

**Submission  
No 24**

**INQUIRY INTO THE DEFENCE INDUSTRY IN NEW  
SOUTH WALES**

**Name:** Engineers Australia

**Date received:** 16 June 2017

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# Defence industry in NSW

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## About Engineers Australia

The Institution of Engineers Australia (Engineers Australia) is the not-for-profit professional association for engineers. Established in 1919, Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. Engineers Australia is the trusted voice of the profession. We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.

## Introduction

The technical capability of our defence organisations must not fall at a time when the complexity of systems continues to grow and when many next generation military assets are being procured. High defence engineering capabilities and workforce skills are more important than ever.

Defence engineering is entirely subsumed within the profession of engineering in the broadest sense and engineers play an important role in all defence inputs, from academia and industry to government resources both uniformed and civilian.

Defence capability includes defence assets, infrastructure, personnel and organisational processes. Systems engineering provide the clearest description of the life cycle management of defence assets from perceived need through requirement analysis, research, development, test, evaluation design, construction, integration, acceptance, operation, sustainment, disposal and new capability development. Engineers play an essential role in every part of this life cycle.

## Procurement

Engineering expertise can make a substantial contribution to improving procurement through two main mechanisms. The first is the application of technical skill and domain knowledge to procurements that are engineering intensive. Using engineering expertise will result in government being a more informed buyer of these engineering intensive procurements, thus increasing the likelihood of better value for money.

The second contribution is the application of engineering practices/approaches, and organisational techniques, such as project management, to procurement more broadly. This can deliver more logical, measured, and justifiable activities and systems that can improve the procurement cycle, procurement systems and the alignment between the procurement and multi-level governmental objectives.

Defence procurement must support industry policy by providing local build, technical assessment, design and research and development opportunities, and whole of life sustainment.

It should be noted as well that build and construction components of procurement should not be overlooked. Ensuring that procurement systems and whole of life cycle costs are covered for the construction of buildings within defence should be factored into government thinking.

It is recognised by governments that there is a need to ensure Australian industry can sustain and integrate defence capability over its life in Australia and when deployed. NSW has an extremely capable engineering workforce, however, if industry is to support major platforms it is critical that it is closely involved in the engineering intensive design and build phase. This will enable development of the skills and experience required to maintain, operate and upgrade those platforms throughout their lives and provide for local enterprises to innovate and be part of the supply chain.

Governments can do well in engaging early with local manufacturers and suppliers, such as steel makers, to foster long term strategies that support the state government's initiatives to increase its capacity to garner contracts.

The other point worth noting is that the strategy is very focussed on defence materiel, however there is significant funding and therefore projects in the defence building and construction space. While building and construction is not always seen as a defence capability, there are some very specific requirements in terms of contracting, legislation, security, heritage and operational demands that industry need to be aware of when working or attempting to work in this space. All NSW based defence establishments will require refurbishment and/or rebuilding work at some point in the near future and there is a very full estate works program already underway.

The current NSW defence strategy should be supported by a more comprehensive industry policy, particularly in manufacturing. This policy should recognise the critical role of manufacturing in boosting economic growth, innovation and productivity. This would be especially important for regional areas of the state where defence bases are established.

Ensuring that industry has the capacity to meet future demands both in terms of output of materials as well as engineering workforce will assist in showing the capacity of the state to meet future needs.

## Skilled workforce

To be able to make informed decisions, specialised workforce skills and experience need to be engaged throughout the entire asset life-cycle. The development of high-tech skills is an essential public good that also benefits the broader community.

Building a technical workforce of the future is undermined by entrenched trends in school studies away from vital enabling subjects. Nationally less than 10 per cent of year 12 students study advanced maths, less than 20 per cent study intermediate maths, about 14 per cent study physics and under 18 per cent study chemistry.

Gender imbalance adds to these problems. At present, the majority of year 12 students, nationally, are young women, but their participation in maths and science subjects is especially low. Just 6.5 per cent of young women study year 12 physics and advanced maths. This reflects unfortunate and unacceptable attitudinal legacies and the failure of governments to adequately invest in teachers and the teaching of science and maths in Australia's schools.

As noted in the NSW Government's defence industry strategy the development of a future workforce must start at schooling age and through the advancement of STEM related subjects.

Australia's capacity to produce its own engineers begins at school.

For NSW to develop more of its own engineers there needs to be a sufficient flow of high school students who are interested in engineering and who have studied the subjects that engineering relies on.

Retention of students at year 12 level in NSW would provide the flow of students who may undertake engineering; however, NSW's retention rates need to improve if NSW is to have a consistent supply of students.

In 2015, retention in NSW, Tasmania, and the Northern Territory was below the national average, while retention rates in Queensland, Victoria and the ACT were above the national average.<sup>1</sup>

Ensuring that students complete their schooling to year 12 provides them with a broader range of opportunities. For the defence industry in NSW, this is an important component in ensuring that the ambition of the state government within its own defence industry policy is reached.

Engineering courses are long in duration and subjects studied rely on students acquiring firm foundations in mathematics and science in later years of high school. Mathematics, physics, chemistry and other sciences are the tools that engineers use to solve real world problems and to convert good ideas into productive and valuable products suitable for domestic and international markets.

There continues to be a trend in students in high school not undertaking these key foundation subjects, as noted above. Without these important subjects the long term pipeline of students with the capability of entering the engineering profession will be diminished, creating gaps that will need to be sourced from overseas. While this in itself is necessary to fill certain skill gaps that exist for specialised engineering work, it should not be the back bone of the local profession.

Engineers undertake professional formation following the completion of essential courses. It typically takes about nine years to complete education and professional formation and so qualify to be fully competent, practicing engineers.

The Chartered credential elevates engineers to the pinnacle of engineering through practical demonstration of competency and ethics.

Chartered engineers exhibit high internationally benchmarked standards of expertise, professionalism and safety.

It is because of these high standards and demonstration of competency and ethics that the Australian Defence Force (ADF) has been partnering with Engineers Australia to elevate both civilian and uniformed members of the ADF to obtain Chartered status.

The ADF has placed a high emphasis on “professionalising” the defence workforce including both staff and the defence industry. By utilising Chartered engineers to raise the profession both within, as an employer, and externally as an end user and informed buyer, the ADF is working to establish better procurement systems and manage risk.

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<sup>1</sup> Engineers Australia, Engineers Make Things Happen, 2017

## Regional Development

While governments exert minimal influence on broader industry policy, leaving the majority to the market, it does have the ability to foster outcomes in the public interest. The link between defence procurement and economic benefits has long been established, and it brings greater access to new technologies, and greater supply chains. Government can create conditions where expertise and build phase operations of new capital assets are sourced locally, creating industrial commons and economies of scale.

This is vitally important for regional NSW. The ability and capacity of regional NSW to provide manufacturing, foster investment and increase employment can be achieved where the mechanisms are established by government.

Not simply large national or international companies, but Small and Medium Enterprises, can benefit hugely from strong, long term policies that can attract business to regional communities.

Additionally, providing infrastructure that can link businesses to point of delivery, or between businesses regardless of distance, can enhance the opportunities for businesses and communities to prosper.

A coherent set of policies that begins with a defence industry focus will push regional economies forward; foster further investment, provide needed infrastructure and provide long term employment opportunities in areas such as engineering.

## Conclusion

The defence industry is a significant contributor to the NSW economy.

Beyond the recruitment of uniformed personnel, defence offers civilian employment and civilian contracts in areas of maintenance, research, development, innovation and construction. Defence assets, as with civilian assets, reach the end of their economic and working lifecycles, new material is needed to maintain Australia's defence capability in an ever changing military and geo-political environment.

Increasing defence budgets in relation to Gross Domestic Product allows for opportunities to capitalise on replacing, maintaining and building new assets for defence. States and territories that can demonstrate their capacity to deliver new assets, that have well developed industry plans which can provide innovative and productive manufacturing, that can be delivered on up to date and well-designed infrastructure have the best chance to exploit these opportunities.

Strong industry policy that underpins defence procurement benefits communities both through direct employment as well as indirect economic benefits from new businesses and expanding business.

Fundamental to all of this, however, is a long pipeline of engineers.

Engineers design, build, operate and maintain defence infrastructure. Their specialised skills and engagement throughout the pipeline gives engineers a special insight into the capacity, adequacy and innovative potential that can be delivered into defence.

Ensuring that the pipeline of engineers is based on strong and determined education policies in STEM related subjects, and the retention of students through to year 12 is vital. Students who have access to and encouragement to undertake foundation courses in mathematics, physics and chemistry which will have the flexibility to choose their career path into the future.





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