DEVELOPING EXCELLENCE IN MEDICAL TECHNOLOGIES

SURVEY AND CASE STUDY FOR THE UNITED KINGDOM

A report prepared for
Advantage West Midlands

by

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1. Introduction

1.1 The report

This report provides evidence from a survey of 100 companies operating in the medical technologies cluster in the West Midlands, alongside six case studies of particular companies. In addition, there is also a survey of employers in Scotland and six case studies of companies. The aim of the case studies is to yield further insights into the findings obtained from the survey.

The purpose of the survey and case studies is to:

- provide information about the characteristics of companies in the West Midlands medical technology cluster;
- analyse the product market positions of these organisations; and
- assess the skill needs that derive from the respective product market positions.

The study adopts the same analytical approach as that adopted in the national Employers Skill Surveys – first started in response to the National Skills Task Force - in differentiating between external recruitment problems (*i.e.* where companies look to the external labour market to obtain the skills they require) and internal skill gaps (*i.e.* where companies report a gap between skills extant in the workplace and those required to meet its product market strategy).

The study also follows the approach established in the Employers Skill Surveys in recognising that the demand for skill is a derived demand from the product market strategy adopted by organisations. Hence the emphasis in the study to assessing product market strategy.

1.2 The survey

This report provides information from a survey of organisations that comprise part of the West Midland's medical technologies cluster. The aim was to include companies not only classified as being medical device manufacturers according to the Standard Industrial Classification (SIC) but also those that produced some medical technology products or services even if these were not the primary output of the organisation.

The sample source for the survey was obtained from four sources:

i. Medilink West Midlands database – where companies contacted by Medilink WM agreed to participate in the survey;
ii. A database of medical technology companies in Coventry and Warwickshire supplied by the Learning and Skills Council;
iii. Kompass database – a large national database of establishments employing 10 or more employees classified by type of product;
iv. Yell database (formerly BT Connections in Business).

1.3 Details of the sample source

The sample for the survey of companies in the medical technologies cluster was obtained from three sources:

i. the Medilink West Midlands database of companies;
ii. the Kompass database;
iii. the Yell database.

The Medilink database offered a good potential source of known medical technology businesses (of all sizes) operating in the West Midlands. In the event, only 18 Medilink members 'opted in' to the survey. The LSC list of medical technology companies contained 138 businesses but some of these were duplicates of businesses also identified

by Medilink. The LSC list was also restricted in coverage to the Coventry and Warwickshire area. Since the number of medical technology businesses that could be identified directly was thus so limited, steps were taken to identify such businesses indirectly from other sources. The two main sources were Kompass and Yell.

The Kompass database lists businesses by their type of activity (which is classified in great detail). Two approaches to identifying medical technology businesses were used. The first selected those businesses that reported production of core medical products such as 'medical and surgical instruments', 'equipment and instruments for medical laboratories', 'medical and surgical equipment', 'ophthalmic equipment', 'dental equipment and instruments' and so forth. Kompass reported a total of 76 business producing in these the 10 core product areas. The second approach involved a search of the Kompass database using a wide range of product and service descriptions related to medical activity. This covered a much wider range of activities, such as production of beds for hospitals, surgical waste disposal units, air conditioning and filtration systems for operating theatres and so forth. A total of 1395 West Midland businesses producing medical related products or services were identified in this manner.

The YELL data base classifies businesses by activity using the Standard Industrial Classification (SIC). The limitations of the SIC as a basis for identifying the medical technology sector were discussed in detail in the West Midlands Baseline Study. SIC 33.10 – Manufacture of medical and surgical equipment and orthopaedic appliances – provides a very narrow definition of medical technology and, in the case of the West Midlands identified only 157 businesses.

1.4 Survey fieldwork

One of the features which has delayed survey work is that many companies identified in the Kompass database as producing medical devices when contacted by the survey company – IFF Research – reported that they were not engaged in the production of medical technology or medical services. This may have been because they no longer produced medical technologies or, more likely, that such activity was a relatively minor part of their output and the respondent was unaware of their company's production of such goods and services. It is striking finding of the survey that even amongst responding businesses, less than a quarter said they produced any of the main medical product or services listed at the start of the interview. The great majority identified their activity as 'Other'. This issue is being investigated further with the survey company in their analysis of non-responses.

1.5 Case studies

The case studies were designed to reveal the manifold dimensions of the medical technologies cluster. They include an in-depth study of the dental sub-sector including four companies operating at the high and low value-added ends of the product spectrum so as to allow comparisons between companies that are alike. The case studies also contain examples of two companies operating in a niche, high value, h-tech segments of the market to illustrate the skill needs of those companies operating in markets where there are high margins to be captured.

1.6 Structure of report

Part A of the report provides information relating to the West Midlands survey and Part B provides information from the survey and case studies in Scotland. Finally Part C provides a conclusion.

B. WEST MIDLANDS SURVEY AND CASE STUDIES

2. Characteristics of organisations

2.1 Ownership of companies

Most companies in the West Midlands medical technology cluster were independent, single establishments *(see Table 2.1)*. Around one fifth were owned by a parent company, over half (58 per cent) of which had their headquarters in the UK, 11 per cent in Europe, and 10 per cent in the USA. This equates with around 8 per cent of medical technology companies being foreign owned.

Table 2.1 Ownership of Medical Technology companies in the West Midlands

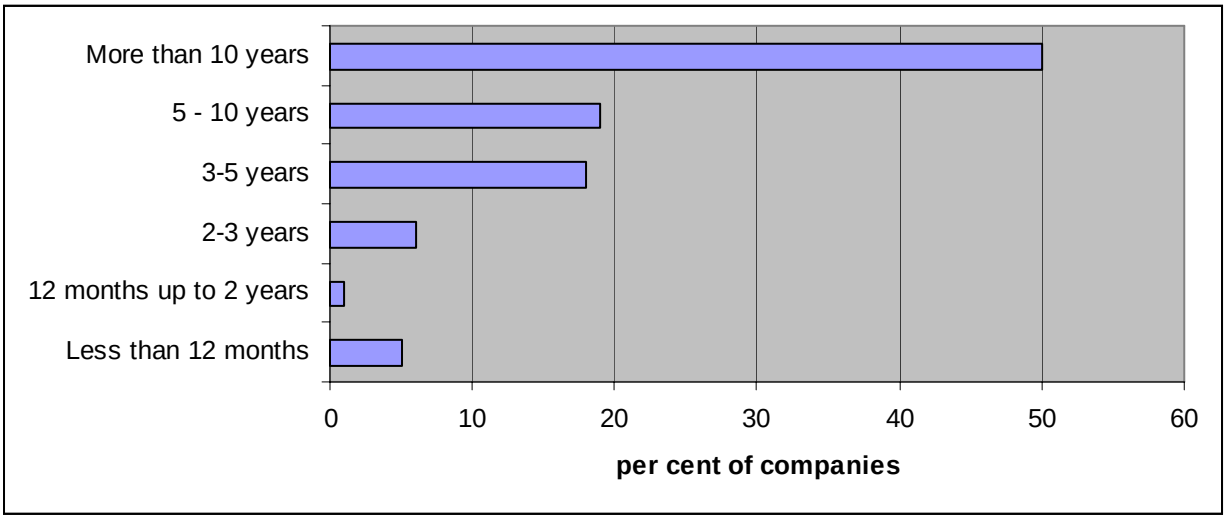
Whether part of a larger organisation:	%
Yes	21
No	71
Total	100
Location of parent company	
UK	58
Europe	11
North America	10
Elsewhere	21
Total	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Where companies were foreign owned they tended to be part of conglomerates that produced a wide range of products rather than solely or principally producing medical technologies or devices.

The results suggest that companies in the medical technologies sector in the West Midlands are well established with half having been located in the West Midlands for 10 years or more *(see Figure 2.1)*. Around 96 per cent of companies reported that they had always been located in the West Midlands.

Figure 2.1: Duration of location in West Midlands

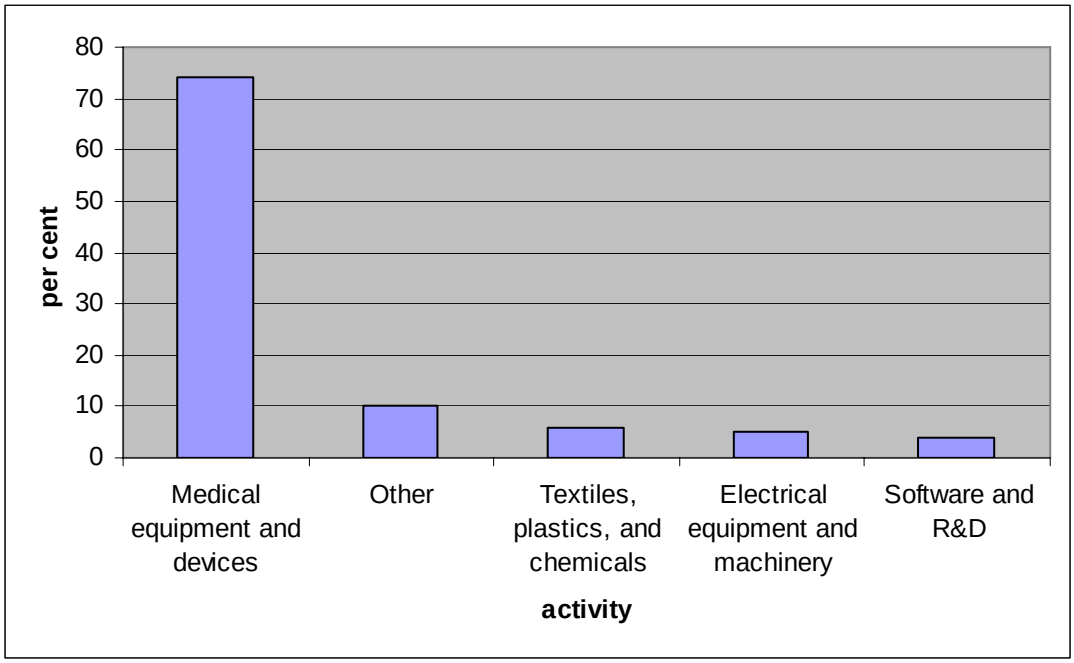


Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

2.2 Product range

It was recognised at the commencement of the study that many workplaces in the West Midlands were engaged in the manufacture of medical technologies and devices but that this may not be their main area of activity. Respondents were asked about the principal activity carried out at the workplace *(see Figure 2.2)*. Around three quarters of workplaces reported that their principal activity related to the manufacture of medical devices, with around a quarter engaged in a variety of activities ranging from the production of electrical equipment (generators, lasers, etc), research and development (R&D), to specialist refuse collection in one particular case.

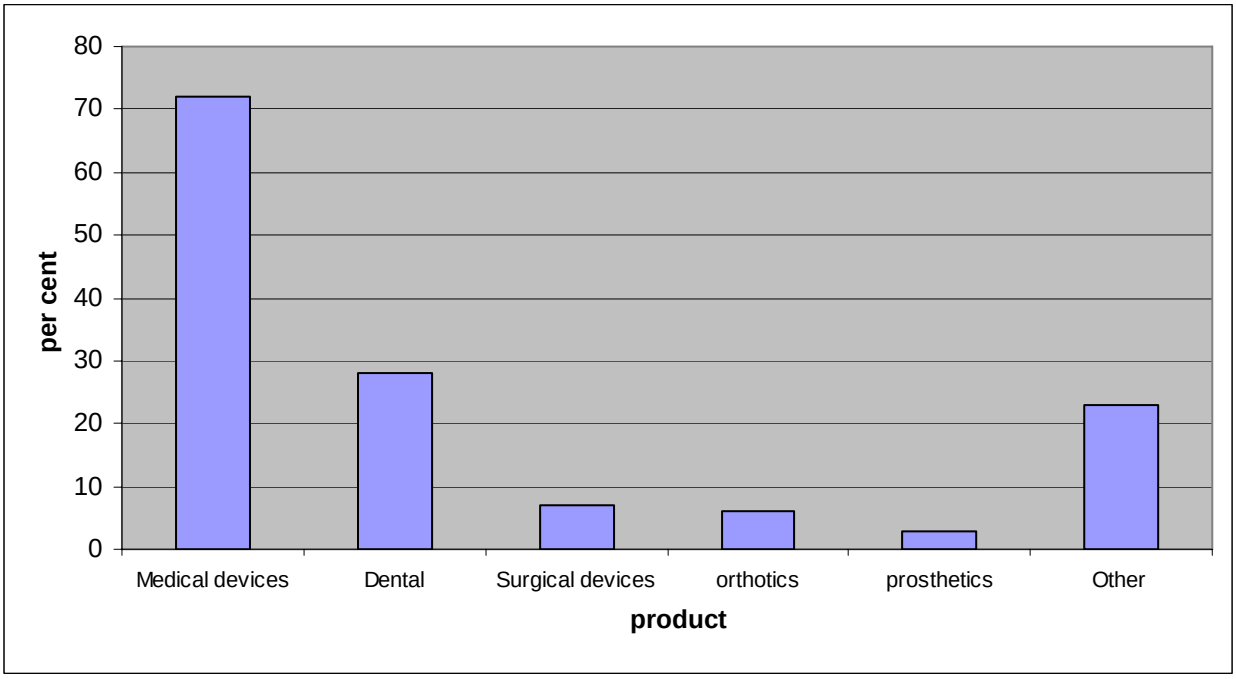
Figure 2.2 Main activity of workplaces producing medical devices in the West Midlands



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

All workplaces confirmed that they produced medical technologies and devices. The particular types of products they produced are outlined below *(see Figure 2.4)*. Most respondents reported that they manufactured medical devices generally, although nearly a third (28 per cent) reported that they were engaged in the manufacture of dental products.

Figure 2.3: Medical products manufactured by West Midlands companies



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)
Base: all respondents

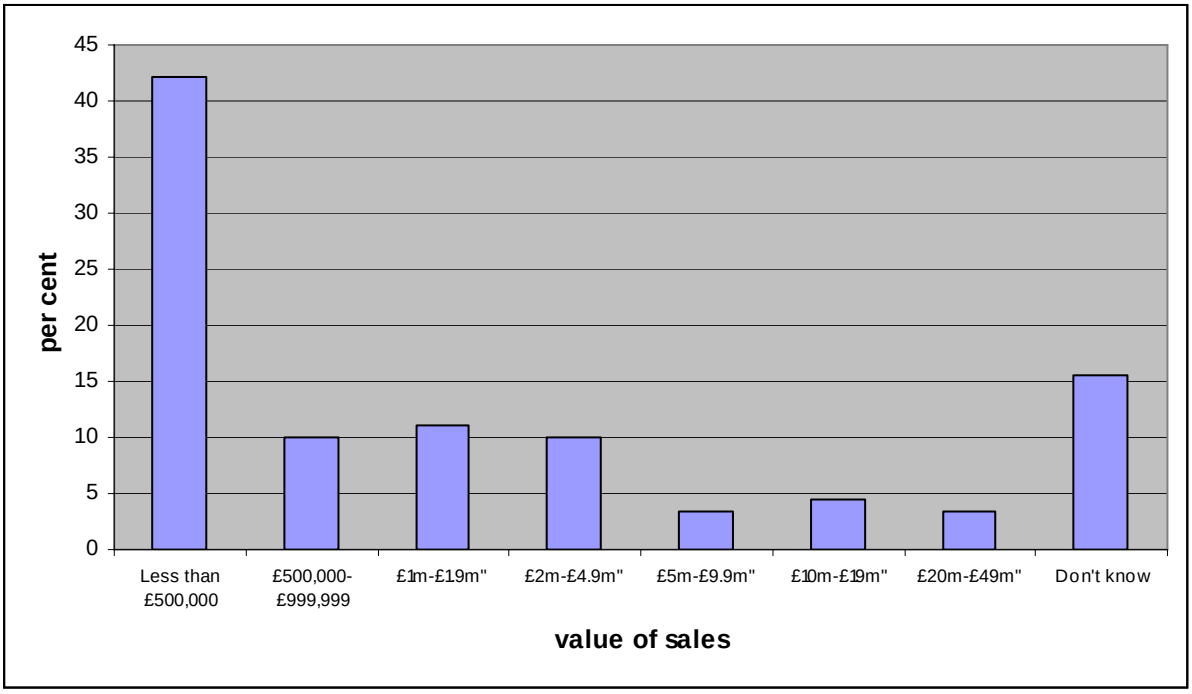
Where employers reported that they produced 'other' medical products they were prompted to specify what they produced in a little more detail. The list below gives an indication of the variety of products being produced in the West Midlands:

- air filters;
- battery manufacture of battery management systems that are used in ambulances;
- de-fibrilators;
- disinfection of water;
- electronics for refrigeration;
- polymer mouldings;
- injection mouldings used for surgical and other medical masks;
- manufacture ear pieces;
- manufacture of lasers;
- manufacture of optical lenses for spectacle retailers;
- manufacture of polymers which are then used by drug research;
- Powder compaction simulator;
- software for dental and orthotic footware;
- manufacture steel urinal stands;
- waste management;
- manufacture coils that are used in body scanners and MRIs;
- manufacture injection moulding for allergy testers;
- manufacture medical diagnostic software.

2.3 Value of sales

Figure 2.4 provides information about the level of sales in the sample of workplaces. The data reveal that many establishments have a relatively modest level of sales turnover with 43 per cent reporting less than £500,000 over the last 12 months.

Figure 2.4 Sales turnover of medical device companies



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

2.4 Share of sales related to medical technologies

The data in *Figure 2.4* relate to all of the output produced by the companies in the sample, but as noted earlier many of these workplaces reported that they were engaged in the production of goods and services classified to areas of activity other than medical devices.

Table 2.2: Percentage of output related to medical technologies

% of sales relating to medical devices	% of companies
1 - 9%	9
10 - 19%	2
20 - 29%	3
40 - 49%	1
50 - 59%	2
90 - 99%	4
100%	69
Total	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

It is not simply the case that the organisations with the largest sales turnover are least likely to have all of their sales in medical technologies. There is in fact a fairly even spread of companies with 100 per cent of their sales in medical technologies across all

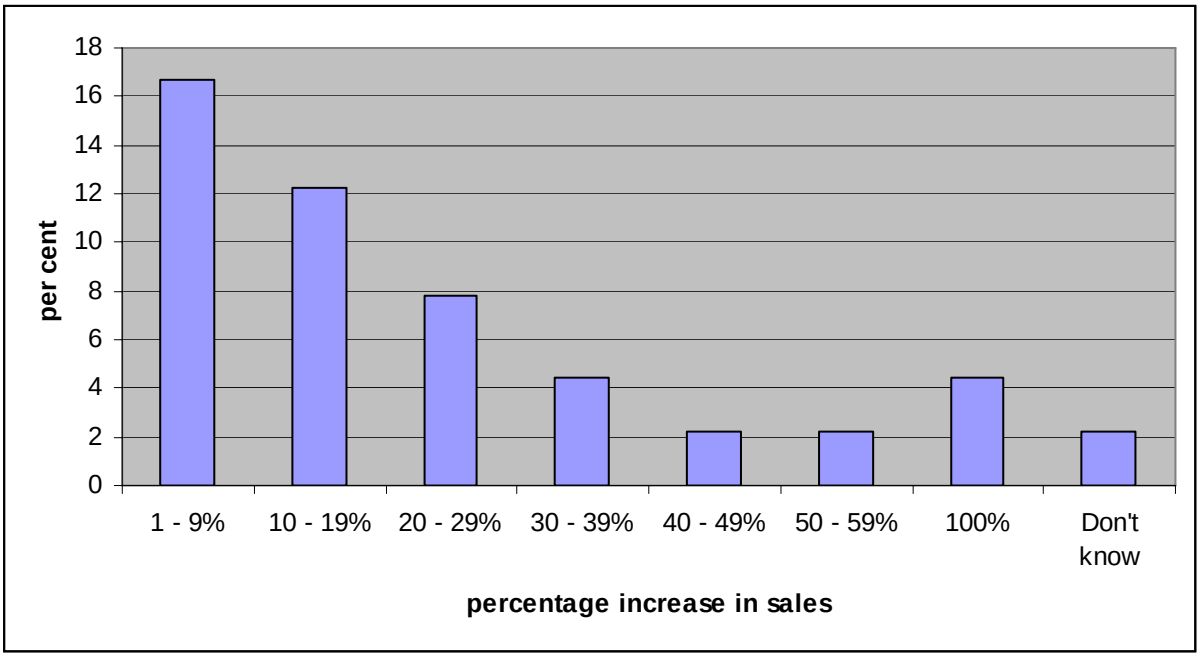
size bands with several companies with a turnover in excess of £10m reporting all of their sales in medical technologies.

2.5 Trends in market/output

At the time of the survey, 12 per cent of workplaces reported that they were currently working well above full capacity, 50 per cent were working at full capacity, 30 per cent somewhat below full capacity, and 6 per cent well below full capacity.

In some respects the medical technology cluster in the West Midlands is an embryonic cluster with growth potential. Around 52 per cent of companies in the sample reported that sales had increased since November 2002, 25 per cent reported no change, and 10 per cent reported a decrease. Where sales had increased they had done so on average by around 22 per cent a year *(see Figure 2.5).*

Figure 2.5 Increase in sales of medical technology companies



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Table 2.3 reveals how increased and decreases in sales are divided between companies with different levels of sales turnover. All of the largest organisations by turnover recorded sales growth whereas there was a slightly more mixed picture with respect to the other levels of sales turnover.

Table 2.3 Change in sales

column percentages

Change in sales	Less than £500,000	£500,000-£999,999	£1m-£1.9m"	£2m-£4.9m"	£5m-£9.9m"	£10m-£19m"	£20m-£49m"	Total
Increase	50	67	70	56		25	100	52
Decrease	11	11	10	22		25		10
No change	37	11	20	11	67	50		26
Don't know	3	11		11	33			12
	100	100	100	100	100	100	100	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Overall, sales in medical technology companies had increased on average across all establishments by around 10 per cent since November 2002.

2.6 Conclusion

The characteristics of companies in the medical technology cluster is comprised mainly of those engaged solely in the production of medical devices, although there a number of companies that are engaged across sectors. The case study evidence, alongside that of previous reports, reveals that some of the companies operating across sectors but including medical devices, are often engaged in higher value activities, such as the application of a hi-tech engineering process to a medical problem. These types of issue are explored in greater detail in the next section.

3. Product Market Position

3.1 Customer base

Table 3.1 outlines the characteristics of the consumers of the products manufactured by medical technology manufacturers in the West Midlands. Over a third of products go directly into the health service (36 per cent) with around another third (36 per cent) going to distributors. It is also apparent from *Table 3.1* that over half of all the products produced require approval from an appropriate regulatory authority before they can be sold.

Table 3.1: Characteristics of customers

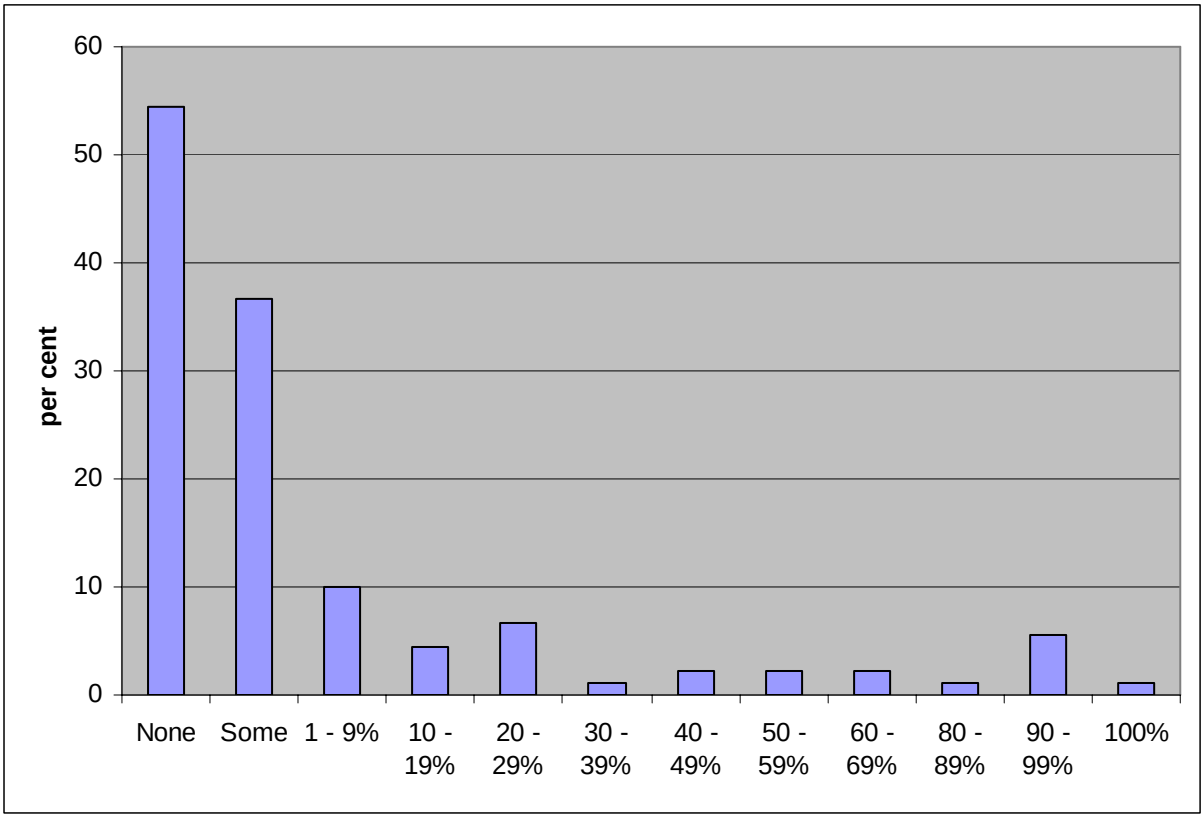
	%
Principal customers	
Health Service	36
Directly to patient	8
Other manufacturers	18
Distributors	36
Don't know	3
Total	100
Sales require approval of regulatory	
All	56
Nearly all	10
More than half	7
Some	4
Not many at all	4
None	10
Don't know	9
Total	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

3.2 Location of customer base

Many medical goods are traded in the international market and accordingly need to satisfy different regulatory bodies. *Figure 3.1* shows the number of workplaces that export their goods and services.

Figure 3.1: Export of goods and services from the West Midlands



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Overall, around 37 per cent of workplaces reported that they exported some of their goods and services. Where companies were exporting it tended to comprise a relatively modest proportion of their output.

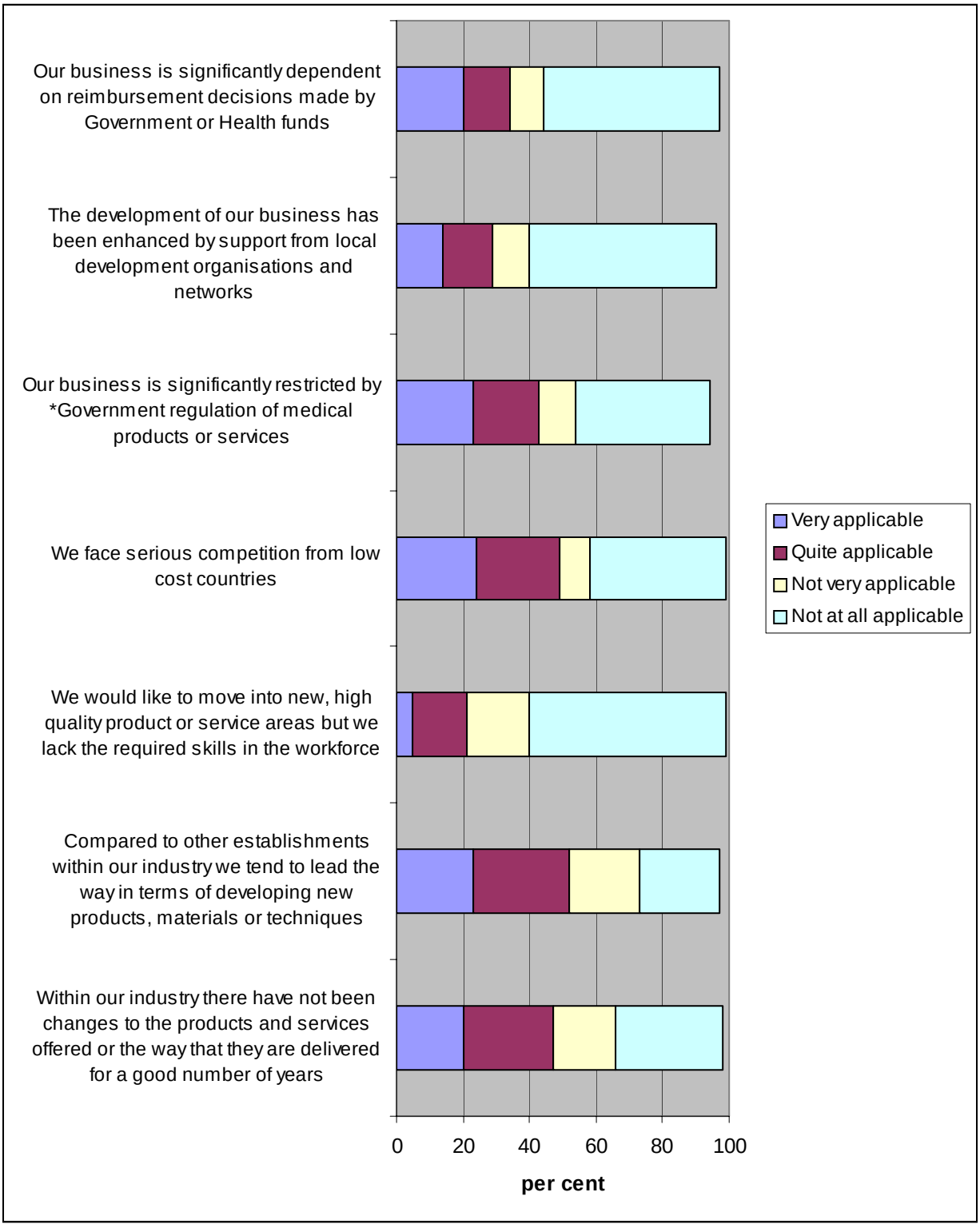
3.3 Product market position

In many respects the purpose the exercise is to identify the extent to which West Midlands' manufacturers of medical devices are engaged in relatively high value-added markets. Accordingly respondents were asked to classify themselves according to whether they were:

- relatively high volume producers;
- engaged in the production of complex products;
- that, on-balance, sales were only moderately sensitive to price;
- that production systems were neither state of the art nor well behind recent developments but somewhere in between;
- production was only moderately automated;
- operating in a premium market.

Around a third of companies (31 per cent) reported that they thought the market for medical technologies will slowly over the next two to three years and around one fifth said it will grow rapidly (23 per cent). Just over a quarter (28 per cent) expected the market to remain stable, and 10 per cent expected it to decline.

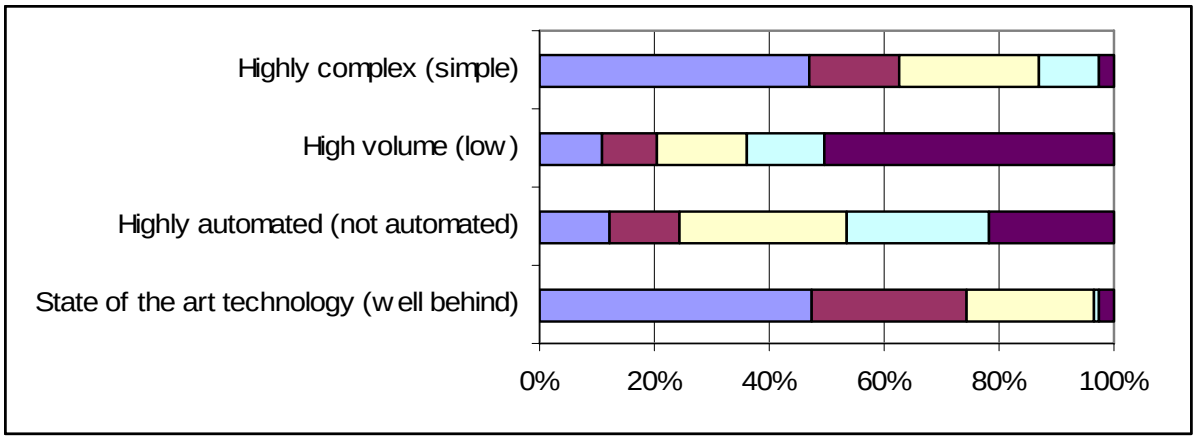
Figure 3.2: Perceptions of business context



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Figure 3.3 shows the respondents' assessment of their technological development compared to the medical technology sector in general.

Figure 3.3: Technological Complexity



Note: The colours indicate the extent to which the respondents characterize own establishment regarding the four aspects in five levels of confirmation/rejection, starting by 'very much' and ending by the opposite (in brackets)

Almost half of the responding establishments (46 per cent) categorise the technological developments within the establishment as state of the art, while only three respondents believe that the technological development within their establishment are either well behind or close to being well behind recent technological developments. Similarly many respondents characterize their establishments as highly complex, low volume production. There is a more even distribution of those who claim that their establishment is high volume (low volume) producers and those who are highly automated and not automated.

3.4 Changing product market strategy

Figure 3.2 provides information about how employers see their product market position. The data indicate:

- that reimbursement decisions made by Government or health funds are not of critical importance to companies;
- support from local agencies has not been central to the development of business for majority of respondents;
- skills are not a barrier to entering higher value markets for a majority of respondents;
- a majority of respondents report that the statement about leading the way in their market is either very or quite applicable to their situation;
- just under a half of respondents feel that business is restricted by regulation.

The findings in relation to skills not being a barrier to entering higher value-added markets is a subject returned to in the following sections. The danger of a simple interpretation of this statistic is that skills do not matter, yet there is strong evidence that where employers are looking to move upmarket sooner or later they encounter problems recruiting people of the calibre required to bring their product market strategies to fruition.

3.5 Product market strategy: case study evidence

The above provides an indication of product market strategy from the survey evidence. The case study evidence provides further insights into this feature.

The dental laboratory sub-sector reveals information about the product market position of organisations operating in relatively low value-added goods *(see panel)*. The sector also reveals some the constraints imposed on operating of the margins of the NHS.

The dental sub-sector

The case studies covered four rather different types of dental laboratories covering crown and bridge work, orthodontics and prosthetics and respondents had slightly differing views reflecting some of those differences. Nonetheless a very consistent impression of the sector and occupation was given. The key messages to emerge from these case studies were as follows:

(i) while dental laboratories are undoubtedly part of the medical technology sector of the region, they represent activity that is very traditional in terms of the manufacturing process. The work involved is labour intensive and uses technology that has changed little over many years. Some changes in material have occurred but little else has changed;

(ii) the business of the sector is indirectly controlled by dental surgeons. Technician are barred by law from dealing directly with patients while surgeons have control over the funding of dental products. This places dental surgeons in a monopsonistic position which most appear to drive down prices for dental laboratory work. This forces dental laboratories to work on low margins and maximise volume. The effect on quality of product is unknown but the impact of low margins on pay and training in the sector appear to be detrimental;

(iii) the forthcoming changes to NHS contracts for dental practices is generally believed to have the effect of reducing the volume of work for dental laboratories. These changes will affect some laboratories more than others, dependant upon how much NHS work in undertaken.

Source: AWM Medical Technology Case studies (IER)

But even in the dental laboratory sub-sector there are example of organisations that have attempted to move into higher value-added markets within their sub-sector. It is useful to compare the position of two dental laboratories in this respect. *Dental Laboratory A* had moved into a relatively high value-added position concentrating on the production of specialist dental products for the private market *(see panel)*.

Dental Laboratory A

This business operates from an unit in a small industrial park in Coventry. The business supports the proprietor and two technicians together with a trainee.

The laboratory specialises in metal-based prosthetics. This work involved the production of frames for dentures using the lost-wax method to cast items in gold and other metals. The nature of the work required a considerable investment in small furnaces and centrifugal casting machines and the business occupied a niche in the prosthetics sector as the result. All business came via dental surgeons and was mainly but not exclusively for private sector patients. This was largely because the items produced were of a superior specification and too high cost for NHS work.

The business was placed at the high quality, high value end of the prosthetics market. This was thought unlikely to change in the foreseeable future. The business was unlikely to be significantly affected by the forthcoming changes in NHS contracts since only a minority of work was NHS related. The technology involved had not changed significantly (lost wax casting of dentures was used in China 3000 years ago!) and no significant future changes were expected. The business thus expected to continue much as before.

Source: AWM Medical Technology Case studies (IER)

In contrast, Dental Laboratory B was dependent upon the production for the NHS *(see panel)*.

Dental Laboratory B

This business had operated for the past 25 years. The business specialises in prosthetics, in particular the production of dentures. These products are manufactured mainly from plastics and ceramics. The business supplies to orders from local dental surgeons and serves the bottom end of the NHS market. The proprietor believes that most patients for whom they produce dentures are people on state benefits or else low income households. The business claims to produce a good quality product within the limitations of NHS specifications.

The proprietor was concerned about the impact of the new NHS contracts for dental practices. He felt that dentists would reduce the volume of orders for dentures. As most of the work was for low income/benefit recipients this was unlikely to result in any corresponding increase in private treatment. Despite these concerns, no specific actions were contemplated.

Source: AWM Medical Technology Case studies (IER)

The two cases reveal the differences in serving two different markets: private *versus* NHS. But should this be seen as a constraint or a choice? In the first instance there appears to have been a element of market positioning whereas in the latter case the laboratory is more reactive to the market in which it is based.

The impact of market position on skill needs is addressed more fully in the following chapters. In the case of the dental laboratories for technicians, the shift to higher value-added products was marked by a relatively modest increase in their skills. In other sectors, the skill needs required to shift into new markets are at a much higher level. This is most manifest in relation to niche producers operating at the higher end of the value-added spectrum. A characteristic of niche producers is an ability to switch between markets, including in and out of the medical devices market. Engineering company A is illustrative of this type of organisation *(see panel)*.

Engineering company A

Company employs 50 people, up from 35 five years ago. The company produces a range of coatings for metals relating to a range of industries: automotive, mints, medical. The medical element of the business is currently small but is growing and considered to be a future growth area. The company also designs and manufacturers the technology for coating metals – this amounts to around 30-50 per cent of the business.

The market for the company's goods is concentrated in the Far East and North America. China is fast developing market and the company believes that it is sufficiently high up the value added chain that it will continue to export to this market as it develops its own manufacturing capacity.

Important for the company is the capacity to apply its product knowledge and technology to a range of design requirements. To do this it employs a relatively high percentage of people in design, and research and development. This provides its capacity to shift between markets and maintain a leading position in the coatings market.

Source: AWM Medical Technology Case studies (IER)

The other characteristic of the organisation is its dependence upon exports. It recognises that it operates in a global market and to maintain its profitability needs to operate where margins are highest since it cannot compete on labour costs in the production of more standard goods.

4. Employment characteristics

4.1 Total Employment

Table 4.1 provides information about the size of workplaces that comprise the medical technologies cluster in the West Midlands. Overall, the cluster is characterised by a large number of small organisations and a few large dominant employers. In this respect the cluster is typical of the size structure of industry in the West Midlands.

Table 4.1: Size structure of medical technology workplaces in the West Midlands

Number of employees	All employment	Medical Technologies
1 - 4	33	43
5 - 9	19	18
10 - 24	14	14
25 - 49	9	6
50 - 99	8	10
100 - 199	8	6
200 - 499	9	2
Total	100	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Because some workplaces were simultaneously engaged in the production of non-medical devices, employers were asked to state how many people they employed overall and how many they employed solely in the production of medical products. On average, employers had 44 employees overall and 24 that were engaged in medical technologies.

To obtain a crude estimate of the number of people employed in the medical technologies cluster in the West Midlands the Kompass database was used to derive an approximate population estimate of employers engaged in medical technologies and devices. A simple grossing exercise based on this suggests that around 27,000 people are employed in the cluster

in the West Midlands. Because of the difficulties in identifying organisations that produce medical devices as a non-primary output this is likely to be an underestimate of total employment.

4.2 Trends in employment

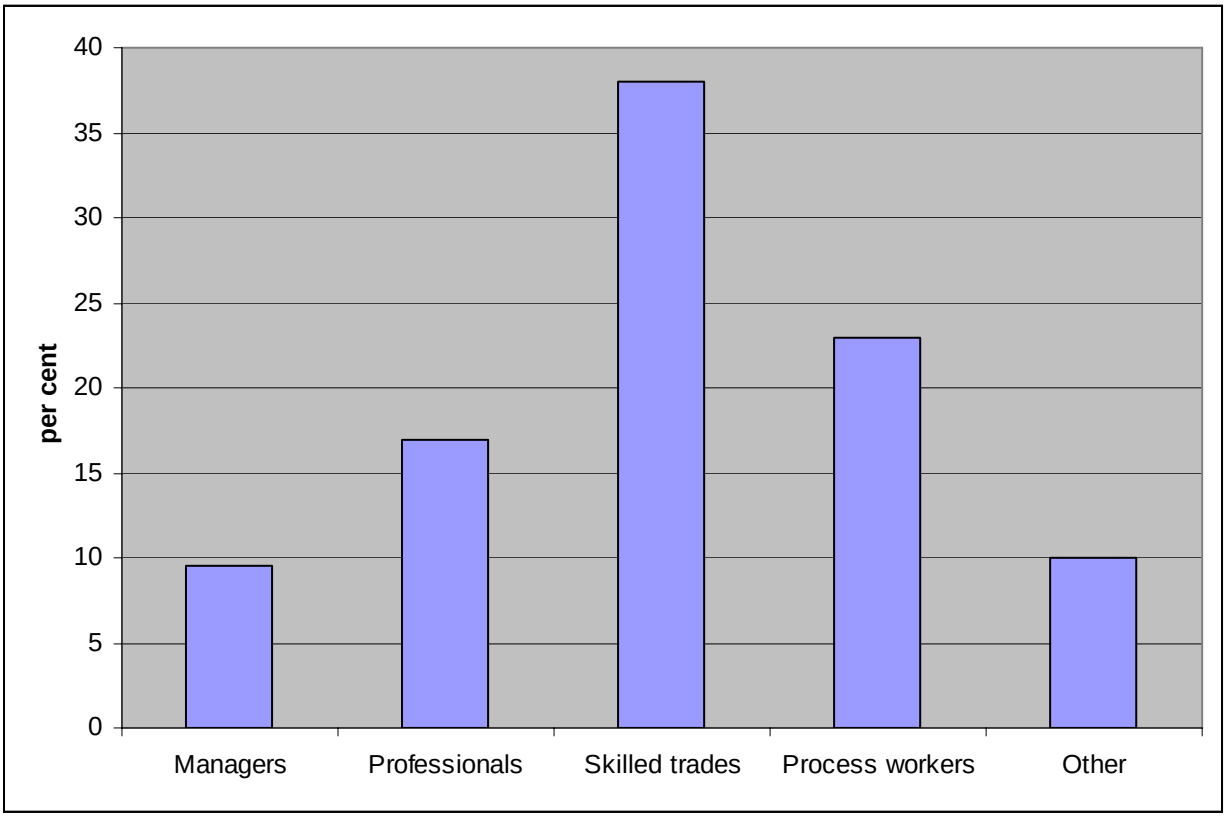
Respondents were asked to give the number of people they employed 12 months ago so that it was possible to obtain an estimate of the extent to which employment has been growing or declining.

Around 15 per cent of workplaces reported that employment had declined, 63 per cent that it had been constant, and 22 per cent had experienced growth. Overall the data suggest that each workplace has increased by an average of a single person. But in a few instances it was reported that employed had increased substantially over the last year.

4.3 Occupational structure of employment

As well as knowing about the number of people employed and whether this is increasing or decreasing, information is also required on the structure of the workforce. *Figure 4.1* shows the occupational structure for the medical devices industry across the West Midlands. Overall the structure of employment matches that of manufacturing establishments in general, given the reliance upon a relatively high proportion of skilled trades workers, typically qualified to apprenticeship level.

Figure 4.1: Occupational structure of employment



Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

4.4 Employment in R&D

Around 35 per cent of establishments reported that they had staff employed in research and development. Typically this was one or two personnel, but there were examples of workplaces reporting a substantial number of R&D staff.

Around 12 per cent of workplaces employed people with a medical or clinical degree.

5. Recruitment

5.1 Level of vacancies

The study used a comparable method to that employed in the Employers Skill Surveys in differentiating between external recruitment problems and internal skill gaps. Skill gaps are addressed in section 6, in this section attention is focused upon external recruitment problems. A distinction is made between hard-to-fill vacancies (HtfVs) that arise for any reason, and a sub-set of HtFVs that relate specifically to difficulties recruiting people with the required qualifications, experience, or skills. These are referred to as skill-shortage vacancies (SSVs).

Approximately 59 per cent of workplaces reported that they had vacancies over the last year. *Table 5.1* reveals the occupational characteristics of those vacancies: the majority were in process occupations (59 per cent) with the next most common occupation being associate professionals (10 per cent).

Table 5.1: Summary of vacancies and recruitment problems

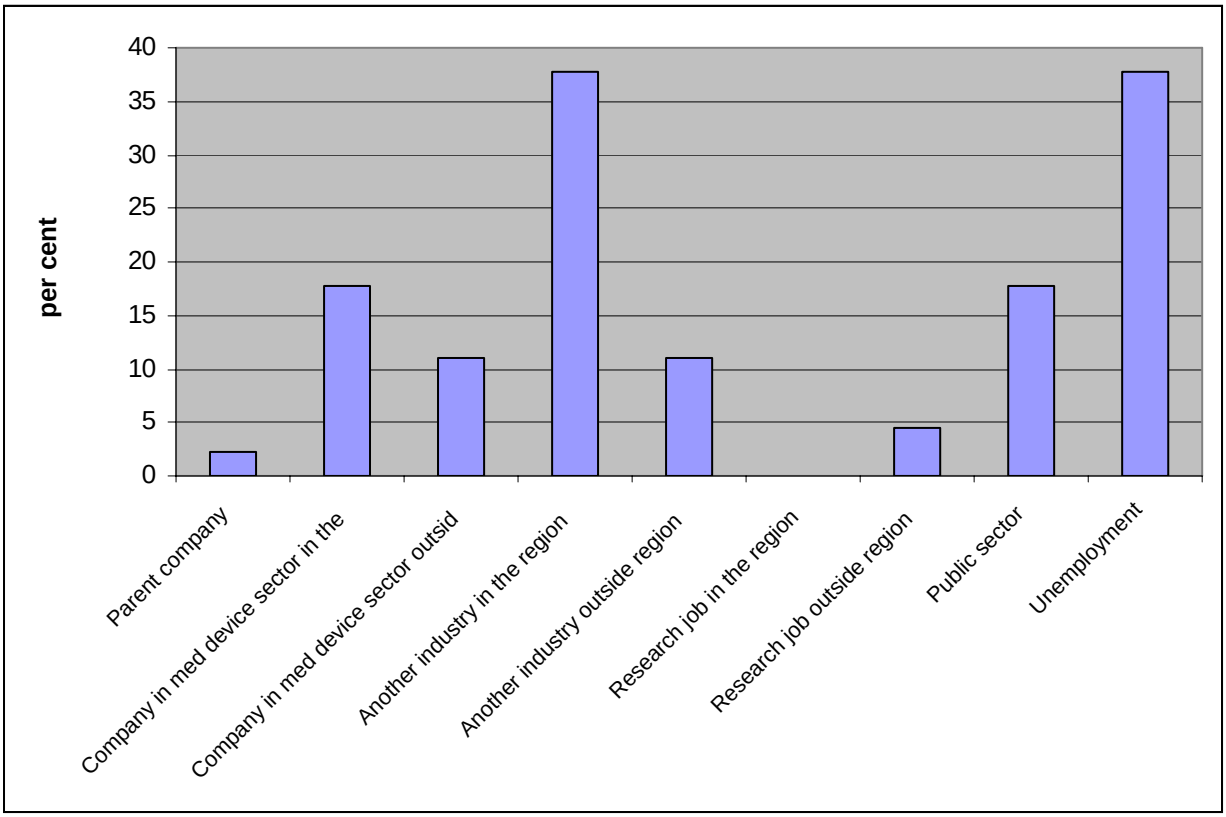
Occupations	Vacancies	Hard-to-fill vacancies	HtFVs as a % of vacancies	Vacancies column %	HtFVs column %
Managers	7	1	14	3	5
Professionals	9	0	0	3	0
Associate Professionals	27	5	19	10	23
Secretarial/Admin	16	3	19	6	14
Skilled trades	17	1	6	6	5
Personal services	0	0	0	0	0
Sales	14	3	21	5	14
Process workers	158	8	5	59	36
Elementary occupations	18	1	6	7	5
	266	22	8	100	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

5.2 Recruitment practices

How companies recruited staff is presented in *Figure 5.1*. In the main recruitment was from either other companies in the region but who operated in a different sector, or from those who are unemployed. In the latter case it is safe to assume that this was primarily for process workers (who were commonly recruited by employers).

Figure 5.1: Recruitment methods



Base: all respondents with vacancies
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

5.3 Evidence of recruitment problems

Table 5.1 provides information about the extent of hard-to-fill vacancies in the West Midlands. Overall, around 42 per cent of workplaces reported that they had experienced problems recruiting staff.

Approximately 8 per cent of all vacancies were hard-to-fill. This is a relatively low share compared to national statistical data for all industries that suggest that around a fifth of all vacancies are hard-to-fill. There is also a distinct occupational pattern to these data. Whereas associate professional staff accounted for around 10 per cent of all vacancies but accounted for 23 per cent of all hard-to-fill vacancies.

Though the evidence of recruitment problems was quite modest, there was a perception amongst companies that were they to enter the market for process or skilled trades workers then supply would be poor. Dental laboratory C reveals evidence of this *(see panel)*.

Dental laboratory C

The business perceived recruitment to be difficult, although it had no desire to recruit at present. One reason for recruitment difficulties was seen to be poor pay. Trainees could expect little more than the National Minimum Wage (trainee status) while even senior technicians received only around £18,000 *per annum* (and many laboratories were too small to offer career progression to such a grade). A further reason for recruitment difficulties was the lack of suitable quality school leavers with an interest in skilled manual work (too many of the bright kids want to go to university).

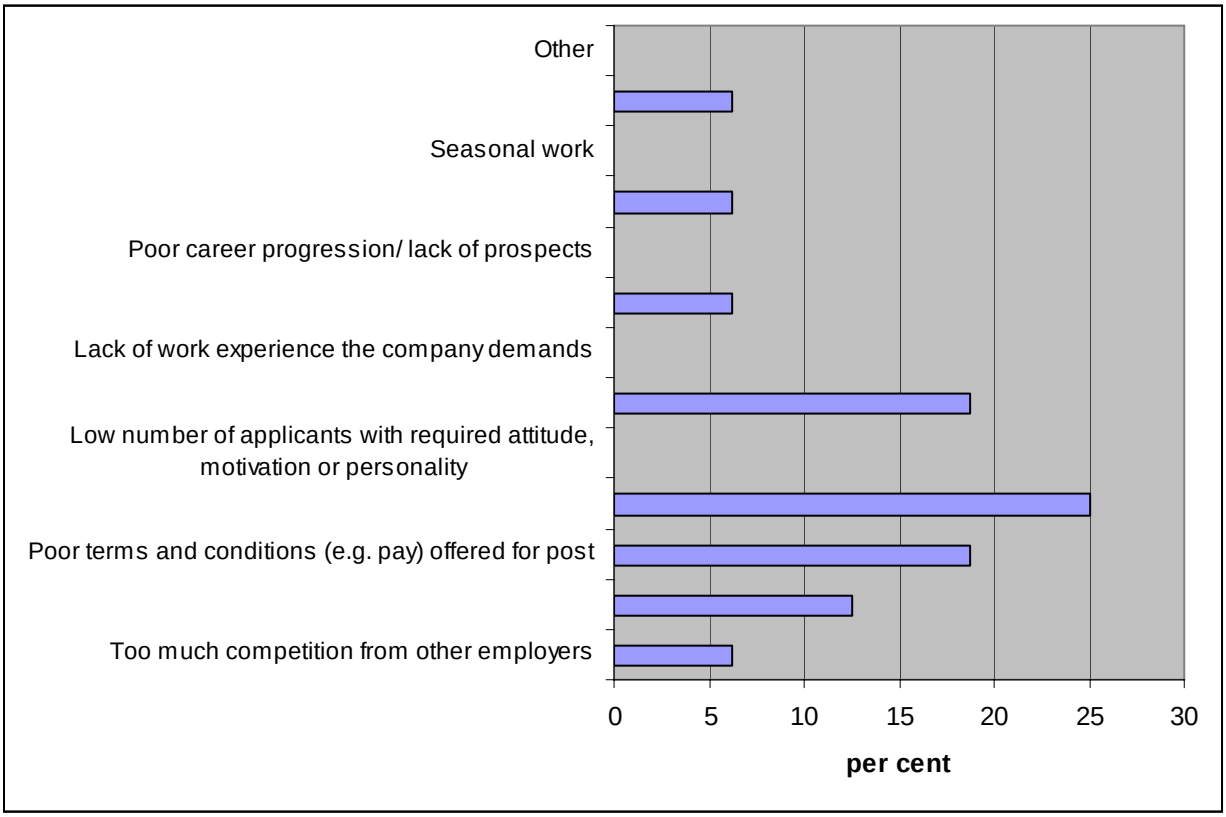
Source: AWM Medical Technology Case studies (IER)

The evidence here points to recruitment problems being less about skills and more to do with the terms and conditions of employment in a relatively tight labour market conditions. At more senior levels the evidence relating to recruitment problems is less marked. To some extent this is a product of companies developing their own staff at a senior level and experiencing relatively little labour turnover.

5.4 Evidence of skill shortages

Figure 5.2 shows the main causes of recruitment problems. By far the most common response was that applicants did not possess the skills required for the job – so in this sense many of the recruitment problems were skill shortages. But this needs to be seen in the light of the relatively low number of vacancies overall.

Figure 5.2: Causes of recruitment problems



Base: all respondents with hard-to-fill vacancies
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

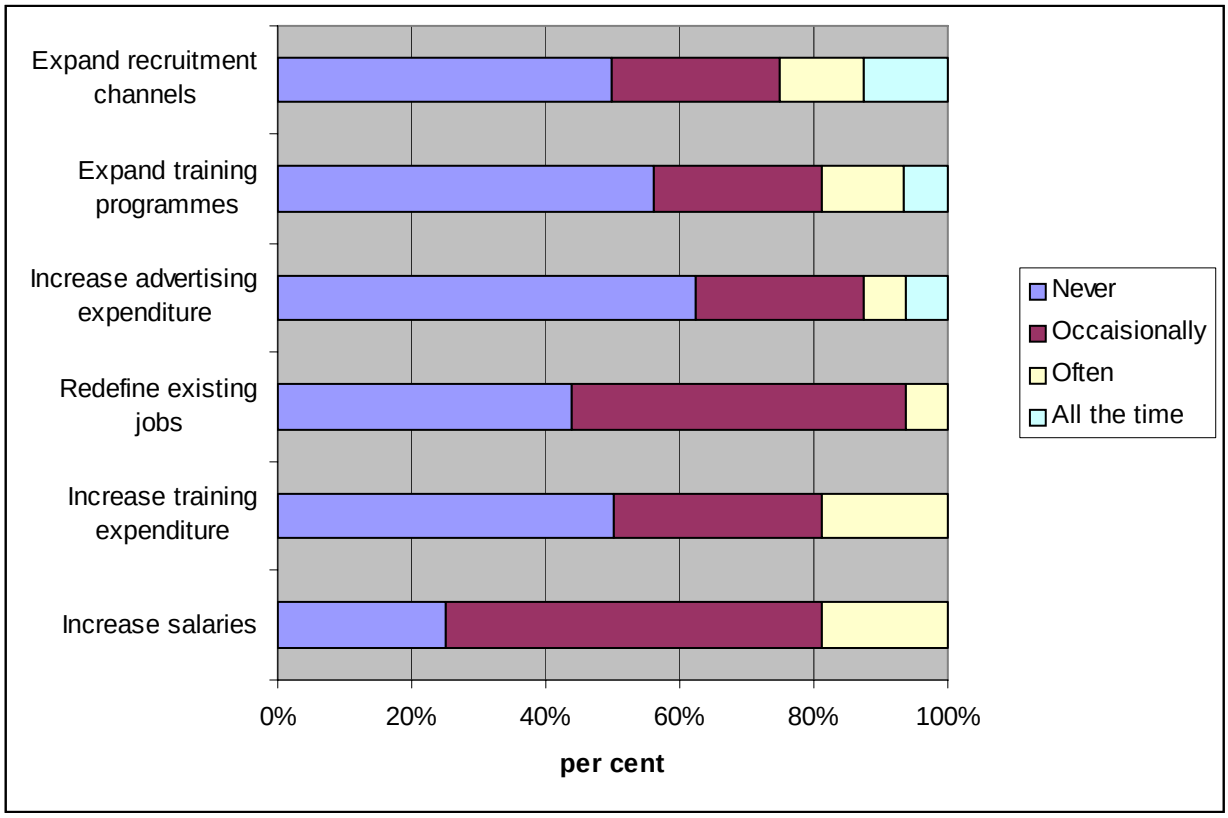
Where skill-shortage vacancies were reported they typically made reference to a range of generic skills – as well as technical ones – relating to team-working, customer service, and communication.

At higher occupational levels, however, companies are typically looking to recruit people with both the mix of generic and technical skills. It is worth noting that often a mix of distinct technical skills are often sought with would be recruits needing to be proficient with respect to different vintages of technology. This has been referred to in previous research as the possession of *hybrid skills*.

5.5 Implications of recruitment problems

Where employers encountered recruitment problems their response was to varied including expanding training activity, increasing salaries *etc. (see Figure 5.3)*

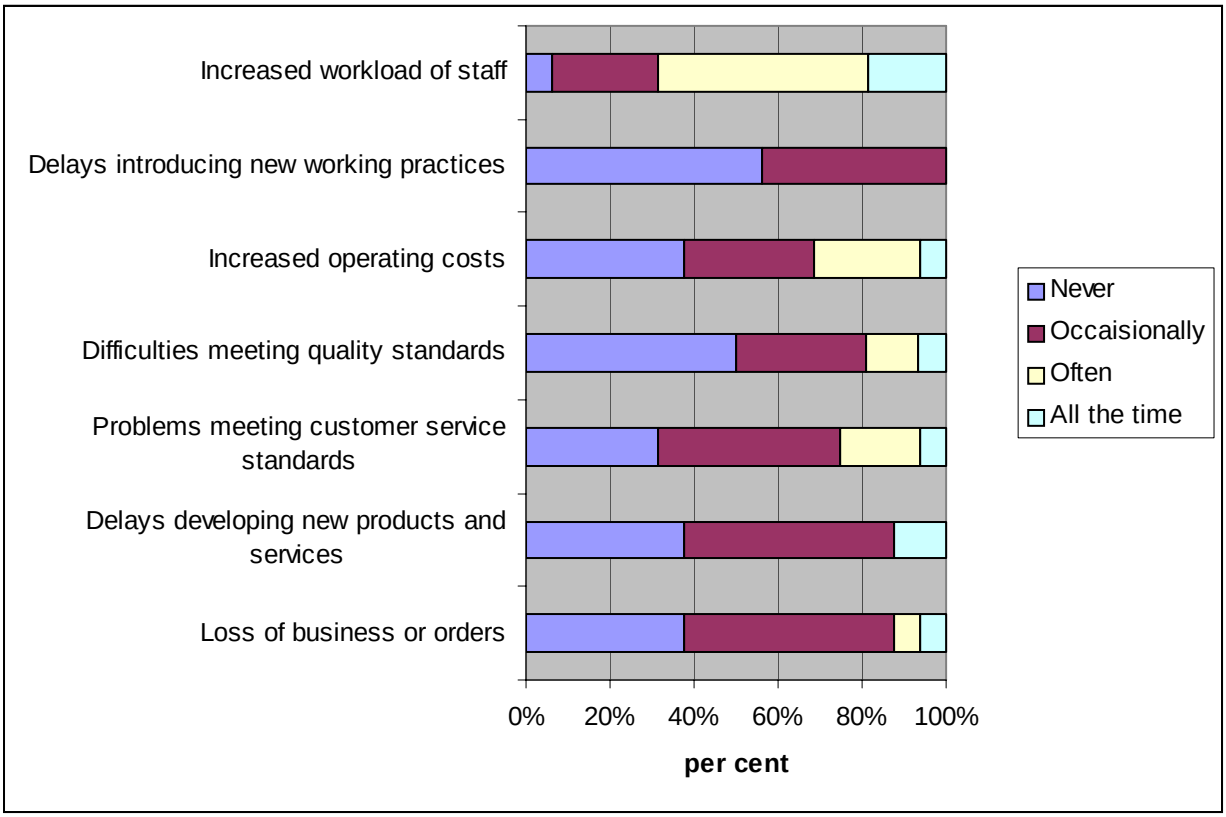
Figure 5.3: Responses to recruitment problems



Base: all respondents with hard-to-fill vacancies
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Figure 5.4 outlines the implications of having recruitment problems for the employer. Though the incidence of recruitment problems is quite modest – and it tends to be quite modest over all sectors of the economy – where they arise can often result in quite damaging consequences for business development, including the loss of business and orders. It can also have consequences for staff morale and motivation where it results in increased workloads for existing staff.

Figure 5.4: Impact of recruitment problems



Base: all respondents with hard-to-fill vacancies
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

5.6 Conclusion

The evidence reveals modest levels of recruitment problems in the medical technologies cluster. This appears to be common at all occupational levels, with the possible exception of process workers. Where recruitment problems were manifest they in some instances not a consequence of skill shortages but more to do with the relative terms and conditions of employment companies were willing to offer. It is striking that skill shortages were more manifest among process workers than amongst managers and professionals. This might well relate to the size of organisations with the manager or professional members of staff in small organisations sometimes being owners or directors of the company and, in that sense, tied to the organisation.

But where recruitment problems were manifest they were damaging to business performance resulting in, for example, loss of business. There was also some evidence of latent recruitment problems where companies felt that if they were to try to recruit employees it would prove difficult to do so. This might well depress the volume of vacancies insofar as companies are unlikely to attempt to recruit staff where they there is no supply available.

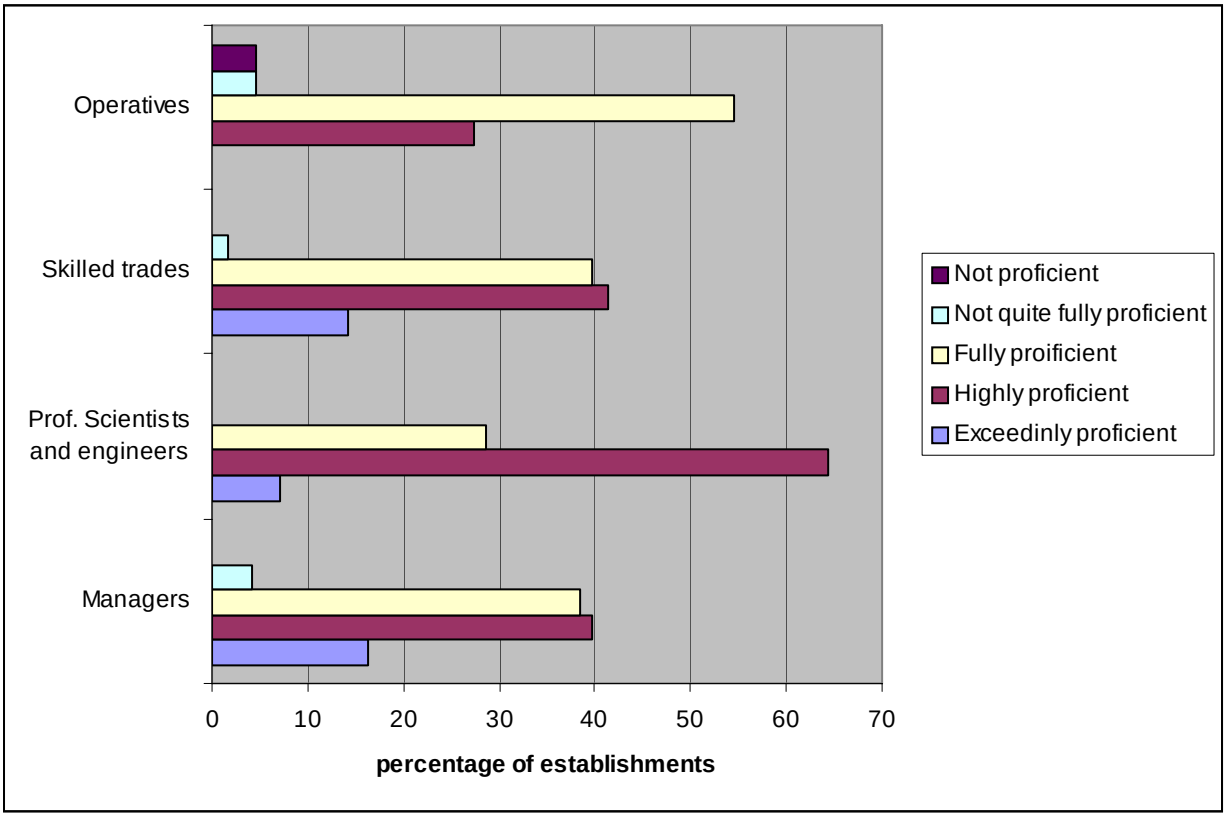
6. Proficiency of existing staff

6.1 Skill gaps

Employers reported that they were satisfied with the proficiency of their staff. The satisfaction ratings of proficiency were generally much higher than recorded by surveys of all industry. Generally speaking, more senior staff were considered to the most highly proficient at their job. But overall, all staff were rated on average to be above full proficiency at their current job.

Overall around 94 per cent of establishments reported that all of their staff were at least proficient at their job; that is no staff were considered to be *not quite* or *not at all proficient at their jobs*. How this is distributed across occupational groups is shown in *Figure 6.1*. Overall, professional scientists and engineers were considered to be the most proficient and operatives the least proficient.

Figure 6.1 Proficiency of employees by occupational group



Base: all respondents with staff in occupation group
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

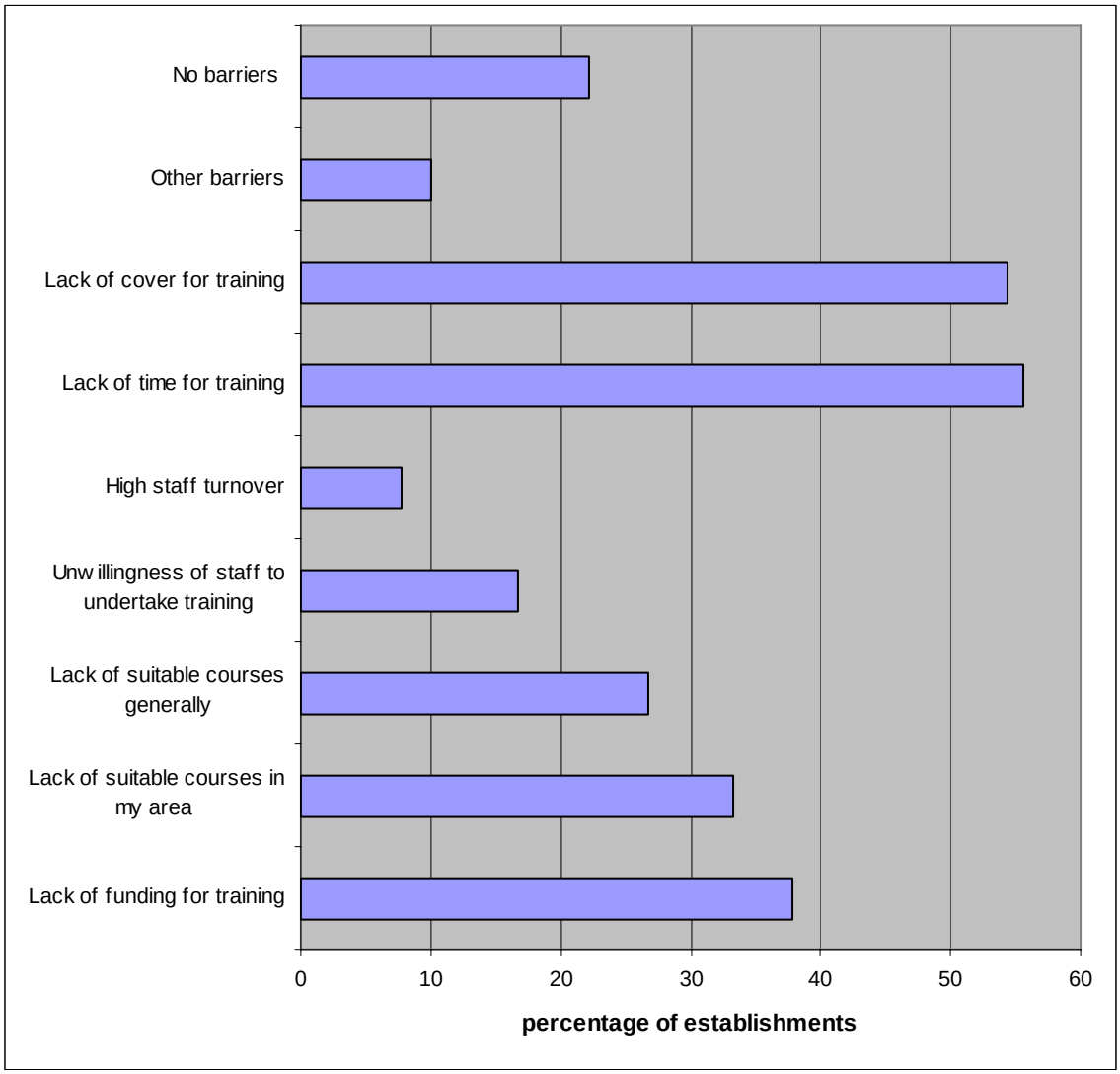
Where staff lack proficiency it tended to be in operations/production management, but this is based upon the responses of the exceedingly small number of respondents who reported that some of their staff lacked full proficiency. The skill most likely to give rise to a lack of proficiency was problem solving – but this finding is subject to the same caveat about the low number of responses.

6.2 Future skill needs

Overall, 68 per cent of respondents thought that their staff was quite well placed to meet the product market challenges of the future and 28 per cent that they were very well prepared. Despite this, around 60 per cent of employers reported that the skills they required were not readily available in their local labour market and a further 10 per cent

felt that it depended upon the skills in question. Around a third of respondents reported that they foresaw certain skills being difficult to recruit in the future *(see Figure 6.2)*.

Figure 6.2 Barriers to developing a fully proficient workforce in the future



Overall, around 4 per cent of establishments reported that they felt that the workforce was not well prepared to meet the future needs of the business. But around a third of establishments reported that skills would be more difficult to obtain in the future. The reasons for this related to the niche markets in which organisations operated and the specific skills this gave rise to (20 per cent of those who expect problems in the future), and low pay (20 per cent).

6.3 Skill gaps and product market strategies

The evidence from the case studies reveals that the relationship between skill needs and product market strategy were complex. If one takes the example of *Dental Laboratory A*, which had moved into higher value markets within the dental sub-sector, its skill needs – outlined in the panel below – are more or less the same as in the other dental laboratories that were operating in more standard markets.

Dental laboratory A

The business required staff with dexterity and an artistic flair. Staff needed to be qualified or working towards a qualification. It could take several years to acquire all the skills necessary to become a fully competent technician. Attaining senior technician status could take (on average) seven years. Many of the skills involved in metal prosthetics were similar to those used in jewellery making (especially those relating to casting metal and gold). It was reported that skilled technicians in the Birmingham area (especially around the Jewellery Quarter) would transfer between work in dental laboratories and the jewellery trades depending upon the buoyancy of these activities. In view of the static nature of the business, few if any new skill needs were perceived as necessary for existing qualified staff. The trainee was attending Mathew Bolton College and working towards a BTEC Certificate.

Source: AWM Medical Technology Case studies (IER)

Amongst more advanced sectors of the cluster the issue is more with reference to latent skill gaps. The examples of the niche producers in operating out of the engineering sector reveal the need to be able to:

- identify new markets for goods;
- developing the productive capacity to enter these new markets; and
- developing the internal competencies to meet the needs of the new market.

Organisations without these capabilities are unlikely to operate with the level of agility required of niche producers.

B: SURVEY AND CASE STUDIES IN SCOTLAND

7.1 Scotland

7.1 Introduction

A survey of medical technology businesses located in Scotland was conducted by telephone in early 2004, using the standard telephone interview schedule used in all of the areas covered by the study. The initial source for the sample was the Kompass database. This large national database of establishments employing 10 or more employees classified by type of product was searched and businesses reporting production of core medical products such as 'medical and surgical instruments', 'equipment and instruments for medical laboratories', 'medical and surgical equipment', 'ophthalmic equipment', 'dental equipment and instruments' and so forth were selected. The initial selection was automated but the final selection was undertaken manually by reference to the detail descriptions of products and services in each business. This search of Kompass generated only 51 businesses producing in these core product areas. In order to increase the prospective sample size, the Kompass sample was supplemented by a sample of Scottish businesses drawn from the YELL database. YELL classifies businesses by activity using the Standard Industrial Classification (SIC) and businesses were selected if they were classified to SIC 33.10 – manufacture of medical and surgical equipment and orthopaedic appliances. While the narrow definition of the sector is a disadvantage (discussed in detail in the West Midlands Baseline Study), this is offset to a greater, or lesser extent by the inclusion of small establishments employing less than 10 employees that would otherwise be excluded if the sample were drawn exclusively from Kompass.

7.2 Characteristics of employers

The total sample achieved in Scotland was 93 companies. A quarter (25 per cent) of companies surveyed were owned by larger organisations *(see Table 7.1)*. Of these, most (48 per cent) were owned by North American parent companies. A small number (13 per cent) were French owned and surprisingly few, just four per cent, were owned by UK parent companies. Where companies were part of a larger organisation, the larger organisations employed an average of around 2600 people worldwide.

Table 7.1
Ownership of Medical Technology companies in Scotland

Whether part of a larger organisation	%
Yes	25
No	75
Total	100
Location of parent company	
UK	4
Rest of Europe	34
North America	48
Elsewhere	13
Total	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

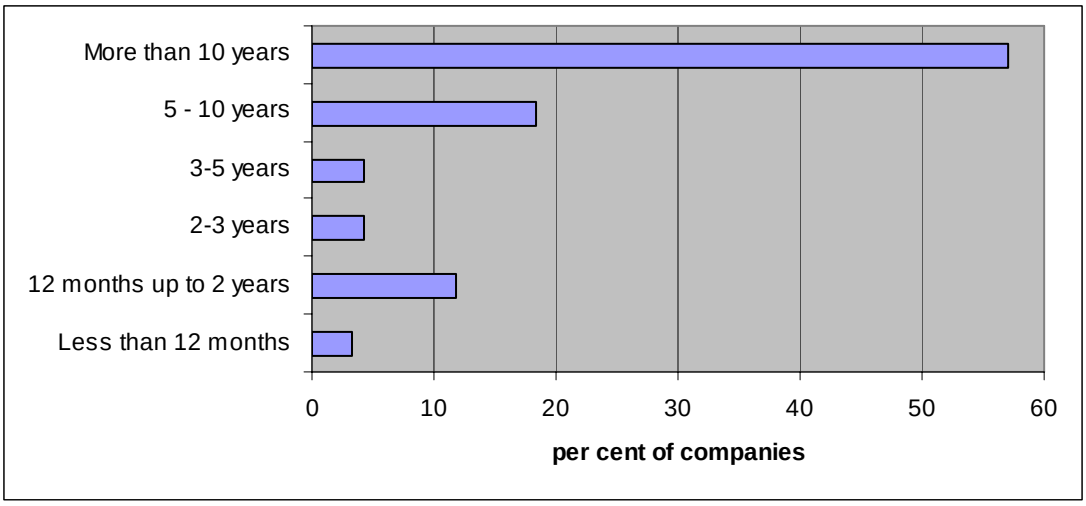
In general, establishments in the sample were small. Two thirds (67 per cent) employed less than 10 people in total. Large establishments were represented in the sample and around 13 per cent of businesses employed 100 or more people (and one establishment employed more than 1000 people in total. In total the 93 businesses employed 6030 people, of whom 5240 were directly employed in medical technology related activity. The high proportion of staff employed directly in medical technologies is a reflection of the

narrowness of the definition used to select the sample. This, of course, means that the businesses in the sample are 'mainstream' medical technology companies, but may also point to other businesses with a more limited involvement in the sector having been excluded.

Despite establishments being in the mainstream of medical technology production and service delivery, relatively few engaged in any research and development. Around three quarters (75 per cent) of businesses reported that they did not engage in R&D at all at that location. Of these, only 21 per cent reported that R&D took place elsewhere in the organisation at another location. Mostly such research and development took place in another branch outside of Scotland or in the Head Office of the parent organisation.

Companies in the sample were well-established Scottish businesses. More than half (57 per cent) had been located at their current address 10 years or more *(see Figure 7.1)* while just 15 per cent had been at that address for less than two years. Even where businesses had been at their current address only a short time, they had mainly relocated from elsewhere in Scotland. Around 93 per cent of companies reported that they had always been located in the Scotland.

Figure 7.1 Duration of location in Scotland



Source: AWM Survey of Medical Technology workplaces (IER/IFF)

7.3 Business context

The median value of sales in businesses sampled was around £1.5 million, but there was substantial variation around this figure. Around 32 per cent of the sample reported sales of medical technologies of less than £500,000 a year. The businesses surveyed were very dependent upon the NHS as a market for their products and services. Almost three quarters (72 per cent) were supplying directly to the NHS with 13 per cent supplying other manufacturers, and 11 per cent supplying distributors. Around 80 per cent of all businesses reported that at least some of their products or services were subject to the approval of a regulatory authority (and 20 per cent said none of their products were so regulated). In most instances, such regulation applied to all or almost all products and services (92 per cent of business subject to regulation).

The nature of the market in which businesses operated was established by means of a series of statements which respondents were asked to score. The responses indicated that most companies regarded themselves as high volume producers (29 per cent of businesses described themselves as such with others close to such a view), engaged in the production of complex products (29 per cent scored their product or service as 'highly complex'), using production systems that were 'state of the art' or close to it and were only moderately automated, selling a product or service that was relatively insensitive to price

(13 per cent reported that sales were not dependent on price) and were thus operating in a premium market.

Just over half (55 per cent) of businesses reported that sales of medical technology products and services had increased in the previous 12 months. A further 29 per cent reported no change in sales over the same period. Only 10 per cent of businesses reported that their sales had decreased. The average increase was of the order of 21 per cent while the average decrease (where applicable) was just 67 per cent. This relatively buoyant business performance was reflected in expectations of future sales. Over a third of companies (38 per cent) reported that they thought the market for medical technologies would increase slowly over the next two to three years and around 16 per cent said it would grow rapidly. A further third (33 per cent) expected their market to remain stable. Only 6 per cent expected sales to decline in the future.

Figure 7.2: Perceptions of business context

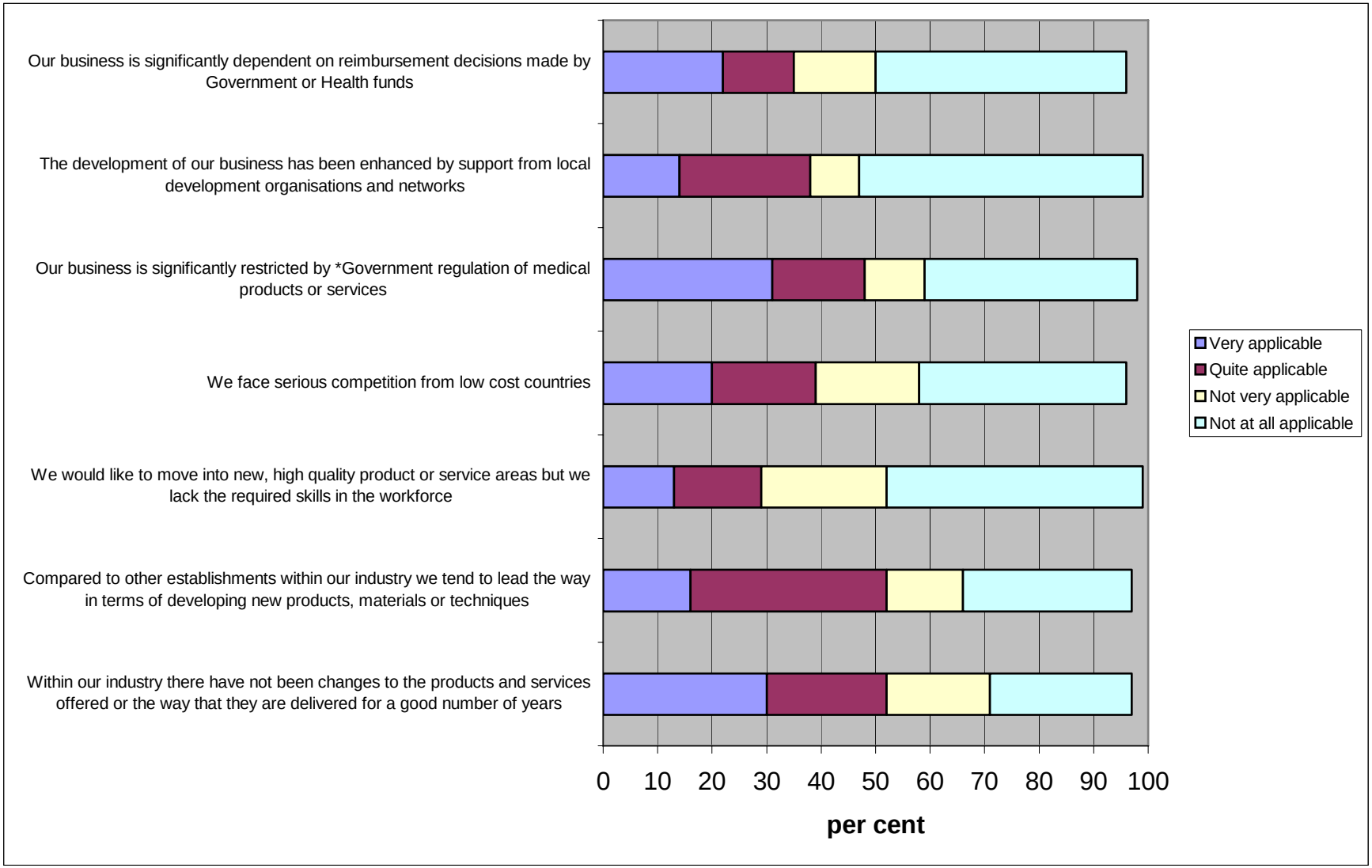


Figure 7.2 provides information about how employers see their product market position based on scoring of statements about their activities. Responses by Scottish businesses concerning their market position indicates the following broad messages:

- reimbursement decisions made by Government or health funds are not of critical importance to most companies;
- support from local agencies has not been central to the development of business for majority of respondents;
- skills are not a barrier to entering higher value markets for a majority of respondents;
- a majority of respondents felt that their business is leading the way in their market;
- although less than half of respondents felt that their business was significantly restricted by Government regulations, around a third felt this to be very applicable in their case.

7.4 Employment and recruitment

Table 7.2 provides information about the size of workplaces that comprise the medical technologies cluster in Scotland. Overall, the cluster is characterised by a large number of small organisations and a few large employers. In this respect the cluster is no different to the size structure of establishments in Scotland as a whole.

Table 7.2
Size structure of medical technology workplaces in Scotland

Number of employees	All employment	Medical Technologies
1 - 4	47	55
5 - 9	19	14
10 - 24	7	8
25 - 49	5	4
50 - 99	9	10
100 - 199	4	2
200 - 499	5	5
500+	3	2
Total	100	100

Base: all respondents
Source: AWM Survey of Medical Technology workplaces (IER/IFF)

Because some workplaces were simultaneously engaged in the production of non-medical devices, employers were asked to state how many people they employed overall and how many they employed solely in the production of medical products. The presence of large establishments in the sample had the effect of raising the mean size of establishment to around 64 people, of whom around 56 (on average) were engaged directly in medical technologies activities.

Figure 7.3 shows the occupational structure for the medical technology sector across the Scottish sample. The chart illustrates the fact that almost half (47 per cent) of the workforce covered by the Scottish sample was semi-skilled plant and machine operatives while 20 per cent were skilled trades occupations. The other major occupational group is that of professional scientists and engineers. Management occupations and other occupations each accounted for around 7-8 per cent of the medical technology workforce. It is to be expected that the preponderance of semi-skilled operative employees in the workforce will be reflected in a

correspondingly small proportion of the workforce holding degree level qualifications. Nonetheless, it is striking to note that less than a third of businesses in the Scottish medical technology sector employed anyone with a degree in either a clinical/medical subject or in engineering and science. It might be surmised that this dearth of graduate employment could be explained by the low levels of research and development in the businesses sampled. This is not the case as the proportion of firms with no graduates in science/engineering or clinical/medical subjects is approximately the same.

Figure 7.3
Occupational structure of medical technology employment in Scotland

Source: AWM Survey of Medical Technology workplaces (IER/IFF)

7.5 Trends in employment

During the 12 months prior to the survey, the total level of employment in the 93 medical technology companies surveyed increased by 284 employees. This represented an average (mean) increase of around three employees per company. In fact not all businesses enjoyed employment growth, some were expanding (23 per cent), some were declining (12 per cent) while in the majority (66 per cent) employment was unchanged. The overall increase in employment observed over the 12 months was the net result of an increase of some 486 employees in expanding businesses (an average of 23 additional jobs per business) and a fall of around 202 jobs in contracting firms (an average of around 18 jobs lost).

When asked how they expected employment to change over the next two to three years, employers were slightly more optimistic than might be suggested by current experience. While half (50 per cent) reported that employment would stay the same, around 29 per cent thought

employment would increase a little, while a further 18 per cent thought that employment would increase a great deal. Only 3 per cent of companies though that employment would decline over the next two to three years (this contrasts with the 12 per cent for whom employment had actually declined in the previous year). These expectations of employment growth probably reflected current production conditions. Half (50 per cent) of all companies reported that they were currently working at full capacity and a further 10 per cent reported that the establishment was working at 'overload'. Only a third of businesses (33 per cent) reported being somewhat below full capacity.4.

Labour turnover was in the region of 20 per cent per annum, with redundancy (mentioned by 25 per cent of employers) and better pay available elsewhere (mentioned by 32 per cent) being the main reasons people had left companies. Turnover arising from a lack of prospects for career development was also mentioned by around 19 per cent of employers.

Around 40 per cent all companies surveyed reported that they had vacancies for staff during the past 12 months and a similar proportion said they had recruited at least one person during that period. The number of vacancies during the 12-month period was around 18. Where vacancies existed, almost half (46 per cent) of companies reported that some of those vacancies had been 'hard-to-fill' (18 per cent of all employers).

7.6 Skill needs

The main skills which companies found difficult to recruit – mentioned by 12 per cent of businesses - were:

- management skills;
- technical and practical skills;
- clinical and medical skills.

Generic skills such as numeracy, literacy, communication and team working were also mentioned, albeit to a lesser extent (6 per cent of employers mentioning such skills as difficult to secure). No employer reported difficulty in recruiting people with engineering or scientific skills, foreign language skills or product regulation.

A variety of reasons were suggested by employers for their recruitment difficulties in the external labour market. The most frequently mentioned were:

- not enough people were interested in this type of work;
- a low number of applicants generally;
- poor terms and conditions compared to other jobs;
- poor career prospects;
- a lack of people with the type of prior work experience demanded by employers.

The impact of not possessing the skills required were reported as leading to a number of problems and costs for firms. The most direct impact of such shortages was to increase the workload of other staff in the enterprise. Such increases in workload and, in some cases, a lack of staff could explain the impact of such shortages on other aspects of the business. Half of all employers with hard to fill vacancies (55 per cent) reported that such shortages had increased their operating costs, 41 per cent reported difficulty in introducing new working practices, 35 per cent reported difficulty in meeting customer service requirements and 29 per cent reported lost orders. While less immediate, such shortages were also reported to result in delays to the development of new products and services which were likely to have longer-term consequences.

Business that had experiences difficulty in recruiting had responded in a number of ways. Increased amounts of training, expansion of trainee programmes and expanded recruitment channels were commonly reported. Around two thirds or more of businesses reported these types of response to recruitment difficulties. This suggests that where recruitment difficulties were encountered, firms relax their hiring standards and train recruits to match company needs. This is consistent with the finding that only 21 per cent of all businesses surveyed said that their preference was to recruit people who already possessed skills relating to medical technologies, whereas 42 per cent said they were willing to take on people and train them to meet their specific requirements. Redefinition of jobs and increase pay were also common responses to recruitment difficulties but not to the same extent as increased training.

Where people have been recruited into a business, the main source of recruitment was from the workforce of other Scottish businesses. Around 42 per cent of businesses surveyed had recruited from other Scottish medical product and service companies and 68 per cent from other industries in Scotland. Where recruitment was from other industries, it was most commonly from general engineering, commerce and, to a lesser extent, from instrument and fine engineering. Quite a large proportion of businesses (39 per cent) reported that they would be willing to source recruitment from outside the UK, but 58 per cent reported that they would not do so.

7.7 Proficiency of existing staff

In general terms, employers reported high levels of proficiency amongst their existing staff, although more senior staff tended to be considered the most highly proficient at their job. But overall, all staff groups were rated on average to be above full proficiency at their current job.

The proportion of staff judged by respondents to lack full proficiency was small (around 3 per cent) in all occupational groups except that of plant and machine operatives where the proportion was assessed at 14 per cent. Despite this finding, the most commonly mentioned skills lacking in the current workforce were judged to be general management skills and production management together with administrative skills. Communications skills and problem solving were also mentioned by respondents. The most commonly mentioned reason for staff lacking proficiency was a lack of training by employers and, to a lesser extent, a lack of work experience amongst new recruits. These results can be regarded as indicative but it should be borne in mind that the findings are based on responses from a very small sample and cannot be regarded as robust estimates for the general population of medical technology businesses in Scotland.

Overall, 51 per cent of respondents thought that their staff was quite well placed to meet the product market challenges of the future and 38 per cent believed their workforce was very well prepared for the future. Despite this, around 55 per cent of employers reported that the skills they required were not readily available in their local labour market and a further 11 per cent felt that it depended upon the skills in question. Only 29 per cent were confident that the skills their business would require in the future were likely to be readily available. Around a third of respondents (33 per cent) reported that they foresaw some skills being difficult to obtain in the future.

7.8 Further evidence from the case studies

Six case studies were undertaken to illustrate particular features of the Scottish labour market for medical technologies. The case studies illustrate a number of features of medical technology companies in Scotland:

- there are a number of niche producers engaged in the manufacture of relatively high value-added goods;

- assembly plants which are not engaged in the production of IPR but provide an important source of employment;
- engineering companies that have diversified into medical technologies as their main markets have declined. For some companies this provides an opportunity to capture relatively high value-added markets although there are risks associated with doing so.

The case study of an ultrasound manufacture illustrates how companies operate in niche markets and the skill needs at a management level required to operate in this market *(see panel)*. Other case study evidence of niche production in medical technologies in Scotland collected by the research team confirms this situation.

Case Study: Ultrasound manufacturer

The company is 20 years old and produces ultrasound technologies for use on animals and imports and distributes ultrasound equipment. The company occupies a niche product: its goods are sold at the premium end of the market. The company recognises that the market for its goods in its main markets (UK, Ireland) is nearly saturated and has developed export markets. It exports mainly to NZ, Australia, and the USA.

Business is going well. The company has expanded from 18 to 25 people over recent years. To maintain growth the company aims to bring out a new product every 18 months to take advantage of technological developments. The MD (who is also the chief designer) and the designer have responsibility for this. The company tends to contract some elements of manufacture (such as software, packaging, mechanical design) because the volume is insufficient to justify the business in-house.

On the shopfloor there is a mix of technicians (electronics) typically with HNC/OND, mechanical fitters (apprenticed), and assembly workers (semi-skilled). Most are in their 40s/early 50s and have been with the company for all of its 20 years.

The key is to keep developing new products. The two designers have a feel for technical advances and what this might mean for their product range, and their sales staff report back about what customers want. The design team also maintain contacts with local universities. They also network as best they can, such as with Trade Partners UK. This tends to bring a round of e-mails in from companies looking for partners most of which come to nothing, but it is important to stay as networked as possible to capture opportunities.

Source: AWM Medical Technology Case studies (IER)

The example of the assembly plant illustrates the skill needs that arise when production is required to meet stringent quality criteria, but involves repetitive tasks *(see panel)*. Other case study evidence of assembly production in medical technologies in Scotland collected by the research team confirms this situation.

Case Study: Assembly Plant

The company has its headquarters in North America. The plant has been located in Scotland for 21 years and is engaged in manufacture of tubing and bowls for collecting blood and salvaging blood in operations. These tubes and bowls are attached to machines that are manufactured by the company in the USA.

The site supplies markets in Europe and Japan. The products are produced in a clean environment with staff wearing protective suits, masks, rubber gloves so as to protect the patient. Quality standards have to be high otherwise they are returned or cause problems during medical

There have been recruitment problems in relation to production work: this is semi-skilled work involving repetitive, intensive tasks of joining and packing tubing. But it requires stringent quality standards to be maintained. There is a skills matrix that identifies where staff are skilled.

Labour turnover is thought to be high because of the nature of the work (working in a clean environment can be claustrophobic).

The company gives applicants a personality test (Hogan Performance Index) and a dexterity test. The company feels that the stringent recruitment criteria are needed because of the high level of quality control required.

In return, the company will provide six monthly reviews where wages can be increased by up to three per cent for good performance (the average is 2 per cent of those that are awarded increasess) and there is a contributory pension scheme (3 per cent from employees, 6 per cent from the company for manual workers).

Source: AWM Medical Technology Case studies (IER)

The case study of the engineering plant illustrates how medical technologies provide an opportunity for engineering companies to diversify into a growth market (see panel).

Case Study: Manufacturer of filters

The company produces filters for a range of devices. Has a long history of producing filters for the medical sector but have not produced much for this market until relatively recently.

Over recent years the business has been in decline: From 450 employees in the mid-1990s to 100 today. This has been caused by price competition. The company has lost a number of manufacturing contracts and is now in a transition phase where it will concentrate more on niche markets rather than mass production. The company cannot compete with the price levels of China and in future will withdraw from manufacturing and move more into design and development of prototypes.

Company now designs products according to manufacturers wishes but is also involved in some innovative developments of their own which are made possible by public funding and links with universities.

This will be a challenging transition for the company since it requires a change in skills mix: it needs design people who are inventive and innovative and who also possess a degree of business acumen. There is a need to design to cost otherwise the company loses money. This has happened in the past. The company “lost a lot of good people in contracting in size”.

Medical technologies are an important part of the future for the company. They are returning to a sector they have experience in from the past, so hope that they will be able to trade on this credibility.

Moving into medical devices does not represent a big skills challenge for the company. There has to be recognition that the design has to be right first time because they are being applied to patients there is much less scope to correct the product as it beds in. But other than this there are not many major challenges for the existing workforce. It is more about how the company develops itself in a niche market by developing people to be flexible, innovative, and show initiative. All ideas are worthy of consideration so there is a need to be open minded. There also has to be recognition that only 1 in 10 designs will make it through to production.

Source: AWM Medical Technology Case studies (IER)

C: CONCLUSION

8. Conclusion

The West Midlands and Scotland results reveal the following:

- much activity is concentrated in small and medium sized enterprises;
- whilst many organisations are engaged solely in the manufacture of medical technologies there are a number of organisations where it is a subsidiary activity;
- the range of products manufactured in the West Midlands is wide with little evidence of specialisation;
- skill needs are quite modest for the time being, although companies felt that any further expansion might to be limited if they were looking for skilled, experienced staff;
- the skills required across the occupational spectrum were not medical technology specific, rather organisations were looking for people with experience in manufacturing.

The key issue in relation to the West Midlands is whether - as previous research has indicated and as documented in the Benchmarking Report – too much activity is concentrated in relatively low-value activities. The Synthesis Report considers this in greater detail against the evidence collected from the other case study areas. At this juncture it is worth pointing out that there are a number of organisations in the region which are engaged in the production of high value