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Building a Local Defence Industry: Workforce Requirements 2006-2010

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Director's Note

Welcome to the twentieth issue of *Economic Issues*, a series published by the South Australian Centre for Economic Studies as part of its Corporate Membership Program. The scope of *Economic Issues* is intended to be broad, limited only to topical, applied economic issues of relevance to South Australia and Australia. Within the scope, the intention is to focus on key issues – public policy issues, economic trends, economic events – and present an authoritative, expert analysis which contributes to both public understanding and public debate. Papers will be published on a continuing basis, as topics present themselves and as resources allow.

The authors of this paper are Michael O'Neil (Director), Edwin Dewan (Research Economist) and Steve Whetton (Senior Research Economist), SA Centre for Economic Studies.

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Michael O'Neil
Executive Director
SA Centre for Economic Studies
March 2007

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Building a Local Defence Industry: Workforce Requirements 2006-2010

Overview

“Defence and industry will need to develop, in partnership with the tertiary sector, a long-term plan to deliver sufficient numbers of skilled people into defence industry if we are to sustain our capacity for self-reliance. The alternative is a progressive run-down in the capability of defence industries to support our national sovereignty”.¹

The awarding of the Air Warfare Destroyer (AWD) contract to South Australia,

defence industry workforce to support a naval shipbuilding and sustainment (repair, refit, etc.) industry is an important component of that challenge.

This paper presents an overview of recent research undertaken by the South Australian Centre for Economic Studies, with the principal objective to aggregate and quantify current workforce capabilities and identify workforce requirements for the South Australian Defence Industry.⁵ The paper has three components. We commence with a brief snapshot of planned expenditure within the defence sector

Introduction

It is generally acknowledged that there are four specific areas within the defence industry in which South Australia has existing or emerging capabilities and each of these are considered in detail in the Defence Capability Plan 2006-2016.⁸ These include the:

- maritime sector (\$650m, peak 2011-12, 11 per cent);⁹
- electronics (\$2b, peak 2011-12, 46 per cent);
- land vehicles (\$300m, continuing to rise post 2011, 10 per cent);
and
- aerospace (\$1.3b, peak 2011-12, 26 per cent).

The Defence Capability Plan anticipates \$5 billion annual expenditure on defence acquisition projects out to 2016 and the four capability areas above account for 93 per cent of planned expenditure each year (with weapons and munitions the remaining 7 per cent). On closer analysis the critical determinant of current capability in which South Australia has a strong competitive edge is the electronic systems element. Major acquisitions lie ahead and include, the Air Warfare Destroyer (\$4.5 to \$6

*... SA ... capability in R&D,
engineering and electronics
to support a defence
industry ...*

*... adjusting to the demands
of an emerging industry ...*

establishment and growth of the automotive industry in South Australia or when shipbuilding was a major part of the economy of Whyalla.

Box 1

Building a strong industry workforce is not some short-term response to skill shortages, that may arise due to variations in the business cycle. Rather, it is premised on an understanding of structural change in an economy, change in economic, social and industry policy, a realisation and response to changing demographic and labour market conditions and a response to new technology and the forces of globalisation. Demand led training is now the focus of training effort. Training courses need to be associated with job-specific experience and linked to job opportunities. The Maritime Skills Institute, new courses for defence related occupations in the VET sector and universities

*... high proportion of more
highly skilled workers ...*

The data set on occupations were coded into 4-digit Australian Standard Occupational Classification (ASCO) under broad titles of manager, professionals, associate professionals, trades and related workers, clerical workers, production and transport and labourers and related workers.

Based on survey data, the total number of direct employees in those defence companies surveyed as at June 2006 stood at 5,800.

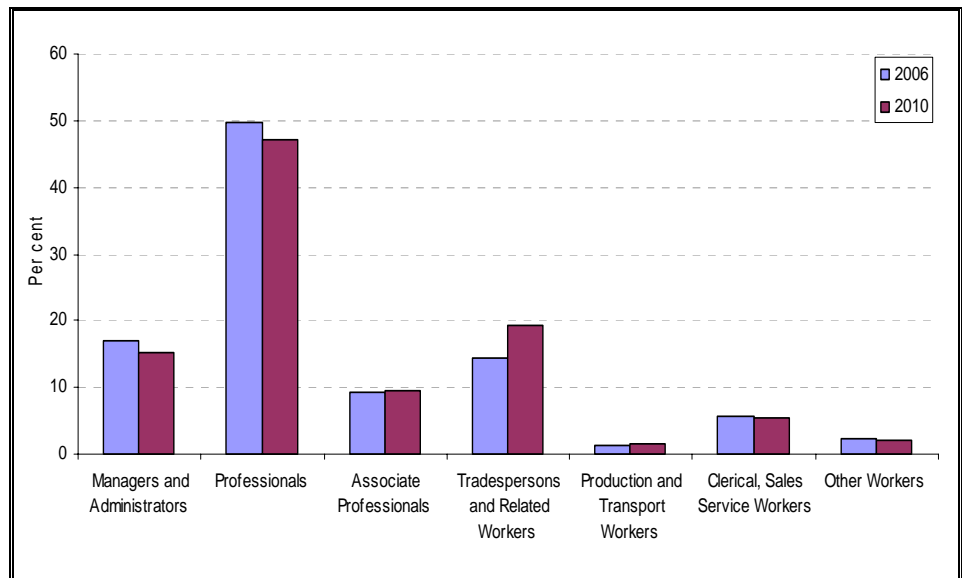
Table 1 shows current employment in the companies surveyed, the share of total employment in 2006 by broad occupational categories, estimated employment numbers to 2010 and the relative share of employment by 2010 at the ASCO one digit level.

Table 1
Current and Future Employment: Number and Share, ASCO 1 Digit

ASCO	2006		2010	
	Number	Percentage Share	Number	Percentage Share
Managers and Administrators	983	17.0	1,080	15.1
Professionals	2,883	49.7	3,382	47.2
Associate Professionals	535	9.2	684	9.5
Tradespersons and Related Workers	840	14.5	1,389	19.4
Production and Transport Workers	80	1.4	106	1.5
Clerical, Sales, Service Workers	333	5.7	385	5.4
Other Workers	142	2.4	142	2.0
Total	5,796	100.0	7,168	100.0

... require professional and trade qualifications ...

Figure 2
Proportion of Employment By Occupational Categories Current and Expected (ASCO 1 Digit)



Source: Defence Industry Survey, SACES 2006.

profile of the workforce

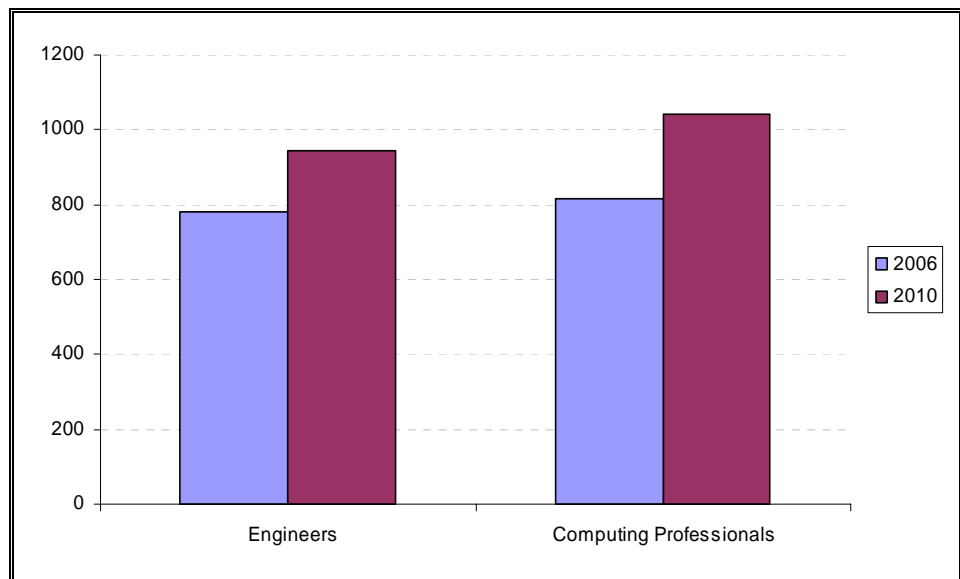
It is evident from Figure 2 that the profile of the workforce in the defence industry is not likely to change significantly over the next four years. However, the share of tradespersons will increase and we sought detailed information on the types of trade qualifications expected to be in demand. In addition, there are obviously new skills/new occupations in demand as a result of the AWD contract, particularly experienced workers in the maritime industry (e.g., naval architects). In the first few years many of these skilled and experienced workers will be sourced from interstate and overseas.

When compared to total employment in South Australia by occupational categories, the profile of employment in the defence sector is heavily weighted to professionals and managers and administrators (see Table 3), those who possess a tertiary qualification and/or significant experience in the workforce.¹⁶

Some 67 per cent of the workforce in the defence industry survey are classified to managerial and professional occupations, compared to 27 per cent of employed persons in South Australia and 21 per cent for the mining industry.¹⁷ Similarly, the survey results indicate that the defence industry employs a slightly higher proportion of those with a trade qualification.

Further detail on the current workforce profile and future demand for skills in the defence industry by major occupational categories is considered below.

Figure 3
Number of Engineering and Computing Professionals



Source: Defence Industry Survey, SACES 2006.

Associate Professionals

In mid 2006, defence companies employed 535 Associate Professionals mainly as electrical, electronics and mechanical engineering associates and technicians; computing support technicians and other associate professionals such as technician officers and business associate professionals. Included in this group are Senior Technical Officers who often have a trade background and have moved within the company into management and supervisory positions. They are now a group of older workers, nearing retirement who possess a deep institutional or corporate knowledge of the organisation and who act as mentors/trainers of young tradespersons. They are described by the companies as “having a trade background, and with extensive years of service have moved into supervisory positions running workshops, installation teams, production facilities and the like”.

The growth rate in this occupational category is expected to be 6.3 per cent over the four years to 2010 although the share of total employment will increase only marginally (from 9.2 to 9.5 per cent).

Tradespersons and Related Workers

As at June 2006 respondents employed 840 tradespersons and related workers. Around 40 per cent of these workers were electrical and electronics tradespersons, 34 per cent had a mechanical engineering qualification and 14 per cent are fabrication engineering tradespersons. The remaining 12 per cent were classified as other tradesperson and include operators, refrigeration and airconditioning mechanics, painters and plumbers.

... addressing demographic change ...

By the year 2010, the number of tradespersons and related workers is expected to increase by 65 per cent at a compound average growth rate of 13 per cent. The growth will occur across all trade categories shown in Table 4.

Table 4
Number of Tradespersons Current and Expected
(Major Occupations only)

Occupations Tradespersons	Number of Workers	
	2006	2010
General Mechanical Engineering	111	192
Metal Fitters and Machinists	49	56
General Fabrication Engineering	46	79
Structural Steel and Welding	45	73
Electricians	274	388
Electrical Distribution	29	69
Electrical Instruments	33	94
Communications	14	17
Other	239	421
Total	840	1,389

Source: Defence Industry Survey, SACES 2006.

Estimating indirect impacts

The Centre developed an Estimation Model 2006 for this study, to estimate from the forecast expansion of the defence sector by the companies in this survey, the following:

-

The expected demand for VET qualified personnel is spread reasonably evenly, with greatest demand for those in business service and skilled manufacturing occupations as shown in Appendix A (Table A.2). The additional requirement from the VET sector will be 730 persons out to 2010.

Estimating Labour Supply

The second component of the study was concerned with an assessment of the supply side, principally through the output of the higher education and post secondary training sectors. There is no “one to one” matching of labour supply and labour demand side as businesses do not always recruit locally, they may prefer to recruit experienced workers rather than new graduates; as well, graduates are mobile and may move interstate or overseas, they may already have employment so they do not enter the pool of readily available labour, and so on.

... education and training providers are responding ...

The Centre approached the three Universities (University of Adelaide, University of South Australia and Flinders University) and TAFE SA for information on recent graduates and current enrolment numbers in engineering, IT/computer science, mathematics and related programs and the trades to provide an indication of the supply of graduates with the appropriate qualifications required by the defence sector. The educational institutions were provided with a template²¹ to generate the following specific information:

- Number of graduates in 2005 – 2006 period.
- Number of enrolments in 2006.
- Duration of the program (time taken to complete each program on full-time basis).
- New programs to be offered in 2007.
- Medium term expectations on enrolment levels for the listed programs.

TAFE SA: Enrolments and Graduates

Following the awarding of the AWD SEA 4000 contract, the Department of Further Education, Employment, Science and Technology (DFEEST) in 2005 identified the following courses as being relevant to shipbuilding, maintenance and repair and all are relevant to employment in the defence sector:²²

- Airconditioning & Refrigeration
- Electrical
- Electronics
- Fabrication and Welding
- Marine Construction
- Mechanical
- Plumbing

In 2005, some 2,267 students graduated in these courses with certificate, diploma and advanced diploma qualifications. At present, a further 8,350 students are enrolled in these courses and about 2,413 are expected to graduate in 2006 (refer to Table 5).

Table 5
Actual and Projected Graduates: 2005 and 2006

Program	Number of Graduates	
	2005 (Actual)	2006 (Projected)
Advanced Diploma (Engineering and Computer Science)	73	84
Diploma (Engineering, Computing/IT, Quality Management and OHS)	306	250
Certificate IV (Engineering, Computing/IT and Transport & Distribution, OHS)	315	360
Certificate III (Engineering, Computing/IT and Transport & Distribution, OHS, Construction and Plumbing)	1,136	866
Certificate II (Engineering, Computing/IT and Transport & Distribution)		

increase thereafter following an increase in enrolments (refer to Appendix B, Table B.4).

Approximately 440 students graduated with Certificate II level qualification in 2005. In 2006, some 2,765 students were enrolled for Certificate II level studies. Slightly less than two-thirds (66 per cent) of the students are undertaking Introductory Vocational Education.²³ A substantial increase in the number of graduates completing Certificate II courses is anticipated following higher enrolments in 2006 (see Appendix B, Table B.5).

... developing a hub for
training courses at Osborne

...

In summary, the trend is for an increase in both enrolments and graduations from the technical and vocational sector in courses relevant to employment in the defence sector. In addition to current enrolments the Maritime Skills Centre, a purpose built facility for skills development of the ASC shipbuilding workforce will provide an important hub for trade and technical courses for naval shipbuilding, repair and maintenance. Up to \$10 million has been allocated for workforce development programs. This is significant as those with a trade qualification and experience in the workforce are forecast to be in strong demand.

University Enrolments and Graduates

In 2005, 1,351 students graduated with undergraduate or higher qualifications from the University of Adelaide, Flinders University and University of South Australia relevant to employment in the defence industry. The number of domestic students who graduated ! *those who are Australian citizen or permanent resident of Australia* – was 767. The actual numbers by qualification were as follows (with anticipated graduations of domestic students in 2006 shown in brackets):

- 601 undergraduate (631);
- 44 postgraduate/certificate/diploma (46);
- 95 Masters degree (100); and
- 27 Doctoral degree (28).

Postgraduate Certificate/Diploma

There were 44 domestic students who graduated with postgraduate certificate/diploma qualifications in 2005. It is the assessment of the course co-ordinators that this group of graduates could all be readily employed in defence companies as most have a background in engineering, science and defence studies. Generally it takes between one to one and a half years to complete these programs for a full-time student. Further, as at mid 2006, there were 130 postgraduate students enrolled in

Masters Degree

Table 8 shows the number of domestic students who completed a Masters Degree in 2005 and student enrolments in 2006. There are three types of Masters program included in the data. That is, a Masters by Research, by Coursework and Masters by combined coursework and research. Ninety five domestic students completed a Masters Degree in the specialised fields.

... tapping into the pool of international students ...

Approximately 1,175 students are currently enrolled in Masters program, of which 44 per cent are domestic students. International students dominate course enrolments most notably in three courses ! Master of Computer Science and IT, Master of Engineering (Manufacturing) and Master of Project Management. The dominance of international students suggests that further efforts needs to be made to understand the origin and destination of these graduates and whether they are available to work in the local defence, computer and electronics industry sectors.

Table 8
Number of Graduates and Enrolments in Masters Degree

Program Name	2005 Graduates	Number of Students Enrolled in 2006		
	Domestic Students Only	Domestic	International	Total
Master in Engineering (Computer Systems) ^a	8	257	80	337
Master of Advanced Engineering	-	1	30	31
Master of Civil, Structural & Environmental Engineering	3	21	11	32
Master of Computer & Software Engineering	-	6	15	21
Master of Computer Science and IT	11	9	134	143
Master of Engineering (Chemical)	-	5	18	23
Master of Engineering (Electrical and Electronics)	4	16	37	53
Master of Engineering (Manufacturing)	6	3	187	190
Master of Engineering (Marine)	-	7	0	7
Master of Engineering (Mechanical)	2	8	15	23
Master of Engineering (Petroleum)	-	8	14	22
Master of Entrepreneurship	9	21	0	21
Master of Project Management	29	58	98	156

Gap Analysis

While there inevitably is some degree of uncertainty regarding the future demand for skilled labour and the supply of graduates the Centre undertook a gap analysis to assess the “situation of the defence sector in 2010”. In estimating the most likely situation in 2010 the following caveats (and likely state of the labour market) were considered relevant:

- by 2010 with the expansion of the Olympic Dam site by BHP-Billiton, there will be a strong demand for those with trade qualifications and engineering/mining qualifications;
- interstate demand for skilled labour in the mining sector will remain strong;
- labour mobility will continue to be a feature of the national labour market especially for those with trade and university qualifications;
- the defence sector in South Australia will recruit experienced personnel such as naval architects for the AWD contract from overseas;
- South Australia will maintain a high and increasing number of new skilled migrants under the skilled-independent regional (SIR) visa (the share of skilled migration is now 7 per cent up from 4 per cent in 1995-96);
- other qualifications/skills in accounting, finance, commerce and human resources are required by the defence sector; and
- skilled workers will transition from other sectors of employment (e.g., automotive, whitegoods) to defence/maritime sector.

... real pressure point is likely to be demand for tradespersons ...

In 2006 defence sector firms recruited 226 university graduates. Out to 2010 new graduate recruitment is expected to gradually increase to 280 per annum to meet expansion in the industry, replacement/turnover of staff and retirement. Recruitment of tradespersons is estimated at 140 persons in 2007 and a further 120 tradespersons each year out to 2010. The projected increase in university graduations in defence related courses is sufficient to meet demand. The “pressure point” in the labour market relates to the number of apprentices in training and an increase in enrolments and graduations is required.

The Maritime Skills Centre will be critical to the supply of qualified tradespersons in electronics, welding, metal fabrication and building trades. There will be opportunities for the re-deployment and re-training of skilled workers.

Table 10
Current Recruitment 2006 and Planned

	2006	2007	2008	2009	2010
Graduates	226	237	247	258	279
Tradespersons	-(¹)	140	120	120	120

Note: ⁽¹⁾ Recruitment of new apprentices was estimated at 60 in 2006 with total employment of apprentices at 170 at various stages of their apprenticeship.

Table 11
Major Occupations Firms Intending to Recruit

General Occupations	Respondents (per cent)
Engineering Professionals	73.5

*... skills/occupations that
are eagerly sought ...*

Moreover, some 15 per cent of respondents indicated they are likely to employ through interstate and overseas migration and specifically the skills sets, experience and qualifications most eagerly sought relate to expertise in shipbuilding and marine electronic installation.

*... government, industry and
education providers
collaborating ...*

The defence industry workforce is expected to grow strongly out to 2010 (and beyond). Direct employment in core defence firms is currently 5,800 persons. By the year 2010, direct employment in the defence industry is projected to increase by 24 per cent to about 7,200. In terms of future workforce requirements it is apparent that companies not currently located in South Australia may be attracted to locate as a result of the AWD contract, other defence work and growth in this sector over time, and are likely to spur further demand for skilled labour.

... a flexible policy mix ...

To cater for higher demand for skilled workers, a flexible policy mix is required with the intention of attracting skilled interstate workers and overseas migrants and more importantly developing the local skill base. Retraining for retrenched workers is an obvious priority.

The defence workforce is “knowledge” based and strongly biased toward high skill levels. Given this profile, the industry will continue to demand skilled workers with Bachelor or higher qualifications and those with Certificate III or IV qualifications and relevant work experience.

*... creating a skills
revolution ...*

It is estimated that direct employment in the defence industry of 7,200 by 2010 will be approximately equivalent to that of direct employment in the mining sector of 7,600 by 2010. On current estimates, direct employment in the mining sector could peak around 2011-2012 with 9,000 employees. The Centre’s estimate for the defence sector of 7,200 direct employees by 2010 is a conservative estimate, so it is most likely that defence, the mining industry and sustained employment growth in electronics and ICT

*... continue to emphasise
science and mathematics ...*

Appendix A

Table A.1
Estimated Gross Employment Impact: 2006-2010
15 Sector Industry Model

Agriculture	56.2
Mining	10.3

Table A.2
Estimated Gross Requirement for VET Qualified Personnel
Secondary Impact Outside Defence Manufacturing: 2006-2010¹

	Total	Advanced Diploma/ Diploma	Other VET
1 Managers and Administrators	73	25	49
21 Science, Building and Engineering Professionals	1	0	0
22 Business and Information Professionals	32	17	14
23 Health Professionals	1	0	0
24 Education Professionals	2	2	1
25 Social, Arts and Miscellaneous Professionals	16	8	8
31 Science, Engineering and Related Associate Professionals	23	8	14
32 Business and Administration Associate Professionals	33	13	20
33 Managing Supervisors (Sales and Service)	32	6	25
34 Health and Welfare Associate Professionals	6	2	4
39 Other Associate Professionals	9	4	5
41 Mechanical and Fabrication Engineering Tradespersons	84	3	80

Appendix B

Table B.1
Advanced Diploma Graduates, Enrolments and Projected Graduates

Program Name	Graduates 2005	Enrolments 2006	Projected Graduates 2006
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Table B.3
Certificate IV Graduates, Enrolments and Projected Graduates

Program Name	Graduates 2005	Enrolments 2006	Projected Graduates 2006
<i>Certificate IV in:</i>			

Table B.5
Certificate II Graduates, Enrolments and Projected Graduates

Program Name	Graduates 2005	Enrolments 2006	Projected Graduates 2006
<i>Certificate II in:</i>			
- Electrotechnology	74	321	
- Engineering	39	56	
- Gas Operations	6	3	
- Information Technology	274	465	
- Introductory Vocational Education	45	1,823	
- Transport and Distribution		94	
Total	438	2,763	854

Source: DFEEST 2006 and SACES 2006.

End Notes

- ¹ Paul Dibb, drawn from ACIL Tasman (2004) “A Profile of the Australian Defence Industry”, Melbourne, p. iii.
- ² The DCP lists acquisitions and sustainment expenditure anticipated as in-country