



Crewing Naval Ships

Under the National Shipbuilding Strategy (NSS), the Canadian Coast Guard (CCG) and Royal Canadian Navy (RCN) are set to welcome a host of new vessels to recapitalize and renew their fleets. As such, the NSS has sparked significant discussion in policy circles and in the media, centring around such considerations as the vessels' capabilities, weapons systems, and communication technologies. An equally pertinent consideration – albeit one that receives less attention than the vessels' other assets – is how these vessels will be crewed. A ship's crew is a vital component of its operational effectiveness and efficiency, and constructing new vessels and new classes of vessels invoke new questions about crewing those ships.

Generally, naval warships require large crews. Given that the vessels undertake a variety of complex functions (ranging from diplomatic to constabulary, and defence to security), warships are inherently more complicated in their design than commercial vessels, which are tasked only with moving cargo. This more complicated design in turn demands a larger crew to ensure the fulfilment of its variety of roles. However, large crews produce large personnel costs. While reducing a vessel's crew would ostensibly lead to cost savings, too large of reductions can hinder the vessel's operations. For instance, as the US Navy observed from its Littoral Combat Ships, vessels designed to carry small crews can “present significant risks for manning and logistics (i.e., high workload and inadequate sleep for the crew, and inadequate shore support), and maintenance.”¹ This could be a consideration for Canada's new Arctic and Offshore Patrol Vessels (AOPVs). Despite its large size, an AOPV can carry a maximum crew of 85 personnel.² While the vessels typically operate with a complement of 65 crewmembers, the RCN may increase their crew size if required for a certain mission or if a 65-person crew produces fatigue and thereby reduces the effectiveness of the vessel's operations.

The size of a vessel's crew is a decision that must be made early in the vessel's construction process, so that its design can take into account the extent of the eating/cooking, sleeping, and restroom facilities required to accommodate those personnel. While overestimating the crew's size can inflate design and construction costs beyond what were needed, underestimating the crew's size can reduce the platform's operational readiness or capabilities and later require expensive and time-consuming design changes.³ Determining the optimal size of a crew is thus both imperative and difficult, especially for newly designed vessels or classes of vessels.

A vessel's technology is a key determining factor of the size of its crew – and what functions and tasks its crew will perform. Evolutions in technology, especially within the past century, have changed crews' responsibilities. For instance, the increasing automation of weapons and propulsion systems mean that personnel are no longer required to manually load weapons systems or stoke coal for the ship's engine. Manual labour is now less integral to the operation of a warship than technical experience, and this prioritization of technical experience will only advance with further technological developments.

Increasingly, the technology on a vessel is becoming a determinant of the size of its crew, as well as the roles and qualifications required of that crew. As Renee Chow, Commander Ramona Burke, and Lieutenant-Commander Dennis Witzke note, “Once specific technologies are assumed, a specific number of roles can be defined for the crew to operate and/or maintain these technologies, and the qualifications can be defined for each role.”⁴ By impacting both the crew’s size as well as the types of people needed for the crew, the technology aboard a ship therefore also influences military occupational structures and the requisite training of its crewmembers. Indeed, shifts in the technology utilized aboard vessels require the addition of personnel educated in new trades, the elimination or combination of other trades, and adjustments to personnel classifications. Professions can hence appear or disappear with organizational and technological shifts.⁵ Finally, the responsibilities that the ship itself is intended to fulfill also dictate the crew it must carry. For instance, a vessel tasked with conducting at-sea replenishment operations will require a crew for that, while a helicopter detachment is imperative for any vessel operating helicopters. Decisions on the personnel needed to staff a vessel, then, are largely contingent on the tasks it will accomplish and the technology it will equip.

The RCN’s intention to increase the proportion of women serving in the Canadian navy is a further factor that is creating new complexities in matters of crewing. Since female crewmembers must be able to share accommodations with other female crewmembers, vessels must have adequate accommodation to support the women in its crew.⁶ Vessel accommodations are adapting in kind. For instance, the modernization of accommodations in major warship designs has resulted in reductions to the number of personnel in each mess, providing more flexibility to ensure the adequate accommodation of any gender composition of crewmembers.⁷ The modernization of the RCN’s personnel composition is thus also requiring adjustments to vessels’ accommodations facilities. So, too, are the international and Canadian regulations that govern the management and accommodation of crews. Indeed, regulations exist that determine the number of hours that personnel can remain on duty, their training, and their living conditions. Crew sizes and accommodations aboard vessels must necessarily take these into account.

It is possible that, as technology progresses, vessels will become autonomous and not require crews. Until then, human crewmembers are responsible for a variety of general and operational-specific tasks, including keeping watch, operating the propulsion systems, maintaining equipment and technology, cleaning, and food preparation, in addition to the fulfilment of the vessel’s specific mission tasks. As a result, human crewmembers are still as an integral an element of a vessel’s operational effectiveness and efficiency as its propulsion or steering systems. Determining the size of such a crew when designing new vessels is a critical yet extraordinarily complex decision, involving the need to strike a delicate balance by determining the size of crew that is necessary for the vessel’s optimal and effective functioning while minimizing personnel and accommodation costs. The technology aboard a vessel, the vessel’s intended operational functions and missions, the need to accommodate female crewmembers, and a host of Canadian and international regulations all play further roles in determining the size of a vessel’s crew, the qualifications it must possess, and the accommodations it requires. The crew that will operate a vessel is thus a key consideration during that vessel’s design, and the design, construction, and delivery of vessels under the National Shipbuilding Strategy will inevitably take such matters of crewing into account. The continual progression of technology will continue to influence both the number of crewmembers required and the roles and responsibilities they must fulfill.

References

¹ See Chow, Burke, and Witzke, “A Systems Approach to Naval Crewing Analysis,” 16; US Government Accountability Office, “Littoral Combat Ship: Deployment of USS Freedom Revealed Risks in Implementing Operational Concepts and Uncertain Costs,” GAO-14-447, July 8, 2014; and Matthew M. Burke, “Littoral Combat Ship Sidelined Again by Maintenance Issue,” *Stars and Stripes*, November 13, 2013.

² Royal Canadian Navy, “Harry DeWolf Class,” Government of Canada, <https://www.canada.ca/en/navy/corporate/fleet-units/surface/harry-dewolf-class.html>. Deploying an AOPS on a mission rather than a frigate with a crew of over 200 sailors could thus offer substantial cost savings. Of course, the Navy’s AOPSs and frigates are designed to undertake drastically different missions. While an AOPS is not anticipated to engage in combat, a frigate is designed for that purpose, which generally requires a larger crew.

³ Chow, Burke, and Witzke, “A Systems Approach to Naval Crewing Analysis,” 16.

⁴ Chow, Burke, and Witzke, “A Systems Approach to Naval Crewing Analysis,” 17.

⁵ See, for instance, Commander Luc Tremblay, “Naval Occupations and the RCN: A Complex Yet Necessary Restructuring,” *Canadian Naval Review* 13, no. 2 (2017): 11-16.

⁶ Accommodation rules differ for Canadian submarines, so this rule does not apply to those vessels.

⁷ It is yet unknown how the accommodation facilities in the new Canadian Surface Combatants (CSCs) will compare in this respect. The original design for those vessels originated from Britain’s Royal Navy, which has its own accommodation standards that are distinct from those of the RCN.