building to our current world-leading position in chemicals, vaccines or pharmaceuticals through to the production of one of the world's leading motor vehicles.

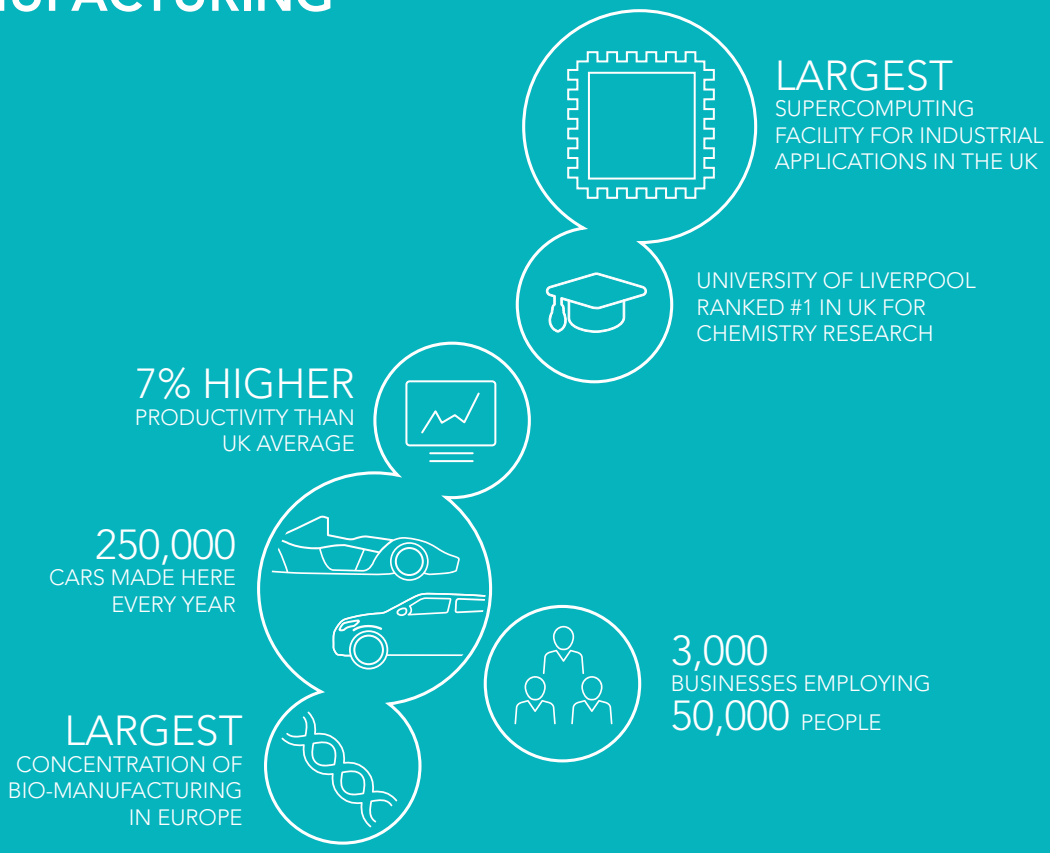


WELCOME TO A PLACE THAT'S **ENGINEERING A BETTER WORLD.**

We're famous for the quarter of a million cars made here each year; and for Europe's biggest bio-manufacturing cluster. We're known for the hundreds of global brands that are made here. But we're not only making things here; we're making them better, greener, safer and more efficient.

And we've got some new tools in our workshop: Supercomputing; Robotics; Virtual Reality; Internet of Things; Sensors; Big Data and Big Science. We've got the largest supercomputing facility for industrial applications in the UK and the highest concentration of robotics for materials science in the world. But there's nothing artificial about our intelligence. And there's nothing robotic about our people.

ADVANCED **ENGINEERING & MANUFACTURING**



LARGEST
SUPERCOMPUTING FACILITY FOR INDUSTRIAL APPLICATIONS IN THE UK

UNIVERSITY OF LIVERPOOL RANKED #1 IN UK FOR CHEMISTRY RESEARCH

7% HIGHER
PRODUCTIVITY THAN UK AVERAGE

250,000
CARS MADE HERE EVERY YEAR

3,000
BUSINESSES EMPLOYING
50,000 PEOPLE

LARGEST
CONCENTRATION OF BIO-MANUFACTURING IN EUROPE

KEY:

1. **Port and Bootle** – Petrochemicals and Food.
2. **Knowsley** – General Engineering and Chemicals.
3. **St Helens** – General Engineering and R&D.
4. **Cammell Laird** – Maritime and Renewables.
5. **Liverpool Knowledge Quarter** – R&D.
6. **Port Sunlight** – R&D, Manufacturing and Enterprise Technology.
7. **Speke** – Biomanufacturing.
8. **Halewood** – Automotive.
9. **Runcorn** – Chemicals.
10. **Daresbury** – Innovation and R&D.
11. **Ellesmere Port** – Automotive.

GLOBAL **REACH**

Liverpool has always been a gateway. Our geography and natural assets have shaped commercial and cultural life here for centuries. Our role in the national and global economy has never been more relevant as international manufacturers make the most of our global links to reach customers and suppliers all over the world.

One of the biggest opportunities for manufacturing firms in Liverpool City Region is the access to a new ports and logistics infrastructure. Superport is an integrated cluster of logistics assets and expertise that will deliver faster, greener global market access. Superport is undergoing more than £1 billion of intermodal infrastructure investment, and the new deep-water Liverpool2 container terminal can service 95% of the world's largest container ships, opening up faster supply chain transit for at least 60% of the existing UK container market.

For international connections there is a choice of both Liverpool and Manchester airports which are within 45 minute drive. Liverpool John Lennon Airport has flights to all major European business centres and Manchester Airport has direct flights to 200 destinations and extensive freight and logistics facilities to support the import and export of goods to and from all major global markets.

For the UK market, the region is well-connected. Wherever your customers, Liverpool is within easy reach. London is just two hours away by train – with services every hour. Direct rail services to Manchester, Birmingham, Leeds, Sheffield, Nottingham and others. And our motorway connections put the vast majority of UK cities from Glasgow to Southampton within four hours drive time.

Image courtesy of Peel Ports

CASE STUDY:
MAKING CARS FOR THE WORLD

The scope of manufacturing operations in the Liverpool City Region is exemplified by two local automotive operations: one making 20 cars a year; the other making that amount in under half an hour.

Liverpool-based BAC (Briggs Automotive Company) makes the Mono, a lightweight, ultra-high performance supercar designed and manufactured using the latest racing technology. BAC has gone from startup to global sales and has won accolades including Top Gear Stig's Car of the Year. The firm proudly sources from local companies, thanks to the area's pool of automotive suppliers because of major OEMs like JLR, GM, Toyota and Bentley. The launch of showrooms in North America, Hong Kong and Japan demonstrates the global reach of the Mono supercar.

At the other end of the production scale, at Jaguar Land Rover's Halewood factory, a car comes off the production line every 90 seconds. This 300-acre site is where the Land Rover Discovery Sport and the Range Rover Evoque are manufactured. The workforce has more than trebled since 2010 and more than 4,000 people are now employed at the premium full body and assembly plant. Production has also trebled since 2010 thanks to £500 million of investment in new machinery and infrastructure. Much of the assembly is carried out by nearly 800 advanced robots in a body shop that is the size of 22 football pitches and the cars built here are exported to more than 170 markets around the world.

WE ARE **CREATORS.**

From the creative sparks imagining new materials and processes; to the geniuses designing cars and ships. From the innovators making solar panels and wind turbines; to the chemists discovering new drugs and the scientists rolling back frontiers. In factories, science parks and university laboratories; in every corner of this great manufacturing region; we are creating something special.

Thanks to our great schools, colleges and universities, Liverpool City Region has a rich seam of future engineering talent that will join an existing workforce.

Our famous cultural, sporting and lifestyle attractions make it easier to attract and retain the skills required by advanced manufacturing businesses.

Our city region has produced innovative Skills for Growth agreements for our key sectors which reflect a unique and innovative joint working between public, private and academic organisations to address current and future skills needs. A great example of this skills partnership in action can be seen at Wirral Met College, where more than 1,000 employers are engaged in ensuring that the curriculum portfolio matches the demands of local businesses.

CASE STUDY:
UNILEVER

Unilever is one of the world's leading suppliers of food, home and personal care products, with more than 400 brands from Persil to PG Tips and Tresemme to Magnum. The global manufacturer has had a major presence here since 1888 at its historic home Port Sunlight in Wirral. Today the site is a hub for Unilever globally with 2,500 employees in roles ranging from global R&D to enterprise technology to manufacturing laundry, household and personal care products.

In 2017, Unilever will open a new Advanced Manufacturing Centre facility here. The 6,500 sq m centre, will house a state-of-the-art pilot plant enabling scientists and engineers to test new ideas during product development on a factory scale. The new Centre is the latest in a line of recent investments at Port Sunlight totalling over £200 million.

Cameron Jones, Unilever Port Sunlight site leader, said: "In building the Advanced Manufacturing Centre we are renewing our commitment to R&D in the UK and the North West. The facility will allow us to create new innovative products, further improve the quality of manufacturing and in addition, accelerate our ability to roll out products across the world.

"The Advanced Manufacturing Centre will complement our existing and new facilities such as the Materials Innovation Factory, currently under construction at the University of Liverpool and due to open early 2017."

WE ARE **COLLABORATORS.**

This is a friendly and open place. People here work best when they work together. For us, open innovation isn't a management theory, it's a way of life around here. Our sense of community and solidarity runs deep. We attract manufacturers from around the world and bring them together in collaborative environments to build better products and services.

Across Liverpool City Region and the wider North West there are strong clusters of activity in Aerospace, Automotive, Marine, Chemicals, Biotechnology, Energy and Food and Drink. You'll find a diverse range of industry networks that bring global OEMs together with supply-chain companies, university research institutes and government agencies in a collaborative way.

CASE STUDY:
VIRTUAL ENGINEERING CENTRE

The Virtual Engineering Centre (VEC), a University of Liverpool initiative based at Sci-Tech Daresbury, is the UK's leading centre of Virtual Engineering technology integration for industrial and commercial applications.

VEC's virtual design and manufacture capabilities use the latest specialist 3D visualisation and Physics-based simulation allowing organisations to explore their designs and optimise manufacturing and maintenance processes in a highly interactive and intuitive way.

An example of the VEC's approach is the collaborative R&D project, known as STRIVE (Simulation Tools for Rapid Innovation in Vehicle Engineering). The VEC worked with Bentley Motors, in conjunction with the Northern Automotive Alliance and local tech firms from Liverpool City Region to look at reducing product development time.

Sharing engineering data on their flagship model the Mulsanne, Bentley Motors and the VEC developed a unique framework to evaluate the assessment, verification and integration of VR technologies and immersive environments. The result was a reduction in Bentley's development timescale from 54 to 48 months and the creation of new highly-skilled roles at their factory.

Mark Harding, Manufacturing Project Leader for Continental & Flying Spur at Bentley Motors said: "The positive impact on the business gained from the deployment of the new toolsets at the Bentley site has been a direct result of this innovative collaboration between us, the University's Virtual Engineering Centre and agile North West based SMEs".

Image courtesy of Virtual Engineering Centre

WE ARE **CHALLENGERS.**

This is a place with spirit, pride and passion.

We're independent and we never shy from challenging the status quo. When someone says it can't be done; we'll find a way; when things need changing and new models are required, you'll find us right there at the forefront of innovation and change.

Our region is bursting full of innovators and entrepreneurs that are revolutionising their industries. Not only will you find individuals and creators; we also have the right infrastructure to nurture and support them.

The role of government agencies and academic partners in creating the right environment to facilitate and encourage innovation is essential. Across the city region there is a proactive approach to champion change and to harness the benefits of industrial and digital transformation.

CASE STUDY:
SIGMATEX

Sigmatex develops and manufactures carbon fibre textiles for composite material applications. The innovative company supplies woven carbon fibre textiles for the world's top supercar manufacturers to high performance leisure brands and major aerospace companies.

Products that were previously designed and manufactured from metals are now being replaced by carbon fibre. Carbon fibre textiles are an enabling technology and can open up new ways of designing improved products to achieve higher technical performance through lightweight strength.

Sigmatex's global headquarters in Runcorn is home to the Lightweighting Centre of Excellence where the firm's automotive R&D team is based. Key players in the composites industry have been brought together by Sigmatex to work on the Lightweighting Excellence Programme, including Nissan, Bentley and Emerald Automotive.

Breakthrough Aerospace Materials project, known as BAM, is a three year project looking to advance manufacturing techniques and simulation of 3D textiles and to make them commercially available to the aerospace industry. Led by Sigmatex, BAM brings together aerospace companies BAE Systems and Rolls-Royce along with composite companies and universities specialising in 3D woven technology. The expected benefits of the project will include structural lightweighting, with reduced manufacturing and inherent assembly costs.

BIG SCIENCE **BIG ASSETS**

At the heart of this region's attractiveness is a thriving academic scene.

Schools, colleges and universities are involved in some of the world's most important science and engineering projects. The amount of new investment in science, technology and engineering facilities and capabilities is testament to the ambition and vision of an academic cluster that works closely with major manufacturers.

- University of Liverpool – a world-class university ranked in the top 1% globally. Its world-shaping research has included associations with nine Nobel Laureates and has an international reputation for research into advanced materials, personalised health and infectious diseases. The chemistry department is known for its research into new materials and nanosciences; while the computer science department is ranked in the top three in the UK.

- Materials Innovation Factory – located at University of Liverpool, this £68 million project will create the highest concentration of robotics for materials science in the world.

- Liverpool John Moores University - is one of the largest, most dynamic and forward-thinking universities in the UK. The Faculty of Engineering and Technology Research Institute brings together a broad range of disciplines, from astrophysics to bio-engineering and computer games technology to microwave research.

- Manufacturing Technology Centre – MTC@LJMU is the first regional offshoot of the national Manufacturing Technology Centre Catapult. This further enhances our links with Innovate UK, the national innovation agency, and other catapult centres for digital technologies. It will provide an innovation hub for local businesses to build and commercialise new products, access new funding streams and point them towards the potential of emerging technologies.

- Liverpool Hope University – was ranked fifth in the UK for student satisfaction by The Sunday Times Good University Guide in 2016 and is in the top 20 of all UK universities for the percentage of academic staff with doctorates.

- Edge Hill University – voted The Times Higher Education University of the Year in 2014/15, Edge Hill is a hub for research around sports science and health-related issues. The computing department was recently voted as the best for teaching in the country.

Within an hour of the city region, you'll find more great engineering talent at universities in Manchester, Salford, Lancaster and Preston. In addition to our universities, there are a number of internationally-significant science assets such as:

- Sci-Tech Daresbury – is home to STFC Daresbury Laboratory and The Cockcroft Institute conducting leading-edge research and development, along with 100 technology companies including IBM and Lockheed Martin, and pioneering open innovation working. There are more than 1,200 people on the site, including 500 scientists working on accelerator science, high performance computing, simulation and data analytics and sensors and detectors.

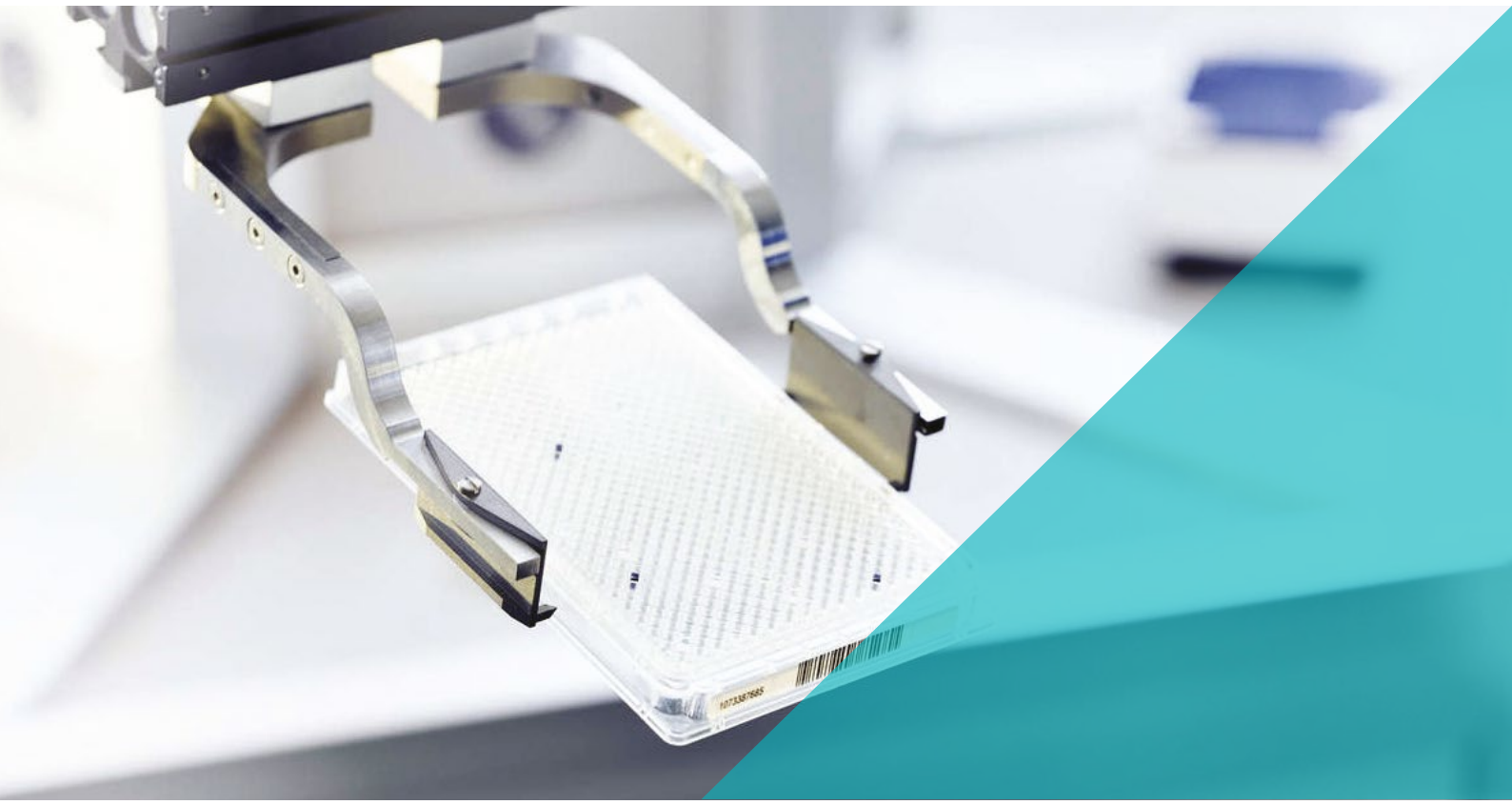


Image courtesy of AstraZeneca

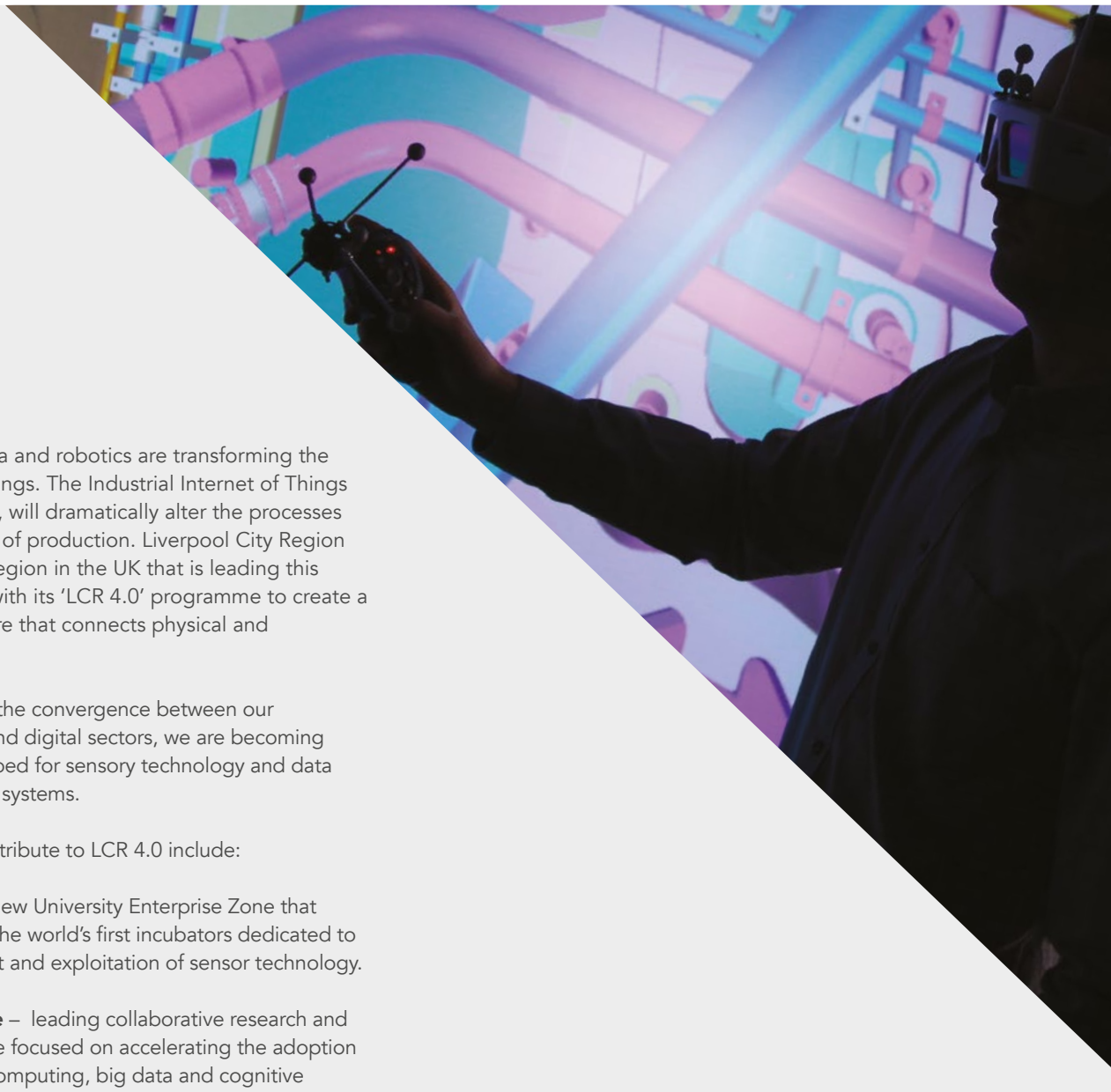
CASE STUDY: **ASTRAZENECA**

Liverpool has a major concentration of bio-manufacturing with global players developing next generation pharmaceutical products. AstraZeneca is an example of the commitment to invest in bio-manufacturing in the region.

Around 360 people work at AstraZeneca's biologics site in Liverpool, which has unique facilities to bulk-manufacture the nasal spray influenza vaccine and can produce up to 19 million vaccine doses every year. Since 2010, there has been £75 million of investment at the site to support increased production of the vaccine for use in the UK and internationally.

AstraZeneca supplies the nasal spray vaccine as an important part of the Government's extended childhood flu vaccination programme. Over time, as the programme rolls out, all children between the ages of two and 17 will be vaccinated against flu each year with the nasal spray made in Liverpool.

AstraZeneca is an active partner with local universities and research bodies. The Centre for Drug Safety Science at the University of Liverpool, brings together companies like AstraZeneca with regulatory authorities and academic researchers to work collaboratively on drug safety.



LCR **4.0**

Sensors, big data and robotics are transforming the way we make things. The Industrial Internet of Things and Industry 4.0, will dramatically alter the processes and possibilities of production. Liverpool City Region is an exemplar region in the UK that is leading this transformation with its 'LCR 4.0' programme to create a new infrastructure that connects physical and digital assets.

By encouraging the convergence between our manufacturing and digital sectors, we are becoming a hardware test bed for sensory technology and data communications systems.

Projects that contribute to LCR 4.0 include:

- Sensor City – new University Enterprise Zone that includes one of the world's first incubators dedicated to the development and exploitation of sensor technology.

- Hartree Centre – leading collaborative research and innovation centre focused on accelerating the adoption of data-centric computing, big data and cognitive technologies into industry to gain competitive advantage.

- Virtual Engineering Centre – the UK's leading centre of virtual engineering technology integration for industrial and commercial applications.

- Engineering and Technology Research Institute (ETRI) - world-class research facilities including Advanced Manufacturing Technology Research Laboratory.

Companies in Liverpool City Region will have the opportunity to collaborate and partner with this world-class infrastructure that is at the centre of the industrial internet of things. Other initiatives that have a focus on IoT projects include Fab Lab Liverpool and the maker community at DoES Liverpool.

CASE STUDY:
PILKINGTON

Pioneers of manufacturing innovations from self-cleaning glass to solar energy panels, Pilkington is a world leader in the glass industry. Founded in St Helens in 1826 and now a member of the NSG Group, headquartered in Japan, Pilkington has major manufacturing facilities in the region, along with the NSG Group's European Technical Centre situated here.

The business employs around 3,000 people across the UK, producing a range of glass solutions, from the manufacture of float, rolled and coated glass to glass processing. The St Helens sites are capable of producing 300,000 tonnes of glass a year for use in cars, commercial buildings, homes and renewable energy projects.

The European Technology Centre, responsible for the strategic direction and performance of the Groups' research and development programme for new products and processes, and the delivery of Group Engineering solutions are also located in the region.

Pilkington is a major player in sustainable energy, providing specialised glass and coated glass products for use in all of the leading solar energy technologies, including thin film photovoltaics, crystalline silicon photovoltaics, concentrated solar power technology and solar thermal collectors.

Phil Brown, European Regulatory Marketing Manager at Pilkington, said: "We've made a significant investment in both R&D and our manufacturing facilities over the past few years, to enable us to continue to produce high-performing energy-efficient products, using nanotechnology for the commercial and domestic markets."

PRODUCTIVE **& COMPETITIVE**

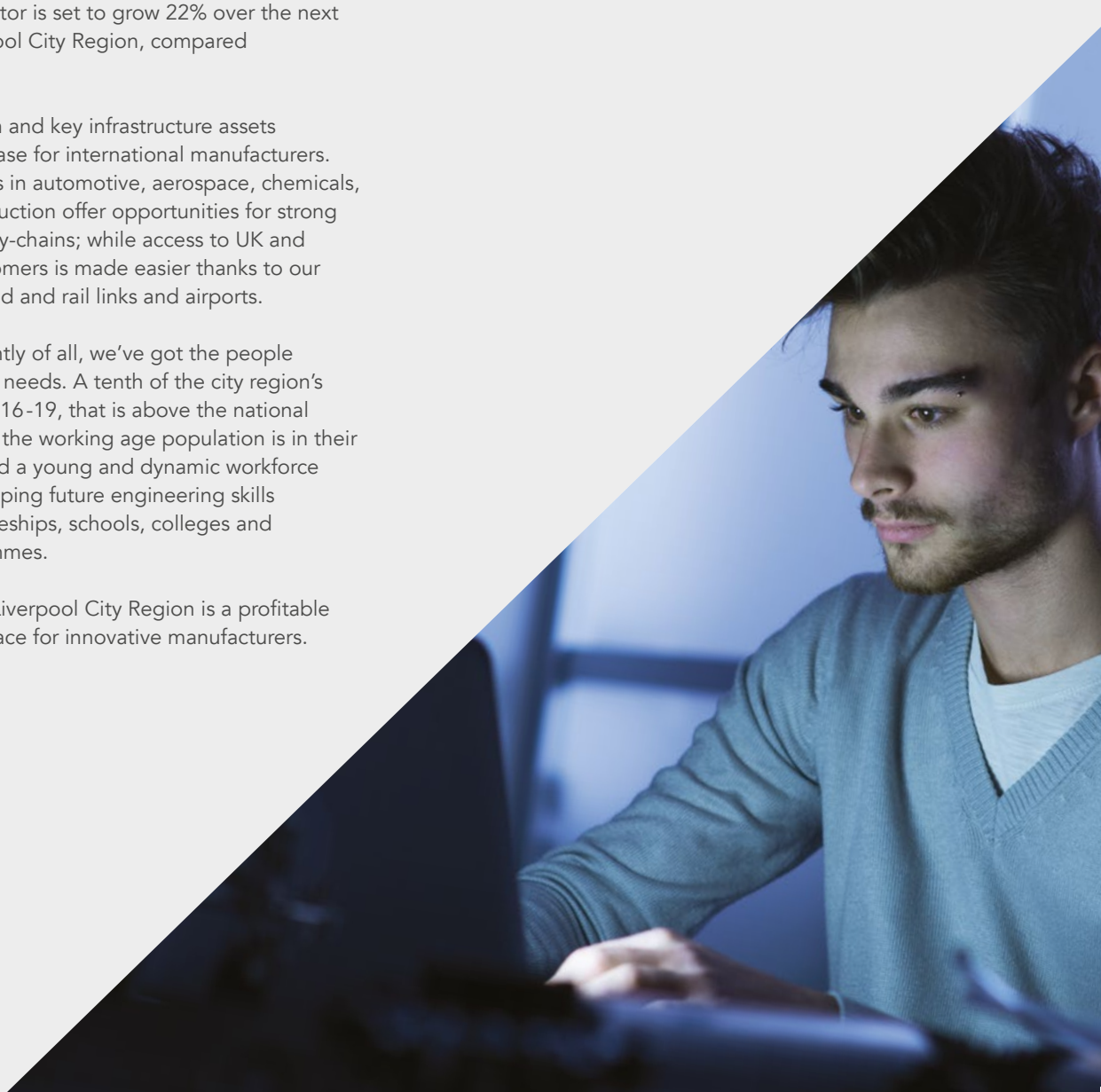
So many major manufacturers and innovative startups choose to locate and invest in Liverpool City Region because of the many cost and productivity advantages when compared to other regions. The cost of land and property is extremely competitive here and operating costs are among the most favourable in the UK.

But it's not just about lower costs though. Our workers are highly productive too. Liverpool led the UK in productivity growth between 2004-2012 with a 34% increase. Economic output per job in advanced manufacturing is £47,305 - this is 7% higher than the UK average. And we're not done growing. The advanced manufacturing sector is set to grow 22% over the next 10 years in Liverpool City Region, compared to 19% nationally.

The area's location and key infrastructure assets make it an ideal base for international manufacturers. Proximity to OEMs in automotive, aerospace, chemicals, energy and construction offer opportunities for strong engineering supply-chains; while access to UK and international customers is made easier thanks to our growing ports, road and rail links and airports.

But most importantly of all, we've got the people that your business needs. A tenth of the city region's workforce is aged 16-19, that is above the national average. A fifth of the working age population is in their twenties. You'll find a young and dynamic workforce here, that's developing future engineering skills through apprenticeships, schools, colleges and university programmes.

The bottom line: Liverpool City Region is a profitable and productive place for innovative manufacturers.



CASE STUDY:
CAMMELL LAIRD

Cammell Laird has been at the heart of British manufacturing for the last two centuries. At its Birkenhead site on the River Mersey, you'll find one of the best and most competitive heavy fabrication facilities in the engineering industry, including one of the largest modular construction halls in Europe. World-class facilities and the right engineering skills are providing services to maritime, civil nuclear, oil and gas, petrochemicals and renewable energy projects.

Ship-building and refitting capabilities continue to be at the heart of Cammell Laird's work, as seen recently with the construction of the flight decks for HMS Queen Elizabeth, the Royal Navy's new aircraft carrier and centrepiece of the UK's military capability.

In 2015, Cammell Laird beat international competition to win the contract to build a new £200 million polar research ship that will be equipped with on-board laboratory facilities and robotic technologies to monitor environmental changes to the polar oceans of the Arctic and Antarctica.

Thanks to major investment in its port infrastructure and facilities, Cammell Laird also plays a critical role in the region's offshore wind industry, handling huge component parts for the construction of the wind farms in the Irish Sea, working with international partners such as RWE and Dong Energy.

We have a team of business location experts from across Liverpool City Region that can assist you with your next project.

We can provide detailed research on markets, sectors and workforce demographics. We can put you in touch with the right contacts at industry networks and partner organisations. We're happy to introduce you to potential partners at our world-class universities and our existing businesses. We can help you to identify all the available support to help your expansion and show you a wider range of sites, premises and development opportunities.

Email us at **LCR@investliverpool.com** or telephone +44 (0)151 233 5912
for help and we look forward to working on your plans with you.

investliverpool.com

INVESTLIVERPOOL
ADVANCING THE CITY REGION

HALTON BOROUGH COUNCIL
Knowsley Council
Liverpool City Council
Sefton Council
St.Helens Council
WIRRAL

Liverpool City Region Local Enterprise Partnership
LIVERPOOL VISION
European Union
European Regional Development Fund

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