

# West of England Local Enterprise Partnership Workshop

## Workshop E

### Sector Skills & Competitiveness Statement

#### Advanced Engineering

##### Definition

1. Advanced Engineering is not in conventional terms an economic sector. It refers to a number of sectors and is best described as technological processes and knowledge in relation to any manufacturing sector that can provide cutting edge or innovative entrepreneurial solutions. It therefore spans a whole range of new areas of industry from renewable energy through to advanced silicon design. In sectoral terms it is present in manufacturing of aircraft and spacecraft, industrial process control equipment, weapons and ammunition, machine tools, optical instruments and photographic equipment and instruments. In the West of England, Advanced Engineering is found in the aerospace, defence and pharmaceuticals industries.
2. This report does not include the substantial microelectronics sector in the West of England, which is covered under the separate ICT sector statement.

##### Background

3. Advanced Engineering is one of the 10 areas selected by the South West Regional Development Agency (SWRDA) as being a priority for the whole region. It is the second largest area of industrial/commercial activity in the South West (financial services is first) employing around 47,000 people and contributing over £3 billion to the regional output, with £1.3 billion in direct exports.
4. In the West of England, aerospace is the largest sub-sector in employment terms, accounting for almost a third of all employment positions in Advanced Engineering. Nine of the twelve largest aerospace companies in the UK have major facilities in the South West, supported by upwards of 700 supply chain companies. Three of these are based in the West of England.
5. Advanced Engineering was selected as a priority for the sub-region because of its relative importance in this area compared with nationally, the rate of employment growth and the share of total sub-regional employment. The director of GWE Business West Chambers of Commerce reports "We have something in the region of 30,000 jobs in the South West reliant on the high-tech engineering industry with BAE as a major player in that network."

- Advanced Engineering has great strategic importance for the West of England, underpinning the manufacturing base of the sub-region and offering the prospect of growth through innovation and diversification into environmental technology markets. Approximately 12,650 (2006) engineers are employed in the West of England accounting for 25% of the region's GVA and employment in this area.

## Outlook

- Advanced Engineering will support many new developments in low carbon emission transport and in the hardware side of environmental technology, due to ongoing pressure for energy efficiency, renewable energy sources, reduction in carbon emissions and more sustainable waste processing. In this context the value of the sector for this region is that the future of manufacturing in the UK is likely to be in high tech, bespoke and niche manufacturing with a significant proportion of mass production likely to drift east to developing economies, particularly the powerhouses of China and India. The imperative for this city-region is to exploit and maximise new opportunities from our knowledge base in areas such as bioengineering or silicon chip technologies. Major employers in Bristol and South Gloucestershire (Invest in Bristol) include:

<b>Company</b>	<b>Numbers employed</b>
BAE Systems	500 - 700
MBDA	500 - 700
Hewlett Packard	750 - 1000
GKN Aerospace	1000 - 2500
Airbus in the UK	2500 - 5000
Rolls Royce	2500 - 5000
Essilor	250 - 500
Babcock	250 - 500
Indesit	250 - 500
SEA systems	200 - 250
St Microelectronics	200 - 250

## Local Support Infrastructure

- The concentration of this industrial sector in the sub-region has been reflected in a significant investment by the public funders of business and skills development, notably SWRDA and the LSC. The key elements of this are listed below.
- The Talent Retention Scheme: This programme, financed by SWRDA, is being trialled regionally in Advanced Engineering. It is aimed at highly skilled individuals out of work or who are at risk of redundancy, as well as businesses involved in recruitment or redundancy. The aim is to keep engineers in work and remaining in the South West. SWRDA funds the scheme up until 2012. Its objectives are to identify new career opportunities in

the sector, offer career management, redeployment and signposting and to give access to a web based recruitment system. The concentration of this sector in the West of England means that this sub-region is home to the greatest number of businesses participating.

10. West of England Aerospace Forum (WEAF): WEAF champions and supports the interests of the aerospace and defence industry in the South West. Its aim is to facilitate an environment where companies can improve their competitiveness and grow the industry.
11. National Composites Centre: The Centre is located at Bristol University and is one of only five in the country. The Centre is one of five hubs for leading composite research and is a key element of the Government's new Composites Strategy and will be formed by the University in partnership with industry, with funding of £12m from central Government and £4m from SWRDA. This is an internationally leading hub, linking activities across all sectors of the UK in research, education and training, technology transfer and incubation of new enterprises.
12. Advanced Composites Centre for Innovation & Science (ACCIS): ACCIS brings together composites activities across the University of Bristol, based in the Faculty of Engineering and linking to the Science and Medical Faculties. Their vision is to be a world-leading centre for composites research, combining cutting edge fundamental science with strong industrial links for exploitation and technology transfer. ACCIS is a focus for collaboration internally, nationally and internationally.
13. Aerospace and Advanced Engineering (AAE) iNet. The iNet is a service to help SMEs transform ideas into the new products and services, which will help drive economic growth. It is being delivered by consortia from across the public and private sector consisting of Manufacturing Advisory Service SW, UWE and EEF (The Manufacturers Organisation) with WEAF as the lead partner. The iNets are a £13 million investment over 3 years and are provided free of charge to the business. iNets are funded by the European Regional Development Fund (Competitiveness), SWRDA and the private and public sector organisations involved.
14. SPark is a partnership between the universities of Bath, Bristol and the West of England, SWRDA and Quantum Property Partnership. It will offer a full range of accommodation from virtual and early stage to dedicated and bespoke buildings. SPark will provide a professional and supportive environment for collaboration between universities and businesses, to enable them to accelerate the commercialisation of new and applied technologies. First phase of the building work started in July 2010.
15. SETsquared Business Acceleration, an activity of the SETsquared Partnership, is a collaboration between the universities of Bath and Bristol (and two others). Its aim is to accelerate the growth of innovation and technology businesses mostly from outside the university to stimulate economic growth in the region's economy by offering a package of business

support. They provide support services and office space, practical help from experienced entrepreneurs, help with access to funding, building businesses from university research and accessing international markets.

16. Bristol Environmental Technology Sector (BETS): BETS has been the primary stakeholder network for the sub-region and has recently joined forces with Low Carbon South West to be constituted as a Community Interest Company (known as Low Carbon South West). The organisation remains private sector led and supported by a partnership of local authorities, UKTI South West, the Universities of Bristol and Bath, the University of the West of England, and the Environment Agency.
17. Engineering Consultancies: There are a number of expert engineering consultancies in Bristol creating and supporting employment opportunities in Advanced Engineering. Examples include Atkins (the UK's largest engineering and design consultancy which recently gained the Bristol water contract worth 5 million), Ove Arup and White Young Green.
18. Bristol, UWE and Bath Universities not only produce a highly educated and skilled engineering workforce for the engineering industry but also are excellent universities with specialists in aerospace related research and education. They have many strong links locally with industry providing demand-led training provision. An example is the South West Higher Level Skills Project where to date 48 employers have purchased 57 higher level skills programmes as part of their workforce development strategies.
19. Further Education has a vital role to play in supporting Advanced Engineering. Key examples of its contribution include the delivery of advanced apprenticeships leading to HNC/Foundation degrees at UWE and mapping into the HEI's BEng/MEng programmes. They are the key player in exposing young people to engineering from the age of 14, through BTEC, Young Apprenticeships and the Engineering Diploma providing a qualification from level one to HE. FE colleges are usually the first step for individuals leaving school, progression to HE, and the obvious supplier of training/support for industry to access, as HEIs do not tend to offer levels 1 – 3 delivery.

## **Inward Investment**

20. The West of England Partnership's inward investment strategy aims to actively promote the sub-region to Advanced Engineering employers. Advanced Engineering employers are attracted to the West of England because of the existing cluster of engineering companies and their suppliers. It is estimated that there are 9 'Prime' companies in the West of England including Airbus and the MoD, and approximately 700 supply chain companies.
21. Expertise and availability of skills in Advanced Engineering is a major selling point for the sub-region and this sector is heavily promoted in marketing materials.

22. Inward investment over the past couple of years has targeted two main areas of opportunity:
- a) Major investment facilitated by government agencies (e.g. GKN investment in the Airbus composites facility).
  - b) Small international investment with growth potential. Typically an initial investment will be comprised of a UK Manager, possibly with a small staff who will work on existing projects of the parent company requiring a West of England presence. This team will then be responsible for bidding for and bringing in new contracts that would flow through the UK entity. In terms of property requirements these companies will normally be seeking to locate in a small or serviced office close to the major companies they are seeking to supply to.
23. In relation to indigenous companies, there are also important clusters in central and north Bristol and central Bath, often associated with the Universities.

### **Skills Issues**

24. A significant issue in the medium term for Advanced Engineering businesses in the West of England is an ageing workforce alongside a decline in the number of local undergraduates in, for example, engineering. There is already reliance upon bringing talent into the area from outside and this is set to become more of a problem as existing highly skilled professionals retire.
25. Absolute levels of employment in this sector are set to fall but replacement needs still generate a significant recruitment demand. In summary the number of professionally registered engineers is falling and their average age is rising. In the West of England 50% of the engineering workforce is aged 45 – 65. Women and BMEs are underrepresented in this sector. From April 2010 Diversity in Apprenticeships has been launched which offers funding to encourage employers to take on apprentices traditionally not represented in the workforce therefore especially relevant to engineering. The industry is moving from specifically mechanical and electronic to a hybrid mechatronic focus.
26. Approximately 600 workers per year will need to be recruited into the industry. Both existing and new workers will require higher level skills than previously with particular stresses on IT/ CNC/CAD skills as well as better communication, team working and commercial awareness skills.
27. There are skills shortages in specialist areas that are not being addressed by local provision and where locally specific new skills will be needed. For example there will be a high demand for engineers to work with composite technology. Existing engineers will need to be persuaded to retrain in order to work with composite materials and design. Already identified is a shortfall of lecturers/trainers in this field. It is not felt that the industry is confident in obtaining accredited qualifications in this new area of expertise. It has been

identified that 300 employees at Airbus will need a level 2/3 in composite engineering as well as many at level 4.

28. Renewable energy has been identified as a rapidly growing field (new skills needed in wind, wave and tidal power).
29. There are currently specific pathways in the region where the local FE colleges have linked with industry to staff a skills shortage e.g. MOD need project engineers and the City of Bristol College are supplying.
30. Anticipated is a demand for welders. There is a need to continue to develop metal working skills, as metal will continue to interface with the newer carbon fibre.
31. There is a need for both application and design engineers. The balance of each depends on the type of business but one is not more important than the other.
32. In addition to the higher end skills, adult apprenticeships need to be encouraged as well as apprenticeships in the more traditional 16 – 18 age group. The new low carbon and green agenda needs to be explored further in terms of its implications for engineers in relation to new skills.
33. Finally where new graduates are entering the workforce, local employers have expressed dissatisfaction with business awareness and soft skills.

## **Key Challenges**

For the Advanced Engineering sector locally the challenges are:

34. Skills and training shortages in specialist areas e.g. composites at all levels. Keeping informed regarding composites because the current picture of carbon fibre and metal may change into the future.
35. Shortages of low levels base skills in order to bolt on specialist construction skills e.g. concrete skills at nuclear sites as well as stainless steel welders.
36. Systems engineering will be a key skill as engineering further down the value chain moves to low cost locations.
37. There is a concern that skills provision should not be seen in isolation from the rest of the South West or indeed the UK as the issues tend to be national or even international ones and diversity and cultural differences in the local workforce are appreciated.
38. The need for local SMEs in the sector to form a stronger working relationship with the prime contractors.

39. Addressing the difficulties faced by companies wishing to access innovative knowledge from HEIs.
40. The recruitment of skilled engineers and graduates who are 'business aware' i.e. understand the wider market opportunities for their business and the overriding need for profitable growth.
41. The need for more joined up training provision with less competition between training providers and colleges. Clearer access to training provision for SMEs.
42. Retaining advanced engineers in both the sub-region and the sector after they have experienced redundancy (70% currently leave the sector).
43. Older workers may not have the qualifications needed to demonstrate their skill level in order to progress or to obtain new employment after redundancy e.g. CNC operators and project managers may not have the Prince 2 qualification.
44. STEM teaching in schools could be improved. Advice, Information and Guidance in engineering is still patchy and lacking in some schools.
45. There is a conflict between promoting level 3 apprenticeships in schools when head teachers are measured by number of university entrants.

### **Priorities for Action**

46. A priority of the West of England Partnership's Skills & Competitiveness Board is to implement a targeted approach to employer engagement and drive up higher and intermediate level skills. Advanced Engineering is clearly an area of business growth in the sub-region and will need a collaborative approach on action for skills to ensure this growth can be achieved. The ultimate aim is for WEP to help shape employment and skills outcomes in order to increase the competitiveness of the West of England economy.
47. A need has been identified for better-coordinated interaction between local Advanced Manufacturing firms, the universities, colleges and other training providers. This interaction would focus on:
  - a) The development of technical skills and higher-level business capabilities in the existing workforce appropriate to the emerging challenges in the industry.
  - b) The creation/development of systems and processes to ensure the capture of mutually beneficial, "close to market", knowledge and expertise within the universities.
  - c) Awareness that often the softer skills needed such as business relationship management (particularly needed in the supply chain

companies) are best developed from within organisations via coaching and mentoring rather than training.

- d) The development of sector specific “Graduate apprenticeship” programmes, where employers are given support in recruitment and selection, alongside a work-focused training programme in, for example, Management for the graduate. Where employers have identified specific skills gaps, these should be included.
- e) The offer of paid undergraduate and graduate short-term project-based work to SMEs in the supply network, alongside an expansion of existing undergraduate work placement schemes.
- f) The development of the city-region’s “technician class” through a boost in numbers for Advanced Apprenticeships at Level 3. The development of Higher Level Apprenticeship frameworks should act to encourage progression from Level 2 and Level 3. Particularly critical for this region is the capacity to retrain existing employees in businesses, which are growing precisely through delivering new technologies and services. For example there are many engineering companies using new materials often in response to demands from their Original Equipment Manufacturer customers. Where there is plainly a connection between business growth and the retraining of existing employees it will be important to reflect that in the funding for example of advanced apprenticeships – protecting some of the provision for the majority of employees aged 25 and above.
- g) Promotion of engineering as a career of choice in the West of England along with local labour market intelligence outlining the importance and economic value of STEM subjects.

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