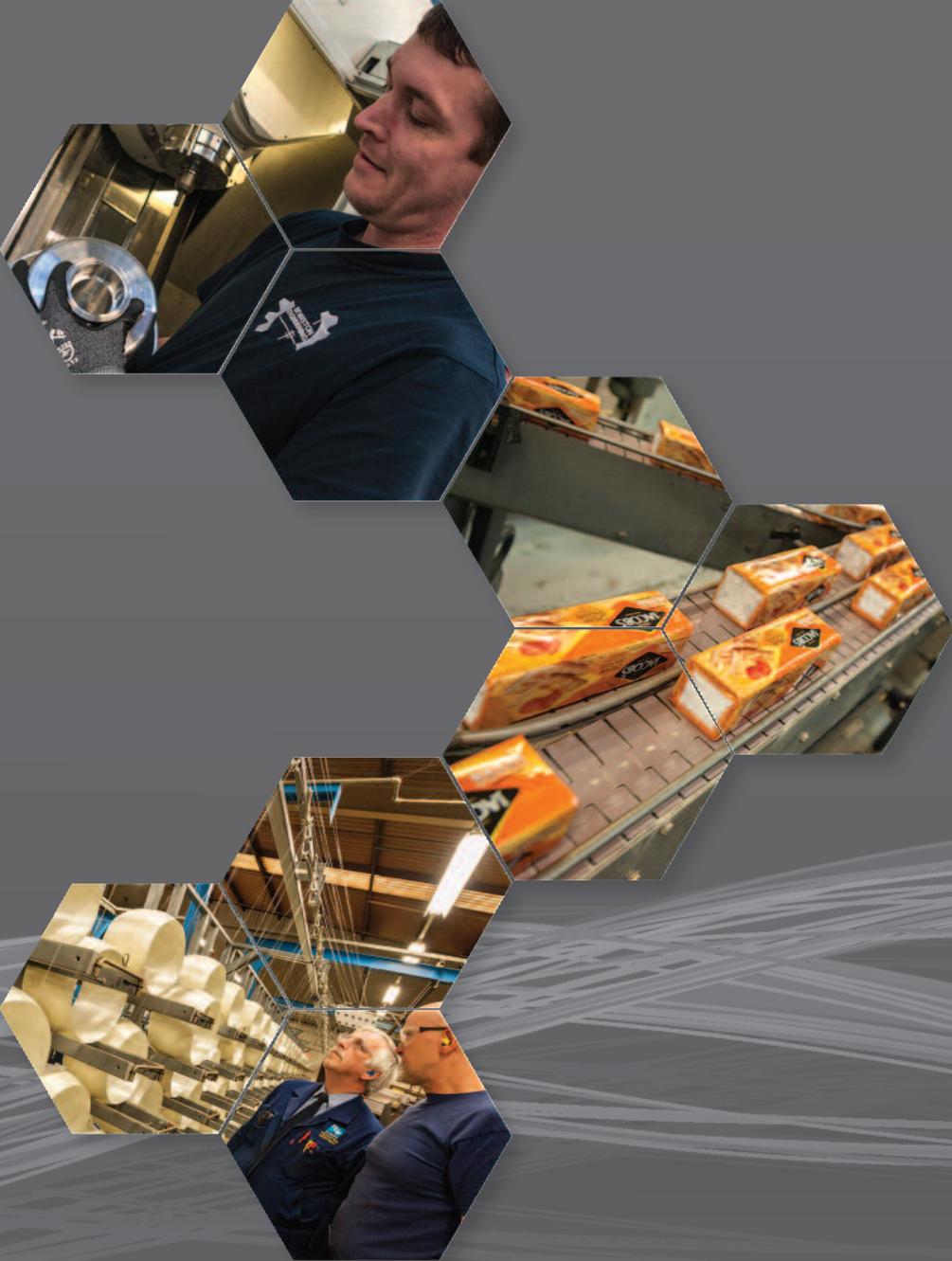


Liverpool City Region Skills for Growth



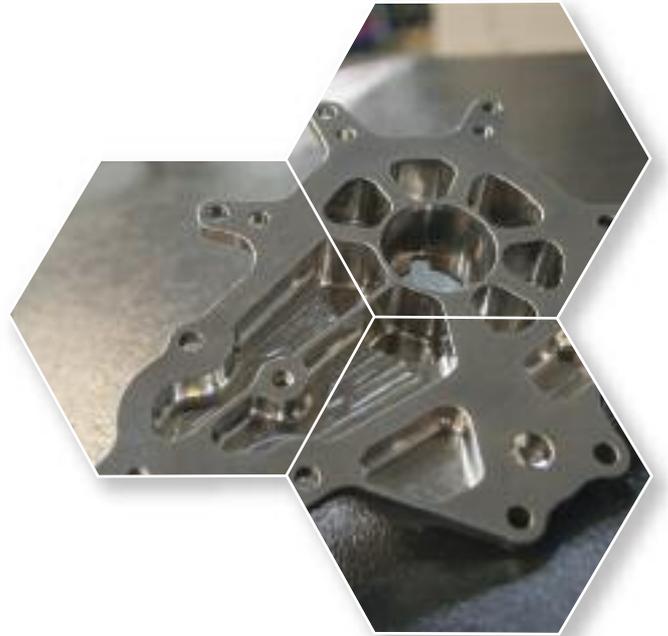
ADVANCED MANUFACTURING
A Skills for Growth Agreement

“

Manufacturing is an exciting industry and excellent career choice, with high quality training and a bright future.

(Richard Else - Operations Director, Jaguar Land Rover and Chair of the Liverpool City Region Employment and Skills Board)

”



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Skills for Growth Agreements

This agreement, produced by the Liverpool City Region Labour Market Information Service, is one of a suite of 10 agreements that will be produced for key sectors and employment locations within the City Region.

The agreements have been commissioned by the Liverpool City Region Employment and Skills Board, as part of the 'City Region Deal' with Government. The purpose of the agreements is to capture the current and future skills needs of businesses and communicate this to schools, colleges, learning providers and universities to enable them to plan courses and provision.

As part of publicising this agreement, employers, skills providers and local employment partnerships within the Advanced Manufacturing sector will be encouraged to work together to resolve the mismatch in employment and skills within the City Region.

It is hoped that individual (or where applicable groups of) employers, and providers, will agree bespoke Skills for Growth Agreements and will publicise these agreements to encourage others to do likewise.



Foreword



Alan Seeley
Human Resources Manager of Getrag Ford and
Chair of the Liverpool City Region Local Enterprise
Partnership Manufacturing Forum

As Chair of the Local Enterprise Partnership's (LEP) Manufacturing Forum, I am pleased to take on the role of Skills Champion for this Agreement.

My company (Getrag Ford) has been manufacturing in Liverpool City Region in one form or another for over 50 years and in that time has seen major changes in UK manufacturing industry. Throughout that time we've experienced the benefits of having a skilled and committed local workforce and recognise the importance of engaging with the local community to inform young people what manufacturing is about and the career opportunities on offer.

To remain competitive as manufacturers and ensure we seize on future opportunities for business investment our human capital - the skills of our workers - is vital.

This Agreement focuses on Advanced Manufacturing - that is our desire to ensure the broad range of manufacturing within the City Region is both competitive and continuously seeks to make best use of modern technology and skills.

The Agreement sets out Headline Actions to be achieved, making use wherever possible of existing initiatives to effectively implement Skills for Growth. The LEP's Manufacturing Forum will add value to these through its collective profile and via individual member activity.

In particular, we recognise that Science, Technology, Engineering and Mathematics (STEM) skills are vital to pursue a career in manufacturing engineering. The Agreement contains practical examples of how we can do more collectively to show the benefits of studying STEM subjects to learners future career prospects.

In conclusion, many thanks to those organisations and individuals who have contributed to the Agreement. It provides an excellent summary of current provision alongside examples of how we can best implement Skills for Growth in Advanced Manufacturing.



Headline actions

This Agreement document is employer-led, by the Liverpool City Region Local Enterprise Partnership Manufacturing Forum, provider-focused and has the support of key partners through the Liverpool City Region Employment and Skills Board.

Based on the analysis of the demand for, and supply of, skills the Agreement recommends the following headline actions.

1. Utilise greater employer ownership of skills funding through the **Liverpool City Region Skills for Growth Bank**. This could include setting up a **Shared Apprenticeship Scheme** for the Advanced Manufacturing supply chain and a **Manufacturing Forum Talent Bank** to (with prior permission) share the details with other manufacturers of promising candidates who have not been recruited with their initial applicant company.
2. There is a demand from employers for young people entering the sector to possess good **application of numeracy and practical problem solving skills**. Employers believe there is value in the 14 to 18 age group learning more about **practical project management and process management** techniques to achieve this, including lean principles.
3. To meet the cumulative replacement demand for manufacturing, concerted effort by the sector is needed to **promote Advanced Manufacturing as an exciting and rewarding career choice. This can be achieved by developing the following local initiatives:**
 - i. The **Manufacturing Futures** group, with the support of the Manufacturing Forum, will lead on promoting an **understanding of Advanced Manufacturing and the career opportunities available** to young people. As a first step, both groups will support MerseySTEM in promoting science, technology, engineering and mathematics to secondary schools, including organising a series of **'Robot Challenge' manufacturing days for schools**.
 - ii. Building on the work of MerseySTEM, employers and training providers to identify **'STEM Ambassadors'** who are working in, or aspire to work in, manufacturing to give talks and take part in events for prospective and current students to promote manufacturing as a career choice. Liverpool John Moores University's World of Work Careers Centre have offered to pilot this approach within Higher Education.
4. There needs to be appropriate advice and sufficient provision in place to **provide effective pathways into manufacturing engineering for young people** at a point when they are choosing their future career and course options. It is also essential that students aspiring to undergraduate engineering courses understand that they need to gain a good A-Level mathematics grade. In turn providers of vocational routes into engineering should ensure students enrol on an A-Level or equivalent mathematics course that includes the mechanics option.
5. Employers and training providers to ensure **higher level skills** provision within Advanced Manufacturing is **relevant and fully utilised**. This should include building higher level skills into continuous professional development plans for employees (where appropriate) and linking this to broader regional, national and European skills initiatives including the **Making it** campaign into the future of high value manufacturing in Liverpool City Region.



Sector briefing - Advanced Manufacturing

“
Manufacturing matters: advanced manufacturing is a key driver of high value job creation and economic prosperity.

(World Economic Forum, 2013)
”

Liverpool City Region manufacturing in a UK context

UK Government views Advanced Manufacturing as a strategic industry, vital to re-balancing the economy and driving economic growth: for example the Chancellor of the Exchequer has previously called for a *'march of the makers'*¹. To achieve this, the Government has sought to work with Local Enterprise Partnerships and others to build an effective business support infrastructure for manufacturing.

While total manufacturing employment has seen a decline in the UK over the last 40 years, (and even the last 10 years), as lower value manufacturing has moved to emerging markets, remaining UK manufacturing productivity has steadily increased as firms strive to remain competitive. A major component of this change has been via UK based advanced manufacturers progressively making capital investments in automation to improve competitiveness, the cost, however, has been to total manufacturing employment, particularly at lower skills levels. In order to consolidate and drive these productivity increases further, employers will need a workforce with increasingly higher level skills².

In the Liverpool City Region over recent years manufacturing productivity has outstripped total productivity growth of the economy as a whole.

Lord Heseltine's recent report to Government, *No Stone Unturned in pursuit of Growth*, highlighted that despite the long term rise in UK manufacturing productivity, as a country we still lag behind our US and German competitors in productivity. The report went on to call for greater investment, including in skills and capital equipment, to increase productivity further and close this productivity gap. In the Liverpool City Region over recent years manufacturing productivity has outstripped total productivity growth of the economy as a whole.

¹ 2011 Budget Statement

² Various, for example Manufacturing: Sector Skills Assessment, UKCES 2012

There are still almost a quarter of a million manufacturing firms in the UK today, generating £150bn annually for the economy and giving the UK a country ranking of 9th in terms of global manufactured output. Manufacturers employ approximately 10% of the UK's working age population and median wage levels tend to be above those for some other sectors e.g. retail and hospitality. For example in the North West the median wage in manufacturing is £24,975, (compared to a £20,093 average across the North West economy as a whole)³.

The UK also has a strong cluster of multi-national companies in the sector, for example in Liverpool City Region alone there are large global manufacturers such as Jaguar Land Rover, Cammell Lairds, Getrag Ford, Unilever, United Biscuits, IneosChlor and NSG/Pilkingtons. In addition the City Region has a strong SME base of companies, including high growth companies, component suppliers within larger supply chains and lower value manufacturing.

There are 3,000+ manufacturing companies in Liverpool City Region, with approximately **50,000 people employed** in the sector in the City Region, representing approximately **13% of total employment**. Manufacturing contributes £2.7bn GVA to the City Region economy.

In addition, as transport and labour costs associated with manufacture in Asia continue to rise, this trend, coupled with the desire for greater supply chain resilience, has returned some competitive advantages to Western markets leading to repatriation and on-shoring of some production processes⁴.

Manufacturing strength in Liverpool City Region is 13.2% of total economic output, (compared to manufacturing being 11.6% of total economic output for the UK as a whole). This suggests the region already enjoys a competitive advantage in this sector and that with careful planning any up-lift in manufacturing could disproportionately benefit the Liverpool City Region.

There are 3,000+ manufacturing companies in Liverpool City Region.

On a regional level, research suggests that increasing skills levels in North West manufacturing would benefit the UK economy by £160m annually, or £1.33bn over 10 years⁵. (Appendix 1 for more details).

For further information on the wider economic development actions being taken to support the sector, please see **Advanced Manufacturing in Liverpool City Region: Opportunities for Growth produced by the Local Enterprise Partnership: http://www.liverpoollep.org/about_lep/key_documents.aspx**.

Advanced Manufacturing sector composition

There are various ways to define what constitutes 'advanced' manufacturing, using research and development (R&D) intensity as one measure and/or productivity levels and productivity growth for each sub-sector of manufacturing.

For the purposes of the Agreement, when we say "Advanced Manufacturing" we mean in its broadest sense, i.e. manufacturing that is competitive - so a broad range of sub-sectors across manufacturing engineering, from Basic metals to Pharmaceuticals and everything in between.

Therefore, Advanced Manufacturing comprises⁶:

- Pharmaceuticals
- Chemicals
- Food and drink
- Automotive
- Printing and publishing
- Metal goods
- Manufactured fuels
- Non metallic min. products
- Mechanical engineering
- Manufacturing general
- Rubber and plastics
- Electrical engineering and instruments
- Wood and paper
- Other transport equipment (inc. marine engineering sector)
- Textiles, clothing and leather
- Electronics
- Basic metals

³ ASHE 2012, provisional results

⁴ RSA, 2013

⁵ NWBLT, 2013

⁶ ONS SIC 2013

Advanced Manufacturing skills profile

Advanced Manufacturing job types

Manufacturing continues to become more 'advanced' with up-skilling of a greater share of employees into professional and technical occupations and a focus on continuous improvement within the workforce. However, skilled trades and process, plant and machine operatives still make up the majority of the workforce.

Key areas of work in Advanced Manufacturing include:

- research and development (R&D)
- commercialisation of R&D

- production and assembly
- packaging and product design
- programme and project management
- commercial skills and marketing
- financial planning
- sourcing and logistics
- business administration / HR

From consultation with manufacturing employers and a recruitment consultant specialising in manufacturing the following job types were identified:

FIGURE 1
ADVANCED MANUFACTURING ENGINEERING JOB TYPES

Operations and Engineering	Quality and Technical	Process Engineering
Manager/Director	Manager/Director	Manager/Director
Mechanical / Electrical	Quality Assurance	Production Engineer
Control systems / Instrumentation	Quality Engineering	Process Engineer
Team Leader	Environmental Management	Continuous Improvement
Maintenance planning	Product inspection/testing	CNC Programmer/Engineer
Condition monitoring	Laboratory	
Operative		

Source: Morgan Ryder, 2013

Underpinning all these job types is the need for Business Improvement Techniques and Lean Manufacturing processes.

Lean Manufacturing and Business Improvement Techniques

Lean thinking and practice aims to increase efficiency, improve work flow and eliminate waste in the manufacturing process while preserving value for the customer. It is largely based on earlier Japanese theories of industrial production, which in turn have their routes in the mass production processes of the early 20th Century first developed in the USA by companies such as Ford.

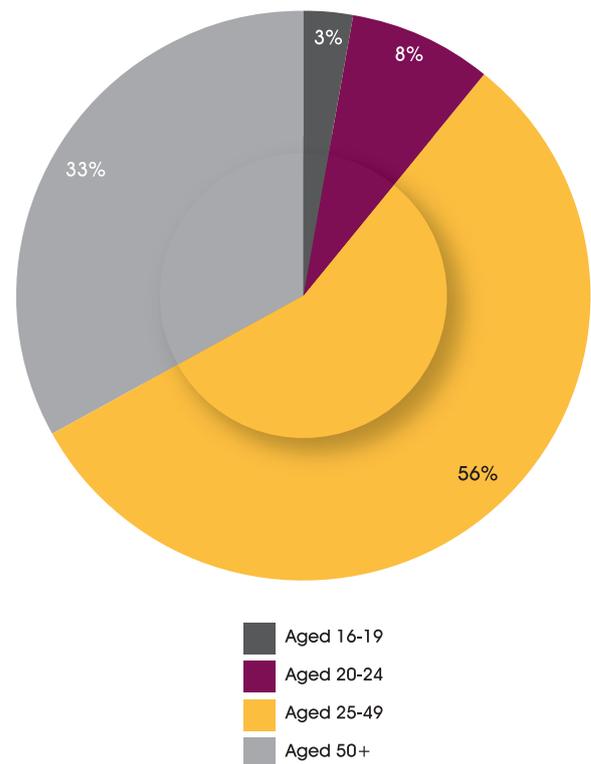
Business Improvement Techniques (BIT) courses use concepts including Lean and Six Sigma to improve business performance as a whole (covering efficiency and reducing waste but also quality issues, staff development and safe working practices).

Both types of training favour learning by doing, using real life projects and team working to deliver tangible business benefits that can be used in practice. The benefits of prospective employees in manufacturing understanding at a very basic level lean and techniques for business improvement are such that it should be embedded in a wider range of training provision delivered in the City Region (particularly in 14 to 18 provision).

Sector age profile

Repatriation and on-shoring of production processes, combined with replacement demand in the sector, will necessitate significant numbers of new recruits. Currently in the Liverpool City Region, one in three of the manufacturing workforce is over 50 years of age, whilst only 11% is aged between 16 and 25 years, (compared to 29% over 50's and 15% 16 to 24 year olds in the wider City Region economy).

FIGURE 2
LCR MANUFACTURING SECTOR AGE PROFILE



Source: Annual Population Survey - Workplace Analysis, ONS (2012)

Currently in the Liverpool City Region, one in three of the manufacturing workforce is over 50 years of age, whilst only 11% is aged between 16 and 25 years.



As noted, 56% of the City Region's Advanced Manufacturing workforce is in the 25 to 49 age bracket. This presents a strong opportunity to focus training investment needs on the existing workforce on an in-work and flexible basis, (and to promote this approach to companies that don't already provide staff training in this way).

Workforce composition

Evidence from Semta (the Sector Skills Council for Advanced Manufacturing) states that the demand for higher skilled entrants, including Apprentices, into Semta sectors will increase against an 8% decline in the national pool from which to recruit young people over the next decade.

Female representation has traditionally been low in manufacturing engineering outside of operative and low skill positions. While the national composition of the workforce is approaching parity in the labour market within some other sectors, (e.g. science), women still make up only 6.9% of engineering professionals⁷.

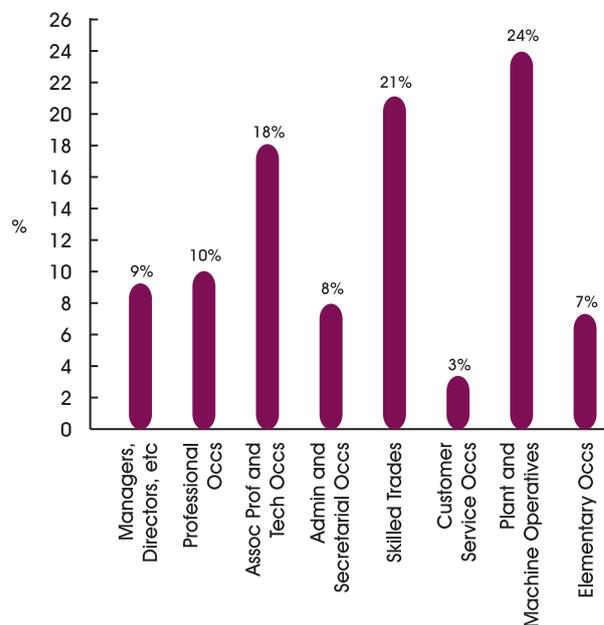
If the best talent is to be attracted then current issues about under-representation need to be addressed at Apprentice level where the lack of diversity is particularly noticeable: 2% are female, 4% are from ethnic minority communities and 6% have a learning difficulty, disability or health problem⁸.

Various campaigns and organisations exist to overcome this including:

- Women's Engineering Society www.wes.org.uk
- Engineer Girl (National Academy of Engineering) <http://www.engineergirl.org/>
- Women in Science, Technology, Engineering and Mathematics: <http://www.wisecampaign.org.uk/>
- Unionlearn <http://ulvoices.org/category/widening-participation/>

Sector occupation profile

FIGURE 3
LIVERPOOL CITY REGION MANUFACTURING SECTOR
OCCUPATION PROFILE



Source: Annual Population Survey - Workplace Analysis, ONS (2012)

Currently the largest occupation groups comprise Plant and Machine Operatives and Skilled Trades. However, this occupation profile will vary significantly by manufacturing sub-sector, for example, as would be anticipated, the pharmaceuticals sector has a much higher skills profile than the basic metals sector.

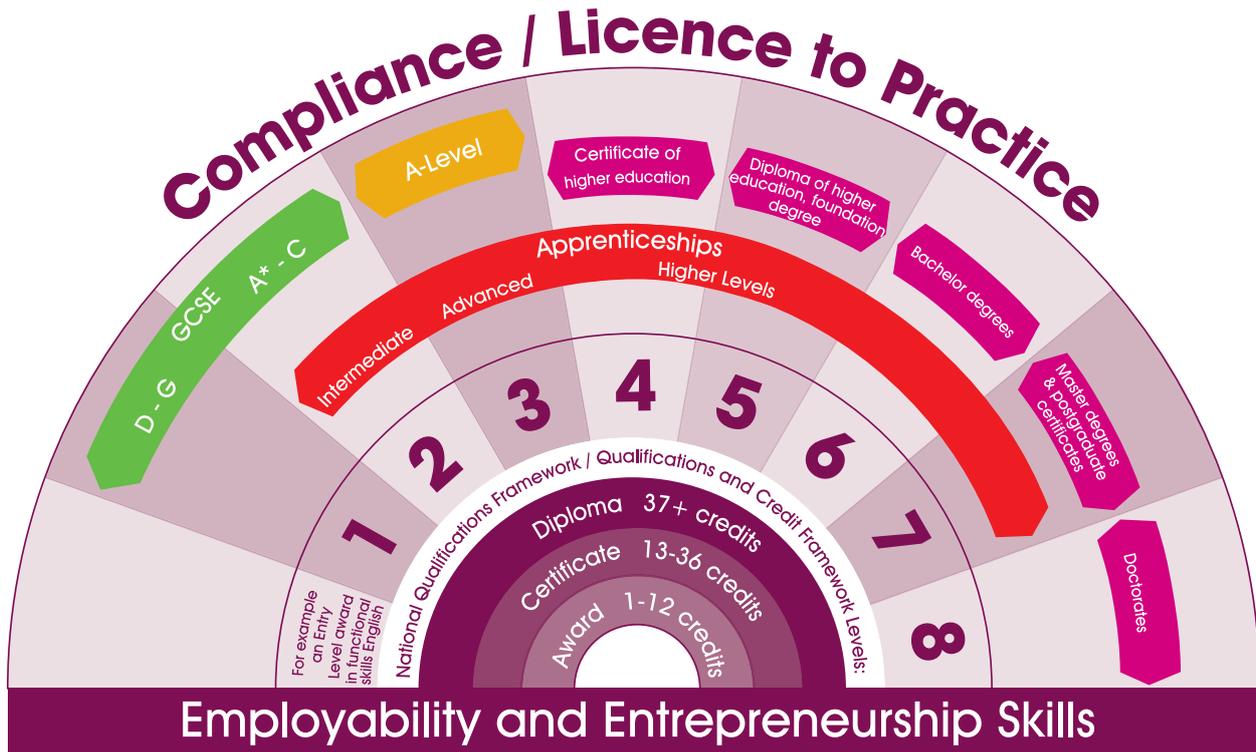
Key qualification levels

Consultation with employers and national evidence for manufacturing suggests key qualification levels required by the sector include:

- basic skills need jobs (L1 to 2)
- Apprentices (L2 to 5)
- experienced technical staff (L3 to 5)
- specialists - graduates and professional staff (L5+)
- support staff - e.g. accountants, sales and marketing, project management, legal, HR and associated professions (L2 and above)

⁷ UKRC, 2010

⁸ Semta, 2013



Source: Adapted from Ofqual model⁹

Chart 1, adapted from Ofqual, gives us a basic understanding of the levels of qualification available. The chart is focused on funded accredited training that leads to a qualification on the Qualifications and Credit Framework (QCF) and the National Qualifications Framework (NQF). However, this Agreement also recognises the importance of employability skills and non-publicly funded training that meets industry needs (e.g. Lean principles).

STEM (science, technology, engineering and maths) disciplines are vital to producing the skilled technical and analytical workers needed in Advanced Manufacturing.

STEM skills

STEM (science, technology, engineering and maths) disciplines are vital to producing the skilled technical and analytical workers needed in Advanced Manufacturing. STEM skills are widely accepted as those skills that support scientific enquiry/research and underpin economic growth. These include:

- Technical skills
- Data analysis and problem-solving
- Research and experimental design

Industry-specific STEM skills are also much sought after e.g. the ability to use bespoke software packages and understand technical materials / repair specific equipment. Employers will also seek generic skills often associated with STEM qualifications e.g. logical problem solving skills¹⁰.

STEM skills contribute disproportionately to national GVA and are of great importance to the country's international competitiveness. Within a modern economy such as the UK, the range of occupations that require STEM skills is broad and employees with these skills and attributes are valuable assets that can command a wage premium across a range of sectors.

⁹ <http://www.ofqual.gov.uk/help-and-advice/comparing-qualifications/>

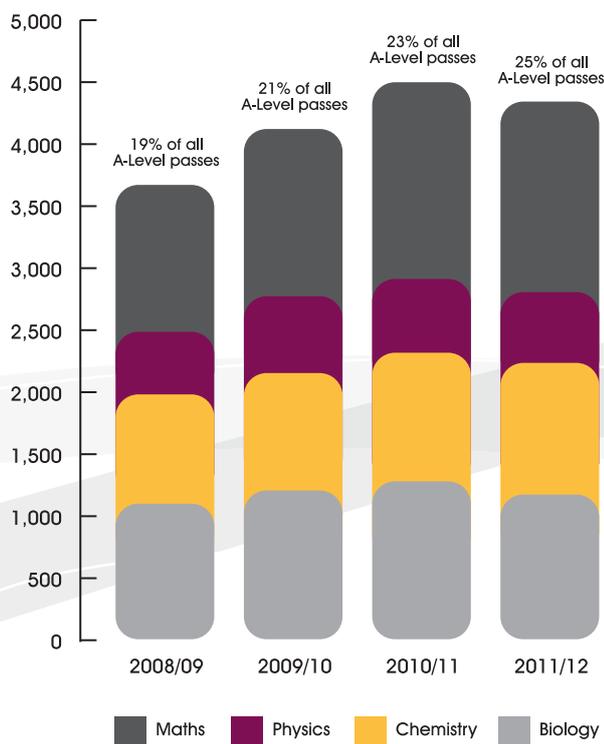
¹⁰ UKCES Employer Survey, 2011

The supply of training

The Advanced Manufacturing sector needs to attract and retain employees with high-level STEM-based qualifications while employers within other industries (such as Financial and Professional Services and the Health sector) attempt to do the same.

Traditional, academic qualifications in Science and Maths remain an important part in developing young people's STEM skills. In 2011/12, around 4,380 pupils in the Liverpool City Region achieved Science or Maths A-Levels. This equates to almost one in four of all A-Level achievements in the year, a rate that has increased annually since 2008/09. This remains around 2% points lower than the England rate, although over the last four years this gap has continued to close as the percentage of Science and Maths A-Level achievements has risen in the City Region. (See Appendix 2 for a full break down of A-Levels volumes by subject level).

FIGURE 4
STEM SUBJECT A-LEVEL ACHIEVEMENTS,
LIVERPOOL CITY REGION



Source: AS/A-Level Statistical First Release, Department for Education (2008-2012)

In 2011/12, around 4,380 pupils in the Liverpool City Region achieved Science or Maths A-Levels.

Figure 4 shows that Maths is consistently one of the most popular STEM subjects amongst learners while a significantly smaller group have achieved Physics A-Level, with the subject accounting for just 3.4% of all A-Levels achieved. These figures echo national trends where the provision of A-Level Maths is considered healthy but applying these skills within industry remains a challenge and only a small minority will go onto a manufacturing career.

The National STEM Centre suggests that this is caused by poor interaction between manufacturers and schools and a lack of effective communication with learners about the industry. **In order to meet the demand for skilled high level engineers within the sector it is essential that schools identify and develop the skills of students with an aptitude for Maths and Sciences (particularly Physics) and help to develop students understanding of Advanced Manufacturing, promoting the sector as an aspirational career choice.**

In *'The Supply of and Demand for High-Level STEM Skills'*, UKCES found that there are specific mismatches of higher level STEM skills and graduate level STEM occupations. Similarly, the same paper found that only a quarter of engineering graduates enter the manufacturing industry and that a significant amount (around four out of 10) of STEM graduates go into non-STEM occupations.

It is therefore essential for students to be encouraged to pursue these subject areas and aspire to work in occupations that require these skills. MerseyStem operates across the City Region to help promote STEM skills development in Secondary Schools.

MerseySTEM

MerseySTEM manage the STEM Ambassador Programme and schools STEM Advisory Programme in the Liverpool City Region. These programmes are funded by the Department of Business, Innovation and Skills (via national organisation STEMNET) in recognition of the vital nature of STEM skills to the UK's future economic success.

The STEM Ambassador Programme enables anyone with Science, Technology, Engineering or Maths (STEM) skills to volunteer their time and expertise to inspire young people and demonstrate the possibilities of STEM subjects and careers. MerseySTEM recruit and train the volunteer Ambassadors and support the work of schools in organising events such as school careers days, STEM Clubs, curriculum support and exciting careers talks. Specific examples include:

- Robot Challenge Days - using Vex Robotic kits, teams of students from different schools take part in a full-day event. The morning session consists of a team-build activity in which students are supported by STEM Ambassadors, from engineering and manufacturing backgrounds, to build their Vex Protobot. In the afternoon, teams pit their robots against one another in a robot wars style competition. The event enables students to understand a variety of design, science and engineering principles but also encourages teamwork, leadership and problem-solving skills.
- Engineering Your Future - MerseySTEM, on behalf of the Institute of Mechanical Engineering, organises five workshops run by companies representing different areas of engineering and also a market-place careers fair. MerseySTEM organise for local sixth form students to attend the event and at the 2012 event, students from 26 local schools/colleges were in attendance.
- STEM Clubs - bringing real-world context to student activities. For example 'Chopping Bikes' held with Rainhill High School - rebuilding scrapped bicycles to create new improved models - with the support of Veolia and STEM Ambassadors from Mexichem Fluor in Runcorn and The City of Liverpool College.
- Curriculum Support - STEM Ambassadors from United Molasses and Storage worked with Maghull High School to develop their design and technology curriculum and provide a computer aided design product brief for pupils.

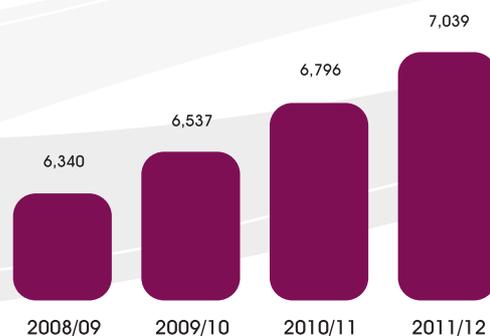
www.merseystem.co.uk

www.stemnet.org.uk

Higher level skills

Locally around 7,000 Liverpool City Region residents were studying STEM subjects in Higher Education (HE) across the UK; accounting for around 14% of the City Region's HE students. Figure 5 shows that this has increased annually from around 6,300 in 2008/09.

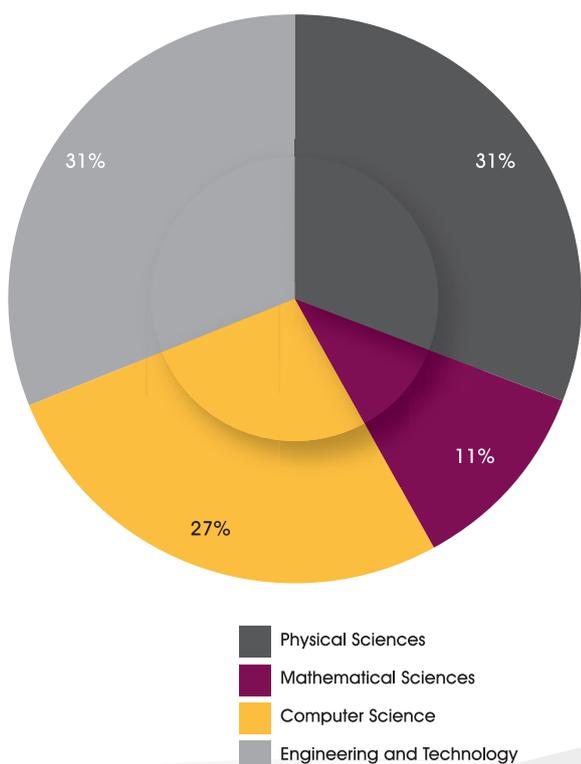
FIGURE 5
LIVERPOOL CITY REGION RESIDENTS STUDYING
STEM-RELATED SUBJECTS AT HIGHER EDUCATION,
2008 TO 2012



Source: Higher Education Statistical Authority (HESA) Data, 2013

More than 30% of those enrolled were studying Physical Sciences which includes Chemistry, Physics and other Materials Sciences while a similar amount of students study Engineering and Technology. Around a quarter of students are enrolled in Computer Science courses (including software engineering and artificial intelligence), with one in ten students studying Mathematical Sciences (such as Mathematics and Operational Research).

FIGURE 6
LIVERPOOL CITY REGION RESIDENTS STUDYING STEM-RELATED SUBJECTS AT HIGHER EDUCATION, BY SUBJECT 2011/12



Source: Higher Education Statistical Authority (HESA) Data , 2013

The most popular individual courses within this category were Computer Science, Mathematics and Information Systems; accounting for 16%, 10% and 7% of all STEM related study respectively. (See Appendix 3 showing the proportional change for all City Region residents studying STEM related courses).

When considering those residents studying courses relating to engineering and technology (an area particularly relevant to Advanced Manufacturing), Figure 7 shows that Electronic and Electrical, and General Engineering are amongst the most popular choices since 2008/09, however, Civil Engineering consistently attracts similar numbers of students.

The numbers of students from the City Region studying mechanical engineering has actually fallen over the last four years despite the economic growth in the sector locally (in particular linked to Jaguar Land Rover). In the same time period Production and Manufacturing Engineering has also decreased while those enrolled in Chemical, Process and Energy Engineering subjects has increased.

FIGURE 7
LIVERPOOL CITY REGION RESIDENTS STUDYING ENGINEERING-BASED SUBJECTS AT HIGHER EDUCATION, 2008 TO 2012

	Number of all Liverpool City Region residents studying STEM-related subjects in the UK			
	2008/09	2009/10	2010/11	2011/12
Broadly-based within engineering	0	1	1	0
General engineering	305	288	344	376
Civil engineering	368	385	379	378
Mechanical engineering	324	353	314	304
Aerospace engineering	104	107	113	132
Naval architecture	6	11	12	9
Electronic and electrical engineering	328	373	362	374
Production and manufacturing engineering	111	105	118	106
Chemical, process and energy engineering	90	102	91	114
Others in engineering	7	8	12	12
Total residents in Engineering related subjects	1643	1733	1746	1805
Total residents in STEM related subjects	6340	6537	6796	7039

Source: Higher Education Statistical Authority (HESA) Bespoke Data, 2013

Among the universities located in the North West there are almost 43,000 students studying for undergraduate and postgraduate qualifications in STEM subjects.

Figure 8 shows student numbers for all STEM and Engineering disciplines by institution within the North West and shows that, for broader STEM provision, institutions in the Liverpool City Region account for around 10,000 enrolments; a quarter of all STEM students. This trend is mirrored by those studying engineering; with one in four learners being based at a Liverpool City Region institution.

FIGURE 8
STEM STUDENTS AT UNIVERSITIES IN THE NORTH WEST,
2011 TO 2012

Higher education institute	STEM student numbers	Engineering student numbers
Chester University	871	103
Edge Hill University	728	-
Lancaster University	2,485	-
Liverpool Hope University	308	-
Liverpool John Moores University	4,303	1,655
Liverpool Institute for the Performing Arts	82	82
Manchester Metropolitan University	4,349	1,098
University of Bolton	2,005	989
University of Central Lancashire	4,746	1,429
University of Cumbria	684	148
University of Liverpool	4,890	1,922
University of Manchester	12,621	5,100
University of Salford	3,385	1,670
Total	41,454	14,608

Source: Higher Education Statistical Authority (HESA) Data, 2013

Enrolment figures for the 2011/12 academic year show that almost 4,540 students enrolled in courses relating to Advanced Manufacturing.

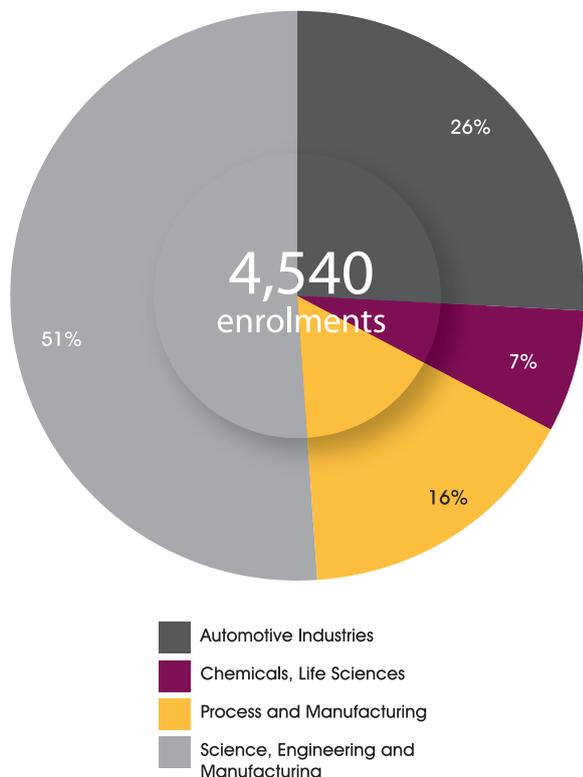
Vocational training - further education

An effective and increasingly popular alternative for learners and existing employees to develop industry-specific skills and work-based experience is through vocational training and Apprenticeships. There are a number of providers offering specific engineering and manufacturing qualifications as well as supporting qualifications such as management and leadership tailored to the sector. For a detailed list of the further education courses relating to Advanced Manufacturing see Appendix 4.

Enrolment figures for the 2011/12 academic year show that almost 4,540 students enrolled in courses relating to Advanced Manufacturing. This is a 42% increase in the number of enrolments from the previous year (and almost double the number from 2008/09) which could suggest either that learners are becoming more interested in pursuing a career in Advanced Manufacturing and/or that training supply is increasing to meet industry needs - both of which are hugely positive steps forward for the sector.

In previous years, approximately 88% of the enrolments went on to become Starts (i.e. remaining on the course for over 6 weeks) which suggests that around 4,000 of the 2011/12 group would do the same. Just over half of all enrolments were in Science, Engineering and Manufacturing Technologies with a further 26% being related to Automotive Industries. (see Figure 9).

FIGURE 9
 FURTHER EDUCATION ADVANCED MANUFACTURING
 COURSE ENROLMENTS IN LIVERPOOL CITY REGION,
 2011/12

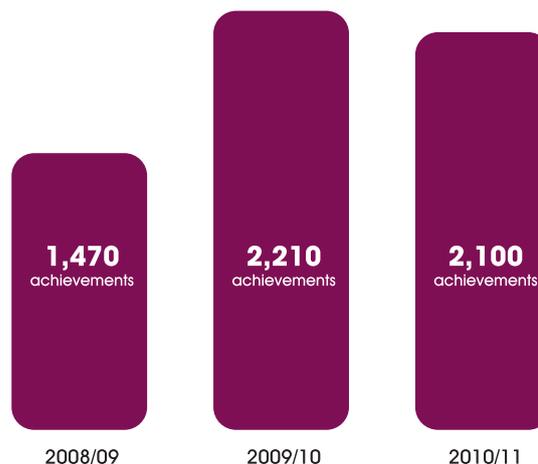


Source: Statistical First Release, The Data Service, 2011/12

Figure 10 shows that, in 2010/11, there were more than 2,000 Achievements in Further Education courses relating to Advanced Manufacturing. Since 2008/09, there has also been a 30% increase in Achievements for Advanced Manufacturing Further Education courses.

The most popular qualification was in Level 3 Science, Engineering, and Manufacturing courses while only an extremely small proportion of learners achieved qualifications relating to Chemicals and Pharmaceuticals. Appendix 7 provides a list of the top training providers (by enrolments) offering Advanced Manufacturing Apprenticeship provision in the Liverpool City Region in 2011/12.

FIGURE 10
 FURTHER EDUCATION ADVANCED MANUFACTURING
 COURSE ACHIEVEMENTS IN LIVERPOOL CITY REGION



Source: Statistical First Release, The Data Service (2008/09 to 2010/11)

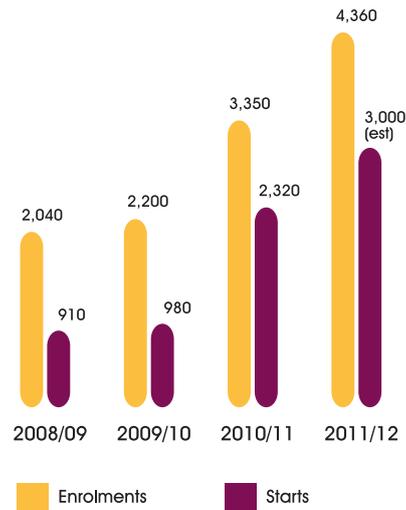
Vocational training - Apprenticeships

All Apprenticeships should now have a minimum duration of one year and are available from Level 2 up to Level 6, (with plans for Level 7). A manufacturing engineering Apprenticeship typically lasts two to four years. The three levels of Apprenticeship available to learners are known as:

- Intermediate Apprenticeships**
 Apprentices work towards work-based learning qualifications such as a Level 2 Competence Qualification, Functional Skills and, in most cases, a relevant knowledge-based qualification.
- Advanced Apprenticeships**
 Apprentices work towards work-based learning such as a Level 3 Competence Qualification, Functional Skills and, in most cases, a relevant knowledge-based qualification.
- Higher Apprenticeships**
 Apprentices undertake a framework at Level 4 and above which will include a competence-based qualification, Functional Skills and, in some cases, a broader vocationally-related qualification which could be a foundation degree.



FIGURE 11
LCR ENROLMENTS AND STARTS FOR ADVANCED
MANUFACTURING RELATED APPRENTICESHIPS
(2008/09 to 2011/12)



Source: Statistical First Release, The Data Service
(2008/09 to 2011/12)

Semta's Apprenticeship Ambition, working with NAS and other partners, aims to double Advanced and Higher Apprenticeship numbers within manufacturing by 2015/16 from current levels. This will be focused on delivering an action plan covering:

- increasing the range of applicants
- improving the quality of applicants
- getting the progression routes into Apprenticeships right
- engaging employers and ownership of skills
- ensuring high quality responsive provision with the proposed design of lean Apprenticeships and a Level 5 engineer Apprenticeship.

The Ambition fits well with the Liverpool City Region Employment and Skills Board's own ambition to raise overall volumes for Advanced and Higher Apprenticeships within the City Region.

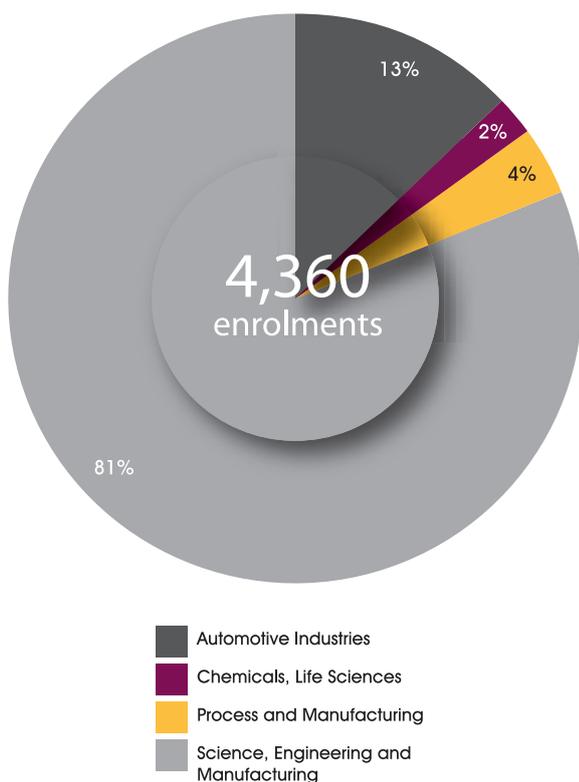
Statistical First Release enrolment data for the 2011/12 academic year show that 4,360 Liverpool City Region residents signed up to an Advanced Manufacturing Apprenticeship in 2011/12. **This is a 30% increase from 2010/11 and more than double the amount that enrolled in 2008/09.** Based on enrolment figures, if 2011/12 were used as the base year, Liverpool City Region would need an extra 4,360 Advanced Manufacturing Apprenticeships by 2015/16 to meet the Semta Apprenticeship Ambition locally.

Figure 11 shows that in 2010/11, around seven out of 10 Apprenticeship enrolments went on to become starts (i.e on the course after week three or six - dependent on the length of the Apprenticeship); if this pattern was repeated in 2011/12, this would account for around 3,000 starts.

Appendix 6 also shows that, in the same period, there were around 620 Achievements from Advanced Manufacturing Apprentices in the 2010/11 academic year. More than half of Achievements were in Science, Engineering and Manufacturing Technology; in particular, 48% were in engineering frameworks with another 25% relating to the automotive industries.

Advanced Manufacturing accounts for 10% of the Liverpool City Region's Apprenticeship Enrolments in 2011/12. Around four out of five of these Apprenticeships were in Science, Engineering and Manufacturing Technology (see Figure 12). It is interesting to note that the ten most popular providers of these Apprenticeships (detailed in Appendix 7) have delivered more than three-quarters of all Enrolments, with PERA Innovation accounting for 44% of provision (around 2,000 Apprenticeships) mainly with Jaguar Land Rover.

FIGURE 12
ADVANCED MANUFACTURING APPRENTICESHIP
ENROLMENTS IN LIVERPOOL CITY REGION 2011/12



Source: Statistical First Release, The Data Service, 2011/12

Skills shortages and gaps (overall)

A skills gap occurs where employees (or prospective employees) do not have the skills required to effectively undertake the full range of duties expected in the job role. Skills gaps can occur at all levels, but occur particularly at entry points into the workforce where practical experience is lowest:

- Apprentices (L2 to 5)
- graduates and post-graduates

Skills shortages in the wider economy (or more often employer difficulty in recruiting in sufficient quantity and/or without having to pay a price premium) are relatively rare. However, City Region manufacturers report recruiting the experienced technical and professional staff they need fall into this category, with a mismatch between supply and demand. Specifically this mismatch falls in the following categories:

- experienced technical engineering staff (L3 to 5)
- specialists - graduates and professional staff (L5+)

Semta report it is the lack of practical and technical skills at Level 3 that is of most immediate concern to employers. In terms of graduate and professional staff, the Council for Industry and Higher Education (CIHE) state that there is a "critical shortage of graduates and postgraduates with STEM capabilities"¹¹ threatening UK competitiveness.

Liverpool City Region Local Enterprise Partnership (LEP) recognises that Advanced Manufacturing has a skills gap. For example Alistair Poole, the Managing Director of St Helens-based manufacturer NGF Europe and a LEP board member has previously stated¹²:

We need people to move back to the North West. There are simply not enough engineers coming out of university.

According to a recent skills report by the Institution of Engineering and Technology (IET), 48% of engineering companies are having difficulty finding suitable senior engineers and 34% said that new recruits often fail to meet their requirements. The biggest skills gap amongst new recruits was reported to be a lack of practical experience, especially amongst graduate employees. Notably, almost half of respondents stated they would employ more Apprentices in four to five years' time. However, the quality of Apprenticeships must be ensured and need to be seen as a starting point to a successful engineering career, not just a way into a job¹³.

Manufacturing organisation the Engineering Employers Federation¹⁴ state that skills, and the lack of them, are a main concern among the region's manufacturers and that companies are responding by increasing investment in training, Apprenticeships and by developing better links with schools and further education colleges. EEF indicates that 74% of its members report finding and recruiting staff as a key concern, while 43% disagreed that access to funding for training is easier than it was two years ago.

¹¹ CIHE, 2009

¹² <http://www.insidermedia.com/insider/north-west/81569->

¹³ Engineering and Technology Skills Demand 2012 <http://www.theiet.org/factfiles/education/skills2012-page.cfm>

¹⁴ EEF, 2012

North West firms suggest that they will substantially increase investment in skills in response to a demand for more highly-skilled staff, but warn that even without a strong recovery, there is still a skills shortage, including a lack of technical skills, work experience and relevant qualifications amongst the local population.

Higher Education data for the City Region shows a year on year increase in Advanced Manufacturing enrolments since 2008 (with general engineering and electronic engineering having the greatest volumes of students). However, anecdotal evidence from the local Higher Education sector suggest that the introduction of higher tuition fees has altered the market for higher education and this, combined with broader economic messages about Advanced Manufacturing as a career choice, could well accelerate the uptake of engineering and electronic engineering degrees in the future.

Discussions with colleagues in relevant departments at the City Region's two main Higher Education Institutions indicate a lack of sufficient numbers of highly qualified candidates (with top A-Level results in maths and science) wanting to take up engineering routes, particularly electronic and electrical engineering.

In addition, some students who are interested in these courses have been unable to achieve the minimum academic requirements for enrolment or may just meet the initial academic requirements, but struggle to complete the course as its complexity increases. To overcome these challenges course tutors recommend that students wanting to pursue these courses take A-Level or equivalent mathematics with the mechanics option.

In one example, LJMU have developed a foundation year course to enable the students to upskill ahead of starting an undergraduate engineering qualification in order to resolve this skills shortfall at Level 3. Despite this, **there is still a shortage of interested and suitably able applicants for many engineering courses and therefore the City Region needs to promote this area specifically to meet current and future demand for these skills, ensuring young people have a greater understanding of the careers available, good salary prospects and the necessary base qualifications required to achieve this.**

This is reinforced by businesses in the sector, who have indicated a need for more skilled engineers to grow their business and meet replacement demand. Therefore it is essential that funding and allocations are matched to industry demand in order to bridge the gap.

¹⁵ Morgan Ryder, 2013



Engineering UK state:

“
The number of engineering graduates coming out of university as a proportion of all graduates is smaller than in Germany and far smaller than Korea and China.

Paul Jackson, Engineering UK
”

In response to skills shortages, many organisations are pulling in skilled labour from other countries within Europe to fill certain skills gaps¹⁵. However, larger well known businesses often have less difficulty in recruiting within their sector, particularly for entry level and graduate roles, although can still struggle to recruit specialist technical skills without paying a price premium.

Given the international nature of manufacturing engineering there is also a need to ensure course provision equips engineers for international and project working e.g. in terms of technical standards and basic knowledge of how to conduct business internationally, of foreign markets and to be able to apply learning across disciplines and cultures in a real life project situation.

Skills gap example: Packaging technologists

The Institute of Materials, Minerals & Mining have identified a skills shortage in the UK of qualified packaging technologists, who can support companies in all sub-sectors of Advanced Manufacturing to bring their product to market. Packaging technologists often work with traditional packaging materials such as glass, card, metals or plastics, but also increasingly use new materials and electronic components in packaging design.

The industry are looking for science and design GCSE or A-Levels students who have an interest in manufacturing and sustainability. Packaging Technologists can study towards the following qualifications accredited by PIABC (Packaging Industry Awarding Body Company, a professional awarding body and part of The Institute of Materials, Minerals & Mining):

- The Certificate in Packaging at Level 3
- The Diploma in Packaging Technology at Level 4

The Institute of Packaging Professionals (IoPP) is also working in partnership with Leeds Metropolitan University to deliver a post-graduate level course which focuses on packaging design, but also covers innovation management, sustainability and marketing. The course is targeted at professionals already working in the sector and will be available by distance learning. IoPP are also developing an Apprenticeship scheme for the packaging industry.

Source: The Institute of Materials, Minerals & Mining, 2013

Base and technical skills required

Globally, the employer evidence from the Manufacturing Growth report (World Economic Forum, 2013) states:

“While STEM (science, technology, engineering and mathematics) literacy is important, executives consistently said STEM is not, by itself, sufficient. Many commented that creativity and imagination are key ingredients to producing great innovation. As a result, they stressed manufacturers need STEM educated, multidisciplinary thinkers who are also creative and can problem-solve in a team environment.”

The evidence gathered locally for this Agreement demonstrates that there are practical opportunities to focus on base skills and re-balancing skills deficiencies. Employer surveys of manufacturers suggest that (for up to intermediate Level 3 positions) **they are less concerned about specific technical skills than about generic skills.**

Specifically the following generic skills are valued by employers:

- leadership and management
- problem solving
- report writing
- communications and team work
- understanding of general manufacturing principles such as lean techniques, process management and quality assurance.

In addition, the **employability skills** required by the manufacturing sector at all levels include:

- Logical, problem solving approach
- Attention to detail, accuracy and consistency
- Mathematical ability and a practical can-do attitude

Employer consultations provide evidence of the need for the right attitudes and work behaviours from prospective employees and business demand for multi-skilled individuals, who possess specific technical skills alongside generic skills.

Employer consultations provide evidence of the need for the right attitudes and work behaviours from prospective employees and business demand for multi-skilled individuals, who possess specific technical skills alongside generic skills. Multi-skilled individuals provide businesses with flexibility, reducing costs and improving competitiveness.

Therefore it is essential that students not only grasp the base and technical skills within employment but hold a good understanding of the norms of the workplace as well as the importance of the right attitude.

This appears to hold true across all skills levels. As one major manufacturing employer who took part in the consultation for the Agreement commented:

“We are currently looking for scientists with a good degree (or even a PhD) but I would rather have someone in my team with a great attitude than a PhD from Oxford with a poor attitude.”

In summary, the more businesses and providers work together to help promote the sector and enable learners to become work ready, the more these skills gaps and shortages can be bridged.

The demand for skills

The Local Enterprise Partnership are in the process of commissioning new econometric forecasting work to identify likely economic growth in the City Region and this will demonstrate the potential employment growth in Advanced Manufacturing. We know from the *Engineering UK: The State of Engineering 2013 Report* that, UK wide, there are predicted to be 2.74 million job openings in engineering between 2010 to 2020 and that the UK will need to double the number of engineering graduates by 2020 to 87,000. Employer evidence within the City Region supports the need for new engineering expertise for growth and replacement demand.

“There is a void in the skills profile when looking for engineers and skilled craftsmen and if this is not addressed manufacturers will become unable to plan ahead confidently.”

LEP Manufacturing Forum

Figure 1 earlier in the report, sets out market information provided by specialist recruitment consultants Morgan Ryder and has been validated with manufacturing employers. This broadly shows the typical job types within manufacturing in the City Region: Operations and Engineering, Quality and Technical and Process Engineering.

There are a number of educational routes into each Advanced Manufacturing engineering job type (as detailed in the Supply of Training section).

Vacancy snapshot

In order to understand employer demand it is useful to review recent job vacancy volumes at occupation and skill level.

A partial indication of demand is given by considering relevant advertised vacancies within the Liverpool City Region. The Labour Insight intelligence tool allows us to look at a snapshot of vacancies that have appeared online in the Liverpool City Region over the last 12 month period (see Appendix 8).

Analysis of online vacancies from a range of websites over a 12 month period demonstrates that, amongst companies that define themselves as within the manufacturing sector, more than 50% of their vacancies are for engineering related roles. Across all sectors, there were an estimated 3,800 engineering vacancies identified (including non-manufacturing engineering vacancies) over the same period which reinforces anecdotal evidence that engineering is an area of high specialist demand.

In regards to specialist skills required for manufacturing vacancies, employers were most likely to ask for the following qualities:

- Six Sigma
- Just-In-Time Production
- Kaizan
- Purchasing
- Lean Manufacturing

Training providers specialising in Advanced Manufacturing indicate that Apprenticeship vacancies in the City Region have increased over the last three to five years. However, providers reported that potential candidates are often not equipped with the numeracy and literacy skills needed for Level 3 qualifications and that, as a result, much of the provision offered starts at Level 2. Additional feedback suggests that there is a need to ensure quality and progression for those learners holding below C grades in Maths and English.

Recruitment strategies

Qualitative evidence from local employers and other stakeholders has identified that the key entry routes into Advanced Manufacturing include word of mouth, through industry contacts and via specialist agencies. This is in addition to general recruitment through employers' own websites, Jobcentre Plus and other job websites. For Apprenticeship vacancies, adverts are placed on the National Apprenticeship Service website along with those of the relevant training providers and company websites.

Specifically, for experienced technical staff and specialists, employer recruitment strategies can often include recruitment by word of mouth within an industry, advertisement in specific trade magazines/websites and the use of specialist recruitment consultants.

Manufacturing vacancies are often listed in industry publications and recruitment and job sites including:

Morgan Ryder Associates:
<http://www.morganryder.com>

The Manufacturer:
<http://www.themanufacturer.com/>

Engineer Board:
<http://www.engineerboard.co.uk/>

Just Engineers:
<http://www.justengineers.net/>

The Engineer Online:
<http://www.theengineer.co.uk/>

Jobcentre Plus job search:
<https://www.gov.uk/jobs-jobsearch>

Packaging News:
<http://www.packagingnews.co.uk/>

Packaging Futures:
<http://www.packagingfutures.co.uk>

The Institution of Engineering
<http://engineering-jobs.theiet.org/>





Current and future opportunities

Innovation opportunities - Making it

making it together

The 'Making It' campaign launched in May 2013 aims to establish and promote the Liverpool City Region as an **innovation hub for manufacturing**.

The work builds on the (UK Government backed) Technology Strategy Board study "*A landscape for the future of high value manufacturing in the UK*", which has identified through consultation with academics and industry the most important manufacturing processes and systems and the most promising emerging science, engineering and technology innovations and this list includes the following:

- Materials science (lightweight and composites)
- ICT
- Sensors
- Robotics
- Bio-processing
- Data processing and storage
- Energy management

Liverpool City Region LEP has worked with the Technology Strategy Board to develop this Advanced Manufacturing approach on a City Region level, identifying specific capabilities that could enhance the performance of Liverpool City Region companies. The Making it work has been led by Nigel Weatherill, Vice Chancellor and Chief Executive of Liverpool John Moores University and has taken place alongside the production of this Agreement.

The 'Making It' report is being formally launched on 31st October 2013 and after this date will be available to view via www.liverpoollep.org.





The issues and analysis - summary

The Employment and Skills Board would like to thank all those organisations and individuals that have taken part in consultations for the production of this Agreement. The following is a summary of the responses gathered.

Perceived barriers to correcting the skills mis-match (employer view)

Feedback was obtained from consultation with a number of key manufacturing employers and via stakeholder events including:

- LEP Manufacturing Forum
- NW Business Insider Manufacturing Event (Dec, 2012)
- Halton Chamber Manufacturing Focus Group (April, 2013)
- Merseyside Paper and Packaging Forum
- Federation of Small Businesses
- Chambers of Commerce
- The main Sector Skills Councils covering Manufacturing: Semta and Cogent
- The Engineering Employers Federation (EEF)
- Manufacturing Advisory Service (MAS)
- Discussion with manufacturing support organisations including recruitment consultants (e.g. Morgan Ryder Associates)
- Discussions with individual manufacturing employers (including as part of National Apprenticeship Service funded research into manufacturing Apprenticeships)

From this consultation, the following issues came through strongly:

- Advanced Manufacturing requires technically skilled employees - working to Lean / Business Improvement Techniques
- An ageing workforce is creating replacement demand - succession planning is required now

- Need to change perceptions: Advanced Manufacturing as the opposite of 'dirty, manual work' or 'monotonous'
- A need to ensure that learners are equipped with an understanding of new technologies as well as Lean and BIT
- Lack of technical, maths based aptitude cited by employers and practical application of this
- General employability skills are also very highly valued by employers

In terms of general employer demand, this broadly covered employability or 'soft' skills and a mix between specialists and support staff:

- Logical, problem solving approach
- Attention to detail, accuracy and consistency
- Mathematical ability and practical approach
- Apprentices at all levels
- Specialists - Apprentices, graduates and professional staff
- Supporting staff - the accountants, sales and marketing, project management, legal, HR and associated professions

Based on this information a number of typical key barriers were identified that need to be resolved to better match skills supply and demand (from the employer viewpoint):

- It's experienced people I need, not newbies...
- I'm too small a business to set up an Apprentice or graduate scheme...
- You haven't got the right quality of people in sufficient number
- I can't afford to take someone new on
- The skills system itself is too complex - how do I navigate it?

Perceived barriers to correcting the skills mis-match (training provider view)

From speaking to and visiting interested training providers individually and from a consultation event with manufacturing training providers operating in the City Region¹⁶ the following barriers and considerations to aligning skills provision were identified:

- There is a need for greater certainty from industry about the specific skills demand (to justify provider investment)
 - Providers are keen to meet the needs of employers, but also have to consider financial viability themselves
 - Need more clarity about the specific skills required by the sector
 - There are issues in attracting learners in sufficient numbers into Advanced Manufacturing related subjects (particularly on a full-time basis)
 - There is a need to improve the overall STEM ability of those entering manufacturing courses (particularly age 16 to 18 maths levels)
 - Providers need employers to offer work experience and Apprenticeship opportunities
 - Funding and cost issues - (in terms of cost of provision relative to public/private funding available)
 - Importance of flexible delivery methods based around the company needs
 - Ensuring smaller companies are more aware of new technologies and the benefits to their business of training staff in their use (linking to the Making it work)
 - A directory of training provision for manufacturing was thought to be useful by some respondents
 - Capital resources for teaching manufacturing can become out of date quickly and are often very expensive to replace (with established training providers often relying on the generosity of the manufacturing employers they work with to donate or loan older machinery)
 - There is a clear need for loan funding or grants to Advanced Manufacturing training providers for infrastructure investment, especially in the private sector
- Some providers expressed interest in creating a centre of excellence for manufacturing in the City Region as a shared physical hub for capital machinery (while others felt this would be difficult to establish or would duplicate new forms of provision e.g. University Technical Colleges). In addition some successful collaboration already takes place, e.g. LJMU making use of St Helens College manufacturing training facilities
 - Are employers really committed to paying for provision?
 - Changing learners behaviour in choosing/consuming courses



¹⁶ Held February 2013 and attended by manufacturing curriculum leads at local colleges, universities and private training providers, plus partner organisations including Semta and the National Apprenticeship Service

What are employers already doing?

Jaguar Land Rover (JLR) - Skills for Growth

Jaguar Land Rover's Halewood Plant manufactures the Range Rover Evoque and Land Rover Freelander and has a growing reputation for outstanding quality/lean manufacturing excellence. The Range Rover Evoque was launched in 2011 to fantastic worldwide sales and as a consequence there was a need to triple the workforce to approximately 4,500 over an 18 month period. As part of the commitment to delivering world class products and a highly trained workforce, Halewood has focused on a range of Apprenticeships that could leverage the talents of its people.

The initial challenge in 2011 was to recruit and address the skills gap for over 1,400 new employees over a five month timeframe, driven by tight production deadlines. As a consequence of customer demand for the Evoque, it was necessary to further recruit 1,000 employees in 2012 as the plant embarked upon 24 hours, five days per week operations. This was a key moment in Halewood's 50 year history.

Getting it right first time - partnership working

The employer's own investment was complemented by funding from the National Apprenticeship Service and support from the EAL awarding body and SEMTA to develop a programme that would train JLR's new workforce with minimum interruption to Evoque production. JLR appointed a consortium involving EAL recognised Centres, PERA Training, Training 2000 and the Society of Motor Manufacturers and Traders (SMMT) Industry Forum to implement the scheme.

The Apprentice framework

Many of the new recruits were not familiar with manufacturing or the automotive industry, so it was essential to familiarise them with the plant's culture and fast-track their development to create a world class manufacturing workforce with the right technical, practical and academic competence. The Apprenticeships were built around JLR's commitment to Lean working practices and add significant value by developing talents, forming a key part in the Plant's life-long learning and development strategy.

The Level 2 Intermediate Apprenticeships provide a genuine insight into the challenges of working in an Advanced Manufacturing organisation and helps develop skills through both 'on and off-the-job' learning.

Impact to the business

Core skills training has nurtured transferable business skills (application of numeracy and literacy), whilst BIT principles have been equally important as they offer tools/techniques to target business processes improvements. Over 95% success rate was achieved for both Knowledge and Core Skills elements of the Intermediate Apprenticeship programme.

JLR report they have consistently found that Apprenticeships are the most effective way of bringing new people into the workforce and developing highly skilled people for the job that needs to be done. The Apprenticeship programmes at Halewood have helped the business to grow in recent years. Approximately 2,000 of JLR's employees will have graduated as a Level 2 Intermediate Apprenticeship by the end of 2013 and they are proud to have brought in so many people of all ages and helped them to achieve this national qualification.

"Manufacturing is an exciting industry and excellent career choice, with high quality training and a bright future"

(Richard Else - Operations Director, Jaguar Land Rover¹⁷).

JLR recently won the Macro Apprenticeship Employer of the year award at the 2013 Liverpool City Region Apprenticeship Awards Ceremony.

Involvement with local schools

In addition to this specific recruitment programme, JLR have a full range of community activity and schools support. For example, in conjunction with its Education Business Partnership, JLR has signed a three year partnership with All Saints High School in Kirkby to help raise aspirations and ambitions by getting involved in mock interview events and helping to design the engineering curriculum at Key Stages 4 and 5.

¹⁷ <http://www.peratraining.com/case-studies/jaguar-land-rover>

R.S. Clare & Co Limited - workforce planning in an SME

RS Clare was founded in 1748, employs 74 staff and is the longest established manufacturer of lubricants in the UK.

Like many smaller manufacturing firms, the organisation have a loyal but ageing workforce and therefore have developed a number of initiatives to ensure they have good succession and contingency planning in place.

RS Clare have developed a good understanding of the skills set within their existing workforce and have developed a skills matrix for each department and team. This will help to identify skills gaps, risks and training needs across the existing workforce.

Over the years the organisation has been committed to the development of Apprentices and is currently supporting two young people within the warehousing and business administration departments through the Liverpool Chamber of Commerce; in addition to this four existing staff are undertaking the Process Manufacturing Apprenticeship Framework with Wirral Metropolitan College after completing the key skills element. RS Clare also offers a one year graduate placement for students studying chemistry within their research and development department which has been very beneficial to the graduates involved and the organisation.

"We clearly understand the many benefits of helping to develop the skills of individuals at any age and level within our organisation. It helps us to keep our staff loyal to the company and compete in these highly competitive global niche markets. It also provides our Apprentices and graduates with vital work experience and a better understanding of our industry to meet our skills needs now and in the future."

(Geraldine Chapple - Company Secretary)

Cammell Laird - engineering apprenticeships

With a staff of more than 750 and nearly 200 years of heritage, Apprenticeships have long been at the heart of Birkenhead based company Cammell Laird, with the skills of ship repair, ship building and engineering stretching down through generations. In 2008 Cammell Laird signed a through-life support contract to maintain 11 ships in Royal Fleet Auxiliary (RFA). This contract is worth up to £1bn over 25 years. Having Apprentices work on the contract, and learn about the RFA, is of huge benefit to the yard as it seeks to deliver the contract over the next two decades. The firm is also diversifying to fulfil its potential and is actively targeting new sectors including offshore renewables, civil nuclear and the oil and gas industry.

To help service this work, Cammell Laird now have 64 Apprentices in the business, with a focus on ensuring its workforce has transferable engineering skills. The Company work in partnership with specialist training provider Maritime and Engineering College North West (MECNW), which is situated next to the yard and is one of the premier locations in Britain for maritime engineering training.

For Cammell Laird, Apprentices are the future. The average age of the workforce is 45. The average age of the Apprentices is 18. The business therefore has a huge skills gap to fill. The Apprenticeship programme closes that gap and gives the shipyard the ability to grow. Having a group of Apprentices committed to four-year programmes increases productivity and reduces staff turnover and 32 Apprentices have graduated into full time employment at the firm over the last four years.

Cammell Laird is constantly striving to improve its Apprentice training and mentoring. For the more able, the yard will sponsor youngsters through a University engineering course and is keen to develop the next generation of middle management from within the existing Apprentice population. Indeed, Cammell Laird's executive team includes many former Apprentices at the yard.

INEOS ChlorVinyls - long term skills planning in the chemicals industry

INEOS ChlorVinyls Runcorn chemicals site is focused on production of chlorine and caustic soda. The site currently sponsors an average of six Apprentices per year through specialist training provider TTE Technical Training Group (which was set up in the 1990s by the then British Steel and ICI and is now part owned by INEOS).

The Apprenticeship is broad based through year one, during which time trainees gain experience in a range of disciplines including mechanical, electrical and instrument engineering through to process operations. At the end of year one an analysis is undertaken to determine the likely future skill needs of the business, which is used as a basis to stream trainees into discipline areas starting in year two.

Trainees spend a further eighteen months on site, gaining experience across a range of operating technologies. During the final six months of training Apprentices are aligned to the area and role into which they are expected to be recruited. They are closely mentored during this period in preparation for employment and to ensure they reach the required standard to operate safely and competently in their chosen field.

In addition to supporting the attainment of mandatory qualifications, the Company also offers Apprentices a variety of formal certified training courses to further enhance their skills and knowledge in their particular discipline area.

The key benefits to INEOS of running an Apprenticeship programme are that it allows the Company to closely match skills to its specific requirements; it encourages the long term development of highly skilled individuals and supports staff retention in critical areas; and it helps to ensure that the latest skills and practices are deployed within the organisation.

Pilkingtons - Apprenticeship programme

Long standing St Helens based glass manufacturer Pilkington UK Ltd, (owned by NSG Group) established a training company, Waterside Training, in partnership with St Helens College in 1995 to provide high quality training that brought industry and education together.

Waterside provides Apprentice training through the direct employment of Apprentices on behalf of sponsoring companies such as Pilkington, Goodrich, NGF Europe, and also by managing the Apprenticeship training for other companies who employ Apprentices directly.

Across the North West, Pilkington has sponsored 38 Apprentices through Waterside within the last five years. Four year Mechanical and Electrical Engineering Apprenticeships are offered along with a tailored three year Glass Manufacturing Apprenticeship. Scientific Apprenticeships are also offered within the Research and Development functions of Pilkington.

Many current Pilkington employees have gone through an Apprenticeship route: from time served craftsmen with 40 years+ experience, to high achievers including the current Director of UK Operations, who runs a £200m business.



Jacobs (United Biscuits) - staff development and school liaison activities

Jacobs Factory in Aintree was 100 years old recently and plays a key role in the local community. Employing over 1,100 people directly, plus temporary workers, over the last seven years the numbers of employees and outputs has increased by over 40%, with over 50,000 tonnes of biscuits now produced per year.

In addition to recruitment of Apprentices and offering graduate placements, Jacobs have strategic policies relating to business in the community and employee development. This includes:

- Established excellent links with two major local secondary schools (Archbishop Beck and Alsop High School). Jacobs attend and support the schools enterprise days, mock interviews, a work inspiration programme and reading support sessions and also sponsor their Student of the Year Awards which includes a factory tour for the winners.
- As part of National Reading Week and Community Week Jacobs staff visited Blessed Sacrament primary school and delivered reading support and donated book vouchers for the school. In addition to this members of the HR team gave a talk about the factory, what manufacturing entails and environmental and sustainability issues.
- Up-skilling of the existing workforce with a Food Manufacturing Excellence program for approx 220 operators (this includes a nationally recognised qualification covering Lean principles and mechanical comprehension and teamwork. This project is run in conjunction with Telford College).
- Trained a group of Advanced Team Members (who take on devolved tasks from engineers) the Company spent £90,000 putting 30 staff through a nine day training program with the North West Training Council. The training gave an appreciation of basic engineering principles and skills.
- Engineering Team Leaders - all undertaking NVQ 2 in Management linked in with Southport College. This aims to develop new manager skills for use in practice.

What are providers already doing?

Higher education

The University of Liverpool and Liverpool John Moores University offer a wide range of degree courses within Advanced Manufacturing. A comprehensive list of provision offered by these institutions can be found in Appendix 9. Changes in the student numbers and increased tuition fees have already led to changes in student application behaviour that may be beneficial to the manufacturing sector as students look for programmes of study that will lead to realistic work opportunities.

Further education

Further education colleges and training providers offer a wide range of courses within Advanced Manufacturing. A comprehensive list of provision offered by these institutions can be found in Appendix 4. Some of these courses have historically been tied to public subsidy dependent on learner participation and achievement rather than the needs of employers. However there are now opportunities to use new flexibilities in the system to encourage a more bespoke approach to meeting need and to encourage greater employer ownership of skills.

These include:

- **The Innovation Code** - provides the ability to receive public funding towards skills delivery in advance of a qualification being placed on the Qualification and Curriculum Framework.
- **The Study Programme** - launched in Sept 2013 which will allow providers to incorporate substantive and relevant work experience into full time courses for learners aged 16 to 19.
- **The Liverpool City Region Skills for Growth Bank** will enable businesses themselves to buy precisely what they need from providers. Further information can be found on www.skillsforgrowthbank.org.uk
- **Apprenticeship Provision**
There are a number of key training providers and businesses offering Apprenticeship training for Advanced Manufacturing across the Liverpool City Region. For a list of current Apprenticeship Frameworks please see Appendix 10.

Apprenticeship frameworks exist covering manufacturing and engineering operations in general, plus sub-sector specific frameworks for example: polymers, the glass industry, print and packaging and coatings manufacture.

- **New Provision - University Technical Colleges**
University Technical Colleges are a new concept in education. They offer the opportunity for students to take full time, technically-oriented courses of study focused on specific industry sectors. They will be equipped to meet the needs of the sector and are sponsored by a university and have been developed alongside key employers and other stakeholders in the sector. This includes:
 - **Liverpool (Low Carbon and SuperPort) University Technical College**, in partnership with Liverpool John Moores University, The City of Liverpool College and supported by Cofely GDF Suez, Peel Ports Ltd and other related employers. Due to open in 2014 with 300 student places available in the first year.
 - **Liverpool (Life Sciences) University Technical Colleges**, in partnership with North Liverpool Academy, the University of Liverpool, Merseybio, The Royal Liverpool and Broadgreen University Hospitals NHS Trust and supported by private sector partners including Novartis and Redx Pharma. Opened September 2013 with over 100 students enrolled.
 - **Birkenhead (Engineering) University Technical College**, originally submitted in partnership with Cammell Laird, the University of Liverpool, JMU, Mersey Maritime Group and Wirral Metropolitan College. The plans are currently being revised, with no official opening date at the time of writing.



Examples of training provision initiatives

Liverpool John Moores University

Business collaboration

Liverpool John Moores University have collaborated with Jaguar Land Rover (JLR) to develop a 16 month Foundation Certificate in Engineering and Technology.

This is a progression route to part-time undergraduate engineering degrees for employees identified by JLR as having the potential for career and skills progression, but who do not have the standard entry qualifications (NC/HNC/HND) or their equivalent.

The initial cohort of 10 delegates from JLR Halewood started the programme in September 2012, with successful completion leading to enrolment in January 2014 onto the part-time Bachelor in Engineering programmes in Manufacturing Systems Engineering and Industrial Electronics and Control Engineering. The intention is to open up the programme to other engineering companies from September 2014.

Foundation Project - engineering progression opportunity

Liverpool John Moores University offer a foundation year for students that have a strong interest in engineering, but do not have the necessary UCAS points to go straight into a degree. The student enrolls on the Extended Engineering and Technology with Foundation year BEng / BSc, which offers a progression route onto BSc and BEng (Hons) engineering degrees programmes within the School of Engineering, Technology and Maritime Engineering.

World of Work Programme - developing skills required in the workplace

Liverpool John Moores University's curriculum now has explicit work related learning and the development of 8 Graduate Skills embedded within all academic programmes. Students are encouraged to recognise and develop a set of higher level employer specified World of Work Skills, contained within three themes: Self Awareness, Organisational Awareness and The Ability to Make Things Happen.

The University of Liverpool

Engineering Education Scheme (EES) annual engineering event for school students

The University's School of Electrical Engineering, Electronics and Computer Science and the School of Engineering host an annual event aimed at Year 12 students from local schools to attract them into Engineering. It is organised by EDT (Engineering Development Trust) who are a provider of STEM (science, technology, engineering and mathematics) enrichment activities for UK youth¹⁸.

Graduate to Merseyside Graduate Recruitment Service for local graduates

The University offers a graduate recruitment service specifically aimed at assisting small and medium sized enterprises (SMEs) in the Merseyside region. Supported by the European Regional Development Fund (ERDF) this free service helps employers to find graduates from Liverpool John Moores University, Liverpool Hope University and the University of Liverpool as well as those returning to the region to work on a specific project or to fill a full-time position.

www.graduatetomerseyside.co.uk

Knowsley Community College

Business Improvement Techniques

The College is working with various major employers to deliver Business Improvement Techniques (BIT) contracts, including the Improving Operational Performance L2 Apprenticeships (BIT Pathway). They are working with Jobcentre Plus in delivering this training to unemployed people to support them into work within manufacturing.

The North West Training Council (NWTc)

Community project work within curriculum delivery

NWTc have developed a community project with Greenbank Sports Academy to build bespoke electric wheelchairs to be used for Power Hockey for the disabled.

This involves engineering students getting involved in the design, development and build of robust and flexible wheelchairs for use in this sport, giving students the opportunity to utilise a range of their skills in a real life project, as well as gain a better understanding of the needs of the disabled.

St Helens College

Partnership with Jaguar Land Rover - business development

The College have a long-standing relationship with Jaguar Land Rover, with 30 students currently enrolled across four Higher National Certificate (HNC) Engineering programmes. These students had undergone a rigorous selection procedure and had been especially selected for their ability and potential within the company. Following completion of the Higher National Certificate (HNC), the students can then progress onto top up Higher National Diploma (HND) and degree-level study, (with the college planning to offer a Level 6 BEng degree).

Computer Numerical Control (CNC) training - starter courses for novices

The College also offer a BTEC First Part Programming CNC Machines course, for novice learners to gain CNC skills to meet employer demand.

Hugh Baird College

Enrichment/enterprise activity for engineering students

All Level 3 BTEC Engineering students will undertake an enrichment / work experience project involving the 'Raspberry Pi' computer. Students will use the computer to build a media centre which can be then used to operate on the internet wirelessly to access movie, picture and music files on the family PC. They can also add parts to it so it can be used to operate by remote control and other functions for the media server include accessing online television services.

The students will be required to design their own casings for the media server. Once the media server is designed and constructed students plan to sell the product as part of the Colleges Hughnique range of merchandise, requiring them to cost and market their wares using a business plan.

¹⁸ http://www.etrust.org.uk/about_edt.cfm

Training Tomorrow's Engineers (TTE) Training Ltd

Apprenticeships - whole person development approach

As noted previously, TTE are a specialist training provider within the chemical, petrochemical, process, power, paper, pharmaceutical, nuclear and oil and gas industries throughout the North West.

They offer a Whole Person Development programme incorporated into the training. Learners will be engaged in many team building activities at Brathay in the Lake District, where they will take part in a series of challenging indoor and outdoor activities designed to give them the chance to learn more about themselves and how they work - on their own and in a team. The objectives of the course are primarily to explore areas of communication and recognise what is useful.

Learners will also practice step-by-step approaches to problem solving and develop teamwork skills. It is also important that they learn to understand how what they do and say impacts on those around them and appreciate that others work in different ways and need different things to help them work and learn. This will help them to grow in self-confidence, build interpersonal relationships and take responsibility for their own learning.

They will also learn how to take responsibility for working safely in a high-risk environment and how to understand the link between 'doing' and 'learning.' The skills learnt through TTE's Personal Development Programme are invaluable and will equip them to deal with a variety of situations and challenges, both at home and in the workplace.

Wirral Metropolitan College

Promotion and up-skilling of provider STEM delivery staff

The College managed the Learning and Skills Improvement Service funded North West Regional STEM (Science, Technical, Engineering and Maths) network group and have developed a number of initiatives to promote and up skill STEM delivery staff. The centre worked with STEM organisations and practitioners across the region to collect and share best practice, disseminate details of available STEM support, deliver CPD events and run regional subject specific networks.

Advanced Manufacturing careers education

Talent needs to be identified from an early age and skills nurtured and doing this will help manufacturers ensure they have the workforce they need.

LEP Manufacturing Forum

It is essential that careers advisers, all training provision and employers in the sector help young people and job seekers understand the opportunities available within the sector. There are a number of local initiatives that should help promote and demystify the sector which are shown below:

Jobs for tomorrow Careers Resources

As part of the work of the Labour Market Information Service, a set of careers materials (including video resources and lesson plans) will be produced for specific roles within the City Region growth sectors during 2013/14 under the **Jobs for Tomorrow**¹⁹ banner and this will include materials for Advanced Manufacturing.

Manufacturing Futures

This is a local group of interested individuals from an educational, careers and economic background convened by David Rawlinson, a Partner specialising in schools practice based at the Liverpool office of international law firm Hill Dickinson. (See Appendix 12).

The group was established following a Conference held in March 2012 at which the Rt. Hon. Frank Field MP was the keynote speaker with one of its principal aims being to:

- Raise awareness and understanding of Advanced Manufacturing as an aspirational career choice for young people in Liverpool City Region

In his keynote speech at the conference giving rise to the group, Mr Field commented that he saw considerable scope for **influencing the career paths of our young people into manufacturing and other City Region sectors at an earlier age.**

¹⁹ <http://www.connexionslive.com/jobsfortomorrow.aspx>

Les Ratcliffe, Director of Jaguar Rover, also spoke at the Conference and advised, whilst Jaguar Land Rover has educational programmes in some 1,500 schools in the UK, they still struggle to find people with the right level of skills, not just technical but also life skills, and he described the problem as a challenge for the future.

The group aims to raise awareness by fostering greater mutual understanding between the education sector (primary, secondary, further and higher education) and manufacturing industry.

Specifically this understanding will help education providers and careers staff to explain the job roles available in Advanced Manufacturing to young people and their parents and highlight the rewarding career choices on offer. The group work closely with the LEP Manufacturing Forum (see Appendix 12) and is planning a series of actions:

- The **Manufacturing Futures** group, with the support of the Manufacturing Forum, will lead on promoting an understanding of manufacturing and the career opportunities available to young people. As a first step, both groups can support with time and resource MerseySTEM, which holds the Government contract in the City Region for promoting science, technology, engineering and mathematics in secondary schools, to organise a series of **'Robot Challenge' manufacturing days for schools**.
- Building on the work of MerseySTEM, employers and training providers will identify **'STEM Ambassadors'** who are working in, or aspire to work in, manufacturing to give talks and take part in events for prospective and current students to promote manufacturing as a career choice. **Liverpool John Moores University's World of Work Careers Centre** have offered to pilot this approach with their students.

“ It is important that we are giving the correct information/picture to students about manufacturing so they know what to expect when they are in post and companies are able to retain staff.

LEP Manufacturing Forum ”

There are also a number of national organisations that offer specific careers resources in the sector. These include:

Tomorrows Engineers:

<http://www.tomorrowsengineers.org.uk/resources.cfm>

SEMTA:

<http://semta.org.uk/individuals>

Cogent:

<http://www.cogent-careers.com/careerpathways>

WISE:

<http://www.wisecampaign.org.uk/women/careers>

National Careers Service:

<https://nationalcareersservice.direct.gov.uk/advice/planning/jobfamily/Pages/manufactureandengineering.aspx>

What works / what can we do more of?

- Manufacturing has to compete with many other sectors to attract and retain individuals with STEM skills. Therefore it needs to address the image/perception issues of the sector. This could be achieved by **businesses in the City Region giving young people a positive ‘taster’ of manufacturing to ‘whet their appetite’ for a future career in the sector.** Inspiring the Future²⁰ and MerseyStem²¹ helps individual volunteers from industry to work more closely with schools and colleges to achieve this.
- Businesses and training providers need to collaborate more effectively to develop programmes of study that meets the present and future needs of employers.
- Manufacturing wage rates have increased by 12.4% since 2006, a faster growth rate than wages in the overall economy and more needs to be done to publicise this through sector specific careers education sessions.
- **Employers have found that the production of a training plan and skills gap analysis of their current workforce is a useful way to ensure effective staff development and succession planning.** Businesses in the sector should consider undertaking this exercise to enable them to better plan their workforce development and recruitment needs around their business growth strategy. Many Colleges and training providers will be able to undertake an Organisation Training Needs Analysis.
- An Apprentice Training Agency style scheme should be considered for the City Region, whereby manufacturers were able to take an Apprentice/s on a placement (e.g. of three to six months), with the Apprentice completing two to four placements over a one year period. On completion of the first year, the Apprentice would be part qualified and could then go into direct employment with their chosen employer and continue their Apprenticeship. This has been piloted by Essex County Council.

Case Study

Essex County Council Engineering Apprenticeship Scheme

In 2009 Essex County Council (ECC) developed a scheme to support employers to develop and go on to employ young Apprentices, with a focus on the manufacturing engineering sector.

This was developed to arrest a sharp decline in Apprenticeships in Essex over recent years and the fact that over a sixth of these were in hairdressing, with the project targeting engineering and manufacturing to rebalance Apprenticeship provision; service projected job growth and reduce the number of young people not in education, employment, or training (NEET).

ECC established an Apprenticeship Training Agency, employing Apprentices directly to reduce the costs faced by employers. Apprentices were rotated around several employers to apply their newly acquired skills and to allow employers to test drive several Apprentices with a view to recruiting them in year two. Partners included public and third sector bodies, National Apprenticeship Service, Federation of Small Businesses, Sector Skills Councils and Industry Training Boards (which co-funded Phase 2 of the programme).

Essex County Council acted as the “employer” for 155 young people whilst undertaking a one year fast track Level II Apprenticeship in engineering. The project exceeded its targets, delivering 135 Level 2 fast track engineering Apprenticeship completions, with 100 young people progressing into full-time employment (often with training) and 30 into further training.

One advantage of this approach was that it allowed some participating small businesses to support Apprentices for the first time. Apprentices also underwent an initial period of classroom based learning in college to build a foundation of knowledge before going on placement.

²⁰ <http://www.inspiringthefuture.org/>

²¹ <http://www.merseystem.co.uk/ambassadors/>



Conclusions

Advanced Manufacturing provides opportunities for jobs and will continue to do so in the next 10 years.

- The business-led Local Enterprise Partnership and Employment and Skills Board are committed to improving the employer ownership and delivery of skills and training for Advanced Manufacturing.
- The 'Making it' High Value Manufacturing project provides Liverpool City Region with an innovative way to consider future needs for Advanced Manufacturing employers locally, including in regard to skills.

Manufacturers need to work harder to promote their companies and sector as there are still incorrect perceptions about Advanced Manufacturing.

- There is increasing awareness amongst young people and their parents and guardians that manufacturing engineering is an exciting professional career choice with good long-term prospects. However, more work is needed to encourage maths and science students to pursue a career in Advanced Manufacturing.
- Advanced Manufacturing employers should be encouraged to act as STEM Ambassadors for the sector working with MerseySTEM. If not doing so already, they could consider offering opportunities for schools and college staff/learners to visit workplaces and also speak at careers information events.
- A group of interested institutions and organisations, convened and led by city law firm Hill Dickinson are exploring opportunities, under the banner of 'Manufacturing Futures', for promoting Advanced Manufacturing as an aspirational career choice to City Region residents.

There are not enough young people studying and achieving good grades in STEM subjects within the City Region to A-Level and beyond.

- STEM skills are critical for creating successful manufacturing engineers. Given this STEM should be an area of further focus by training providers for example using a blended learning approach where science and maths skills are applied through practical projects, also bringing in aspects of lean and Business Improvement Techniques.
- Good achievements in maths and physics to Level 3 and above are critical to pursuing a career in Advanced Manufacturing and this message needs to be clearly communicated to prospective learners.

Schools, colleges and providers need to reflect modern manufacturing techniques in their provision to better prepare young people for work.

- There is a need to ensure there are sufficient quality engineering opportunities for interested learners to take up, this will require an increased volume of employers offering Apprenticeship openings, as well as increased provision to enable more full and part time learners to be trained to meet the demand now and in the future in manufacturing engineering.
- There is a need to ensure providers offer students the chance to work on industry standard machinery. Public funding including capital grants and loans needs to be considered to allow providers in this field to invest in new equipment and technologies to enable them to deliver effective provision and close the skills gap.
- In turn, employers could also consider how they can support training, either through providing equipment to a partner training provider or allowing students to use theirs on site when not operational. (Best practice examples of this already take place, but there is an opportunity to further this by concerted efforts between providers and employers).

- The Skills for Growth Bank proposal provides a useful route to help employers meet future skills challenges and correct the skills mis-matches and barriers highlighted in this Agreement.
- Training Providers should ensure that a basic grounding in lean and Business Improvement Techniques is embedded into relevant programmes of study.

More work needs to be done with SMEs to encourage them to take on Apprenticeships.

- The labour market statistics in this Agreement demonstrate that manufacturing related Apprenticeship provision has been increasing in the City Region, with some excellent examples of employers taking on Apprentices and graduates identified. However, it is recognised that provision is disproportionately concentrated in larger employers and despite repeated initiatives nationally and locally to encourage Apprenticeship uptake amongst micro and small employers more work is still required.
- The Liverpool City Region Apprenticeship Hub are currently looking at these issues and will be developing a number of initiatives to promote Apprenticeships.
- There is a specific opportunity to ensure public funding such as the Advanced Manufacturing Supply Chain Initiative (AMSCI) and Regional Growth Fund boost workforce skills levels including for smaller manufacturers.



Advanced Manufacturing: Skills for Growth Agreement

Meeting employment and skills demand with supply by agreement

Businesses involved in this agreement	Partner organisations involved in this agreement

What will the agreement accomplish (please list key areas agreed)	
We will work together to grow the next generation of world-class Advanced Manufacturing engineers	<input type="checkbox"/>
We will support the development of a Shared Apprenticeship Scheme for Advanced Manufacturing	<input type="checkbox"/>
We will support the setting up of a Manufacturing Forum Talent Bank	<input type="checkbox"/>
We will identify STEM Ambassadors from within our organisation and take part in the activities of MerseySTEM	<input type="checkbox"/>
We will work together to reshape and redesign the curriculum of our learning and/or employment programmes	<input type="checkbox"/>
We will ensure our young people understand the basic concepts of Lean and Business Improvement Techniques and can apply these techniques in a work setting	<input type="checkbox"/>
We will ensure our existing Advanced Manufacturing workforce has the highest calibre of manufacturing engineering skills, including Higher Level Skills	<input type="checkbox"/>
We will work together to develop a better understanding of the opportunities within the sector and inspire the career choices of local people and demonstrate what Advanced Manufacturing has to offer	<input type="checkbox"/>

Other specific objectives (please specify)

Businesses named in this agreement will undertake the following actions (please specify)

Colleges, providers and partners named in this agreement will undertake the following actions (please specify)

Signatories

Business Signatories:

Partner Signatories:

Provider Signatories:

Period of Agreement

Date from:

Target date:

Although Skills for Growth Agreements do not form a legally binding contract they should form a public commitment. To help underpin and publicise this commitment please return completed Agreements to:

Liverpool City Region Employment and Skills Board, c/o City Region Employment and Skills Team, Knowsley Council, PO Box 21, Archway Road, Huyton, Knowsley, Merseyside, L36 9YU

For an electronic version of this template, please go to www.lcrskillsforgrowth.org.uk

References

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'A landscape for the future of high value manufacturing in the UK': Technology Strategy Board, 2012

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Manufacturing and Nuclear in the North West, North West Regional Leaders' Board, 2013

'No stone unturned: in pursuit of growth', Lord Heseltine Review, 2012

North West Manufacturing Statistics, SEMTA, 2012

Skills For Growth - A More Productive and Flexible Labour Force Engineering Employers Federation, 2012

Semta Apprenticeship Ambition, Semta, 2013

Skills for Industry 'Bridging the Divide': How addressing the skills gap would stimulate economic growth in North West England and nationally, North West Business Leadership Team, 2013

Sector Skills Insights: Advanced Manufacturing, UKCES July 2012

The Demand for STEM Graduates and Postgraduates, CIHE STEM Policy Group, January 2009

The supply of and demand for high-level STEM skills UKCES December 2011

SMEs likely to see the largest need for graduate recruitment, The Engineer, 11 October 2012



Appendices

Appendix 1

'Skills for Industry: Bridging the Divide' North West Business Leadership Team (NWBLT), 2013

NWBLT's Bridging the Divide document on Skills for Industry set out seven problems identified by major North West manufacturers in relation to skills, covering:

- a shortage of young people qualified for engineering and manufacturing
- young people experiencing difficulty in quickly adapting to the world of work
- cultural barriers in some sectors of society to pursuing a career in manufacturing
- complexity and frequent change in the education system
- skills strategy and governance lacking coherence and consistency
- employer difficulty in identifying the most appropriate training providers to meet their needs
- poor two-way communication between employers and education and training providers

To overcome these problems, and realise the £160m annually that NWBLT estimate would accrue to the North West economy by raising skills levels in manufacturing, the document sets out the following recommendations:

- establishing a talent bank to promote engineering and manufacturing industry (using industry ambassadors and linking to publicly funded careers advice services)
- creating a single signposting and delivery body for skills brokerage (industry-led, democratically accountable and monitoring standards and quality)
- using both bodies, produce a long-term national skills strategy and delivery system (over minimum 10 year period, as in Germany)

Source: <http://www.nwblt.com/>

Appendix 2

A-Level achievements in maths and science subjects,
Liverpool City Region, 2008/09 to 2011/12

	2008/09	2009/10	2010/11	2011/12
Biology	1,097	1,215	1,285	1,191
Chemistry	914	970	1,049	1,049
Physics	494	596	605	599
Maths	1,202	1,381	1,609	1,541
Total STEM passes	3,707	4,162	4,548	4,380
STEM as % of total passes	19.3%	21.4%	23.2%	24.5%

Source: AS/A-Level Statistical First Release, Department for Education (2008 to 2012)

Appendix 3

Liverpool City Region residents studying STEM-related subjects at higher education, 2008/09 to 2011/12

	2008/09	2009/10	2010/11	2011/12	
				Count	% of total
Aerospace engineering	104	107	113	132	1.9%
Artificial intelligence	8	6	9	11	0.2%
Astronomy	78	80	93	94	1.3%
Biotechnology	9	12	10	13	0.2%
Broadly based programmes in computer science	1	2	2	2	0.0%
Broadly based programmes in mathematical science	1	1	1	1	0.0%
Broadly based programmes within engineering and technology	0	1	1	0	0.0%
Broadly-based programmes within physical sciences	19	23	23	25	0.4%
Ceramics and glasses	1	2	3	5	0.1%
Chemical, process and energy engineering	90	102	91	114	1.6%
Chemistry	422	458	515	553	7.9%
Civil engineering	368	385	379	378	5.4%
Computer science	1,188	1,154	1,128	1,155	16.4%
Electronic and electrical engineering	328	373	362	374	5.3%
Forensic and archaeological science	269	314	387	402	5.7%
General engineering	305	288	344	376	5.3%
Geology	151	156	166	158	2.2%
Information systems	529	505	508	487	6.9%
Maritime technology	48	50	55	61	0.9%
Materials science	10	14	12	12	0.2%
Materials technology not otherwise specified	20	19	22	19	0.3%
Mathematics	598	603	683	733	10.4%
Mechanical engineering	324	353	314	304	4.3%
Metallurgy	5	5	7	7	0.1%
Minerals technology	0	2	3	4	0.0%
Naval architecture	6	11	12	9	0.1%
Operational research	5	2	4	5	0.1%
Others in computer sciences	2	1	1	3	0.0%
Others in engineering	7	8	12	12	0.2%
Others in mathematical sciences	0	0	1	1	0.0%
Others in physical sciences	63	63	57	75	1.1%
Others in technology	152	165	177	228	3.2%
Physical geographical sciences	360	361	381	396	5.6%
Physics	301	306	328	354	5.0%
Polymers and textiles	158	182	142	28	0.4%
Production and manufacturing engineering	111	105	118	106	1.5%
Science of aquatic and terrestrial environments	90	93	105	135	1.9%
Software engineering	166	180	186	222	3.1%
Statistics	43	45	41	47	0.7%
Total residents studying STEM-related subjects	6,340	6,537	6,796	7,041	----

Source: Higher Education Statistical Authority (HESA) Data, 2013

Appendix 4

Liverpool City Region further education full and part time provision within the Advanced Manufacturing sector

Engineering

- 17th Edition Regulations - Requirements for Electrical Installations (BS7671)
- Advanced Diploma in Engineering
- BTEC Extended Diploma Electrical Engineering
- Certificate in Fabrication and Welding Engineering Technology
- Diploma in Electrical Installations
- Entry Level 3 Diploma for the Introduction to Vehicle Technology
- Entry Level Vocational Studies in Engineering
- Level 2 Certificate in Preparation for Working in the Engineering Manufacturing Industry
- Level 1 and 2 Award in Welding
- Level 1 and 2 NVQ Performing Engineering Operations
- Level 1 Award in Introductory Manual Metal Arc (MMA) Welding
- Level 1 Award in Introductory Metal Inert Gas (MIG) Welding
- Level 1 Award in Introductory Oxy-Acetylene Welding
- Level 1 Award in Introductory Tungsten Inert Gas (TIG) Welding
- Level 1 Award in Introductory Welding Skills - (MAGS (MIG) Welding)
- Level 1 Award in Introductory Welding Skills - (TAGS (TIG) Welding)
- Level 1 Certificate Introduction to Electrical Installation
- Level 1 Engineering
- Level 1 NVQ Certificate in Performing Engineering Operations
- Level 1 NVQ VRQ Certificate in Engineering Technology
- Level 1 Tomorrow's Technicians
- Level 2 and 3 Award in 2 Dimensional Computer Aided Design (CAD)
- Level 2 and 3 Business Improvement Techniques
- Level 2 and 3 Diploma in Electro Technical Installations
- Level 2 Certificate Electrical Installation - Electrotechnical
- Level 2 Combined Working Practices
- Level 2 Diploma in Engineering (Electronics)
- Level 2 Diploma in Engineering (Manufacturing and Electronics)
- Level 2 Diploma in Engineering (Manufacturing)
- Level 2 Diploma in Engineering and Technology - Electrical
- Level 2 Diploma in Engineering and Technology - Mechanical
- Level 2 Engineering
- Level 2 Extended Certificate in Engineering
- Level 2 NVQ Certificate in Performing Engineering Operations
- Level 2 NVQ Diploma in Performing Engineering Operations
- Level 2 NVQ Fabrication and Welding
- Level 2 NVQ Mechanical Engineering - New Opportunities
- Level 2 NVQ Mechanical Engineering Production
- Level 2 NVQ Performing Engineering Operations
- Level 2 Part Programming Computer Numerical Control Machines
- Level 2 Performing Manufacturing Operations
- Level 2 Tomorrow's Engineers
- Level 2 VRQ Diploma in Engineering and Technology (Electrical and Electronic)
- Level 2 VRQ Diploma in Engineering and Technology (Fabrication and Welding)
- Level 2 VRQ Diploma in Engineering and Technology (mechanical)
- Level 3 Award in the Initial Verification and Certification of Electrical Installations
- Level 3 Award in the Installation and Maintenance of Solar Photovoltaic Systems 2399-311/312/313/314
- Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations
- Level 3 Award in the Requirements for Electrical Installation BS7671:2008 (2011)

- Level 3 Certificate Electrical Installation - Electro technical
- Level 3 City and Guilds 7579 03 - Two Dimensional CAD
- Level 3 Diploma Engineering Technology
- Level 3 Diploma in Engineering - Electronic or Mechanical/Manufacture
- Level 3 Diploma in Engineering Technology - Electrical
- Level 3 Diploma in Engineering Technology - Mechanical
- Level 3 Diploma in Installing Electrotechnical Systems and Equipment
- Level 3 Extended Diploma in Electronic Engineering
- Level 3 Extended Diploma in Engineering
- Level 3 Extended Diploma in Engineering (Mechanical/Manufacturing)
- Level 3 Extended Diploma in Operations and Maintenance Engineering
- Level 3 National Diploma in Electrical / Electronic Engineering
- Level 3 National Diploma in Mechanical Engineering
- Level 3 National Diploma in Operations and Maintenance Engineering
- Level 3 NVQ Engineering Maintenance
- Level 3 VRQ Diploma in Engineering and Technology (Fabrication and Welding)
- Level 3 VRQ Diploma in Engineering and Technology (Mechanical)
- Level 4 HNC In Electrical/Electronic Engineering
- Level 4 HNC In Manufacturing Engineering
- Level 4 HNC In Mechanical Engineering
- Level 4 HNC In Operations Engineering
- Level 5 HND In Electrical/Electronic Engineering
- Level 5 HND In Manufacturing Engineering
- Level 5 HND In Mechanical Engineering
- Level 5 HND In Operations Engineering

Laboratory

- NVQ 2, 3 and 4 Laboratory and Associated Technical Activities (LATA)

Computing

- BTEC Level 2 and 3 in Computing
- BTEC Level 3 Diploma for ICT Practitioners (Systems Support/Networking)
- BTEC Level 3 Extended Diploma IT
- CISCO Certified Network Associate
- CISCO Network Academy (Semester 1 Networking for Home and Small Businesses)
- CISCO Network Academy (Semester 2 Working at a Small-to-Medium Business or ISP)

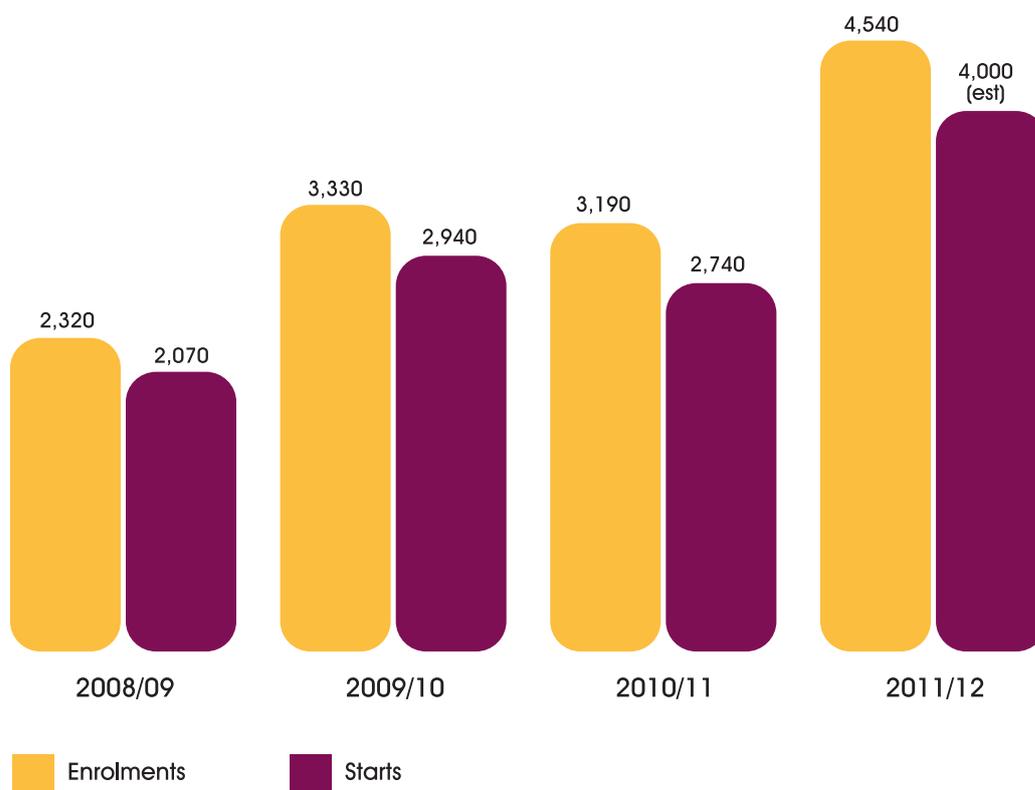
- CISCO Network Academy (Semester 3 Introducing Routing and Switching in the Enterprise)
- CISCO Network Academy (Semester 4 Designing and Supporting Computer Networks)
- CompTIA A+ and Network+ with BTEC Level 2 Diploma for ICT Practitioners (Systems Support/Networking)
- Computer Hardware Skills - CISCO IT Essentials
- ECDL Extra (Software Packages)
- Foundation Degree Computer Science
- Higher National Diploma Computing and Systems Development
- HNC Computing and Systems Development
- HND Computing and Systems Development
- I.T. Essentials leading to A Plus Certificate
- Installing Configuring and Administering Microsoft Windows 7
- Introduction to Programming
- Level 5 Foundation Degree in Information Technology
- Networking CISCO CCNA Semester 1 and 2

Management Courses

- CIPD Level 3 Certificate in Human Resources Practice (Foundation)
- CIPD Level 5 Intermediate Certificate Human Resource Management
- CMI Award in Team Leading
- CMI Level 3 Diploma in First Line Management
- CMI Level 5 Diploma in Leadership and Management
- CMI Level 7 Diploma in Strategic Leadership and Management (Postgraduate Masters)
- ILM Level 2 Award in Leadership and Teamskills
- ILM Level 3 Award and certificate in First Line Management
- Level 2 BTEC Diploma Business and Management
- Level 3 BTEC Extended Diploma Business and Management
- Level 4 and 6 HNC and BA Hons Business and Management
- Level 5 FD Business and Management
- Level 4 and 5 HNC and HND Computing and Systems Development
- Level 3 and 4 Management
- Level 2 Team Leading
- Level 3 SMTD Module 4 and IOSH Managing Safety Award
- Level 2 NVQ Level 2 International Trade and Logistics Operations

Appendix 5

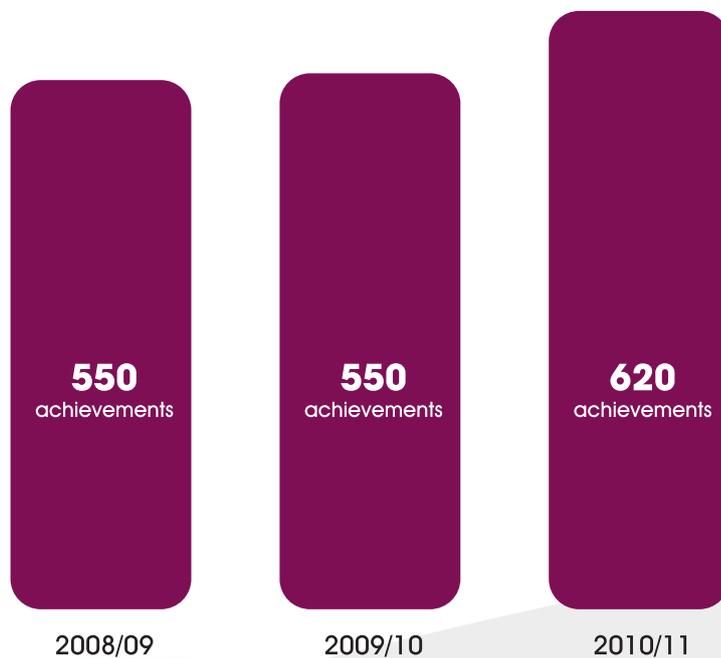
LCR FE enrolments and starts for Advanced Manufacturing related courses (2008/09 to 2011/12)



Source: The Data Service, 2013

Appendix 6

Advanced Manufacturing Apprenticeship completions in Liverpool City Region



Source: The Data Service, 2013

Appendix 7

Top Advanced Manufacturing Apprenticeship providers by enrolment for Liverpool City Region 2011/12

Provider	Count
Pera Innovation Limited	2,180
Wirral Metropolitan College	580
St Helens College	570
The City of Liverpool College	540
Knowsley Community College	420
North West Training Council	330
NCG	290
Riverside College Halton	220
Southport College	220
The Vocational College Limited	220
Maritime + Engineering College North West	200
Hugh Baird College	180
Greater Merseyside Learning Providers' Federation	160
Joint Learning Partnership Limited	130
West Cheshire College	130

Source: The Data Service, 2013

Appendix 8

Top occupations and related skills identified in Advanced Manufacturing employers online vacancies

Occupations	Skills
Mechanical Engineers	Six Sigma
Production and Process Engineers	Kaizen
Engineering Technicians	Just-In-Time Production
Transport and Distribution Clerks and Assistants	Process Improvement
Production Managers and Directors in Manufacturing	Failure Modes And Effects Analysis (FMEA)
Chemical Scientists	Purchasing
IT Business Analysts, Architects and Systems Designers	Procurement
Management Consultants and Business Analysts	Lean Manufacturing
Quality Assurance and Regulatory Professionals	Logistics
Buyers and Procurement Officers	Validation
Routine Inspectors and Testers	Manufacturing Engineer
IT User Support Technicians	Manufacturing Resource Planning (MRP)
Programmers and Software Development Professionals	Manufacturing Processes
Chartered Architectural Technologists	Lean Six Sigma
IT Specialist Managers	Enterprise Resource Planning (ERP)
Business and Financial Project Management Professionals	Process Engineering
Metal Machining Setters and Setter-Operators	Business Analysis
Electrical Engineers	Product Development
Managers and Proprietors in Other Services N.e.c.	Mechanical Engineering
Quality Assurance Technicians	Supplier Selection
Vocational and Industrial Trainers and Instructors	Accounting
Elementary Storage Occupations	SAP
IT Project and Programme Managers	Business Process
Engineering Professionals N.e.c.	Six Sigma Black Belt
Natural and Social Science Professionals N.e.c.	Lean Methods
Assemblers and Routine Operatives N.e.c.	Engineering Management
	Supply Chain Management
	Contract Management
	Six Sigma Green Belt
	Structured Methods
	Mentoring
	Computer Aided Draughting/Design (CAD)

Source: Active Informatics Labour Insight Tool, 2013

Appendix 9

List of relevant higher education course provision within Liverpool City Region

Liverpool John Moores University

- Mechanical Engineering BEng (Hons)
- Automotive Engineering BEng (Hons)
- Industrial Electronics and Control Engineering BEng (Hons)
- Computer Aided Design BSc (Hons) - renamed Product Design Engineering from Sept 14
- Mechanical and Marine Engineering MEng (Hons)
- Mechanical and Marine Engineering BEng (Hons)
- Electrical and Electronic Engineering BEng (Hons)
- Manufacturing Systems Engineering BEng (Hons)
- Electrical and Electronic Engineering MEng (Hons)
- Mechanical Engineering MEng (Hons)
- Automotive Engineering MEng (Hons)
- Computer Technology BSc (Hons)
- Product Innovation and Development BSc (Hons) - programme closed Sept 14
- Extended Engineering and Technology with Foundation year BEng / BSc

Liverpool University

- Avionic Systems with Year in Industry BEng (Hons)
- Avionic Systems with Pilot Studies with Year in Industry BEng (Hons)
- Computer Science and Electronic Engineering BEng (Hons)
- Computer Science and Electronic Engineering with Year in Industry BEng (Hons)
- Electronic and Communication Engineering BEng (Hons)
- Electrical Engineering with Year in Industry BEng (Hons)

- Engineering Foundation BEng (Hons) (4 year route including a Foundation Year at Carmel College)
- Electronics with Year in Industry BEng (Hons)
- Electronics BEng (Hons)
- Electronic and Communication Engineering with Year in Industry BEng (Hons)
- Electrical Engineering and Electronics BEng (Hons)
- Electrical Engineering and Electronics with a Year in Industry BEng (Hons)
- Electrical Engineering BEng (Hons)
- Engineering BEng (Hons)
- Engineering with Product Design BEng (Hons)
- Mechanical Engineering BEng (Hons)
- Medical Electronics and Instrumentation BEng (Hons)
- Mechanical Engineering with Business BEng (Hons)
- Mechanical and Materials Engineering BEng (Hons)
- Mechatronics and Robotic Systems BEng (Hons)
- Mechatronics and Robotic Systems with Year in Industry BEng (Hons)
- Avionic Systems with Year in Industry MEng (Hons)
- Avionic Systems with Pilot Studies with Year in Industry MEng (Hons)
- Computer Science and Electronic Engineering MEng (Hons)
- Computer Science and Electronic Engineering with Year in Industry MEng (Hons)
- Electronic and Communication Engineering with Year in Industry MEng (Hons)
- Electronics MEng (Hons)
- Electronic and Communication Engineering MEng (Hons)

- Electrical Engineering and Electronics MEng (Hons)
- Electrical Engineering and Electronics with a Year in Industry MEng (Hons)
- Electronics with Year in Industry MEng (Hons)
- Engineering MEng (Hons)
- Engineering with Product Design MEng (Hons)
- Medical Electronics and Instrumentation MEng (Hons)
- Mechanical Engineering MEng (Hons)
- Mechanical Engineering with Business MEng (Hons)
- Mechanical and Materials Engineering MEng (Hons)
- Mechatronics and Robotic Systems MEng (Hons)

Source: Unistats

(<http://unistats.direct.gov.uk/searchresults/>)

Wirral Metropolitan College

- HNC in Operations Engineering (Part Time)
- FD in Chemistry (Full and Part time)
- HNC in Chemistry (Part Time)
- HNC in Biology (Part Time)
- BTEC Higher Level Apprenticeship in Chemical Science (Part Time)

City of Liverpool College

- HNC in Electrical/ Electronics (Part Time)
- HNC in Operations Engineering (Part Time)
- HND in Applied Science (Biology)
- HND in Applied Science (Chemistry)
- HND in Computing and Systems Development

Southport College

- HNC in Engineering (Part Time)

St Helens College

- HNC in Electrical / Electronic Engineering (Part Time)
- HNC in Manufacturing Engineering (Part Time)
- HNC in Mechanical Engineering (Part Time)
- HNC in Operations Engineering (Part Time)

Hugh Baird College

- FD in Information Technology (Full Time)

Knowsley Community College

- FD - Information Technology

KEY

HNC Higher National Certificate

HND Higher National Diploma

FD Foundation Degree

Appendix 10

Current relevant SASE accredited Apprenticeship frameworks

List of Apprenticeship frameworks related to Advanced Manufacturing (England)

Framework title	Issuing authority	Level	Framework ID
Ceramics Manufacturing (England)	Proskills	2	FR02264
Engineering Manufacture (Operator and Semi-skilled) (England)	SEMTA	2	FR01465
Intermediate Level Apprenticeship in Improving Operational Performance (England)	SEMTA	2	FR02276
Combined Manufacturing Processes (England)	Proskills	2,3	FR02263
Composite Engineering (England)	SEMTA	2,3	FR02057
Extractives and Mineral Processing Occupations (England)	Proskills	2,3	FR02344
Glass Industry (England)	Proskills	2,3	FR02243
Intermediate and Advanced Level Apprenticeship in Engineering Manufacture (England)	SEMTA	2,3	FR02230
Intermediate and Advanced Level Apprenticeship in Process Manufacturing (England)	Cogent	2,3	FR02371
IT Application Specialist (England)	e-Skills UK	2,3	FR01983
IT, Software, Web & Telecoms Professionals (England)	e-Skills UK	2,3	FR02369
Laboratory and Science Technicians (England)	SEMTA	2,3	FR00940
Metal Processing and Allied Operations (England)	SEMTA	2,3	FR02058
Polymer Processing Operations (England)	Cogent	2,3	FR02157
Print and Printed Packaging (England)	Proskills	2,3	FR02271
Production of Coatings (England)	Proskills	2,3	FR02270
Food and Drink (England)	Improve	2,3,4	FR02353
Supply Chain Management	Skills for Logistics	2,3,5	FR02050
Management (England)	Skills CFA	2,3,4,5	FR02099
Composite Engineering (Craft and Technician)	SEMTA	3	FR01726
Electrotechnical (England)	SummitSkills	3	FR01543
Operations and Quality Improvement (England)	SEMTA	3	FR01168
Engineering Manufacture (Craft and Technician)	SEMTA	3	FR01480
Metal Processing and Allied Operations (Craft and Technician)	SEMTA	3	FR01727
Engineering Manufacture (Senior Technician)	SEMTA	4	FR00939
Higher Apprenticeship for IT, Software, Web & Telecoms Professionals - Level 4 (England)	e-Skills UK	4	FR02370
Higher Apprenticeship in Advanced Manufacturing Engineering Level 4 (England)	SEMTA	4	FR02278
Mineral Products Technology (England)	Proskills	4	FR02029
Project Management (England)	Skills CFA	4	FR01936
Higher Apprenticeship in Life Sciences & Chemical Science Professional - Level 4 and 5 (England)	Cogent	4,5	FR02330
Business Innovation and Growth (England)	Skills CFA	5	FR01787

Source: Alliance Sector Skills Council, Apprenticeship Frameworks Online (<http://www.afo.sscalliance.org/>)

Apprenticeships under development:

Higher Apprenticeship in Advanced Manufacturing Engineering Level 4 and 6 (England)

The Higher Apprenticeship framework for Advanced Manufacturing Engineering at Level 4 and 6 has been designed to provide the manufacturing and engineering sectors with high grade technicians and engineers who have practical skills, combined with a higher education qualification. This will facilitate progression to Level 5/6 qualifications and enable them to work towards 'Incorporated Engineer' status. Higher Apprentices will undertake higher-level technical occupations at level 4 in such sectors as aerospace, nuclear, mechanical and electrical engineering.

Issue number: 6

Framework ID: FR02292

Issuer: SEMTA

Higher Apprenticeship in Advanced Manufacturing Level 6 (England)

The Higher Apprenticeship framework for Advanced Manufacturing at Level 6 has been designed to provide the manufacturing and engineering sector in England with high grade engineers. Higher apprentices will develop higher level practical skills, combined with an honours degree and they will achieve Incorporated Engineer status. They will undertake higher-level engineering occupations in sub-sectors such as aerospace, nuclear, mechanical, electrical/electronics, automotive or maintenance.

Issue number: 1

Framework ID: FR02281

Issuer: SEMTA

Appendix 11

Liverpool City Region manufacturing futures group (convened by Hill Dickinson)

Calday Grange Grammar School
Christchurch C of E Primary School
Greater Merseyside Connexions Partnership
Hill Dickinson
Jaguar Land Rover
Liverpool City Council
Liverpool City Region Local Enterprise Partnership
The City of Liverpool College (formally Liverpool Community College)
Liverpool John Moores University
Mersey Maritime
MerseySTEM
Maestro Services Ltd
North West Business Leadership Team
Place North West
University Academy

Appendix 12

Liverpool City Region Local Enterprise Partnership Manufacturing Forum Members

Cammell Laird
Chargepoint
Dairy Crest
General Motors
Getrag Ford
Ineos Chlor Vinyls
Jaguar Land Rover
Nutricia
Pilkington
Unilever
United Biscuits

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0151 443 3585

