

## Submission 46 - Royal Institution of Naval Architects, Australian Division

The Royal Institution of Naval Architects, Australian Division made submission 6 to the inquiry into the Future of Australia's naval shipbuilding industry in the 44th Parliament.

This document is intended as a supplementary submission to the original submission 6.

All submissions received in the 44th Parliament can be accessed via the following link:

[http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate/Economics/Naval\\_shipbuilding/Submissions](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Naval_shipbuilding/Submissions)

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RINA submission to enquiry into naval shipbuilding industry (2017).doc

## **THE ROYAL INSTITUTION OF NAVAL ARCHITECTS**

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The Royal Institution of Naval Architects exists to promote and serve the interests and needs of its members, who are involved at all levels in the design, construction, repair and operation of ships, boats and marine structures. The RINA has members in over 80 countries, and is widely represented in industry, universities and colleges, and maritime organisations.

An Australian Branch of the Institution was founded in 1954. It was made the first Division of the RINA in 1978, and today has Sections in Queensland, New South Wales, Australian Capital Territory, Victoria, Tasmania, South Australia/Northern Territory and Western Australia. There are some 600 members of the RINA in Australia.

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## INTRODUCTION

This is the response of the Royal Institution of Naval Architects (Australian Division) to the invitation by the Senate Committee on Foreign Affairs, Defence and Trade to make a submission to its the re-referred inquiry into the Future of Australia's Naval Shipbuilding Industry.

Areas of particular concern to the RINA and its members which are discussed in this submission include:

- Maintaining a continuous stream of work to the industry.
- Vital importance of Department of Defence being an intelligent customer, including:
  - Appropriate numbers of suitably qualified engineers in the correct positions to influence the process; and
  - Provision for engineers and other civilian staff to conduct regular exercises to maintain and enhance their capabilities (as the operational staff do).
- Incorporation of lessons from previous projects, and operational issues, into the design of the next generation of naval ships and submarines.
- Importance of Australian conditions to warship design.
- Difficulties associated with the RAN using ship and submarine designs developed by overseas designers for foreign navies.

The RINA believes that maintaining a viable defence shipbuilding industry is critical to Australia's maritime defence. The industry must include the skills and capabilities in the construction, modernisation and maintenance of ships as well as weapons and combat systems. It believes that these skills and capabilities must be maintained in Australia, and that dependence on their importation or their development on an "as-needed" basis is not in Australia's best long term interests.

Martin Renilson  
President, Australian Division  
The Royal Institution of Naval Architects

## **General**

First, it is important to note that in addition to the major shipyards, the naval shipbuilding industry comprises a whole range of other organisations including specialist technical organisations and equipment suppliers. These are all required to ensure the future of Australia's strategically important naval ship and submarine building industry, both for initial design and construction, as well as for through-life-support.

From a purely technical point of view, there are three very sound reasons for Australia to maintain a sustainable naval shipbuilding industry.

Firstly, the substantially different operating conditions faced by Australian warships compared to those used by other navies means that a warship optimised for a foreign navy is very unlikely to be suitable for the RAN. History has shown that almost always, modifications are required, and that these changes cause more problems than expected. Foreign designers are not as experienced in the implications of many of these unique requirements as Australian designers.

Secondly, the importance of being able to incorporate Australian operational lessons and experience into the design of future warships should not be underestimated. The RAN has extensive experience in operation of warships, including the peculiarities of Australian operations and operating environment, and this should be incorporated into the design of any future Australian warships. As there is no prototype warship – the first of class must work – and as warships are expected to have a long life, it is vital to get this right. Incorporating lessons from previous ships (perhaps classified, in many cases) is essential to being able to achieve that.

Finally, as ships cannot easily be transported overseas for maintenance and repair, it is essential to have the ability to do this in Australia. If Australia does not have the ability to design and build naval ships, then having the resources and capability to deliver through-life-support locally will be far more difficult.

Of course, technical issues are not the only reasons for needing a sustainable naval shipbuilding industry. Other reasons include development of the knowledge and skills necessary to deliver through-life-support to naval ships in Australia, as well as improving employment opportunities and economic stimulus to the local regions.

Nonetheless, this submission is confined to the engineering and manufacturing issues involved in a sustainable shipbuilding industry, namely those issues within the professional expertise of the RINA's members.

### ***(a) The development of contracts relating to naval ship and submarine building***

In addition to the major shipyards, the naval shipbuilding industry comprises a whole range of other organisations including specialist technical organisations and equipment suppliers.

The naval shipbuilding industry is highly specialised, and in general it is not possible for those working in this industry to flit between it and other fields. Therefore, a rapid increase in the size of the industry is difficult to manage, and fraught with dangers as the additional

staff who would be required would be unlikely to be particularly well experienced in the nuances of the defence issues.

Conversely, if there is insufficient work for the naval shipbuilding industry in Australia it is difficult for the companies to adapt by moving into other fields. They are more likely to downsize, and the expertise of their staff is then lost to the defence field.

Many defence related organisations are subsidiaries of large international companies. These companies will only invest in Australia if there is a good possibility of adequate work. If such work dries up they will make substantial losses, and consequently may be tempted to pull out of Australia. If this occurs, it may well be difficult to encourage them to return at a later date when there is more work around.

Many other defence companies are SMEs. If the defence work load disappears then they may well close, resulting in a loss of capability to the defence industry.

As a result, a very important aspect of dealing with the defence industry must be the provision of a steady stream of work at whatever magnitude the DoD feels is an appropriate level. Peaks and troughs should be avoided wherever possible, and as much notice given to industry when these are unavoidable, to help companies plan.

The RINA strongly recommends that a sustainable naval shipbuilding industry must be based upon an industry plan involving a steady throughput of projects, to develop and maintain the naval shipbuilding skills required at all stages of any project. The peaks and troughs of recent naval shipbuilding projects have meant that skills cannot be further developed by moving on to the next project but are generally lost to other industries. As a result, when subsequent projects are commenced they start from a very low skill base and with individuals knowing that they only have employment for the life of their part of the current project.

Smoothing out of the peaks and troughs could be managed in a number of different ways.

Firstly, rather than place a contract for a relatively long production run of supposedly identical ships, with progressive modifications made during that run, it would be desirable for contracting to be managed in batches, within which each ship is truly identical and of a design fixed at the outset. This approach would not only have the benefit of reducing costs associated with modifications to the design but would allow skills and experience gained to be incorporated into subsequent ships in a managed process akin to carrying skills and experience into the next project. It would also create work for another workforce, focussed on the rolling batch of modifications, to keep the fleet of vessels in date with the ever evolving naval environment.

Secondly, gaps between major projects might be filled by production of non-combatants and other non-frontline ships for which the delivery timetable is not critical.

Thirdly, whilst the Australian shipbuilding industry must remain flexible in order to be able to produce a range of different product types, 'consistency of purpose' is important to maintain the overall integrity of the manufacturing system, from design, through production, to sustainment. The desirable aim to achieve a greater degree of consistency, transcends organisational and functional boundaries. Standards and standardisations have played a key role in driving progress towards improving efficiency in manufacturing, but the procurement

of ship designs from different overseas countries becomes problematic due to differences in national philosophical approach, hence the need for greater consistency in Australia's application of materiel requirements and standards.

It is very pleasing to note that the Federal Government appears to understand this important issue, and is addressing it through continuous naval shipbuilding plan. It is essential that this be maintained by future Governments.

***(b) The design, management and implementation of naval shipbuilding and submarine defence procurement projects in Australia***

*The importance to the naval ship and submarine building industry of DoD being an intelligent customer*

The first important point to note is that the DoD needs to be a highly intelligent customer. This will reflect well in the decisions made throughout the whole design and procurement process, from the initial concept stages right through the procurement stages, and also the operational issues. If DoD is an intelligent customer this will affect the whole of the naval ship and submarine building industry.

Conversely, if the DoD is not a sufficiently intelligent customer, poor decisions can be expected at any of the stages in the procurement process, regardless of the systems which are put in place to try to prevent this. This will reflect badly on the naval ship and submarine building in Australia.

So an important kernel of the design, management, and implementation of naval shipbuilding and defence procurement projects in Australia must be a strong focus on ensuring that DoD is, and remains, an intelligent customer.

To do this it is essential that there is an adequate number of appropriately qualified engineers, both within the DoD and industry, and that they are in the correct position to influence the procurement process.

*Exercising to retain skills*

Maritime engineering is a complex field, and engineers need to be properly trained, with appropriate, and up to date, experience. To this end it is very important that they have the opportunity to conduct relevant exercises to maintain their skills, and hence such a program needs to be in place. Where appropriate this should involve DoD/industry interaction, and could include secondments of relevant staff into industry for specific periods and well defined tasks. However, the main element ought to be that these engineers are given the opportunity, and requirement, to maintain their skills by making use of them on a regular basis in a prescribed manner to ensure that they remain current and at the leading edge in their field.

For example, a ship designer who has not been involved in a ship design for the last 10 years is very unlikely to be in a position to give intelligent input in his field.

The need to remain current by conducting exercises is well understood by the RAN, which spends large sums of money on this to keep its operational staff well trained. The level of funding required to do this for engineers and other civilians who make vital decisions related

to procurement of naval ships and submarines is far smaller, however this doesn't appear to be being made available. This is without doubt a false economy.

#### *Interchange between DoD and industry*

In addition to the possible interaction with industry during the program of exercises described above, it is important that there is also a formal interchange program to allow both the DoD engineers an opportunity to work in industry, and those from industry to work within DoD.

Clearly, care needs to be taken with regards to details, particularly when staff from industry are seconded to the DoD. However, it is believed that the benefits to DoD in terms of ensuring that it remains a very intelligent customer make it worth the effort to overcome these difficulties.

#### *Maintaining knowledge about the international state of the art in the field*

Mechanisms need to be in place to ensure that engineers are able to keep in touch with the state of the art in their field internationally. Although this is certainly done very well indeed by some scientists and research engineers in the DST Group, it is also essential that it is also done by those engineers in DoD who are contributing directly to the procurement process, as well as by those in the industry itself.

In some cases this may mean international exchanges, however in most cases it will mean programs of international visits, including relevant conferences, together with encouragement to maintain knowledge regarding international state of the art by continuous professional development activities. These could include attending technical sessions run by organisations such as the RINA in Australia.

Of course, where engineers are conducting specific exercises which require knowledge of international state of the art that gives the motivation to learn and keep up to date in the relevant aspects of the state of the art.

#### *Feedback from trials and in-service issues*

DoD is in a very good position to obtain feedback regarding trials and in-service issues. As an operator of a large fleet of ships it ought to be able to learn from operational issues, often not apparent to engineers who are only designers or builders, without the experience from ships in service. It is essential that mechanisms are in place to ensure that those at the procurement end of the process are able to benefit from those with experience at the operational end of the process.

A key element of new designs is to start with the actual (not just predicted) data from past designs. This actual data is obtained from comprehensive trials, in particular on the first of class. Hence, it is vital that DoD has a very good repository of such data, and that this be made available to those involved in the procurement process. It is difficult to overestimate the advantages of this data, and the importance of the Intellectual Property associated with it. However, in some cases fragmentation of engineering staff, and rapid turnover of RAN staff holding project based jobs, makes this very difficult.

In addition, where the designs have been carried out by overseas based organisations ownership of this Intellectual Property may be contentious. The need for DoD to have full access to it should be recognised at an early stage in the tender process where overseas organisations are involved.

This feedback will assist greatly in ensuring the success of future ships and submarines.

***(c) The utilisation of local content and supply chains***

*The importance of Australian conditions*

The RAN has to operate over a vast area in conditions ranging from relatively benign tropical waters to extreme conditions in the Southern Ocean, covering a wide range of tasks with a relatively small number of ships and low budget.

Therefore many of the key design features required by RAN ships, such as: range; endurance; seakeeping; and sustainability are quite different to those of other nations. This is particularly the case for non-nuclear submarines, but also applies very widely to surface ships.

Hence, the importance of taking into account Australian conditions is very real when it comes to ship design. This is often very misunderstood when considering Military Off the Shelf (MOTS) ship designs, and statements that because a particular ship design can be operated successfully by some other navy it is the right vessel for the RAN are, unfortunately, often made by the uninformed.

The substantially different operating conditions faced by Australian warships compared to those used by other navies means that a warship optimised for a foreign navy is very unlikely to be suitable for the RAN. History has shown that almost always, modifications are required, and that these changes cause more problems than expected. Foreign designers are not likely to be as aware of the implications of many of these different requirements as Australian designers.

Thus, although it is certainly possible to make use of overseas design work, great care is required to ensure that this is suitable for Australia's requirements. Being a highly intelligent customer will put the DoD in a better position to assess the appropriateness of such an approach on a case by case basis to ensure the success of the Australian shipbuilding industry.

*Use of local equipment*

As noted elsewhere in this submission, the need to fully understand Australian conditions is of vital importance in the whole of the design and procurement process. Of course, this includes the need to understand what equipment is appropriate for use on RAN ships and submarines, both in terms of operational requirements, and the availability of suitable support.

Thus, an understanding of the availability of local equipment, and associated supply chains, is very important at the beginning of the project, to ensure that this is accounted for in the specifications. As ships and submarines are designed to have long lives, it is important to ensure that the relevant equipment, and supply chains, are suitably long lived such that they can be used to support the vessels for their lifetime.



***(d) The integration of offshore design work and supply chains in Australia***

*Overseas warship design organisations*

Many overseas warship design organisations have extensive experience with warship designs for their navies, and also in many cases for other countries' navies. They will be regularly exercised in the technologies, have continuous feedback from full scale trials, and be fully aware of the state of the art, which puts them in a very good position to conduct future warship designs.

These organisations are able to quickly and efficiently offer ships of designs that are either already proven or developed from proven designs. However, these designs need to be modified to the specific needs of the Australian Navy, for example to obtain a longer range to suit our extensive coastline and remoteness. Other significant modifications often relate to military capabilities, including combat and communication systems.

In addition, these “standard” designs will often contain equipment and machinery that is not easily supportable in Australia, and maintenance may become an expensive and time-consuming nightmare. The initial ship design for Australia will need to reflect the requirement for equipment that can be readily sourced and/or supported in Australia.

The scarcity of space into which equipment, systems and accommodation are to be fitted is a feature of warships and a very expensive aspect of them. This issue relates even to a so-called proven design, where invariably there is a need to modify the existing design to accommodate different, updated or modified equipment and systems, such as weapons and combat systems. Furthermore the need to provide access for maintenance and possible replacement at some future date requires additional space which is not always included at the design stage, because many shipbuilders have little interest in through-life costs.

Thus, although it is necessary in many cases to make use of overseas warship design organisations, and overseas suppliers, great care needs to be taken by the DoD when doing this. The potential pitfalls must be recognised, and steps put in place to mitigate against any issues arising. This is an important aspect of the need for the DoD to be an intelligent customer.

## **CONCLUDING COMMENTS**

As outlined previously, the RINA Australian Division considers that for the future sustainability of Australia's strategically vital naval shipbuilding industry there needs to be account of the following points:

- Maintaining a continuous stream of work to the industry.
- Vital importance of Department of Defence being an intelligent customer, including:
  - Appropriate numbers of suitably qualified engineers in the correct positions to influence the process; and
  - Provision for engineers and other civilian staff to conduct regular exercises to maintain and enhance their capabilities (as the operational staff do).
- Incorporation of lessons from previous projects, and operational issues, into the design of the next generation of naval ships and submarines.
- Importance of Australian conditions to warship design.
- Difficulties associated with the RAN using ship and submarine designs developed by overseas designers for foreign navies.

Should the Committee wish to further pursue these points, we would welcome the opportunity to elaborate on them.

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