

# ThyssenKrupp Marine Systems Australia Pty Limited



ThyssenKrupp

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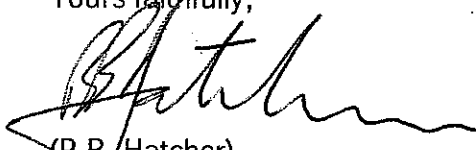
1 May, 2006

Dr K. Dermody  
Committee Secretary  
Senate Foreign Affairs, Defence and Trade Committee  
Department of the Senate  
Parliament House  
CANBERRA ACT 2600

Dear Dr Dermody,

We respectfully ask that you bring the attached submission on the scope and opportunity for naval shipbuilding in Australia to the attention of the Senate Committee.

Yours faithfully,



(P.B. Hatcher)  
Chief Executive Officer

# **ThyssenKrupp Marine Systems Australia Submission to the Senate Foreign Affairs, Defence and Trade Committee Inquiry into Naval Shipbuilding in Australia**

ThyssenKrupp Marine Systems Australia Pty. Ltd. is grateful for the opportunity to provide this written submission to the Senate Foreign Affairs, Defence and Trade Committee Inquiry into Naval Shipbuilding in Australia.

## **Company background**

Our company is a wholly-owned subsidiary of Blohm+Voss GmbH, Germany's pre-eminent warship designer and builder; and the designer of Australia's ANZAC Class frigates.

In January 2005 ThyssenKrupp Werften, the owner of Blohm+Voss, merged with Howaldtswerke-Deutsche Werft GmbH (HDW) to create ThyssenKrupp Marine Systems AG, owned 75% by ThyssenKrupp Technologies AG and 25% by the United States company One Equity Partners. The merger created the largest naval design and shipbuilding group in Europe, consolidating the following leading companies: Blohm+Voss, Hamburg; HDW, Kiel; Blohm+Voss Repair, Hamburg; Nordseewerke GmbH, Emden; HDW-Nobiskrug GmbH Rendsburg.; Kockums AB, Sweden; and Hellenic Shipyards SA, Greece. ThyssenKrupp Marine Systems has resources of over 11,000 highly skilled and experienced personnel and an annual turnover of Euro 3 Billion (approximately AUD 4.9 Billion).

HDW is the world leader in conventional submarine design and construction, including the latest air independent propulsion technologies. It also brought into the ThyssenKrupp Marine Systems group the submarine and surface warship design capabilities of its subsidiary Kockums AB, the designer of the COLLINS Class submarines. HDW acquired Kockums in 2002.

ThyssenKrupp Marine Systems is, therefore, well established in Australia in two major acquisition programmes. Through its Australian subsidiaries ThyssenKrupp Marine Systems Australia and Australian Marine Technologies, the company is committed to supporting the ANZAC and COLLINS Classes, for the length of their service in the Royal Australian Navy, to the extent permitted by the Defence Material Organisation.

## **Australian Industry Construction Capability and Capacity**

From its involvement in the very successful ANZAC Ship Project, as the platform design sub-contractor to Tenix, and the COLLINS Submarine Project, as the design subcontractor to ASC, ThyssenKrupp Marine Systems has no doubt that Australian industry is capable of building and supporting complex warships and submarines. The Air Warfare Destroyer (AWD) Project, the Amphibious Landing Helicopter Dock (LHD) ships Project and, presumably, a follow on submarine project will provide the assured workload needed to develop and maintain the necessary engineering design, construction and system integration skills and infrastructure. Australian industry should be able to further develop the ability to compete successfully in the region for the supply of high technology warships as a result of these projects. The growing success of Austal and Tenix in the export market, which is in large part the result of skills established in Australia through the COLLINS and ANZAC projects, is evidence that Australian companies can be internationally competitive.

The Defence Capability Plan (DCP) shows a significant peak in ship procurement from 2006 to about 2015. We understand that the major large ship projects between now and 2015 are:

- Three Aegis Air Warfare Destroyers (AWD)
- Two Amphibious Landing Helicopter Dock ships (LHD)
- One afloat support ship – Auxiliary Oiler Replenishment ship (AOR)
- One strategic sealift ship

Building the production capacity and project and quality management systems necessary to realise all of these projects in Australia would require a significant expansion of the current capability. Management of these projects requires extensive warship industry corporate experience, systems and processes, not just skilled and experienced individuals. The greatest risk to complex warship projects lies in inadequate management systems and inexperienced engineering management.

Construction of the AWDs and LHDs in Australia is appropriate in order to consolidate and grow the in-country skills necessary to support these warships with their complex integrated combat systems. However, care should be taken to ensure that the cost premium to achieve an in-country build is reasonable and that sufficient skilled labour remains available for the ongoing maintenance and upgrade of existing naval ships. For example, the program of upgrades to the existing ANZAC ships is a high risk project that will demand a very high level of engineering management and production effort. Nevertheless, it should be possible to establish the infrastructure needed to successfully implement the AWD and LHD projects with a manageable level of risk.

However, construction of the AWDs and LHDs in Australia will impact on the other major naval ship acquisitions: the AOR and strategic lift ship. The AWDs and LHDs will be the largest and most complex warships ever built in Australia. Problems, whose resolution will require experienced, skilled engineering management, will inevitably occur. Stretching the capacity of Australian industry to also build the AOR and strategic lift ships in Australia would introduce a very significant risk that the AWD and LHD projects would be left without sufficient resources to overcome these problems. The end result would be a significant increase in the risk of failure of the AWD and LHD projects. Certainly, construction of the AOR and sealift ship in Australia would provide production work and add to the GDP, but this would come at a cost and risk premium to the Department of Defence for little strategic benefit.

The design and construction of AORs require specialist skills and knowledge that are not directly applicable to the construction of other types of ships and are not necessary for in service support, particularly since AORs are not subject to the major modifications that characterise in-service support of warships. Australia already possesses the engineering infrastructure and skills necessary to support an AOR in service. Much of the technology employed in these ships is common with commercial tankers and does not demand the defence-specific skills that are necessary to maintain and modify submarines and military standard warships. The present project to modify the commercial tanker Delos (SIRIUS) and the success in maintaining HMAS SUCCESS for many years demonstrate that Australia already possesses the capability to support an AOR in service. Construction of a new AOR in Australia would not add to this capability or Australia's capability to support other types of ships.

Given that the risks to the AWD and LHD projects associated with building a single AOR in Australia would substantially outweigh the benefits, the inevitable conclusion is that the AOR should be built off shore. Furthermore, the savings made by the overseas construction of the AOR would go some way to offsetting the cost premium for construction of the AWDs and LHDs in Australia, which could be in the order of \$450 million (5% of \$9 billion) plus additional infrastructure costs in the order of \$200 million.

### **Australian Design Capability**

Australia has the capability to construct complex warships, and there is little doubt that construction capacity can be expanded to cope with the AWD and LHD projects. However, it is entirely another question whether Australia can develop, in the foreseeable future, the capability to perform the full spectrum of design work involved in the development of large, complex warships and submarines without the direct support of well-established and experienced overseas designers. Companies such as Tenix, ASC and Austal have the detail design capability in Australia to repair, maintain and, to a limited extent, modify large warships, but they are not experienced warship designers. If Australia is ever to develop a viable major design capability, encompassing the full spectrum of design activity (i.e. concept, principal and detail design), it will need to be more proactive in building on the technology and knowledge transfer achieved through projects such as ANZAC, COLLINS and the AWD.

Given our experience with the ANZAC program, we are sceptical that this will be achieved without a change in Department of Defence policy. Having established in Australia a highly competent and effective design capability, in the form of Australian Marine Technologies Pty Ltd, in order to more than meet the letter and spirit of the ANZAC Project's technology transfer objectives, we have been disappointed to see that capability increasingly excluded from ANZAC upgrade work and new projects. Unless the Defence Materiel Organisation ensures that such capabilities are nurtured and encouraged, there will be little incentive for overseas designers to establish them in the first place.

We note that Gibbs&Cox will be establishing an AWD design capability in Australia, much as Blohm+Voss did for the ANZAC Project. These design capabilities will not remain viable unless they are assured of at least all the principal design work associated with the repair and modification of the respective classes of ships. Even that workload is not enough to maintain a viable major warship principal design capability. An effective design capability needs a continual new design workload to remain competent.

As evidenced by both the ANZAC and COLLINS projects, there is an understandable tendency of shipbuilder prime contractors to undertake as much of the in service design work as possible by themselves, at the expense of the design capabilities established in Australia by the original designers. This is inevitable under the current DMO policies. Kockums, the original COLLINS designer, has pulled out of Australia, partly because of this issue and partly because of intellectual property issues. ThyssenKrupp Marine Systems may also have to consider its future in Australia with regard to ANZAC support if it is precluded from providing a professional level of design support. It must be remembered that international warship designers such as ThyssenKrupp Marine Systems cannot risk their professional reputations by continuing to be associated with designs that have been subjected to modification by design organisations that do not possess a full knowledge and understanding of the original design standards, approaches, and design quality processes. The HMAS WESTRALIA fire is a salutary reminder of the consequences of design change that is implemented without appropriately experienced and qualified professional input. To draw a comparison with another industry, no airline would perform extensive modifications to its 747 aircraft without the involvement and approval of Boeing, the original specialist designer.

We believe it is imperative that the DMO establish long term design support arrangements directly with the Australian companies that constitute the design capabilities established by the original ship designers under major projects. These relationships should be independent of the arrangements put in place for in-service support production work. The DMO needs to have direct access to the most expert and competent design advice and principal design services available, independent of the shipyards and support organisations that stand to benefit from the volume of production and maintenance work. The active involvement of specialist independent designers in the ongoing analysis of maintenance outcomes and continual refinement of

We further recommend that consideration be given to establishing a single warship Naval Design Bureau in Australia. Such a bureau should be independent of the shipyards and companies competing for construction and production support contracts. It should be the sole source provider of all in-country warship design services and should be the recipient of all design technology procured under major warship projects. The Naval Design Bureau could form the focus of a network of companies and research establishments focussed on developing design standards, forward concept designs and maintenance strategies and techniques, which should be driven by design engineering. Furthermore, the bureau would work with the original designer of each new major ship, acting as the recipient of technical data, technology and know how, and as the provider of the data and guidance required to maximise commonality with other RAN ships.

This is not a new concept. It was considered in an extensive report, *The Australian and New Zealand Ship Construction and Repair Industry*, of a study conducted under the auspices of the Defence Industry Committee in 1995<sup>1</sup>. The report recommended, inter alia, that:

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<sup>1</sup> *The Australian and New Zealand Ship Construction and Repair Industry*, Defence Industry Committee Report, published by Directorate of Publishing, Defence Centre – Canberra 17083/95, May 1995.

- "5. Defence should seek to further advance Australian naval design capabilities and, to that end, should:
- (a) Develop a policy of encouraging local design for smaller vessels whose design lies within Australian capacity and competence;
  - (b) Maintain a significant and independent in-house capability in concept studies and preliminary design which can be used to provide expert advice and ensure that Defence continues to be an informed customer in naval construction and refit technologies; and
  - (c) Consider, in conjunction with other agencies, the feasibility of establishing a national design network involving organisations such as the DSTO, CSIRO, AMECRC and industry."

The successes of Austal and Tenix in designing and building smaller ships is, arguably, evidence that Defence has acted on recommendation 5(a) above, but it is clear that the situation with regard to recommendations 5(b) and 5(c) has deteriorated since 1995. Defence's in-house engineering capability has declined to the point where Defence's inability to perform as an informed customer represents a significant risk to major projects. If Defence is to hold contractors liable for technical performance, it must retain the technical expertise necessary to adequately define its requirements and produce the analysis and arguments necessary to demonstrate that the contractor is non-compliant. Defence has explored innovative Alliance contracting strategies, in which the DMO and contractors work together within a risk sharing no-blame agreement, as a means of compensating for the run-down of its in-house engineering capability. The ANZAC Alliance Agreement is one example, albeit one that was flawed by not including the original ship designer as a member. However, recent projects suggest that the DMO is moving back towards more traditional contracting concepts, in which the contractor is required to accept full liability for technical performance. Such approaches will only be effective if the DMO possesses the engineering competence to hold the contractor accountable, or has access to an independent agency that can provide the necessary expertise – a Naval Design Bureau.

With regard to recommendation 5(c), the situation has deteriorated markedly. The Australian Marine Engineering Cooperative Research Centre (AMECRC) has since been disbanded and nothing appears to have been done to establish a national design network. We believe that such a network is an excellent idea, but that it would only be effective if it has a Naval Design Bureau at its core.

Opponents of this concept of a central national Naval Design Bureau may argue that removal of competition would result in inefficiencies and inflated costs for design services. However, the cost of platform design represents only a small fraction of the total acquisition cost of a project (in the order of 5%), and an even smaller fraction of the whole of life cost of a ship. The impact of design quality on project production and support costs far outweighs the cost of the design work itself. The cost of rework, failures and poor performance resulting from substandard design can be enormous and can easily exceed the total cost of the design work. The emphasis in design work should be very much on effectiveness and knowledge building through continuity, rather than design cost minimisation. Also, establishment of a single design bureau would facilitate commonality across future classes of ships, leading to reduced operating costs. A single common design bureau would become the focus for review and refinement of maintenance systems, leading to further reductions in operating and maintenance costs.

Adoption of such a proposal would require a change in DMO acquisition strategies. Major warship projects would require a two step process. Firstly the DMO would have to select either an existing design or preferred overseas designer and then contract the Australian Naval Design Bureau to subcontract the selected designer to jointly develop a new design or Australianise an existing ship design. Having developed the principal design to the tender quality level, the DMO could then compete construction of the ship design in Australia. The DMO would have to provide the principal design as Government Furnished Information, but could require that the successful shipbuilder accept full liability for the performance of the ship against an agreed ship specification. The Naval

Design Bureau would continue to work for the DMO in holding the shipbuilder accountable. The outcomes would be:

- achievement of value for money through competition of the major component of any ship project (the construction, material and equipment costs);
- creation of a single, highly capable centre of warship design excellence in Australia;
- reduced operating maintenance costs through commonality and improved maintenance systems and plans; and
- reduced reliance on overseas designers for future projects.

The *Australian Naval Shipbuilding and Repair Sector Strategic Plan* (NSRSSP), which was published by the Defence Materiel Organisation in 2002, but not endorsed, recommended that a single shipyard be selected to build all future major naval ships, but made little mention of design. A central element of the proposed single shipyard would have been a single, national naval design capability, which would have been the recipient and keeper of all design technology and intellectual property transferred from overseas designers. The single shipyard would have developed not only the capability to build ships, but also the capability to design them. In not adopting the NSRSSP, Defence also rejected, possibly unwittingly, the concept of a single naval design organisation. Whilst Australia may be able to sustain two or more builders of large naval ships, it is unlikely that the present policy of establishing a design capability for each major ship project will lead to an effective, sustainable major ship design capability. We submit that the NSRSSP should be revisited in light of the decision to retain competition in ship construction. Many of the arguments that initially led Defence to recommend a single shipbuilder still remain valid for the concept of a single major naval ship design organisation: a Naval Design Bureau.

It is apparent that the Australian Government's approach to the acquisition and support of submarines and naval ships is suffering from lack of a clear strategy. Whilst competition is an important tool, it must be applied within a clear strategic framework. The acquisition cost of individual projects can be reduced through competition, but life cycle cost can also be reduced through commonality in design standards and maintenance practices and by providing continuity of work. Project by project competition in all aspects of a project may not be the best way to minimise the total cost of maintaining Australia's total maritime capability.

We submit that consideration should be given to foregoing the immediate, often illusory benefits of competition in the design and design engineering support of naval ships, as a means of better focusing and managing competition in the area that really matters; namely procurement and production work associated with construction, repair and maintenance, which amounts to approximately 95% of life cycle cost. Although design may only account for 5% of the total cost of a project, design quality and effectiveness has a significant impact on the other 95%. Ineffective design support can easily lead to production and maintenance costs that far exceed the total cost of design effort.

## Recommendations

ThyssenKrupp Marine Systems Australia recommends that:

- a. in order to reduce risks to the AWD and LHD projects, consideration be given to constructing the AOR and strategic sealift ships off shore, to existing proven designs; and
- b. a single Naval Design Bureau be established as the focus for all major warship design activity in Australia.