

The Walrus Class submarine and beyond

Report interviews the Commanding Officer of the Dutch Submarine fleet, Captain Hugo Ammerlaan about the Walrus Class service life extension programme and developments concerning the next generation of submarines.

Commanding Officer Submarine Service Netherlands at the Royal Netherlands Navy, Captain Hugo Ammerlaan started his naval career more than 35 years ago. He was immediately attracted to submarines because he could expect 'a lot of responsibility at a young age' and in the days of the Cold War submarines were also certain to be on 'real missions' rather than training exercises.

During the decades he has been the Commanding Officer of the Walrus Class submarine Dolfijn, been part of the Royal Navy's Submarine Tactics and Weapons Group at the Faslane submarine base in Scotland and being CO of both an M-class frigate and air-defence and command frigate. Captain Ammerlaan was also the Naval Plans Officer for NATO, based at the NATO International Military Staff (IMS) headquarters in Brussels.

He was named Commanding Officer Submarine Service Netherlands in 2013. "Coming back into submarines fitted like a glove, I enjoy every minute of the job."

Returning to the submarine world was not looking very likely for many years as debate raged in the Netherlands for more than a decade as to whether submarines should still be considered a strategic asset. The Dutch built some of the first submarines in the early 1900s and had a fleet of 30 at the time of the Second World War. By the eighties the fleet was down to six boats; four Dolfijn Class and two Swordfish Class. But following the fall of the Berlin Wall, a decision was taken to replace these with the four Walrus Class boats the Royal Netherlands Navy has now.

Service Life Extension With the design of the Walrus Class dating back to the

seventies, the Dutch military procurement arm Defence Materiel Organisation (DMO) decided in 2004 that the Walrus Class should undergo a Service Life Extension (SLEP) programme. This means their operational lifetime is extended by 10 years but the programme was to have a limited budget and thus a limited scope. In October 2013 HNLMS Zeeleeuw (sea lion) started her SLEP at the Naval dockyard in Den Helder. With the extra decade, the Walrus Class would then be operational until the next submarine class entered service – expected in 2027. However, these plans could all have come to nothing if the Netherlands decided to abandon its submarine fleet. But meanwhile, in 2013, news eventually came through that the government would continue to invest in the submarine fleet. This coincided with the fact that Captain Ammerlaan got the chance to return to his beloved submarines. Currently,

the first of the fleet to have completed the life extension – HNLMS Zeeleeuw – is undergoing sea trials.

As the extension programme was limited, the DMO decided to focus on safety and operational relevance, Captain Ammerlaan explains. "Safety of course is always vital. Here we looked at the hull, quality of the steel – is it still fully rounded, are all the fittings in the right place, is there any corrosion?" And concerning operational relevance one of the periscopes was replaced with an optronics mast, and investments were made in a new combat management system, improved satellite communication and the ability to be able to operate in a network-centric environment. Sonar processes were improved and the torpedo weapons system was upgraded to the MK48 Torpedo Mod 7AT (Advanced Technology).

The DMO has worked directly with MARIN and through the Dutch Underwater Knowledge Centre (DUKC), which is a network of both companies and knowledge institutes involved in submarine technology, for many years and more recently during the Walrus service life extension programme.

Optronics mast One major element MARIN and DUKC was involved in was the new optronics mast. "MARIN was asked to calculate the effects of introducing the new mast and its impact on the hydrodynamic behaviour of the boat. This included examining the flow of water in the casing (the outer hull) and how this influences manoeuvrability. For example, if all the new masts are up, to what level will the local flow phenomena change? MARIN also looked at the design of the hatch for the periscope. It is preferable to have an opening rather than a hatch because we want to avoid something mechanical, but again, what impact does this have on manoeuvring and on the noise levels. Is a hatch actually needed or could we introduce small 'spoilers' to prevent unwanted effects?"

All of the new equipment had to fit into the existing space as well. "In the event we had to take some ribs out of the submarine fin to fit the new mast(s)."

Another important research topic concerned special forces. "MARIN was brought in to assist us with how Diver Propulsion Devices



(DPD) should be fitted to the deck." MARIN carried out research into the changes this makes to the hydrodynamics. "Submarine safety is reliant on being manoeuvrable. Therefore, MARIN conducted research into how to form the right shaped cradle for the DPDs and it modelled the cradle to see if this would have a negative influence. I think it is important to stress that this aspect needed to be solved at very short notice, within weeks and MARIN had the flexibility, was keen and capable to assist us."

Shallow water As the Walrus Class was designed for the Cold War, patrolling the Greenland-Iceland-UK Gap, this would typically mean very deep diving and long periods under water without surfacing. But the work of the fleet has changed over the years, with coastal surveillance and special forces' operations more likely tasks nowadays. "Our priority was to have a flexible vessel that could adapt to the post Cold War period. For example, we now operate a lot at periscope depth in shallow waters."

Again, MARIN played a significant role addressing this issue, examining how sailing

dived in shallow waters impacts manoeuvrability, as well as the effects of the bottom on the submarine. MARIN built a simulation model to assist us in determining the manoeuvring envelope, which is also used to train officers and for the RNLN's simulators. "I cannot say more but we are happy with the results. We needed data and modelling about this issue."

Expeditionary diesel submarine

Looking further into the future, Captain Ammerlaan believes that the basic tear-shaped hull will not change very much. "It is a good shape hydrodynamically speaking, but we will see a change when it comes to the introduction of larger Autonomous Underwater Vehicles (AUVs). There will be questions that need answering regarding the Launch & Recovery of these AUVs and how is manoeuvrability impacted when retrieving them. How will they be refuelled? Is a hatch going to open in the hull? Will drones be deployed...? This is all just speculation. But I think it is certain that a submarine won't stand alone so much in the future and will be involved in many more tasks. With regard to economic trade, the Netherlands

will still need expeditionary diesel submarines, but will it be an evolution of the Walrus Class or one with a mix of unmanned and manned vehicles?"

Captain Ammerlaan adds: "We are learning from the current Walrus Class and MARIN is helping us as the MOD to remain 'a smart specifier'. This means we still have the knowledge in-house to state our own requirements and continue to carry out the maintenance and overhauls etc. of the fleet for the coming years." ▢

Captain Hugo Ammerlaan will move on to a new role in April when he becomes the Netherlands Naval Attaché in Washington. He will be succeeded by Captain Herman de Groot, also a highly experienced submariner.