

## FOREWORD

As Australia moves forward into a new era of high technology, new approaches to manufacturing and logistics, and a revolution in information technology and communications, the knowledge, skills and initiative of the workforce will be a determining factor for the competitiveness of Australian industry. However our potential competitiveness may well be limited by emerging quite severe skills shortages.

If Australian industry is to build its competitiveness, there are some big issues that the training system and industry must address, particularly the escalating rate of technological and workplace change and new ways of doing business such as e-commerce, sophisticated production and logistical chains, and the management of costs.

The Australian Industry Group sees the maintenance and development of Australia's skills base as a vitally important issue. The significance of training to Australia's productive capacity was identified in our watershed report "*Make or Break*" and was explored more fully in our subsequent study "*Training to Compete*".

The Ai Group places considerable importance on skills development and accordingly I was delighted to accept the invitation from the Minister for Education, Training and Youth Affairs, the Hon David Kemp, to manage the Engineering Skills Shortages project to give an industry view on issues, impediments and solutions in relation to shortages in the skill sets of the engineering trades. The report which has been prepared is a considered and comprehensive review of previous research and the current situation relating to skills shortages.

It is important to acknowledge and express appreciation to the Working Party for their focus and professionalism, and in particular the Working Group Chairperson, Richard Winter (Email Limited). His leadership and insight together with the strong industry skills focus have given great depth to the report. The industry representatives: Sue Hoskings (AEMS), Colin Anderson (BTR), and Mark Paris (Easy Metal Products) have taken time out from their individual enterprises to work on this project for the benefit of industry generally. Andy Smith (National Centre for Vocational Education and Research) has been a great source of valuable information to the project. I acknowledge and thank each of them for their contribution.

The Engineering Skills Shortages Working Group and the Australian Industry Group have developed this report to lay the path for a joint Industry / Government approach to engineering skills development in Australia. I am proud of the role the Australian Industry Group played in the development of this report, and commend it to Government and industry. I look forward to the Australian Industry Group taking a lead role in implementing its recommendations.

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# ENGINEERING SKILLS SHORTAGES

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# 1. EXECUTIVE SUMMARY

Australia's education systems are essential to the continued development of the skills and knowledge required in the modern workplace. Training Packages are a key tool in skills development, and it is important to continually refine both the tool, its utilisation, and its integration with the total spectrum of education and work in Australia. It is essential that Industry and Government work together to develop the skill capacity Australia must have in order to compete at a global level.

Governments and Industry have undertaken substantial work to develop a vocational education and training system that will respond to skills shortages and deliver training flexibly, and customised to employer requirements. The past ten years have seen the establishment of Training Packages, the National Recognition Framework, and considerable progress towards the concept of a "one-stop-shop" for employers seeking to interface with the vocational education and training system.

This report was undertaken as a result of concerns of the Australian Industry Group, and the Minister for Education and Youth Affairs, Dr David Kemp over the high level of skills shortages that industry is experiencing despite these reforms. The Australian Industry Group convened the Engineering Skills Shortages Working Group, at the Minister's request to:

- undertake research and/or provide evidence of research that demonstrates the benefits to employers of investment in training
- identify the skill set needs of each occupational area now and in the future (3-5 years) including common cross industry skill sets
- identify the impediments and/ or barriers to satisfying these needs and,
- recommend initiatives and solutions (short, medium and long term) which may assist in addressing the needs.

This report is the outcome of the Working Group's research and advice on these terms of reference<sup>1</sup>.

## Skills in Shortage

Identification of skills shortages is not a simple exercise. This report indicates some major problems with information systems currently used to identify skills shortages. For example, it is difficult to generate a precise and reliable picture of regional skill needs. Further, current systems cannot determine whether employers experiencing skills shortages are seeking an additional person to fill a vacancy, or simply a specific skill their workforce does not currently have. This information is crucial to informing a targeted and effective response to skills shortages.

Key skill needs identified by this report were in generic core skill areas such as communication, team work, literacy, numeracy, computer/IT skills and personal attributes such as capacity to learn, independent problem solving. High levels of shortage were identified across the three engineering streams of mechanical, fabrication and electronic. Shortages are particularly severe at the higher trade levels of electronic engineering, and welding skills, tool making, and in computer aided design and machining, and in the use of computer numerically controlled processes.

## Barriers to meeting skill needs

The major barriers identified by the report relate to:

- difficulties in recruiting apprentices, which arise from demographic pressures, a lack of understanding of career opportunities within manufacturing, and a lack of key skills within the recruitment pool;
- a need for better information on recruitment alternatives including skilled migration alternatives, and best practice recruitment and selection techniques;
- insufficient support for training at a prevocational level;
- rigidities in regulatory and administrative requirements relating to apprenticeships and traineeships, and difficulties in accessing the training and regulatory and administrative systems generally;
- insufficient flexibilities in delivery and assesment of training, particularly in relation to work based delivery, and recognition of prior learning;
- insufficient support for re-skilling and up skilling current employees;
- the costs of training, and a need to promote the benefits of training to employers;
- inadequate remote and regional access to training;
- a growing dependence on small contractors and labour hire companies as a short term source of skilled labour, in contrast to maintaining all competencies internally.

## Solutions to skills shortages

The Working Group took a strategic approach in developing solutions to these barriers, and identified six key objectives. A broad range of strategies are recommended as means by which the objective can be achieved. The objectives are to:

- make a long term paradigm shift in how the industry is perceived to establish a broad understanding of manufacturing as hi tech, a developer, designer and user, of information technology tools, and as a global industry, with great opportunity for career and financial reward;
- build a training culture within the industry that will support continual development of skills;
- build on the existing skills of the workforce;
- expand the provision, variety and uptake of pathways into apprenticeships;
- ensure the ready availability of high quality, consistent and timely information on skills shortages and Registered Training Organisations' responses to skill needs;
- improve outcomes from recruitment solutions to skills shortages.

Many of the strategies that sit under these objectives are well within the capacity of the training system, and are supported by the recent reforms of the National Recognition Framework and the New Apprenticeship System. The Working Group see a key role for the Australian Industry Group to work with governments and employers in taking up the strategies to develop and support the skill pool essential to Australia's competitive abilities in the global economy.

## 2. INTRODUCTION

In September 1999, the Minister for Education, Training and Youth Affairs, the Hon, Dr David Kemp, MP held a meeting with peak industry organisations, including Australian Industry Group, Australian Chamber of Commerce and Industry and the Business Council of Australia, to discuss issues relating to skill shortages.

In recognition of the particular problems related to the traditional trade areas, the Minister established three working groups to consult widely and provide further advice and recommendations. The working groups cover the engineering, electrical contracting and automotive trades.

### 2.1 Working Group

The Australian Industry Group (Ai Group) managed the Engineering Working Group.

The working group was chaired by Mr Richard Winter, National Training Manager, Email Ltd. Its membership included company representatives from the mechanical, fabrication, and electrical and electronic areas. These included the Australian Electronic Manufacturing Services, BTR Engineering-Fairfield and Easy Metal Products. Membership also included the following government and industry bodies: the Department of Education, Training and Youth Affairs (DETYA); the Department of Employment, Workplace Relations and Small Business (DEWRSB); the Australian National Training Authority (ANTA); the National Centre for Vocational Education and Research (NCVER); the Australian Chamber of Commerce and Industry (ACCI), and the Metal Trades Federation of Unions (MTFU).

### 2.2 Terms of Reference

Each of the working parties had the following terms of reference:

- Undertake research and/or provide evidence of research that demonstrates the benefits to employers of investment in training;
- Identify the skill set needs of each occupational area now and in the future (3-5 years) including common cross industry skill sets;
- Identify the impediments and/ or barriers to satisfying these needs and;
- Recommend initiatives and solutions (short, medium and long term) which may assist in addressing the needs.

### 2.3 Purpose

The purpose of this paper is to act as a basis by which employers, industry groups and registered training organisations can provide advice to the Commonwealth Government on skill shortages in the engineering industry.

The paper is being developed on an on-going basis to facilitate consultation. It will be used as a basis for discussions in a national industry forum, to be held in late April 2000.

## 3. METHODOLOGY

This paper has been developed through a combination of consultations, desk research of previous related studies and surveys of manufacturing employers, labour hire companies and Registered Training Organisations. Given the extensive research already conducted in this area, the paper aims to consolidate existing knowledge and generate new empirical information in strategic areas, such as differentiation between labour and skills shortages, the involvement of labour hire companies in skills development and impediments to Registered Training Organisations in meeting employer training requirements.

### 3.1 Existing Research

Key reports examined in preparing this paper included:

- *Training to Compete*, 1999. This report undertook a national study, involving a survey, focus groups and interviews to gather the views of over 350 companies;<sup>2</sup>
- *Study of Engineering Skills Shortages in Queensland*, 1998, surveyed 259 Queensland firms;<sup>3</sup>
- *On the Brink of Crisis?*, 1997, undertook a qualitative survey with more than 100 employers in Victoria, and discussions with educators, training providers and unions;<sup>4</sup>
- *Northern Territory Skills Shortages Report*, 1997. Research for this report interviewed and undertook regional workshops involving a total of 339 employers and other relevant groups.<sup>5</sup>

Other research examined includes:

- State MERS ITAB VET plans
- Engineering Skills Training Board (Victoria) – Skills Profiles Documents
- DEWRSB statistics
- NCVET data
- *Hunter – Clever Region*, Report for DEWRSB<sup>6</sup>

### 3.2 Consultations

The consultation process involved:

- Requests for input from a wide range of industry bodies in December 1999;
- Meetings with regional and section committees of Ai Group and member organisations of ACCI. Ai Group conducted a total of eleven industry forums across Queensland, NSW and Victoria.

## 3.3 Survey of Employers

Ai Group developed a survey instrument to develop employer information on:

- current skills gaps;
- both labour shortages and shortages of particular *skills* utilising the Metal and Engineering Industry Competency Standards;
- current means of satisfying skill needs; and
- employer support for solutions to skill shortage problems in the engineering trades.

The survey was mailed to employers in February 2000, involving Western Sydney members of Ai Group and ACCI members in regional areas in Queensland. In addition, Ai Group and ACCI conducted telephone interviews with members across the range of industry sectors and areas within NSW, Queensland, Victoria and South Australia.

A total of 262 firms responded to Ai Group's survey, the majority of which (68%) were small to medium sized enterprises, with less than 100 employees. 110 members of ACCI organisations responded to the survey. Largely, findings were similar although there were some differences that are noted throughout the document. Given the size of the sample, differences should not be regarded as statistically significant, more an indicator that more work is required to generate a consistent picture.

A report of the results of the combined Ai Group/ACCI survey is at Appendix 1.

## 3.4 Survey of TAFE

Ai Group undertook a national survey of the TAFE systems to determine their ability to respond to industry skill demands, as the major providers of training in engineering trade skills. The response to this survey highlighted significant difficulties in obtaining information which would enable monitoring and evaluation of the implementation of reforms such as flexible delivery and Recognition of Prior Learning, and responsiveness to skill demand. The results of the survey are integrated throughout the body of this paper. Survey results are included at Appendix 1.

## 3.5 Sample Survey of Labour Hire Companies

Ai Group interviewed and surveyed two major labour hire companies to identify skill shortage areas and point to methods used by labour hire companies to respond to skill shortage issues.

## 3.6 National Forum

Ai Group hosted a national forum, consisting of fifty representatives from enterprises, industry organisations, Group Training Companies, labour hire Companies, training providers, State Training Agencies, DETYA, DEWRSB, NCVET and ANTA, was held on 10 March 2000.

The forum raised a number of issues consistent with those raised in this paper, and focussed on solutions to these issues. These have been woven through the text of this paper.

A copy of the notes taken from the forum is at Appendix 3.

## 4. TERM OF REFERENCE: BENEFITS OF INVESTMENT IN TRAINING

*Undertake research and/or provide evidence of research that demonstrates the benefits to employers of investment in training.*

Studies of enterprise returns on training investment overwhelmingly indicate that firms recoup their investments in training, through raised productivity, which contributes to enterprise performance. Recent employer surveys within Australia indicate that, in general, employers have an understanding of the link between productivity and training. The Ai Group report: *Training to Compete* found 71% of companies who responded identified a strong link between their decision to train and their competitive edge. In addition, 75% considered that in the next three to five years, training would be “an essential competitive tool”. Of the companies identified in the report as “best performing companies”, these figures increase to 81% and 82% respectively.<sup>7</sup>

A recent survey of 400 NSW employers in the manufacturing sector by Australian Business in NSW revealed that 93% of companies are investing in some training for their staff. This compares with an equivalent figure of only 68% for the manufacturing sector reported by the Australian Bureau of Statistics in 1997.<sup>8</sup>

There are, however, two problems with studies that try to find a link between investment in training and benefits to the enterprise. Specifically, it is difficult to separate the impact of training on enterprise outcomes from that of other variables, and it is also difficult to establish whether training is a determinant of enterprise success or occurs as a result of it.<sup>9</sup>

These issues aside, there have been numerous studies overseas and some within Australia, which have attempted to establish a clear link between training and improved performance.

The NCVET has prepared a paper outlining the methodology and findings of a range of research papers exploring the link between productivity and training. Key findings of this paper are that:

- US research strongly indicates high and quantifiable returns to enterprises that invest in employee training programs. These benefits will be experienced at the enterprise level in the form of increased labour productivity and involve rates of return of over 30 per cent. These findings are being replicated in Australia where preliminary results show that Australian enterprises may experience lower wage bills and higher productivity growth as a result of their training activities;
- rates of return for specific training programs may be far higher than 30 per cent. Australian evidence indicates that returns of over 1,000 per cent may be experienced by firms undertaking training in specific areas such as health and safety;

- training investments may also pay off in a number of ways other than simple productivity or cost reduction benefits. The NIESR<sup>10</sup> research shows that training produces a higher level of flexibility in the workforce resulting in an enhanced ability to cope with technological and organisational change. This gives high training enterprises a strategic advantage over time;
- intermediate skills are important to the prosperity of an enterprise, as demonstrated by the NIESR. Such skills are often gained through the public VET system rather than through in-company training. The VET system is a critical source of skills for high performing economies and high performing enterprises;
- training is most effective when undertaken as part of the introduction of high performance work practices<sup>11</sup> and as part of a “bundle” of innovative human resource policies. High performance enterprises are significant investors in the training of their employees.<sup>12</sup>

The NCVER advises that there are four research projects currently underway which are addressing the issue of enterprise return on training investment in the Australian context.

So far the work appears to indicate that:

- training increases profitability, providing significant returns, although the level of return is not generally understood by enterprises;
- key variables impacting on enterprise profitability are training quality and quantity and the external labour market;
- training should be promoted as a part of a complex suite of business practices or as part of corporate strategy, if profitability goals are to be achieved;
- the benefits that arise as a result of training can be demonstrated at the individual training program/section level when outcomes of specific programs are studied.

It was noted at Ai Group's National Forum that neither these studies nor their results were well known amongst employers.

## 5. TERM OF REFERENCE: CURRENT AND FUTURE SKILL NEEDS

*Identify the skill set needs of each occupational area now and in the future (3-5 years) including common cross industry skill sets.*

In answering this term of reference the Working Group has looked at issues of both labour supply and particular skill shortages. It examined the following issues:

- the factors influencing skill shortages;
- the adequacy of current approaches to measuring skill shortages; and
- both the labour and particular skills identified in shortage across the country in both metropolitan and regional areas, from the various sources referred to in this paper.

### 5.1 Factors influencing skills shortages

An analysis of skill shortage issues requires an understanding of the factors that influence their development. The impact of many of these has increased in the past decade, particularly global competition, technological change and the sources of supply of skilled labour.

#### 5.1.1 Economic Factors

At a macro level, global competition is a key driver in reshaping industry and influencing the skills it requires. To compete in global manufacturing, industry must focus on making its products and services competitive not only domestically, but also internationally. New market areas, new products, new ways of producing and providing services are reshaping the skills required of the manufacturing workforce.

While the overall state of the economy strongly influences demand for engineering trades skills<sup>13</sup>, the most significant demand determinants are activity levels in the manufacturing, construction and transport sectors.<sup>14</sup> The nature of these industries, and particularly the trade exposed nature of manufacturing render employment subject to cyclical patterns. This cyclical nature of much of engineering trades employment is a major contributor to the skill shortages experienced. It also contributes to fluctuations in apprenticeship intakes. In times of downturn, employers tend to provide fewer training opportunities. This results in a diminished supply of newly trade qualified persons when the economy improves.<sup>15</sup>

## 5.1.2 Technological Change

While globalisation is a driving influence on skill requirements, technological changes appear to be the most significant factor impacting on skills required, making some older skills obsolete and rendering others critical.<sup>16</sup> The rapid speed of changes in technology makes it increasingly difficult for industry, and training providers, to keep pace with the changes in skills required.

## 5.1.3 Changes in Sources of Skilled Labour

Since the early 1990's, traditional sources of skilled labour in the engineering trades have changed dramatically. Contracting out, and labour hire companies are increasingly being used as labour solutions. Privatisation of public utilities has reduced the traditional training ground and supply of skilled labour for engineering trades, large companies are much more focussed on training for their own skill requirements, and there is little evidence to suggest that smaller employers have increased their training effort of apprentices. These factors have impacted on the pool of skilled labour available, and particularly for smaller and medium sized companies that traditionally relied heavily on these sources of skilled labour.<sup>17</sup>

Nevertheless, the mechanical engineering and fabrication trades workforce still constitutes a significant proportion of trade qualified employees in Australia, and in 1998 included 225,000 people. This amounts to approximately 2.5 percent of all employment in Australia. Mechanical engineering and fabrication trades are the second largest areas of employment in Australia's trades workforce (after construction), accounting for some 17 % of total trades employment in Australia.

## 5.1.4 Labour mobility

The transient nature of engineering trades employment across the range of sectors utilising engineering trade skills influences the development of skill shortages in a number of ways. It promotes the creation of skill shortages in smaller firms and the more trade exposed sectors that find it difficult to compete with the financial rewards offered by those in the less trade exposed sectors, projects and larger companies. The Engineering Trades workforce will move between sectors, between employers within sectors and across regions to those areas where pay and conditions are, at best, creating shortages of skilled labour from where they have come. These movements have shown to impact negatively on the skill pool in regions.<sup>18</sup> Labour mobility also impacts indirectly by providing a disincentive to using training solutions to prevent future skill shortages.

## 5.1.5 "Wastage" From the Trade

The mechanical engineering and fabrication trades have had average success compared to other trades in retaining qualified persons within the skilled trades workforce. Some 39 percent of qualified mechanical engineering and fabrication tradespersons are working in their trades, compared with only 38 percent for other trades.

"Wastage" is not necessarily a negative labour market event and can refer to career progression from trades positions to related positions that benefit the industry and the individual. The majority of those who have left are working in other areas of the labour market. Half of these have gone onto more highly skilled/managerial positions. Participants of the National Forum advocated that this information is a vital factor in marketing the industry and its benefits to potential entrants.

A number of tradespeople in the resource sector leave their trades to become operators of complex plant and machinery. This pattern is reinforced by higher rates of pay for operators. Forecasts are for low wastage rates in the mechanical engineering trades and higher rates in the fabrication trades in future.<sup>19</sup>

#### 5.1.6 Ageing of the Workforce

There has been an ageing of the engineering trade workforce resulting from a decline in numbers of young persons entering the engineering trades, and a reduction in workforce numbers. More than 37% of people working in engineering trades are 40 years or over.<sup>20</sup> With the retirement of this workforce will come the strong likelihood of skills shortages becoming more severe. There is a need therefore to address future supply of skilled labour now.

Notably, demographic projections show that the relative proportion of young people in the population will fall considerably over the next 20 years.<sup>21</sup> This means the source of new skills for the mechanical engineering and fabrication trades, as for all other occupations, will have to increasingly come from apprentices and trainees who are older when commencing a contract of training.

## 5.2 Current approaches to measuring skills shortages

To appreciate available skill shortage information, the way skill shortages are identified and measured must be considered. Measurement of job vacancies through advertisements in newspapers is the most common and regularly used method of obtaining information on skill shortages. Consultations and surveys conducted for this project, indicated that this method does not necessarily provide an accurate picture of industry skill needs.<sup>22</sup> Many companies report they use a variety of methods to meet immediate skill vacancies which do not include advertising in newspapers, such as use of word of mouth, labour hire companies or agencies.

Qualitative skill surveys are carried out at intervals by DEWRSB and other industry based organisations. While this provides more information about the nature of skill shortages it has a number of shortcomings:

- Firstly, as a measure of vacancies it does not accurately measure the appropriately qualified applicant pool. For example, if an employer reports that they had five “suitable applicants” for a position, there is no measure taken to determine whether the same five applicants are also applying for jobs with 10 other employers. In this way the size of the applicant pool may not be accurately reflecting skill shortages;
- Secondly, qualitative studies are often undertaken on an ad hoc basis or in response to identified needs, although this does not apply to the DEWRSB methodology.<sup>23</sup> This approach does not provide the basis for efficient and continual monitoring of industry conditions or needs;
- Finally, there are inconsistent methods of collection against occupational and skill categories which make it difficult to understand the true nature of the skills in short supply identify appropriate solutions. This aspect is worthy of further analysis.

Fundamental reforms have been made to engineering trades over the last decade in response to substantial changes in skill requirements, to increase workforce flexibility and enhance career paths. The previous large number of occupational titles (eg fitter, welder, boilermaker, sheetmetal worker, and machinist) were reduced in Federal and State awards into three main classifications supported by three new qualifications; Engineering Tradesperson (Mechanical), Engineering Tradesperson (Fabrication); and Engineering Tradesperson (Electrical/Electronic). A fourth trade has also been created called the Higher Engineering Trade providing additional training, leading to either a more core specialist or a multi-skilled outcome.

Despite these changes, many jobs are still advertised by old occupational titles and much of the data collected on skill shortages continues in these terms or by Australian Standard Classification of Occupations (ASCO) descriptors. The official collection statistics also continue to be reported against outmoded groupings of "metal trades" which is relevant only to a percentage of engineering trade occupations. This creates confusion and difficulties in reporting and interpreting skills shortages. New trades, such as the Higher Engineering trade, do not find their way into the analysis in any form.

Additionally, employers' perceptions of job roles vary considerably, and the key skills identified in an occupation by one employer may not be similarly identified by another. For this reason it is difficult to determine what specific skill sets or competencies are actually required in the workplace. Skill shortage information gathered using current methods is generic and needs to have a much tighter focus in identifying the competencies or groups of competencies in demand by enterprises.<sup>24</sup>

The most sophisticated analysis of projected skill shortage is undertaken by the National Centre for Vocational Education and Research (NCVER). However, these projections only take into account projected economic and employment growth data. Other factors, such as workplace and technology changes, are not captured in this analysis, which are increasingly becoming the fundamental determinants of skill needs. The traditional methods of determining skill and training demand by these two factors alone must be revisited if skill shortage issues are to be addressed in the future.

### 5.3 Skills Shortages

Acknowledging the shortcomings of the data, there is general agreement that there are skills shortages in engineering trade occupations.

The Australian Industry Group Training and Skills Survey found that a significant portion of companies are experiencing skills shortages "...with the most difficult problems anticipated at trades/ post trades levels"<sup>25</sup>. Training to Compete noted that "concern about shortages in critical skills is almost a constant among Australian companies, and internationally", noting, in support, a range of documentation including the Marshman and Wilson studies.<sup>26</sup>

ACCI has noted that it is "evident that employers view skills shortages as a critical issue overall", with shortages consistently referred to in its surveys as a significant barrier to investment, or an important matter that needs to be addressed by Government and industry.<sup>27</sup>

DEWRSB has advised that shortages of certain tradespersons are currently widespread in Australia, with the most significant national current and emerging shortages in areas that include "the Metal Trades and Electrical Trades".<sup>28</sup>

NCVER argues that the combination of commencements in New Apprenticeship training and the set of non-apprenticeship training pathways to the mechanical engineering and fabrication trades have been sufficient to keep pace with employment trends in the trades. However, they state that the preconditions for skill shortages are arising in certain trade occupations. This is particularly the case in specialised occupations such as metal fitters and machinists, toolmakers, steel welding and metal casting.<sup>29</sup>

The MTFU have identified a broad range of skill shortages and comment that "Given the decline in skill formation investment across the economy in general and in the engineering occupations in particular, it would not be prophesy to expect shortages in most occupational areas over the next five years".<sup>30</sup>

These views are not unique to Australia. A survey of American Manufacturers in 1998 identified shortages of engineering tradespersons.<sup>31</sup> In Europe, the Employers Organisation of the Metal Trades (WEM) has recently released a position paper on skill shortages.<sup>32</sup>

## 5.4 Identified Skill Shortages

Trade shortages are more evident in the larger states, reflecting the general labour market conditions. Whilst shortages are being experienced in regional areas nationwide, increasingly those in the eastern states are finding it difficult to fill skill needs. Despite the oversupply of engineering trades in the Hunter region resulting from closure of BHP, shortages are worsening in Sydney.<sup>33</sup> The subdued mining activity in the Northern Territory and Western Australia has led to an easing of engineering trade shortages. Demand is also declining in South Australia, but appears to be strengthening in Victoria.

For the purpose of this section the following occupational areas are included in the analysis under the three streams of engineering. For a listing of specific skills shortages in each of the streams and generic and higher level skills, see survey results at Appendix I.

### 5.4.1 Mechanical Engineering

This stream covers the occupational areas of:

- Airconditioning
- Fitter
- Locksmith
- Machinist – 1st Class
- Mechanical Tradesperson – Special Class
- Motor Mechanic
- Plant Mechanic
- Refrigeration mechanic
- Scientific Instrument maker
- Structural Steel Tradesperson
- Toolmaker

- Instrument Tradesperson
- Aircraft maintenance

Shortages have been identified in the following occupations:

- Engineering Tradesperson – Mechanical
- Metal Machinist
- Toolmaker
- Aircraft maintenance<sup>34</sup>
- Fitting<sup>35</sup>, also, see Appendix 1 for detailed breakdown of skill shortages in Machine and Process operations
- Maintenance and Diagnostics
- Air conditioning mechanics

and also, expertise in CAD/CAM<sup>36</sup>, CNC<sup>37</sup>

Projected shortages have also been identified for pipe fitting, rigging and construction fitters with rising investment in infrastructure and commodity processing.<sup>38</sup>

### 5.4.2 Fabrication Engineering

This stream covers the occupations of:

- Boilermaker
- Moulder
- Patternmaker
- Sheet metal Worker – 1st Class
- Welder – Special Class
- Welder – 1st Class

Across the eastern states advertised vacancies for “metal fabricators” have increased markedly in the last 6-8 months.<sup>39</sup> Shortages have been identified in the following occupations:

- Metal Fabricator (Boilermaker)
- Welder
- Sheetmetal Worker (first class)<sup>40</sup>

and in the following skills:

- high levels of welding skill
- working to very fine tolerances
- assemble fabricated components
- weld using gas tungsten arc welding
- reading drawings.<sup>41</sup>

#### 5.4.3 Electrical/ Electronic Engineering

This stream covers the occupational areas of:

- Refrigeration Mechanic
- Electrical Instrument maker and/or Repairer
- Electrical Fitter
- Toolmaker
- Scientific Instrument Maker
- Electronics Tradesperson
- Electrical Mechanic
- Instrument Tradesperson
- Structural Steel Tradesperson
- Electrician – Special Class

Shortages have been identified in the occupation of Refrigeration Mechanics<sup>42</sup>, Electrical Fitter and Electrician – Special Class. In the electronics field, the following skills are in shortage:

- testing requirements
- systems analysis
- component knowledge
- reading of schematic works
- electro technicians
- open track analysis.<sup>43</sup>

#### 5.4.4 The Higher Engineering Trade

This is a new trade established to meet the demand created by the continued introduction of new technology and work for either a multi-skilled or highly specialised tradesperson. In some areas there has been a higher take up of the apprenticeship, particularly where the trade is supported by

registered training organisations. With increasing concentration of automotive and plant servicing into larger units, along with the increased use of electronic technology shortages in this area are projected for the future.<sup>44</sup>

## 5.4.5. Higher Level and Generic “Core” Skills

When taking a more sophisticated approach to the analysis of skills shortages it is clear that generic “core” and higher level skills are also in short supply. These include core skills (such as literacy, numeracy, computer/IT skills), interpersonal skills (such as team working, communication skills) and personal attributes (such as capacity to learn, independent problem solving).<sup>45</sup> A particular shortage has been reported through the Ai Group Survey in Occupational Health and Safety. Further, the survey indicates that of the respondent employers experiencing skills shortages, 16 percent had skills shortages at post trade level and 12 percent were experiencing shortages at higher levels such as lower technician, advanced trade levels. The ACCI survey results were higher in this area, being 32 percent and 30 percent respectively.

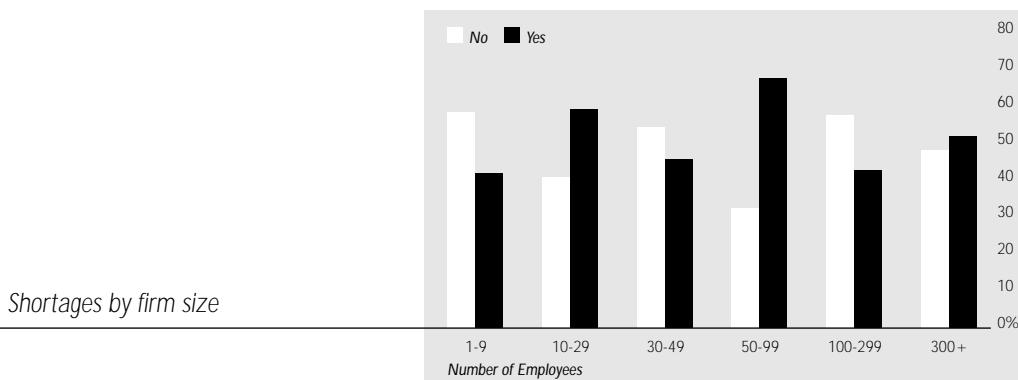
It is notable that 36 percent of firms (ACCI report 47.7%) responding to the employer survey undertaken for this paper reported that their shortages related to specific skills, rather than occupational shortages. The main skills reported to be in short supply are listed in Appendix 1. The majority of the skills in short supply relate directly to machine and process operations, where the 46 firms reported 296 incidences of skills shortages. A number of these skills shortages relate directly to skills required in the utilisation of NC/CNC machines and processes.

Post trade and higher order technician levels skills including detailed design skills have also been identified as skills in short supply.<sup>46</sup>

Listed on page 20 is the latest available information on skill shortages in each of the major states. This information is obtained from ITAB surveys.<sup>47</sup>

## 5.5 Shortages by Firm Size

Employers report that larger, well-known firms are more likely to be able to attract potential employees and apprentices. However, skill shortages appear to be reported by all sizes of enterprise. The survey conducted by Ai Group for this project, for instance, shows no correlation between firm size and proportion of firms reporting skills shortages (see graph below).



## 5.6 Shortages by Sector

The survey conducted for this project considered shortages by sector. The results showed that 93% of firms in the airconditioning industry reported shortages, 67% of electrical engineering firms reported shortages, and 62% of firms in the metals and engineering sector reported shortages.

### Industry Sectors Reporting Significant Shortages

Sector	Proportion of firms reporting shortages
Ai Group survey	
Airconditioning	93%
Electrical Engineering*	67%
Metals & Engineering	62%
Construction	60%
Automotive	55%
Labour Hire*	50%
Printing*	50%
Rubber & Plastics	50%
Textiles, Clothing & Footwear*	50%
Electronic Manufacturing	44%

\* Industry sectors with samples of 5 or less firms

## 5.7 Regional and rural issues

Detailed and quantitative information on skill shortages in regional and rural areas is difficult to obtain. Data is not systematically collected on a regional basis. Information of a qualitative nature is gathered by Industry Training Advisory Bodies for inclusion in their VET Training Plans, but not in a consistent or comprehensive manner. There are currently some DEWRSB funded projects underway in which Area Consultative Committees are conducting skills audits in their regions. The consistency and quality of these reports is not yet known and results from this process are not yet available.

The level of information available is not sufficiently comprehensive or consistent to provide measures to properly address skill shortages in rural or regional areas. However, the following factors are apparent in regional and rural areas:

- a drain of skills to metropolitan areas where higher wages and more opportunities can be found ;
- a drain of skilled labour to large industry sectors (eg mining), where wage levels and conditions are often more attractive. This makes it difficult for local manufacturing facilities to retain tradespeople;
- a reluctance on the part of employers to train apprentices because of economic difficulties and the likelihood that they will leave for better positions when qualified;

# Skill Shortages in Engineering

- the need for students to travel large distances for training;
- economic vulnerability resulting from an over dependence on one industry, eg. agriculture, sugar, mining;
- difficulties in finding quality applicants and skilled tradespeople.<sup>48</sup>

State	Shortages identified	Comment	Recent work
NSW	Toolmaking, metal fabrication (boilermaking), sheetmetal working, welding, refrigeration mechanics, licensed aircraft maintenance engineering, CNC machining, IT/engineering skills	Regional skill vacancies for fabrication workers are becoming increasingly common. Pronounced in most regions, excepting Wollongong and Newcastle.  Employers also commonly cited a lack of detailed drawing skills, drafting and CAD experience as areas where on-the-job requirements did not match apprenticeship training.	Current projects.  Thin markets in NSW – an overview of current practice and implications in VET market examining the role thin markets will play in the provision of skills – concerns the quality of training providers and the potential for training need to be met.  Investigation of the applicant pool, characteristics and industry marketing issues.
Vic	Toolmaking, metal fitting and turning, sheetmetal working, boilermaking, welding, machine setting, numerical control programming and operating, electroplating and boatbuilding, licensed aircraft maintenance engineers.  Industry sectors affected – Heavy engineering, repetitive manufacturing, basic metals and foundry, light fabrication and to a lesser degree marine.	A large proportion of companies noting skill shortages were businesses with a workforce of less than 50.	Continual, regular survey of industry skill needs and concerns.

State	Shortages identified	Comment	Recent work
QLD	Boilermakers, welders, fitters and associated engineering callings, licensed aircraft maintenance engineers.  "Boilermakers and welders are by far in greatest demand".  Industry sectors affected.  Resource development, light and heavy fabrication, aerospace.	Skill shortages identified are deceptive. There is concern that real occupational shortages are being made through cross skilling related tradespersons.  Small and medium sized companies are most affected.	
WA	Boilermakers, welders linked to resource sector, electricians with instrumentation skill, draftspeople capable of using advanced software, licensed aircraft maintenance engineers.  Shortages forecast to rise in 2000 with growth in resource sector.  Industry sectors affected Mining, oil and gas.	Cyclic demand for skill.  Outsourcing of skilled labour remains a key resource.	Regular monitoring of skill shortages, particularly in the resource sector is carried out.
SA	Boilermaking, sheet metal fabricators and roll forming, CNC operators, welding, electrical, air conditioning and refrigeration mechanics, aircraft maintenance engineering & instrumentation  Industry sectors affected Heavy engineering and resource sector, particularly in wine industry		

# 6. TERM OF REFERENCE: BARRIERS TO SATISFYING SKILL NEEDS

*Identify the impediments and/or barriers to satisfying these needs.*

In addressing this term of reference the Working Group has chosen to look at the methods employers use to satisfy skill needs and then the barriers that exist in satisfying needs by these methods.

There are a number of methods used by employers to satisfy skill needs. These include:

- direct recruitment and training of apprentices or employment of apprentices through Group Training Companies;<sup>49</sup>
- use of non trades pathways, such as traineeships and other accredited Vocational Education and Training courses;
- direct recruitment of trade qualified people;<sup>50</sup> either
  - locally,
  - through overseas skilled migration,
- use of labour hire companies or contract staff;
- training existing staff in areas of skill shortage either by upskilling or transferring employees to different areas.

In some cases, employers may choose to carry a vacancy rather than risk employing a person who does not meet requirements.

A discussion of impediments to using these solutions to skills shortages follows.

## 6.1 Recruitment and training of apprentices

Apprenticeships remain, for many employers, a viable and attractive long term option to satisfying skill needs. The Ai Group survey indicates that employers view Apprenticeships as the best option for addressing skills shortages (this is supported by the outcomes of the ACCI survey). Apprentices and trainees (most of these are apprenticeships) in a contract of training in the mechanical and engineering and fabrication trades currently number over 20,000.<sup>51</sup> However listed below are a number of barriers to recruiting and training apprentices for employers.

### 6.1.1 Recruitment pool

Consultations and the survey of employers emphasise that the pool from which they recruit is reducing in size and is perceived to be reducing in quality. Employers are repeatedly advising that *the quality of applicants* for positions and apprenticeships is poor.<sup>52</sup> The 1997 DEWRSB *Survey of the Labour Market for Apprentices*, found that although there is an adequate supply of *suitable* applicants for existing apprentice vacancies, employers reported that nearly *seventy per cent* of applicants were unsuitable, lending support to anecdotal comments about the “poor quality” of applicants.<sup>53</sup> The Ai Group survey demonstrated that nearly half of firms with training issues were concerned over the lack of quality applicants. The ACCI survey indicated a slightly lower proportion had concerns over this issue.

Contributing factors to this issue<sup>54</sup> are:

- the image held by students, parents and communities of the industries employing engineering trade skills is poor, despite the potential for growth and the possibility of good career paths and financial rewards;<sup>55</sup>
- Employer consultations consistently raised concerns over vocational preparation in schools. Concerns centre on development of the generic core skills. Employers believe that the school system is promoting academic and other careers at the expense of manufacturing, ensuring that it is the last career option considered.<sup>56</sup> Vocational training in schools is one method of promoting career opportunities. However, while vocational training in schools has increased there is a general view that, except in isolated cases, take up of options relevant to manufacturing and engineering has been limited. The percentage of year 12 students in Metals and Engineering related VET courses across all of the largest states<sup>57</sup> in 1998 was approximately 1.1% of total student enrolments;
- need for support in recruitment. Employers at the National Forum noted that small employers particularly might require some support in establishing effective recruitment and selection processes;<sup>58</sup>
- paperwork and perceived complexity associated with navigation of the training system. Brokerage services through industry organisations or Group Training Companies are often cited as the means to solve complexity issues;<sup>59</sup>

### 6.1.2 Flexibility of apprenticeships

Flexibilities enabled by the introduction of Training Packages and the National Training Framework are not being taken up in large measure. State Government legislation and traditional delivery patterns have resulted in a longer lived adherence to the traditional four year indenture approach than anticipated. This restricts the appeal of trades pathways to high performers. There are also some rigidities in current workplace relations arrangements underpinning traditional apprenticeships. These factors can reduce the attractiveness of apprenticeships to employers and young people, as the *length of apprenticeships* does not easily sit with short-term contracts,<sup>60</sup> and a four-year indenture is not attractive to young persons. Young people particularly have access to other industry areas that can offer the same levels of qualification for a lesser period of time in training. Now that competency

standards are accepted, and in large part implemented through Training Packages, consideration should be given to broadening the concept of competency to enable recognition and reward of excellence. Many employers see the inability of the competency system to recognise excellence as a serious information deficiency.

### 6.2 Training Delivery

Some employers report that delivery modes and geographic location of Registered Training Organisation delivery impacts on the accessibility and relevance of training for both apprentices and current employees, and therefore impacts on their willingness to train. Further, an enterprise's internal training competence can impact on its decision to participate in the apprenticeship or broader training system. Specifically:

- *Delivery modes* – There is evidence to suggest that where TAFE colleges offer flexible and innovative delivery methods, enrolment patterns have stabilised or increased.<sup>61</sup> However, current budgetary pressures have the potential to discourage RTOs from providing flexible delivery options, as these are considered to be more expensive.<sup>62</sup> These outcomes reinforce the perceived bias to less resource intensive training by Registered Training Organisations;
- *Infrastructure* – There has been a downward trend experienced in TAFE enrolments for Engineering and Manufacturing programs over the past three to four years. Industry is concerned that drops in enrolments and under-utilisation of resources are having a negative impact on the decisions of TAFE with regard to closing faculties and shedding capital equipment;<sup>63</sup>
- *Remoteness* – Regional and rural areas have expressed concern in relation to closure of workshop facilities, which results in students having to travel great distances to facilities and discourages employers from taking on apprentices;<sup>64</sup>
- *Technology* – The Training System is finding it difficult to keep pace with the changes in skill requirements. Changes in skill requirements result from the changes made to work practices combined with the rapid pace of technological change; There is considerable potential for TAFE to become increasingly involved in on-site delivery of training, addressing changed industry demand for cross-skilled training of employees, tailored to the enterprise need and provided on site/in flexible mode;<sup>65</sup>
- *Implementation of reforms* – for the engineering trades, capacity for flexible training programs has existed since the early 1990's, and has been enhanced considerably by the introduction of Training Packages and the National Recognition Framework. However, Registered Training Organisation implementation of these flexibilities has been patchy. Many companies have reported that they would offer more training if more choice in content was provided or courses were more conveniently located.<sup>66</sup> Again, where registered training organisations have marketed their services, and sought to develop an interactive and supportive relationship with employers, there appears to have been a positive impact on enrolments.<sup>67</sup> There are good examples of where Registered Training Organisations have taken an energetic and creative approach to implementation of flexibilities, and these provide an excellent basis for Best Practice examples, for use in marketing and professional development exercises.

The survey of TAFE systems undertaken for this project could not demonstrate one way or the other whether flexibilities such as Recognition of Prior Learning, workplace delivery, mentored delivery and customisation of training courses were in fact being offered, or taken up by employers. The information collected was inconsistent, and does not provide the basis for comparison. It does, however, suggest that a low number of TAFE colleges provide the full range of the choices offered by the Training Package,<sup>68</sup> and a very high dependence on college based delivery in TAFE. Given the prominence given by Industry Associations, DETYA, ANTA and State Training Agencies to the flexibilities and potential of Training Packages, it is of particular concern that the VET system does not currently have the capacity to monitor implementation of this key element of the current reforms to the VET system.

- *Internal Training Expertise* – A number of employers cite lack of training expertise within the enterprise, and/or lack of access to training expertise as being a barrier to taking on trainees and apprentices.<sup>69</sup>

### 6.3 Costs of training

The cost of training apprentices also continues to be cited as an impediment to training apprentices, and training generally. In particular, companies continue to describe the low rate of return on apprenticeship investments in the first two years as a disincentive to taking on apprentices, particularly where apprentices leave their employer once they have completed their trade qualification. In difficult economic times, training may be seen as a cost, which is not fixed and therefore able to be reduced or not undertaken. The Ai Group survey indicates major concerns over returns on investment in training generally.<sup>70</sup> Employers have raised concerns that existing incentives do not adequately compensate for costs of apprenticeship training, given the length and complexity of the programs.

There is a perception that the unit costs, as set by State Training Authorities for engineering related training act as a systemic disincentive to its provision through either lock step or flexible delivery mechanisms. Implementation of the Key Performance Measures as the basis of measurement of State Training Authority performance will help address this issue.

Further, while funding allocations are rigidly separated into "Recurrent" and "Capital" classifications, creative options in resourcing delivery of training are limited. It is argued that on-job delivery; mentored delivery and distance delivery combinations should be cheaper options for Registered Training Organisations. This could be true if costing systems included capital costs, and management systems gave TAFE Institutes managerial discretion to make their own capital and recurrent funds allocations. It is important to examine factors informing a registered training organisation's decision whether to provide flexible delivery, and also, how that delivery is costed.

## 6.4 Non-trades pathways

There are indications of employer and student interest in non-trades pathways to acquisition of engineering skills. Around 32,600 such students were enrolled in courses relating to the mechanical engineering and fabrication trade occupations in 1998. Seventy four percent of these students were studying at AQF level III or equivalent or higher levels.<sup>71</sup> Initial figures indicate that school leavers constitute a high proportion of these enrolments, which would suggest that the higher level pathways are an attractive choice for young people. Training Packages support expansion of this pathway as an option to develop trade related skills, but some further work is required to review who these students are and their destinations following qualification.

Some interest has been expressed by employers in using traineeships as an alternative entry point to apprenticeships. The level of utilisation of traineeships appears to vary, as respondents to the Ai Group and ACCI surveys recorded different levels of indenture of traineeships.<sup>72</sup> However, the numbers of trainees moving to apprenticeships under the Metal and Engineering Training Package appear to be low.<sup>73</sup> The issues underlying articulation between these qualifications need further exploration.

## 6.5 Recruitment of trade qualified people

Recruitment of skilled workers from other regions is an option available to employers. Domestic migration of skilled workers can resolve skills shortages, where sufficient incentives apply. However, domestic migration may result in skills shortages emerging in the areas from which labour is drawn. Also, relying on domestic migration as a solution to skills shortages presupposes that the labour market is geared to mobility, which is not necessarily the case. Many skilled employees and potential New Apprentices are not willing or able to travel to localities where there are employment opportunities. There are many factors impacting on the willingness of labour, skilled or otherwise, to move. Relocation costs, for example, are often considered to be too high by workers seeking jobs, especially given the limited length of many employment contracts.<sup>74</sup>

Employers may choose to recruit qualified people from overseas as a strategy to address skill shortages. Australia has a number of permanent and temporary migration mechanisms that may provide engineering skills in the short term.<sup>75</sup> However, these mechanisms are not well understood amongst manufacturers. Industry associations may play a key role in disseminating information on migration options available to employers.

## 6.6 Labour hire companies or contract staff

A rapidly growing trend is for companies to contract out, or outsource, all non-core activities.<sup>76</sup> Consequently, labour hire companies in particular represent a fast growing and significant element of the manufacturing industry, and engineering skills base. In general, labour hire companies recruit skilled people. A number of reports have highlighted as an issue the lack of participation in skills development by labour hire companies, although both companies interviewed for this project had apprentices employed.

Research and consultation undertaken in relation to this paper<sup>77</sup> indicates that while some labour hire companies do employ apprentices,<sup>78</sup> there are several barriers that limit their involvement in skills development:

- resistance by employers to the labour hire company sending an apprentice to the job;<sup>79</sup>
- companies are reducing maintenance undertaken and the amount they will pay for maintenance in an effort to reduce costs and remain competitive. Consequently, the margins for labour hire companies are also reducing, and taking on an apprentice is not considered cost beneficial to the labour hire company;<sup>80</sup>
- labour hire companies have difficulty predicting their workflow, or the exact nature of work which they will be undertaking. As a result, it is difficult to make a long-term commitment to the training of an apprentice.<sup>81</sup>

There is a need to further investigate the capacity labour hire companies have to develop ways to ensure they contribute to the future skills pool.

## 6.7 Training existing staff

The Ai Group survey of employers showed that in the last 3-5 years, nearly all firms with skills shortages (135 of the 137 firms with shortages) reported implementing training solutions. Informal training of existing employees (such as training delivered by suppliers or workplace trainers) was a training solution for 59 percent of these 135 firms (30% for the ACCI survey). Training of existing employees in skills required as an adult apprentice/ trainee was undertaken by 30 percent of firms.

Given the current poor access to RPL, the frequent recourse to informal work place training can be seen as problematic. It is likely that this training is specific to workplace needs and particular equipment used in that workplace, which, whilst expedient to the business, is not likely to improve the overall skills pool of the workforce without good access to RPL mechanisms.

There is a need to increase the rate of implementation of RPL arrangements so such training can be recognised, and enable pathways into further skill development and qualification.

In response to the TAFE system survey, respondents all raised the public tendering mechanism as the system's main mechanism for responding to short term skill shortages. Training purchased by the government under this arrangement generally targets those already in the workforce, although it has been used to fund pre-vocational training. The extent to which this is used for engineering skills requires further investigation.

# 7. TERM OF REFERENCE: INITIATIVES AND LONG TERM SOLUTIONS

*Recommend initiatives and solutions (short, medium and long term) which may assist in addressing the needs.*

The Working Group has developed six key objectives in answer to the identified barriers to addressing skills shortages. These objectives are in accord with solution pathways employers have expressed support for through consultations and responses to the employer surveys conducted for this project. A high level of support was expressed for working with schools and the secondary education systems, for measures to address the perceived poor industry image, and for measures which resulted in improved employer knowledge of and involvement in training delivered to apprentices and other employees. Other supports identified as useful were an improved incentive regime, support in recruitment and internal training delivery, and in accessing the training system.

The objectives are to:

- make a long term paradigm shift in how the industry is perceived to establish a broad understanding of manufacturing as hi tech, a developer, designer and user, of information technology tools, and as a global industry, with great opportunity for career and financial reward;
- build a training culture within the industry that will support continual development of skills;
- build on the existing skills of the workforce;
- expand the provision, variety and uptake of pathways into apprenticeships;
- ensure the ready availability of high quality, consistent and timely information on skills shortages and Registered Training Organisations' responses to skill needs;
- improve outcomes from recruitment solutions to skills shortages.

The table on the following pages sets out the objectives, strategies by which they may be achieved, the priority and duration of those strategies, lead agencies and responsibility, and performance indicators by which achievement of the strategies can be measured.

Employers have expressed a high level of interest in skills shortages, and in this project's approach to them. The Australian Industry Group is committed to an ongoing role in the implementation and monitoring of these strategies, and will ensure that concerned employers are given full access to participation in the outcomes of this skills shortages project.

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
<p><b>1.</b> Long term paradigm shift in how the industry is perceived to establish a broad understanding of manufacturing as hi tech, a developer, designer and user, of information technology tools, and as a global industry, with great opportunity for career and financial reward</p>	H	<p>Establish a committee including representatives of Industry, and the ITAB to:</p> <p>a) Develop a high profile marketing campaign targeting school students, job seekers, career counsellors, parents and community on general image</p> <p>b) Promote manufacturing industry as career destination, and provide information on pathways to acquisition of trades qualifications and trade related skills.</p>	24 months	<p>Industry working with ITAB and govt agencies with govt support</p> <p>Industry/ ITAB with govt support</p>	<p>Activities and outcomes of marketing and promotion work to be reviewed by the committee annually.</p>
		<p>Note: these strategies will be supported through activities undertaken in 4(a).</p>			
<p><b>2.</b> Build a training culture within the industry that will support continual development of skills</p>	H	<p>a) Implement a marketing and information campaign to promote the benefits to employers of investment in training.</p>	24 months	<p>Industry working with ITABs, ANTA, State Training Authorities, DETYA</p>	<p>Articles in industry magazines, incorporation in presentatios to employers</p>
	M	<p>b) Support employers in broadening their traditional selection pool and advise on ways to attract and retain apprentices, such as offering best practice career path strategies.</p>	12 months	<p>As above</p>	<p>ITAB VET plans report improved recruitment outcomes.</p>

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
2. Build a training culture within the industry that will support continual development of skills (cont.)	H	c) Increase resources for the Educative Services Program to increase support for developing expertise within NACs and RTOs in using the Metals and Engineering Training Package, in order to support employers in meeting their skill needs and accessing flexibilities developed under the reforms of Training Packages, New Apprenticeships and the National Training Framework. See also 5(c).	12 months	Industry, supported by DETYA.	RTO's report increased training in Metal & Engineering courses, Employers report improved service from NACs.
	L	d) Investigate and improve support measures needed by employers to meet the costs of apprenticeships, including reviewing employer incentives which reward employers for the extra time commitment and level of training involved in supporting development of trade skills.	6 months	Industry, working with DETYA and State Training Authorities.	Increased take up of Apprentices and Incentives.
	H	e) Review of legislative issues relating to apprenticeships to identify and remove impediments to training through the apprenticeship system.	12 months	State Training Authorities, with	Employers report greater ease in establishing and signing off completed apprenticeships.

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
2. Build a training culture within the industry that will support continual development of skills (cont.)	M	<p>f) Investigate and pilot regional industry clustering arrangements that aim to address skill shortages through:</p> <ul style="list-style-type: none"> <li>• supporting good practice in recruitment and training</li> <li>• fostering sharing of training resources and rotation of apprentices</li> <li>• building better relationships with Registered Training Organisations, and better servicing by and utilisation of NACs.</li> </ul>	24 months	Industry, working with DEWRSB (esp area consultative committees) and DETYA, NACs	3 viable regional networks established by industry
3. Build on the existing skills of the workforce	H	<p>g) Review capacity of competency standards and Training Packages to recognise and acknowledge excellence.</p> <p>a) Improve employer access to Recognition of Prior Learning services for current employees through first identifying impediments to access and then recommending and implementing strategies to improve access. Strategies should support assessment of skills against the Metal and Engineering Training Package to identify skills and knowledge held and training required for skills gaps.</p>	12 months	<p>ITAB, working with Industry, RTOs and ANTA</p> <p>ANTA with advice from Industry, ITAB, RTOs, State Training Authorities</p>	<p>Recommendations on how competency based assessment can be developed to recognise and acknowledge excellence</p> <p>Impediments identified, employers reporting greater access</p>

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
3. Build on the existing skills of the workforce (cont.)	H	<p>b) Review, and if necessary, implement incentives and support such as targeted training to support upskilling where skill shortages are identified.</p>	ongoing	ITAB, with advice from Industry, ANTA, State Training Authorities	Hours of training delivered to non-indentured employees increases
4. Expand the provision, variety and uptake of pathways into apprenticeships	H	<p>a) Audit and expand the take up of school to industry links programs that support pathways to engineering qualifications and increase the amount and range of accredited vocational training options in school, including part time apprenticeship options.</p> <p>b) Provide and promote pre-vocational training to provide a pathway into apprenticeships</p>	12 months Annually	<p>DETYA with advice from Industry, State Training Authorities, schools systems, ANTA</p> <p>STAs with advice from ITAB on areas of need</p>	<p>ASTF &amp; State Education Departments report increased numbers taking engineering options at school to ITAB</p> <p>Courses provided in states where recruitment problems reported</p>
	M	<p>c) Implement a project to:</p> <ul style="list-style-type: none"> <li>review current non-trades student cohort</li> <li>review pathways from traineeships to apprenticeships</li> <li>investigate the possibility of achieving engineering trades skills through alternative pathways.</li> </ul>	6 months	NCVER with advice from Industry, unions, DETYA, and government support	Pathways agreed and implementation strategies developed by ITAB

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
4. Expand the provision, variety and uptake of pathways into apprenticeships (cont.)	M	d) Raise Job Network provider and employer awareness of the availability of the Metal and Engineering Training Package as a tool for assessing the skills of job seekers. See also 2(c)	12 months	Industry working with DEWRSB Jobs Network Providers	Employers report more accurate referrals from Job Network Providers
	H	e) With a view to increasing uptake of apprenticeships through Group Training Companies, identify reasons why employers do not use them more frequently. This information can then be used to expand recruitment activities of Group Training Companies by manufacturing employers.	12 months	Industry working with GTCs and Labour Hire Companies, with government support	Increased numbers of apprentices employed by GTCs and Labour Hire companies
5. Ensure the ready availability of high quality, consistent and timely information on skills shortages and Registered Training Organisations' responses to skill needs.	M	a) Ensure Registered Training Organisations collect and report on data on their implementation of flexible delivery and recognition of prior learning mechanisms	18 months	ANTA with advice from Industry NCVET, State Training Authorities and RTOs	National Reports can be generated on RPL and flexible delivery activity against the Metal and Engineering Training Package

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
5. Ensure the ready availability of high quality, consistent and timely information on skills shortages and Registered Training Organisations' responses to skill needs (cont.)	H	<p>b) Establish a cross industry and government committee to review and recommend changes to ASCO groupings; identify the appropriate methods for more regular monitoring of skill shortages; identify the appropriate occupational groupings and skill areas to be used for analysis and implement these recommendations</p>	By 2006	Industry working with ITAB, the Australian Bureau of Statistics, RTOs DEWRSB, NCVER	Next census cycle uses categories reflecting skill and qualification descriptions relevant to current practice of industry
	H	c) Review the appropriateness of nomenclature used to identify and analyse skill requirements of key occupations as an interim solution to facilitate generation of more accurate skills shortage data in the short term	12 months	DEWRSB working with industry, ITAB, NCVER	Industry, ITAB & NCVER report greater relevance of ABS information on labour force
	H	d) Develop processes and procedures for collecting consistent, accurate data on a regional basis.	12 months	DEWRSB working with Area Consultative Committees, Industry, ITAB	Sufficient information on regional skills shortages for RTOs and training programs to respond

Objectives	Priority	Strategy	Duration	Lead Agency & responsibility	Performance Indicators
6. Improve outcomes from recruitment solutions to skills shortages	L	a) Ensure employers have information available to them on migration options as a mechanism for addressing skills shortages, and provide information to employers on the available mechanisms for recruitment of personnel from overseas.	Two months then ongoing	DIMA, with support from DEWRSB and Industry	Reduced employer complaints concerning migration options to meet skills shortages
	H	b) Given the growing significance of Labour Hire Companies as a source of skilled labour for manufacturing industries, run a project with Labour Hire Companies to identify strategies to facilitate a greater role in skills development, particularly in increasing take up of apprenticeships.	24 months	Industry, with funding support from DETYA, involvement of Labour Hire Companies, State Training Agencies, RTOs and Group Training Companies	Higher apprenticeship numbers, and increased training by labour hire companies
	See ref.	c) Support employers in establishing effective recruitment and selection practices (see 2b, 2f, and 4d)	See ref.	See ref.	See ref.

## APPENDICES

<b>Appendix I</b>	<b>Engineering Trade Skills Shortages Survey Results</b>	<b>i</b>
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# ENGINEERING TRADE SKILLS SHORTAGES SURVEY RESULTS

## The Sample

The Australian Industry Group (Ai Group) and the Australian Chamber of Commerce and Industry (ACCI) surveyed a total of 372 employers in the engineering industry to collect information on skills shortages, methods used to resolve them, and barriers to resolving skills shortages in the engineering industry. Both the Ai Group and ACCI surveyed employers from all States and Territories and collected results from 262 and 110 employers respectively.

The results were processed separately by each organisation however, it was agreed that the survey analysis be combined and presented as one report wherever possible with the data output. Due to some minor differences in processing of the survey results and due to the larger sample collected by Ai Group allowing some more indepth analysis to occur, it was not always possible to amalgamate the results. Where this is the case, footnotes have been included.

Table 1 Survey sample by firm size

Number of Employees	Proportion of Sample	Number in Sample
1-9	17.2	64
10-29	31.2	116
30-49	11.0	41
50-99	13.4	50
100-299	16.7	62
300+	8.6	32
No Response	1.9	7
<b>Total</b>	<b>100.0</b>	<b>372</b>

The main industry sector represented by survey participants is the metals and engineering sector, which represents 55% of the sample. The breakdown of the sample by industry sector is reported below.

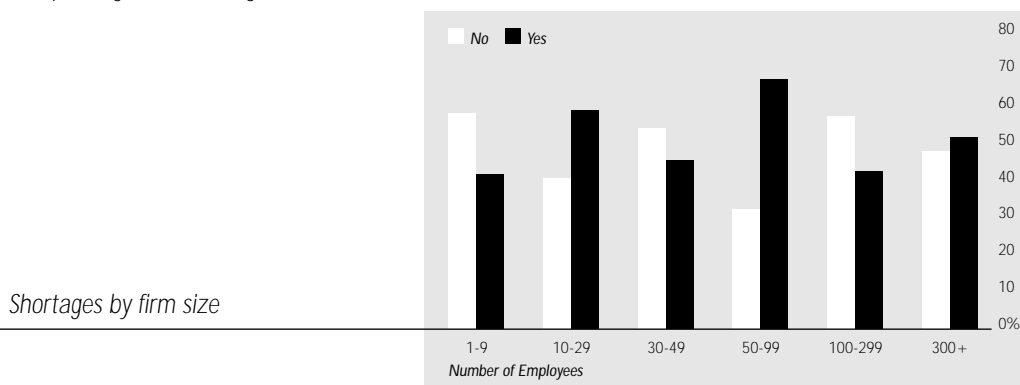
Table 2 Survey sample by industry sector

Industry Sector	Proportion of Sample	Number in Sample
Metals and Engineering	54.6	203
Construction	7.0	26
Automotive	6.7	25
Airconditioning	5.4	20
Food	4.6	17
Electronic Manufacturing	3.2	12
Rubber and Plastics	3.2	12
Labour Hire	2.4	9
Packaging	1.3	5
Other	11.6	43
<b>Total</b>	<b>100.0</b>	<b>372</b>

## Skills shortages

Of the firms surveyed, 49% (183 firms) reported skills shortages.

As can be seen from the chart below, there was no correlation between firm size and proportion of firms reporting skills shortages.<sup>82</sup>



The sectors in which a high proportion of skills shortages were reported are listed in the table below. 93% of firms in the air-conditioning industry reported shortages, 67% of electrical engineering firms reported shortages, and 62% of firms in the metals and engineering sector reported shortages. However, it should be noted that some of the sectors reported consist of a very small sample size, and the sectors that have sample sizes of five or less firms are marked with an asterisk.

**Table 3 Industry Sectors Reporting Significant Shortages<sup>83</sup>**

Industry Sector	Proportion of Firms Reporting Shortages
Airconditioning	93
Electrical Engineering	67
Metals & Engineering	62
Construction	60
Automotive	55
Labour Hire	50
Printing	50
Rubber & Plastics	50
Textiles, Clothing & Footwear	50
Electronic Manufacturing	44

\* Industry sectors with samples of 5 or less firms

## Occupational areas

Many employers who reported experienced skills shortages identified shortages in more than one occupational area. The top nine occupational areas where the majority of shortages are reported are listed below. As shown, the greatest skills shortages were in Engineering Tradesperson – Mechanical (25.7% of firms experiencing shortages); Fitter (23%); and Machinist – 1st Class (22.4%).

**Table 4 Occupational Area where significant shortages reported**

Occupational Area	Proportion of Firms Reporting Shortages in this area
Engineering Tradesperson – Mechanical	25.7
Fitter	23.0
Machinist – 1st Class	22.4
Toolmaker	16.9
Welder – 1st Class	16.4
Engineering Tradesperson – Fabrication	15.8
Boilermaker	15.8
Sheetmetal Worker – 1st Class	11.5
Electrician – Special Class	9.3

## Skill Shortages in Engineering

Of the firms reporting shortages, the majority of firms (63%) reported that the shortage was related to a general lack of people with the requisite trade qualifications. 40% of firms reported that the shortage was more related to an inability to find people with specific skills required by the enterprise within the occupational area.

Of the firms that reported that the shortage was related to specific skills, the main skills reported to be in short supply are listed in the table below. This table relates only to the Ai Group sample. As you can see, the majority of the skills in short supply relate directly to machine and process operations, where 52 firms reported 296 incidences of skills shortages. A number of these skills shortages relate directly to skills required in the utilisation of NC/CNC machines and processes.

**Table 5 Specific skills shortages reported<sup>84</sup>**

Skills areas	Incidences* of skills shortages	Significant** skills shortages reported	No of firms reporting shortages
Generic	129	Apply quality systems	14
		Write reports	12
		Organise & analyse information	10
		Operate in a work based team environment	10
		Operate in an autonomous team environment	10
Assembly	31	<i>no significant skills shortages reported</i>	–
Casting & Moulding	39	<i>no significant skills shortages reported</i>	–
Fabrication	166	Assemble fabricated components	17
		Weld using gas tungsten arc welding process	10
Forging	5	<i>no significant skills shortages reported</i>	–
Machine and Process Operations	296	Perform general machining	20
		Program NC.CNC machining centres	19
		Set & edit NC/CNC machine/process	17
		Operational maintenance of machines/equip	16
		Perform complex lathe operations	16
		Setting machines (complex)	15
		Perform lathe operations	15
		Perform milling operations	15
		Complex milling operations	15
		Set NC/CNC machines/process (basic)	14
		Basic NC/CNC programming	13
		Program and set up CNC manufacturing cell	11
		Operate NC/CNC machine/process (basic)	11
		Setting machines (routine)	10
		Program multiple spindle/axis NC/CNC machining centre	10

Skills areas	Incidences* of skills shortages	Significant** skills shortages reported	No of firms reporting shortages
Surface Finishing	36	<i>no significant skills shortages reported</i>	–
Drawing, Drafting and Design	43	Interpret technical drawings	11
Installation and Commissioning	46	<i>no significant skills shortages reported</i>	–
Materials Handling	50	<i>no significant skills shortages reported</i>	–
Measurement	27	<i>no significant skills shortages reported</i>	–
Occupational Health and Safety	54	Undertake OHS activities in the workplace	14
Planning	23	<i>no significant skills shortages reported</i>	–
Quality	45	<i>no significant skills shortages reported</i>	–
Communication	25	<i>no significant skills shortages reported</i>	–
Training	16	<i>no significant skills shortages reported</i>	–
Maintenance and Diagnostics	295	Maintain & overhaul mechanical equipment	11
		Maintain & repair pneumatic systems	10
		Maintain & repair hydraulic systems	10

\*An incidence refers to a firm reporting a skills shortage in a subcategory in the skills area  
\*\*A significant skills shortage refers to shortages reported by 10 or more firms

## Level of skills shortages

Of the firms experiencing skills shortages, 45% reported that they were most prevalent at the base trade level, followed by 32% at the skilled operator level, 31% at the post trade level, and 24% at the higher skills level.

## Methods used to resolve skills shortages

### Training Solutions

In the last 3 to 5 years, nearly all firms with skills shortages reported implementing training solutions. Informal training of existing employees (such as training delivered by suppliers or workplace trainers) was a training solution for 57.4% of firms experiencing skills shortages. Training of existing employees in skills required as an adult apprentice/trainee was undertaken by 26.8% of firms.

Apprentices were employed and trained by 73.2% of firms with skills shortages, with 74.6% of these firms choosing to directly employ and train the apprentice and the remaining undertaking this through a Group Training Company. Where a Group Training Company (GTC) was employed, the majority of firms cited positive reasons for using the GTC, such as the high standards able to be achieved through the system and the accreditation achieved.<sup>85</sup>

Trainees were employed and trained (to lead to an apprenticeship) by 14.8% of firms with skills shortages. Reasons cited for employing trainees included the flexibility of the system in allowing evaluation of the trainee over time, and also the usefulness in developing longer term and/or enterprise specific skills.<sup>86</sup>

## Recruitment solutions

Recruitment solutions for skills shortages were also reported by almost all firms reporting skills shortages. In the survey, 35.5% of firms with skills shortages reported that they have employed a qualified tradesperson through a labour hire company. More popular though, were direct recruitment solutions utilised by 88.5% of firms. Over three quarters of these firms (77.8%) reported direct recruitment was undertaken by advertisement domestically, 34.6% by recruitment through an agency, 38.3% by word of mouth and 8% by sponsorship of skilled migration. Very few other recruitment solutions were reported.

## Success of Skills Shortages Resolutions

The most common successful methods of resolving skills shortages reported by firms were: to train an apprentice (successful for 47% of firms with skills shortages); directly recruiting a tradesperson by advertisement (40% of firms); and informal training of existing employees (37.2% of firms). The relative success of methods of obtaining skills is reported in the table below.

**Table 6** Relative success of different methods of resolving skills shortages

Method	Number of Firms Reporting Success with this Method
Train an Apprentice	86
Directly recruit a tradesperson by advertisement	73
Informal training of existing employees	68
Directly recruit a tradesperson by word of mouth	46
Employ a qualified tradesperson through labour hire company	40
Employ an apprentice through group training company	29
Adult Apprenticeships	28
Directly recruit a tradesperson through recruitment agency	26
Employ a trainee leading to apprenticeship	25
Directly recruit a tradesperson by sponsorship of skilled migration	8

Firms also stated their preferred method of dealing with skills shortages problems. The preferred methods cited by firms are reported in the following table. As shown in the results, the preferred methods of dealing with skills shortages relates very closely to the most successful methods.

Table 7 Preferred methods of resolving skills shortages problems

Preferred Method	Number of Firms Reporting this Method Preferred
Train an Apprentice	76
Directly recruit a tradesperson by advertisement	68
Informal training of existing employees	46
Directly recruit a tradesperson by word of mouth	29
Employ a qualified tradesperson through labour hire company	24
Employ an apprentice through group training company	16
Adult Apprenticeships	16
Directly recruit a tradesperson through recruitment agency	15
Employ a trainee leading to apprenticeship	11
Directly recruit a tradesperson by sponsorship of skilled migration	5

## Barriers to Skills Shortage Resolution by Preferred Method

### 7.1 Training Issues

One third of firms (33.3%) with skills shortage problems cited that the lack of quality applicants for apprenticeships was a major barrier to training. About one third of firms cited a lack of basic skills as a problems with the quality of applicants, with poor numeracy and literacy skills often cited. Many firms also reported that there was a very poor response to advertisements for apprenticeships indicating a general lack of interest in trades and impacting on the quality of applicants. A number of also firms reported poor work ethic amongst the applicants for apprenticeships.<sup>87</sup>

More than one quarter of firms (25.7%) with skills shortage problems reported that poor industry image amongst potential applicants was a training hurdle.

Approximately 18% of firms with skills shortages reported that the time commitment in taking on an apprentice was a barrier to utilising apprentices to resolve skills shortages in the industry.

Of the firms with skills shortages lack of training expertise internally was cited by 17% of firms as a barrier to resolving skills shortage problems by the firm's preferred method. Overwhelmingly, the main reason for a lack of training expertise internally is the inability to allocate resources to the task away from the firm's core work activities.<sup>88</sup>

Lack of support and/or advice from a training provider has cited by 11% of firms with skills shortages. A number of firms reported that the courses offered by training providers were not adequate, appropriate and/or timely. In addition, some firms reported that information on training providers and the courses that are on offer was not available.<sup>89</sup>

The main problem relating to training to fill skills shortages relates to the nature of training itself. Many firms are concerned that the investment in training individuals is not realised by the firm.

Firstly, individuals are trained and then can be poached by competitor firms (who gain the competitive edge by not having to invest in training). Secondly, the competitive nature of the industry limits incentives for both firms and individuals to invest in training. Generally, resources are not available (to take from production itself); adequate remuneration is not available to individuals to give them an incentive to undertake the training; and jobs are not guaranteed at the end of training as industry size and rationalisation squeeze employment. As a result, many firms report that training cannot be undertaken without additional (Government) incentives.<sup>90</sup>

## 7.2 Recruitment Issues

Over half of firms with skills shortages (51.9%) reported that low quality of applicants in the recruitment process was a problem to solving skill shortage problems. Firms cited specifically low numeracy and literacy skills, and general experience in the field.

Poor industry image among potential applicants was an issue for 20.2% of firms with skills shortages.

Approximately 19.7% of firms with skills shortages reported inadequate referrals or poor service from Job Network Providers. Firms reported that the service from Job Network Providers was either inadequate or not timely, with their specific trade need not being met by the providers, and a low number of referrals made. One respondent stated, in defence of Job Network Providers, that they are drawing from a limited pool of the labour force (those out of work and/or not willing to work) which means that the quality of applicants is limited.<sup>91</sup>

Of firms citing skills shortages, 12.6% reported that the uncertain economic environment impact on their ability to use recruitment to solve skills shortages problems. In particular, the performance of the manufacturing sector is of great concern, exacerbated by a lack of government policy to achieve a strong and viable manufacturing industry in Australia.

Inadequate screening processes were reported as a problem for 8.2% of firms with skills shortages.

Amongst the additional recruitment related barriers cited were the additional problems faced by firms located in regional areas with only a small pool of skilled workers available.<sup>92</sup>

## Where do the solutions lie

Over two thirds of firms (68.3%) with skills shortages suggest that better links with schools to promote trades as a career option, especially through student participation in structured workplace learning, may be solution to resolving skill shortages in engineering trade areas. Almost two thirds (65%) reported that better industry related careers advice within schools may be a solution.

A marketing campaign to improve industry image was suggested as a solution by 39.3% of firms with skills shortages.

Nearly one third of firms (32.2%) reported that pre-vocational training (that is, more training provided prior to taking on an apprentice/trainee) was an important element to solving the skills shortage problem.

One third of firms (33.3%) reported that greater financial incentives were required to take on apprentices, to assist firms in covering the costs of on-the-job-training and the low productivity of workers during the training period. Suggested ways in which financial incentives could be provided include: cash reimbursement of costs; tax incentives; (including payroll tax reductions); subsidised workers compensation premiums; and tool allowances for apprentices to purchase their own tools.

18.6% of firms suggested a return to traditional apprenticeships. Some firms suggested that the curriculum needed to concentrate more on the skills required in the workplace, and on hands on skills. Some firms (17%) suggested greater support and/or advice from training providers would help solve skills problems. It was suggested that training providers should consult more broadly with industry to ensure that the curricula for the courses are appropriate, relevant, and up-to-date. In the survey, 20.2% of firms suggested that more intensive work and study programs were required to achieve an improved trade outcome.

18.6% of firms suggested that more pathway options need to be available to achieve trade skill outcome other than the four year apprenticeship. Some suggested approaches included competency-based, self-paced learning, and work placed based training., and in fact, 20.2% of firms support qualifications and training arrangements that are more enterprise based. Tertiary training was also suggested as an important alternative to the apprenticeship approach, with 11.5% of firms suggesting that more pathway options to achieve higher than base trade level outcome through apprenticeship type training. Some firms supported a return to the technical school system for secondary school age youth.

Recognition of prior experience to achieve a trade outcome was deemed to be an important aspect of improving the training arrangements by 19.7% of firms.

13.7% of firms suggested that better access to advice on training options to meet enterprise specific skill requirements would assist in improving the skills base. Firms suggested that industry organisations played an important role in providing advice on training advisers. Firms need to know what training providers are available and best able to meet the needs of their individual enterprises.

Similarly, 13.7% of firms report that there should be greater access to adult apprenticeships.

An important aspect to revitalising trades is re-balancing in society the concept of trades as a worthwhile career. This includes providing information to schools on trade options available and promoting careers in the trades.

# OUTCOMES OF THE NATIONAL FORUM: ENGINEERING SKILLS SHORTAGES

## Gazebo Hotel, Parramatta, Friday 10 March 2000

The forum was attended by a total of 50 Employers, representatives of the Australian Industry Group, the Australian Chamber of Commerce and Industry, the Commonwealth departments of education, training and youth affairs, employment, workplace relations and small business, the Australian National Training Authority, and state government training authorities.

The day was run in workshop form. The first workshop session addressed issues and impediments, and the second addressed solutions.

### Issues and impediments

#### Costs

- Swings in manufacturing activity lead to a short term approach to skills investment.
- Training, as a controllable cost, can become a secondary priority in a plan operating budget.
- Continual pressures to reduce maintenance costs.
- Perception that apprentices will cost in every way – dollars, time and patience – this means employers using labour hire frequently reject requests on part of labour hire company to place apprentices as part of the team, even when this is at no additional costs.
- Change in business practice reflecting reduction in tariffs, global competition, short term contracts, an outcomes focus, increased influence of shareholders, and short term investment (seeking short term benefits).
- High costs of doing business means there is a necessity for employees to be multiskilled.
- Who should bear the costs of training and assessment: the State, the employer, or the employee?

#### Labour Market

- Smaller public sector utilities have lead to smaller apprentice/ trainee base. Corporations moving away from traditional apprenticeships.
- Boom in labour hire has lead to net leakage from full time employment in traditional trades. Therefore less stable on-site training base.

- Labour market tends to reward non-trade positions in manufacturing above trade positions.
- Changing nature of occupations means that employers don't need all the trade outcomes. Some upskilling, some down skilling, and different mix of needs. Need for redefinition of what the trade is.
- Supply and retention rate of labour in decline.
- Onus for skills development seen as moving away from enterprises to labour hire companies.
- "Career pathers" – people moving around between jobs, are expensive to enterprises as the investment in their training is lost when they move.
- Loss of tradespeople to other occupations with higher wages (eg. train drivers).
- Not enough places for apprentices.
- Demographics – decreasing proportion of young people.

#### Systemic issues

- Industrial relations issues, legislative issues, political agendas of stakeholders.
- Complexity of New Apprenticeship system presents barriers to employment of new tradespeople.
- Skill caps, RPL, training agendas, rates of change.
- Lack of availability or access to relevant trade up-skilling (short courses) and lack of technological capacity in TAFE.
- Government Purchasing policy on training apprentices.
- Limits on TAFE Resources.
- Lack of local training resources: eg Japan, ITABs.
- System only geared to resource only entry level.
- Funding for VET/ VET in schools geared to "bums on seats" – most popular courses get the dollars.
- Lack of funding/ resources for recognition of existing skills.
- Costs of training for new technology and advanced manufacturing applications must be absorbed by employers on-the-job (higher investment barriers for SMEs with tight margins).
- Failure of people and the system to understand the importance ( and the need to resource) structured on-the-job training experience.
- Reporting inadequacies (ASCO) to truly identify where skill shortages are and at what level.

#### Training Options

- Changing nature of occupations, are trades keeping pace?
- RPL mechanisms and assessment mechanisms not clear.
- RTO difficulty in meeting the changing needs of industry, including RTO culture, the system, the rapid change of industry, and as a consequence, changing jobs, skill and training requirements.

- Employers don't know what training options are available.

## Selection Pool/ Industry Image issues

- Hard to attract people to industry.
- Selection Pool reducing in size.
- Outdated image, lack of general knowledge of manufacturing and careers within, negative impact of high profile closures, influence of parents – they write the applications, and frequently advise children not to take up a career in manufacturing.
- Applicants have insufficient skills – a need for pre-employment training. They don't know enough about the industry.
- Hidden job market – employers not advertising and vacancies not recorded.
- Share prices of manufacturing companies going down even where company profits, production and exports very healthy. Not a fashionable industry and thus not attracting investment.
- Needs a creative approach – “Naked Chef” why not “Naked Boilermaker”.
- Recruitment processes are not yielding the best outcomes for employers. Suggestion of a collective of employers conducting a joint recruitment exercise – culling, interviewing and selecting.
- The big impact that a poor selection can have on a small business.
- Perception that there is no career path.
- Importance of having a well known “brand” to attract applicants”.
- Perceived lack of employment security.

## Skills shortages

There was limited discussion of skills shortage, however, there was general agreement that there were shortages in the following areas:

- technical: high level welding skills, reading drawings, welding to fine tolerances, electrical and electronic skills;
- generic/ soft skills: team work, problem solving, literacy, numeracy, supervision, workplace or peer training skills ...
- Broad skill sets: combinations of technical and generic skills;
- There are skill shortages, but they are not limited to the “trade” level. People have the wrong sets of skills.

## Solutions

### Marketing

- Promote image manufacturing as a career destination.
- Work with industry to make a paradigm shift in image, benefits of training.
- Promote available careers.
- Market training system to employers, including user choice, promote benefits of training.
- Promotion to increase selection pool.
- Promotion to shareholders to take long term investment approach.
- Market image to community.
- Promote positive image of industry to itself.
- Sell success stories re training experiences.
- Back winners – Group Training Companies for SMEs.
- Use videos, schools, TV, soap star as apprentice fitter.
- Ai Group needs to sell itself and the industry.
- Target Mums with career info.
- Advertising and messages on the “big picture” glossy side of manufacturing pathways.

### Business- School links

- VET in schools.
- In-school traineeships – Years 11 & 12.
- Employers to visit schools and advise students on career possibilities.
- Have kids go into industry to see it.

### Funding

- Training funds could be included in EBAs
- Tax incentives
- Tax concessions/ targeted in kind assistance for RTO recognised quals/ units paid for by employer, and also for training directly related to new R&D, investment in new technology, and planned/ capital upgrades

## Engagement with training system

- Empower employers as training consumers.
- Cultural change for RTOs, marketing and working with RTOs to become truly customer focussed.
- Training brokers – industry focussed. Interim need for intermediaries between enterprises and RTOs.
- Industry targets for NACs, with a system of incentives.
- Incentives to support targetted groups.
- Need for clear message on how the system works. Work backwards from employer's needs.
- One stop shop needed.
- Ai Group to facilitate specialist or niche training.
- Mechanisms to improve employer/RTO relationships.
- Improve knowledge of training packages.
- Case studies on alternative pathways (2 year to operator/ semi technician, or 4 year to technician status).
- Bring back closer links between advanced research and training and industry (need to be administered and managed – eg. cadetships).

## Training

- Make RPL realistic, clear process and affordable
- Provide reward for those taking a mentorship role for trainees
- Need to ensure small business can train competently, and select well
- Encourage development of existing employees through government incentives
- Greater emphasis on pre-apprenticeship training
- Sell training for adults and existing staff
- Flexibility of training delivery
- Apprenticeships need to be sped up – shorter time
- Train current employees in soft skills, management, communication, team work
- Pre-employment training industry focussed and identified entry level skill requirements
- Different pathways, including “nested” qualifications, traineeships as an entry point to trades, escalated acquisition of skills
- Encourage hire companies to train
- Encourage small business to train
- Reduce costs of participation

### Career Pathing

- Enterprises to focus on development of and promotion of career pathways.
- Need to show examples of career paths, and also need to create the career paths where they don't exist.
- Sell message to individuals about responsibility for their own career paths.
- Need to develop strategies to keep people and give them higher level skills.
- Is Attrition really a problem – we need to know where tradespeople go to, and develop a case that trades can be a stepping stone in a career.
- Tradespeople that stay in a trades position for a long time can be obstructive as their chief objective, or means of gaining additional funds is through high overtime.
- Sell career path – apprentice to technician, professional or manager, or to owning own business, success stories.

### Strategic Partnerships

- At national and regional levels.
- Rationalisation of ITABs and review relevance and role of ANTA.
- Implementation of Training packages with RTOs, employers, employees, Employer orgs, GTCs.
- Identification and removal of tax disincentives and initiation of tax incentives for training. Local level groups to share experiences and support training and assist in selection. Use local public forums to help with above, mentored by RTO or industry groups.

### Data

- Joint working group to address training and skills needs data collection.

## SURVEY OF TAFE AUTHORITIES

### THE SURVEY

The survey of TAFE Authorities was designed to investigate aspects of the training system's ability to supply engineering trade skills.

The survey sought to investigate measures introduced over the last ten years to make the training of engineering trades persons more flexible, including measures that might lead to a reduction in training time or a greater focus on the needs of enterprises. It can reasonably be expected that such measures might feature in any new initiatives to alleviate skill shortages. The degree of take-up of measures such as recognition of prior learning (RPL) and flexible delivery serve as a guide to both the interest and readiness of training providers and their clients to embrace such initiatives.

Some knowledge of the MERSITAB Metal and Engineering Training Package is needed to fully understand the aims of the survey. The MERSITAB Training Package has traineeship and engineering production qualifications at AQF II, AQF III Engineering Tradespersons qualifications in mechanical, electrical/electronic and fabrication trades AQF IV Certificate in Engineering – Higher Engineering Trade and in AQF V Diploma in Engineering. All qualifications have a small core number of units and a very high number of electives. As well, all qualifications have been developed to allow for articulation from one qualification to the next highest qualification.

One aim of the survey was to test if the degree of flexibility designed into the MERSITAB qualifications was being matched by the offerings of providers. The opinion of providers was also sought as to whether in their experience greater flexibility led to more training places being offered by employers.

Issues that the survey investigated included:

- the age mix of AQF III Engineering Trade students;
- the proportion of AQFIII Engineering Trade students that were not apprentices;
- the extent of RPL credit for apprentices, non apprentices and AQFIV and higher students;
- modes of study;
- degree of content flexibility offered;
- progression of traineeship to apprenticeship;
- progression of trade qualified students to higher qualifications;
- planning processes used by TAFE authorities to anticipate and meet changes in demand, especially those related to skill shortages.

## SURVEY RESULTS

All States and Territories indicated difficulties with completing the survey. Most of the difficulties related to the short time allowed for completion of the survey and the lack of centrally held records on the information requested in the survey. Every State and Territory indicated that data would have to be sought from TAFE Institutes and in some States also from private providers. The involvement, procedure and time for the data collection varied from State and Territory in Appendix 1. A valid cross state analysis of survey results has not been possible.

Some implications of the difficulties are:

- there is still a substantial difference between information available at the TAFE or private provider Institute level and that held centrally at TAFE head office or State Training Authority level;
- Information on RPL processes does not appear to be systematically collected and analysed. This inhibits identification of occupational groups best suited for upgrading programs to relieve skills shortages;
- Information on student progression from one qualification to the next is variable and often difficult to extract.

Thus, while flexible delivery, RPL, and customised and enterprise focussed delivery is stated as being a high priority for the VET system, VET information collection systems provide little information that would enable the monitoring and evaluation of the implementation of these reforms.

Only Western Australia, South Australia, Queensland and Victoria have returned the survey to date, with Victoria responding to Section 2 of the survey only. The difficulties in obtaining results are outlined in Appendix 1. The NSW Department of Education and Training indicated that it would not be able to respond to the survey because of the large amount of work involved in dispatching to and then collecting and collating information from Institutes, and advised that it could only complete the survey if it was compensated for this work.

As there is insufficient information generated by the survey from which to draw conclusions, it can only be used to identify areas of interest for further research. These areas are as follow:

- Non indentured enrolments in trades courses may be significantly high. In WA, 13% of such enrolments were not indentured.
- A very low number of students are upgrading from traineeships to apprenticeships: WA and SA figures are very low.
- It appears that students undertaking higher level courses may have a higher likelihood of being granted RPL
- Indications are that a low number of TAFE colleges provide the full range of the choices offered by the Training Package: in WA 20% of TAFE colleges offer this range, and in SA, none. ACT advise that there is no evident demand for the total training package. Also, the small staff cannot deliver the full package, however, work based training with TAFE mentoring is a growing training choice of employers.

NSW: Where colleges cannot meet demand for a particular unit, they are required to offer mentored on-the-job delivery. This should not be on a fee for service basis unless the cost was above the equivalent cost of college based delivery (*which, given that college based delivery costs do not include capital costs, it would be. Thus mentored delivery only available on fee for service basis*).

- There appears to be a very high dependence on college based delivery in TAFE. In WA, 95% of delivery is college based, and in SA, there is near total dependence on college based delivery for TAFE. Also, 68% of SA apprentices are in a block release delivery pattern.
- Enrolments in post trades level courses tend to be school leavers rather than trades qualified people. In WA, 85% and in SA, 60%.
- NSW: RPL information will differ from state to state as they all use different approaches to classifying the granting of credits. However, it does appear that students undertaking higher level courses may have a higher likelihood of being granted RPL.
- CIT do not experience many constraints in responding to employer demand.

### Qualitative Information

Planning for Apprenticeship training needs:

- ACT: liaison/ meetings with employers, trend analysis, construction approvals, and construction proposals, discussions with the ACT Office of Training and Adult Education, ACCESS Economics with information on employment trends, input from ITABs;
- Vic: ITAB VET Plans, DEWRSB;
- Qld: Training Consultants and Account managers servicing engineering VET, State Vocational Education Priority Planning Documents and ITAB plans;
- WA: State Industry Training Councils and ITABs, State Govt commissioned research into skill requirements of resource and infrastructure projects, estimates of demand undertaken as part of State Training Strategy.

Quick response to skill shortage issues and changes in demand:

- ACT: claims to have the capacity to respond;
- Vic: TAFE Institutes can shift their resources to respond to training demand at the local level;
- Qld: Can respond. Institutes have sufficient flexibility and can skill up existing staff to meet skills shortages with customised training programs. However, long lead time involved in developing trades skills limits the speed with which the training system can respond;
- WA: publicly tendered programs.

#### Influence of the State Training Profile:

- ACT: The implementation of User Choice means CIT no longer sets targets in the apprentice area. Office of Training and Adult Education advises that public tender funds significant in meeting skills shortages;
- Vic: State Training Profiles do not constrain Victoria's ability to respond to skills shortages;
- Qld: no real impact;
- WA: TAFE Colleges negotiate college profiles in response to skills shortages, funding for the provision of training to address skill shortages as part of the publicly tendered program.

#### Unit Costs:

- ACT: unit costs are significant, but no clear answer was given. Discussion was confined to enrolments in apprenticeship courses;
- Vic: concerned that funding pressures on TAFE Institutes in recent years may have lead to a decline in their ability to respond to client needs. Has therefore committed additional funds;
- Qld: Unit costs are significant. Currently allocation of profiles to Institutes is done without acknowledging the differing resourcing requirements different profiles have. Further, higher costs of delivery in remote areas impact on resourcing requirements. The STA attempts to address this with higher prices for remote delivery. Thin markets also impact on resourcing costs. The STA seeks to manage this through pricing arrangements and consolidating delivery mechanisms;
- WA: funding model takes into account academic staffing and support, class size ratios, consumables, admin staffing, fixed costs and regional remote costs. It recognises cost differential and funds higher cost programs accordingly.

#### Impact of Flexibility:

- ACT: no clear evidence of the impact of flexibility on demand as yet;
- Vic: responded only with respect to apprentices. In this case, claims apprenticeships are an employment not training decision, and argues that flexibilities within the training system unlikely to impact on the decision to employ an apprentice, and therefore apprentice enrolments;
- Qld: Flexibility when used to provide a quality training program will increase demand;
- WA: generally flexibility improves access to training and therefore contributes to increased demand for such training.

Regarding qualitative information, only WA has so far provided a considered response. WA's response indicates that the principle mechanism used to respond to identified skills shortages in an immediate way is through the publicly tendered training programs, which are a small proportion of the overall budget. Otherwise, resources are allocated through a triennial planning process. State systems are prevented by the ANTA funding structure from merging capital and delivery costs, and therefore, it is difficult to clearly identify exact overall costs associated with delivery of particular options.

## ENDNOTES

- 1 Because of time constraints, the Metal Trades Federation of Unions, a member of the working group, were not in a position to approve this final document.
- 2 Training to Compete, The Training Needs of Industry, Report to the Australian Industry Group, Allen Consulting Group, 1999.
- 3 Study of Engineering Skills Shortages in Queensland, prepared by Deborah Wilson Consulting for the Department of Employment, Training and Metal Trades Industry Association, 1998.
- 4 On the Brink of Crisis?, Bob Marshman and Associates prepared for the Engineering Skills Training Board (Vic) Inc, 1997
- 5 Northern Territory Skills Shortages Report, R & M Consultants and Street Ryan and Associates for Australian Chamber of Commerce and Industry, 1997.
- 6 Employment Studies Centre and Hunter Valley Research Foundation, Hunter - Clever Region, Report for the Hunter Area Consultative Committee of DEWRSB, February 1999
- 7 Training to Compete, 1999, page 26
- 8 survey conducted by Australian Business Limited, September, 1999
- 9 Smith, A, Returns to Enterprises on Investments in Training, NCVER
- 10 National Institute of Economic and Social Research Studies (NIESR)
- 11 this is a term used largely in the United States, to refer to practices such as teamwork, Total Quality Management principles and Just in Time techniques of organisation
- 12 Smith, A, Returns to Enterprises on Investments in Training, page 10
- 13 For example, the negative impact of the Asian economic crisis has eased demand for skills in the past two years (DEWRSB, 2000)
- 14 DETYA, Skills in Australia - Trends and Shortages, Analytical Series No 98/5, 1998, page31
- 15 DEWRSB, 2000
- 16 Training to Compete, 1999, page 32
- 17 Advice received from MERS ITAB in response to this project, January 20
- 18 Advice received from MERS ITAB in response to this project, January 20
- 19 Although DEWRSB argues that there is some potential to lower net wastage rates from these trades as 42 % who have left say they would consider returning with improved pay and career prospects (NCVER, Evidence of Skill Shortages in the Mechanical Engineering and Fabrication Trades, February 2000, page 20)
- 20 NCVER, Evidence of Skill Shortages in the Mechanical Engineering and Fabrication Trades, February 2000
- 21 NCVER, Evidence of Skill Shortages in the Mechanical Engineering and Fabrication Trades, February 2000
- 22 DETYA Trends in Demand For and Supply of Metal Tradespersons, July 1999
- 23 The DEWRSB methodology is very thorough and factors in a range of relevant background information. DEWRSB uses newspaper job advertisements as a basis for conducting detailed surveys. Employers who have recently advertised vacancies are surveyed on whether they have been able to fill vacancies as advertised. The key measure informing DEWRSB advice on skills shortages is the percentage of vacancies filled, but it is also taking into account economic and vacancy trends, employment statistics, training output and migration statistics. In the larger states around 20 to 30 employers (or more in some instances) would be contacted for each occupation, and the telephone discussions with employers provide information on issues such as: how many suitable applicants; reasons for applicants not being suitable; specialised experience required; factors affecting demand for skills; and remuneration (DEWRSB advice for this project).
- 24 Advice received from MERS ITAB in response to this project, January 2000
- 25 Training to Compete, 1999, page xvii
- 26 Training to Compete, 1999, page 42

27 ACCI submission for this report. The submission noted that the July 1999 ACCI Survey of Investor Confidence shows a rise from 6th to 4th in the availability of suitably trained employees as a constraint in investment. This issue was rated more significant as a constraint to investment than wage costs, government regulations and insufficient demand, and is the highest rating this issue has had since the survey started eight years ago.

28 DEWRSB , 2000

29 NCVER, Evidence of Skill Shortages, 2000, page 28

30 Advice from MTFU in relation to this project

31 The Skills Gap- The Shortage of Qualified Workers: A Growing Challenge to the American Economy, 1998, The Manufacturing Institute.

32 WEM, Position Paper on Skill Shortages in the European Metal Trades, January 2000

33 DEWRSB, 2000

34 Advised by MTFU, 2000, and MERSITAB, 2000

35 Training to Compete, 1999

36 Computer Aided Design, Computer Aided Machining

37 DEWRSB, 2000; and Wilson, D, 1998

38 MFTU, submission in relation to this project, December, 1999

39 Advice received from MERS ITAB in response to this project, January 2000

40 DEWRSB, 2000, Wilson, D, 1998

41 DEWRSB, 2000

42 DEWRSB, 2000

43 Advice from Australian Electronic Manufacturing Services, February 2000

44 MFTU, submission in relation to this project, December, 1999

45 eg: Training to Compete, 1999, Northern Territory Skills Shortages Report, 1987, Study of Engineering Skills Shortages in Queensland, 1998

46 MTFU, advice submitted in relation to this project, December 1999

47 Advice from state ITABS and collated by MERS ITAB in response to this project, January 2000

48 Information from State VET plans and discussions with regional representatives in relation to this project

49 "Apprenticeship training in the mechanical engineering and fabrication trades (and all other major trades) experienced a decline in Australia in the early 1990's from the record high levels of the late 1980's. Since the mid 1990's, we have seen a significant turnaround, with strong growth in the past couple of years."(NCVER, January 2000).

50 Training to Compete, 1999, found that over 70% of the companies who responded showed this preference.

51 NCVER, 2000

52 In May 1998 the average weekly earnings for Engineering Trades workers was 13% above the average weekly earnings for all occupations. Almost half of respondents to Training to Compete reported on the lack of quality of applicants. Wilson, D, 1998, also reported on this issue.

53 DEWRSB, 1997

54 these issues are supported by the findings of the Ai Group and ACCI surveys.

55 This theme is repeated in a number of reports, including Marshman, B, 1997, Wilson, D, 1998

56 Marshman, B, On the Brink of Crisis?, 1998, page 7

57 Excludes Tasmania, Northern Territory and the ACT. Figures drawn from State and Territory Board of Studies departments

58 Reported at the 10 March 2000 National Forum

59 Study of Engineering Skills Shortages in Queensland, 1999 and Training to Compete, 1999

60 Advice received from MERS ITAB in response to this project, January 2000

61 Review - Faculty of Engineering and Manufacturing, Illawarra Institute of Technology, January 2000. This is supported by outcomes of the TAFE survey.

62 This is supported by the responses to the TAFE survey, which indicate unit costs are a factor in decisions about course delivery.

63 Marshman, 1998

64 NSW Industry VET Plan 2000-2002, page 20

65 Discussions with Illawarra Institute of Technology

66 Training to Compete, 1999, page xv

67 Discussions with: Illawarra Institute of Technology; Flexible Learning Services, Brisbane Institute of TAFE

68 In WA 20% of TAFE colleges offer the full range of Competency Standards included in the Training Package, and in SA, none. The ACT advised that there is no evident demand for the total training package and the small staff cannot deliver the full package.

69 This issue was raised at the 10 March forum, and also in the employer survey. The survey found that 77 percent of firms cited training issues as causing a barrier to resolving skills shortage problems by the firm's preferred method. 26 percent of these identified lack of training expertise internally, with a key factor being the inability to allocate resources to the task away from the firm's core work activities. Lack of support and/or advice from a training provider was cited by 13 percent of firms with training barriers. A number of firms reported that the courses offered by training providers were not adequate, appropriate and/or timely. In addition, some firms reported that information on training providers and the courses that are on offer was not available.

70 The ACCI respondents did not raise costs as an impediment to training.

71 NCVET, 2000. This is supported by information gained in the TAFE survey conducted for this report, which found that non-indentured enrolments in trades courses may be significantly high. In WA, 13% of such enrolments were not indentured.

72 As noted in the Methodology section, collation methods and sample size limit the usefulness of comparisons.

73 Figures provided by WA and SA for the TAFE survey for this report indicate this

74 Advice received from MERS ITAB in response to this project, January 2000

75 Under permanent migration, people with engineering skills can enter through:

\* The points-tested categories as general migrants. Such migrants now need to have their skills assessed by a relevant body prior to lodging their application, they must meet threshold criteria regarding their skills (qualifications and experience), age and English language proficiency, and pass the prevailing level of the points test pass mark; or

\* The Employer Nomination Scheme, where employers can directly sponsor employees who meet their requirements providing they test the domestic labour market and they have a record of, or commitment to, training Australians.

Under temporary entry arrangements, employers are also able to sponsor employees from overseas. These arrangements are reasonably streamlined.

76 Training to Compete found that over 40% of companies reported having contracted out some parts of their business and 25% of companies employ a significant percentage of employees on short term contract or through labour hire companies. The Ai Group and ACCI surveys conducted for this project indicated that 39% and 26% of respondents respectively employed a qualified tradesperson through a labour hire company.

77 10 March 2000 National Forum, Ai Group section meetings and the February 2000 survey of labour hire companies

78 Both labour hire companies surveyed in relation to this project stated that they employ apprentices.

79 10 March 2000 National Forum

80 10 March 2000 National Forum

81 Ai Group section meetings

82 Based on results from the Ai Group sample

83 Based on results from the Ai Group sample

84 Based on results from the Ai Group sample

85 Based on reasons given by firms in the Ai Group sample

86 Based on reasons given by firms in the Ai Group sample

87 All of these reasons were given by firms in the Ai Group sample

88 Based on reasons given by firms in the Ai Group sample

89 Based on reasons given by firms in the Ai Group sample

90 This paragraph based on results from the Ai Group sample

91 Based on reasons given by firms in the Ai Group sample

92 Based on reasons given by firms in the Ai Group sample

