



Europe

United Kingdom

Plymouth

- 2.1 The delegation visited the Babcock/Royal Naval Dockyard Devonport
- 2.2 Babcock explained to the delegation that their role was very much as a service provider, not a traditional Original Equipment Manufacturer (OEM). This meant that Babcock had long term contracts with a very small number of customers. It was a successful model, noting that Babcock was now the major supplier to the UK Ministry of Defence (MoD).
- 2.3 Babcock explained their role in surface ships construction and support, and provided background to the consolidation process that had been taking place in UK dockyards. This is part of a UK Government policy to create an indigenous support capability.
- 2.4 The Babcock presentation explained the split between BAE Systems and Babcock in construction and support, with BAE Systems being the builder of submarines and Babcock the support contractor. It was noted this distinction is less clear cut for surface ships, with Babcock involved in some construction work and BAE Systems involved in some support work.
- 2.5 The delegation was interested in how this 'single source' approach, worked for the UK. Rear Admiral Lloyd stated that the UK has no other option – there is no alternative capability available and the UKMOD knows it has to deal with this situation. Babcock and BAE Systems are seen as integral parts of the 'strategic enterprise' of shipbuilding and

support. This is in part driven by the overheads of establishing and maintaining the required technical expertise.

2.6 Babcock explained to the delegation that, given the life-cycle from start of first boat to the disposal of the last, submarines required a fifty year program plan.

2.7 Babcock are involved in at all stages of a fifty year planned submarine program, including:

- Design
 - ⇒ concept, appraisal and detailed design of Successor
 - ⇒ continuous-at-sea deterrence
 - ⇒ weapons handling systems upgrades
- Fleet time engineering
 - ⇒ clear program of support for current fleet
 - ⇒ supporting HMS Astute into service
 - ⇒ commissioning and training
- Deep maintenance and infrastructure support
 - ⇒ Devonport identified as Centre of Excellence
 - ⇒ HMS Vigilant concluding (LOP(R))
 - ⇒ planning and preparation underway for HMS Vengeance

2.8 The UK enterprise system has some key themes:

- Commitment to an enduring submarine enterprise - program stability
- Clarity of Ministry of Defence, Defence Equipment and Support , Fleet and Industry roles
- Recognition of difference between design/build and sustainment environments
- Re-shaping Ministry of Defence and industrial enterprise to deliver:
- Cost out, sustainability in, performance improvement.
- Focus on delivering In-Service submarine availability.

2.9 Babcock detailed the enterprise approach to support contracts. A commitment to making savings in support for each contract is required. Contracts are based on meeting availability targets, and there was a profit/loss share approach, with a base cost plus fee, with the objective to

drive sustainability up and the fee down. There is recognition of the need to be within a 'band of profitability'.

- 2.10 MoD staff explained the UK approach of very close cooperation between the MoD and Babcock in some detail. Engineering support and information and knowledge management were identified as being critical to that cooperation and collaboration.
- 2.11 Captain Methven stated that there was a very cooperative approach with Babcock at all stages – there were no issues on that score. Safety was always the priority, with availability the next priority – target is 4 of 6 Trafalgar (T) class boats operational with 1 of 4 Vanguard (V) class on station at all times. The MoD was the safety duty holder, with responsibility for the budget and the delivery of submarine availability to Navy command under the joint business agreement.
- 2.12 The delegation was interested in the UK's view of the critical elements. Were systems engineering or systems integration more important? Did the specifications need to be right at the outset? Rear Admiral Lloyd advised the MoD used to be very prescriptive, but was less so now. There was an acknowledgement that the investment had now been made in industry now, and the most important thing was for the MoD to be an 'intelligent customer'.

Inspection

- 2.13 Site visits included HMS Torbay in refit (inside and outside), and an external view of HMS Vengeance which was high and dry in dry dock prior to its Long Overhaul Period (Refuel). The delegation also toured the nuclear fuelling/defueling facilities. These are significant pieces of infrastructure.

Spain

Ferrol

- 2.14 Navantia's shipyard manager, Esteban García Vilasánchez began with a presentation of the Navantia ship construction board, the models of various recent types of ship that had been built by the company, and the model of the shipyard and its surrounds. The delegation noted the close relationship between the company and the Spanish Navy. Mr Francisco (Paco) Barón Bastarache, Vice President for Commercial and Industrial

Cooperation for Navantia also provided a presentation on the structure and capabilities of the company, including a video presentation. Presentations were also provided on the Landing Helicopter Deck (LHD) and Air Warfare Destroyer (AWD) programs.

Inspections

- 2.15 The delegation toured the AWD module construction, saw the LHD-02 progress on the slipway, and had an extensive tour onboard LHD-01, where outfitting work is continuing. The delegation was very impressed with the LHD capability, particularly its size, habitability, and obvious capability.
- 2.16 The delegation also inspected the Spanish Navy *Álvaro de Bazán* class Frigate SPS *Méndez Núñez* (F104) and attended a slide presentation on the capabilities of the ship. The delegation asked about who did the integration of the Aegis systems for F 100 – the answer was this was done by Navantia.
- 2.17 The delegation also had a tour of the Replenishment Oiler (AOR) ship, BAC *Cantabria*.

Madrid

Visit to Spanish Ministry of Defence

- 2.18 General Juan Garcia Montano gave an introduction. He covered the Spanish economic situation, the defence materiel cooperation Memorandum of Understanding (MOU) with Australia and the bilateral discussions that had taken place in Sydney during Pacific 2012.
- 2.19 Discussions centred on the NH-90 helicopters and covered many common issues that Australia and Spain are experiencing in service, including engines, windscreens and floors. Spain said it was keen to learn from Australia about 'hot and high' environment issues given Australia's testing is more advanced.
- 2.20 Colonel Diaz Vega – the Spanish NH-90 lead - outlined the Spanish 'National Industrial Plan' which led to the establishment of the Aeronautic and Logistics Platform in Albacete. The forward fuselage section was constructed at Albacete which was seen as an important capability for the future. Cost was estimated as being an additional Euro 100 million.
- 2.21 Obsolescence issues in the helicopter were discussed. The Spanish explained their preference to undertake common configuration changes to

the aircraft. However they explained that there was a possibility that they may not be able to afford to do this, with the possibility that obsolescence would prove to be more expensive in the longer term. They advised Australia to be careful. This was a discussion about doing a block upgrade at a specified time as opposed to continuous spiral upgrades. They noted the up-front cost associated with paying for IP to enable this.

- 2.22 Colonel Diaz mentioned some of the design defect issues with the helicopter, including the windscreen cracking. This was seen as an issue for the company to fix, at no cost to Spain.
- 2.23 The delegation sought information about the future of aircraft construction in terms of composite versus aluminium components. The Spanish representatives agreed that the future was composites, but this has presented some challenges for Spain.
- 2.24 The delegation requested an update on the helicopter floor issue, noting that the helicopter was supposed to have been designed for more troops and kit, so it was unclear why the design had failed so badly. The Spanish agreed, noting that a forum on the helicopter had identified that the floor was not strong enough. Consequently, Spain is expecting a nil cost fix for this by the manufacturer.
- 2.25 The delegation took some particularly salient points from the discussion with the Spanish Ministry of Defence;
- Investigation and analysis of a capability needs to be done as early as possible. This will have an impact of the capability's cost, schedule and planning.
 - It must be decided who are best placed to do this investigation and analysis; is it DSTO, people from the test environment or specifically contracted industry to do it on the Commonwealth's behalf.

Visit to Navantia Head Office

- 2.26 Navantia management emphasised the company's commitment to Australia in terms of current programs, and its increasing presence in Australia particularly noting the state of the Spanish economy and the expectation of continuing low demand from the Spanish Navy.
- 2.27 Navantia is looking at a long list of opportunities, including submarines, AOR, Landing Craft, Heavy (LCH), Offshore Patrol Vessel (OPV), Future Surface Combatant. Navantia Australia will have 30 people on staff by next year and intend to be involved in through-life support activities and provide engineering consultancy services.

- 2.28 The delegation asked Navantia for their opinion about the schedule issues in Australia, noting that, while the Defence Materiel Organisation (DMO) had mostly dealt with cost issues, schedule continues to be a problem. The delegation suggested that perhaps this was partly to do with Australianising Military of the Shelf (MOTS) designs, whereas it seemed that Navantia was able to deliver on schedule.
- 2.29 Navantia stated diplomatically that this was difficult to answer as there are always many unknowns. A fixed price contract is an incentive for Navantia. Navantia stated that they were set up for flexibility, and for cooperation with others, including the US. Cooperation with BAE Systems on AWD was a first time experience for Navantia, so some problems had arisen – partly these were due to strong cultures, which were hard to match up. Once established, the relationships need to be continued.
- 2.30 The delegation was greatly interested in strategies for Australia to ensure realistic initial timeframes and avoid initial over-optimism. Navantia commented that, generally, internal knowledge is good within each company, but it is the people integration that is the most important thing to get right.
- 2.31 The delegation asked directly for Navantia’s opinion on the progress of the AWD. Navantia stated there are different contract structures and dealing with an Alliance is different and more difficult than dealing with Spain and Norway. Language problems also contributed to the issues. Problems had now been overcome in Navantia’s view but more challenges are ahead as the combat system is brought into the ship and integration is addressed. Navantia advised Australia should not underestimate those challenges.
- 2.32 Navantia stated that there was a small but strong team in Australia and Navantia attended all program meetings and was participating strongly. Navantia has the right people and is integrating those people with Lockheed Martin, Raytheon and ASC¹. Navantia also noted that ASC’s quality is very good.
- 2.33 The delegation noted that the Cantabria vessel viewed the day before was very impressive, and asked what would be the schedule for production of such a ship if it were 95% common with the Spanish vessel, with only appropriate modifications for commonality of systems with the AWD and LHD: Navantia later advised a 42 month production schedule, based on minimal Australianisation.

1 Previously Australian Submarine Corporation, now known as ASC.

- 2.34 Navantia informed the delegation that they thought that DMO was comprehensive and knowledgeable, although sometimes too much documentation was required and it was perhaps too process-oriented. Navantia had some difficulties understanding the emphasis on MOTS, but, generally, DMO is held in high regard.

Visit to Airbus Military at Getafe

- 2.35 Airbus Military began by conveying their high opinion of the Australian approach to procurement and of DMO in particular. They also had a high opinion of the RAAF.
- 2.36 The Multi Role Tanker Transport (MRTT) boom problems were discussed at some length. The delegation noted that this was another example of a 'MOTS solution' actually requiring more development than anticipated. Airbus Military and the Resident Project Team (RPT) leader agreed that this was the case, as a 'fly by wire' boom was required. It was noted this should have been flagged as a risk earlier in the process.
- 2.37 It was explained to the delegation that the cost of the fix was about \$10m plus additional RPT costs etc and this would be shared between Airbus Military and Australia. The first version of the new software had been received and was being evaluated.
- 2.38 The delegation was interested in knowing how such risk can be identified earlier. The RPT response was that better ability to dissect the proposals to assess the degree of maturity is required whether it is MOTS or developmental issues.
- 2.39 Airbus Military noted that 'complexity on top of uncertainty always makes an issue'.
- 2.40 The delegation were updated on testing of the boom using F-16s, and asked why there had been problems with the MRTT when the US was refuelling F-16s all the time seemingly without such problems. Airbus Military noted that booms are often lost, often due to human error, which can't be entirely removed from the process. Airbus Military was doing its best to reduce such losses..

Inspections

- 2.41 The delegation was given a tour of the facilities including a tour of a MRTT aircraft at close quarters. The delegation was also shown around a ten-year old C-295 aircraft on the site tour.

Reception at residence of Ambassador HE Zorica McCarthy

- 2.42 On the evening of 19 April the delegation attended a reception at the residence of Australia's Ambassador to Spain, Her Excellency Zorica McCarthy.
- 2.43 Spanish guests included the Chief of Navy and Chief of Air Force, indicating to the delegation that Spain sees Australia as an important partner in defence materiel issues.
- 2.44 The delegation thanks Ambassador McCarthy for her hospitality.

Cartagena

- 2.45 The visit to Cartagena was hosted by the Cartagena Shipyard Director, Manuel Filgueira Ameneiros, and Paco Barón. Also present amongst the Navantia representatives was the Director for Submarine Design, Remigio Diez Lorenzo. Admiral Jaime Muñoz Delgado, Head of Naval Logistic Command & Senior Submariner Officer was also present.
- 2.46 Navantia began by explaining some of the company's submarine building history, including showing the delegation the shipyard's vessel honour board and model room.
- 2.47 Staff numbers at Navantia Cartagena were stated as being around 1,166. This business is not dissimilar to ASC - a fact which was noted by the delegation.
- 2.48 Presentations given to the delegation outlined the recent history of Scorpene submarine builds, including the sharing of the work with DCNS² for the Chile and Malaysia boats, with Navantia building the aft sections and DCNS the forward sections. This then led into the presentation on the current S-80 program.
- 2.49 The delegation questioned the Air Independent Propulsion (AIP) system and its ethanol source. Navantia explained that a wine production by-product was being used, and that cereals could also be used. It was explained that there was a suitable plant near Cartagena and the product from this plant was higher quality than using wine by-products.

2 DCNS S.A. (formerly the Direction Technique des Constructions Navales and the Direction des Constructions Navales) is a naval defence company based in France and is one of Europe's leading shipbuilders.

- 2.50 Navantia gave a presentation on all aspects of the S-80. It was noted that BAE Systems had been involved in manufacturing the first sonar domes, but later domes are being manufactured by Navantia since it has acquired the necessary huge hydraulic press to form the curved 'petals' of the dome.
- 2.51 The combat system is being supplied by Lockheed-Martin after a competitive process. Navantia described the combat system as attempting to achieve 'Virginia Class performance in a small platform'.
- 2.52 There was discussion of the perceived major risks in the program. Navantia listed these as systems integration of onboard systems, the performance of new developmental systems, testing, and overall cost.
- 2.53 Navantia summarised some of their previous contributions to SEA1000³ including the 2009 Request For Information (RFI) exercise and the RFI for batteries. They also explained some of their intentions with regard to the current RFI process, and the approaches they would take to meeting the MOTS/Evolved MOTS and Design to Requirements elements. The intention was to meet as many of Australia's requirements as possible, but some trade-offs would be proposed. This included an option for either a 'one diameter' or 'three diameter' hull. Navantia said that they were serious about the process as 'Australia' is very important to Navantia'. Navantia emphasised their experience in international collaboration.
- 2.54 The delegation sought information on intellectual property control and separation during development, and Navantia agreed that control of intellectual property information was very important.

Inspection

- 2.55 The delegation toured the submarine facilities including the S-80 build (including the new hydraulic press), submarine simulator, virtual design facilities and Air Independent Propulsion development and testing facilities.
- 2.56 During a final wash-up session after the tour, the delegation discussed Spain's strategic basis for having a submarine capability. The Spanish Admiral stated that Spain saw submarines as an important part of a

3 As part of the 2009 Defence White Paper preparations, significant work was undertaken to identify and quantify the maritime capability developments that would be required to meet Government's expectations. This process resulted in SEA 1000.

balanced force, and that Spain had quite a wide area of interest in the Atlantic and the Mediterranean.

- 2.57 The delegation questioned what IP arrangements would apply under any new S-80 contract. Navantia confirmed that it would all be Spanish IP – there was a documented agreement with France (in English) to cover this.
- 2.58 The delegation also queried if there were any Foreign Military Sales (FMS) or International Traffic in Arms Regulations (ITARs) issues with the S-80. The Spanish Navy responded that there were no issues with the Combat System, other than the usual licences, as it was a commercial purchase, not FMS.

Germany

Kiel

- 2.59 The delegation visit to Kiel was hosted by Hans Christoph Atzpodien, CEO and Chairman of the Board for ThyssenKrupp Marine Systems (TKMS), and Andreas Burmester, Chairman of the Board for Howaldtswerke-Deutsche Werft (HDW), and supported by a range of senior HDW managers, including Manfred Klein, Senior Vice-President of HDW, Jan-Olof Johansson.
- 2.60 HDW stated that the workforce breakdown at Kiel was about 56% white collar, 37% blue collar, and 7% apprentices. It was noted that HDW employed a 'craft' system for apprentices, in common with Australia and the UK.
- 2.61 HDW provided extensive coverage of the various submarine products including Type 212/214, and the planned Type 216 which was being put forward by HDW as a possible option for SEA1000 in the long term.
- 2.62 HDW listed its various customers, and outlined the 'material packages' approach to enabling construction to take place in customer countries.
- 2.63 It was noted that there were about 600 design engineers and that submarine design was a constant process, either for new boats or modifications to existing designs.
- 2.64 Analysis of the time taken from commencement of design through to delivery of boats for the various submarine types was provided to the

delegation. This varied from 17 years in the case of Type 214 to 11 years for the Dolphin. For the Military Off The Shelf (MOTS) solution based on Type 214 it would be about 6-7 years if there was 5-10% adaptation of the design, or up to about 9 years if there was a feasibility phase.

- 2.65 The discussion about the content of the MOTS offers made (or about to be made) to Australia included displacement, complement, propulsion systems, fuel cells and cruise speed.
- 2.66 The delegation were provided with a comparison of the 2009 Request For Information (RFI) offer made to Australia (the Large Oceangoing Submarine, or LOGS) and the proposed 2012 MOTS offer based on the Type 214. There was also some comparison of the LOGS and the proposed Type 216.
- 2.67 The delegation questioned whether the Type 216 would have hull-penetrating masts. HDW stated that would be the case as this tended to still be a customer requirement. HDW saw this as a tradition that would take another 10 years to overcome.
- 2.68 The potential for 'bridging' between Type 214 and Type 216 was discussed. Specifically this discussion centred on potential areas of commonality such as diesels, combat system and towed arrays.
- 2.69 The delegation sought HDW's view on a possible 214 MOTS and then Type 216 'new generation' approach to Australia's submarine capability requirements. HDW's view was that it does not make sense to have too many different classes of boat. The delegation questioned possible timeframes if a straight to Type 216 decision was made: HDW advised that it would be 10-11 years until the first boat completion, with additional deliveries every 9 months after that.
- 2.70 The delegation queried the maintenance and man-hour considerations for a major docking. HDW stated that to a Full-Cycle Docking for a Type 212 equivalent was about 10 months and about Euro10 million.
- 2.71 The issues around the resource requirements for building versus maintaining submarines were discussed. HDW's view was that shipbuilding resources needed to be balanced against the establishment of ongoing support.
- 2.72 The infrastructure required for Type 216 (which is a 4,000 tonne displacement boat) and whether there was any thought of infrastructure being established in Australia was discussed. HDW suggested that there was a wider issue of market demand, and that it was perhaps a later area for consideration. Their stated view was that it was wise to build the first

submarine of type in Kiel. It was noted that the client can send representatives to Kiel for indoctrination into the boat technical details and the support philosophy during an initial build process.

Inspections

- 2.73 The delegation was taken on a tour of the dockyard, including a Type 212 submarine in maintenance, the submarine production facilities and the AIP development and testing facility.
- 2.74 In a wrap-up session after the tour, HDW were asked for their view of what they saw as their 'strategic advantage'. HDW named the following points:
- that the company is privately owned, and this removes some of the other pressures suffered by DCNS and Navantia.
 - the company has a solid base in technology and has flexibility to deal with customer requirements and reduce risk, on a case by case basis.
- 2.75 HDW considered that this was a big opportunity for TKMS/HDW to work with Australia.