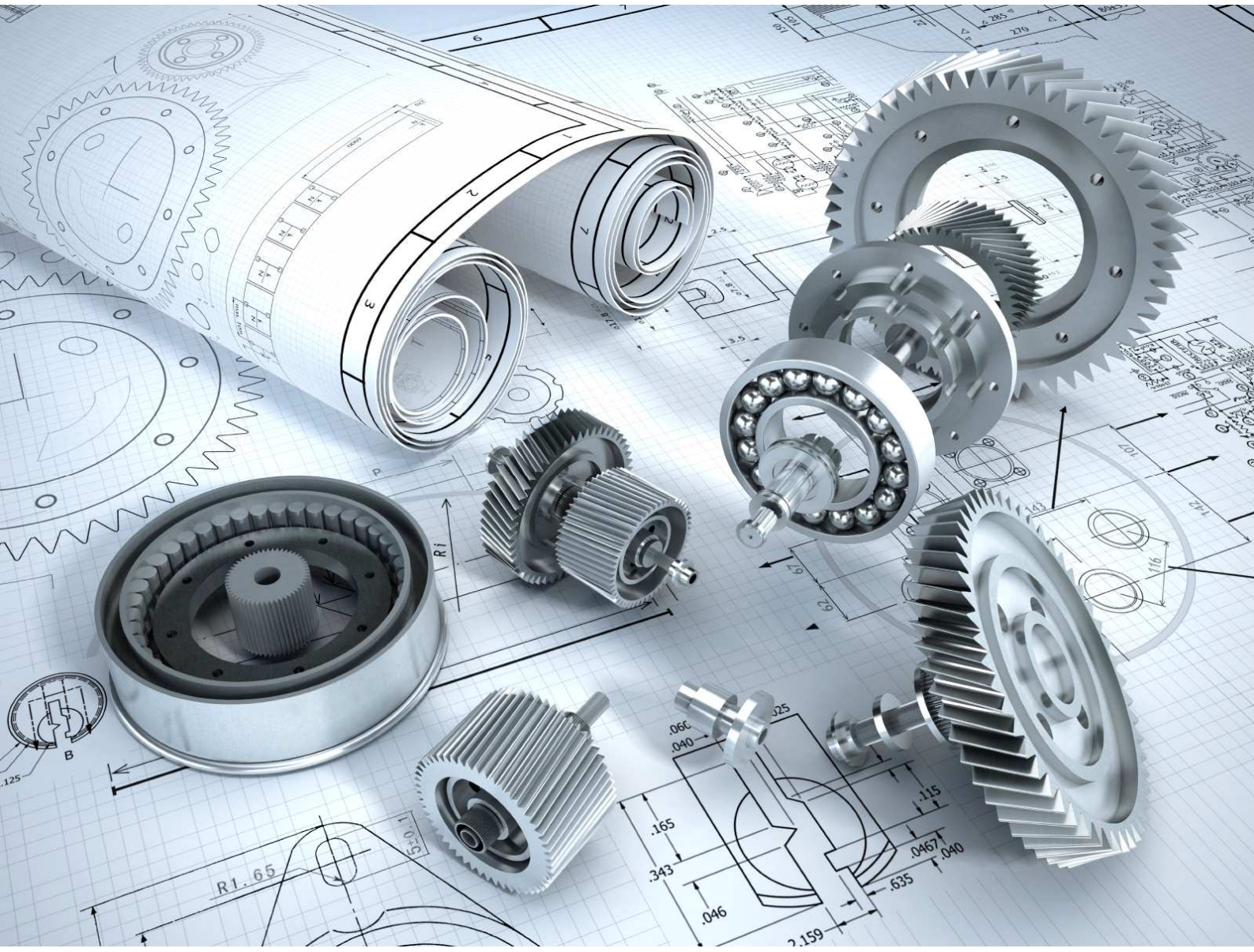
Support for the Engineering and Advanced Manufacturing Sector in Angus and the North East

Final Report

December 2015



SQW

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1. Introduction

1.1 SQW was commissioned by the Angus Community Planning Partnership to carry out research to inform the provision of support for the Engineering and Advanced Manufacturing (EAM) sector in Angus and the wider North East. This document reports on the findings from the study, including conclusions and resultant recommendations for Angus Council and partners to take forward in supporting the future growth of the sector.

Aims and objectives

1.2 The **overall aim** of the study was to gather evidence of current and potential future barriers to growth facing engineering and manufacturing firms operating within the region and to use this to develop and test options / recommendations for addressing them, focussing on where market failure could be identified.

1.3 The four main **objectives** of the study, as outlined in the brief for the study, were to:

- Establish the current manufacturing landscape in the North East
- Appraise the ambition of companies to grow
- Establish the current capacity of both public and private sector training provision in the region
- Recommend options that would identify potential "Advanced Manufacturing and Training Centre" roles.

Approach

1.4 The stages involved in delivering the work were:

- **Inception** – an inception meeting was held with the client group on 31 March 2015
- **Desk review** – a literature review of relevant industry publications and official data sources was carried out during May/June 2015
- **Business consultations** – over 40 EAM companies were contacted to participate in the study and a total of 17 consultations were completed[1]
- **Stakeholder consultations** – with local and national stakeholders involved in the provision of support for the sector[2]
- **Interim reporting** – an interim report was submitted to Angus Council and partners and a meeting was held to discuss this on 22 July 2015
- **Business survey** – a survey was issued to 49 EAM companies in Angus and the wider Tayside region and a total of 13 responses were received (27%)

[1] See Annex A for the list of companies consulted
[2] See Annex B for the list of stakeholder consultees

- **Final reporting** – the findings from the various strands of the research have been summarised in this final report, with resultant conclusions and recommendations.

Report structure

1.5 The remainder of the report is structured as follows:

- **Chapter 2** provides an overview of the economic and policy context for the study
- **Chapter 3** looks at the economic contribution and performance of the EAM sector in Angus and the wider North East based on analysis of official statistics
- **Chapter 4** considers the potential for growth of the sector covering company growth ambitions, opportunities and barriers
- **Chapter 5** looks at the range of current and planned support for companies operating in the sector, both locally and nationally
- **Chapter 6** looks at people and skills supply for the engineering and advanced manufacturing sector within Angus and the wider North East region
- **Chapter 7** provides summary conclusions and recommendations for consideration by Angus Council and partners.

2. Economic and policy context

Chapter summary

- The economic recovery in Scotland is set to continue through 2015, although **growth is expected to slow as a result of the recent fall in the global oil price** and the resultant impact on output and productivity from the oil and gas sector.
- The impact of the downturn will filter through industry supply chain networks and companies as activity and investment is scaled back. **In the short term, this will have a negative impact on the growth prospects for the Scottish engineering and advanced manufacturing sector**, and in particular those firms based in the North East that are dependent on the oil and gas industry for sales and revenue.
- The 2015 Government Economic Strategy (GES) for Scotland highlights **innovation, investment and internationalisation** as three key areas where public sector investment and activity will be targeted to support sustainable economic growth.
- The GES also highlights the importance of the manufacturing sector to the national economy as a source of exports, investment in research and development and high skilled / well paid jobs. **The provision of support for continued growth of the engineering and advanced manufacturing sector in the North East therefore aligns well with national policy priorities.**
- At the local level, the Angus Economic Strategy 2013-2020 identifies a key priority for the Angus Economic Partnership as being to **support enterprise and infrastructure**, with a particular focus on sustainable business growth, economic recovery and tourism. The Strategy does not directly reference engineering and manufacturing as being priority sectors.
- The skills issues facing the Scottish engineering and energy sectors are well articulated within their respective Skills Investment Plans (SIPs). The SIPs detail **priority actions for both public and private sector stakeholders** to ensure that current and future skills supply is informed by industry need and supports growth.
- The SIPs have been co-developed and endorsed by the relevant industry leadership groups and **provide the strategic framework for any skills-related interventions for the industry at the regional level.**

Introduction

2.1 This chapter provides an overview of the economic and policy context for Engineering and Advanced Manufacturing (EAM) within Angus and the rest of Scotland / UK. It includes commentary on the influence of the economic and policy landscape on the future growth prospects for the industry.

Economic environment

2.2 The economic recession that started in late 2008 has resulted in a challenging environment across all sectors of the UK and Scottish economies – both at the macro and individual business level. Having said that, the Scottish Government 'State of the Economy' report (published in June 2015)[3] predicts positive economic trends during 2015, building on the growth in employment and output in 2014. However, this forecast is tapered with uncertainty, mainly due to the combined effects of the fall in the global oil price and the trading environment in Europe (and elsewhere).

2.3 The sharp decline in the oil price affects the profitability and the wider economic activity of the offshore sector in Scotland. As a result, and given the distribution of activity across the economy, there are likely to be regional and sectoral effects (particularly in the North East). Recent and forecast developments in the Scottish economy include[4]:

- Scotland's economy grew by 2.7% during 2014, the fastest rate of growth since 2006 – a slightly slower rate of 2.3% is expected in 2015
- Onshore investment made a major contribution to nominal growth in 2014, driven mainly by infrastructure projects, inward investment and consumption spending
- Scottish firms are expected to scale back activity and cut costs by reducing the prices they pay throughout the industry supply chain (in response to the oil and gas sector)
- Lagging growth across Europe (relative to other advanced economies), and a weaker Euro, making it more expensive for Scottish firms to export to the Eurozone
- The Index of Manufactured Exports (IME) – a subset of total international exports – contracted in the fourth quarter of 2014, with a subdued performance across the three largest exporting sectors: Food and Drink; Engineering & Allied Industries[5]; Chemical and Pharmaceutical Products
- Labour market conditions have picked up with rising employment, and reduced youth unemployment, during the course of 2015
- Since the start of the recession in 2008, engineers' median salary increases were less than the national average[6], but this has improved, particularly for engineers with Chartered status
- Statistics on Foreign Direct Investment (FDI)[7] show that, in a UK context, Scotland has been one of the most successful locations for FDI projects in recent years. There were 80 FDI projects in Scotland in 2014. Manufacturing projects rose during 2014, increasing from 15 to 31 projects (see also section 3).

[3] Scottish Government, State of the Economy. June 2015. See report.
[4] Ibid.
[5] Weak performance was noted in the underlying subsectors of Mechanical Engineering, and Electrical and Instrument Engineering.
[6] http://www.theengineer.co.uk/channels/skills-and-careers/news/engineers-salaries-took-a-battering-in-the-recession-then-something-exciting-happened/1018543.article
[7] EY Attractiveness Survey Scotland 2015: Scotland on the World Stage. See survey here.

National and local policy perspective

National

2.4 In 2015, the Scottish Government published a refreshed Government's Economic Strategy (GES)[8]. The GES outlines four priority areas where public sector investment and activity will be targeted, three of which are directly relevant to the current study: *innovation*, *investment and internationalisation*. These are all considered important drivers of long-term economic competitiveness, productivity and sustainable growth. The key points in relation to each are set out below.

- **Innovation**: measures associated with this include supporting the development of innovative businesses; encouraging more Scottish businesses to engage in innovation and research and development (R&D); supporting research within Scotland's Universities and improving commercialisation of academic research; developing approaches to bring about innovative workplace practices; and new approaches to public services and public procurement.

- **Investment**: human capital investment through education and skills is considered a 'central focus' of the Scottish Government's planned activity. Other key areas of investment relate to the provision of physical and digital connectivity; and investment in infrastructure to help Scottish businesses to grow, innovate and create employment opportunities.

- **Internationalisation**: the focus here is to support Scottish firms to enter new markets and expand in key traditional markets; and bring about a more export-orientated focus across all businesses and sectors in Scotland, particularly among SMEs.

2.5 The GES makes specific reference to the role of manufacturing in supporting future economic growth:

> *"Rebalancing the economy will require a stronger role for exporting companies and sectors to increase sales in products and services. A strengthened role for manufacturing will be a key part of this. Manufacturing firms are more likely to export and to invest in research and development; whilst increasing the scale of the manufacturing sector can help with wider equality objectives in terms of addressing regional imbalances through local spillovers, while providing jobs that are typically high skilled and well paid."*
>
> Scotland's Economic Strategy, Scottish Government 2015, P27.

Local

2.6 Following from the national context, we present below a 'snapshot' of the *local* perspective, based on a review of economic development strategies and actions plans for Angus and the wider North East of Scotland.

[8] Scottish Government, Scotland's Economic Strategy. March 2015
http://www.gov.scot/Topics/Economy/EconomicStrategy

- **Angus**: The Angus Economic Strategy 2013-2020 sets out the role of the Angus Economic Development Partnership[9] as being to *'secure a prosperous and fair Angus by supporting businesses, investing in infrastructure and promoting the learning opportunities that will encourage and enable the development of our communities'*. The four key priorities set out in the Strategy are to support: enterprise and infrastructure; pride in place; communities; and skills. The Strategy references the significant contribution of oil and gas service companies in terms of investment and employment for the area, but does not specifically highlight engineering or advanced manufacturing as a being key industry sectors.

- **Dundee**: the Dundee Partnership's Economic Strategy and Action Plan 2013-2017[10] states that sector specific skills can be addressed through delivery of sector based Work Academies (e.g. Renewables and Engineering). The Strategy also has the development of Dundee as *'a leading centre for the offshore renewables industry in the UK'* as a key outcome. The Dundee Local Development Plan (2014)[11] and the National Renewables Infrastructure Plan (N-RIP) identify the Port of Dundee as a potential location for the manufacturing, installation and maintenance of offshore renewable energy devices and supporting infrastructure.

- **Aberdeen and Aberdeenshire**: SQW developed a draft strategy and action plan (2015) for Aberdeen City and Shire Economic Future (ACSEF). This work identified the scope to develop centres of excellence in oil and gas based on existing skills and experience in the region (e.g. decommissioning, subsea, offshore wind) and in other energy energy-related disciplines. The £2.9bn City Region Deal[12] represents an opportunity to put in place key infrastructure required to support further growth. With respect to skills, the region needs to improve in this area and raise the productivity of the existing workforce, attract more people to live in the region with the right skills – with significant 'replacement demand' expected in the energy sector and demand for technical skills in other sectors. A separate Regional Skills Strategy for the North East is currently being produced.

Key trends and issues in the sector

2.7 Table 2-1 outlines some of the current trends and issues facing the engineering and advanced manufacturing sector, both within the UK and internationally. This is followed by a brief outline of the skills related challenges facing the industry.

Table 2-1: Summary of key trends and issues relating to EAM

Source	Key trends and issues
European Commission EU Skills Panorama 2014 – Advanced Manufacturing	• Advanced manufacturing expected to grow significantly in Europe, with global market expected to double in size by 2020. This is expected to lead to an increase in the number of high-skilled jobs in the sector. Growth in R&D investment expected to increase demand for engineering jobs at graduate and intermediate level

[9] The Partnership consist of Angus Council, Dundee and Angus College, Dundee and Angus Chamber of Commerce, Federation of Small Businesses, Department for Work and Pensions, NHS, Scottish Enterprise, Skills Development Scotland, TACTRAN, Visit Scotland and Voluntary Action Angus.
[10] Dundee Partnership (2013) Economic Strategy and Action Plan 2013-2017. See report here.
[11] Dundee City Council (2014) Dundee Local Development Plan. See report here.
[12] City Region Deal: http://www.aberdeencity.gov.uk/CouncilNews/ci_cns/pr_cityregiondeal_120315.asp

Source	Key trends and issues
	• Need for increased technical skills in particular e.g. digital techniques, computing, manufacturing methodologies
BIS Manufacturing in the UK (2010)	• Manufacturers in developed countries differentiate themselves by moving away from traditional business strategies based around the sale of a particular product to new models where the sale of a product is combined with associated services – referred to as 'servitization' of manufacturing
BIS Growth Review Framework for Advanced Manufacturing (2010)	• Barriers to growth for the advanced manufacturing sector include: innovation and knowledge transfer; take up of new technologies; accessing skills and training; access to finance; exporting; regulatory issues; and energy costs and security of supply
Engineering UK The State of Engineering (2015)	• Slow growth in supply of engineers to meet the forecast of UK demand for engineering skills • Reshoring is growing - economic potential of reshoring is significant • Growing trend for 'remanufacturing' (a series of manufacturing steps acting on an end-of-life part or product to return it to like-new or better performance, with a warranty to match) adding to the future resurgence of the sector • Value of remanufacturing in the UK to rise and create thousands of skilled jobs • UK Trade and Investment (UKTI) with the Manufacturing Advisory Service (MAS) have launched Reshore UK, a new one-stop-shop to help companies bring production back to the UK
Royal Academy of Engineering http://engineeringforgrowth.org.uk/skills-and-diversity/	• UK needs more than a million new engineers and technicians across the UK by 2020 - doubling of the current number of annual engineering graduates and apprentices
EEF – the manufacturers' association Backing Britain: A manufacturing base for the future (2014)	• UK manufacturers 'reshoring' • Key disadvantages of manufacturing in the UK: cost of energy, labour costs, and planning regulations
Scottish Engineering Quarterly Review June 2015	The June 2015 Survey of Scottish Engineering members found: • Medium sized companies remain positive about *order intake* but small and large companies continue to report negative figures. Within the sectors only fabricators and mechanical equipment are positive • *Output volumes* are positive for medium companies but negative for both small and large companies. Fabricators and transport are the only disciplines within the sector which are positive • There are no *staffing* increases reported from any size of company. Fabricators and electronics are the only positive sectors within the industry. • *Capital investment plans* in general continue to be positive as they are in small and medium companies. Training investment plans in general continue to be healthy.

Source: See references in table.

Skills

2.8 The *Engineering and Advanced Manufacturing Skills Investment Plan*[13] details specific skills issues for the sector in Scotland relating to:

- Meeting **future demand** for skills (e.g. replacement demand, older workforce in SEMT sectors; implications of shift towards higher level skills)
- Potential **skills gaps and shortages**[14] resulting from a lack of technical and practical skills, as well as hard-to-fill vacancies
- Encouraging **more graduates** to enter the sector
- Improvements required to **graduate skills** by offering internships and placements
- Building capacity of **SMEs** (micro enterprises are less likely to fully utilise graduate skills)
- Addressing the current **gender imbalance** within the sector
- **Misalignment of skills provision and employment**, with the North East under-supplied in terms of Further Education (FE) provision
- **Crowded landscape** of initiatives and organisations in the engineering sector
- The need to have **better connection of education and industry**.

2.9 The response to these issues, as articulated in the SIP, has been to focus on three main objectives[15]:

- Attracting and retaining high class talent in the sector and addressing the current gender imbalance
- Creating and developing an effective skills supply pipeline
- Simplifying the skills landscape and improving the way in which the skills system responds to employer needs.

2.10 The refreshed *Energy Skills Investment Plan*[16] identifies **a similar set of challenges to be addressed**, including: ongoing significant demand for new labour; demand for a similar set of skills across all of the sub-sectors of the industry (resulting in a very competitive labour market); the need for recruitment to comprise of both experienced workers and new labour market entrants (graduates and apprentices); lack of relevant experience acting as key barrier to people seeking to enter the sector; limited business co-operation to address employment

[13] The EAM SIP was facilitated by Scottish Development Scotland with input from Technology Advisory Group, Aerospace, Defence and Marine Group, Scottish Manufacturing Advisory Group, Glasgow Economic Leadership's Engineering Design and Manufacturing Group, Scottish Engineering, and Forum for Advanced Manufacturing and Engineering Skills (FAMES). See SIP document.
[14] Shortages reported for project engineers; design engineers; IT specialists; technicians; welders; composite engineers; CNC machinists; fabricators and for specialist/niche positions.
[15] Ibid.
[16] The Energy SIP received input from Energy Skills Action Group; Industry Leadership Groups for Oil & Gas, Renewables, and Thermal Generation/CCS; Energy Technology Partnership; Energy Skills Partnership; Oil & Gas Academy of Scotland; National Skills Academy for Power; and National Skills Academy for Nuclear. See SIP document.

and skills issues (staff poaching and higher wage levels); challenges in attracting women to work in the sector; up-skilling existing employees to meet changing needs; and the need for sufficient skills base to undertake R&D, and demonstration activities.

2.11 The response to these challenges has been to focus on a number of priorities for the SIP to address[17]:

- **Raising awareness** of the range of careers in the energy sector
- **Developing pathways** to enable more people to enter the sector
- Ensuring that the content and modes of delivery of education and training courses and programmes **meet the needs of industry**
- **Up-skilling** to develop the existing workforce
- **Tackling the gender imbalance** in people entering and working in the sector planning and co-ordination informed by good labour market intelligence.

2.12 The UK Commission for Employment and Skills (2012)[18] identifies the principle challenge facing the high value manufacturing sector in the UK as being the **rapid pace of technological development taking place on a global scale**. The challenge for the UK sector is to capture and retain a leading share of the high value added segment of the global market. The evidence points to the high value added segment being in the **research and development (R&D) of new products and processes, design for manufacture, and the manufacture of relatively complex products**. However, even where manufacturers are engaged in high volume rather than niche production, there is a need to ensure that they possess the product market strategies which will allow them to prosper in this segment of the market and to maximise contribution to overall value-added in economy. Within this context, **the challenge for SMEs is identified as being to acquire the 'strategic management skills which will allow them to prosper and grow'**[19] e.g. specialists to fill particular functional roles in the organisation (marketing, finance, human resources, etc.).

2.13 In addition, it is argued that supply chains increasingly represent supply networks. This is requiring *'higher levels of flexibility, agility and a broader spread of soft skills across the workforce. It is likely that in the future higher levels of employee responsibility, autonomy and managerial delegation will be required at all levels in the organisation'*[20].

2.14 Finally, advanced manufacturing is recognised as **knowledge intensive and requiring high level of innovation**. The implication is that skills will need to be sought and developed (through provision of knowledge and training), to undertake the R&D and innovation activities required.

[17] Ibid.
[18] UKCES (2012) Sector Skills Insights: Advanced Manufacturing.
[19] Ibid.
[20] Ibid.

3. Profile of the sector

Chapter summary

- The Engineering and Advanced Manufacturing (EAM) sector is a **large and important component of the Angus economy**, accounting for almost a third (32%) of all economic output from the area in 2012.
- EAM has been a **strong driver of the Angus economy in recent years**, with growth outpacing both Aberdeen City and Shire and Scotland and playing a key role in supporting economic recovery within Angus.
- The EAM sector in Angus is **more productive than the Scottish sector as a whole**, with GVA per head amounting to 122% of the Scottish average, suggesting that the area is home to relatively high value added manufacturing activities.
- The EAM sector is an **important source of well paid jobs for Angus**. Average earnings for people working in the sector are almost two thirds higher than the average for the economy as a whole.
- There were **230 manufacturing companies in Angus in 2014**, accounting for 3% of all Scottish companies in the sector and 6% of all businesses in the area. Angus has a higher concentration of EAM firms with more than 50 employees than across Scotland as a whole.
- **Manufacturing firms in Angus invested £1.9m in R&D in 2013** – 0.4% of the Scottish total. The area is home to 2.7% of Scottish manufacturing firms, suggesting that these are under-investing in R&D relative to their counterparts elsewhere in Scotland.
- There were **3,600 people working in the EAM sector in Angus in 2013**, 3% of all Scottish jobs in the sector. These were mainly concentrated in engineering and the manufacture of metal products, machinery and chemicals / pharmaceuticals.
- The time lag of two to three years in the publication of economic and labour market data means that the impact of **the recent fall in the oil price is not yet showing up in official output or employment statistics.** Estimates suggest that up to 6,000 Scottish oil and gas jobs are currently at risk, which has major implications for the engineering supply chain throughout Scotland.

Introduction

3.1 This chapter looks at the profile of the Engineering and Advanced Manufacturing (EAM) sector in Angus and the wider North East of Scotland. It considers the economic contribution of EAM to the regional and national economy, as well as the profile of businesses and individuals working in the sector. The chapter concludes with some observations and implications for the current study arising from this analysis.

Defining the sector

3.2 For the purposes of gathering data on economic and labour market trends in the EAM sector, a definition has been developed based on Standard Industrial Classification (SIC) codes. This was done through a review of industry publications, including the Skills Investment Plan for the Engineering Sector, as well as standard definitions of 'high value manufacturing' used by government departments and agencies including Scottish Enterprise, the Department for Business Innovation and Skills and the OECD. The definition is set out in Table 3-1.

3.3 For some of datasets covered within this chapter, this level of detailed sector breakdown is not available. In these cases, proxy definitions have been used and these are referenced throughout.

Table 3-1: SIC Definition of the Engineering and Advanced Manufacturing Sector

SIC Code	Description
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment not elsewhere classified
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
33	Repair and installation of machinery and equipment
71	Architectural and engineering activities; technical testing and analysis

Economic contribution

Economic output

3.4 The Engineering and Advanced Manufacturing (EAM) sector **is a large and important component of Angus economy**, accounting for almost a third (32%) of total economic output (as measured by GVA) from the area in 2012. The sector is also a major contributor to the Scottish economy as a whole, accounting for 18% of national GVA in the same year.

3.5 Table 3-2 shows that total economic output from the EAM sector in Angus amounted to **£3.2bn** in 2012 – 2% of the Scottish total of £150.4bn. The sector is smaller in Dundee, although still substantial, generating £2.5bn GVA in 2012.

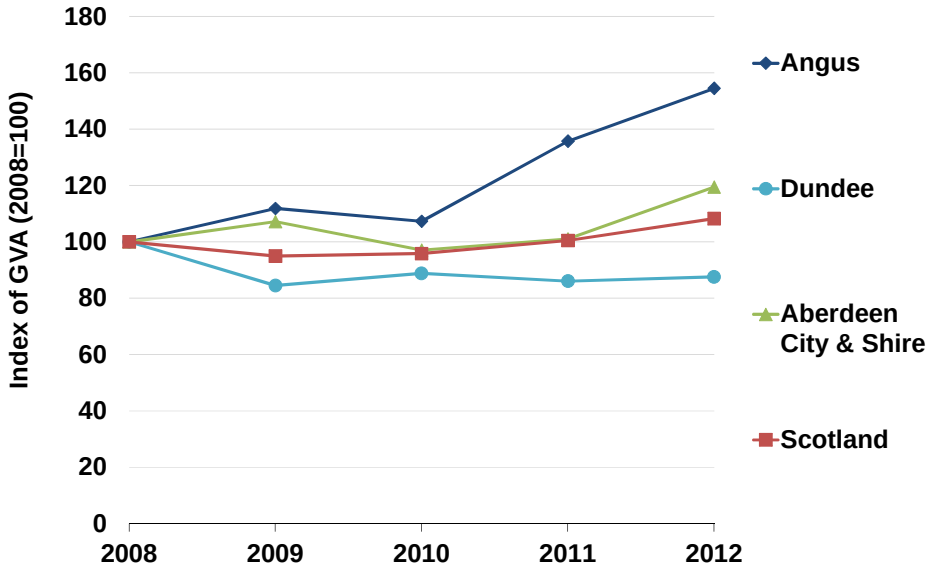
3.6 In output terms, the EAM sector in Aberdeen City and Shire is much larger – **more than eight times the size of the Angus and Dundee sectors combined**. However, the size of the Aberdeen City and Shire economy is so much larger (predominantly due to the wealth creation

associated with the oil and gas industry) that the *relative* share of output accounted for by the EAM sector is half that of Angus at 16%.

Table 3-2: Gross Value Added (GVA)

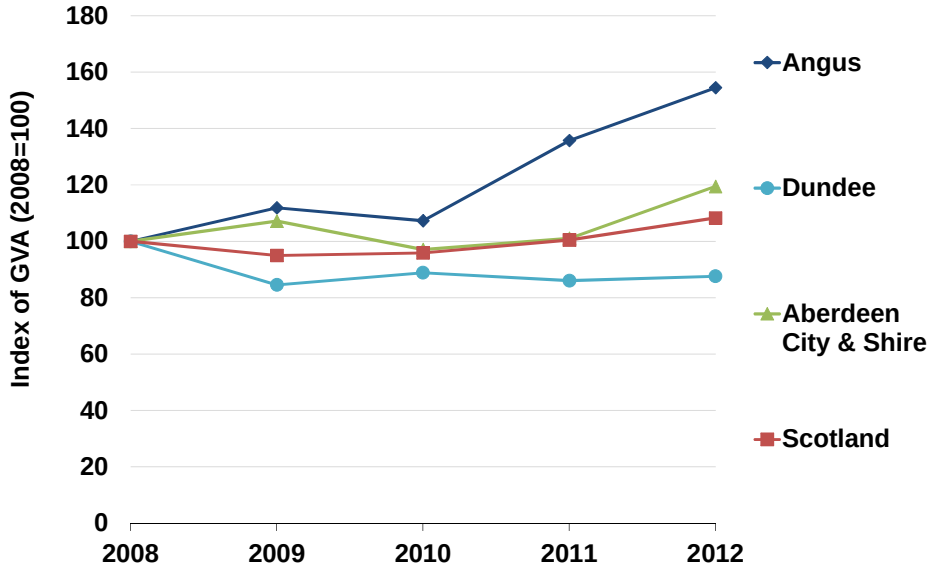
	GVA from EAM sector (£bn)	GVA from all sectors (£bn)	GVA from EAM as % of GVA from all sectors
Angus	3.2	9.9	32%
Dundee	2.5	15.5	16%
Aberdeen City & Shire	48.4	297.1	16%
Scotland	150.4	832.3	18%

Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
GVA is presented in Basic Prices



3.7 Figure 3-1 shows that **the EAM sector has been a strong driver of the Angus economy** in recent years. Output from the sector (again measured by GVA) increased substantially between 2010 and 2012, outpacing both Aberdeen City and Shire and Scotland, and in contrast to a decline in Dundee. This was a period of slow growth across the economy as a whole as it emerged from recession, indicating that that EAM sector had an important role in supporting economic recovery within Angus.

Figure 3-1: Index of GVA from the Engineering and Advanced Manufacturing (EAM) Sector



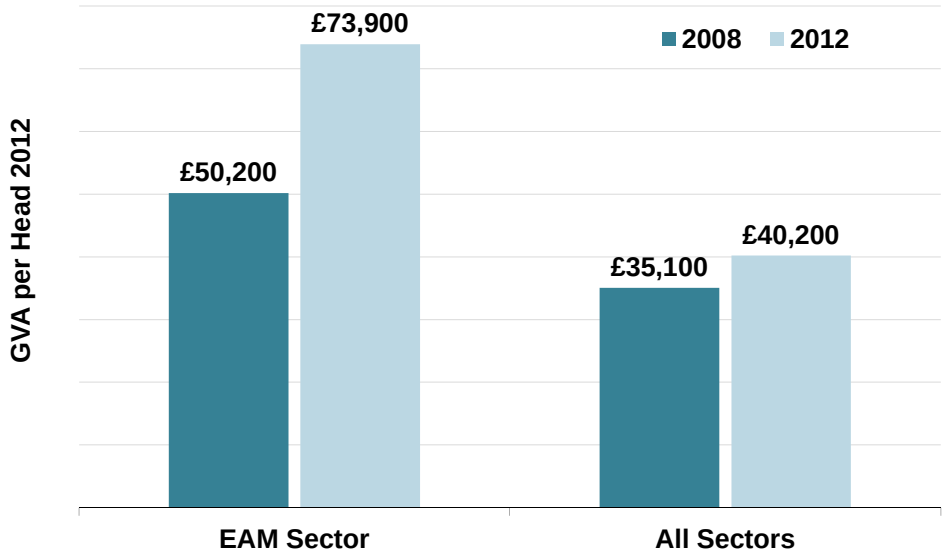
Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
GVA is presented in Basic Prices and the growth figures have therefore not been adjusted to take account of inflation

Productivity

3.8 **Engineering and Advanced Manufacturing is a high value added sector**, with productivity levels well above the average for the economy as a whole. Figure 3-2 shows that productivity (as measured by GVA per Head) in the EAM sector in Angus amounted to **£73,900** in 2012. This was almost **50% higher than in 2008** and substantially above the average of £40,200 for all industry sectors.

3.9 *In interpreting these figures, it should be noted that they are based on GVA at current basic prices and have therefore not been adjusted to take account of inflation or government taxes / subsidies. The 'real' GVA per head values and growth rates will be lower, although the overall trends will be the same.*

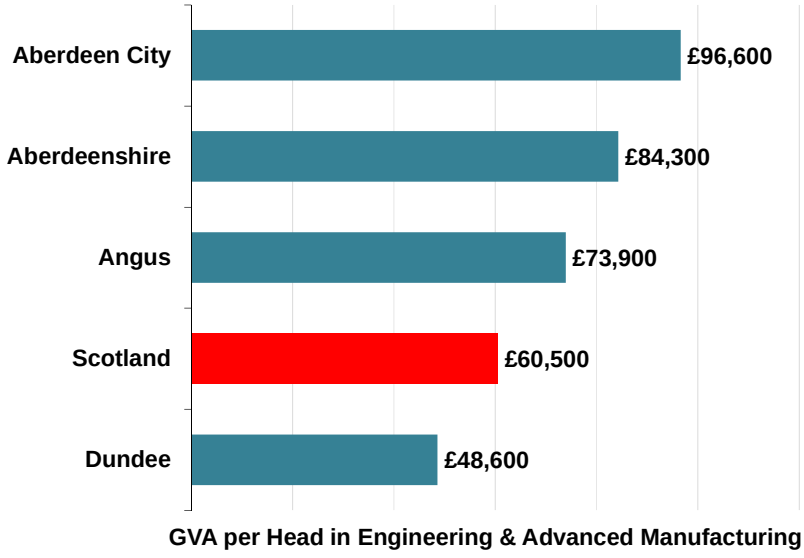
Figure 3-2: GVA per Head in Angus, 2012



Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
Figures are based on GVA at Basic Prices and have therefore not been adjusted to take account of inflation

3.10 Figure 3-3 shows that **productivity in the EAM sector in Angus is higher than the Scottish sector as a whole**, with GVA per head of 122% of the Scottish average in 2012. Productivity levels are also above the average for Dundee, although lower than the very high rates in Aberdeen City and Shire, reflecting the very high levels of economic output generated from oil and gas activities. Aberdeen City and Shire is in fact the most economically productive region of the UK outside of inner London.

Figure 3-3: GVA per Head in Engineering and Advanced Manufacturing, 2012



Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
Figures are based on GVA at Basic Prices and have therefore not been adjusted to take account of inflation

Earnings

3.11 The EAM sector is an **important source of well paid jobs for Angus**. Individuals working in the sector earned an average of £30.6k per year in 2012, almost two thirds (63%) higher than the average of £18.8k for all industry sectors. Furthermore, wage increases in the industry have **outpaced the economy as a whole** in recent years – increasing by 26% between 2008 and 2012, double the equivalent rate of 13% for all industry sectors.

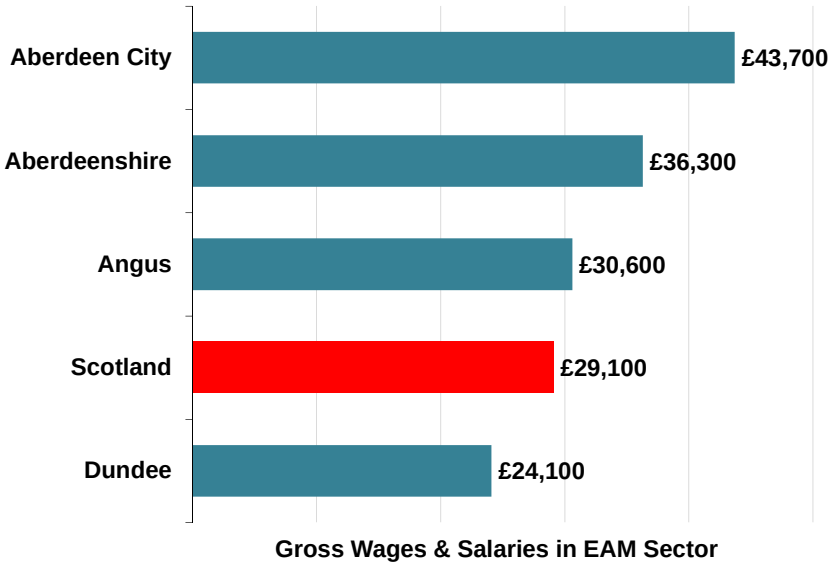
Table 3-3: Gross Annual Wages and Salaries in Angus, 2008-12

			Change 2008-12	
	2008	2012	No	%
Engineering and Advanced Manufacturing	£24,300	£30,600	£6,300	26%
All Industry sectors	£16,600	£18,800	£2,200	13%

Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
Figures are presented in current prices and have not been adjusted to take account of inflation

3.12 Average annual wages and salaries in the EAM sector in Angus are **higher than the national average** and around 27% higher than in Dundee. However, they are lower than in Aberdeenshire and just 70% of the average for Aberdeen City. This means that EAM firms operating in the area have lower labour costs than in Aberdeen City and Shire although, as highlighted earlier in this chapter, they also generate lower levels of GVA per employee.

Figure 3-4: Gross Annual Wages and Salaries, 2012



Source: Scottish Annual Business Statistics, Scottish Government
Based on SIC Codes 24-33 and 69-75 – excludes manufacture of chemicals / pharmaceuticals
Figures are presented in current prices and have not been adjusted to take account of inflation

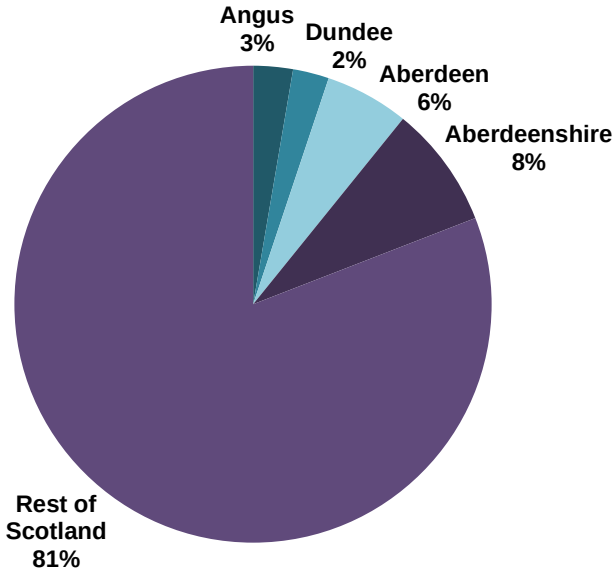
Business base

Number of companies

3.13 There were **230 manufacturing companies in Angus in 2014**, accounting for 3% of all Scottish companies in the sector and 6% of all businesses in the area. Across Scotland, manufacturing firms accounted for 5% of all registered businesses in 2014.

3.14 The North East of Scotland (Angus, Dundee, Aberdeen City and Shire combined) was home to 18% of all Scottish manufacturing companies in 2014. This was higher than the region's share of national jobs (16%), suggesting that the region has an above average concentration of firms operating in the sector.

Figure 3-5: Share of Scottish Manufacturing Companies, 2014



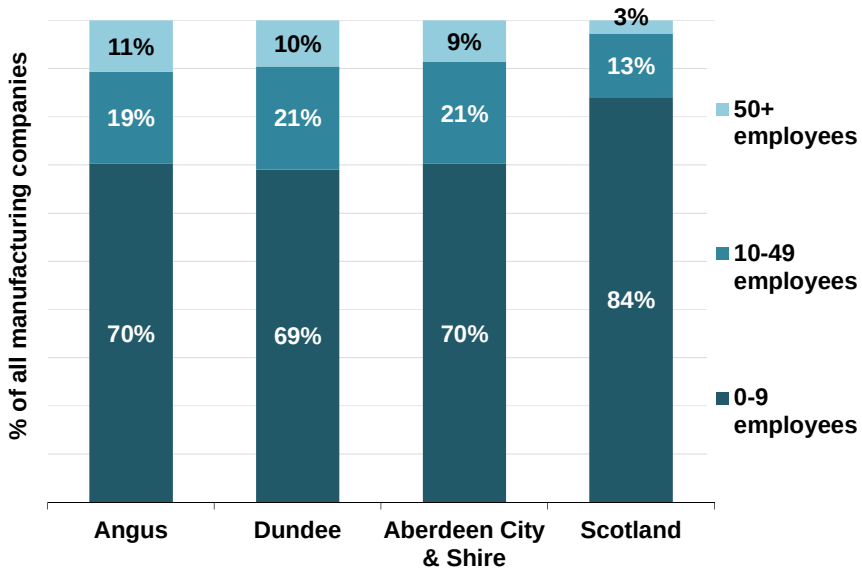
Source: Scottish Government Business, Enterprise and Energy Statistics
Based on SIC Section C – manufacturing
Base: All Scottish manufacturing companies – 8,550

Companies by size band

3.15 Figure 3-6 shows that the manufacturing industry in Angus is characterised by a **higher concentration of firms with more than 50 employees than across Scotland as a whole**. Similarly, Dundee and Aberdeen City and Shire also have above average shares of manufacturing firms with 50 or more employees relative to the Scottish sector as a whole.

3.16 However, despite this, **the majority (70%) of manufacturing companies in the region are micro-firms employing fewer than 10 people**. There were 165 companies in this category in 2014. A further 45 firms (19% of the total) had 10-49 employees and the remaining 25 (11%) employed 50 or more people.

Figure 3-6: Manufacturing Companies by Size Band, 2014



Source: Scottish Government Business, Enterprise and Energy Statistics
Based on SIC Section C – manufacturing
Bases: Angus (235); Dundee (215); Aberdeen City and Shire (1,280); Scotland (8,550)

Business Investment in Research and Development

3.17 The Scottish Government publish statistics on expenditure on research and development (R&D) by manufacturing businesses in Scotland. The latest figures show that **manufacturing firms in Angus invested £1.9bn in R&D in 2013** – 0.4% of the Scottish total of £467m. The area is home to 2.7% of Scottish manufacturing firms, suggesting that these are under-investing in R&D activities relative to their counterparts elsewhere in Scotland.

3.18 Table 3-4 shows that manufacturing firms in Dundee invested over £30m in R&D in 2013, accounting for 6.5% of the Scottish total – much higher than the areas' share of businesses in the sector (2.5%). Like Angus, levels of investment in R&D by manufacturing firms in both Aberdeen City and Shire were lower than their respective shares of companies. In part this is because many of the oil and gas operations are parts of larger groups. R&D expenditure tends to be attributed to the head office location of firms. Angus, Aberdeen City and Aberdeenshire are all home to multi-national EAM companies whose headquarters (and R&D functions) are based elsewhere. This was confirmed by several of the larger EAM companies in Angus that were consulted with as part of the current study. Therefore, it is not that these companies are not investing in R&D (in fact, many of the multi-national firms were reported to be investing heavily in this), it is just that they are not doing it within the region.

Table 3-4: Manufacturing Business Investment in R&D, 2013

	Manufacturing Business Investment in R&D 2013 (£m)	% Scottish Manufacturing Business Investment in R&D 2013	% of Scottish Manufacturing Firms
Angus	1.9	0.4%	2.7%
Dundee	30.5	6.5%	2.5%
Aberdeen City	17.5	3.7%	5.7%
Aberdeenshire	8.4	1.8%	8.3%
Scotland	467.0	-	-

Source: Scottish Government Business Enterprise, Research and Development Statistics
Based on SIC Section C – manufacturing

Profile of the workforce

Total employment

3.19 There were **3,600 people working in the EAM sector in Angus in 2013**, accounting for 3% of all Scottish jobs in the sector. This was 200 less than in 2009, an overall decline of 4%. This was also a slightly faster decline than the fall of 3% in the total number of Scottish jobs in the sector, but slower than the 13% in Dundee (Table 3-5).

3.20 There was a modest increase of 3% in the numbers employed in the EAM sector in Aberdeen City between 2009 and 2013, but this was much slower than the substantial increase of 23% in Aberdeenshire over the period.

Table 3-5: Employment in Engineering and Advanced Manufacturing, 2009-13

			Change 2009-13	
	2009	2013	No	%
Angus	3,760	3,600	-160	-4%
Dundee	3,450	3,010	-440	-13%
Aberdeen City	25,560	26,440	880	3%
Aberdeenshire	12,000	14,750	2,750	23%
Scotland	147,340	142,510	-4,830	-3%

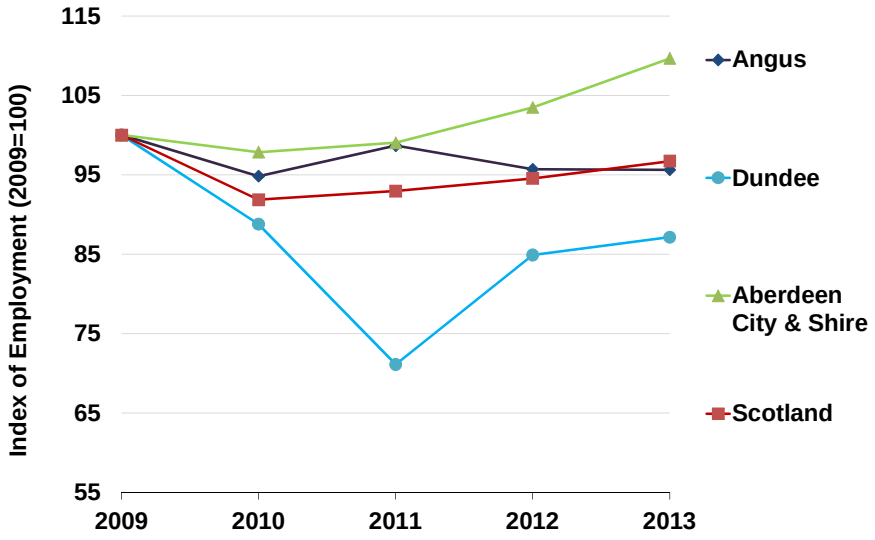
Source: ONS Business Register and Employment Survey
Based on SIC Codes 20-21; 24-30; 33; 71
Totals have been rounded to the nearest 100, percentages have been calculated on the unrounded figures

3.21 Figure 3-7 shows that employment in the EAM sector in Scotland fell between 2009 and 2010, but has been growing steadily since then – the trend in Angus has broadly mirrored the national picture. There was a sharp fall in employment in the sector in Dundee between 2009 and 2011, followed by two years of growth.

3.22 EAM employment in Aberdeen City and Shire grew strongly between 2010 and 2013 – the latest year for which official employment figures are available. The region's economy and labour market is widely regarded as having emerged relatively unscathed from the global financial crisis that started in 2008, mainly due to the rapid rebound in oil prices. However, the recent drop in the oil price has resulted in over 6,000 jobs in the oil and gas sector being announced as lost or at risk since 2014. These are mainly concentrated in the Aberdeen City and Shire area, but will have major ramifications throughout the whole of the Scottish engineering supply chain.

3.23 In early 2015, the Scottish Government set up the **'Energy Jobs Taskforce'.** This is a partnership of industry, public sector and trade union representatives formed to help tackle the challenges facing the energy sector in terms of the scale of expected job losses. The taskforce aims to: retain and grow the talent and skills in the industry; identify and implement support to people who are facing redundancy; enhance partnership and collaboration.

Figure 3-7: Index of Employment in Engineering and Advanced Manufacturing, 2009-13



Source: ONS Business Register and Employment Survey, SQW Analysis
Based on SIC Codes 20-21; 24-30; 33; 71

Employment by sub-sector

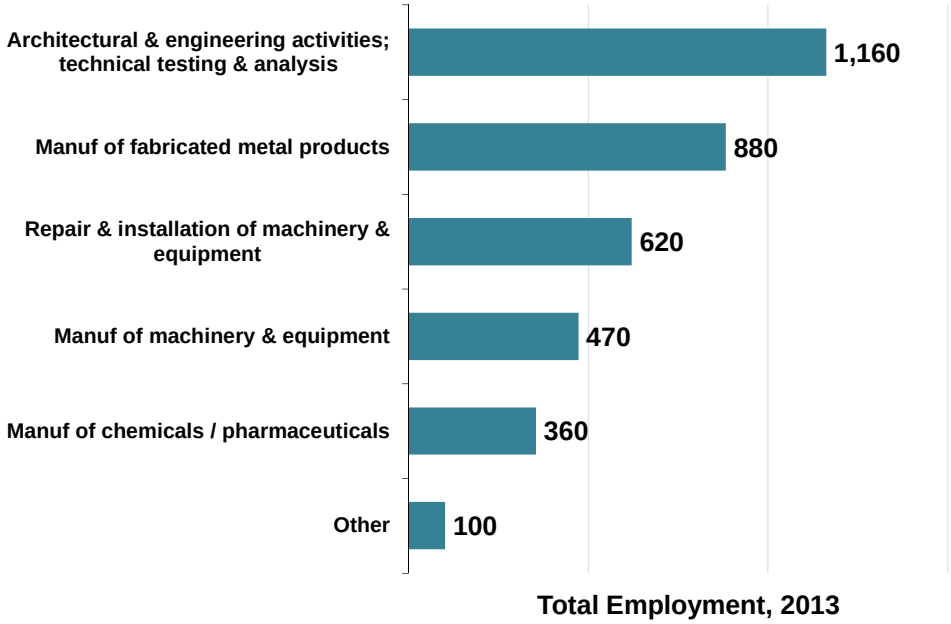
3.24 Figure 3-8 shows that:

- The largest employing sub-sector of the Engineering and Advanced Manufacturing sector in Angus is **architectural and engineering activities; technical testing and analysis**, accounting for 1,160 jobs in the area in 2013
- The region also has high concentrations of employment in **manufacturing of metal products** (880 jobs); **repair and installation of machinery and equipment** (620);

and the **manufacture of machinery and equipment** (470). Many of the companies in these sectors are involved in the supply and servicing of machinery and parts for the oil and gas industry, meaning that they are potentially exposed as a result of the current fall in the oil price.

- The region also has a number of jobs in the **manufacture of chemicals / pharmaceuticals industry** (360).

Figure 3-8: Engineering and Advanced Manufacturing Employment in Angus, 2013



Source: ONS Business Register and Employment Survey, SQW Analysis
Based on SIC Codes 20-21; 24-30; 33; 71

Conclusions and implications

3.25 The EAM sector accounts for a third of the Angus economy and is the source of over 3,500 well-paying jobs for the area. Output and employment from the sector has grown strongly in recent years and the sector has played a key role in supporting the post-recession economic recovery within Angus. **There is therefore a strong case for supporting continued growth of the sector.**

3.26 The time lag of two to three years in the publication of economic and labour market data means that the impact of **the recent fall in the oil price is not yet showing up in official output or employment statistics.** The most recent estimates suggest that up to 6,000 Scottish oil and gas jobs are at risk. This scale of job losses would have major ramifications throughout the whole of the oil and gas supply chain in Scotland – including the EAM firms in Angus that produce and service parts for the industry – making the short term outlook for sector less certain.

4. Potential for growth

Chapter summary

- Of the 17 companies consulted through the study, 11 expect to achieve **substantial growth in both turnover and workforce over the coming five years**. Stakeholders working with engineering and manufacturing companies in the region also reported that many had an appetite for growth.
- The shorter term outlook for the sector is less positive. Almost all of the companies, even those that expect to achieve overall growth in the coming five years, reported that **turnover and staffing will remain static until at least 2017**.
- **The majority of companies consulted are currently exporting.** The main export markets are West Africa, Europe, the Middle East and Australia. Whilst some firms are exporting to one or two countries, others are exporting to over 40, suggesting that there is scope for growth in new markets.
- The recent downturn in the oil price **could act as a stimulus for EAM firms located in the area to consider diversifying into new sectors**. Whilst there are likely to be some legislative and regulatory barriers to be overcome in doing this, a benefit of diversification is that firms would reduce their exposure to cyclical nature of the oil and gas industry.
- The comparatively low cost of land in Angus is a key selling point for the area in terms of attracting investment. There doesn't appear to be a shortage of available land in Angus to **support the expansion of existing Engineering and Manufacturing companies in the area**. In fact, several of the firms consulted reported that they had already secured additional land for this purpose. However, there may be an issue of available land for new investors to the area.
- The most common barrier to growth cited by EAM businesses in the region was the **challenging economic climate** resulting from the recent fall in the oil price and fluctuating exchange rates.
- **Access to labour and skills** was cited by several businesses as a current or potential future barrier to growth. Issues raised include: attracting new entrants to the sector; access to skilled engineers, business development staff and software programmers; and issues arising from having an ageing workforce.

Introduction

4.1 This section considers the growth potential of the Engineering and Advanced Manufacturing sector in Angus and the wider North East region. It covers company growth ambitions and opportunities, as well as potential barriers. The information presented is based on

consultations with engineering and manufacturing businesses in Angus and Dundee[21], as well as feedback from stakeholders working with engineering and manufacturing firms in the region[22].

Company growth ambitions

4.2 Of the 17 companies consulted, 11 reported that they are expecting to achieve **substantial growth in both turnover and workforce over the coming five years**. The remaining six are aiming to maintain current turnover and staffing levels, although one subsequently announced redundancies after the consultation and another stated that, despite this aspiration, redundancies looked 'almost inevitable'.

4.3 The medium-term outlook for the sector is therefore is relatively positive in terms of company growth aspirations. However, the shorter term outlook (next one to two years) is less so. Almost all of the companies, even those that expect to achieve overall growth in the coming five years, reported that **turnover and staffing will remain static until at least 2017**. As will be covered later in this chapter when we come to look at potential barriers, the growth aspirations of most of the firms in the region are predicated on an improvement in the oil price from 2017 onwards.

Opportunities

New markets and sectors

4.4 **The majority of companies consulted to date are currently exporting.** The main export markets for EAM firms in the area are West Africa, Europe, the Middle East and Australia. Whilst some firms are exporting to one or two countries, others were reported to be exporting to over 40. There could be opportunities for those already exporting (as well as those who are not) to expand into new markets.

4.5 The recent downturn in the oil price **could potentially act as a stimulus for EAM firms located in the area to consider diversifying into new sectors**. Whilst in some cases, there are likely to be legislative and regulatory barriers to be overcome in doing this (e.g. for aerospace / defence and nuclear decommissioning), a benefit of diversification is that firms would reduce their exposure to fluctuations in the oil price and the resultant cyclical nature of the oil and gas industry.

Availability of land

4.6 There was reported to be **no shortage of available land in Angus to support the expansion of existing Engineering and Manufacturing companies in the area**. In fact, several of the firms consulted with reported that they had already secured additional land for this purpose.

4.7 The comparatively low cost of land in Angus (relative to Aberdeen City and Shire) is a key selling point for the area in terms of attracting investment. Multi-national firms located within the area often compete for investment with manufacturing plants based in lower cost

[21] See Annex A for the list of companies consulted with
[22] See Annex B for the list of stakeholder consultees

economies and so any potential cost savings they can make increase their likelihood of attracting investment for growth / expansion.

4.8 The local authority was reported to be receiving a lot of enquiries about land availability from EAM firms not already located in the area. There is less land available for new developments / relocation (as opposed to expansion), which could potentially act as a constraint on future growth.

Montrose Port

4.9 A major £6m quay upgrade for Montrose Port Authority (MPA) was completed in 2014. This has enhanced the harbour's capacity for handling larger cargo and oil and gas ships, enabling it to broaden its scope of vessel services. The port has experienced strong growth in recent years with annual turnover increasing from £2.5m to £4.3m in the three years to 2014, and the numbers of oil and gas vessels using the port more than doubling over the same period.

4.10 The Port was described by business consultees as being **'very business friendly'** and representing a key asset for the area in attracting future investment.

Economic climate

4.11 The most common barrier to growth cited by EAM businesses located in the region was the **challenging economic climate** resulting from the recent fall in the oil price and fluctuating exchange rates, the latter being mainly driven by economic instability within the Eurozone.

4.12 The majority of firms consulted have been **exposed to the downturn in the oil and gas industry**. Several reported this to be their main / only source of revenue and sales and they have each experienced a substantial decline in orders and the value of contracts being awarded since 2014. Those that are most reliant on oil and gas industry are currently in 'survival mode' and will not be thinking about or investing in growth until there is a marked improvement in the oil price – the latest forecasts predict that this won't be until at least 2017. An indirect effect was also reported by consultees in that companies in other sectors have become precautious as a result of the uncertainty surrounding oil and gas, which is also having a negative effect on sales.

4.13 **Fluctuating exchange rates**, particularly in the Eurozone, are reported to be making it difficult for firms to remain price competitive and to invest in growth. This is having a particular impact on those that import materials from outside the UK and also sell their products overseas. In order to address this, some firms are renegotiating costs during the contract lifecycle, whilst others are adopting a form of hedging in their contracts, which involves building in measures to protect against fluctuations. However, both of these solutions impact on companies' ability to remain competitive.

Price competitiveness

4.14 In the current economic climate, price was reported by businesses to be the top consideration in the awarding of contracts, with quality coming a close second. As mentioned above, **fluctuations in the exchange rate are making it difficult for companies in Scotland to remain competitive on price relative to other firms based in lower cost economies**. The

relatively high labour costs in Scotland also means that firms are increasingly having to look for efficiencies elsewhere in the business in order to remain competitive, with the focus being on taking out as much of the costs associated with delivering contracts as possible.

Political climate

4.15 One company mentioned political instability in Eastern Europe (particularly Ukraine) and the Middle East as acting as a potential barrier to expansion into these markets. The current EU trade sanctions against sales of military and dual use goods to Russia, as well as goods and services for oil and shale oil exploration and production, were also identified as a barrier to growth for firms currently exporting to Russia and those looking to expand into the country.

Access to labour and skills

4.16 Access to labour and skills was cited by several businesses as a current or potential future barrier to growth. The main issues raised in relation to this were:

- **Sector attractiveness** – particularly in relation to getting young people and females to consider careers within the industry. The consensus amongst consultees was that schools could and should be doing more to promote the available opportunities and to address misperceptions on the part of young people (and often their parents) that engineering involves hard physical work in a dirty environment.
- **Place attractiveness** – in addition to sector attractiveness, firms in the area reported an issue around place attractiveness, with Angus and Dundee struggling both to retain young people within the area and also to attract people to live and work there.
- **Access to skilled engineers** – this has been a major issue in the past for firms in Angus and Dundee as they have not been able to complete with the salaries on offer in Aberdeen. However, it is becoming less of an issue now due to the downturn in the oil and gas industry, which has resulted in an increase in the availability of engineers across the North East region.
- **Business development staff** – one company reported that they find it a particular challenge to recruit good business development staff who are able to bring in new customers. A lot of people working at a senior level within the industry are very technically experienced, but lack business development, sales and marketing skills.
- **Ageing workforce** – several firms reported that a substantial proportion of their workforce will be retiring within the next 5-10 years. This could potentially act as a constraint on future growth as firms will need to recruit large numbers to replace those who are retiring from the workforce.
- **Embracing digital technology** – advances in technology mean that many traditional welders now have to be much more IT-literate in order to programme machines. This is resulting in a skills gap, particularly amongst older workers. One consultee described this as "more than a skills issue" with older workers often lacking confidence with digital tasks and machinery. There are no such problems amongst younger recruits and apprentices.

- **Software engineers / programmers** – technical design and software development roles were reported to be the hardest to fill due to a general shortage of software engineers / programmers within the industry. This was identified by consultees as a risk to the UK industry as a whole, particularly given that other nations (notably India) are much further advanced in relation to this.

4.17 The labour and skills issues highlighted above are reported to be impacting on company performance and growth prospects in three main ways. Firstly, a lot of time and resource is going into recruitment with several firms reportedly having to go overseas to source suitably skilled engineers and software programmers. Secondly, some work that could have been completed in Scotland is being sent to overseas production facilities. Thirdly, the digital skills gap amongst some older workers is impacting on productivity and this is expected to become even more of an issue over time.

Energy

4.18 Power supply was cited by one consultee as a major barrier to growth at their site in Angus. There are vacant plots available within the vicinity that they could potentially expand into. However, they have been told that the **National Grid is currently at capacity for the area** and that they would need to invest £1m to install the infrastructure required to address this. In addition to the costs, the work would lead to considerable disruption and so is not currently an attraction option. Wind power could potentially offer a solution to addressing this issue and avoiding major upgrades to the grid and this is something being considered. A second firm cited energy costs as a major barrier to growth. They are also looking into investing in renewable energy sources as a means to offset this.

Access to finance / capital

4.19 For many engineering and manufacturing firms, growth in output and / or employment can only be achieved through capital investment in machinery. A couple of the firms consulted cited **access to finance / capital** as a key barrier to expansion. For the smaller supply chain firms, this is raised either through increased sales / profits or from external sources of investment or lending. For the larger multi-national firms, it involves making a case to the wider group for capital investment, often in competition with other sites based in lower cost economies. Access to finance is likely to be a bigger barrier to smaller firms that struggle to generate the surpluses needed for investment and lack the track record to secure lending.

Investment, innovation and R&D

Approaches to R&D

4.20 For around half the companies consulted, new product development takes place in direct response to market demand (i.e. to meet specified contract requirements). This is particularly true in the case of third party sub-contractors who are responding to detailed product specifications. In some cases, they do attempt to market and sell any new products and processes to other customers, but would be unlikely to develop these in the absence of an initial contract. These firms do not have dedicated innovation / R&D teams and so product development is carried out by core production staff.

4.21 All of the multi-national firms consulted reported that they had dedicated in-house teams responsible for product and process development and R&D and that they invested heavily in this. However, these are not based in Angus – they are all based at other sites located overseas. The competitive nature of the industry means that this activity tends to be kept in-house and "tightly guarded" – for this reason, they would be unlikely to work collaboratively with other firms on this. In the oil and gas sector the Wood Review (2014) raises the need for, and challenges of, collaboration to address cost competitiveness.

Barriers to R&D

4.22 The main barrier to investment in R&D reported by the smaller supply-chain firms was the **cost and associated risk of not getting a return on investment**. This type of expenditure is difficult to justify in the current climate and tends to take a back seat to delivering core business activities. The fact that smaller firms don't have dedicated R&D teams means that they have to take people "off the job" to work on this, which adds to the cost. A further factor is that core production staff do not always have the necessary skills required to develop new products.

4.23 The multi-national firms reported that they would be **unlikely to move their innovation / R&D functions to Angus**. There were two main reasons for this: firstly, the machines at the sites in Angus are running at capacity and would need to be taken offline in order to test new ideas; secondly, they would be unlikely to be able to source the world-class design engineers in Angus that are available elsewhere in their groups. The message from these firms is that they are already investing heavily in this type of activity and do not require specific support. However, smaller supply-chain firms located in the area would benefit more from this type of assistance.

4.24 Companies were asked what would encourage them to invest more in new product / process development and the main answers cited were:

- **Financial support** to offset the costs and risk involved, particularly for smaller firms
- **Access to specialists / subject experts** that they can work with on the development of new products and efficiency improvements
- **Exhibitions and trade conferences** focussing on the latest innovations in engineering and manufacturing.

Conclusions and implications

4.25 The medium term outlook for the industry is positive in terms of company growth ambitions, with the majority of firms expecting to achieve substantial growth within the next five years. However, this is predicated on an improvement in the oil price from 2017 onwards with the best case scenario being "steady-state" until then. Although, the downturn could provide an impetus for firms to consider diversifying into new markets and sectors, thereby reducing their dependency on oil and gas.

4.26 Access to skills (particularly engineers) has been an issue for companies in Angus and Dundee in the recent past. This seems to have eased as a result of the recent downturn in the oil and gas industry. However, this could be temporary and access to skills may act as a constraint on

future growth if or when the oil price picks up again. A further related issue is the ageing workforce in the sector, which will result in large scale recruitment being required just to maintain current employment levels as many people retire from the workforce.

4.27 There is limited evidence of R&D activity within EAM firms in Angus. The reasons seems to be two-fold: smaller supply chain firms are essentially responding to contract requirements, whilst the R&D functions of the larger multi-national firms tend to be based elsewhere. The consultations suggest that it is unlikely that larger firms will consider moving their R&D functions to Angus. Support is therefore likely to be best focussed on SMEs. In addition to new product development, they are likely to benefit from support to increase efficiencies, helping them to become more price competitive.

5. Business support for growth

Chapter summary

- There is a **wide range of national-level business development support** available to firms located within Angus and wider North East region.
- There is less provision specifically tailored for the Engineering and Advanced Manufacturing sector within Angus. There is **potential scope for additional support for the sector in the area**, but this would need to be tailored and differentiated from existing provision (both national and local).
- Initiatives such as the **Centre for Engineering Education and Development (CEED)** offer a package of support that EAM firms in the region could potentially benefit from. The Scottish **High Value Manufacturing Catapult** also offers a broad package of support to engineering and manufacturing companies with research, innovation, process and efficiency improvements and product development.
- Feedback from business on the nature and quality of national provision was mixed, and there are issues around **raising awareness of what support is available**, particularly for smaller firms.
- There is evidence of demand from EAM firms in the area for support to achieve **process and efficiency improvements**, as well as **recruitment and the development of training plans**. There was also a positive response from firms to the suggestion of an **online portal** and events targeted at **raising awareness of career opportunities** in the sector, particularly amongst young people.
- There are lessons that can be learned from the experience of Fife Economy Partnership. These include the need for a **co-ordinated and joined up approach**, ideally under the banner of the local economic partnership; ensuring support is **tailored to the needs of businesses,** rather than being supply-driven; there being **no up-front costs for businesses** to engage; and the need for effective relationship management, drawing on **business and sector intelligence.**

Introduction

5.1 This section provides an overview of existing and planned support for the Engineering and Advanced Manufacturing (EAM) sector, both nationally and within the North East. This is based on a desk review of industry publications and action plans, consultations with stakeholders currently involved in the provision of support for the industry and feedback from businesses. It concludes with a case study example of the approach that Fife Council has taken to co-ordinating the provision of support for manufacturing companies in the area, highlighting key lessons from this that will be useful in informing the developing approach within Angus.

National and local provision

5.2 There is a plethora of publicly-supported business and skills support which firms from Angus and the wider North East have access to. Our purpose here is to present only selected interventions which are specific to the engineering and advanced manufacturing sector or particularly new / innovative. In so doing, we have deliberately not set out the 'mainstream' business support schemes available to businesses through the SE/HIE network.

UK

5.3 The UK Government Science and Innovation (2014)[23] long-term strategy refers to the Catapult Centres including the High Value Manufacturing Catapult (HMVC), supported by Innovate UK.

High Value Manufacturing Catapult

5.4 The Hauser Review (2010) recommended that to close the gap between the research base, government should invest in 'translational infrastructure' through a network of Technology and Innovation Centres (TICs) in areas where the UK had particular strengths. Following this Review, the network of Catapult Centres was developed.

5.5 The rationale for support related to innovation and research (e.g. risk and uncertainty) and externalities (e.g. through contributing to spillover effects), and other aspects such as the coordinated capability development that they could provide (e.g. infrastructure, skills, equipment) that would otherwise not be in place, and the increasingly distributed nature of innovation where again a coordinated role played by TICs may have benefits by reducing the search and transaction costs faced by companies. The Catapults draw on international models, such as the Fraunhofer Institutes in Germany and the Netherlands Organisation for Applied Scientific Research. The Catapults have a third-third-third funding model drawn from government, competitive research funding (e.g. from public programmes) and private sources.

5.6 HMVC was the first to be established, in 2011, bringing together a network of existing specialist expertise from across the UK. The aim is to support growth of high value/knowledge intensive manufacturing businesses by providing novel and effective technology solutions across manufacturing sectors. HVMC provides open facilities that increase the speed and scope of technology diffusion between different sectors.

5.7 HVMC has a network of seven centres all with different specialisms. HMVC has also been able to draw on its existing industry and academic relationships, contributing to the relative maturity of the Catapult compared to others that are part of the Catapult programme. As part of funding, the centres charge fees for different levels of membership for industry partners as well as for particular research projects or access to facilities. A summary of the seven centres, their competences and examples of activities are set out in Table 5-1.

5.8 This summary suggests that there may be some common themes in terms of the nature of support, e.g. direct and collaborative R&D projects, and access to facilities to support various product and process developments, prototyping and testing. At the same time, however, support is likely to be tailored to individual companies, and will vary given the breadth of

[23] HMT Treasury and BIS, Our plan for growth: science and innovation. December 2014. See report.

sectors and competences across the HVMC. The summary also identifies the existence of training and skills support (e.g. at AMRC and Manufacturing Technology Centre, MTC), incubation support for new companies (e.g. CPI and MTC) and business support (e.g. for funding and supplier development).

Table 5-1: Network of seven centres

Centre and main locations	Competences	Example activities
Advanced Forming Research Centre (AFRC), University of Strathclyde	Billet forging; sheet forming; precision forming	Laboratories for use by businesses through direct R&D, e.g. to test and analyse metal parts and components Centre carries out research projects, e.g. on improving process efficiency
Advanced Manufacturing Research Centre (AMRC), University of Sheffield	Machining; materials & component testing; composites including hybrid and metallic materials; assembly Particular focus on aerospace	Varying equipment and facilities for prototyping and testing new technologies and processes Currently developing Factory 2050 for collaborative research on assembly and component manufacturing Training centre, including for academic qualifications, apprenticeships and continuous professional development
Centre for Process Innovation (CPI), Wilton, Sedgefield and Darlington	Printable electronics; chemical processing; bio-technology; bio-refining; flexible manufacturing	Facilities to support prototyping, demonstration and scale up Materials testing and investigation Business and funding support Incubator facility
Manufacturing Technology Centre (MTC), Coventry	Intelligent automation; tooling & fixturing; joining; electronics assembly; net shape manufacture; operational efficiency & process modelling	Equipment to develop and demonstrate new technologies on an industrial scale Incubator facility Support tailored to needs of companies Engineering training courses Due to open conference venue
Nuclear Advanced Manufacturing Research Centre (NAMRC), Universities of Sheffield and Manchester	Fabrication of civil nuclear components	Laboratory space to develop new techniques and technologies Supplier development and support Training (with links to co-located National Nuclear Skills Academy)
National Composites Centre (NCC), University of Bristol	Composites design and manufacture	Equipment and research to support design and manufacture of composites Workshop space Emphasis on being an 'open-access', and relevant to range of sectors
Warwick Manufacturing Group (WMG), University of Warwick	Lightweight product & system optimisation; energy storage and management; digital simulation verification and validation	Laboratory and test facility for battery cells for hybrid/electric vehicles (incl. ageing of cells) Design, manufacture and testing of lightweighting solutions

Source: SQW desk review

Pan-Scotland and local

5.9 Some examples of Scotland level initiatives are presented below.

- The **Centre for Education and Development (CEED)**[24] is a not for not-for-profit organisation, part funded by SE, which brings together businesses and academics across the engineering, manufacturing, science and technology sector. The concept was launched in 2006 and is based on a US model to improve innovation for Michigan-based car manufacturers and their supply chain, both in R&D and skills development. Features of CEED include[25]:

  - A focus on addressing the daily challenges facing businesses, drawing on the collective knowledge, experience and expertise offered by members. It is essentially a problem-solving network dealing with all aspects of the manufacturing business including: property; planned maintenance and lean manufacturing techniques; energy; training; marketing; health and safety; product development; procurement and supply chain, project management.

  - Support is made available through the *'Clinic Programme'*. E ach Clinic has an Academic Chair or Industrial Practitioner (or both) plus a facilitator from within CEED. The Academic/ Industrial Practitioner and facilitator deliver the Clinic agenda based on: requests from member companies; topics of interest from our member forums; new academic input; collective issue identified; initiatives from collaborative partners. Typically, the clinic topic is hosted on a member's site.

  - Membership includes access for companies to *'Growth500'* – a business management and people development programme. This provides practical knowledge to firms across a range of topics (e.g. marketing, leadership, finance, operations, technology, people, strategy etc.). The focus is on the issues of most concern to member businesses.

  - Growth500 also provides the opportunity to collaborate with other firms on common challenges; allows firms to see how business problems are addressed elsewhere (contributing to learning); and provides professional development for junior and middle management through engaging with peer groups, sharing of best practice.

  - CEED works with collaborative partners: SE, SMAS, SDS, local authorities, Business Gateway, Scottish Chambers of Commerce, local Chambers, etc. Dundee & Angus College is a member of CEED.

  - Membership fee is £1,200 per annum for SMEs (less than 250 employees); and £3,000 per annum for large organisations, academic partners, local authorities (over 250 employees).

- **The Scottish Manufacturing Advisory Service (SMAS)** delivers a range of specialist advice services for manufacturing firms including: one-to-one advisory services for (particularly around business process improvements); awareness of best practice in manufacturing, through training and seminar activity; support for collaborative projects between companies; signposting to other initiatives that will help companies

[24] http://ceed-scotland.com/
[25] CEED presentation, May 2015

exploit new business opportunities; and the International Strategy Development programme. SMAS is staffed by experts specialising in process improvement, lean manufacturing, innovation and allied disciplines.

- **Scottish Engineering**[26] is an employers' association for the manufacturing engineering sector. It provides a range of services to over 300 member companies across Scotland. This includes support for grant applications, strategic planning and lean manufacturing, as well as training, coaching and mentoring. It also includes access to a telephone advisory service and professional support for health and safety and employee relations issues. Scottish Engineering is represented on a range of regional and national fora, including the Fife Economic Partnership and the Energy Jobs Task Force, which was established by the Scottish Government in response to the major global challenges facing the oil and gas sector.

- **Scottish Research Partnership (SRP)**[27] provides a coordination role to ensure engagement between relevant research groups (including Scottish regional engineering research partnerships), and between academic researchers and industry. SRP has four pan-Scottish themes: Civil Engineering; Technologies for High Value Manufacturing; Engineering at the Life Sciences Interface; Communications; and Energy.

  - SRP is a collaboration between three regional research partnerships based around institutions in Edinburgh (Edinburgh Research Partnership), Glasgow (the Glasgow Research Partnership), and Aberdeen and Dundee (the **Northern Research Partnership**)[28].

  - The **Northern Research Partnership** in engineering and related disciplines has been established by the University of Aberdeen, the University of Dundee and the Robert Gordon University, with funding from the Scottish Funding Council. The Northern Research Partnership, along with the other two Research Partnerships aims to develop a critical mass of research in engineering and allied disciplines.

- Other national sources of business support for the sector include: SE Engineering and Technology Advisory Group; SE Aerospace, Defence and Marine Group, Industry Leadership Groups for Oil & Gas, Renewables, and Thermal Generation/CCS; and Energy Technology Partnership.

5.10 In terms of regionally focussed support for firms in Angus and the wider North East:

- **Tayside Engineering Network (TEN)** brings together the local engineering community (individuals, businesses, and education) to organise events to exchange and develop innovative ideas which promote best practice within the local Tayside Engineering Community. The aim is to exchange knowledge and create mutually

[26] http://www.scottishengineering.org.uk/
[27] http://www.researchscotland.ac.uk/index.php
[28] http://www.northscotland-research.ac.uk/

beneficial opportunities. Activities include presentation evenings, site visits, open door weekends and social events.

- **Energy North**[29] is a not-for-profit trade group of over 200 members in the Oil & Gas, Renewable Energy and Nuclear markets, covering the North of Scotland and Islands. Support services include: energy project database for members; dedicated oil & gas taskforce to promote the skills, services and infrastructure to the industry in Aberdeen and beyond; targeted member meetings to address issues and areas of concern; trade missions and exhibitions promoting members and the wider area; networking and information on the industry; weekly updates around the group on forthcoming events, relevant news articles, information on funding, etc.; quarterly newsletter; political lobbying of both UK and Scottish Governments.

Feedback from businesses

Consultations

5.11 Business consultees were asked for their views on the range of business support currently available to them. At the national level, businesses reported having accessed support from **Scottish Enterprise, Scottish Manufacturing Advisory Service, Business Gateway, Skills Development Scotland and SEMTA**[30]. This included support with R&D, exporting, business plans, accessing funding and 'lean' approaches to manufacturing. Overall, the feedback was mixed in terms of the quality and usefulness of the support received. For some businesses, accessing the support was described a "laborious process" which took too long and generated "a lot of red tape". However, others referenced how well supported they felt they had been and the difference this had made to their businesses. This was particularly true of those that had received Account Managed support from Scottish Enterprise.

5.12 In terms of local provision, the majority of consultees reported that they had engaged with the **Tayside Engineering Network (TEN)**. This was to be expected given that contact details for the business consultations were largely drawn from the TEN membership list. Feedback on this was that it offered a useful opportunity to network with other companies working in the area. However, there was a sense that recent meetings had become "too public sector focussed" with not enough business representation. A further complaint from businesses was that some of the topics and presentations were not directly relevant to their core business activity, making it difficult for them to justify taking time out to attend.

5.13 There was a **general lack of awareness** amongst most of the businesses consulted about the range of support available to them, both locally and nationally. This was particularly true of smaller firms and those who are not part of the Scottish Enterprise account-managed programme. The latter were generally much more aware of the range of support available and how to access this.

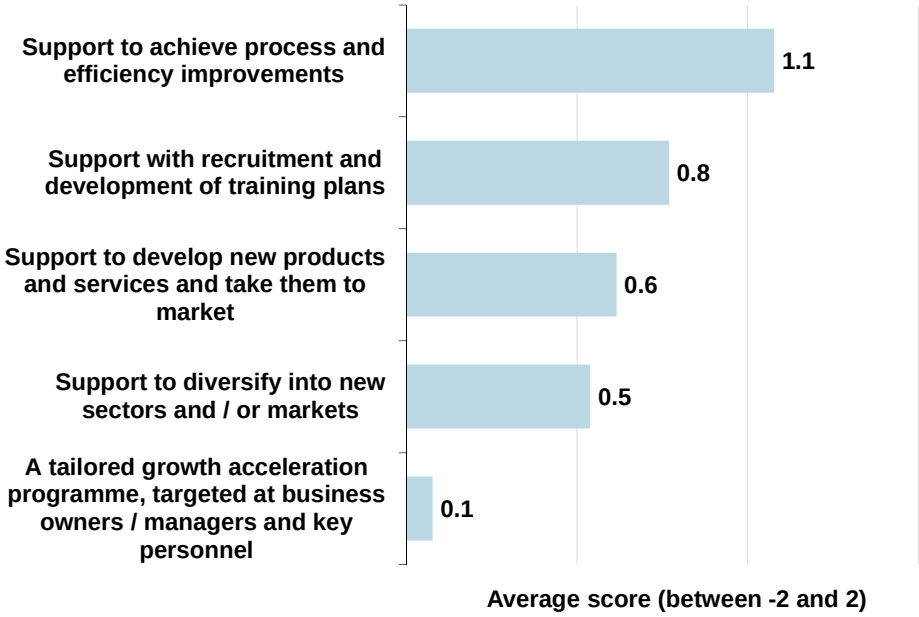
[29] http://www.energynorth.co.uk/
[30] Another source mentioned was Equate Scotland

Survey

5.14 A short electronic survey was emailed to 49 engineering and manufacturing businesses in Angus and Dundee asking how interested they would be in various types of support and how this could best be delivered to meet their needs. A total of 13 responses were received (27%).

5.15 Figure 5-1 shows that **support to achieve process and efficiency improvements** achieved the highest average score of the five types of support listed. This aligns with feedback from consultations with businesses, many of which cited production costs as a major barrier to growth given that they are often competing for contracts with firms based in lower cost economies. **Support with recruitment and development of training plans** also scored highly, suggesting that access to people and skills is a key issue for many firms in the area, again this is supported by feedback from consultations. The service of least interest to survey respondents was a tailored growth acceleration programme.

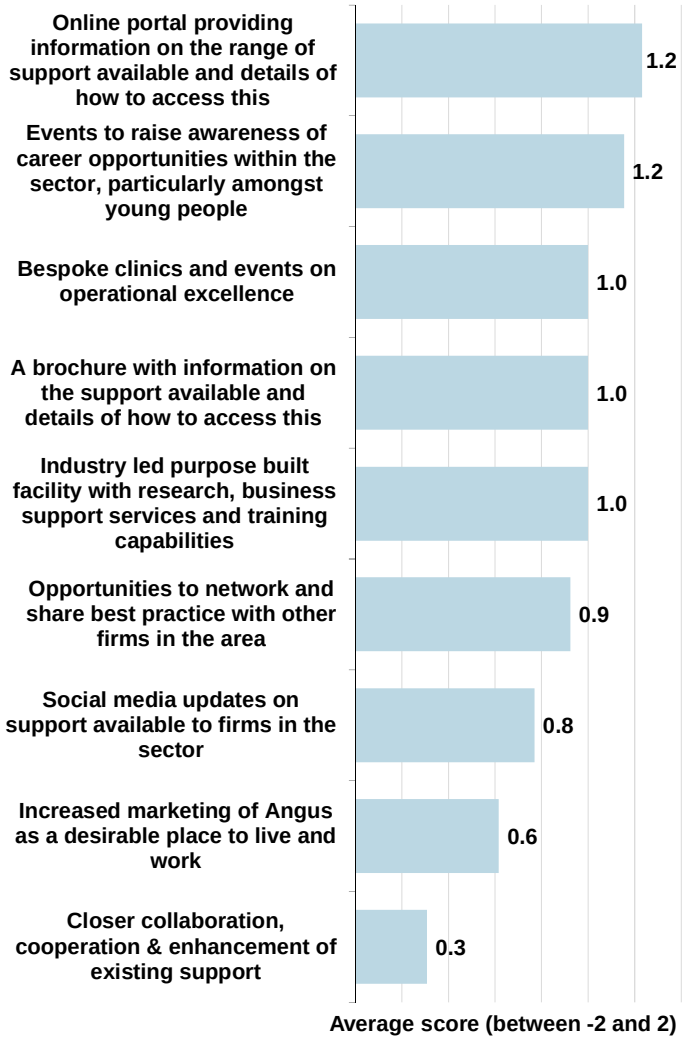
Figure 5-1: How interested would you be in the following types of support:



Source: SQW Business Survey
Base: 13 respondents
Average scores based on responses to a 4-point scale ranging from 'Not at all interested' to 'Very interested'

5.16 Survey respondents were then asked how useful various channels for the delivery of support would be to them and the responses are shown in Figure 5-2. The most popular answer was an **online portal** providing information on the range of support available and details of how to access this. This was closely followed by **events** to raise awareness of career opportunities in the sector; **bespoke clinics and events** on operational excellence; a **brochure** with information on available support; and an industry-led **purpose built facility**. On the latter point, it is worth noting that this was raised in each of the business consultations and, whilst most companies reported that they would be interested in accessing this type of support if it were made available, they all said that they would not be willing to co-invest in the development of this, particularly in the current climate.

Figure 5-5-2: How useful would each of the following be in addressing your support needs:



Source: SQW Business Survey
Base: 13 respondents
Average scores based on responses to a 4-point scale ranging from 'Not at all useful' to 'Very useful'

Case Study

Fife Economy Partnership

The model of support for the manufacturing sector provided by Fife Economy Partnership was cited by several consultees as an example of best practice. The lead officer from Falkirk Council responsible for developing this was consulted as part of the current study.

The concept originated from recognition of the importance of the manufacturing sector to the Fife economy and the fact that this was not acknowledged within the economic strategy for the area, which focussed on other sectors such as renewables and tourism. A programme of engagement and consultation with manufacturing firms in Fife revealed that many had support needs that were not being met. A Manufacturing Action Plan was subsequently developed, which

detailed a series of activities and events aimed at co-ordinating the range of support available and making this accessible to firms in the area. There was a particular focus on the provision of networking opportunities (via business breakfasts) for companies, based on feedback from business leaders in the sector that they would welcome the opportunity to meet and discuss common issues with peers. The Manufacturing Action Plan is updated on an annual basis.

The key success factors for the approach are:

- **All available support being promoted under the Fife Economy Partnership banner –** rather than through individual stakeholders and agencies. This has helped reduce the complexity of the landscape, making it easier for businesses to navigate. It has also helped provide credibility with companies, as the Partnership includes high profile business representatives and so is not seen as a just a public sector initiative.
- **Focussing on the support needs identified by businesses and delivering on these** – this means listening to the challenges faced by companies and tailoring the support offered accordingly, rather than trying to promote services which may not be relevant. In other words, taking a demand rather than supply-led approach.
- **The front-end service being provided to companies for free** – this includes engagement, support needs analysis, sign-posting to services and access to networking opportunities, most of which is funded through Fife Council economic development budget.
- **Effective relationship management** – underpinning this is the need to build intelligence on businesses operating in the area, including up to date contact details and a record of engagement. Fife Council has an economic database for this purpose, which is managed externally and provides monthly reports on activity and engagement with companies in the area.
- **Access to sector intelligence** – individuals engaging companies must be up to speed with the key issues facing the sectors that they are operating in order to have credibility and also to tailor the support offered accordingly.

6. People and skills supply

Chapter summary

- Angus has an ageing population and this is likely to become more pronounced over the coming decade, with growth concentrated in older age groups and a decline in the working age population expected. This is likely to **exacerbate existing skills shortages across all industry sectors**.
- Over a third of the manufacturing workforce in Angus will reach retirement age in the next ten to fifteen years, meaning that **large scale recruitment will be required just to maintain current employment levels**.
- Combined with a shrinking working age population, this is likely to present a challenge for many firms in **sourcing suitably skilled and experienced staff**.
- Engineering was the **top choice for school leavers from Angus** entering HE / FE and employment in 2013/14. However, relatively few school leavers going into engineering courses and jobs were female, suggesting scope for further work to increase the attractiveness of the sector to young women.
- The challenge for Angus firms is in **retaining these new entrants**, with many reported to be moving on to better paying opportunities located elsewhere (often in the oil and gas industry) following completion of their training.
- This is creating somewhat of an **hourglass shaped engineering and manufacturing workforce**, with high numbers of new entrants and older workers, combined with a shortage of workers in their 30s and 40s with 10-20 years' experience.

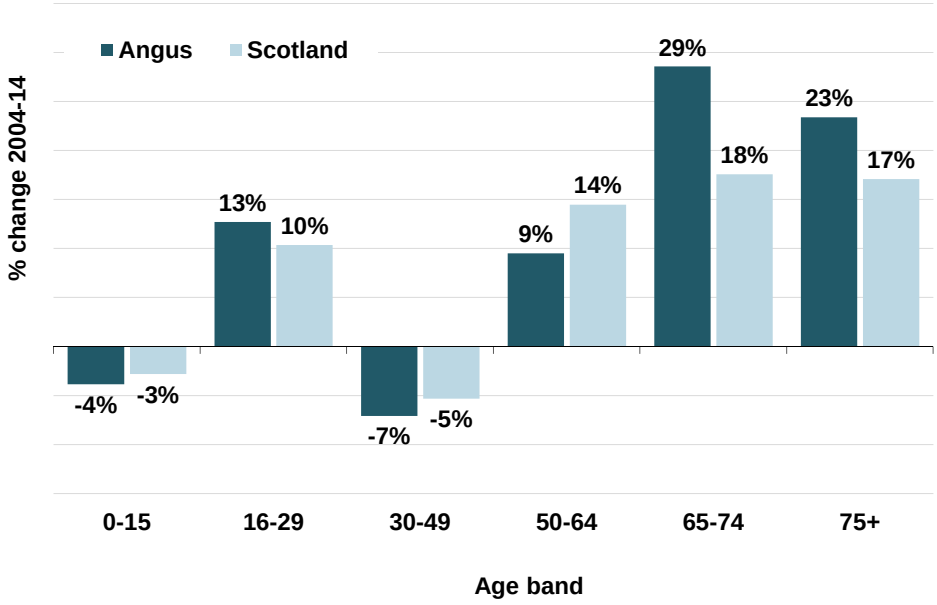
Introduction

6.1 This chapter looks at the current and potential future supply of people and skills for the Engineering and Advanced Manufacturing sector within Angus and the wider North East region. It starts with consideration of the changing demographics of the population and the age profile of the sectoral workforce, followed by analysis of trends in school leaver destinations and young people entering the sector. The range of apprenticeship, college and university provision for the engineering sector is then covered in more detail.

Changing demographics of the population

6.2 Like many local authorities in Scotland, Angus has an ageing population. In 2014, over two thirds (43%) of people living the area were over the age of 50, above the national average of 37%. Figure 6-1 shows that population growth in recent years has been mainly concentrated amongst older age groups and that the pace of growth in the retired population (over 65s) in Angus has outpaced that of Scotland as a whole over the past decade.

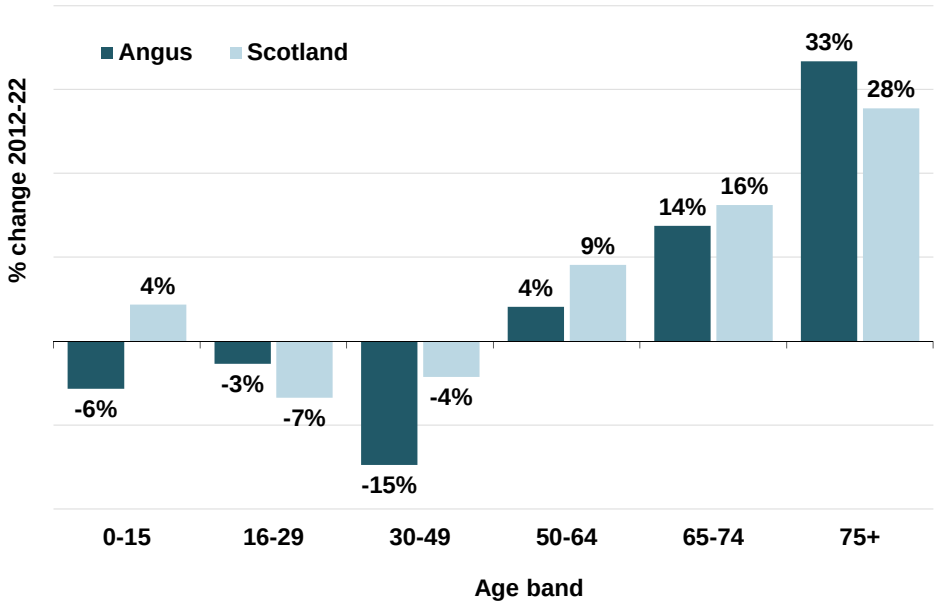
Figure 6-1: Population change by age in Angus and Scotland, 2004-14



Source: National Records of Scotland

6.3 Looking ahead, the latest population projections for Angus suggest that this recent ageing of the population is set to accelerate over the coming decade (Figure 6-2). Population growth to 2022 is expected to be concentrated exclusively amongst those over the age of 50, with declines expected across all younger age groups, including the key working age group of 30-49. The resultant decline working age population could potentially act as a constraint on future growth, further heightening existing skills shortages across all industry sectors.

Figure 6-2: Projected population change by age in Angus and Scotland, 2012-22



Source: National Records of Scotland

Age profile of the workforce

6.4 The older age profile of the Angus population is particularly pronounced when looking at the manufacturing workforce. In 2015, almost two fifths (37%) of people working in the sector in Angus were over the age of 50[31] and therefore likely to retire within the next ten to fifteen years. This will require large scale recruitment on the part of local firms just to maintain current employment levels, with a need to attract many more new entrants to the sector.

6.5 Several business consultees reported that the older age profile of their workforce was acting as a **barrier to adopting new digital technologies**, thereby limiting the potential for process and efficiency improvements. The reasons for this are complex and go beyond simple training needs. The fact is that older workers tend to be much less confident with digital technology and less willing to fully embrace this, which is in contrast to younger employees, so-called 'digital natives' who are much more comfortable with new technology. This issue is likely to partly resolve itself over time as older workers leave the labour market through retirement and are replaced by new entrants with the required digital skills. However, there may be a requirement for support for firms to address this issue in the short to medium term.

School leavers

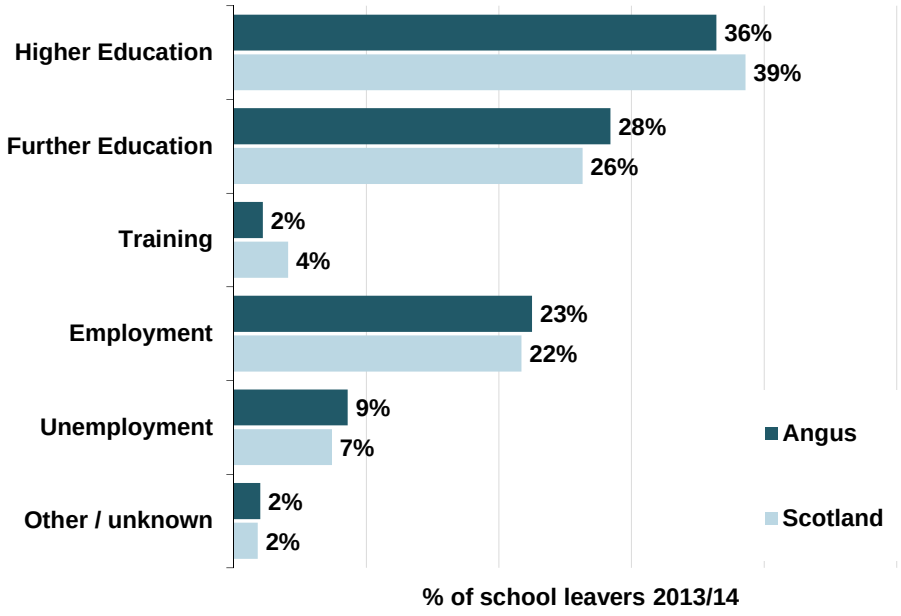
6.6 The ageing profile of the manufacturing workforce in Angus means that there is an ever increasing requirement to **attract new entrants to the sector** in order to secure the supply of people and skills that will be critical to supporting future growth. There are a range of initiatives currently being delivered within Angus aimed at raising the profile and awareness of career opportunities in the sector. These include **Primary Engineering**, which delivers services to primary schools across Angus and Scotland to raise awareness of career opportunities in STEM-related professions. Programmes include teacher training, the provision of interactive and paper-based resources, as well as regional and national competitions. All projects are linked to practicing engineers to provide a real-world context.

6.7 A couple of firms consulted reported that they had previously engaged in work with schools in Angus to promote opportunities within the sector. However, the consensus was that **more could and should be done to better raise the profile and awareness of careers in the industry** and in particular to get over negative perceptions amongst parents and teachers that jobs in the industry were unstable or in decline. There was acknowledgement that industry practices often don't help in this respect with downturns in the oil price often being followed by high profile job losses.

6.8 Of the 1,000 young people that left schools in Angus in 2013/14, over a third (36%) went into Higher Education (HE) and 28% went into Further Education (FE) – see Figure 6-3. Leavers from Angus were more likely to go into FE, and less likely to go into training, than their counterparts across the rest of Scotland. They were also more likely to enter the labour market either through employment (23%) or unemployment (9%) – both of these proportions were slightly above the averages for Scotland as a whole.

[31] *Source: Annual Population Survey – Workplace Analysis*

Figure 6-3: School leaver destinations 2013/14



Source: Skills Development Scotland School Leaver Destination Return (SLDR)
Base: All school leavers (Angus = 1,026; Scotland = 51,876)

6.9 **Engineering** was the most popular course of study for Angus school leavers in 2013/14, chosen by 12% of all young people entering HE / FE in that year. **Science and maths** was also very popular, accounting for 17% of all HE entrants from Angus schools. Young males accounted for the vast majority (**88%**) of all individuals entering HE / FE engineering courses from schools in Angus, in line with the national trend.

6.10 Engineering is also the **top occupational grouping for Angus school leavers entering employment**, which includes those undertaking training in employment through Modern Apprenticeships. In 2013/14, over a fifth (23%) of all Angus school leavers entering employment went to work in engineering. The gender bias is even more marked for this group, with males accounting for **96%** of the total.

6.11 These figures suggest that a **high proportion of young people in Angus are choosing to pursue a career in engineering immediately upon leaving school**. However, females account for a very low proportion of these suggesting that much more needs to be done to increase sector attractiveness to young women in the area. Although, this is an issue nationally and certainly not unique to Angus.

6.12 One business consultee described the manufacturing workforce in Angus as being an **hourglass shape** in that there are high concentrations of young people / new entrants to the sector, combined with large numbers of older workers, and a gap in the 'middle' (workers in their 30s and 40s with 10-25 years' experience). This has arisen from relatively large numbers of young people entering the sector on leaving school and then moving on following completion of their training to better paying opportunities located elsewhere, often in the oil and gas industry. This suggests that the issue for companies in Angus is not necessarily just about raising the attractiveness of the sector to new entrants, which will continue to be important, but about **attracting and retaining suitably skilled and experienced staff**.

6.13 The recent downturn in the oil and gas industry in Aberdeen City and Shire potentially offers an opportunity for Angus firms to attract more of this 'middle' group to work in the area, thereby addressing the current shortage of experienced workers and helping with succession planning. However, it might be some time before workers are willing to accept the lower salaries likely to be on offer in Angus and there is always the risk that they will leave again if and when the oil price improves.

Education and training provision

Modern Apprenticeships

6.14 Modern Apprenticeships offer individuals the opportunity to 'earn while they learn' and achieve industry recognised qualifications. All Modern Apprentices (MAs) have employed status and this is the main route through which many individuals enter the engineering and manufacturing sectors. In 2013/14, a total of 75 Modern Apprentices started on engineering frameworks with companies located in Angus, accounting for 10% of all MA starts within the area in that year.

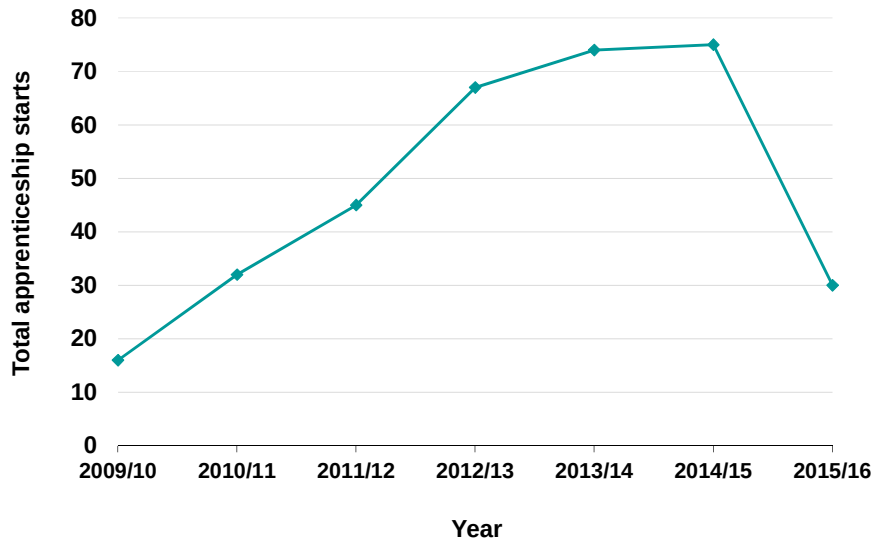
Angus Training Group

6.15 Angus Training Group (ATG) was set up more than 30 years ago and is a well-established apprenticeship training provider for the engineering and manufacturing sectors in the area. The Group has 55 member companies, 25 of which currently have apprentices in their first or subsequent years of training.

6.16 Having been involved in the provision of training for the industry for several decades, Angus Training Group is familiar with the "boom and bust" cycles of the oil and gas industry and the impact of these on company training budgets. Generally, when times are good, companies are happy to invest in training and take on apprentices. However, when there is a downturn in the industry, budgets for recruitment and training are typically amongst the first to go.

6.17 An early indication of the impact of the current downturn in the industry on employer investment in training is shown in Figure 6-4. The number of apprentices taken on by ATG grew steadily between 2009/10 to a peak of 75 in 2014/15. The organisation was at full capacity in that year and in fact had to turn away apprentices. However, the impact of the recent downturn in the oil and gas industry has been both sudden and marked with the intake for the coming year (2015/16) dropping by more than half to just 30. These fluctuations pose major challenges for the organisation in terms of maintaining business continuity and staffing levels.

Figure 6-4: Apprenticeship starts at Angus Training Group, 2009-10 – 2015/16

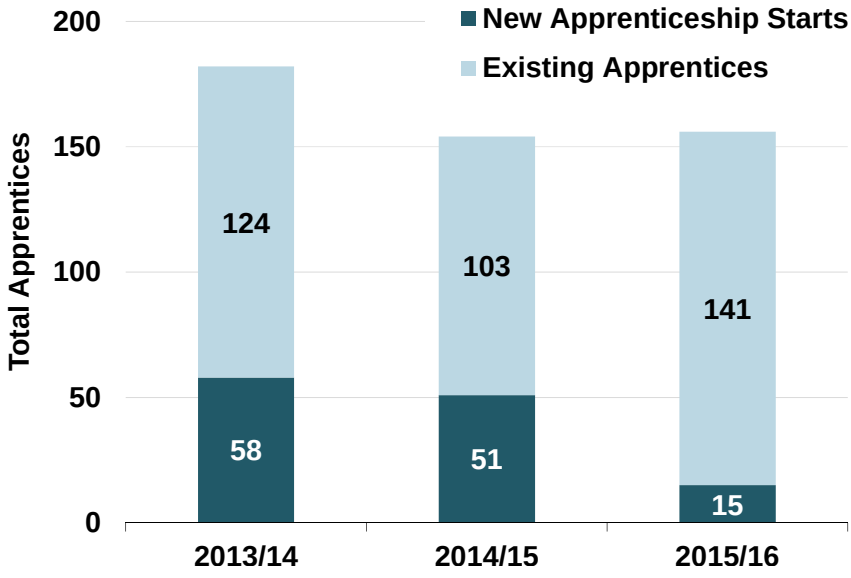


Source: Angus Training Group

Dundee and Angus College

6.18 Dundee and Angus College also offer a Modern Apprenticeships in engineering-related frameworks. As with Angus Training Group, they also experienced a substantial drop off in new apprenticeship starts in 2015/16 (Figure 6-5). **These figures point to a significant scaling back of investment in new apprentices by engineering companies in the area.**

Figure 6-5: Modern Apprenticeships at Dundee and Angus College, 2013/14 – 2015/16



Source: Dundee and Angus College

Alternative models

6.19 It could be argued that the traditional apprenticeship model is potentially more suited to larger firms than SMEs. For example, in the case of Angus Training Group, it involves trainees

spending their first year 'off-the-job' at the training centre. This is a high financial outlay for small employers, with no return on investment in the first year as the apprentice is not on site.

6.20 In order to help stem the decline in apprenticeships resulting from the recent downturn in the oil price, and in particular to encourage higher take up of apprenticeships amongst SMEs, consultees suggested that it might be worth considering alternative models of provision. For example, the new Foundation Apprenticeships being offered to senior phase pupils could be attractive to SMEs as it enables young people to complete elements of their training whilst still at school. The shared apprenticeship model that has been developed for the construction sector in Angus (case study below) also offers a potentially transferable model for the engineering sector.

Case study: Angus Shared Apprenticeship Programme

The Angus Shared Apprentice Programme (ASAP) was launched in October 2015 and is the first of its kind in Scotland. It offers individuals the opportunity to complete a full construction apprenticeship by working with a number of different employers to gain the skills needed to complete their qualification.

ASAP is a collaborative company made up of Angus Council, Dundee and Angus College, the Construction Industry Training Board and local employers, with support provided from Skills Development Scotland. It aims to encourage more Angus companies to offer apprenticeship opportunities in the construction sector by offering them the opportunity to share an apprentice with other employers, thereby reducing the costs and associated risks involved.

College Provision

6.21 The region's needs, in terms of college provision, are primarily served through Dundee and Angus College. The College was formed in 2013/14 as a result of a merger between Dundee College and Angus College. The College offers a wide range of engineering courses across all levels as set out in Table 6-1.

Table 6-1: Engineering provision available at Dundee and Angus College

Course Title	Description
Skills for work (Energy and Engineering)	These are basic level courses available to S4 school students considering a career in the industry. They involve attendance at the college one day per week during school term.
Introductory Programmes	These are essentially "taster" programmes offering the opportunity to explore a career in mechanical engineering / renewables / motor vehicles. Some students completing the programme move on to an NC in an engineering-related subject, whilst others go on to other subject areas.
National Certificate (SCQF Levels 5/6)	The college offers NC-level engineering courses across a range of disciplines including mechanical engineering / electrical engineering / welding / CNC / engineering systems.
Higher National Certificate / Diploma (SCQF 7)	The HNC / HND level courses also cover a wide range of engineering disciplines. They provide articulation into second year graduate engineering courses at Robert Gordon, Dundee and Napier Universities.

6.22 Dundee and Angus College had approximately 1,500 students studying engineering-related courses in 2013/14. The majority of these (77%) were part-time students and the remaining 23% (a total of 430) were on full-time courses. Demand for places on engineering courses at the college was reported to be outstripping supply by a factor of 3:1. In other words, there are three times the number of applications as there are places available. Taking account of the fact that some individuals submit multiple applications for different courses, this still suggests that there is no shortage of demand for places despite the recent downturn in the industry.

6.23 A major challenge faced by Dundee and Angus College, as well as other colleges across Scotland, is attracting and retaining suitably qualified lecturing staff for engineering courses. The college sector cannot offer the level of salaries available to qualified engineers working in the industry.

University Provision

University of Abertay

6.24 The University of Abertay is located in Dundee and offers graduate and post-graduate courses in a range of science, engineering and technology subjects as set out in Table 6-2. The focus of much of the provision on offer at the university is in civil rather than mechanical engineering. A total of 191 people graduated from engineering courses at the University in 2012/13, of which 84% were male and 16% were female.

Table 6-2: Science, Engineering & Technology courses available at the University of Abertay

Undergraduate	Postgraduate
BSc (Hons) Biomedical Science	MSc Energy, Water & Environmental Management
BSc (Hons) Civil Engineering	MProf Food and Drink Innovation
MEng/BEng Civil and Environmental Engineering	
BSc (Hons) Environmental Science and Technology	
BSc (Hons) Food and Consumer Science	
BSc (Hons) Food, Nutrition and Health	
BSc (Hons) Forensic Sciences	

Source: University of Abertay website

6.25 The university previously offered a degree qualification in **Renewable Energy Technologies**. This was developed in response to an approach from Fife and Dundee and Angus Colleges, based on perceived demand from industry. Articulation routes were developed for students achieving HND level qualifications at the colleges to enable them to progress to degree level. The course started well, with 20/30 students per year. However, interest subsequently fell away for two main reasons. Firstly, the qualification was not recognised by employers, who were looking for individuals trained in core engineering disciplines, such as mechanical or electrical. Secondly, the renewables industry in Scotland has not achieved the scale of growth

that was previously expected resulting in limited job opportunities. The course was deemed no longer viable and closed to new entrants after the 2014/15 academic year.

6.26 The university had a similar experience with a **Computer Engineering Intelligence System** (EIS) course that was developed in response to a reported shortage of software engineers and programmers in the industry. Take up was very low and the course has also been closed to new entrants from the coming academic year. The issue seems to have been a mismatch between what employers are looking for (i.e. engineers from core disciplines with software programming capability) and what the course was offering, which was dedicated.

6.27 The lesson from these experiences seems to be that employers looking for engineers with specialist skills in renewables or software programme also want them to be trained in core engineering skills. The implication is that mainstream engineering degree courses, with a range of additional 'top-up' training options that are tailored to the specific needs of employers, are what is required. This also provides a better foundation of transferable skills for individuals to enable them to better manage their careers and respond to changes in the labour market.

University of Dundee

6.28 The University of Dundee School of Science and Engineering offers graduate and postgraduate courses in civil, electronic and mechanical engineering. An overview of the courses available at the school is provided in Table 6-3. A total of 742 people graduated from engineering courses at the University in 2012/13, of which 80% were male and 20% were female.

Table 6-3: Engineering courses available at Dundee University

Undergraduate	Postgraduate
BEng / MEng (Hons) Civil Engineering	MSc Civil Engineering
BEng (Hons) Electronic Engineering	MSc Geotechnical Engineering
BEng (Hons) Mechanical Engineering	MSc Geotechnical Earthquake and Offshore Engineering
MSci / BEng / BSc (Hons) Renewables	MSc Concrete Engineering & Environmental Management
	MSc Structural Engineering
	MSc Renewable Energy & Environmental Modelling
	MSc Biomedical Engineering
	MSc / PGDip Design for Medical Technologies
	MSc Medical Imaging

Source: University of Dundee website

Feedback from businesses

6.29 Businesses were asked where they currently access skills and training support. The sources cited include **Carnegie College, Turning Point Scotland[32], Scottish Enterprise Leadership and Management courses, private consultants / training providers, Angus Training Group (apprenticeship training), Dundee and Angus College and the Saltire Foundation**.

[32] http://www.turningpointscotland.com/

The larger firms also do a lot of their training in-house. A minority of consultees reported a lack of awareness of the training support available to them.

6.30 The few consultees who mentioned Angus Training Group were **very positive about the quality of apprenticeship training they provide**. Although, there was recognition of some scope for improvement, particularly in relation to equipment (which was considered by one consultee to be quite dated) and recruitment/interviewing methods for apprenticeships. The feedback received on college provision was **generally less positive**, with two firms reporting that the engineering training available at colleges across central and north east Scotland did not meet their requirements. They would like to see more tailored and flexible provision, with a greater focus on day release / evening rather than full-time courses. They would also like to see an improvement in the quality of teaching staff within the colleges.

6.31 One consultee cited a gap in Angus and the wider North East in the provision of professional training in software packages e.g. MS Excel and PowerPoint. Another gap highlighted relates to "cladding"[33] – none of the training providers currently offer this as they tend to focus on basic welding.

6.32 The majority of the firms consulted reported that they **recruited mainly through apprenticeships and college leavers**, with few reporting a requirement for graduate-level engineers. The result is that most reported fairly limited engagement with the universities in the region, although a couple of firms had engaged with the University of Dundee on specific research projects with mixed results. A complaint from one firm was that they found the university sector fairly difficult to engage and navigate.

[33] Metal based cladding.

7. Conclusions and recommendations

7.1 This document has reported the findings from a study aimed at identifying potential barriers to growth facing engineering and manufacturing firms in Angus and the wider North East region and exploring options for addressing these. This final section provides summary conclusions and recommendations for consideration by Angus Council and partners in supporting the future growth of the sector.

Economic and policy context

7.2 The economic recession that started in late 2008 has resulted in a challenging environment across all sectors of the UK and Scottish economies. The latest indications are that the recovery is set to continue through 2015, but this is tapered with uncertainty, mainly due to the combined effects of the fall in the global oil price and the trading environment in Europe.

7.3 The impact of the downturn in the oil price is particularly concentrated in Aberdeen City and Shire, but will filter through industry supply chain networks across Scotland and beyond as company activities and investment are scaled back. In the short term, this will have a negative impact on the growth prospects for the engineering and advanced manufacturing sector in Angus. **Any package of support for the sector will therefore need to take account of the challenging conditions that many firms are operating in and the likely constraints that this will have on available budgets for investment.**

7.4 The Government Economic Strategy for Scotland highlights the importance of the manufacturing sector to the national economy as a source of exports, investment in research and development and high skilled / well paid jobs. **The provision of support for continued growth of the engineering and advanced manufacturing sector in the North East therefore aligns well with national policy priorities.** At the local level, the Angus Economic Strategy identifies supporting enterprise and infrastructure as a strategic priority to be delivered through a focus on business growth, economic recovery and tourism. However, priority actions for supporting future growth of the engineering and manufacturing sectors have not been articulated.

Profile of the sector

7.5 The engineering and manufacturing sector accounts for a third of the Angus economy and is the source of over 3,500 well-paying jobs for the area. Output and employment from the sector have grown strongly in recent years and it has played an important part in supporting the post-recession economic recovery in Angus. **There is therefore a strong case for supporting continued growth of the sector.**

7.6 The sector in the region is characterised by a number of large multi-national firms, but also many smaller indigenous companies. Particular specialisms include engineering; manufacture of metal products, machinery and equipment; servicing and installation of machinery and equipment; and chemicals / pharmaceuticals. A lot of the companies in the region supply the oil and gas industry and have been exposed to the recent downturn.

Analysis of Scottish Government statistics also suggest that firms in the area spend less on R&D activities compared with their counterparts across the rest of Scotland.

Potential for growth

7.7 **The medium-term outlook for the engineering and manufacturing sector is relatively positive in terms of company growth aspirations.** However, the shorter term outlook (next one to two years) is less so. Almost all companies consulted reported that turnover and staffing will remain static until at least 2017. It is also worth noting that the growth aspirations of most of the firms in the region are predicated on an improvement in the oil price from 2017 onwards, which is far from certain.

7.8 The downturn in the oil price could act as a stimulus for engineering and manufacturing firms in the area to **consider diversifying into new sectors and markets**. Some firms, particularly SMEs, are likely to need support to overcome the legislative and regulatory barriers associated with doing this. However, a benefit of diversification is that firms would reduce their exposure to cyclical nature of the oil and gas industry. The majority of companies consulted are currently exporting, with the main export markets being West Africa, Europe, the Middle East and Australia. Whilst some firms are exporting to one or two countries, others are exporting to over 40, suggesting that there is potentially scope for others to expand into new markets with support.

Business support for growth

7.9 There is a range of national-level business development support available to firms located in Angus. However there is less provision specifically tailored for the engineering and manufacturing sector in the area. There is scope to develop this, **but it would need to be tailored and differentiated from existing provision.**

7.10 The landscape of provision is complex, with multiple public and private sector stakeholders offering similar types of support to firms in region. This is confusing for companies, and SMEs in particular, who report that they find the system difficult to navigate and often don't know where to go to get the support they need. There is a strong argument for simplifying the landscape. This could be achieved by **bringing together all of the support available under the banner of the local economic development partnership** with the local authority taking the lead in engaging companies and signposting them to the various types of support available.

7.11 In addition to some duplication of provision, there are also gaps with the more comprehensive support (in the form of the Scottish Enterprise account managed programme) which is only available to select firms who meet certain criteria. The study found greatest demand from companies for support to **achieve process and efficiency improvements, as well as recruitment and the development of training plans**. Whilst there was general interest from firms in accessing the type of support that might be available through a physical Centre for Excellence, none of the businesses consulted said they would be willing to invest in this, particularly in the current climate when budgets available for investment in non-core business activities were reported to be limited / non-existent. There was however strong support for the concept of a "Virtual" Centre for Excellence, which would incorporate an online portal setting out the range of support available and details of how to access this.

People and skills supply

7.12 Over a third of the manufacturing workforce in Angus will reach retirement age in the next ten to fifteen years, meaning that **large scale recruitment will be required just to maintain current employment levels**. Combined with a shrinking working age population, this is likely to present a challenge for many firms in sourcing suitably skills and experienced staff.

7.13 Engineering is the top choice for school leavers from Angus entering HE, FE and employment, suggesting that **sector attractiveness is less of an issue than it has been historically**. However, relatively few young women choose to pursue opportunities in the sector on leaving school and more needs to be done in this area. The challenge for Angus firms is in retaining new entrants, with many reported to move on to better paid opportunities elsewhere (often in oil and gas) following completion of their training.

7.14 These skills issues are combining to create an **hourglass shaped engineering and manufacturing workforce**, with high numbers of new entrants at the one end, a concentration of older workers at the other, and a shortage of workers in their 30s and 40s with 10-20 years' experience.

Recommendations

7.15 On the basis of the findings in the report, we put forward the following recommendations for consideration by Angus Council and partners. The focus is on developing a more co-ordinated and joined-up package of support for the engineering and manufacturing sector in the area, as well as strengthening access to support for innovation, skills and diversification.

Developing a joined up approach

Recommendation 1: Angus Economic Partnership should consider developing an action plan for the Engineering and Advanced Manufacturing sector. This should articulate the ambition for the sector with actions for public and private sector stakeholders to take forward in order to realise this. The approach taken in Fife was given as an example by several consultees.

The process of developing this would help secure engagement and commitment from public and private sector partners to work together to support the future growth of the sector. It would also help bring cohesion and co-ordination to the existing landscape of provision, which is cluttered and difficult for companies to navigate. Consideration should be given to bringing all of the support available under the banner of the Angus Economic Partnership.

Recommendation 2: The Partnership should engage stakeholders across the Tayside and wider North East region where appropriate. The offer of a package of support to engineering firms across the Tayside area makes sense in terms of the economic geography of the region and other regional policy and planning structures. In some cases, it might also be worth engaging stakeholders in the Aberdeen City and Shire area given its proximity to Angus and the likelihood of common issues facing companies in the oil and gas sector.

Recommendation 3: Consideration should be given to the development of a "Virtual" Centre for Excellence. The focal point for this would be an online portal setting out the range of local / national support available to engineering and advanced manufacturing firms in area and details of how to access this. This would cover the full range of support available to firms for

business development, innovation and skills. It could also be accompanied by brochure setting out the key services available to be mailed to companies.

Recommendation 4: The Tayside Engineering Network (TEN) provides an existing platform for engaging businesses in the development of a package of support for the sector, as well as further developing opportunities for networking and sharing of best practice. The scope and remit of the group should be reviewed with a view to strengthening its role as a focal point for the industry in the region.

Recommendation 5: Underpinning the packaging of support is a need for good quality intelligence on the businesses in the region. This could take the form of an up to date database of company contact details and record of engagement with all the partners. This should be accompanied by intelligence on the issues facing the sector in the region, and help shape the support that might be required.

Support for innovation

Recommendation 6: There is currently a gap in the support available to SMEs in the region to achieve process and efficiency improvements (as well as for new product development). The study found that this was the area that most interested businesses. The Economic Partnership should consider engaging with the Scottish High Value Manufacturing Catapult as a route to addressing this.

Support for skills

Recommendation 7: A high proportion of the manufacturing workforce in Angus will be reaching retirement age within the next ten to fifteen years. A package of support to help with recruitment, succession planning and attracting / investing in new people should be developed to help address this.

Recommendation 8: A common complaint from companies in the region is that a lot of trained staff leave to take up higher paying opportunities elsewhere, often in the oil and gas industry. This creates a reluctance on the part of employers to invest in their workforce, thereby perpetuating the pattern – i.e. employees don't feel invested in and so decide to move on. The provision of support to companies for workforce development, progression and training plans could help address this issue.

Support for diversification

Recommendation 9: The sector is dependent on the performance of the oil and gas industry and is impacted by its fluctuations. The current restructuring taking place in the sector is an opportunity to support greater diversification. This is difficult at a time where the focus is on survival, with more limited resources to explore alternative opportunities, Working together, sharing experiences or offering support for joint research, could help to emphasise these opportunities.

Annex A: Business consultations

Table 7-1: Business consultations

Consultations completed with:	Located in:
A&C Precision Engineering Ltd	Dundee
David Ritchie (Implements) Ltd	Angus
Finesse Control Systems	Angus
GE Oil and Gas – Brent Road	Angus
GE Oil and Gas – Charleton Road	Angus
Interplex PMP Ltd	Angus
J&D Wilkie	Angus
Michelin Tyre PLC	Dundee
National Oilwell Varco	Angus
Northern Tool and Gear	Angus
Pacson Valves	Dundee
RAM Engineering and Tooling	Angus
Reekie Steeltec	Angus
RGS Forfar	Angus
Rautomead Ltd	Dundee
Tokheim	Dundee

Annex B: Stakeholder consultations

Table 7-2: Stakeholder consultations

Name	Organisation
Alan Swankie	Angus Training Group
Brian Buchan	Scottish Engineering
Brian Rice	GSK
Claire Owens	Skills Development Scotland
David Blackwood	University of Abertay
David Milliken	Scottish Enterprise
David Nicholson	Centre for Engineering Education and Development (CEED)
Gavin Halliday	Scottish Enterprise
John Cargill	Scottish Enterprise
Joyce Mathew	Scottish Enterprise
Julia Brown	Scottish Enterprise
Kevin Murphy	Dundee and Angus College
Michael Ward	High Value Manufacturing Catapult, University of Strathclyde
Pamela Stevenson	Fife Council
Paul Cantwell	High Value Manufacturing Catapult, University of Strathclyde
Paul Caruana	Clyde and Tay Ports
William Scott	Skills Development Scotland