

PROJECT SEA 1448 -

New radar horizon set for Anzacs & beyond

One of the most intriguing defence technology developments to come out of Australia for many years is rapidly approaching the apex of its critical development cycle, in readiness for government consideration as to the conclusion of a production contract that will see significant new defensive and warfighting capabilities installed in the Navy's 'Anzac'-class frigates.

■ Canberra Bureau Report

Several recent critical government decisions have effectively cemented the composition of front-line Royal Australian Navy (RAN) ships for the next decade and beyond, and headed by three new 'Hobart'-class air warfare destroyers (AWDs), four 'Perry'-class guided missile frigates (FFGs), and eight 'Meko' 200 derivative 'Anzac'-class frigates.

Whilst the Navy won't see the first of its project Sea 4000 destroyers until 2014, and the project Sea 1390 upgrade of the FFG's is steeped in controversy over technology and schedule challenges, the sturdy 'Anzac'-class has readily assumed a preferred role in sustaining Australia's contribution to stability in the Persian Gulf, in particular, ensuring Iraqi oil production facilities are secured against terrorist attacks.

Originally termed a general purpose (or patrol) frigate and handicapped by the 'fitted for but not with' mentality of earlier governments, the likelihood of progressively more challenging operating environ-

ments facing these vessels was first recognised by plans in the 1980s for a substantive warfighting improvement program (WIP).

For various reasons, the 'Anzac' WIP never came to pass, and was successively replaced in December 2003 by project Sea 1448, which encompassed a new vision and funding of \$500m to improve each vessel's all round capabilities, with a particular focus on anti-ship missile defence (ASMD).

Original acquisition plans saw a series of improvements drawing off proven technology, as well as encompassing a bold Australian proposal to 'leapfrog' overseas radar technology programs and, in the process, kick-start a new Australian electronics and systems integration industry based on phased-array technology particularly sized for frigates and corvettes.

The new technology opportunity was pitched by Canberra-based CEA Technologies and its founding technical director, Ian Croser, who saw an opportunity to broker fresh ideas into a local defence community concerned about expectations being put upon other fleet units (ie: project Sea 1390) to cover

retirement of the RAN's three 'Charles F Adams'-class guided missile destroyers (DDGs), well prior to any replacement being secured.

Croser won an important opportunity to prove his new radar concept in 2004 when government agreed to fund trials of a prototype CEA FAR phased array radar on HMAS 'Arunta'. Impressive results from these trials are said to have made their way through the Defence system to then Defence Minister, Senator Robert Hill.

Hill went on to sign off in 2005 on a more substantive program to accelerate development of what is now described as the 4th generation S-band CEA FAR active phased array radar (supplemented with X-band CEAMOUNT illuminator technology), and set for parallel integration with other approved 'Anzac'-class equipment upgrades.

Hill said at the time of approving the next stage (phase 2) of the Sea 1448 project that CEA had truly developed a product "with genuine competitive advantage in the important criteria of weight, cost, capability and an overall value for money. The system offers the Navy a significant capability boost (whilst having) clear export potential (to) a market estimated in the billions of dollars."

In these respects, CEA Technologies confirmed 19 Decem-

ber 2007 that during recent demonstrations for the 'Anzac' ASMD project, the company had successfully achieved the required 'through air radar' performance with the CEA FAR, including "implementing and demonstrating important aspects of its digital beam forming technology that was not scheduled for this stage of the program".

Digital beam forming is currently the most advanced approach available for phased-array antenna emission pattern control. Published information suggests it provides significant performance advantages over conventional analogue beam-forming techniques, including improved operations in severe environmental clutter and, through the use of multiple simultaneous beams, increased 'search and track' timeline efficiency.

In short, what this means is that from the roof of its offices in Canberra (which overlook the national capital's airport for 'targets of opportunity'), CEA Technologies has now satisfied a bevy of observers from the Defence Materiel Organisation (DMO) and the DSTO that - in the shift from analogue to digital technology - significant gains have been made in overall radar performance to ensure that when finally contracted to transfer engineering development model-

>>> page 29



CEA TECHNOLOGY IMAGE

proven technology onto the ship, the 'Anzac'-class will indeed be fitted with the latest digital radar capabilities available to modern warships.

Significant work has also been undertaken in designing the means (see image page 8) by which the six faces of the CEAFAR radar (which provide the simultaneous tracking of multiple targets), and the four faces of the CEAMOUNT illuminator will be eventually accommodated on a re-designed top hamper of each frigate.

This process has now gone through several iterations, but has recently settled on an option that shifts the citadel well back from the bridge - roughly mid-centre along the length of the ship - and with the SPS-49 horizon search radar sitting atop the CEAFAR/CEAMOUNT housing.

Relocating and raising of the superstructure containing the subject radar faces - as high as possible consistent with maintenance of the ship's metacentre (ie: ensuring the vessel is able to right itself after rolling in heavy seas) - is believed to have delivered further substantial increases in range detection - estimated to be well beyond the generally understood 30 nautical mile range of Raytheon's Evolved Sea Sparrow Missile (ESSM) embarked upon the 'Anzac'-class.

Added to this, the combined system of radar, illuminator and central equipment group (incorporating mainly power supplies), is able to generate in excess of ten simultaneous fire control channels, thus providing a huge increase in defensive power over the existing 'Anzac' ships, and driv-

ing a decision to increase the number of ESSMs carried onboard to thirty-two missiles.

Croser says a key element of the CEAFAR's technical development involves the location of all the components needed for radar generation on the face of the new radar. He adds, it's important to understand this "really is a software-based radar. So as threats change in the future, you can develop new modes (algorithms) for the system without having to implement new hardware changes."

Further, he says the technology and its inherent capability is also easily transferable to other areas, in particular, mobile ground-based air defence, as well as for airborne use.

In these respects, CEA Technologies is now actively engaged in pursuit of international Naval programs in Europe and North

America (including the Canadian 'Halifax' upgrade), with opportunities currently estimated by the firm to be in excess of A\$250 million.

For the immediate future, however, the company's focus remains on production of the first two deliverable Sea 1448 systems, which are currently in a state of assembly at CEA's Canberra facilities, and due for delivery in December 2009, with system level grooming and integration to commence in 2008.

Croser says the company's immediate product development outlook remains on-time and budget in a manner consistent with expectations that first ship installation work should start in early 2009 (after final acceptance testing), in order to achieve a target 'first-of-class' delivery in June 2011. **ADBR**

ASC fattened up for no sale? - Ctd from p 27

ASC will pay upwards of \$300m in dividends through to financial year 2019/20.

So depending on what the actual value of the AWD 'build' contracted negotiated by ASC was (ie: this figure will likely never be published) - and assuming payments for work undertaken will not require the firm to continue past practices of internally funding non-reimbursable costs, and hard won 'Collins' productivity is successfully transferred to the AWD build - ASC's return on equity is forecast to significantly expand into the mid-term of the AWD construction contract - up from the 18.6% recorded in 2006/07 to around a four-year average of 35% per annum by the time the first destroyer is scheduled to be delivered.

Such high rates of return would then progressively fall towards the norm experienced in more recent financial years (ie: as the construction program matures), and ASC's source of revenue began to fall back onto substantive reliance on the submarine TLS contract.

The foregoing analysis assumes the absence of approval

for a fourth destroyer, and does not consider any long-lead payments that might be made in advance of ASC undertaking the 'Collins'-class replacement underwater warfare capability build.

ADBR emphasises that the above projections are derived from limited-variable ratio spreadsheet modelling of historical ASC financial outcomes, with analysis outcomes not specifically discussed with company management prior to publication.

ADBRs estimates only consider some of the better known fundamentals that are expected to drive future ASC corporate performance, assumes government policy towards the company's re-privatisation does not substantially change, and - post re-privatisation - financial directives maintained by the current management are sustained by the company's new owners.

Adding together the above projections for shareholder equity and prospectively to be declared dividends, the analysis supports a current valuation of ASC at around \$500m, prior to the application of any premiums that might be paid as part of securing ASC as a stra-

tegic business asset, including its positioning in terms of the replacement 'Collins' submarine build.

Other considerations relevant to a contemporary valuation of ASC declared in the company's 2006/07 Annual Report, relate to its practice of 'self insurance' in terms of covering risks (and costs) associated with workers' compensation.

As noted above, ASC has undertaken a concerted program to improve safety across the enterprise, with substantive reductions achieved in the annual 'lost time injury frequency' rate, as well as reductions in the 'medically treated injury rate. ASC's practice is to raise its provision for self-insurance when an accident occurs that may give rise to a workers' compensation claim. Accordingly, in 2006/07, this provision stood at \$6.1m.

ASC also maintains a warranty provision for 'Collins' submarine related activities calculated on the basis of claims received, and expected future claims based on past sales and historical claim rates. Former ASC Annual Reports have highlighted 'significant uncertainty' related to estimates for contracting activities as the estimates are said to depend on the

circumstances particular to the submarine build contract.

The TLS contract commenced with the Commonwealth on 1 July 2004 is noted in the latest annual report as providing "little historical evidence for the calculation of the warranty provision", thus meaning historical data from the previous submarine build contract has been used to determine potential future warranty claims.

ASC acknowledges the above discussion yields only 'best estimates', given evidence that prior accounting periods saw potential warranty claims being recorded and incorrectly treated as 're-work'. After the receipt of payments from the Commonwealth, provisions of \$1.1m were made by ASC management during the year in relation to warranty, leaving the total warranty provision at \$8.8m as at 30 June 2007.

ASC is also currently enjoying a 'contribution holiday' in terms of payments to its defined benefits superannuation plan, a state that is now scheduled to be reviewed by actuarial recommendation - to take place no later than 1 July 2008.

ADBR