TO STRENGTHEN THE U.S. SHIPBUILDING INDUSTRY, INVEST IN FIVE CAPABILITIES

By Michael W. Jones and Andrew Miller

The past few months have seen increased discussion on strengthening the U.S. shipbuilding industry, from December's introduction of the Shipbuilding and Harbor Infrastructure for Prosperity and Security (SHIPS) for America Act to the President's "Restoring America's Maritime Dominance" Executive Order, issued on April 9. The increased attention is merited: the U.S. shipbuilding industry, on a gross-tonnage basis, had 0.1% of the 2023 global market, compared with 50.7% for China and 15.4% for South Korea.[1] The newly released Executive Order includes increasing the number of U.S. built, flagged, and crewed vessels; growing demand for U.S. shipping through tax and regulatory relief; and establishing a Maritime Security Trust Fund and other financial incentives to invest in domestic shipbuilding and other maritime capability acquisition, sustainment, and operations.[2] Other efforts to strengthen the domestic shipbuilding demand signal are also underway: on February 21, the U.S. Trade Representative issued a draft rule requiring that, by 2032, 5% of U.S. exports would need to move to U.S.-flagged vessels.[3]

If these objectives are met, the U.S. will increase both the gross tonnage built in the country and the share of gross tonnage from commercial vessels. To achieve this increased volume while managing the shift in product mix, shipyards and policymakers should focus on five capabilities:

1. Design capability
2. First-of-class vessel capability
3. Follow-on vessel capability
4. Trades capability
5. Facilities capability

Design Capability

Ship design can be split into two parts: (1) concept design through functional design and (2) production design. Design capability focuses on concept design through functional design and requires, amongst many competencies, optimizing end-user requirements, technology development and maturation, and design for manufacturing.

[1] U.N. Trade and Development, Ships built by country of building, annual. Last updated June 5, 2024. Accessed January 8, 2025. https://unctadstat.unctad.org/datacentre/dataviewer/US.ShipBuilding

[2] The White House, "Restoring America's Maritime Dominance", dated April 9, 2025. https://www.whitehouse.gov/presidential-actions/2025/04/addressing-risks-from-susman-godfrey/ [sic]. Accessed April 9, 2025

[3] Costas Paris, "U.S. to Hit Chinese Ships with Hefty Port Fees," *The Wall Street Journal*. February 24, 2025. Accessed online.

For ships of substantial size, much of the U.S. design capability is focused on military vessels with challenging end-user requirements and significant technological advances (e.g., the Ford class's Electromagnetic Aircraft Launching System (EMALS)), and where the customer (the U.S. Government) is often willing to fund changes to the shipyard's manufacturing capability and absorb cost and schedule risk.

Commercial vessels take almost the opposite approach, with an emphasis on proven approaches, mature technology, less customization, low risk, and fixed prices. While the overall design process is very similar, if not the same, the underlying mindsets and attitudes used in executing the process are different. This is not just unique in shipbuilding – it is consistent across many industries where government is a significant customer – and developing these mindsets and attitudes requires focus and repetition.

As design firms make this transition, they should particularly focus on minimizing late design products through:

- An integrated design/build process that links design, build strategy, material purchasing, and construction
- Establishing norms to estimate and manage the design effort: each piece-part has cost, quality, and schedule norms based on type, discipline, and design maturity phase
- Implementing a robust change control board that requires all changes, their root causes, and total impacts to be fully understood before approval

As the government enables this transition, they should encourage designs that leverage mature (or almost mature) technology and that have broad demand.

First of Class Vessel Capability

Translating a vessel from design into a finished ship is complex and represents a distinct capability from building a second or third ship in a class. In the government shipbuilding market, first-of-class ships often experience cost and schedule overruns: the U.S. Department of Defense reports that first-of-class ("development") programs see cost increases averaging 14.9% (compared with no growth on follow-on ("production") programs), and the U.S. Government Accountability Office found that the average first-of-class ship exceeds its budget by 52%, compared with only 8% for the average follow-on ship.[4]

This capability starts with translating the ship's functional design into a production design, including dividing the ship into blocks, the basic unit of production. Because block dimensions depend on the manufacturing equipment at a specific shipyard, production design is not "one size fits all" and requires close coordination with the shipyard and the creation of a shipyard- and ship-specific build strategy.

[4] See *Performance of the Defense Acquisition System* (2019), GAO-07-943T; GAO-05-183; GAO-18-238SP

Completing production design on schedule and with high quality is essential to achieving cost and schedule targets – cutting steel before the design is complete leads to many cost and schedule issues on first-of-class vessels.

The capability also includes supplier development, material procurement, and vessel construction – including developing the test and commissioning plan.

Supplier development, in particular, is challenging: the current supply base is primarily focused on the government market, and expanding it to accommodate new commercial shipbuilding work could be a challenge, given the limited pool of skilled trades workers, the different design standards for government and commercial vessels, and the likely limited return on investment from adding new capacity (due to a likely low volume of new ships). Government and industry will need to consider how to best invest in the supply chain, and whether it is better to establish a new supply base for commercial ships or to expand the government supply base (with the incumbent challenges that managing to two different sets of standards entails).

U.S. shipyards have extensive experience with first-of-class vessel construction. However, those that do have generally allocated all of their capacity to the government market. Government and industry will need to determine whether it is a better use of resources to expand the capacity of yards with current first-of-class experience to work on commercial projects, or whether it is better to expand the number of yards with first-of-class capabilities.

Follow-on Vessel Capability

Building follow-on vessels is about operational excellence more than it is about coordinating engineering and operations, developing a supply chain, and developing rapid fixes to recently identified design gaps. It is about cost control through diligent management of production expenses and labor hours and coordinating a pre-existing supply chain to deliver material in time to support production.

The U.S. shipyards with extensive experience in follow-on vessel production for larger vessels tend to focus on large government programs, such as the shipyards that build the *Arleigh Burke* destroyers or the *Virginia* and *Columbia* submarines. Crucially, this is the capability that would be most needed in any conflict scenario – the capability to rapidly produce multiple vessels of the same design.

Government and industry will need to collaborate on the demand for each commercial ship design so that a sufficient number of yards receive the volume of orders required to build up this capability.

Trades Capability

Shipbuilding relies on a workforce of skilled tradespeople, and trades capability is building up both the size of the workforce and its experience level. As noted elsewhere, the U.S. currently has a shortage of skilled trades workers – for example, the American Welding Society projects that 330,000 new welding professionals will be needed by 2028, with 82,500 welding jobs to be filled annually between 2024 and 2028. Some of this is to replace the 159,000+ welding professionals who are

approaching retirement.[5] However, just because there are job openings does not mean that the labor force will adapt to fill them – focused efforts to attract people into the skilled trades is needed, especially given current shortages.

With government funding, the maritime industrial base has been promoting the skilled trades – for example, through the Build Submarines campaign, which includes a marketing presence at sporting events – but additional approaches to build the workforce, such as those employed by Australia to develop the workforce needed to build submarines under the AUKUS agreement, would further help grow this workforce.

Once built, government and industry should be intentional about the work assigned to each yard: workforces have historically had challenges shifting between commercial shipbuilding (which uses commercial standards) and government shipbuilding (which typically use more rigorous standards). When a workforce used to building commercial ships shifts to building government ships, unique government requirements and processes – which ensure resiliency in combat – may be inadvertently overlooked, leading to rework costs and schedule delays (if caught). When a workforce used to building government ships shifts to building commercial ships, government-specific requirements and processes can endure, generally adding cost and time to the commercial build and eating into profit and schedule margins.

Facilities Capability

Shipyard facilities determine how a ship is built, influencing required labor, schedule duration, and overall cost. Differences in facilities between shipyards can cause a production design that works for one yard to not work for the other – likely requiring additional engineering time and effort to adapt the design so that it can be built by more shipyards.

If the goal of the Executive Order is, in part, to develop domestic capacity that can build both commercial and government ships, especially in time of crisis or war, government and industry should consider investing in facilities that (a) are substantially similar across yards, such that the production design of critical warships would not need to be substantially re-done and (b) support both commercial and government ship construction. For example, a *Wasp*-class amphibious assault ship is similar in length and breadth to a Panamax or Panamax Max container ship.

Conclusion

The "Restoring America's Maritime Dominance" Executive Order provides a generational opportunity for shipyards to invest in facilities and develop capabilities that support both the commercial and government markets. Thoughtful investment decisions that build these five capabilities will increase the likelihood that, when rapid Navy production capacity is needed, U.S. shipyards will be able to shift their production from commercial vessels without delay.

Photo credits: iStock, Austal USA

[5] American Welding Society, https://weldingworkforcedata.com/. Accessed January 8, 2025.

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