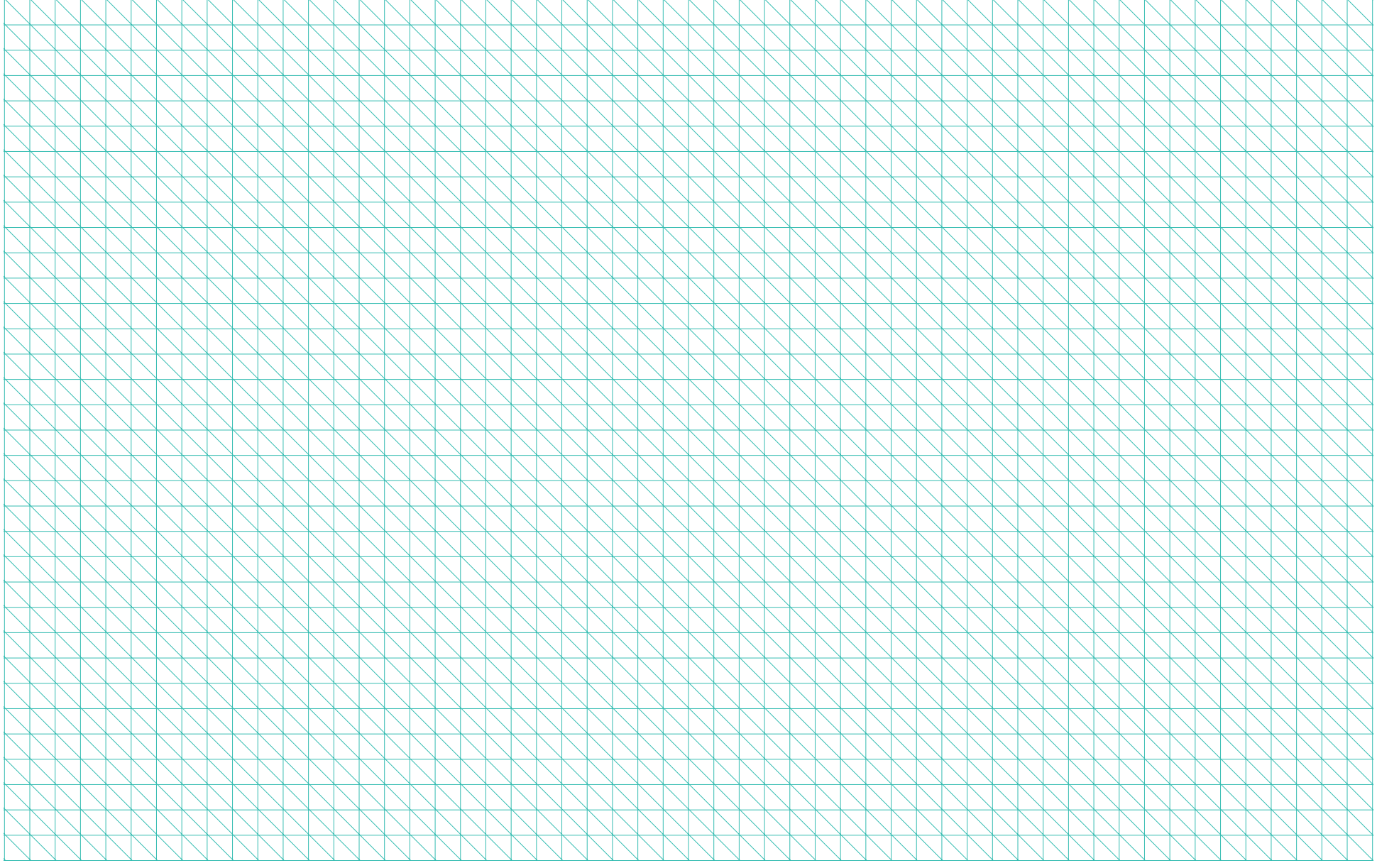

Modern Manufacturing

An Economic Asset for Sheffield and the City Region

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Acknowledgements

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Your contributions have had a direct impact on the quality of the analysis herein and your continued support is essential in taking this project forwards.

Wilson Benesch turntable

Introduction by Bob Kerslake

Chief Executive, Sheffield City Council

We commissioned this research as we were keen to recognise the importance of the manufacturing industry to Sheffield and the City Region. The research focuses on the economic contribution that the manufacturing industry makes to the local economy.
The evidence demonstrates that manufacturing has a powerful economic role to play within a well performing economy.

Many of Sheffield's manufacturers are healthy, profitable and producing more goods than ever. Measured in terms of output and productivity, there are clear signs of growth. For example despite an employment decline of 25%, the economic output generated by the manufacturing industry has increased by 12%. Although the future of the industry will involve fewer jobs, this picture of growing economic output is in contrast with the continued perception of industrial decline.

This publication is an important milestone in providing evidence of the strength of the industry, and its importance to the economy. We as a city and City Region need to support manufacturers as they move to higher value-added activities, enabling our manufacturing industry to reach its economic potential as a generator of wealth.

Foreword from 'Made in Sheffield'

The 'Made in Sheffield' Initiative is delighted to contribute the foreword to this report – a report which heralds the next chapter in a local success story. Its key theme is the recognition that manufacturing is of central importance to the local economy. Drive down the Parkway or along the M18 and you will see that although the nature of the region and the production techniques in the factories have changed, Sheffield and its surrounding area continues its historical role as a successful producer region generating a significant trade surplus.

Made in Sheffield has helped to refocus attention on manufacturing's contribution to a balanced economy, and its importance for the future. No-one should forget that this area is unique.

This report has met with support and received input not only from private sector manufacturers but also key organisations such as the Company of Cutlers, the Engineers Employers Federation (EEF), the Chambers of Commerce, Creative Sheffield, Made in Sheffield and the Universities. This is a partnership determined to support and develop our area's economic success throughout the 21st century.

The support of the private sector is important because it is the driving force in the producer economy. The importance of an entrepreneurial spirit can be seen constantly as business owners take research and knowledge to improve products, to generate sales, pay wages and reinvest profits in the region.

This report recognises the massive contribution that manufacturing has made, is making and will continue to make to our economy. The skills, knowledge and location of the region have created a unique business environment which has built on the historical reputation, with Sheffield being the watchword for quality products. The Made in Sheffield Mark gives businesses an opportunity to visibly support their brand while also giving a guarantee to customers of a quality product from a distinct geographic location.

Let's tell the world it's …

MADE IN SHEFFIELD

Executive Summary

This research project was commissioned to investigate and provide evidence of the economic contribution that the manufacturing industry makes to the local economy. This publication aims to show economic evidence to challenge the continued perception of decline in the manufacturing industry.

The report offers a quantitative analysis of Sheffield-wide data to define the structure and economic performance of the industry. A central part of this analysis identifies the significant relationships in the sector across the Sheffield City Region. The quantitative analysis is supplemented by qualitative information to highlight some of the main challenges manufacturers face.

The study builds on previous work undertaken, including the Sheffield Economic Masterplan, The Sheffield Rotherham Economic Study and the City Region Development Programme.

The structure of the Manufacturing Industry

Manufacturing is no longer seen simply as production. It describes the process of turning ideas into products and services, from research and design, through production, to service provision. In order to remain competitive, manufacturers in today's market need to be inventors, innovators, global supply chain managers and service providers.

There is a growing core of high value manufacturers in the Sheffield City Region. These companies are successful, investing and innovating. Not all of them are 'advanced' manufacturers, but all are 'modern manufacturers' in that they are competitive in today's economy through differentiating their businesses, whether through R&D, advanced technology, materials, product design, or customer service.

The industry has also shed much of its low value-added manufacturing and the process of moving up the value chain is underway in Sheffield and the wider city region. This movement, however, is not complete. There is a spectrum of activity that spans from low value to high value, and many of Sheffield's businesses are found along this spectrum.

The economy does not function according to local authority boundaries. Sheffield is at the heart of an agglomeration of manufacturing expertise and knowledge which takes in South Yorkshire and North East Derbyshire (known as the City Region).

The manufacturing industry in Sheffield and Rotherham is so closely integrated that it is essentially a single cluster, specialising in advanced engineering and metals (AEM). Further research indicated that it is one of the largest AEM clusters in the UK.

Local expertise in metal and materials, together with investment and innovation, have given Sheffield City Region companies access to higher value markets such as medical equipment and aerospace industries. Analysis shows that Sheffield's medical equipment sector is of national significance and growing strongly, and a local supply chain of engineering and metal firms form a substantial local supply chain to the aerospace industry.

Manufacturing's contribution to the Economy

Manufacturing accounts for 18% of Gross Value Added (GVA), 4% more than the national average and much greater than the industry's 12% employment share. This equates to a contribution of approximately £3 billion to the regional economy.

The sector's large employment losses seen over the last decade have started to lose pace during 2004-2006. This slowing of employment decline is due primarily to the expansion of SME manufacturers in growing markets such as medical, aerospace and CDI, and their supporting supply chain. This flatter trend is set to continue as the SME growth accelerates and the rationalisation of the area's larger firms begins to plateau.

The long-term future of the industry will involve fewer jobs, but this does not mean that the manufacturing industry across Sheffield City Region is not looking for a new generation of workers. An ageing workforce and the changing composition of the industry will create significant replacement demand.

Manufacturing acts as an inflow to the local economy. A strong export market injects external wealth into the local economy, and can help to safeguard against economic slowdown. A strong manufacturing sector also stimulates demand for knowledge services such as accountancy and law.

Preparing for the challenges of the future

Lack of skilled labour is a real concern for manufacturing businesses and acts as a barrier to growth. To move up the value chain, manufacturers need people in their businesses who have the skills to drive innovation and design, provide first class customer service and utilise the latest technology. This presents a challenge not only to attract new knowledge workers into the sector, but also to manage the skills level of the existing manufacturing workforce.

The key to future success is the change in composition of manufacturing activity away from a purely production focus. Economically this moves the industry to higher value activities, which generate increased wealth and competitiveness. Firms' innovation, and their investment in research, design, technology and product are the drivers of this process, and are essential to the long-term economic success of the industry.

The perception of the manufacturing industry today does not reflect its reality, and in fact holds it back. The industry is changing, moving into higher value, higher technology markets and is utilising a wider range of skills and technology than ever before. The industry is not widely recognised as an economic asset and is often undervalued by policy makers and the business community. Perception of the industry is of critical importance because the Sheffield City Region's association with manufacturing has the potential to attract or deter potential investors, knowledge businesses and knowledge workers.

Taking Action – The Manufacturing Forum

One of the crucial issues arising from this report is the need for a consolidated strategic direction for the industry. The industry itself, manufacturing support organisations, research centres, universities and Government need to work together with solidarity to meet the challenges outlined in this report – especially if we are to change the perception of the industry.

To address this issue, it is proposed that a manufacturing forum is created, to encompass all main business support bodies, research centres and associations within the Region. By working together, such organisations can offer significant support to enable the industry to move forward, and equally important, to change perceptions of manufacturing.

Much work has been accomplished in encouraging all manufacturing business organisations to collaborate. This is the first time individuals and organisations have come together as one force to support this important sector of our economy. It is now essential to grasp this opportunity for the benefit of the local economy and the wider region.

Economic Context

The UK manufacturing industry currently contributes approximately 15% of Gross Value Added and employs 11% of the UK workforce.

The UK Government is clear that 'manufacturing matters' to the UK economy.

"Manufacturing Matters. It is vital to the economic well being of our nation. I am convinced that manufacturing in the UK has a strong long-term future."

Rt.Hon.Patricia Hewitt, MP
Speaking as Secretary of State for Trade and Industry

The UK manufacturing industry has faced some huge challenges in recent times: a global downturn, strong currency and interest rates and low investment. Although the market today is showing some signs of upturn, with an export-driven demand for capital goods and a subsequent increase in investment, the threat of overseas competition looms large over UK manufacturers.

"..global competition is intensifying and our manufacturers must take advantage of advances in technologies, together with the opening up of world markets, to stay ahead."

UK Manufacturing Strategy

The Government's Manufacturing Strategy emphasises that the future for UK manufacturers lies in moving up the value chain. Only firms that:
- invest and innovate
- utilise technology and design
- utilise advanced production techniques
- produce high value-added products that meet demand

will have a global market to sell in.

In a recent document 'Defining High Value Manufacturing' produced by the IfM[1] and the Department of Trade and Industry (now DBERR), manufacturing is described as the process of turning ideas into products and services. It states that manufacturers in today's market need to be inventors, innovators, global supply chain managers and service providers to remain competitive.

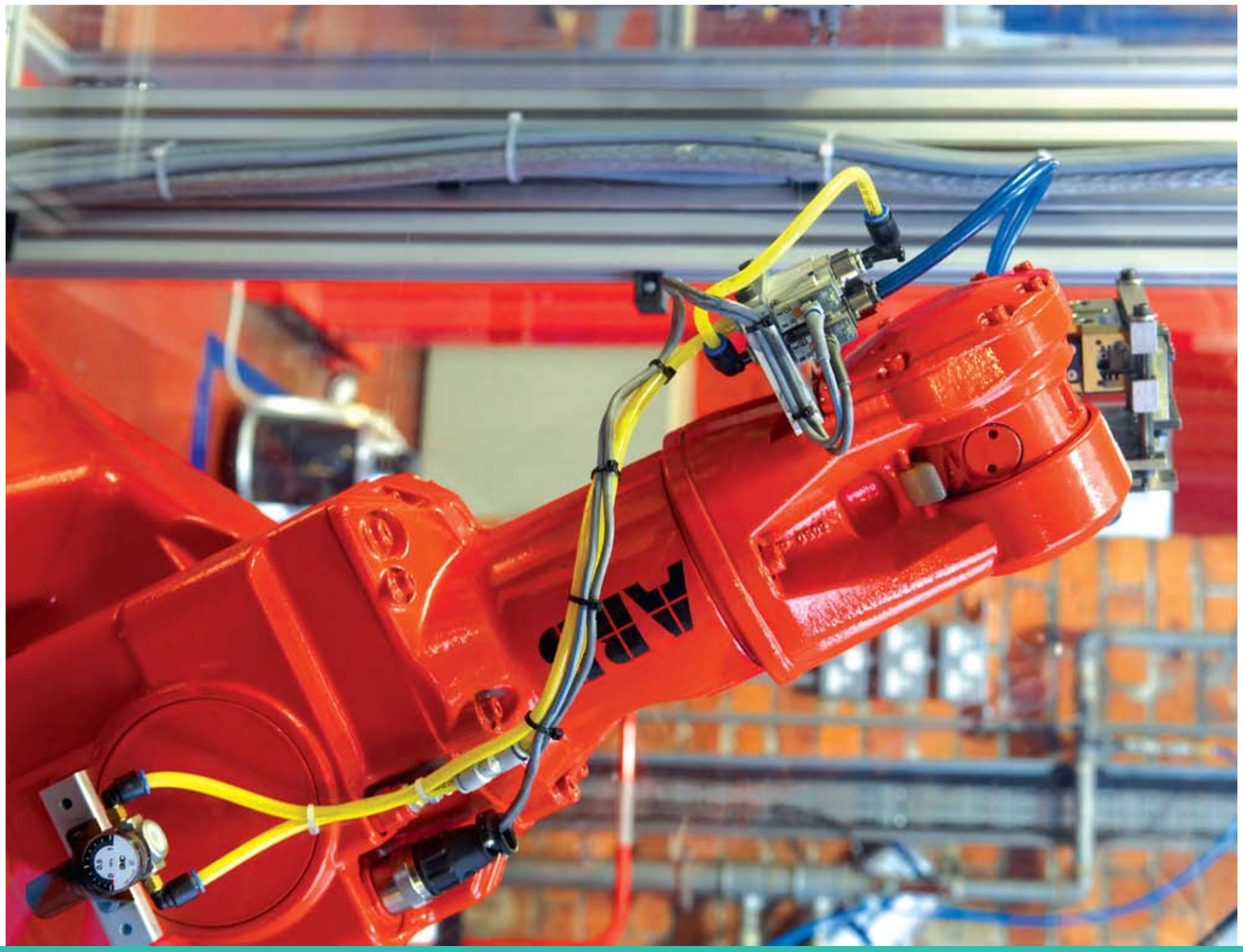
"What was once seen just as production is now production, research, design and service provision."

Extended Definition of Manufacturing
Source: Defining High Value Manufacturing Jan 2006

The process does not necessarily need to be undertaken by a single company. Industry, academia and Government can collaborate to develop the products and manufacturing methods necessary for an innovative, knowledge-based economy to thrive.

Developing such collaboration means creating an industry with the capacity, capability and, most importantly, the commitment to creating, adapting and using the latest manufacturing techniques.

1 Institute for Manufacturing



Modern Manufacturing – Case Studies

Case study 1: Joint Replacement Instrumentation Limited

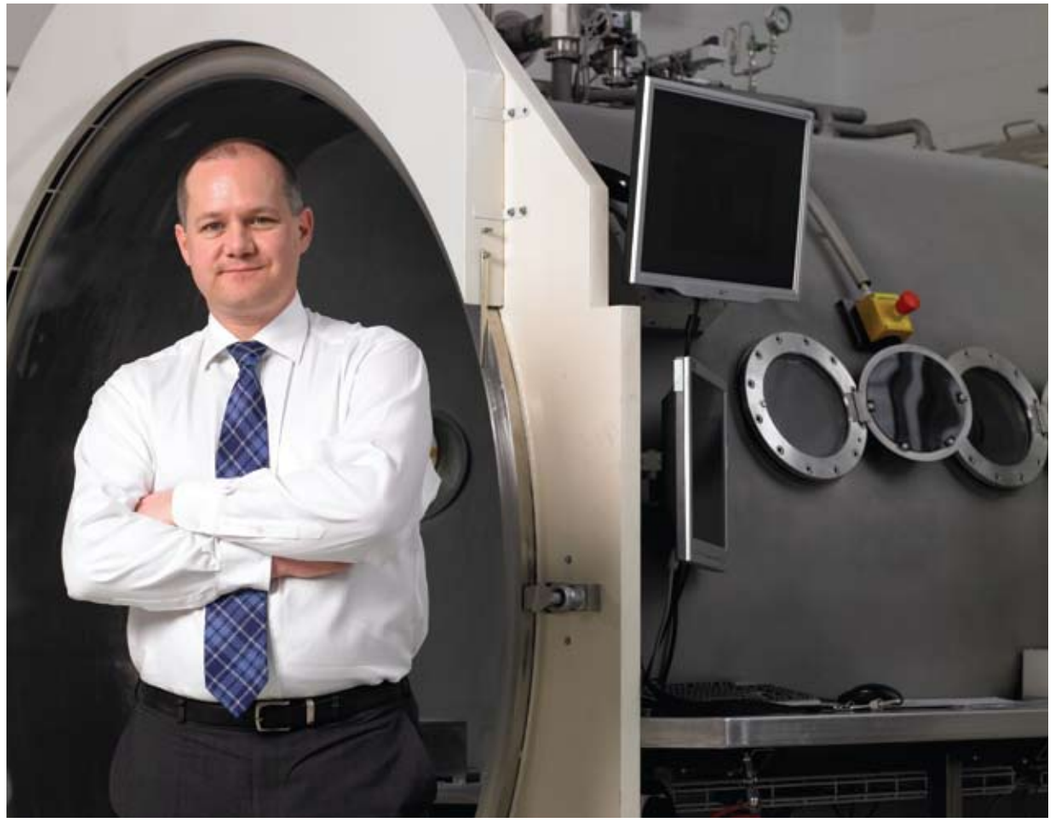
Picture: Keith Jackson, Technical Director

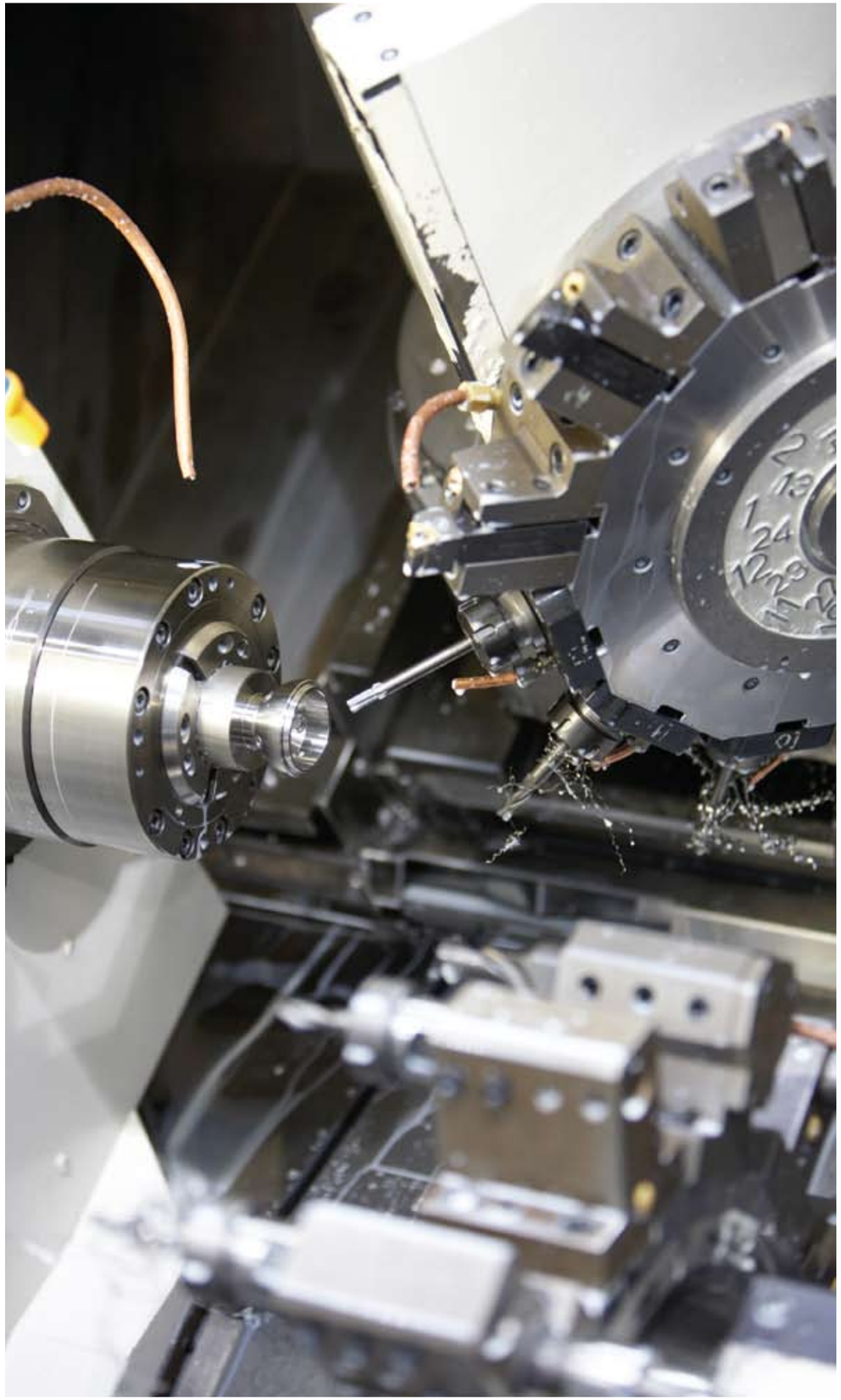
Joint Replacement Instrumentation Limited (JRI), in the specialist field of Orthopaedics since 1969, is a privately owned British Company that designs, manufactures and distributes hip and knee replacement prostheses together with all necessary surgical instrumentation for implantation.

JRI have been manufacturing implants in Sheffield since 1977. After 30 years the Company's commitment to the city continues with a £6M investment in a new state-of-the-art manufacturing facility. Staffed by highly skilled men and women from the heart of the British Steel industry, they use the most modern computerised CNC machinery and measuring technology to ensure the high quality of implants and instruments on which hospitals, surgeons and patients have come to depend.

Sheffield's international reputation for specialist metals manufacturing has created a cluster of medical device companies that are supported by a well-developed supply chain. The medical device industry is highly regulated and JRI operate robust quality management systems. Winner of the coveted Queen's Award for Technology, JRI continue to innovate to deliver new and enhanced products. Forty percent of the total Company business is export with worldwide distribution.

The Company's founder, Mr Ronald Furlong was an orthopaedic surgeon and he established the Furlong Research Charitable Foundation (FRCF) to fund leading orthopaedic research. JRI is now wholly owned by this highly regarded orthopaedic research charity and the majority of JRI's profits are gift aided to the FRCF to fund cutting-edge research that will ultimately benefit patients.





Case study 2: AESSEAL

Picture: Chris Rea, Managing Director and Gordon Bridge, Chief Executive

AES Engineering Ltd (which trades as AESSEAL) was formed in 1981 by Chris Rea with 5 people. With his small team he designed a modular range of mechanical seals and sold the product primarily to companies in South Yorkshire.

Today, the company has 1,050 employees. It sells more than 80% of its product to 83 countries and has branches in 66 locations in 30 countries. It has three principal manufacturing sites, one in Bradford and two in Rotherham. These account for more than 95% of production output.

A mechanical seal is a precision engineered product which fits in rotating equipment, such as centrifugal pumps, and prevents leakage of potentially harmful liquids and gases.

The Company's range of mechanical seals now covers all industries and all applications. The range includes high performance Dry Gas Seals capable of operating at 46,000 revolutions per minute and at 300 bar; bearing protectors with unique patented features; standard product and one-off specials.

Industries served include Oil and Gas, Petrochemical, Chemical, Pharmaceutical, Pulp and Paper, Food Processing, Power Generation, Mining, Shipping, Steel Production and General Industry.

Customer service is the company's core value and the company's purpose is "To give our customers such exceptional service they need never consider alternative sources of supply".

The Company's turnover in 2008 will be £74 million with a target for 2012 of £150 million.

AES Engineering Ltd is the second largest manufacturer of mechanical seals in the UK and fourth largest in the world. Its long-term objective is to be Number One.

Chris Rea is the majority shareholder and Managing Director of the AES Group of Companies.

Case study 3: Bromley Performance Sports

Picture: Kristan and Richard Bromley, Directors

Originating from a BYESYSTEMS Winter Olympic Sport technology initiative, Bromley Performance Sports was formed by brothers Kristan & Richard Bromley in 2000.

The company has to date successfully forged a position as a world leader in the development of high performance winter sport products, one of the most competitive sporting and product environments for a British company.

In February 2008, using high performance sled technology developed by the company, Kristan as GB's top Skeleton athlete has become the first bob skeleton slider in history to win the European, World Cup and World Championship crowns in the same season and the first British athlete sine 1965 to become World Champion.

A former design engineer for British Aerospace, Kristan Bromley earned his Ph.D. in materials engineering from the University of Nottingham. This unique mix of science, engineering and performance sport, combined with the expertise of his younger brother Richard, a Structural Dynamics & Systems engineer, has led the brothers to focus their company with a mission of becoming world leading innovators of performance sports products.

Bromley attributes much of his sporting success to the company's works technology initiative, F1-ICE, which is tasked with developing the fastest Skeleton Sled, Bobsleigh Runners, Speed Skates and Snowboarder-cross equipment for the forthcoming 2010 Olympics. This includes Olympic Silver medallist Shelley Rudman (Skeleton) and World Championship Silver Medallist Nicola Minnicello (Bobsleigh), both Sheffield based athletes.

Believing that knowledge, engineering and technological innovation are the keys to maximising performance potential the team brought together leading expertise from within the UK to support the redevelopment of the entire Skeleton sled system. This includes support from the Sports Engineering Group at Sheffield Hallam University where Kristan holds a Visiting Professor chair and Richard a Research Fellow position.

The company is planning to expand its product range outside of the bobsleigh sports into multi sport markets whilst offering a 'one stop shop' for leading brands to push the performance boundaries of their products in order to become and maintain a market lead position.

Case study 4: DavyMarkham

Picture: Kevin Parkin, Managing Director

DavyMarkham employs 180 staff and has a turnover over £18 million annually. We have one of the largest engineering facilities in Western Europe with a long and proud history in the design, manufacture, fabrication and machining of heavy and complex engineering components and assemblies.

Our vast workshops offer unique facilities, massive machine tools and huge worktables, which cannot be found anywhere else in the UK. We are able to handle extremely large projects, utilising our expertise in design, hydraulics, controls, engineering, installation and servicing, and have the capability of moving individual structures weighing up to 350 tonnes, yet we work to incredible accuracies.

DavyMarkham designs, fabricates, assembles and installs moving structures; for example bridges. The blinking eye of the Millennium Bridge in Newcastle–Gateshead would not move if it were not for DavyMarkham. Much of our work you will have all seen but perhaps not associated with DavyMarkham or Sheffield. The Thames Barrier flood defences, machines that cut the Channel Tunnel, the Terminal 5 control tower at Heathrow, and the Falkirk Wheel all have DavyMarkham stamped on them.

We are a traditional company, doing traditional manufacturing, but our use of technology and the exceptional skills of the workforce make DavyMarkham a truly modern manufacturer. We seek continuous improvement within our business; through investing in our employees, a new generation of apprentices, high-tech methods of machining, cutting and measuring and collaborating closely with our local universities.

The service we offer is a complete problem solving capability, not just a production. facility. Come to DavyMarkham with an engineering problem and we will give you a solution, taking the project through design, analysis and financing and on to machining, fabrication, installation and servicing. We pride ourselves on our on-site assembly and attestable accuracy: if it's DavyMarkham you can be assured it will work first time on site.

DavyMarkham is proud to be a Sheffield manufacturer; not only do we epitomize the quality associated with the "Made in Sheffield" brand, but we believe that – with the local skills and knowledge, the available supply chain and excellent transport links – in Sheffield we are at the heart of UK manufacturing.

Case study 5: Wilson Benesch

Picture: Craig & Christina Milnes, Directors

Wilson Benesch can arguably claim to be the leading High End loudspeaker brand in the UK.

The company is owned by Craig Milnes, director of product development and design and Christina Milnes, director of all aspects of sales, production and financial planning.

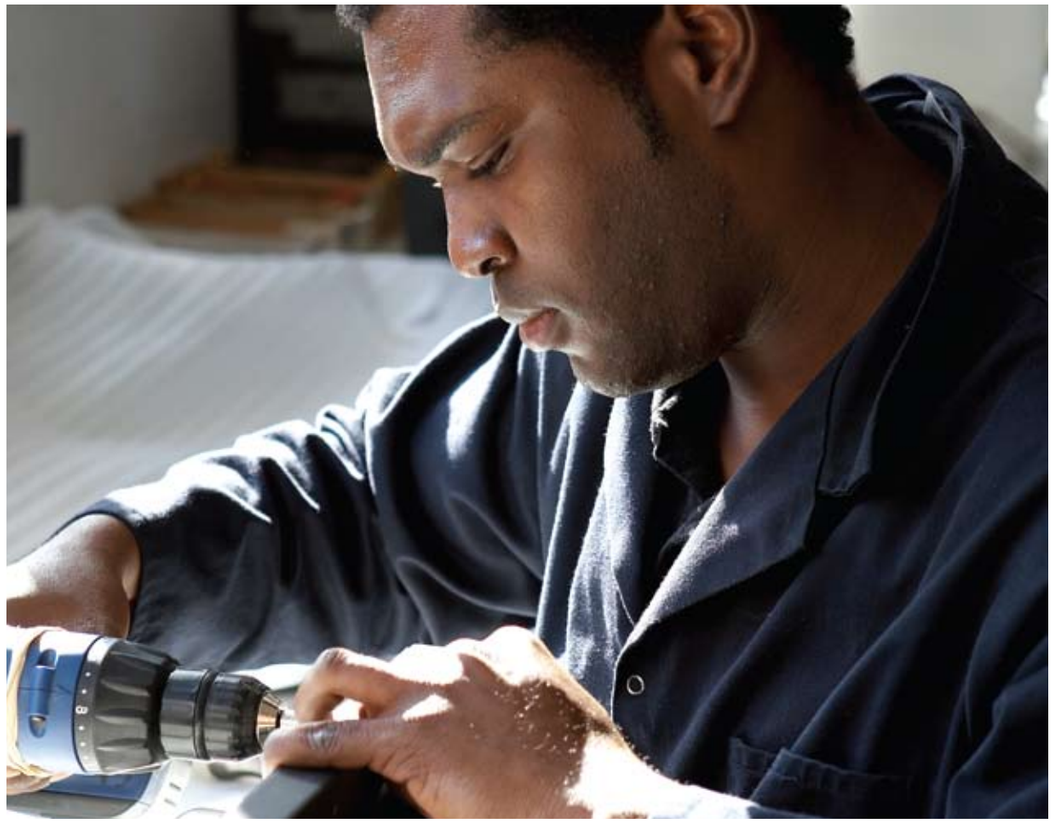
Wilson Benesch was founded on a creative idea and funded on innovation funding support from the Nat West Bank and the DTI. With re-invested profits into further research and development as well as CAD CAM manufacturing systems, the company has strived towards creating new solutions, to commonly accepted problems in audio systems.

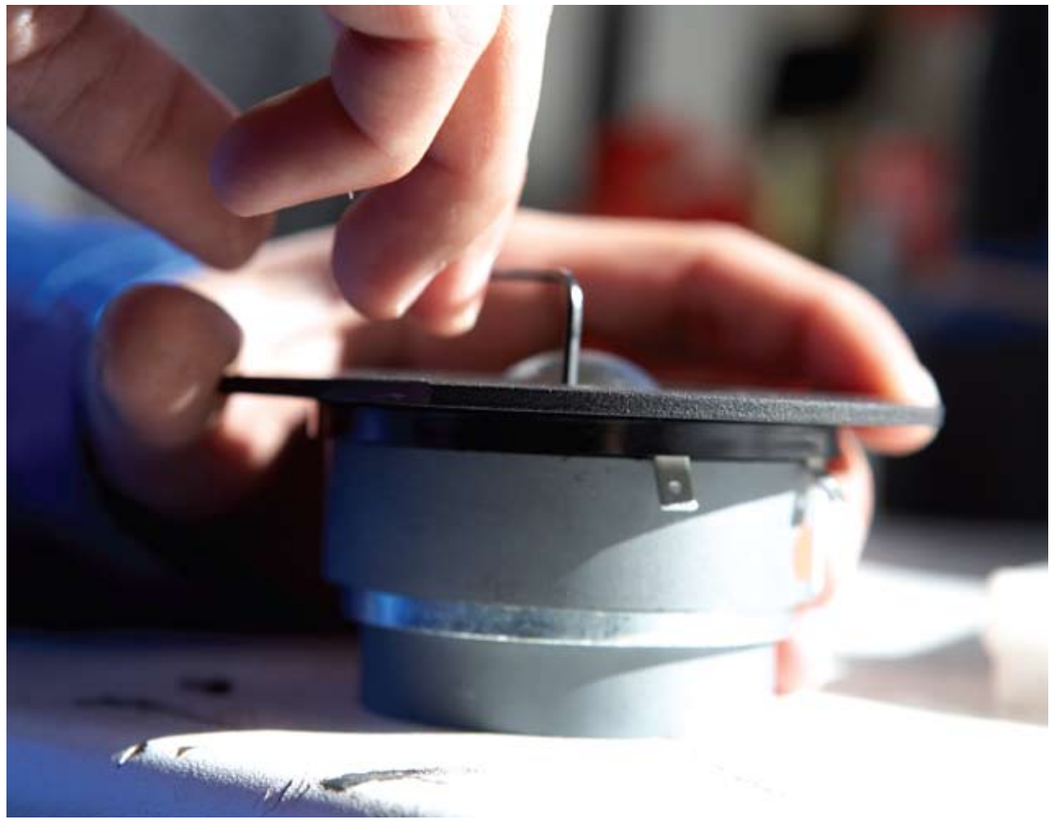
Without its manufacturing base and technical know how, Wilson Benesch would just be another "me too" product. Like competing designs it would depend upon massive marketing budgets for its success as opposed to real product improvement. In contrast, Wilson Benesch has grown slowly by taking the long route and investing its resources in manufacturing and innovation. Today the brand is recognized for all the right reasons, distinctive design and manufacturing excellence that marry the most advanced materials technologies with traditional materials to achieve sublimely beautiful products.

The Future is Carbon strap line was adopted four years ago. Having pioneered the use of these advanced materials in audio products, the company name is now synonymous with this technology. Its designs have received unprecedented levels of critical acclaim throughout the world and list of awards won on every continent is a major achievement.

Wilson Benesch is the only UK audio company to have won not one but two SMART grants for its high-risk developments. The last outcome from one of these products is now patented and has been described as a Genius design and "the most accurate woofer of all times". The latest designs from the company will further endorse its credentials, with the introduction of materials technology that function at the molecular level.

The word "manufacturing" covers a huge area of activity. It begins with creativity, it might take the form of a product, or building or field of development, more often than not it involves materials. It is one of the most exciting things to be involved in and being able to go from idea to finished product is a real privilege.





Case study 6: Fripp Design

Picture: Steve Roberts, Commercial Director

Fripp Design was formed in 2005 by Steve Roberts and Tom Fripp. It's mission is to design, develop and prototype product ideas, in house; licensing volume manufacture to a third party. The company designs products that solve quantifiable problems i.e. has understandable value to those that need it; Fripp designs 'essential to have', rather than 'nice to have' products.

In 2007, Neil Frewer was recruited to significantly enhance the design effort; both Tom and Neil are Masters Graduates in product design and rapid prototyping from Sheffield Hallam University; one of the UK's best Universities for Product Design.

Fripp Design is based in the Innovation Technology Centre on the Advanced Manufacturing Park. Being located at the ITC has been significant to Fripp Design's business development. As the high technology incubator in the region, Fripp Design has gained access to many similar sized and like minded businesses which has accelerated many of the product developments in hand.

Fripp Design owns and operates high tech rapid prototyping technologies that enable the company to rapid manufacture new product ideas for assessment both internally and externally. This has led to a strategically important alliance with Sheffield University on the application of Rapid Manufacturing techniques in health care provision. The company hopes to announce a new breakthrough in the making of soft tissue prosthetics later this year.

As a high technology start up, Fripp Design is, without doubt, in one of the best locations in the UK to build a successful Product Design company utilising the latest technologies in design and manufacture. The local Universities have the intellectual knowledge and expertise to help fast track ideas. Yorkshire Forward, through its investment in the ITC and AMP have created an environment were young companies can 'fast track' their business development in a dynamic and creative environment.

And what does 'Made in Sheffield' mean in the 21st Century for Fripp Design? It is about creating high value jobs, creating Intellectual Property and wealth for the local economy by exploiting new ways and methods of designing and manufacturing.

Case study 7: Gripple – 20 Years Young

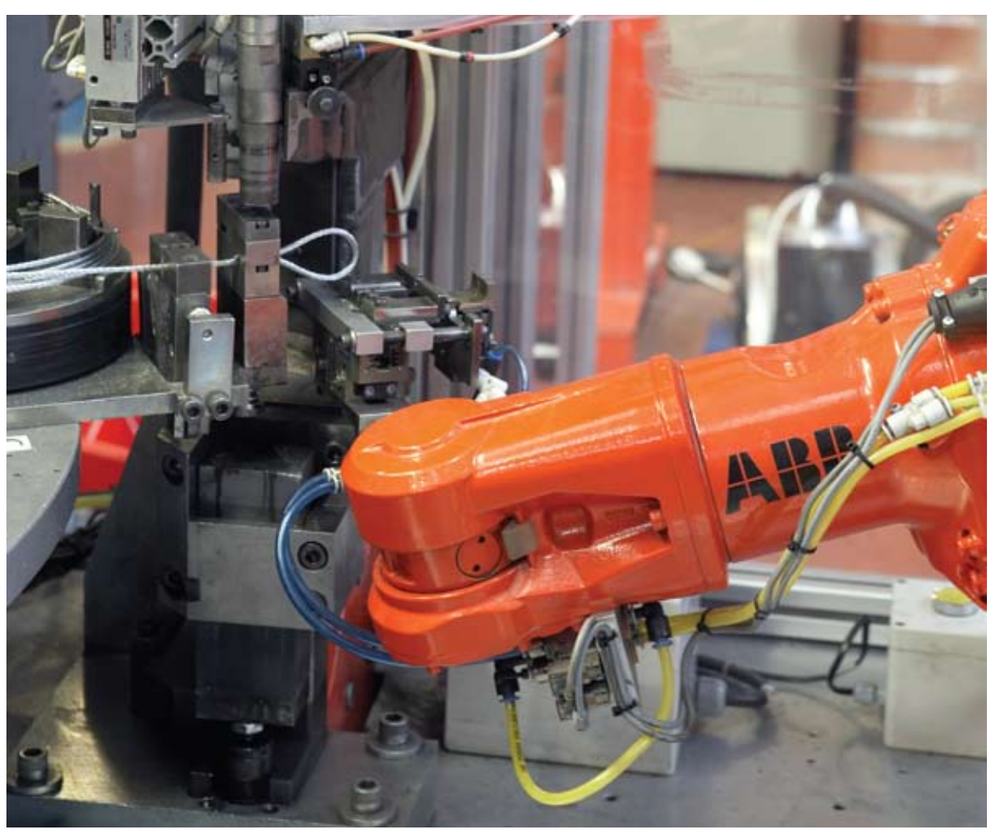
Picture: Mark Edwards, Managing Director

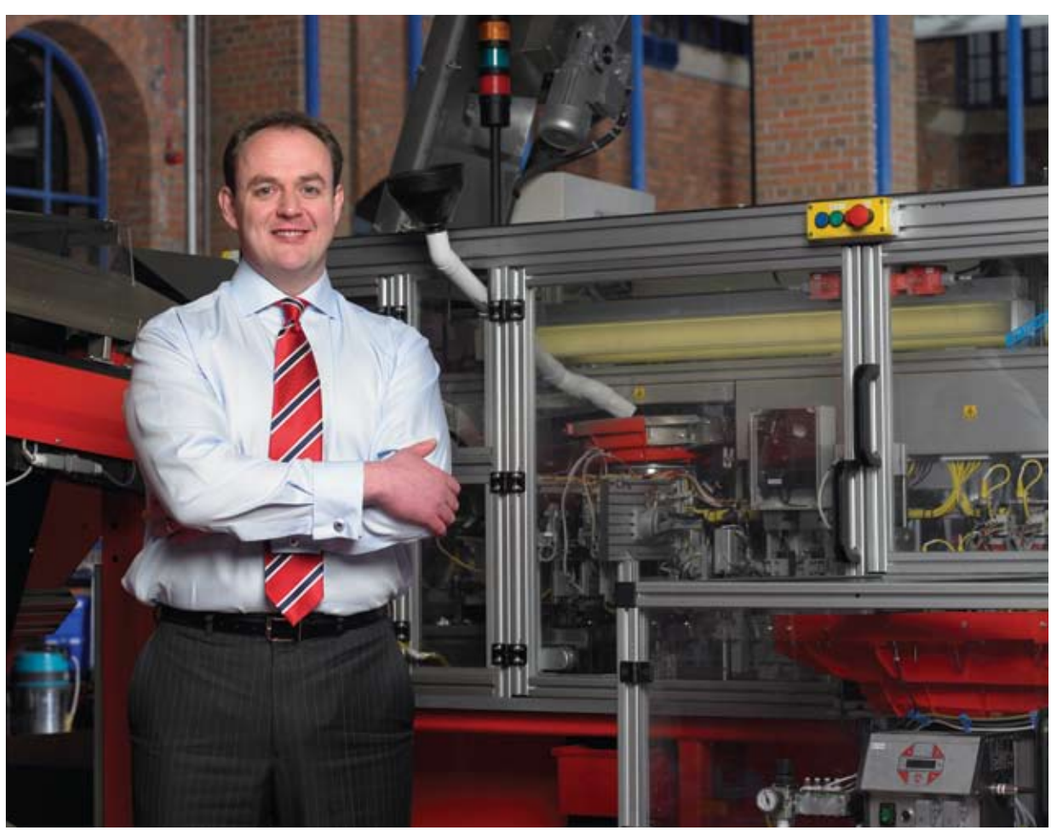
Gripple was founded in 1988 by Hugh Facey, its long standing Chairman. Now in it's 20th year, the company will produce over 30 million 'Gripples' annually for the joining and tensioning of wire in agricultural applications, and for suspending overhead services in industrial and commercial buildings.

The original Gripple was developed in response to a need articulated by a Welsh hill farmer for a quick and secure means of joining field fencing. Hugh Facey developed the 'Gripple', and amazingly, the first prototype actually worked! After some refinement and brand development (a Gripple is so-called because it both 'grips' and 'pulls' the wire – Grip, pull = Gripple!) the product was launched in the UK. Within three years, Gripples were being sold across Europe's fields and also in vineyards where they are used to terminate and tension trellising wires.

It was the ability to take an idea and turn that vision into a reality that launched the Gripple, and it was similar inspiration that saw a whole new avenue open up in the mid 1990's. By turning the Gripple through 90 degrees and combining it with steel wire rope, Hugh found that it was possible to make a suspension system, capable of supporting very substantial loads. This launched a new development process, which gave rise to the range of Gripple suspension systems, which are now sold into the construction industry worldwide. In order to better serve this industry sector, two international offices were opened in Strasbourg and Chicago, facilities that now employ over 80 people.

Gripple now employs in excess of 250 people worldwide, and sells its products in over 80 countries. The secret of Gripple's success is no secret at all, and it starts with people. The majority of Gripple employees are shareholders, and therefore part owners of the business. All are salaried, none are hourly paid, and no employee, not even the Chairman is locked away in an office. All three sites – Sheffield, Strasbourg and Chicago are completely open plan. This team environment, and a never ending search for innovative solutions to everyday problems has brought Gripple to sales in excess of £20m and an Olympic goal of £60m sales by 2012.
The story continues…..





Part One: The structure of the manufacturing industry

Part One: The structure of the manufacturing industry

Sheffield has long been established as a manufacturing economy. It enjoyed world renown as a steel producer and was home to numerous innovations including the crucible process and stainless steel.
From the late 1970s, Sheffield has seen rapid de-industrialisation with huge job losses. Approximately 100,000 jobs have been displaced in the manufacturing sector over the period 1971-2001; 73,000 of which were based in the metals industry.

Today the Sheffield economy is performing well, unemployment is at national levels and growth in GVA is comparable to other Core Cities. Sectoral analysis indicates that Sheffield is successfully diversifying its economic structure, while retaining a strong core of manufacturing capability.

Structure and location

Sheffield's manufacturing industry employs 29,900 people and has 1,600 manufacturing businesses.

The structure of the industry has been heavily weighted towards small and medium sized manufacturers and this pattern has been reinforced over recent years due to the loss of several large and medium sized manufacturers.

See Fig. 1

The majority of Sheffield's manufacturing employment and businesses are based in and around the Central and Don Valley Area; 57% of employment and 46% of manufacturing businesses can be accounted to this central region.

The table below shows the percentage of manufacturing employment and businesses in the Lower & Upper Don Valley areas, Central Riverside and the City Centre. These areas are also clearly visible in the following maps.

See Fig. 2

Fig. 1 – Structure of Sheffield's Manufacturing Industry

Sheffield Manufacturing Businesses		
Size Band	1998	2006
1–10 employees	65%	74%
11–49 employees	25%	19%
50–199 employees	8%	6%
200 or more employees	2%	1%
Total	1,700	1,600

Fig. 2 – Location of Manufacturing

ABI 2005	Sheffield	LDV%	UDV%	CR%	CC%	Total	Other
Manufacturing Employment	31800	35%	13%	6%	4%	58%	42%
Manufacturing Businesses	1600	25%	7%	8%	6%	46%	54%

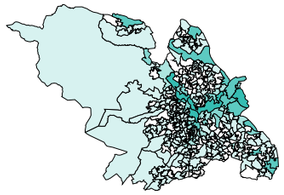
*all figures are rounded to nearest 100 for confidentiality (ABI guidelines)

These areas present a V-structure spanning Sheffield, and form the base of a 'tick' shape that extends into the so-called Sheffield/ Rotherham Axis.

Firms in the Upper & Lower Don Valley area tend to be larger, with high employment concentrations. The data also suggests that manufacturing firms in Central Riverside are significantly smaller, with City Centre firms being the smallest throughout Sheffield.

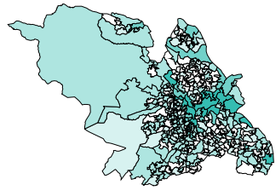
The remaining 54% of manufacturing businesses are comparatively small and relatively evenly spread throughout Sheffield. There are several more concentrated pockets of manufacturing business and employment, for example at Stocksbridge, Ecclesfield and the Holbrook estate. There is also a peripheral clustering of firms on the Sheffield / Rotherham border, reflecting the importance of Rotherham's manufacturing sector to Sheffield.

Distribution of Manufacturing Employment



Employees in Manufacturing	
1–10 employees	65%
11–49 employees	25%
50–199 employees	8%
200 or more employees	2%

Distribution of Manufacturing Businesses



Manufacturing Businesses	
1–10 employees	65%
11–49 employees	25%
50–199 employees	8%
200 or more employees	2%

The maps are based on Super Output Areas (SOA); they show the number of manufacturing jobs / businesses in each SOA area, with the deeper colours indicating a higher density of businesses / jobs[2].

Inter-linkages with the Sheffield City Region

The manufacturing industry in Sheffield sits at the centre of an agglomeration of manufacturing expertise and knowledge which spreads across South Yorkshire and into the bordering areas of North Nottinghamshire and North East Derbyshire. This area is described as the Sheffield City Region.

The Sheffield City Region, and in particular the relationship with Rotherham, are of significant importance to the Sheffield manufacturing industry.

In the City Region manufacturing activity accounts for around 15.5% of jobs. With the exception of Doncaster, the density of manufacturing employment is higher in all other City Region districts than it is in Sheffield. This is an indication that the linkages between the City Region authorities are strong.

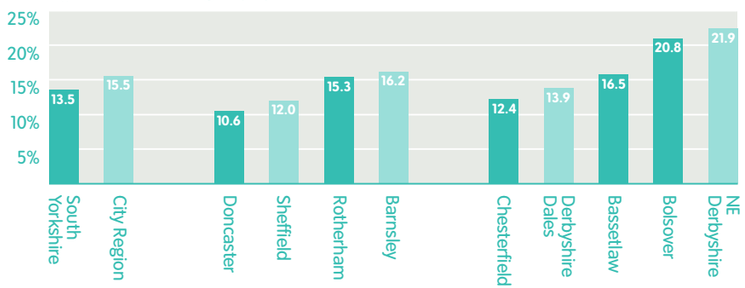
See Fig. 3

Analysis[3] shows that Sheffield residents filled only two-thirds of Sheffield manufacturing jobs. The biggest inflow of workers is from Rotherham, accounting for 14% of Sheffield manufacturing jobs. Chesterfield and North East Derbyshire provided a further 5% between them and Barnsley 4%. Applying these percentage flows to the latest data, it can be estimated that approximately 9,000 people travel to work in Sheffield's manufacturing industry today.

Sheffield residents also travel to work in the South Yorkshire and the City Region manufacturing industry; 22% in total (of manufacturing workers who live in Sheffield). Again, the strongest manufacturing employment linkages are with Rotherham, with 7.8% of Sheffield residents (who work in manufacturing) travelling to work there. Most of the districts surrounding Sheffield had a larger flow of manufacturing employment travelling into Sheffield compared to those travelling out of Sheffield, a ratio of 2:1 being fairly typical.

This analysis highlights the strong inter-relationship between the Sheffield Rotherham manufacturing economies, and furthermore the interdependence of the City Region's manufacturing industry.

Fig. 3 – Manufacturing Employment in the Sheffield area



2 businesses/employment could be located anywhere within the SOA – the map does not indicate precise locations.
3 Based on the 2001 census

The Sheffield Rotherham manufacturing cluster

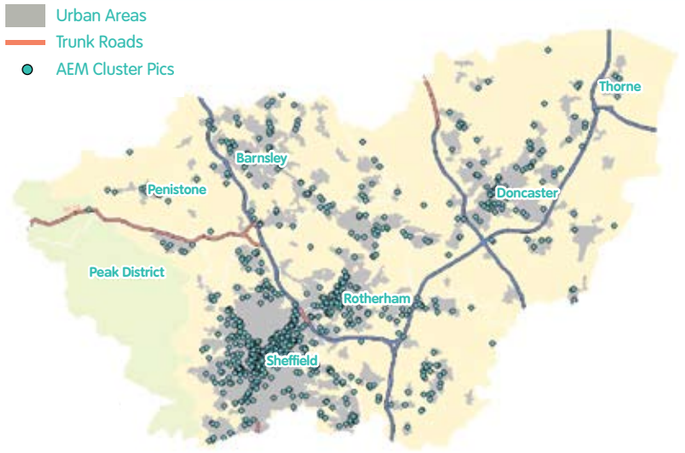
Research into the integrated nature of their respective economies, commissioned by Sheffield and Rotherham local authorities, showed evidence that Sheffield and Rotherham can legitimately be seen as a single functioning economy. The evidence was illustrated most strongly in the manufacturing industry, where the results showed strong sectoral complementarities between the two economies in the composition of their manufacturing industry. For example, Sheffield's top 11 sectors that purchase most intensively from suppliers in Rotherham are all metal-based manufacturers.

The most strongly linked of these sectors produce finished metal products such as cutting tools, medical equipment or office machinery. There are also strong links with producers of component and intermediate metal goods such as forgings and castings. Further analysis of Rotherham sectors selling to Sheffield, demonstrates that iron and steel are by far the leading input into Sheffield.

The analysis concludes that Sheffield and Rotherham have a 'common clustering of advanced engineering and metals manufacturing activity'.

Further research into identified Advanced Engineering and Materials cluster, highlighted that its presence in Sheffield and Rotherham makes it one of the largest AEM clusters in the UK in terms of both employment and the number of businesses.

This agglomeration of skills and business, spearheaded by Universities, has attracted some of the world's most prestigious companies, most notably Boeing at the Advanced Manufacturing Research Centre at the Advanced Manufacturing Park on the Sheffield / Rotherham Border.



Map produced by YF, taken from SY SEA, based on AEM Businesses

The Advanced Manufacturing Park

The Advanced Manufacturing Park (AMP) is a world-class manufacturing technology park providing advanced manufacturing technology solutions to ensure repetitive advantage for industry. In just four years it has already made an impact by bringing business to the UK from global technology companies such as Boeing, Rolls-Royce and Alcoa.

Technologies on the AMP centre on materials and structures, covering metallic and composite materials; typically used in precision industries including: aerospace, automotive, sport, environmental and energy, oil and gas, defence and construction.

Technology developed on the Park is already being utilised in leading edge projects in the aerospace, automotive, motorsport and defence industries; such as the next generation of military and commercial aircraft, including the Boeing 787 and within Formula One. The impact these businesses have made to the economy has been far-reaching and the continuing success of this world-class technology park is vital not only to the region, but to the entire UK.

The vision for the AMP emerged from the decline that South Yorkshire had seen in its traditional industries of coal and steel over the last 20 years. Despite this decline the region has retained established skills and knowledge in the areas of advanced manufacturing, backed by materials research expertise within the two Sheffield universities, and other independent research organisations.

A joint venture was created between Yorkshire Forward and UK Coal to reclaim land on the former opencast colliery at Waverley, Rotherham and to develop the AMP. Monies from the European Union's European Regional Development Fund have also supported the project.

The AMP is fast becoming a magnet for organisations in the areas of advanced manufacturing technology. Key to the attraction of locating on the AMP is the fact that it provides companies with:

- the ability to harness manufacturing innovation through collaboration between industry and research, including the region's world-class universities;
- access to internationally renowned materials technology research centres;
- outstanding skills base in a region providing the highest number of engineers in the UK;
- unrivalled supply chain which boasts leading companies in the forging, machining, casting and coating of aerospace components;
- a high quality business environment.

Investors to the Park are assisted by skilled and highly experienced advisers, providing a fast, accurate and free service, taking potential investors from initial enquiry to comprehensive aftercare.

There are a number of future projects under development for the AMP. These include:

- Environmental Energy Technology Centre;
- Flexible Manufacturing Space.

These developments plus the continued work of the technology organisations associated with the Park will ensure that the AMP continues to be an asset to the region and the UK for years to come.

Advanced Manufacturing Research Centre

The Advanced Manufacturing Research Centre with Boeing (AMRC) is a £multimillion partnership which builds on the shared scientific excellence, expertise and technological innovation of the world's leading aerospace company and the world-class research within the University of Sheffield's Faculty of Engineering.

The AMRC has established itself as a world-class global research facility developing innovative and advanced technology solutions for advanced materials forming. Building upon Sheffield's historic and indigenous expertise in metal development and processing, the University, Boeing and the AMRC are also keen to now develop their internationally acknowledged research into other materials such as composites. Novel and new materials will form an integral part within the development of Boeing's new generation of planes.

The AMRC applies scientific theory, imagination and manufacturing principles to solve advanced manufacturing problems. The AMRC is tangible evidence of what is possible when industry, academia and Government co-operate to deliver pragmatic economic, educational and environmental solutions benefiting everyone.

The AMRC was the anchor tenant on the Advanced Manufacturing Park with its official opening taking place in July 2004. Since then, the AMRC has grown from two sponsors to 34 and helped to bring investment to the region by developing local manufacturing capabilities.

The AMRC focuses on six key-core research competencies; Tool Wear; Industrial Psychology; Modelling; Surface Integrity; Dynamics; and Material Science. The AMRC's capabilities are dedicated to helping companies improve profitability by optimizing the application of manufacturing technology. Any company or organisation can gain full access to support services offered by the AMRC by becoming a sponsor. The AMRC has access to the latest machines, tools, and software available. Its capabilities are fully committed to applying traditional and experimental scientific principles for solving manufacturing challenges.

The AMRC has recently expanded into the new 'The Factory of the Future'. This will house the latest manufacturing equipment and 'state of the art' production capabilities to enable businesses to trial new developments in a full-scale commercial production capacity, before making significant and high-risk investment decisions.

Information Communications Technology (ICT) and 'virtual' manufacturing will be key components of the new facility, as will alternative manufacturing methods, such as additive manufacturing processes which grow 3-dimensional parts – considerably reducing material waste and increasing design flexibility.

The facility building will be 4,200 sq.m. and distinctive in its architecture. It has been designed as national exemplar of 'sustainable' – or environmentally friendly – building development. The facility is expected to be of significant interest to regional companies in the aerospace, automotive and medical sectors. It is also projected to attract investment partners from around the globe and will build an international reputation for manufacturing excellence. One of the early objectives for the facility will be to ensure that Yorkshire and Humber-based suppliers are selected as preferred partners to these companies.

Castings Technology International

Castings Technology International (Cti) is Europe's leading centre of excellence dedicated to providing independent R&D, technical support and consultancy services to the castings and metal related industry. It opened its new headquarters on the AMP in March 2006.

As a Research and Technology Organisation (RTO) with 105 technical personnel and an annual budget of over £7 million, the organisation has a worldwide membership of approximately 300 companies in 40 countries, which includes casting producers, their suppliers and castings users.

Areas of expertise include the design of castings, materials selection, specifications, manufacture, quality control, inspection and testing, and component performance. It has a wide range of expertise, facilities and resources geared towards practical development work. They include comprehensive solid modelling, stress analysis, casting simulation and computer-aided machining software facilities. Cti has a pattern shop equipped with state of the art machining centres, rapid prototyping machines and foundries producing ferrous, non-ferrous, titanium and superalloy castings by air and vacuum melting techniques, together with extensive experience in metallurgical processing and materials.

Cti staff offer a vast range of expertise with specialist casting designers, mechanical and design engineers, metallurgists and ceramicists. Interaction between these specialists means that project teams are readily formed to provide rapid responses to customer demands, and has given Cti a well-proven reputation for reliable delivery of services, products and data, on time and on budget.

Cti has recently announced plans for further expansion at the AMP. Construction has begun on a 40,000 sq.ft. building adjacent to the existing headquarters building. The £4.7 million project will increase Cti's presence on the AMP to over 90,000 sq.ft. by completion of construction later this year.

The new facility will house additional R&D equipment, production-scale 'technology demonstrators' and a major investment in state of the art equipment to finish, inspect and certify castings to the highest integrity standards required by industrial clients.

The confidence to undertake another major investment on the AMP so soon reflects the success Cti have achieved in recent years and especially since moving onto the Park. Product development activity has grown significantly and projections for the next three years envisage further growth. This will ensure a sustainable future for Cti as one of the world's leading centres for research, technology and services relevant to casting supply chains and new markets.

TWI Limited

TWI is one of the world's foremost independent research and technology organisations.
TWI moved into the purpose built Technology Centre on the AMP in December 2005.The two main technologies housed within the Centre are laser processing and friction stir welding.

TWI provides industry with engineering solutions in structures incorporating joining and associated technologies (surfacing, coating, packaging, cutting, etc). It is the only single source of expertise in every aspect of joining technology for engineering materials – metals, plastics, ceramics, composites and electronic assemblies. TWI's expertise covers materials properties and applications; joining, fabricating and assembling technologies; and manufacturing management.

TWI Yorkshire runs one of the most powerful friction stir welding machines in the world, with the ability to weld sections up to 200mm thick in one pass. In addition to this, a friction stir welding machine with a high concentricity welding head has allowed TWI to develop tools and procedures suitable for joining materials of high melting temperature.
The RoboStir™ robotic friction stir welding machine allows TWI to develop 3D welding techniques and applications.

Future Developments to the AMP

Environmental Energy Technology Centre (EETC)
The EETC is to be built as a second wing to the Innovation Technology Centre (ITC) on the AMP. Its aim is to provide an environment where future energy technologies can be developed more effectively and quickly. This will enable developers to test out ideas and prove them. To assist in this the building will have a mini energy grid. The building will provide an opportunity to demonstrate practical current sustainable energy technology, while also providing a showcase for emerging technologies. Construction of the building is scheduled for completion by late 2008.

Flexible Manufacturing Space
The Flexible Manufacturing Space is a 95,000 sq.ft. development of quality industrial and hybrid accommodation. Hybrid units will be available from 3,000 sq.ft., while the industrial units are larger, from 10,000 - 24,000 sq.ft.

These units are suitable for use as research facilities or for light manufacturing activity. They will attract start-up and high growth organisations requiring more space than is currently available at the ITC. Construction of the FMS will be completed by late summer 2008.

Dormer Tools – part of the Swedish-based Sandvik Group has signed up to build a new 20,000 sq ft state of the art facility as part of this development. The new multi-million pound home for Dormer in the UK will feature:

- a major research and development facility, which in collaboration with partner organisations such as the University of Sheffield will see Dormer push back the boundaries of tool design;
- a custom-built international standard training centre;
- global corporate functions such as IT, sales and marketing and product management;
- an international export service to support emerging and developing markets.

The exciting venture will capitalise on the engineering and management expertise of the region and also benefit from a large investment in a strengthened Research and Development facility – a cornerstone of Dormer success as a global brand.

A key focus will be the development of new tools for machining of advanced aerospace materials, high performance drilling and specialist applications in sectors such as motorsport and medical equipment.

Part Two: The sectoral composition of the manufacturing industry

Part Two: The sectoral composition of the manufacturing industry

Policy Context

Currently, the policy framework around manufacturing is primarily cluster-based. Cluster theory is based on the premise that the more geographically localised an industry is, the more internationally competitive that industry will be – through access to specialised inputs and employees, enhanced access to information and institutions, creating competition and stimulating new business.

At present, Yorkshire Forward has prioritised seven regional clusters in the Yorkshire and Humber area. These are mainstreamed through the Regional Economic Strategy, specifically Objective 2 – Competitive Business. The Cluster Strategy led by Yorkshire Forward identifies 'Advanced Engineering and Metals' (AEM) as a key cluster for the regional economy.

Outside cluster policy, the manufacturing industry is also subject to a UK Manufacturing Strategy. The policy identifies seven[4] 'pillars of activity' to support the manufacturing industry.

These seven pillars, identified by Government, are the focus of a regional Manufacturing Action Plan, deliverable through Yorkshire Forward's Regional Economic Strategy. Delivery is backed up by the Manufacturing Advisory Service which aims to help manufacturers improve their productivity and efficiency by providing advice, information and 'hands on' specialist manufacturing help. This region has the Yorkshire and Humber Manufacturing Advisory Service, which is one of the best performing in the country.

Clusters

The manufacturing industry can be broken down in various ways, for example by sector, cluster or market, and at various levels of detail – broad industry to Standard Industrial Code level 4. Reflecting current policy, this report will look at a cluster breakdown of the manufacturing industry, utilising regional cluster definitions. This will be supplemented with some further detailed market analysis where appropriate.

Although the majority of manufacturing employment can be attributed to the Advanced Engineering and Metals Cluster, there are key elements of manufacturing in all clusters. The table below shows the proportion of Sheffield's manufacturing industry serving each cluster.

See Figs 4 & 5

The AEM cluster accounts for more than half of Sheffield's manufacturing businesses and almost 60% of manufacturing employment.

Approximately 10% of manufacturing employment services the food cluster and creative and digital industries. However the figures show that the composition of manufacturing in these clusters is very diverse. Whereas only 3.2% of manufacturing business serves the food cluster, creative and digital accounts for nearly 17% of manufacturing businesses.

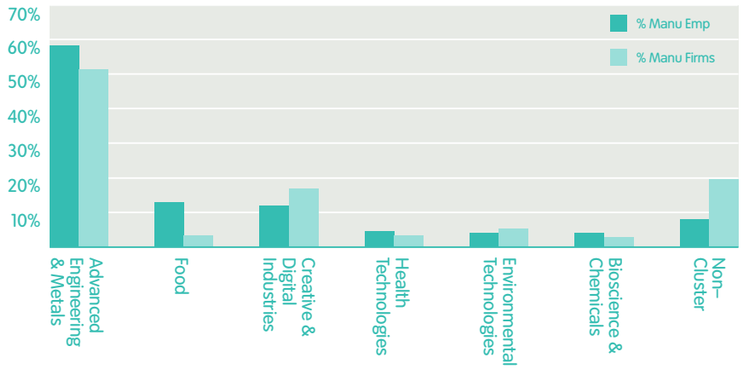
The health technologies cluster, environmental technologies and bioscience and chemicals clusters each account for up to 5% of manufacturing employment and businesses.

Approximately 9% of Sheffield's manufacturing industry does not 'fit' into cluster definitions. This highlights the fact that any cluster policies undertaken regionally or locally may fail to include or engage with all manufacturers.

Fig. 4 – Manufacturing industry disaggregated by cluster

Regional Clusters	Employees	Firms	% Manu Emp	% Manu Firms
AEM	17250	820	57.6%	51.9%
Food	3700	50	12.5%	3.2%
Creative & Digital Industries	3500	270	11.7%	16.9%
Health Technologies	1300	40	4.3%	2.6%
Environmental Technologies	900	70	3.0%	4.5%
Bioscience & Chemicals	1000	25	3.2%	1.5%
Non-Cluster	2350	310	7.8%	19.4%

Fig. 5 – Manufacturing Employment by Cluster



4 Macroeconomic Stability, Investment, Science and Innovation, Best Practice, Raising Skills and Education Levels, Modern Infrastructure and The Right Market Framework

Advanced Engineering & Metals

6.9% (17,250) of Sheffield's total employment and 4.8% (820) of its businesses are classifiable as Advanced Engineering and Metals – more than half the manufacturing industry in Sheffield.

This represents a significantly higher density of AEM employment and business than both the Yorkshire and Humber region and the national average. What's more, Sheffield alone accounts for 17% of AEM regional employment and 15% of its AEM businesses. Equivalent calculations based on the Sheffield & Rotherham AEM cluster increase the contribution to 25% and 21% respectively.

The graphs below illustrate the sectoral activities which make up the AEM cluster in Sheffield.

The sector make-up of the AEM cluster in Sheffield covers several important areas of manufacturing, namely: metals and machinery, medical equipment and transport equipment – e.g. aerospace.

The contrast in the business and employment make-up of the AEM sectors is revealing in that we can infer sector characteristics from the data. For example, only 6% of manufacturing businesses are in 'basic metals', but 20% of manufacturing employment can be attributed to this sector – so we know that several large employers dominate this sector.

Key Markets in AEM Cluster

Metals & Machinery

The term Metals and Machinery refers to three types of activity:

Basic Metals – This sector refers to the manufacture of metals and first order processing such as casting, rolling and drawing. This sector is significant in terms of employment (4,000) but represents only a small proportion of larger firms. Basic Metals has experienced a decline of 40% over the last few years but has recently seen a slowdown in the rate of decline.

Fabricated Metal Products – This sector includes the manufacture of metal structure, parts and products (cutlery and tools) and processes such as forging, pressing, stamping. This is the dominant activity in the AEM cluster and in the Sheffield manufacturing industry as a whole, accounting for almost 10,000 jobs and 500 firms. Employment levels have fallen considerably from 1998, although again the data shows more stability in recent years.

Machinery and Equipment – Machinery and machine tools are used in manufacturing virtually all products. Therefore a large manufacturing sector in Sheffield and the wider region will naturally feed into a substantial market for machinery. The sector employs 2,900 people and accounts for 150 businesses, but has been declining quickly over the last few years (33% over 98-05).

The metal industry is long established in Sheffield. The forging and casting of metals is one of the UK's internationally competitive industries[5], with a large export market and world leading innovations and development which have given the industry a direct feed into 'high value' markets such as aerospace and medical devices.

The Sheffield area has a real strength in the metals market. The local knowledge stock in metals is unrivalled, with an established manufacturing infrastructure hosting several UK major specialist research facilities and international firms such as Boeing and Rolls Royce.

At present the UK metals industry is strong, and this is being translated into the local economy. In recent years, Sheffield's 'Special Steel Company' has been ranked 1st in the 'Top 100 SME Companies – Listings by Turnover' for the South Yorkshire area[6]. The manufacturing sector has the largest presence in this listing and "as a group have had a very good year with turnover, profits and employment up by 13%, 33% and 3% respectively. This has essentially been driven by metals companies."[7]

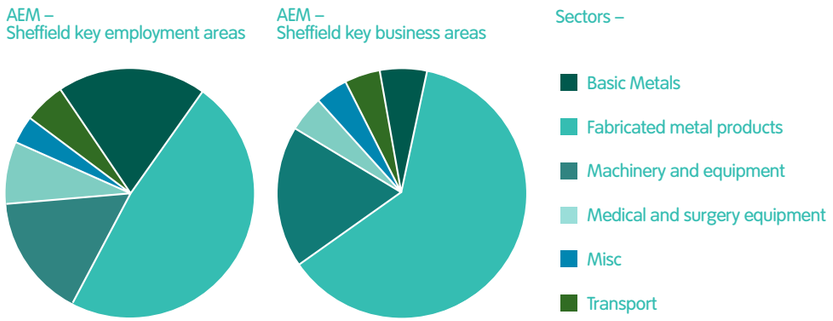
Medical Equipment

Sheffield's medical and surgical equipment market is nationally significant, and is growing (Location Quotient 4.5 – where 1 equals national average). The market accounts for 1,300 jobs and 40 businesses, which equates to around a quarter of the regional market.

Over the period 1998-2006 growth has been stronger than nationally, increasing by around half, with particularly strong growth in 2004-2005. The industry is structured around several larger firms (1,000 jobs) and numerous SME's (400 jobs) supplying orthopaedic forgings and castings, specialist steel alloys, coatings and testing services for the human implant and instruments market. As it is primarily steel-based, the medical equipment cluster in Yorkshire and Humber is differentiated from other medical clusters, and thus benefits from the Sheffield area's specialist manufacturing infrastructure.

Forecasts for this market in Sheffield predict strong growth in output over the period 2006-2016. However, while prospects in this industry are strong, the market is not large and so scope for employment growth will be limited.

Fig. 6 – Manufacturing Employment & Business in AEM Markets



5 DTI Business Clusters in the UK: A First Assessment 2001
6 Includes Chesterfield
7 Sheffield Star – Business Supplement

The industry forms part of the regional 'Healthcare Technologies' cluster, which combines the pharmaceuticals and medical devices industry. The region benefits from a large number of hospitals and nine universities with internationally renowned specialist centres of excellence. 'Medilink' represents a collaboration between industry, academia and hospitals and Sheffield University plays a supporting role in this organisation. Sheffield is also home to some world leading companies in the healthcare sector.

Medilink (Yorkshire & the Humber) Ltd is a membership-based professional association which services medical technology companies, hospitals and universities within the Yorkshire & Humber region of the UK. It also provides a gateway for national and international clients interested in developing relationships (commercial, research or clinical) with the region's medical sector.

B.Braun Medical Ltd is a member of the B. Braun Group, one of the world's leading healthcare companies, and has its UK headquarters in Sheffield. B.Braun offers healthcare professionals and hospitals an outstanding range of products from world renowned surgical instruments, innovative implants and therapeutic systems to a leading range of specialist services.

Aerospace

Cluster mapping by Yorkshire Forward suggests that Sheffield firms make up 36%[1] of aerospace suppliers, equating to approximately 100 firms.

Standard data sources do not reflect the true extent of the aerospace capabilities of Sheffield's manufacturing industry. This underestimate can be attributed to the nature of the supply chain in this particular market. Aerospace suppliers in Sheffield tend to service more than one market, and so may not be categorised formally as 'aerospace' in the data. However, research into the aerospace cluster, commissioned by Yorkshire Forward in 2003, suggested that a significant supply chain of 252 firms in the region recognised themselves as servicing the aerospace industry. Few stated that this was the only market they supplied.

The research described that, "Yorkshire appears to concentrate on the supply of metals-related products and services to the 'airframe' (e.g. BAE systems) and aerospace engine (e.g. Rolls Royce) sub sectors, with few products or sales for aerospace 'equipment' sector."

It describes the supply chain as having a small number of specialist aerospace firms, a larger number of broadly-based engineering and metal firms for which aerospace is one of several markets and a number of generic 'site and service' suppliers.

The research also takes a geographic look at the supply chain and gives evidence that Sheffield has a significant aerospace supply chain; approximately 36% of the regional supply chain can be found in Sheffield.

Yorkshire also has a real economic asset in this market through the Advanced Manufacturing Research Centre, partnered by Sheffield University and Boeing.

The National Metals Technology Centre

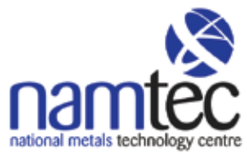
The National Metals Technology Centre (NAMTEC) is the UK's research and skills centre for metals technology. NAMTEC's aim is to enhance the competitiveness of the UK's metals and manufacturing sector through research and development, stimulating high technology innovation, creating greater awareness of technological developments and enhancing the higher level skills base within industry.

NAMTEC was established in 2002 as a not for profit organisation. Located at Swinden House, in the heart of South Yorkshire's metals and manufacturing industry, NAMTEC was charged with providing knowledge transfer and technical support services to metals and manufacturing companies, both in the region and across the UK. In 2005, NAMTEC was expanded to provide 'training' and 'research and development' services to the metals and manufacturing sector, alongside its existing knowledge transfer activities. With a team of highly qualified staff, and access to world-leading metals and engineering research facilities, NAMTEC has provided extensive support to a wide range of companies across the sub-region.

Over the last five years NAMTEC has established itself as a major national body within the metals and manufacturing sector, and represents the interests of small, medium and large companies throughout the supply chain. Following further growth during 2007-8 NAMTEC now provides a wide range of support services in the sub-region; including the provision of membership and technical services, technical training and research & development programmes.

Since its inception NAMTEC has worked in close partnership with Yorkshire Forward, Objective1 (South Yorkshire) and the Learning & Skills Council to deliver over £40m worth of business sales, to create and safeguard over 1,300 jobs and deliver 900 learning opportunities.

www.namtec.co.uk



Key Clusters served by the manufacturing industry

As the Advanced Engineering and Materials cluster makes up the largest part of the manufacturing industry, other specialisms in the industry can often be overlooked. However the data shows that the manufacturing industry feeds into all seven clusters identified by Yorkshire Forward.

Food
Manufacturing in the food cluster accounts for 12.5% of Sheffield's manufacturing employment, approximately 3,700 jobs. This cluster is one of the region's UK significant sectors – with Yorkshire and the Humber being one of largest food producing regions in the UK. Sheffield, however, plays a relatively small role in this cluster.

The sector is relatively stable and is dominated by a small number of larger companies. Forecast data suggests that the cluster will experience a modest increase in output and a modest decline in employment over the period 2006-2016.

Creative and Digital Industries
This cluster is primarily service based. Manufacturing accounts for around 27% (3,500 jobs) of CDI employment, playing a part in markets such as publishing and printing and the manufacture of television, radio and other electronic equipment.

The manufacturing element of this sector has been growing in recent years, and the cluster as a whole has performed well.

Chemicals and Bioscience[8]
Bioscience is an emergent and growing 'young' cluster and is particularly strong in Sheffield. The cluster has many strengths upon which it can build, including new incubator facilities and strong universities.

The University of Sheffield has currently spun-out ten bioscience companies and has internationally recognised tissue engineering research, and the recently created Centre for Stem Cell Biology. These are complemented by research in both clinical and pure sciences. Sheffield Hallam University's Biomedical Research Centre is a specialist facility focused on clinically relevant basic research relating to Chronic Inflammatory and Degenerative Diseases and their therapies.

Although data based on industry codes does not give a full representation, it indicates that approximately 1,000 jobs are accountable to this cluster. Growth over the period 1998-2005 has been primarily through the expansion of the current business base, which is relatively small.

Environmental Technologies
In Sheffield, manufacturing accounts for approximately 10% of this cluster, representing around 1,100 manufacturing jobs. Key markets are the recycling of scrap metals and the manufacture of electrical distribution and control equipment. Environmental Technologies manufacturing has remained relatively stable – with some nominal business growth (firm base is made up of small firms).

Non-Cluster
The manufacturing markets that are not covered by cluster definitions primarily supply chain markets to the construction and building industry, including building apparel and plastics. There is also a modest glass market, but this has been in heavy decline.

8 Information for this cluster is based on the South Yorkshire Strategic Economic Assessment

Part Three: How has the industry performed?

Part Three: How has the industry performed?

In the UK, manufacturing has seen a stronger performance in recent years. This is due to its improved competitiveness – manufacturers are moving to higher value activities, establishing their competitive advantage by research and design, technology, efficiency, highly skilled labour and service provision.

This change in the composition of manufacturing activity, away from a purely production focus, is the key to its future success. Economically this change has put the industry back into the core of the economy, as manufacturing grows its ability to generate wealth and competitiveness. This is nowhere more true than in the Sheffield area.

Economic Performance

Employment

Currently the manufacturing industry accounts for 29,900 jobs in Sheffield, approximately 12% of employment. This compares to 10.9% nationally and gives Sheffield the highest manufacturing representation among the Core Cities.[9]

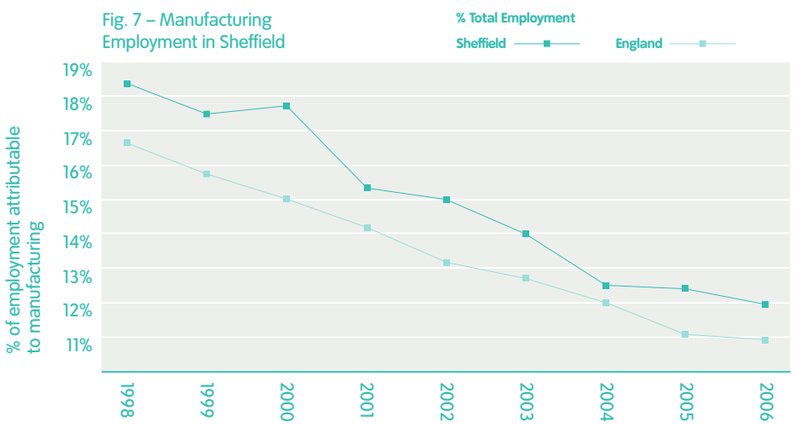
Until 2005 the decline in manufacturing employment had exhibited no signs of slowing, and the industry had shed 25% of its workforce during the period 1998-2004. Over this period Sheffield had seen a faster rate of decline than the national average, but since 2005 this trend has changed. As the data shows, decline has slowed considerably during 2005-2006 and this trend is predicted to continue.

See Fig. 7

The slowing of employment decline can be attributed mainly to the expansion of SME manufacturers in expanding markets such as medical equipment, aerospace and their supporting supply chain. As SME growth accelerates and larger firms in the area complete their rationalisation, this flattening out is set to continue.

While the long-term future of the industry will involve a smaller workforce, the changing composition of the industry and the need to replace an ageing employment profile will mean that manufacturing industry across Sheffield City Region will be looking to source a new generation of workers.

Fig. 7 – Manufacturing Employment in Sheffield



9 Sheffield, Birmingham, Leeds, Nottingham, Bristol, Newcastle, Liverpool, Manchester

Gross Value Added

In the wider economy, the success of the manufacturing industry is often measured by its ability to generate employment. Thus employment decline within manufacturing has led to a prolonged perception of an industry in decline.

This report argues that the function of the manufacturing industry is primarily to create and produce output, through the application of technology and process, and thus it is on these merits that the industry should be assessed. A judgement based purely on employment does not give a true reflection of the contribution manufacturing makes to the local economy.

The following evidence is of crucial importance to this argument as it clearly shows that, despite employment decline of 25%, the economic output generated by the manufacturing industry in South Yorkshire[10] has increased.

Over the last ten years Gross Value Added in South Yorkshire has increased by 12%, almost double the growth seen nationally. Putting this performance in the context of the large employment decline seen over the same period further highlights the strength of the industry in South Yorkshire – in effect it has achieved jobless growth.

See Fig. 8

In addition to the growth seen in the industry, GVA also gives a direct measure of the contribution the manufacturing industry makes to the local economy. In 2004 South Yorkshire's manufacturing industry accounted for 18% of GVA. This is a contribution of approximately £3 billion to the region's GVA. This represents 4% more than the national figures and is much greater than the 12% employment share – indicating that the manufacturing industry has a substantial GVA per worker ratio in comparison to other sectors.

Productivity

In comparison to other sub-regions South Yorkshire has seen strong productivity growth. Based on GVA per worker as an indicator for labour productivity, manufacturing productivity in South Yorkshire has increased by 38% over 1998-2004, 3% above the productivity growth of the Yorkshire and Humber Region and equal to the UK performance.

See Fig. 9

However, in spite of this strong increase in productivity, manufacturing GVA per worker remains significantly lower than the average. GVA per worker stands at £38,700 in South Yorkshire, compared to a regional average of £42,300 and a national average of £46,600. This gives an effective 'productivity lag' of 17% with the national average and 9% in comparison to the region.

Investment

There is a strong investment market for the manufacturing industry in Sheffield. Approximately a quarter of the city's investment enquiries are for manufacturing.

"Sheffield has a strong background in attracting manufacturing inward investors and is consistently receiving more high value enquiries in the 'Advanced Manufacturing and Metals' priority sector."

Sheffield First for Investment

Manufacturers seeking to invest tend to fall into three main categories: high value manufacturers, niche product manufacturers or low value manufacturers.

There are a growing number of high value companies seeking to invest. Indigenous companies are investing to specialise and move up the value chain, but the majority of enquiries in this category are from inward investors. While investors are attracted by the city's skill and knowledge base, they are also facilitating the move to high-value, high-tech markets.

Companies indigenous to Sheffield dominate enquiries by niche product manufacturers. The figures indicate that Sheffield companies tend to have distinct areas of specialisation, rather than being volume manufacturers.

Approximately 12% of investment enquiries have been from 'low-value' manufacturers, all of which were indigenous companies. This could indicate that the low value manufacturers in Sheffield are not as engaged in investment and innovation.

"Overall, the statistics suggest that Sheffield now has an opportunity to build a strong advanced manufacturing base through the growth of its specialised indigenous companies (the city's industrial backbone) and the attraction of high-value companies in highly specific technology areas (the key to an economic step-change)."

Sheffield First for Investment

10 Sectoral GVA Figures are not available at district level and as such the following analysis is based on the sub region – South Yorkshire. As Sheffield is a major source of manufacturing employment for the sub region it can be assumed that SY trends will be indicative of Sheffield itself.

Fig. 8 – Manufacturing Contribution to GVA

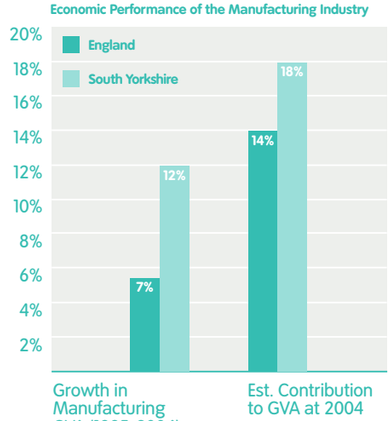


Fig. 9 – South Yorkshire 38% increase in Productivity

The Export Market – an Inflow into the economy

A healthy export market is an asset for any economy as it acts as an economic inflow, injecting external wealth into the local and national economy. It can also help to safeguard the economy in times of recession.

At present the UK economy is under recessionary pressure, but the manufacturing market appears to be strong. Bob Hale, head of manufacturing at Grant Thornton, asserts that: "Against a backdrop of profit warnings, falling business confidence and credit market turmoil, the UK manufacturing sector is at present something of a beacon in the dark."

There are, of course, risks to an industry reliant on exports as exchange rates are often volatile and export markets vulnerable. However an industry which sets its competitive advantage not on price, but on technological expertise, skilled labour, premium product and excellent service, can to some extent protect itself against this risk.

Sheffield's export market in the manufacturing industry is healthy. Although data is difficult to collect at local levels, to give a full picture of the Sheffield City Region's export capabilities a variety of data is available from various manufacturing organisations.

The best data available at local level is from Business Link. The data shows that approximately 500 manufacturing firms have exported over the last two years, and on average 21% of these firms' business is export based. Due to the nature of Business Link as a support agency, this data is likely to exclude larger, high value firms who have not needed assistance, and thus this data is likely to underestimate the extent of the export market.

Consultation with local manufacturers has highlighted that, other than a local supply chain, the majority of the manufacturing customer base exists outside the Sheffield area and thus acts as an inflow into the local economy. Moreover the consultation suggests that local high-value manufacturers export 50-80% of their business.

Regional data available from 'Trade Yorkshire' indicates that the Yorkshire and Humber Regional export market is valued at £3,000 (million) at December 2007, with approximately 55% attributable to EU25 countries and 45% to non-EU exports. The number of exporters in the region stands at approximately 3,600.

Indirect contributions to the economy

The measures discussed so far highlight the direct contribution the manufacturing industry makes to the economy – which is significant in itself. However, this does not fully represent the impact the industry has on the local economy.

A substantial manufacturing sector creates a strong demand for high value knowledge sectors such as accounting and legal services, and this acts as a further stimulant to the local economy.

Part Four: Preparing for the challenges of the future

Part Four: Preparing for the challenges of the future

"Ultimately, whether manufacturers succeed or fail depends on their own ability to take the steps needed to move their businesses forward. However, firms also need a business environment that gives them the confidence to make these investments in innovation, skills and new equipment.."

Manufacturing Performance 2007/8, EEF & Grant Thornton

Developing a workforce for the future

Lack of skilled labour is a real concern for manufacturing businesses and acts as a barrier to growth. To move up the value chain, manufacturers need people with the skills to drive innovation and design, to provide first class customer service and to utilise the latest technology. This presents a challenge not only in attracting new knowledge workers to the sector, but also in managing the skills level of the existing manufacturing workforce.

The key drivers of demand and supply for the manufacturing labour market are as follows.

- **Changing demographics.** The current ageing profile of the manufacturing industry leaves the sector with high replacement demand for workers. The Centre for Full Employment (CFFE) labour market survey estimates that the demand for new and replacement jobs could be as high as 17,000 for South Yorkshire (estimated 7,000 for Sheffield).

- **The image of engineering and manufacturing.** The continued perception of decline has a strong impact on the supply of labour to the manufacturing industry. The next generation of workers often choose their career paths based on information gained from relatives – and for the manufacturing industry this can sometimes be a history of poor working conditions and redundancy. It is important that the reality of the manufacturing industry today, and the opportunities it offers, are clearly articulated and promoted across the region to challenge outdated perceptions.

- **Technological change.** Increases in technological advancements, coupled with global competition mean that it is highly unlikely that the recruitment needs of the sector will be met by simply relying on existing programmes. As new equipment and processes are introduced, existing workers are often deskilled and new training is needed.

- **Moving up the value chain.** As the industry diversifies into the full spectrum of manufacturing activity (R&D through production to customer service) there is developing demand for skills that are perhaps not traditionally associated with manufacturing.

To develop an appropriately skilled future workforce, the industry needs to be active, with support from local and national Government and in collaboration with schools and universities. Together with these partners, the industry needs to promote modern manufacturing as an exciting and rewarding employment opportunity.

Local activity

Rotherham and Sheffield Local Authorities have made a priority of promoting engineering and manufacturing through the appointment of a Co-ordinator to focus on the sector related issues in schools and colleges.

The result of this is the establishment of a South Yorkshire Engineering Strategy Group as a forum for schools, colleges, universities, employers and training providers to meet to discuss matters related to workforce development. This has successfully promoted engineering with young people across the region and recorded a growth in interest in the sector; established training provision for young people aged 14 – 16 in conjunction with employers to address the skills deficit which is currently accessed by 160 learners on a day release basis; and established a network of employers to support work based learning in schools, colleges and other institutions.

Activity in the region has been identified as best practice and consequently the local authorities have been asked to host visits from other authorities across the country and for Sheffield to become one of only two authorities in Yorkshire and Humberside to be allowed to offer the new Diploma in Engineering for learners aged 14 –19 from September 2008. This will accompany the highly successful Young Apprenticeship scheme offered to 14 –16 year olds by the two authorities in recent years.

Young apprentices – Promoting engineering and manufacturing with young people across the region

As a result of collaboration across Sheffield and Rotherham local authorities young people across the region now have the opportunity to see first hand what the manufacturing and engineering industries are about.

Y10 GCSE students attend the employment unit in Sheffield every Thursday, to gain an NVQ level 2 qualification in engineering. The course is taught by passionate, experienced engineering trainers from industry who give the students a mix of classroom, practical and industrial experience. The students receive 50 days industrial experience with engineering employers around the locality.

Daniel Rhodes, aged 14

I wanted to do this course as I want to be an engineer in the future. I like the practical work and computer work, particularly using the CAD programme (computer aided design). At the moment we are drawing basic shapes, making them 3D and introducing design elements such as holes. I also enjoy the industry visits; my favourite was to Sandvik medical.
This course is better than the classroom because you get qualifications but it also shows you what a job in engineering would really be like.

Nathan Halt, aged 14

I've always wanted to design and make stuff (my dad and granddad were engineers), so this course sounded like a good option.
As part of the course we made an MP3 amplifier, where we plug in an iPod or MP3 player and it amplifies the sound, like a speaker. First we made the circuit, on a circuit wizard programme, and then we built the circuit. We also designed and made the casing for it using CAD and auto desk inventor.
It works too – well it would work if I had an MP3 or iPod – so it sits on my desk at the moment. We have had three visits to employers so far Toyoda Gosei, Sandvik medical who make artificial joints and Independent forgings and alloys. They make everything from tiny nuts to big aerodrome wheel blades.

Troy Pennycooke-Morgan, aged 14

I play for the Sheffield United Academy…but if I don't make football, I'd like to be a sports engineer, maybe designing football boots.
I didn't know design was part of engineering at first but now I see how much they are linked. For example football boots are about so much more than looks. The new Beckham boots try to increase swerve. If I designed a boot I would have to think about making it lightweight, how it fits your foot, how you feel the ball through the boot, how you walk and the studs.
I wasn't sure about engineering before this course because I didn't realise there were so many different types of engineers, now I know there is engineering in everything and I think bringing it to the sports side is really interesting.

Encouraging Innovation

Manufacturers who intend to survive and grow need to be innovative.

There have been numerous reports urging policymakers to place greater emphasis on encouraging the wide spectrum of innovation activities taking place. Historically, innovation has been considered the domain of high-tech companies and has been seen as irrelevant to 'typical companies'. On the contrary, typical companies are exactly the sort of business that can benefit most from innovation.

Steve Davies of EEF states that, "following the example of 'higher-tech' manufacturers, firms need to innovate, invest and rationalise their businesses with a view to moving to higher value manufacturing activities and markets. In other words, start by examining your company's products and services – in totality, from every angle. Start with raw materials all the way to the finished goods. A task which is easier said than done when 100% of your management effort is going into getting next week's order out of the door. Strategic planning often falls well down the priority scale at times like these. Lateral thinking is required to examine if you can replace any of the various stages with a more efficient, more cost effective technique."

The process he describes need not necessarily be undertaken by a single firm. Companies, universities and research centres can successfully share this process by acting in effective collaboration. Almost all innovators (over 90%) collaborate with an outside organisation and almost half work with universities or other scientific institutions.

Manufacturers in the Sheffield City Region are beginning to put more emphasis on innovation. Research from EEF Sheffield shows that over 70% of firms have increased their spending on innovation and more than half plan to do so over the coming three years. Furthermore they add that most of these innovators are seeing bottom line benefits with significant improvements in productivity, turnover and profitability.

Management ability is an additional issue which has an impact on a company's capacity to innovate and to invest in skills. Research into the skills needs of the sector has identified that local companies were often held back by a lack of strategic skills at management level. The typical SME profile was shown to be that of a privately owned business, with some businesses demonstrating low awareness of the need for strategic planning or indeed how to go about it.

Access to Business support

There is a range of support available to manufacturers, with initiatives that have been developed at different times under different funding streams. The result is a confusing picture. Manufacturers often complain that they simply do not know where to go for help – and when they do seek help, the quality of the help they receive is extremely variable. Business support arrangements are currently being restructured in Yorkshire and Humber, the new structures aim to give a simpler framework for manufacturers to find relevant business support.

Business Environment

The business environment is becoming ever more challenging. Manufacturing businesses must remain competitive in terms of their technology, processes, labour force skills and products to offset the risks and vulnerabilities apparent in today's market.

- **Competition from low cost economies.** One of the biggest competitive threats to manufacturers today is from low-wage economies. The message from Government and industry is that competing for low skill, low pay jobs will not provide the answer. Instead, the response must be to find opportunities to turn the global market to the manufacturer's own advantage; "…the strength of East Asian economic power is also its weakness. For example the Chinese are able to imitate existing manufacturing processes at the lowest cost possible; however they are not very good innovators, which can be used to our advantage. We must exploit this deficiency and shift our focus from trying to compete with the Chinese on a cost basis to working with them to create the knowledge they require. Industry, academia and Government must take a collaborative approach to develop the products and manufacturing methods necessary for an innovative, knowledge based economy to thrive. Developing collaboration means changing the thinking of a mature sector and creating an industry with the capacity, capability and, most importantly, the commitment to creating, adapting and using the latest manufacturing techniques."[10]

- **Dependence on UK and World markets.** Unlike other sectors of the economy, manufacturing relies strongly on healthy world markets. Growth in the world economy has contributed to a good manufacturing performance during 2006/7. However, manufacturers who rely solely on the strength of global demand to drive their business, without innovation, will be more vulnerable in the medium and long-term.

- **Energy & Utilities Prices.** Price uncertainty poses risks for manufacturers, especially as oil prices continue to rise and the dollar falls. It becomes increasingly important that manufacturers are supported in facilitating energy efficiency.

10 Timothy Scherer, of the University of Sheffield Advanced Manufacturing Research Centre with Boeing identified in an article for The Star Manufacturing Survey 2006

Part Five: What happens next?

Part Five: What happens next?

Industry Overview

Manufacturers in Sheffield and across the wider City Region have responded to deindustrialisation through investment and innovation in products, processes and materials. This has resulted in increased productivity and access to higher value markets. As illustrated, this has influenced the make up of the industry and shaped it towards higher value-added markets, leading to changes in the overall configuration of the sector.

There is a growing core of high value manufacturers in the Sheffield City Region. These companies are successful, investing and innovating. Not all could be termed 'advanced' manufacturers, but each is a 'modern manufacturer' in the sense that they are competitive in today's economy. They have managed to differentiate their businesses through various effective ways – including R&D, advanced technology, materials, product design, or customer service. The most successful are those companies which can combine this mix appropriately.

The industry has shed a large proportion of its low value-added manufacturing. This refers primarily to commodity, low technology products selling in markets with intense international competition from low cost economies. Although low value industries will not be able to compete in today's international environment, the sector will have an ongoing presence in the economy. It will be much smaller, but sustained through servicing higher value firms.

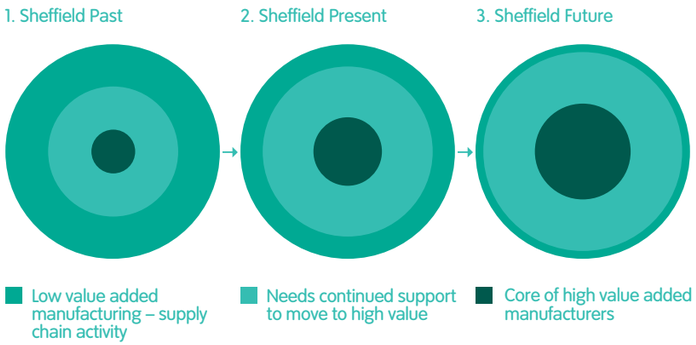
The diagram below helps to illustrate these changes. The inner core of high value firms is growing, and the lower value markets are contracting.

See Fig. 10

This process of moving up the value chain is underway in Sheffield and the wider city region, but it is not complete. There is a spectrum of manufacturing activity that spans from low value added to high value added. Many of Sheffield's businesses can be categorised as being in the middle of this spectrum. The middle band in the diagram represents this tier of manufacturers.

These manufacturers have some competitive advantage and are negotiating current market conditions, but without further investment and innovation to enable them to move into higher value added operations, they may be vulnerable in the long-term. It is this group of companies that need continued support to ensure they have the strategic know how and the resources to make the changes within their businesses which will help provide long-term stability in the market and ultimately increase their output and value added.

Fig. 10 – Moving up the value chain



Challenges

This report highlights the economic contribution that the manufacturing sector makes to the economy, and provides evidence of recent successes in terms of GVA growth and productivity. However it is also important to recognise the challenges that lie ahead.

Moving up the value chain. The change in the composition of manufacturing activity away from a purely production focus is the key to its future success. Economically this moves the industry to higher value activities, which generate increased wealth and competitiveness. The drivers of this process are innovation and investment by the companies into research, design, technology and product. These activities are also essential to the long-term economic success of the industry.

Increased economic growth & productivity. The manufacturing industry has increased its GVA by 12% over the last ten years. Although this is impressive in the context of large employment declines, it does not match the growth seen in the overall economy. GVA growth in the local manufacturing industry must seek to equal that seen in the economy as a whole if it is to maintain its contribution to GVA. It is likely that this growth will be achieved through greater productivity as, despite some strong growth, productivity levels in Sheffield remain low in comparison to the UK.

Developing a workforce for the future. A lack of skilled labour is a real concern for manufacturing businesses and acts as a barrier to growth as does the association with employment decline and the impression of the industry as one offering only 'dirty' jobs. The industry needs to continue to address this issue, with support from local and national Government and in collaboration with schools and universities, to promote modern manufacturing as offering long-term and rewarding employment / career opportunities.

Challenging the perception of the industry. The perception of the manufacturing industry today does not reflect reality, and serves only to hold it back. The industry is changing, moving into higher value, higher technology markets and utilises a wider range of skills and technology than ever before. The industry is not widely recognised as an economic asset and is often undervalued by policy makers and the business community.

Sheffield City Region's association with manufacturing has the potential to attract or deter potential investors, knowledge business and knowledge workers who will use their perception of the manufacturing industry as part of their decision-making process. The issue of image is therefore of central importance.

Taking Action – The Manufacturing Forum

This report presents information that initiates a comprehensive overview of the manufacturing industry in Sheffield City Region. In undertaking this report it is evident that such an overview does not currently exist within the industry, making it difficult to establish a strategic direction for the industry as a whole.

One of the key issues arising from this report therefore, is the need for a consolidated strategic view of the industry. The industry, manufacturing support organisations, research centres, universities and Government need to work together to meet the challenges the report outlines – especially if perceptions of the industry are to change.

In order to address this issue, it is proposed that a manufacturing forum is created. The forum should encompass all the main business support bodies, research centres and associations within the Region.

"EEF Sheffield is proud to be able to introduce the concept of 'The Manufacturing Forum'. The group will work across political borders to champion manufacturing across South Yorkshire and the neighbouring areas of North Nottinghamshire and North East Derbyshire, including Chesterfield.

To date all interested parties have reached a general consensus that these bodies are prepared to work collaboratively, under the auspices of EEF Sheffield and the Cutlers Company and with full involvement of the Chambers of Commerce.

Crucial to the success of the forum is the buy-in of all bodies working across the manufacturing industry. A full engagement process is underway with other manufacturing member organisations such as The Manufacturing Advisory Service (MAS), Business Link (BL), The National Metals Technology Centre (NAMTEC), The Welding Institute (TWI), Castings Technology International (CTI), The Advanced Manufacturing and Research Centre (AMRC) and Creative Sheffield.

By working together, such organisations can offer so much more in enabling the industry to move forward and in changing people's perceptions of manufacturing.

The role of The Manufacturing Forum will focus on three areas.
1) To agree a communication strategy, providing a consistent, affirmative dialogue of manufacturing performance and activity to challenge the negative perception of the industry.
2) Liaise with central, regional and local Government representing manufacturer's needs.
3) To provide a platform for the network of support organisations.

The Manufacturing Forum will not be a delivery service or provide a discussion point for the 'here and now' role of day-to-day manufacturing issues – this work is the remit of other Forums. It aims to complement rather than compete with the existing organisations' structures and delivery services.

"Much work has been done in an attempt to get all manufacturing business organisations to collaborate. This is the first time individuals and organisations have come together as one to support this important sector of our economy. It is now essential to grasp this opportunity for the benefit of the local economy and the wider region."

Steve Davies – Chief Executive EEF Sheffield

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