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Chairman Wicker, Ranking Member Hirono and distinguished members of the Seapower Subcommittee, thank you for inviting me to appear before you to discuss the state of military shipbuilding and share our ideas on how we increase the size of the U.S. Navy's fleet to 355 ships as efficiently and effectively as possible.

I am here today representing Huntington Ingalls Industries, which operates two of our nation's major shipyards: Ingalls Shipbuilding, of which I am the president, and Newport News Shipbuilding, where my colleague Matt Mulherin will soon turn over the reins to Jennifer Boykin. We also own and operate Continental Maritime, a small repair yard in San Diego.

Today I will discuss the investments and improvements we are making at our shipyards to accelerate and make more cost-effective our military shipbuilding efforts. I will also discuss what we recommend are best practices and the tools and resources to fully meet an accelerated shipbuilding plan, including leveraging hot production lines and employing multi-ship procurement strategies.

Newport News has been building ships for 131 years, and Ingalls for over 79 years. Together, we have built more than 70 percent of the Navy's fleet of warships. Our yards employ more than 30,000

shipbuilders, including more than 5,000 engineers and designers. We are the largest employer in the state of Mississippi and the largest industrial employer in the state of Virginia. Supporting the work at both yards are roughly 5,000 suppliers from all 50 states. Throughout our company, we have more than 1,000 employees with 40 years or more with the company; we honor them with the title of Master Shipbuilder.

We build ships that last for decades. In February, we authenticated the keel of the destroyer *Frank E. Petersen Jr.* (DDG 121). That ship will be still be in service in 2050. At Newport News, the aircraft carrier *Gerald R. Ford* recently successfully completed builder's sea trails. She will be in service until nearly 2070.

We appreciate the widespread support for increasing the size of the Navy's fleet, and we look forward to participating in the dialogue on the best way to do this. We especially appreciate Chairman McCain's recommendations in January contained in "Restoring American Power." This document—coupled with numerous other studies, including the Navy's own Force Structure Assessment—provides a compelling rationale for increasing the size of the Navy. As a partner with the Navy and Congress on providing the nation with the fleet it needs, we are always looking for ways to provide more buying power for our customer.

Before I discuss ways to accelerate our Navy's drive to 355 ships, let me tell you a bit about our industry. Building warships is hard work. These are unbelievably complex machines—challenging to design and challenging to build. We used to measure complexity and capability of a ship by the tons of steel required to build it. While steel still matters, the requirement for life-cycle cost-savings through crew-size reduction and for increased lethality of these weapons systems increases the complexity of the

design. For instance, *Ford* contains 10 million feet of electrical cable and 4 million feet of fiber optic cable—a 200 percent increase in the amount of cable over USS *Abraham Lincoln* when she was commissioned in 1989.

Unlike many other Department of Defense acquisition programs, we don't build prototypes, test articles or construct low-rate initial production runs before producing the first ship in a class. The first ship in a class *is* the prototype; it is commissioned and sent into harm's way and is expected to serve for between 30 and 50 years, depending on the ship class. The idea of not having a prototype is part of the issue with why a first-of-class ship has cost challenges built into the effort. And also unlike many other programs, the construction of one ship will span years and cover multiple budget submissions and legislative cycles.

Shipbuilding is largely outdoor work. Although I will talk later about ways we are providing cover for our shipbuilders, we build ships outdoors, in the heat, cold, sun, wind, rain and snow.

As I mentioned earlier, we are supported by roughly 5,000 suppliers in all 50 states. Our supplier base has seen significant changes as the size of the fleet has decreased.

For nuclear shipbuilding, during the 20-year period between 1977 and 1996, Electric Boat, Newport News and the industrial base delivered almost 90 nuclear ships in the *Ohio*-, *Los Angeles*-, *Seawolf*- and *Nimitz*-class programs. The industrial base population during that time was in excess of 17,000 suppliers between both Electric Boat and Newport News. Critical suppliers decreased 27 percent over the years as suppliers left the submarine industry due to low-rate production. Ownership changes and corporate consolidations caused further contraction of the industrial base by an additional 16 percent. For

example, major suppliers that left the industrial base during this time included General Electric and Westinghouse, resulting in the components they had provided becoming single-sourced. Overall, the outcome of low-rate production and lead time to enter our marketplace resulted in a reduction in competition and an increase in the number of single- and sole-source acquisitions, which now account for approximately 65 percent of total spend at Newport News. After the major contraction described above, approximately 3,000 suppliers remain to support submarine and CVN programs as first-tier suppliers.

Qualifying to be a supplier is a difficult process. Depending on the commodity, it may take up to 36 months. That is a big burden on some of these small businesses. This is why creating sufficient volume and exercising early contractual authorization and advance procurement funding is necessary to grow the supplier base, and not just for traditional long-lead time components; that effort needs to expand to critical components and commodities that today are controlling the build rate of submarines and carriers alike. Many of our suppliers are small businesses and can only make decisions to invest in people, plant and tooling when they are awarded a purchase order. We need to consider how we can make commitments to suppliers early enough to ensure material readiness and availability when construction schedules demand it.

With questions about the industry's ability to support an increase in shipbuilding, both Newport News and Ingalls have undertaken an extensive inventory of our suppliers and assessed their ability to ramp up their capacity. We have engaged many of our key suppliers to assess their ability to respond to an increase in production.

The fortunes of related industries also impact our suppliers, and an increase in demand from the oil and gas industry may stretch our supply base. Although some low to moderate risk remains, I am convinced that our suppliers will be able to meet the forecasted Navy demand.

Next I would like to address ways to accelerate getting ships to the fleet. We view this as a team effort with our customer, our suppliers and Congress. First I will discuss efforts we are undertaking at our yards, and then I would like to suggest ways that Congress can help us.

Huntington Ingalls Industries has made significant capital improvements across the two yards, and we are investing $1.5 billion over five years in improving our facilities. At Ingalls, we are continuing a set of improvements we refer to as the "Shipyard of the Future" that covers all aspects of shipbuilding, including infrastructure upgrades, process improvements and continuous investment in our workforce. The funds are being provided by a combination of corporate, state and Navy investment.

These initiatives include an improved line of robotics; assembly halls that will facilitate the modular construction of future ships, reducing the time it takes to build those ships; areas and tools that protect our most precious asset, the people of the workforce, to keep them from the elements and give them the ability to be most efficient; as well as the addition of a new dry dock that will replace the current dock that is more than 30 years old with greater displacement, which will provide for increased flexibility and outfitting, allowing for greater completion rates prior to launch.

At Newport News, we are investing nearly $1 billion dollars to build facilities that provide the capability to build the new class of ballistic missile submarines, the *Columbia* class. We are also investing in facilities to further drive costs out of *Virginia*-class submarines and *Ford*-class carriers with added

automation and bringing work indoors, under cover and out of the weather. Additionally, with the help of additional funds from Congress, we are investing in a range of process improvements that we call Design for Affordability (DFA). On the *Virginia*-class submarine program, DFA initiatives have returned $5 for every $1 invested. Given the longer time between construction starts, we expect savings of about $2 for every $1 invested on the *Ford* class.

Some examples of DFA initiatives that will benefit the *Ford* class include the implementation of Integrated Digital Shipbuilding (IDS), which saves money by eliminating the need for traditional paper construction drawings by putting a robust, three-dimensional and data-enhanced product model in the hands of the shipbuilders on the deckplate. Our goal is for CVN 80, the third ship in the *Ford* class, to be a paperless ship. Other DFA initiatives include the use of improved coatings and increasing the size and completeness of "superlifts" to eliminate smaller erection lifts.

On the *Ford* class, we have also been aggressive in applying lessons learned from CVN 78 to drive costs down on CVN 79, including modifying more than 7,000 items to increase production efficiency and reviewing more than 25,000 recommendations from our shipbuilders. As a result, we have signed a contract on CVN 79 that commits to an 18 percent reduction in man-hours from CVN 78.

Along with our partners at Electric Boat, we have leveraged lessons learned from continuous production and made significant investment in technology, manufacturing techniques and facilities to support aggressive *Virginia*-class submarine cost and schedule reductions. A good example of this is the design and construction of a Supplemental Module Outfitting Facility (SMOF), a covered facility designed for continuous production of VCS bow sections to support a two-per-year VCS construction build rate with

reduced man-hours. This facility has significantly contributed to program cost-reductions and the ability to reduce VCS construction time spans from greater than 84 months to less than 66 months.

At Ingalls, in addition to the Shipyard of the Future infrastructure improvements already discussed, we are taking steps to make design choices that improve producibility, streamline our equipment packaging and improve our overall process flow throughout the yard. These efforts are paying off, and I am proud to tell you that right now Ingalls is over 1 million man-hours ahead of schedule across all our ship classes.

Additional investments aside, both yards are relentlessly looking to exploit opportunities for process improvements. We constantly look to move work “upstream” and away from the waterfront. If you’ve visited our shipyards, you may have heard about the 1-3-8 rule. Consider work done inside a shop, with adequate lighting, ventilation and easy access to tools and materials as costing one “unit” of work. The same work, done in an assembled module, where one of our shipbuilders is working outside, and perhaps working above their head, may cost three “units.” And work done on a nearly complete ship, where our shipbuilders have to climb up ladders, often with their tools, and work in increasingly confined spaces and integrate their work with other teams on the ship costs eight times what it would cost in a shop.

We are also investing in our workforce. The skills required are many and varied, and mastery does not occur overnight. We have master craftsmen who are machinists, electricians, welders, pipefitters, crane operators, fabricators and experts at a host of other technical skills. We also employ naval architects, structural engineers, designers, test engineers and a variety of other professionals. It takes three to five

years to hire someone off the street, then train and develop him or her into a journeyman-level employee, and it takes an average of eight years to develop a fully certified nuclear pipefitter.

We operate apprentice schools at both shipyards. These nationally recognized schools, with highly competitive application processes, provide us with well-trained, professional shipbuilders who go on to become leaders in the shops and on the waterfront. Several of our vice presidents are Apprentice School graduates. In addition to continuous training, the company has invested in health centers for our employees and their families, and we are now undertaking an effort to increase our employees' financial literacy.

Congress has been very supportive of the shipbuilding industry, but let me suggest ways that we can work better together. All these suggestions will have two things in common: stability and predictability—in design and requirements, in funding, and in schedule.

Maintaining a stable design and stable requirements on short and predictable construction centers provides us a foundation to make the process improvements I spoke about earlier. As I said, building a complex warship is a multi-year endeavor. Although it is difficult, we try to replicate the benefits you would expect from an assembly line as much as possible. My goal is to have one of my teams finish performing a set task on one ship and then move immediately to perform the same task on the next ship. This is really where we see savings. This practice also allows for innovation to come from our shipbuilders. When they are allowed to repeatedly perform the same task, not only do they get really good at it, they figure out ways to do it better.

Stability and predictability in funding allows us and our suppliers to properly plan and make long-range hiring plans. At Newport News, we are still feeling the effect of decisions made as a result of sequestration after the passage of the Budget Control Act. Until Congress acted forcefully, the Navy had proposed delaying the refueling and complex overhaul of the aircraft carrier USS *George Washington*. This delay was one of the major factors in the difficult decision to lay off 1,500 Newport News shipbuilders in 2015 and 2016. Newport News is now hiring shipbuilders as work begins to climb back up—what we call "green labor," new shipbuilders lacking experience, where training is very expensive.

Along with a stable design, the intervals at which we begin construction, what we refer to as centers, have to be set correctly to let us optimize the learning I just discussed. We were pleased that Chairman McCain, in "Restoring American Power," recommended accelerating production of the *Ford*-class aircraft carriers to four-year centers to support an increase to 12 CVNs. If the construction intervals get too long, it is like we are starting at square one again. For instance, the optimal production rate for LHA-class amphibious ships is between three and four years, depending on some variables. Presently, the program of record reflects a break in production between LHAs 8 and 9 of seven years, which would result in a cost increase of as much as $700 million above the optimal build plan. In another example, we experienced a five-year break in production in the *Arleigh Burke*-class destroyer program between DDGs 110 and 113, which resulted in a vessel labor cost increase of more than 20 percent for the first ship in the restart. These disruptions to the optimal build interval ripple through the industry down to our suppliers, many of whom are not as well situated as Ingalls to weather the ups and downs.

I strongly believe that the fastest results can come from leveraging successful platforms on current hot production lines. We commend the Navy's decision in 2014 to use the existing LPD 17 hull form for the LX(R), which will replace the LSD-class amphibious dock landing ships scheduled to retire in the coming

years. However, we also recommend that the concept of commonality be taken even further to best optimize efficiency, affordability and capability. Specifically, rather than continuing with a new design for LX(R) within the "walls" of the LPD hull, we can leverage our hot production line and supply chain and offer the Navy a variant of the existing LPD design that satisfies the aggressive cost targets of the LX(R) program while delivering more capability and survivability to the fleet at a significantly faster pace than the current program. As much as 10-15 percent material savings can be realized across the LX(R) program by purchasing respective blocks of at least five ships each under a multi-year procurement (MYP) approach. In the aggregate, continuing production with LPD 30 in FY18, coupled with successive MYP contracts for the balance of ships, may yield savings greater than $1 billion across an 11-ship LX(R) program. Additionally, we can deliver five LX(R)s to the Navy and Marine Corps in the same timeframe that the current plan would deliver two, helping to reduce the shortfall in amphibious warships against the stated force requirement of 38 ships.

Multi-ship procurements, whether a formal MYP or a block-buy, are a proven way to reduce the price of ships. The Navy took advantage of these tools on both *Virginia*-class submarines and *Arleigh Burke*-class destroyers. In addition to the LX(R) program mentioned above, expanding multi-ship procurements to other ship classes makes sense.

This is important to remember when we consider procuring an icebreaker for the U.S. Coast Guard. We are looking forward to participating in that competition, but we hope it will be a production run of at least three ships. Given the amount of design, engineering, planning, hiring and learning that goes into a new ship class, contracting for just a single ship puts us and our suppliers in a tough spot.

The most efficient approach to lower the cost of the *Ford* class and meet the goal of an increased CVN fleet size is also to employ a multi-ship procurement strategy and construct these ships at three-year intervals. This approach would maximize the material procurement savings benefit through economic order quantities procurement and provide labor efficiencies to enable rapid acquisition of a 12-ship CVN fleet. This three-ship approach would save at least $1.5 billion, not including additional savings that could be achieved from government-furnished equipment. As part of its Integrated Enterprise Plan, we commend the Navy's efforts to explore the prospect of material economic order quantity purchasing across carrier and submarine programs.

In closing, let me reiterate that I appreciate the opportunity to address you today. The size and capability of a nation's Navy has long been a measure of that nation's strength, both to deter foes that would do us harm as well as assure friends that stand with us. We are partners with Congress, the Navy and our supply chain in building the fleet the nation needs at a price it can afford. We will continue to provide solutions and identify ways to increase productivity and lower costs.