



Action⁴skills

The Engineering and High Tech
Manufacturing Sector





Action⁴skills

Targeting the sectors
vital to Hertfordshire's
economy



Executive Summary

Key statistics

	Engineering and high tech manufacturing	All Herts
Business base		
No. of business establishments	1,400	49,200
Micro-businesses (<10 employees)	1,100	42,600
% <i>business base</i>	78%	87%
% <i>employment</i>	16%	22%
Workforce		
Total workforce	22,400	549,500
Employees	21,300	487,600
Self-employed as % workforce	5%	13%
Part-time employment	5%	34%
Female employment	21%	50%
Workforce aged under 25	10%	14%
Workforce aged 55 or over	15%	16%
Workforce dynamics		
Employment change 1998-2002	-7,500	-
% <i>Employment change</i>	-26%	-2%
Forecast change 2004-2013	-3,800	-
% <i>Forecast change</i>	-14%	+9%
Labour turnover p.a. (approx)	11%	N.A
% workforce in FT education 1yr ago	1%	3%
Workforce skills		
Workforce with no qualifications	2,200	-
	10%	11%
Low skilled workforce (≤ Level 1)	4,900	-
	22%	25%
High skilled workforce (Level 4+)	6,000	-
	27%	26%
Workforce training in previous 13wks	4,900	-
	22%	27%
Skill needs		
Employers with hard-to-fill vacancies	240	-
% <i>business base</i>	17%	8%
Employers with workforce skill gaps	370	-
% <i>business base</i>	26%	23%

Note: For definitions and sources see main report

Key messages

- Despite decreasing employment levels over recent years and forecast employment decline, the engineering and high tech manufacturing sector remains important to Hertfordshire in terms of employment and the development of a local knowledge economy.
- Within Hertfordshire there is a relatively high concentration of engineering and high tech manufacturing employment in Stevenage, reflecting the presence of companies such as Fujitsu and IFR (Formerly Marconi Instruments).
- Whilst accounting for only 1% of all engineering and high tech manufacturing establishments within Hertfordshire, large businesses account for 32% of employment in the sector.
- The sector suffers from a relatively high level of job turnover with around 11% of the workforce changing each year. This

represents a significant cost to many employers.

- Skills gaps are commonly reported by employers (26% of business establishments), particularly among process plant and machine operatives (23% of skills gaps). Technical and practical skills are the most frequently cited skill gaps for workers in these occupations.
- Despite the forecast net falls in employment, the level of replacement demand is likely to result in a requirement for approximately 500 new entrants to employment per year across all levels, with a further 1,200 moving in from other related sectors (not all of these will require training).
- Skills gaps are having a significant impact on employers, leading to increased operating costs and delays in developing new products.

Conclusions and recommendations

There is a need to attract able young people to the engineering and high tech manufacturing sector and to build on the skills of the existing workforce, in particular the 4,900 workers (22%) who are not qualified to Level 2. In order to tackle skills gaps there will be a need for relevant, up-to-date training for both new entrants and existing workers.

This paper outlines three workforce development priorities for the sector and makes suggestions for employers and stakeholders to consider:

1. Improve the sector's image and attract young people of both genders to the sector

- There is a need to replace the large number of staff leaving the sector each year. The current workforce is predominantly white and male.
- Policy responses could consider initiatives focused on young people aimed at:
 - expanding the availability and quality of work experience within the sector
 - enhancing the information on prospects in the sector available within careers guidance
 - enhancing resources and support available to science teachers to support their efforts to make lessons exciting and up-to-date.
- Employers and stakeholders in Hertfordshire should work with regional partners to try to address these issues.

2. Ensure the sustainability of provision when faced with projected falls in employment

- Risk that demand for training from employers in more specialised occupations may become increasingly fragmented in Hertfordshire.
- The LSC could undertake a strategic review of which college is providing which training with the aim of ensuring that a 'critical mass' of provision can be maintained to support the sector.
- Ensure that available provision meets the skills needs of employers as identified in the Sector Skills Agreement for the sector and the East of England manufacturing strategy.

3. Ensure that qualifications and course content reflect changing skill needs within the sector

- Hertfordshire LSC could work with partners to ensure that employers have a real input into course design, and that providers are empowered and enabled to respond to employer demand.
- Longer term aim of developing productive partnerships between employers and providers.

1.0 Introduction

This paper is one of a series that outlines the workforce dynamics and skills and training issues in key sectors in the Hertfordshire economy.

The series sets out:

- The demographics of the workforce in each sector
- The skills and qualifications profile of the workforce
- The likely demand for and supply of new skills and workers, now and in the future
- The local business drivers.

Where possible, local data has been used for the analysis. However, where local data was unavailable, inferences have been made from regional and national data to provide a best estimate of local workforce dynamics. Unless otherwise indicated, figures are for Hertfordshire.

For the purposes of this paper, the engineering and high tech manufacturing industry closely approximates the SEMTA footprint (the Sector Skills Council for Science, Engineering and Manufacturing Technologies), and includes, among other activities, the manufacture of metal products, electrical and electronic apparatus and medical and precision instruments. For more details of the sector definition used, see Annex I.

The sector has been defined using Standard Industrial Classification (SIC) codes. As the definition is industry-based, workers included may be in any occupation, provided they work for an establishment considered to be part of the sector.



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Key drivers of change

The prospects of the engineering and high tech manufacturing sector are linked to demand within the global economy, and are also affected by changes in the sterling exchange rate.

The engineering and high tech manufacturing sector is directly affected by advances in technology. As a result, this can lead to frequent changes in the sector with regards to working practices, product development and skills demands.

For example, in recent years advances in IT have led to significant transformations in the output and processes of businesses within the sector, with the internet altering the way businesses communicate and share information.

New practices such as cell and team working have been influenced by the drive for efficiency, new managerial ideas and meeting the requirements of new technologies and products. Technological changes such as the automation of production lines and increased use of robotics have led to the need for higher level technical skills and IT operator skills. There is also an increasing focus on customer service, with greater pressures for ever speedier response times.

However, it should also be noted that although new technologies offer significant benefits, they also serve to illustrate the threat to competitiveness which a lack of investment can cause.

The engineering and high tech manufacturing sector is increasingly competitive, with easier communications, reduced tariff barriers and transport costs, and the enlargement of the EU allowing low wage countries to compete more effectively. Growing competition from lower cost and increasingly skilled workforces overseas will all be key drivers of change within the engineering and high tech manufacturing sector over the coming years.

In such a climate, innovation is increasingly being identified as a growing source of advantage. As a result the emphasis within the UK is an increased shift towards innovation, and a shift of production towards high value added products. The workforce will need to be increasingly technologically adept and flexible in this ever-changing environment.

Central to this shift towards innovation is the development of new technologies, and with the presence of leading universities

in the East of England the area holds potential for further development of the sector. In addition, Hertfordshire is also home to some significant names within the aerospace industry, such as Lucas Aerospace and Matra BAe Systems.

Workforce development priorities

While recruitment difficulties in the sector appear to be on a par with the Hertfordshire average, national evidence suggests that recruitment and retention are in fact very important issues for the engineering and high tech manufacturing sector. It has been suggested that there is a need for young people and women in particular to see the engineering and high tech manufacturing sector as an attractive career option.

Employer concerns about the quality of students emerging from the full-time education system, and specifically concerns over standards of maths and science proficiency, as well as poor facilities for training have been identified as important issues for the sector.

There is a clear need for responsive continued professional development within the sector to develop the skills required to adapt to any technological developments. In order to ensure that the sector's existing workforce and any new entrants possess new and specific technical skills that may be required to drive the sector forward, it is essential that qualifications and course content reflect these changing needs.

There is also a need to ensure that within the context of declining employment, a sustainable critical mass of learning provision is available for both current workers and new entrants to the sector.

This paper therefore suggests that the most pressing workforce development needs over the next 3–5 years for the engineering and high tech manufacturing sector will be to:

1. Improve the sector's image and attract young people of both genders to the sector.
2. Ensure the sustainability of provision when faced with projected falls in employment.
3. Ensure that qualifications and course content reflect changing skill needs within the sector.

These issues are revisited in the Conclusions and Recommendations section on page 17.



Figure 1.1

Engineering and high tech manufacturing sector – SWOT analysis

Strengths

- The presence of leading aerospace companies in Hertfordshire
- Core of skilled employees

Weaknesses

- Employment is heavily male orientated
- Poor image of industry among potential employees
- Continuing low levels of investment in skills development

Opportunities

- The East of England has a world class science base to drive forward innovation and R&D
- New technologies will allow more efficient production cycles

Threats

- Older age profile than the average for all industries
- The length of time and cost involved in training staff for the sector creates difficulties for firms in this fast-moving sector
- Low wage economies of the EU accession countries are already attracting inward investment from UK and foreign manufacturers, and have a high level of participation in graduate education
- Exchange rate fluctuations

2.0 Engineering and High Tech Manufacturing in the Hertfordshire economy

This section looks at the importance of the engineering and high tech manufacturing sector in Hertfordshire and the employment in the county.

Key messages

- Engineering and high tech manufacturing is an important sector in the Hertfordshire economy in terms of employment, with a workforce of around 22,400 (21,300 employees and 1,100 self-employed).
- Within Hertfordshire there is a particularly high concentration of engineering and high tech manufacturing employment in Stevenage, where 11% of all jobs are in this sector.
- The largest sub-sector is the manufacture of machinery and equipment, which employs one quarter of the engineering and high tech manufacturing workforce. Within this, the manufacture of instruments for measuring accounts for around 9% of all employment in the sector.
- Employment in micro-businesses in the engineering and high tech manufacturing sector in Hertfordshire is lower than the average for all industries in the county but above the regional and national averages for the sector.
- Large businesses with more than 200 employees account for only 1% of all engineering and high tech manufacturing establishments in Hertfordshire but account for 32% of all engineering and high tech manufacturing employment.

In terms of employment, the Annual Business Inquiry (ABI) suggests that there are around 1,400 engineering and high tech manufacturing establishments in Hertfordshire employing approximately 21,300 employees. The engineering and high tech manufacturing sector accounts for 4% of the employees in Hertfordshire, slightly below the proportion employed in the sector nationally (6%).

It should be noted that the ABI (like many other labour market information data sources) does not include self-employed people. The Labour Force Survey (LFS), which does include the self-employed, suggests that there are 1,100 self-employed people working in the engineering and high tech manufacturing sector within Hertfordshire (around 5% of the total workforce in the sector).

Figure 2.1 shows that engineering and high tech manufacturing accounts for between 2% and 6% of total employment in each of the ten local districts in Hertfordshire. The exception to this trend occurs in Stevenage, where the sector accounts for 11% of employment (approximately 4,600 people). This is partly due to the presence of companies such as Fujitsu and IFR (formerly Marconi Instruments) within the district.

Figure 2.2 shows that Stevenage has the highest number of engineering and high tech manufacturing employees, and North Hertfordshire the highest number of business establishments in the sector. The lowest number of both engineering and high tech manufacturing employees and establishments is in Three Rivers.

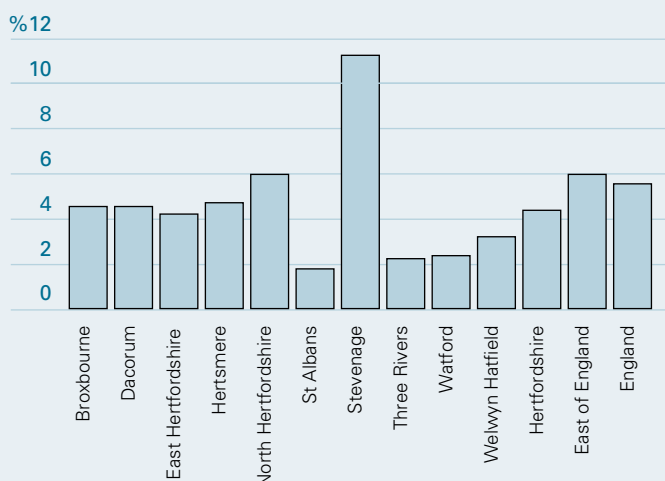
North Hertfordshire has the highest concentration of engineering and high tech manufacturing employment with a Location Quotient¹ (LQ) of 1.48, and St Albans has the lowest (0.52).

Micro-businesses account for 16% of engineering and high tech manufacturing employment in Hertfordshire (approximately 3,400 employees). This is lower than the proportion for all industries in the county (23%) but higher than the regional

¹ Location Quotients indicate the relative strength of the sector in the district. An LQ of more than 1 signifies that a district has a higher concentration of employment in the sector relative to Hertfordshire as a whole. An LQ of less than 1 indicates that a district has a lower concentration than Hertfordshire as a whole.

Figure 2.1

Engineering and high tech manufacturing as a proportion of total employment – Hertfordshire districts



Source: ONS Annual Business Inquiry, 2002
Note: Figures do not include the self-employed

Figure 2.2

Engineering and high tech manufacturing employees and business establishments in Hertfordshire districts

District	Establishment	Employees	% of sector	LQ
Broxbourne	117	1,437	6.7	1.25
Dacorum	163	2,890	13.5	0.83
East Herts	228	2,357	11.0	1.19
Hertsmere	106	2,111	9.9	0.82
North Herts	262	2,937	13.8	1.48
St Albans	118	983	4.6	0.52
Stevenage	93	4,553	21.3	1.23
Three Rivers	87	611	2.9	0.82
Watford	121	1,424	6.7	1.02
Welwyn Hatfield	136	2,028	9.5	1.15
Total	1,431	21,331	100	

Source: ONS Annual Business Inquiry, 2002
Note: Figures do not include the self-employed

average for the sector (12%).

While large businesses with more than 200 employees account for only 1% of establishments in the sector, they account for almost a third of engineering and high tech manufacturing employment in Hertfordshire (32%). It is medium sized firms that dominate the sector in Hertfordshire.

The Standard Industrial Classification (SIC) used in national statistics divides engineering and high tech manufacturing into nine sub-sectors. These are:

- Basic metal manufacturing
- Metal products
- Manufacture of machinery and equipment
- Manufacture of office machinery and computers
- Manufacture of electrical machinery and apparatus
- Manufacture of radio, television and communications equipment
- Manufacture of medical and precision instruments
- Manufacture of motor vehicles, trailers etc.
- Manufacture of other transport equipment

More details of these sub-sectors can be seen in Annex I.

Figure 2.3 shows that 25% of employment in the engineering and high tech manufacturing sector in Hertfordshire (approximately 5,600 jobs) is in the manufacturing of machinery and equipment.

A further 49% of employees in the sector (10,400 jobs) work in the manufacture of metal products, the manufacture of electrical machinery and apparatus and the manufacture of medical and precision instruments sub-sectors (18%, 16% and 15% respectively).

The engineering and high tech manufacturing sub-sectors can be further broken down into numerous minor sub-sectors. The largest of these minor sub-sectors is the manufacture of instruments for measuring, which accounts for around 9% of all employment in the sector. The strength of this sub-sector may be due to the presence of large employers such as IFR (formerly Marconi Instruments).

Figure 2.4

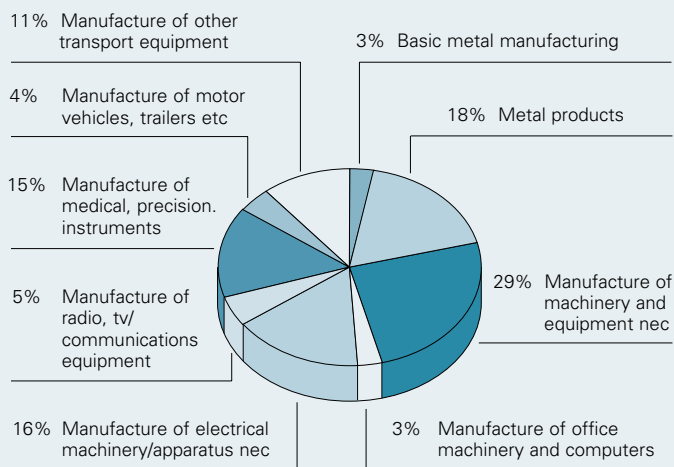
Employees by minor sub-sector – Hertfordshire

	No of employees	Proportion of sector
Manufacture of instruments for measuring etc	1,900	8.8
Treatment and coating of metals etc	1,700	7.8
Manufacture of other general purpose machinery	1,600	7.5
Manufacture of electrical equipment nec	1,200	5.5
Manufacture of structural metal products	1,100	5.2
Manufacture of other fabricated metal products	1,000	4.6
Manufacture of electricity distribution apparatus	900	4.4
Manufacture of other special purpose machinery	800	3.9
Manufacture of parts for motor vehicles	600	3.0
Manufacture of machine tools	600	2.9
Manufacture of office machinery/ computers	600	2.7
Manufacture of medical/surgical equipment nec	600	2.7
Manufacture of machinery for production of mechanical power	600	2.6
Manufacture of electronic valves etc	500	2.2
Manufacture of optical instruments etc	500	2.2
Manufacture of lighting equipment etc	400	2.0
Manufacture of TV/radio transmitters etc	300	1.5
Manufacture of TV/radio receivers etc	300	1.2
Manufacture of cutlery, tools etc	200	0.8
Other minor sub-sectors	6,100	28.4

Source: ONS Annual Business Inquiry, 2002. Note: Figures do not include the self-employed. Numbers have been rounded.

Figure 2.3

Employment by sub-sector – Hertfordshire



Source: ONS Annual Business Inquiry, 2002
Note: Figures do not include the self-employed

3.0 The Current Workforce

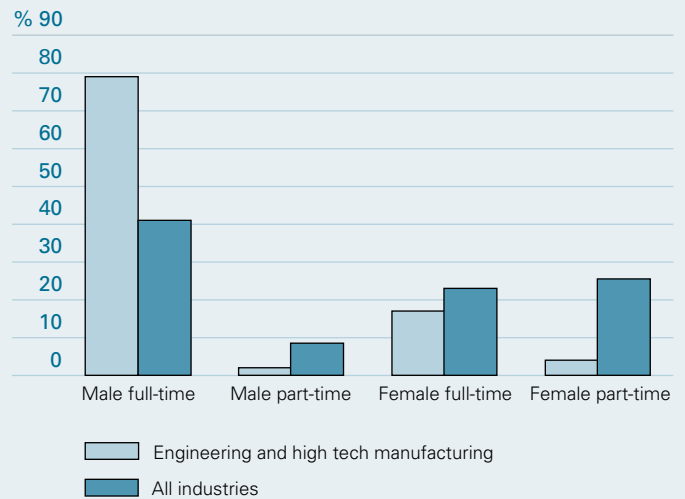
This section profiles the current workforce and typical employment opportunities in the sector. It also looks at the current supply and demand for skills in the engineering and high tech manufacturing sector.

Key messages

- The engineering and high tech manufacturing sector relies heavily on male, full-time employment.
- The sector possesses a workforce with an older age profile than is found in all industries within Hertfordshire.
- Around 90% of employment is in occupations that are not specific to the sector. The concentration of workers in these occupations suggests that cross-sector initiatives to support workforce development may be more appropriate for these occupations.
- Around 51% of the engineering and high tech manufacturing workforce possess intermediate level skills.
- Recruitment difficulties are as common in engineering and high tech manufacturing businesses in the East of England as in all industries in the region or in the sector nationally.
- Skills gaps are commonly reported by employers (26% of business establishments), particularly among process, plant and machine operatives (23% of skills gaps). Technical and practical skills are the most frequently cited skill gaps for workers in these occupations.
- Skills gaps are having a significant impact on employers in the sector. Increased operating costs are the most often cited consequence. Delays in developing new products or services are also reported relatively frequently.
- Process plant and machine operatives are a key occupation to target within the sector for skills development programmes. This might lend itself to targeting for the Level 2 entitlement or basic skills.

Figure 3.1

Gender and employment status



Source: ONS Annual Business Inquiry, 2002
Note: Figures do not include the self-employed

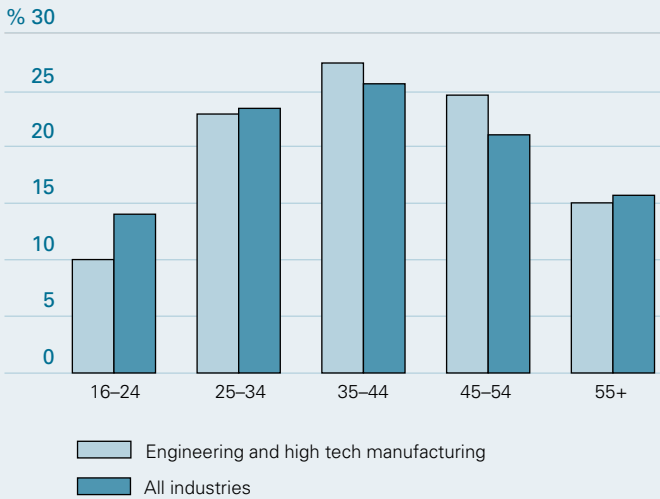
Figure 3.2

Gender and employment status of engineering and high tech manufacturing workers – district areas

	Male full-time (%)	Male part-time (%)	Female full-time (%)	Female part-time (%)
Broxbourne	79	1	15	5
Dacorum	81	<1	15	3
East Herts	76	1	17	6
Hertsmere	72	1	25	3
North Herts	78	1	17	4
St Albans	75	1	18	5
Stevenage	81	<1	16	2
Three Rivers	74	1	19	5
Watford	79	1	16	5
Welwyn Hatfield	79	1	16	4
Total	78	1	17	4

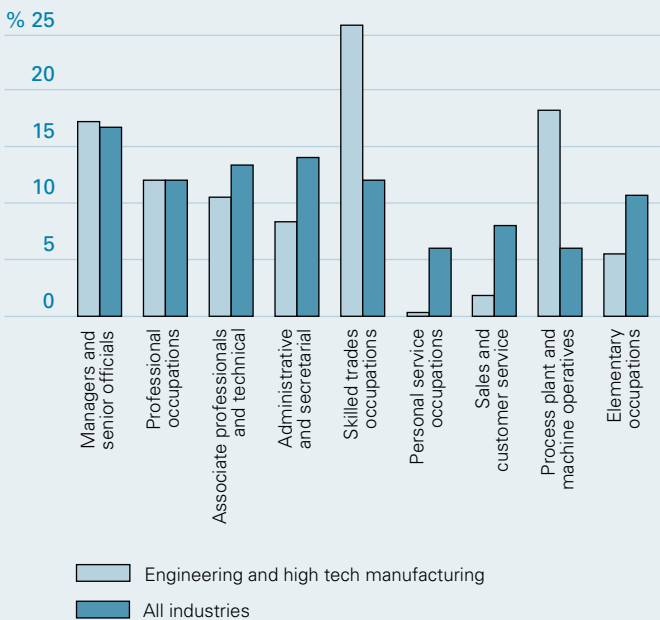
Source: ONS Annual Business Inquiry, 2002
Note: Figures do not include the self-employed

Figure 3.3
Age breakdown of the sector – Hertfordshire



Source: ONS Labour Force Survey, Spring 2003. Inferred data
Note: Figures include the self-employed

Figure 3.4
Broad occupational breakdown – Hertfordshire



Source: ONS Labour Force Survey, Spring 2003. Inferred data
Note: Figures include the self-employed

Demographics of the sector

The engineering and high tech manufacturing sector is heavily reliant on male labour. There are approximately 16,900 male employees in the sector within Hertfordshire, equal to around 79% of the workforce compared with 50% in all industries.

Around 20,300 engineering and high tech manufacturing employees (95%) work full-time compared with 66% for all industries. Approximately 82% of those employed on full-time contracts are men.

Figure 3.2 shows that the employment structure of the sector is broadly similar across each district. However, employees are more likely to be female in the Hertsmere area than in any other district. The reasons for this need further investigation, and are likely to be related to individual local employers.

At a national level, employees from ethnic minority communities account for around 9% of employment in the sector, compared with 15% for all industries. Census 2001 data reveals that there is a smaller proportion of people from ethnic minority backgrounds in Hertfordshire than in England and Wales as a whole. We estimate that there are around 1,300 people from ethnic minority backgrounds working in the engineering and high tech manufacturing sector in Hertfordshire (around 6% of the sector workforce). This is a lower proportion than the average for all industries (9%).

Figure 3.3 suggests that the engineering and high tech manufacturing sector in Hertfordshire has a slightly older age profile than the average for all industries. More than two thirds of all workers in the sector are aged over 35 (67%), compared with around 63% in all industries. A fifth of those employed in the manufacture of metal products are aged over 55.

Despite no obvious ‘demographic time bomb’ in terms of numbers of employees, it is possible that more mature workers may have vital skills and knowledge that may be lost as they retire.

Occupational analysis

Figure 3.4 shows the broad occupational breakdown of employment in the sector. More than a quarter (26%) of all engineering and high tech manufacturing employment in Hertfordshire (5,700 jobs) is in skilled trade occupations. This is double the proportion for all industries (12%), as might be expected.

The 4,100 process, plant and machine operatives also account for a much higher proportion of workers than in the economy as a whole (18% compared with 7%).

Around 18% of the sector’s workforce works in managerial roles.

Figure 3.5**Employment in specialist occupations – engineering and high tech manufacturing**

Code	Occupation	% of sector employment	Estimated jobs in Herts
5221	Metal machine setters and setter-operators	3.6	800
5215	Welding trades	2.7	600
5213	Sheet metal workers	1.2	300
5222	Tool makers, tool fitters and markers-out	1.1	200
-	Other sector specific	1.0	200
-	Total sector specific	9.6	2,100

Source: ONS Labour Force Survey, Spring 2003. Inferred data.
Totals may not sum due to rounding
Note: Figures include the self-employed

Figure 3.6**Employment in other significant occupations in engineering and high tech manufacturing**

Code	Occupation	% of sector employment	Estimated jobs in Herts
1121	Production workers and maintenance managers	6.7	1,500
5223	Metal working production and maintenance fitters	5.9	1,300
8131	Assemblers (electrical products)	4.6	1,000
1132	Marketing and sales managers	4.1	900
5241	Electricians, electrical fitters	2.9	600
8125	Metal working machine operatives	2.9	600
2126	Design and development engineers	2.5	600
5249	Electrical and electronic engineers	2.5	600
4122	Accounts wages clerk, bookkeepers	2.4	500
2132	Software professionals	2.1	500
3542	Marketing representatives	1.8	400
8133	Routine inspectors and testers	1.7	400
8139	Assemblers and routine operatives	1.7	400
9149	Other goods handling and storage occupations	1.7	400
3113	Engineering technicians	1.6	400
1136	Information and communication technology managers	1.5	300
4150	General office assistance or clerks	1.5	300
8132	Assemblers (vehicle and metal goods)	1.4	300
9139	Labourers process and plant operations	1.4	300
2122	Mechanical engineers	1.3	300
4133	Stock control clerks	1.3	300
4215	Personal assistants and other secretaries	1.2	300
2124	Electronics engineers	1.1	200
2129	Engineering professionals	1.0	200
-	Other non-sector specific	33.3	7,500
-	Total non-sector specific	90.1	20,100

Source: ONS Labour Force Survey, Spring 2003. Inferred data.
Totals may not sum due to rounding
Note: Figures include the self-employed

Figure 3.5 shows that around 10% of employment in the engineering and high tech manufacturing sector is in "sector specific" occupations (approximately 2,100 jobs). These are occupations where over two thirds of total employment in the occupation occurs within the engineering and high tech manufacturing sector. The concentration of workers in these occupations would suggest that sector based initiatives would be most appropriate to develop the skills of these individuals.

Of these occupations, metal machining setters and setter operators make up the greatest proportion of the sector specific workforce, accounting for around 800 jobs (4% of total employment in the sector). Other significant "sector specific" occupations include welding trades (3% or 600 jobs) and sheet metal workers (1% or 300 jobs).

Figure 3.6 shows that 90% of engineering and high tech manufacturing employment in Hertfordshire is in occupations which are not specific to the sector. These occupations can also be found in sectors such as "low tech" manufacturing, warehousing, distribution and professional services to the manufacturing sector. Indeed, the outsourcing of functions is one reason why 'direct' manufacturing employment has seen such dramatic falls. Cross-sector initiatives to support workforce development may be more appropriate for many of these occupations (e.g. managers).

The large number of technical occupations in the sector, each employing only a few hundred workers in Hertfordshire may cause problems for employers as annual training demand for technical skills may be insufficient to support local provision.

Skills and qualification issues

The analysis of skills in this paper uses qualifications as a proxy measure for skill levels. Whilst this is not ideal, qualifications are the best measure available. Three broad skill levels are used:

Low skill (NVQ 1 or less including those with no qualifications). Common skills requirements for jobs at this level include basic literacy, numeracy and IT skills and a range of generic skills.

Intermediate skill (NVQ 2–3). Skill requirements in these occupations are often vocational or technical in nature. They

may also require higher level generic skills including analytical and problem solving abilities.

High skill (NVQ 4+). These skills are important in most managerial, professional and associate professional roles. They are sometimes technical in nature but usually require high level analytical, communication and people management skills.

The LSC Hertfordshire Annual Plan 2004–05 highlights that the working population of Hertfordshire overall has the highest skills levels within the East of England.

Figure 3.7 illustrates the importance of intermediate level skills to the engineering and high tech manufacturing sector, with over half (around 11,500 or 51%) of the workforce possessing skills at this level. Low level skills are less common than in all industries (22% compared with 25%). As an indication of the likely extent of basic skills issues, 10% have no qualifications, compared with 11% for all sectors.

Skills shortages and gaps

The National Employer Skills Survey (NESS) offers some insight into the sectors skills shortages (a lack of suitably skilled people in the labour market) and skills gaps (skills deficiencies in the existing workforce). It is important to note that the NESS does not include the self-employed or businesses with only one employee.

Skills shortages – recruitment difficulties

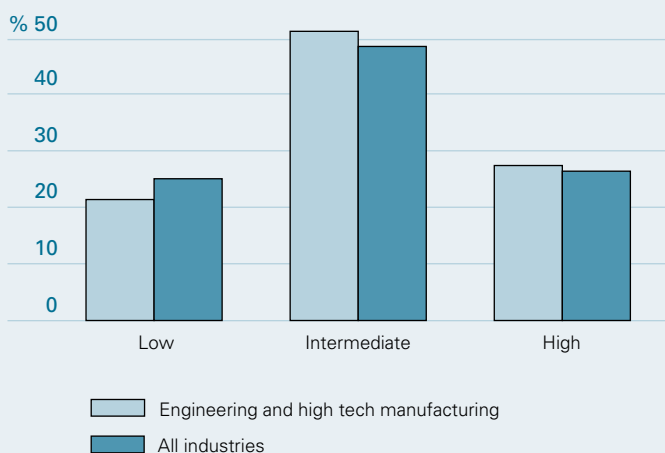
Figure 3.8 shows that vacancies are reported by similar proportions of employers in the engineering and high tech manufacturing sector in the East of England (17%, equal to around 240 establishments in Hertfordshire), those in all industries in the region (18%) and in the sector nationally (16%).

Skills gaps

However, the NESS also suggests that engineering and high tech manufacturing employers in the East of England have significant skills gaps in their existing workforce. Around 26% of engineering and high tech manufacturing employers in the East of England report skills gaps compared with 23% in all industries.

Figure 3.7

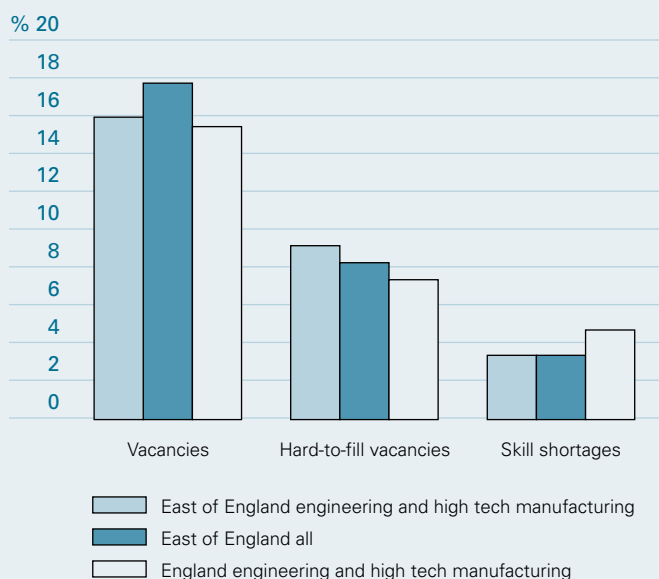
Skill levels – broad analysis – Hertfordshire



Source: ONS Labour Force Survey, Spring 2003. Inferred data
Note: Figures include the self-employed

Figure 3.8

Recruitment difficulties and skill shortages



Source: LSC National Employer Skills Survey, 2003. Inferred data.
Note: Figures do not include the self-employed or businesses with only one employee

Figure 3.9 shows that employers in the engineering and high tech manufacturing sector in the East of England were most likely to report increased operating costs as a consequence of skills gaps, with more than half (51%) stating that they had experienced this problem. Skills gaps in engineering and high tech manufacturing are significantly more likely to lead to delays developing new products or services than in all industries, with 45% of employers in the sector reporting this consequence, compared with 23% overall.

Engineering and high tech manufacturing employers are less likely than those in all industries to report that skills gaps lead to loss of business (19% compared with 25%), difficulties meeting customer service objectives (33% compared with 41%), or difficulties introducing new working practices (28% compared with 32%).

Figure 3.10 shows the incidence of skills gaps in the three largest occupational groups in the engineering and high tech manufacturing sector, compared with the proportion of the workforce found in each occupation.

Nearly a quarter of the skills gaps reported by employers in the engineering and high technology sector in the East of England relate to process plant and machine operative occupations. Skills gaps among workers in these occupations are more

common than might be expected from the proportion of the workforce employed (18%).

In contrast, skill gaps among managers and senior officials and skilled trade occupations are less commonly reported than might be expected – as these occupational groups account for 18% and 26% of employment in the sector respectively, but only 12% and 18% of reported skill gaps.

When asked about the skills that were lacking among process, plant and machine operatives who are not fully proficient in their role, employers were most likely to identify technical and practical skills (cited by 90% of employers with skills gaps for this occupation) and problem solving skills (85%) as the areas most in need of improvement. There are a number of potential initiatives that might be used to improve the skills and qualifications of these workers, including the Level 2 entitlement and basic skills provision.

The most common gap among skilled trades employees relates to problem solving skills (48%), whereas team working skills (73%) were most likely to be lacking among managers and senior officials. Identifying a funding source to tackle these generic skills issues is likely to be less straight-forward, should employers not see funding training in these areas as a priority.

Figure 3.9

Consequences of skills gaps – East of England

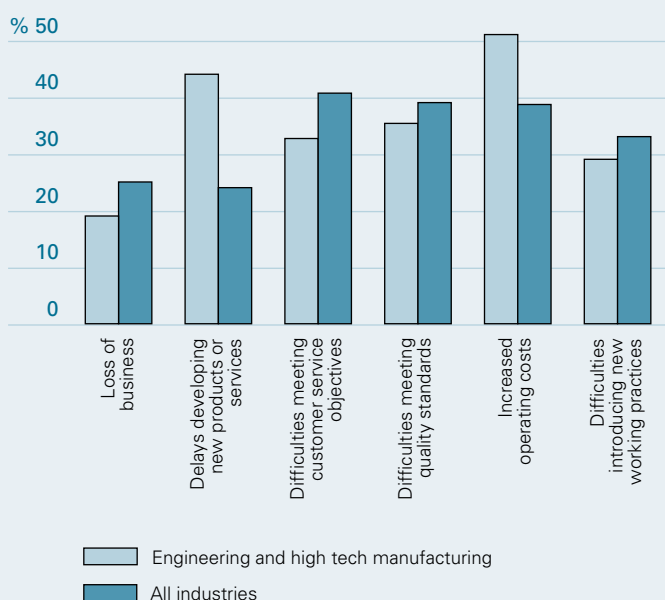


Figure 3.10

Proportion of skills gaps in key occupational groups – engineering and high tech manufacturing (East of England)

	Managers and senior officials	Skilled trades	Process, plant and machine operatives
% of workforce in occupation	18%	26%	18%
% of workforce with skills gap in occupation	12%	18%	23%

Source: LSC National Employer Skills Survey, 2003 and ONS Labour Force Survey, 2003.
Note: Figures do not include the self-employed or businesses with only one employee.

Source: LSC National Employer Skills Survey, 2003.
Note: Figures do not include the self-employed or businesses with only one employee

This section looks at the changing nature of employment in the sector, the sector's training activity and the implications for learning provision.

Key messages

- Employment in the engineering and high tech manufacturing sector in Hertfordshire declined significantly between 1998 and 2002 and is forecast to decline further between 2004 and 2010.
- Forecast employment change differs significantly between occupational groups within the sector with employment in skilled trade occupations forecast to decline the most with a loss of around 900 jobs.
- However, despite the forecast decline in employment levels there will still be an annual demand for new staff within the sector.
- Our best estimate is that the high level of replacement demand is likely to result in a requirement for approximately 500 new entrants to employment per year across all levels, with a further 1,200 moving in from other related sectors (not all of these will require training). The requirement would be lower if staff turnover could be reduced.
- Staff turnover is a significant issue for the engineering and high tech manufacturing sector. Around 11% of the workforce changes each year.
- Levels of job-related training in the sector are lower than the average for all industries for workers at all skill levels.

Employment in engineering and high tech manufacturing was at a lower level in 2002 than in 1998, with an overall decrease of around 26% (7,500 jobs) during this period. However, this figure masks an increase in employment between 1999 and 2001 of 9% (2,000 jobs). The large decreases in employment are likely to be linked to overcapacity in the sector globally, the impact of the high value of sterling and/or greater productivity and efficiency in the sector. There were also closures of notable local employers, such as Daewoo.

Figure 4.2 shows that employment change in the engineering and high tech manufacturing sector in Hertfordshire between 1998 and 2002 varied significantly between sectors. The greatest decline occurred in the manufacture of office machinery and computers sub-sector (65%). The manufacture of radio, television and communications equipment and the manufacture of medical precision instruments sub-sectors also experienced significant declines in employment levels over this period (47% and 34% respectively).

Figure 4.1

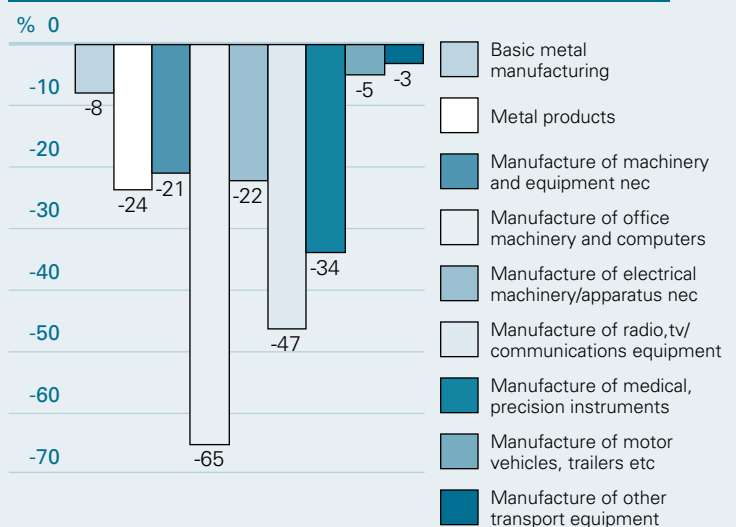
Annual employment change 1998–2002 – Hertfordshire

	1998	1999	2000	2001	2002
Employment	28,814	23,332	24,293	25,338	21,331
% change from previous year	-	-19%	+4.1%	+4.3%	-15.8%

Source: ONS Annual Business Inquiry 1998, 2002
 Note: Figures do not include the self-employed

Figure 4.2

Employment change 1998–2002 by sub-sector – Hertfordshire



Source: ONS Annual Business Inquiry 1998, 2002, percentages
 Note: Figures do not include the self-employed

VAT registrations and de-registrations

VAT registrations and de-registrations also give an indication of sector growth and decline. Figure 4.3 shows VAT registrations and de-registrations as a percentage of business stocks at the end of the year.

[N.B: The data in Figure 4.3 relating to VAT registrations and de-registrations in 2002, has been gathered from NOMIS. The statistics only allow for analysis of 'manufacturing' and not the sector as we have defined it. Therefore, the following statistics can only provide a broad idea about what is and has been happening in the engineering and high tech manufacturing sector.]

Both VAT registrations and de-registrations are lower for the manufacturing sector than the average for all industries in Hertfordshire. De-registrations account for a larger proportion of business stocks (9%) than registrations (6%). This suggests that the net stock of businesses declined between 2001 and 2002.

However, it should be noted that VAT registrations and de-registrations provide only an indication of what is going on in the sector. As well as businesses opening or closing down, the measures also include firms moving above or below the threshold for payment of VAT, currently £58,000 p.a. The measures do not take account of businesses below the VAT threshold so very small businesses are not included.

Projected employment change

The Experian Business Strategies (EBS) forecasting model shows that between 2004 and 2010 engineering and manufacturing employment in Hertfordshire is expected to decrease by around 14%. Applying this figure to ABI/LFS data for the engineering and high tech manufacturing sector this equates to around a further 3,800 jobs that could be lost.

Figure 4.4 shows that the sector is set to see continuous

annual decline in employment until 2010. One of the underlying reasons for the forecast is that productivity growth is expected to be stronger than output growth, which means that fewer employees will be needed.

Figure 4.5 shows that the majority of occupations in the engineering and high tech manufacturing sector are expected to see a decline in employment between 2004 and 2010. The greatest decline is forecast for skilled trades and elementary occupations. Employment in both occupations is expected to decrease by 15%.

However, because relatively few people are employed in elementary occupations in the sector, the expected decline in skilled trade employment is more significant – with skilled trades accounting for the largest numerical decline in employment (around 900 jobs).

Employment flows

While projections suggest that there will be a decline in the number of engineering and high tech manufacturing jobs in the East of England, the majority of annual demand for new staff in any sector is to address natural turnover in the labour market, where people leave their current job through retirement, sickness and job changes, for example.

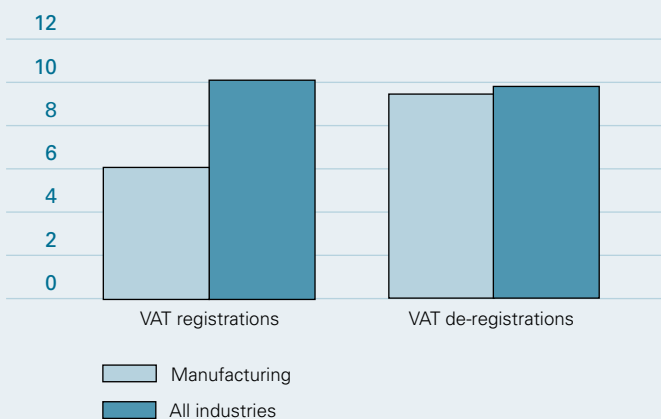
Around 11% of the engineering and high tech manufacturing workforce changes each year. This does not include people moving between jobs or sub-sectors within the sector. Therefore the turnover experienced by an individual business may be higher.

Half of those leaving engineering and high tech manufacturing jobs in the East of England changed sectors, whilst a further 42% left due to unemployment or factors such as sickness or family commitments.

A significant proportion of those joining the sector come from another sector (53%), whilst only 15% join from full-time

Figure 4.3

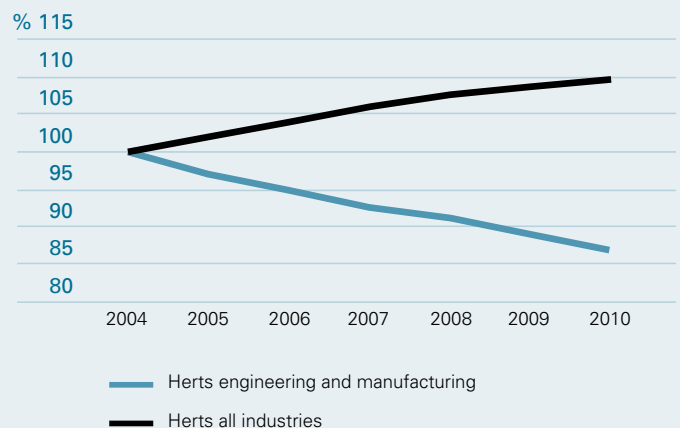
VAT registrations and de-registrations 2001–2002 – Hertfordshire



Source: NOMIS, VAT registrations/de-registrations by industry, 2002

Figure 4.4

Forecast employment in engineering and high tech manufacturing 2004–2010



Source: Experian Business Strategies Forecasting Model, 2003.
Note: Figures include the self-employed

Figure 4.5**Forecasted employment change by occupation 2004–2010 – engineering and high tech manufacturing (Hertfordshire)**

Occupation (model categories)	% change in employment 2004–2010	Est engineering and manufacturing jobs in Herts
Managers and senior officials	-4%	-160
Professionals	-11%	-298
Associate professional and technical	-7%	-168
Administrative and secretarial occupations	-8%	-149
Skilled trades occupations	-15%	-860
Personal service occupations	0%	-
Sales and customer service occupations	4%	+14
Process, plant and machine operatives	-13%	-532
Elementary occupations	-15%	-181

Source: Experian Business Strategies Forecasting Model 2003.
Note: Figures include the self-employed.

education. Some of those joining from other sectors will require training in new skills.

Our best estimate is that the high level of replacement demand is likely to result in a requirement for approximately 500 new entrants to employment per year across all levels, with a further 1,200 moving in from other related sectors (not all of these will require training). This would be lower if staff turnover could be reduced.

Newly qualified staff

In 2003, around 310 workers joined the Hertfordshire engineering and high tech manufacturing sector from full-time education. However, across the four colleges in Hertfordshire, around 1,200 individual learners signed up for engineering and manufacturing related courses in 2002/3. This suggests that these courses may be providing skills for a broader range of sectors.

The broad types of engineering and high tech manufacturing related courses available from Hertfordshire further education providers is outlined in Figure 4.7. Around 30% of enrolments in this area are for electrical and electronic engineering and around 29% are for mechanical, aeronautical and general engineering courses.

Around 44 people completed or left engineering, technology and manufacturing Work Based Learning (WBL) programmes in 2003–2004, all of which were undertaking Advanced Apprenticeships. However, the level of achievement of qualifications on these programmes is relatively poor and improvements need to be made if this is to become a significant route for new entrants to the workforce.

Recent announcements² on the development of

² DfES Press Release 10 May 2004. 'New Apprenticeships will widen opportunity and boost business – Clarke'

Figure 4.6**Inflow and outflow 2002/3 – engineering and high tech manufacturing**

Inflow	%
Full-time education	15%
Changed sector	53%
Unemployment	16%
Other out of work (including family commitments etc.)	15%
Outflow	
Retirements	8%
Changed sector	50%
Unemployment	21%
Other out of work (including sickness, maternity etc.)	21%

Source: ONS Labour Force Survey, 2003. Inferred data.
Note: Figures include the self-employed

Figure 4.7**FE engineering and high tech manufacturing provision – programme area**

Sub-programme area	% of enrolments
Manufacturing	8%
Mechanical, aeronautical and general engineering	29%
Electrical and electronic engineering	30%
Marine technology and transport	19%
Materials technology	2%
Other engineering	13%
Total engineering and high tech manufacturing related enrolments	100%

Source: LSC – Hertfordshire. Individualised Learner Records

Apprenticeships could increase the importance of this route into the sector and include proposals to:

- Introduce 'Young Apprenticeships' to give more young people 'tasters' of vocational work and learning
- Extend the programme to offer more places to those aged over 25
- Improve the portability of programmes between employers.

Training levels in the current workforce

The proportion of the workforce reporting that they had undertaken job-related training in the last three months is lower for engineering and high tech manufacturing than for all industries (22% compared with 27%).

Figure 4.8 shows that job related training is less common in engineering and high tech manufacturing at all skill levels. For example, around 30% of workers in the sector with high level skills had undertaken job related training, compared with 39% of high skilled workers in all industries.

Figure 4.9 shows that around 62% of the engineering and high tech manufacturing employers in Hertfordshire questioned as part of the 2003 National Employers Skills Survey (NESS), had funded or arranged training for some of their employees in the past 12 months, a higher level than in all industries (57%). However, the proportion of employers who had arranged training leading to a formal qualification was lower for the sector (42% compared with 52%).

Employers in the engineering and high tech manufacturing sector are most likely to fund or arrange health and safety training (86%), job specific training (85%), or training in new technology (76%).

The most commonly reported barriers to developing and maintaining a skilled workforce are a lack of time for training

(reported by 53% of engineering and high tech manufacturing employers), lack of cover for training (45%), and a lack of funding for training (44%).

Engaging SMEs in learning

Given the importance of small and micro-businesses in the engineering and high tech manufacturing sector, encouraging employers to train their staff is a key challenge. Encouraging SMEs to engage in workforce development is one of the priorities of Hertfordshire Business Link.

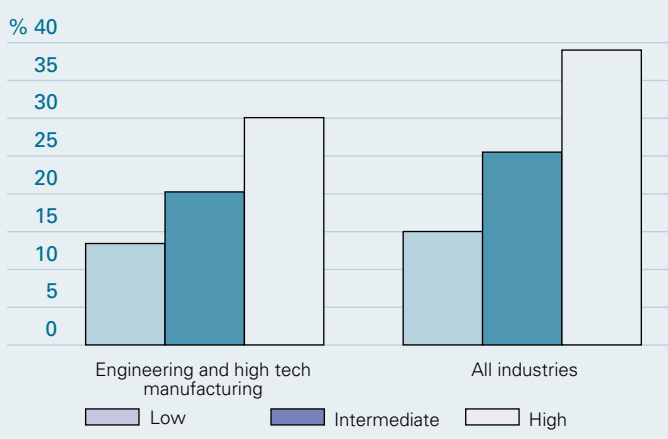
Business Link data suggests that in 2003/04, some 733 visits had been made to engineering and high tech manufacturing establishments by business advisors, the majority of which were to businesses with between 10 and 49 employees (48%) and micro-businesses (30%).

However, relatively few engineering and high tech manufacturing employers have committed themselves to Investors in People (IiP). IiP is a national quality standard that sets out a level of good practice for the training and development of people to improve business performance. Data supplied by Business Link reveals that only two engineering and high tech manufacturing establishments in Hertfordshire gained IiP recognition in 2003/04 but 24 were working towards the standard.

Interestingly, whilst one of the criticisms of the IiP programme in the past has been that it is more tailored to large organisations, 22 of the 24 engineering and high tech manufacturing employers currently working towards the standard employ fewer than 50 people.

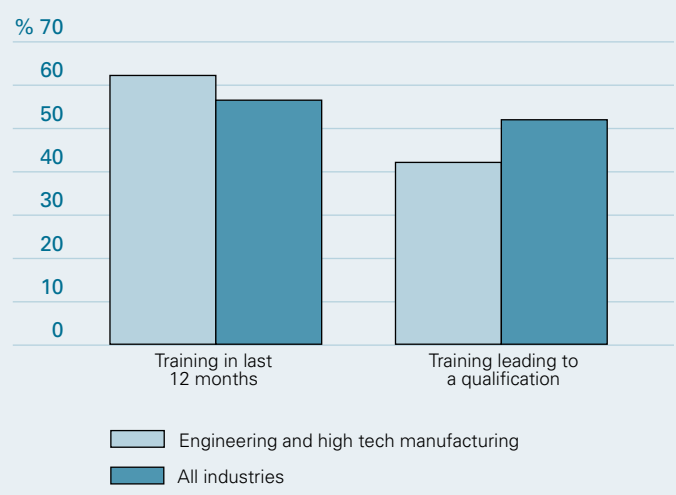
This may be because Business Link in Hertfordshire has been particularly successful in targeting these firms in attempting to hit its Small Firms Initiative (SFI) targets. The next question is how to build upon this success.

Figure 4.8
Those undertaking job-related training in the past 13 weeks – Hertfordshire



Source: ONS Labour Force Survey, Spring 2003. Inferred data.
Note: Figures include the self-employed

Figure 4.9
Establishment has funded job-related training in past 12 months – Hertfordshire



Source: LSC National Employer Skills Survey, 2003.
Note: Figures do not include the self-employed or businesses with only one employee

This section looks at the learning and skills representative bodies active in the engineering and high tech manufacturing sector, their activities and their plans for the development of the sector. It also sets out the key issues and skills concerns for the sector that they have identified and the efforts they are making to try to address these issues.

Key messages

- Improved training infrastructure and possible qualification reforms may play a significant role in increasing training and skills levels within the sector in the longer term.
- The Manufacturing Strategy and Action Plan for the East of England identifies key issues for the sector as:
 - Improved skills levels across the workforce, including 'generic' skills.
 - Improved management and supervisory skills.
 - Activities being driven at national level yet to make a significant impact.
 - The strategy also highlights a trend towards the need for higher level engineering/technical skills and a decline in the traditional craft/operator skills.
- The image of the sector, combined with the 'pull' factor of the expansion of HE, has had a negative impact on the number of young people choosing to enter the sector.

Workforce development – national

In April 2003, the Secretary of State for Education and Skills, Charles Clarke awarded the licence for a new Sector Skills Council (SSC) for the science, engineering and manufacturing industries. Known as SEMTA (Science, Engineering and Manufacturing Technology Alliance) the SSC represents the sectors of aerospace, electrical engineering, electronics, mechanical engineering and metal trades, motor vehicles, ship building, biotechnology, nanotechnology, mathematics and forensic science.

The main workforce development issues and priorities for action highlighted by SEMTA's predecessor and founding partner (EMTA) are set out in Figure 5.1.

SEMTA has been chosen as one of the first "pathfinder" Sector Skills Councils to develop Sector Skills Agreements (SSAs). These agreements are designed to allow employers in a sector to identify their skills needs and work with training and education providers and other stakeholders, such as LSCs, to meet these needs. As SEMTA's remit is so diverse, it is currently developing a number of SSAs to cover different parts of the sector including aerospace, automotive and electronics. However, skills needs relevant to the engineering sector as a whole have also been identified³. These are:

- Risk management
- Exploitation of new product development
- Supply chain management
- Lean manufacturing
- Business understanding
- Project management
- Knowledge management
- Generic skills
- Systems thinking
- Teamwork
- High level engineering skills

Workforce development – regional

The Regional Economic Strategy – 'East of England 2010: prosperity and opportunity for all' (forthcoming) proposes support for business to be targeted at 9 industry sectors and 13 business clusters considered central to the prosperity of the region. High technology features as one of the 9 key sectors and in a number of relevant clusters including: biotechnology and ICT; manufacture of medical equipment; motor sport manufacture and aerospace.

³ Electronics – Sector Skills Agreement: Stage 1, SEMTA, 2004.

Figure 5.1

Workforce development issues and priorities for action

Key issues

- Image problem of engineering in the UK – often misperceived as low skilled and male only.
- Careers advice and guidance – promotion of further and higher education has stifled the supply of young people in work based learning.
- Poor output from the education system – concerns over standards of maths proficiency and lack of technical expertise.
- Length and cost of engineering training imposes a requirement to plan 4–5 years ahead of fast moving trends.
- Poor facilities for engineering training.
- Engaging significant numbers of SMEs that do not offer training.
- Need for a unitised credit based qualification framework.
- Skills gaps and shortages.
- Retention of skilled staff.

Priorities for action

- Attracting more people.
- Review of the qualifications framework.
- Developing the adult workforce.

In response to a report entitled 'Manufacturing Industry in the Eastern Region: An Analysis of Support, Needs and Provision' produced on behalf of EEDA, a Regional Centre for Manufacturing Excellence has been established. The centre will work to raise productivity levels through the provision of specialist manufacturing advice as well as audits of operations and active engagement with manufacturing companies.

The Manufacturing Strategy and Action Plan for the East of England identifies key issues for the sector as:

- Improved skills levels across the workforce, including 'generic' skills
- Improved management and supervisory skills
- Activities being driven at national level yet to make a significant impact.

The strategy also highlights a trend towards the need for higher level engineering/technical skills and a decline in the traditional craft and operator skills. This should be reflected in the balance of advanced apprenticeships being offered. SEMTA is currently leading a pilot which the strategy suggests could form a part of the future Apprenticeship offer to the sector.

The East of England is supporting the government's manufacturing strategy, in particular against the seven pillars shown in Figure 5.2.

Furthermore the Manufacturing in the East of England Regional Strategy and Action Plan (draft) identifies a number of strategic objectives to help improve the competitiveness of the manufacturing sector in the region (also shown in Figure 5.2).

Figure 5.2

The seven pillars of government manufacturing strategy and the East of England strategic objectives

Government manufacturing strategy pillars

- 1 Macroeconomic Stability
- 2 Investment
- 3 Science and Innovation
- 4 Best Practice
- 5 Raising Skills and Education Levels
- 6 Modern Infrastructure
- 7 The Right Market Framework

East of England strategic objectives

- Encourage greater investment in workforce development to strengthen the sectors skills base
- Stimulate greater awareness and application of innovation across all areas of business operations
- Increase productivity levels to create greater added value and improve competitive performance
- Stimulate higher levels of manufacturing investment
- Strengthen supply chain linkages across the region and build the capacity of the local supplier base
- Improve the sector image, particularly among young people of school age and labour market entrants, to enhance prospects for career development
- Improve further the sector's international trade performance

Source: Manufacturing in the East of England Regional Strategy and Action Plan (draft), KCG, on behalf of EEDA, Manufacturing East and others, October 2004.

This section sets out the workforce development priorities for the engineering and high tech manufacturing sector in Hertfordshire. It explores what is currently being done to address these priorities and what opportunities there may be for further action.

Skills gaps have been identified as an important issue in the engineering and high tech manufacturing sector, especially at Level 2. Therefore, there is a need to attract able young people to the sector and to build on the skills of the existing workforce, in particular the 4,900 workers (22%) who are not qualified to Level 2. In order to tackle skills gaps there will be a need for relevant, up-to-date training for both new entrants and existing workers.

This paper suggests there are three workforce development priorities for the engineering and high tech manufacturing sector in Hertfordshire. All require the active involvement of employers and those providing learning relevant to the sector and initiatives such as Sector Skills Agreements could have an important role to play here.

1. Improve the sector's image and attract young people of both genders to the sector

In Section 3, it was demonstrated that the current workforce in the sector is predominantly male and that a fifth of those employed in the manufacture of metal products are aged over 55.

In addition, Section 4 showed that levels of staff turnover within the sector generate a demand for new entrants to replace workers leaving the sector.

Policy responses could consider initiatives focused on young people aimed at:

- expanding the availability and quality of work experience within the sector
- enhancing the information on prospects in the sector available within careers guidance
- enhancing the resources and support available to science and mathematics teachers to support their efforts to make lessons interesting and relevant.

The development of the 14–19 Agenda, which gives students under the age of 16 the chance to study vocational options, offers an important opportunity here. However, there will be a need to ensure that the vocational routes on offer meet the needs of the sector and that students are aware of the options and prospects available to them.

In order to respond to the changing nature of the sector, there will be an increased need for workers with higher level engineering or technical skills, rather than traditional craft and operative skills. Addressing this issue successfully will require suitable Advanced Apprenticeship provision in these areas and attracting young people with the ability and aptitude to follow programmes at this level.

LSC Hertfordshire should seek to engage with SEMTA in its efforts to investigate and develop appropriate future apprenticeship offer for the sector.

Local employers have a clear role to play in addressing this issue and the LSC should seek to ensure that there is a strong local employer association or sector group for engineering and high tech manufacturing in Hertfordshire to help develop resources and direct learning providers to appropriate businesses. There is a risk that without such guidance, initiatives will simply increase demands on 'familiar faces', i.e. the handful of medium to large employers that have close working relationships with colleges and learning providers. As this is a strategic objective outlined in the Manufacturing in the East of England Regional Strategy and Action Plan, employers and stakeholders in Hertfordshire should seek to work with regional partners to try to address these issues.

2. Ensure the sustainability of provision when faced with projected falls in employment

In Section 4 we saw that overall employment in the engineering and high tech manufacturing sector has fallen in recent years and is forecast to continue to decline for some time.

There is a risk that if employment in the sector continues to fall, demand for training in more specialised sectors and occupations may become increasingly fragmented in Hertfordshire. The LSC could undertake a strategic review of which colleges are providing what training, with the aim of ensuring that a 'critical mass' of provision can be maintained to support the sector. Falling employment rates in the sector could lead to colleges struggling to make minimum enrolment levels on some courses. However, it is possible that sufficient demand may still exist at a county or regional level that could be met by collaborative provision.

Whilst the distance learners are willing to travel may be a limiting factor in collaborative provision for new entrants, the LSC and training providers could seek to explore support for student travel to study and/or mobile provision.

It also seems likely that retaining a critical mass of demand in order to support ongoing professional development for technical posts in the sector will be an issue in the future. The LSC could seek to encourage alliances between companies in the sector to jointly plan and purchase provision.

For example, Portsmouth Engineering Training Association (now known as PETA Ltd) was founded in 1970 by the managing

director of Sealectro Ltd. Together with five other companies he based the Association in Southsea. The combined vision of this group of companies was to establish an organisation, controlled by local business, that would be free from external influences to concentrate on the training and development of people employed in local industry and commerce. The motto of the company is "set-up by companies for companies" – this still remains the case, although the membership of the Association has widened.

Alternatively, leading companies could be approached to open up their training to other local companies. An example of this is Walkers Crisps in Peterlee, which has opened up their training facilities (with the aid of grants) to local communities.

3. Ensure that qualifications and course content reflect changing skill needs within the sector

Many jobs in the sector, especially in process, plant and machine operative roles, are highly sector specific, requiring appropriate qualifications and training. Employers are particularly looking for technical and practical skills combined with problem solving.

Section 5 summarised the policy context. SEMTA has argued that it would support a move towards a unit based credit framework for qualifications, so that training can be more effectively tailored to meet the needs of employers. In the interim, LSC Hertfordshire should seek to work with partners to ensure that employers from the sector have a real input into course design, and that providers are empowered and enabled to respond to employer demand. It will be vital to ensure that available provision meets the needs of employers as identified in the Sector Skills Agreements for the sector.

On a day-to-day level this will also require tutors and trainers to have up-to-date knowledge and experience of the technology and working practices used in the sector. Continued falls in engineering and high tech manufacturing employment, especially in certain specialised sub-sectors, could further exacerbate existing problems with respect to the shortage of suitable individuals from industry available to act as trainers.

Increasingly, addressing this issue may require individual learning providers to develop links with employers across a larger geographical area. Once again this would be made easier by strong employer representative groups for the engineering and high tech manufacturing sectors in Hertfordshire and East of England.

Annex 1. Sector Description

Engineering and high tech manufacturing: SIC92 definition

- 27 Manufacture of basic metals**
- 28 Manufacture of fabricated metal products**
- 29 Manufacture of machinery and equipment**
- 30 Manufacture of office machinery and computers**
- 31 Manufacture of electrical machinery and apparatus**

- 32 Manufacture of radio, television and communications equipment**
- 33 Manufacture of medical and precision instruments**
- 34 Manufacture of motor vehicles, trailers etc**
- 35 Manufacture of other transport equipment**

Occupational job roles, SOC 2000 (9 key engineering and high tech manufacturing roles)

5215 Welding trades

Welding trades workers join metal parts by welding, brazing and soldering, and cut and remove defects from metal using a variety of equipment and techniques.

Entrants typically possess GCSEs/S grades or an appropriate GNVQ/GSVQ. Training is typically by apprenticeship incorporating practical experience and technical training. NVQs/SVQs are available at Levels 1, 2 and 3. Apprenticeships are available at NVQ/SVQ Level 3. To gain employment, welders must pass a Welder Approval Test to demonstrate the required skills.

Tasks

- selects appropriate welding equipment such as electric arc, gas torch, etc.;
- connects wires to power supply, or hoses to oxygen, acetylene, argon, carbon dioxide, electric arc, or other source and adjusts controls to regulate gas pressure and rate of flow;
- cleans and smooths weld.

5221 Metal machining setters and setter operators

Workers in this unit group operate machines to drill, bore, grind, cut, and mill or to otherwise shape metal workpieces.

There are no formal academic requirements although some employers may require GCSEs/S grades. Training is usually received on-the-job. NVQs/SVQs at Level 2 are available.

Tasks

- examines drawings and specifications to determine appropriate method, sequence of operations and machine setting;
- selects and fixes work-holding devices and appropriate cutting, shaping, grinding and/or forming tools;
- sets machine controls for rotation speeds, depth of cut and stroke, and adjusts machine table, stops and guides;
- operates automatic or manual controls to feed tool to workpiece or vice versa and checks accuracy of machining.

5222 Tool makers, tool fitters and markers-out

Tool makers, tool fitters and markers-out mark out metal for machining and fit, assemble and repair machine and press tools, dies, jigs, fixtures and other tools.

There are no formal academic requirements although some employers may require GCSEs/S grades. Training is usually received on-the-job. NVQs/SVQs at Level 2 are available.

Tasks

- examines drawings and specifications to determine appropriate method and sequence of operations;
- marks out reference points using measuring instruments and tools such as punches, rules and squares;
- operates hand and machine tools to shape workpieces to specifications and checks accuracy of machining.

5213 Sheet metal workers

Sheet metal workers mark out, cut, shape and join sheet metal using hand or machine tools, to make and repair sheet metal products and components (excluding vehicle bodywork).

Entrants typically possess GCSEs/S grades. Training is usually via apprenticeship including practical experience and technical training. Apprenticeships in Engineering Materials Processing, Engineering Assembly and Engineering Construction are available at NVQ/SVQ Level 3.

Tasks

- examines drawings and specifications to assess job requirements;
- uses template, measuring instruments and tools to mark out layout lines and reference points;
- uses hand or machine tools to bend, roll, fold, press or beat cut sheet metal;
- assembles prepared parts and joins them by bolting, welding or soldering;
- finishes product by grinding, filing, cleaning and polishing.

5223 Metal working production and maintenance fitters

Metal working production and maintenance fitters erect, install and repair electrical and mechanical plant and industrial machinery, fit and assemble parts and sub-assemblies in the manufacture of metal products and test and adjust new motor vehicles and engines.

Entrants usually possess GCSEs/S grades, a GNVQ/GSVQ or a BTEC/SQA award. Apprenticeships in Engineering Maintenance at NVQ/SVQ Level 3 are available. NVQs/SVQs in Aircraft Engineering Maintenance are available at Level 3. Further professional qualifications are required to become a licensed aircraft engineer.

Tasks

- examines drawings and specifications to determine appropriate methods and sequence of operations;
- examines operation of, and makes adjustments to, internal combustion and jet engines and motor vehicles.

8131 Assemblers (electrical products)

Workers in this unit group wire up prepared parts and/or sub-assemblies in the manufacture of electrical and electronic equipment, make coils and wiring harnesses and assemble previously prepared parts in the batch or mass production of electrical and electronic goods and components.

There are no formal academic entry requirements. Training is typically provided on-the-job, supplemented by short courses. NVQs/SVQs in Electronic Product Assembly are available at Level 1.

Tasks

- examines drawings, specifications and wiring diagrams to identify appropriate materials and sequence of operations;
- selects, cuts and connects wire to appropriate terminals by crimping or soldering.

8125 Metal working machine operatives

Metal working machine operatives operate machines to cut, shape, abrade and otherwise machine metal, use hand and power tools to remove surplus metal and rough surfaces from castings, forgings or other metal parts, and clean, smooth and polish metal workpieces.

There are no formal academic entry requirements. Training is typically received on-the-job. NVQs/SVQs in Engineering Machining are available at Level 1.

Tasks

- secures workpiece in drilling, boring, milling, planing, grinding, lapping, honing, electrochemical, or other shaping machines, or loads metal stock on to press;
- sets controls, starts machine and operates controls to feed tool to workpiece or vice versa and repositions workpiece during machining as required;
- withdraws workpiece and examines accuracy using measuring instruments.

1121 Production, works and maintenance managers

Production, works and maintenance managers plan, organise, direct and co-ordinate the activities and resources necessary for production in manufacturing industries and the maintenance of engineering items, equipment and machinery.

There are no pre-set entry standards. Entry is possible with either a degree or equivalent qualification, relevant experience or without academic qualifications. On-the-job training is provided and professional qualifications are available.

Tasks

- liaises with other managers to plan overall production activity and daily manufacturing and maintenance activity;
- manages production to ensure that orders are completed to an agreed date and conform to customer and other requirements;
- monitors production and production costs and undertakes or arranges for the preparation of reports and records.

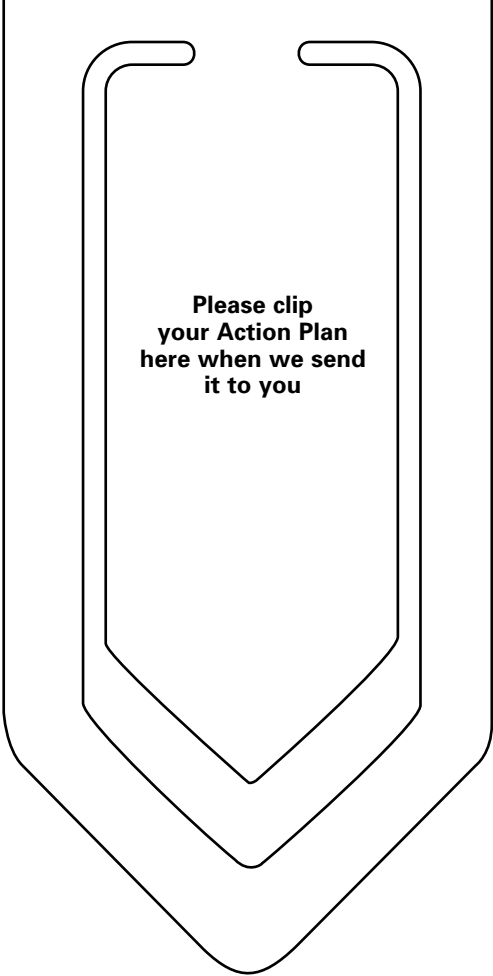
2126 Design and development engineers

Design and development engineers conceive engineering designs from product ideas or requirements in mechanical, electrical and electronic engineering.

Design and development engineers usually possess an accredited university degree. After qualifying, periods of appropriate training and experience are required before membership of a chartered engineering institution. Incorporated engineers possess an accredited university degree, BTEC/SQA award or an Apprenticeship leading to an NVQ/SVQ at Level 4. All routes are followed by periods of appropriate training and relevant experience.

Tasks

- assesses product requirements, including costs, manufacturing feasibility and market requirements;
- arranges construction and testing of model or prototype and modifies design if necessary.



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Action⁴skills

Targeting the sectors
vital to Hertfordshire's
economy

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