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Fang Zheng

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# 翻译

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**Tracking Their Wake:  
How Strong is the U.S. Navy Today?**



**中国海事研究所**  
China Maritime Studies Institute



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## Tracking Their Wake— How Strong Is the U.S. Navy Today?<sup>1</sup>

By Fang Zheng (方正)

\*Nearly 80 years have passed since the end of World War Two, and during this time the U.S. Navy has always ranked as the number one navy in the world, mainly thanks to support from America's enormous national power. But for the past ten years or so, with the great decline of America's economy, the U.S. Navy has had to face more and more problems. For example, the service lives of ships have grown longer and longer. There has been a serious lack of repairs and maintenance work. The speed of shipbuilding has noticeably slowed. And [the U.S. Navy's] newest class of aircraft carrier was not operational for five years after it was launched. These problems indicate that the U.S. Navy is in a state of exhaustion and will find it difficult to handle all manner of potential confrontations and war in the 21<sup>st</sup> century.

### Shocking Datapoints on Paper

The U.S. Navy has an active-duty force of approximately 350,000 personnel and 101,000 naval reservists. It has over 290 ships on active service in the fleet (for a total tonnage of more than 3.5 million tons, not including auxiliary vessels), and 2,626 aircraft of all types. The U.S. Marine Corps has 180,000 personnel (as of 2020), and 38,500 reservists, with 1,211 aircraft of all types. The U.S. Navy's main ships include: 11 aircraft carriers, 9 amphibious assault ships, 22 cruisers, 71 destroyers, 22 littoral combat ships, 62 nuclear-powered attack submarines, 14 nuclear-powered ballistic missile submarines, and 4 nuclear-powered cruise missile submarines. Its other vessels include: 11 amphibious transport ships, 11 amphibious landing ships, 2 amphibious command ships, 8 mine warfare vessels, and 13 patrol boats. This massive military force already surpasses the world's next nine largest navies combined. However, there's a gap between the U.S. Navy's power on paper and its actual real-world situation. Many reports and datapoints show that the U.S. Navy's actual combat strength is already far below what it appears to be on paper.

Taking the U.S. Navy's vital aircraft carriers for example, currently the U.S. Navy has 11 operational carriers, all of which are nuclear-powered, including one new *Ford*-class and 10 *Nimitz*-class ships. These carriers are all in the category of 100,000-ton super carriers. According to the U.S. Navy's plan, it will build 10 *Ford*-class carriers, with each replacing one old *Nimitz*-class carrier. However, from July 22, 2017, when the first *Ford*-class ship was commissioned,

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<sup>1</sup> 方正 [Fang Zheng], 寻踪觅迹—今日美国海军实力如何? ["Tracking Their Wake: How Strong Is the U.S. Navy Today?"], 舰载武器 [Shipborne Weapons], (November 2024 B), pp. 38-43.

**Translator's Note:** This source is a magazine published by the China State Shipbuilding Corporation's Zhengzhou Electromechanical Institute (中国船舶集团 郑州机电工程研究所), a PRC government entity that is involved in China's naval shipbuilding industry. Fang Zheng is likely a pseudonym.

until 2022, it continually faced many technical problems that couldn't be fixed, causing it to be fundamentally unable to enter into a state of operational readiness. The failure of the [Navy's] plan to do a one-to-one replacement of the *Nimitz*-class carriers has had knock on effects on the *Ford*-class's construction plans.

It is important to note that the first *Nimitz*-class ship, the USS *Nimitz*, entered service on May 3, 1975. And the last one, the USS *George H.W. Bush* entered service on January 10, 2009. *Nimitz*-class carriers were designed to have a service life of 50 years. The USS *Nimitz* is rapidly approaching retirement age. Its logistics and maintenance expenses are enormous, and the amount of time the ship spends anchored in port is increasing. But because the *Ford*-class has technical problems that are difficult to solve, the one-to-one replacement plan now appears far behind schedule and there's no completion date in sight.



On paper, the U.S. Navy is the most powerful navy in the world. It routinely conducts multiple carrier formation operations to “flex its muscles.”

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Now the U.S. Department of Defense is planning to overhaul and modernize the *Nimitz*-class ships that are approaching retirement and extend their service lives by another 10 years. Even if this life-extension plan is carried out, it is an indisputable fact that the *Nimitz*-class carriers that have already reached or exceeded the limits of their [useful] service lives are in a poor condition.

At present, the U.S. Navy can only simultaneously deploy three *Nimitz*-class ships together at the very most. This is because American carriers use nuclear propulsion, and their maintenance cycles far exceed those of conventionally powered carriers, and also because the majority of America's carriers have already passed the halfway points of their service lives. The last *Nimitz*-class ship—the USS *George H.W. Bush*—has already been in service for over ten years. And half of this class of carriers has been in service since the 1970s and 1980s. The implications are that these carriers [now] require longer periods for major overhauls, and they have high breakdown rates. As a result, the U.S. Navy can no longer easily deploy five [carrier groups] together like it could 20 years ago, let alone eight carriers, which it could at its peak to conduct operations against any selected target or region. In addition, because its carriers are growing older and its new carriers are far behind schedule with no completion date in sight, it has become a serious challenge for the United States to maintain a normal disposition of carriers around the globe. Frequent gaps in aircraft carrier availability have already become normal.

Another core operational capability of the U.S. Navy's surface fleet is its amphibious assault ships. The U.S. Navy has a total of nine of these ships in service, including seven *Wasp*-class ships and two *America*-class ships. Originally, there were eight *Wasp*-class ships. One of them, the USS *Bonhomme Richard*, was decommissioned early, after a large fire. However, the new *America*-class has had few technical difficulties and a smooth production run. Currently, it is the only U.S. Navy surface ship program that is not screwed up.

Compared to aircraft carriers, which are the pillars of the surface fleet, the U.S. Navy's other large surface ships are in an even worse state. At present, the future of the *Ticonderoga*-class cruisers looks uncertain. These cruisers came into service during the Cold War. Five have already been decommissioned and 22 remain in service. The youngest serving *Ticonderoga*-class ship was commissioned in 1994. Based on the ship's 35-year design-life, it has four more years before decommissioning. Add to that the fact that the U.S. Navy has conducted too many operations across these years, and this has caused extremely serious attrition to the service lives of their ships. As such, most of the aforementioned ships now spend long periods dockside and very rarely go out [to sea]. Only around one third of them can still maintain a decent state of readiness.



Three U.S. Navy carrier formations conduct maneuvers at sea.



The U.S. Navy carrier USS *Nimitz* is about to reach a full 50 years in service. Even though it has undergone multiple mid-life overhauls and major refitting, the ship is simply too old. It cannot compare with the capabilities of new carriers.



*Ticonderoga*-class cruisers are old and worn, but for the U.S. Navy these large surface ships are difficult to replace.

The U.S. Navy originally planned to phase out its oldest 11 *Ticonderoga*-class cruisers beginning in 2020, while overhauling and modernizing the 11 ships that were in better shape, striving to keep them in service until around 2040. There are two reasons for the United States to extend the service lives of this class of cruiser. First, there's currently no combat ship that can replace it. The United States originally developed the DD-1000 *Zumwalt* class cruiser, which saw a massive mistake in how it was oriented. This class mainly



The U.S. Navy's USS *America* amphibious assault ship.

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was designed around the land attack mission. In addition, this class of ship used too many new technologies, leading to many technical problems that could not be solved. At the same time, all the new technologies used in this class of ship caused unit prices to continually inflate. Unable to purchase more, the U.S. Navy ultimately built only three. Consequently, if it really started decommissioning the *Ticonderoga*-class, the U.S. Navy's surface fleet's combat power would be greatly reduced. Even finding a flagship would become difficult.



Second, *Ticonderoga*-class cruisers have up to 122 individual vertical launch system tubes. And they can launch Standard Missile 2 air defense missiles and Tomahawk cruise missiles. Their passive phased array radars have already been upgraded and modernized. Their overall capability is more advanced than that of the *Arleigh Burke*-class destroyer. The *Arleigh Burke*-class only has 90 to 94 vertical launch tubes, one fourth fewer than the *Ticonderoga*-class. Additionally, the *Ticonderoga*-class was designed to serve as the flagship of carrier groups. So they have larger command spaces and are able to accommodate all the command department personnel on the ship with ease. This is something that the *Arleigh Burke*-class does not have.

As such, no matter what, the U.S. Navy must maintain these old *Ticonderogas* for another 10 years. Once the next generation cruiser arrives, they can then decommission the [*Ticonderoga*-class]. Whether or not their modernization and life extension plans can be carried out is currently unknowable.

The mainstay of the U.S. Navy's surface fleet is the *Arleigh Burke*-class, which already has 62 ships in class. This is the most numerous of any class of destroyers that has been built and commissioned by the U.S. Navy since World War Two. But the biggest problem of the *Arleigh Burkes* is that most of these ships have also passed the mid-points of their service lives. As the ships' service lives decrease, their logistics and maintenance costs increase. For instance, the lead ship of the *Arleigh Burke*-class, DDG-51 USS *Arleigh Burke*, was commissioned in 1991 with a designed service life of 30 years. In theory, it should already have been decommissioned. But because funds were insufficient, the U.S. Navy began implementing a life extension and upgrade [program] for older *Arleigh Burkes* sometime around 2010, estimating their service lives could be extended to 40 years. As such, DDG-51 will begin decommissioning around 2030.

However, according to the U.S. Navy's fleet expansion plan, extending the service life of DDG-51, the USS *Arleigh Burke* destroyer, from 35 years to 45 years is not worth the cost. This has injected a lot of uncertainty into the goal of reaching 355 ships. Afterall, the performance of new ships far exceeds that of old ships, and they have greater cost-effectiveness. Moreover, the U.S. Navy's top budget priority is to ensure the next generation strategic nuclear submarine can be developed on schedule. Based on the latest information from the United States, the U.S. Navy has already cancelled the *Arleigh Burke*-class destroyer's life extension program. The U.S. Navy's current contingency plan is to build a line of Flight III *Arleigh Burke* destroyers and use them to replace the older ships that will soon be decommissioned. At the same time, it is urgently planning a next generation destroyer and striving to begin construction in 2030.

As for nuclear submarines, the U.S. military has 68 submarines, which all use nuclear propulsion. These boats include 14 *Ohio*-class strategic ballistic missile submarines and four *Ohio*-class cruise missile submarines. In addition, the U.S. military has 62 nuclear-powered attack submarines.<sup>2</sup> Of these, 40 are *Los Angeles*-class, three are *Sea Wolf*-class, and 19 are *Virginia*-class [boats].

It is worth noting that among the 14 *Ohio*-class nuclear-powered ballistic missile submarines that are responsible for the nuclear counterattack mission, the youngest was commissioned in 1997.

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<sup>2</sup> **Translator's Note:** The submarine numbers used by the author appear erroneous.

According to the U.S. Navy's plan at the beginning of the 21<sup>st</sup> century, its *Ohio*-class nuclear-powered ballistic missile submarines would start being decommissioned in 2027. And the *Ohio*-class successor would be the next generation nuclear-powered ballistic missile submarine SSBN (X), which would begin development around 2010. It was estimated that the first [new] boat would be commissioned around 2031. However, due to the lack of a compelling strategic requirement, the next generation nuclear-powered ballistic missile submarine project was repeatedly pushed back. It was not approved until January 2017, with the plan calling for the construction of 12 boats. The original plan had called for work to begin on the first boat in 2021, aiming for the boat to be launched in 2028. This timetable could still make the *Ohio*-class decommissioning deadline. It is estimated that a gap will not appear in the U.S. submarine-launched nuclear force.

The four *Ohio*-class nuclear-powered cruise missile submarines were converted from the earliest-built four nuclear-powered ballistic missile submarines, and the oldest of them was commissioned in 1981. The newest boat was commissioned in 1984. They have already reached the ends of their [operational] lives. These boats have not gone out to sea to conduct a mission for several years. Basically, they are anchored dockside and awaiting decommissioning. It can be seen that the U.S. Navy's land-attack firepower has been seriously weakened. That fact is no longer a point of contention, and the U.S. Navy no longer has the strength to build a similar strike platform.

At the same time, old and worn *Los Angeles*-class nuclear-powered attack submarines are now gradually being decommissioned. Next generation *Virginia*-class [boats] are gradually replacing them. The plan was for all replacement work to be done by 2034. A nuclear-powered submarine developed during the Cold War, the *Los Angeles* class's last boat was commissioned in 1996. Based on a nuclear submarine's average service life of 35 years, it should be decommissioned right around 2031. Currently, there are only 25 to 28 nuclear attack boats still in relatively good condition and able to carry out missions. And this number will continue to decline over time. During the Cold War, nuclear submarines were built without regard to cost. As a result, the U.S. Navy is now struggling with logistics and maintenance. According to a 2020 U.S. Navy document, the list of serving nuclear submarines requiring repairs stretched all the way to 2023. And the nuclear submarine first on the list was pretty lucky—many nuclear submarines with small existing problems were “sick” but still conducting operations.

The U.S. Navy is fully aware of these problems, but because of America's existing policies and its economic woes, and especially the priority of ensuring the construction of strategic nuclear [ballistic missile] submarines,





*Arleigh Burke-class destroyers are the backbone of the U.S. Navy's surface fleet.*



A U.S. Navy *Ohio*-class strategic nuclear submarine, the USS *Nebraska*.

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the *Virginia*-class nuclear submarine's production speeds mean they cannot totally replace all 40 *Los Angeles*-class boats by 2031. The U.S. Navy planned to take the *Los Angeles*-class [submarines] that entered service more recently and are in better shape and modernize and upgrade them using equipment from the *Virginia*-class. That way, some of the *Los Angeles*-class [submarines] could stay in service until 2040 or even 2050. But some high-level U.S. Navy [leaders] took a negative view of this plan. They believe these submarines have been employed too frequently, so upgrading them would not make much difference, and it would be better to save the money and use it to build more of the *Virginia*-class or begin developing a new and more advanced nuclear-powered attack submarine. So, the plan was never implemented. And especially after the onset of the Covid-19 pandemic, the U.S. Navy was overwhelmed responding to the pandemic, and it quickly shelved the plan to upgrade the *Los Angeles*-class.



A later flight, improved U.S. Navy *Los Angeles*-class nuclear-powered attack submarine. The biggest external difference from the earlier flight was the removal of diving planes from the sail, placing them on the bow.



A U.S. Navy *Virginia*-class Block IV nuclear-powered attack submarine, the USS *Hyman George Rickover*.

Speaking in all candor, the *Virginia*-class nuclear-powered submarines really are the main force of the U.S. Navy's nuclear-powered attack submarine force, and they are the newest class of nuclear-powered submarines to be built and commissioned in the 21<sup>st</sup> century. Nonetheless,

several *Virginia*-class submarines have already passed the halfway points of their service lives. Also, the 19 *Virginias* have to be divided between the Pacific Fleet and the Atlantic Fleet to undertake different missions. This has created a situation where the already inadequate numbers [of boats] are clearly stretched even thinner, a situation that has already dragged on for years. The *Sea Wolf*-class only has three boats. One of these boats has just experienced a major accident and will probably need to be placed in dry dock to undergo three or four years of repairs. It could even be summarily scrapped. The other two boats have already entered their final few years of service life. Even if there is a life-extension program, its cost effectiveness could appear as unappealing as that of the *Los Angeles*-class. So, when the U.S. Navy reaches 2030, it will have one type of nuclear-powered attack submarine, and that is the *Virginia*-class.

As we have seen, overall most vessels in the U.S. Navy have been in service for a very long time, and a considerable number of its main force ships have reached, or have almost reached, the limits of their service lives and face either decommissioning or upgrading, both difficult choices. Although the U.S. Navy is still the world's number one navy in numerical terms, its power has already declined a lot. To avoid the appearance of decline, the U.S. had no choice but to release the 30-year shipbuilding plan in 2016 and prepare to build a fleet composed of 350-ships. In 2018, the U.S. "National Defense Authorization Act" mandated and required the Navy to expand the fleet to 355 ships as fast as possible, but surprisingly, it did not give a clear timetable. According to the shipbuilding plan, the U.S. Navy's fleet size will gradually expand, but the ships it is building do not have any particularly outstanding advantages. And they will be using all manner of missiles that are also basically just older types.

### **A Shipbuilding Industry in Terminal Decline<sup>3</sup>**

Quite naturally, the U.S. shipbuilding industry is the foundation upon which America's powerful navy rests. When people think of the American shipbuilding industry, they always conjure up the image of the World War Two era, and its rapid and effective production of aircraft carriers. During World War Two, the U.S. built a total of 150 carriers. Of these, over 120 were escort carriers, and over 30 were fleet carriers. Back then, the American shipbuilding industry could build a 35,000-ton,

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<sup>3</sup> **Translator's Note:** alternative translations for 日薄西山的造船业 could include: "a sunseting shipbuilding industry" or "a shipbuilding industry nears the graveyard". The expression suggests the approach of death and final internment.



American Shipbuilding hit its high point in World War Two. This image shows construction of the aircraft carrier USS *Randolph* (CV 15) at Newport News Shipbuilding in 1943.

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*Essex*-class heavy aircraft carrier in 173 days. It took [only] 78 days to build a 15,000-ton *Independence*-class carrier, and work could be completed on an escort carrier in 42 days. On average, the American shipbuilding industry launched one large destroyer every seven days, built one new escort destroyer every three days, and launched one 10,000-ton transport ship per day. These high production rates allowed the United States to win World War Two by completely overwhelming the navy of fascist Japan. This was the glorious highpoint of the American shipbuilding industry. At the time, U.S. shipbuilders won the honor of being able to “build a Liberty ship in four days.” While this moniker might have been a little exaggerated, it nonetheless accurately depicts that golden age of American shipbuilding.

During the Cold War, American shipbuilding was still unbeatable. In the four years prior to 1968, the U.S. built 44 cruisers and destroyers and two large nuclear-power aircraft carriers. In addition, it built 69 nuclear-powered submarines. On average, it launched a nuclear-powered submarine once every three and a half weeks. Backed by a massively powerful shipbuilding industry, the U.S. Navy forced the Soviet Union to take an unconventional approach and go all-out to build an underwater nuclear [submarine] fleet to correct the imbalance.

After the Cold War ended, it was just like the ancient Chinese maxim: “The bow is put away when the bird is gone, and the dog is cooked when the rabbit is dead” (鸟尽弓藏，兔死狗烹).

Without the Soviet Union to serve as its opposition, the United States cut many of its naval ships and personnel and also hit the emergency brakes on ship orders. Many contracts were cancelled. As American shipbuilding companies closed, the industry moved overseas. This created a situation whereby the U.S. Navy had no choice but to rely on foreign nations for equipment acquisitions and even rely on the nation that is its “[strategic] competitor.” Over the past 30 years, the global market has undergone a huge transformation that has resulted in a serious shock to American companies that specialized in making parts for shipbuilding. As foreign competitors replaced manufactures and suppliers in America, the U.S. shipbuilding industry gradually lost its competitive edge. This forced the U.S. Navy to rely on foreign suppliers that had developed a monopoly.

For those American shipbuilders that are still lucky enough to remain alive, “days are like years.” One report said that American shipbuilders are struggling to survive, and they lack needed resources and investment. For example, the U.S. currently only has one company that can provide the shafts used by submarines, and this company’s equipment is seriously aged. If it is not upgraded in the next few years, it will not be able to meet market requirements, and multiple navy programs will be brought to a halt. In addition, the American shipbuilding industry is extremely slow to develop new technology because its civilian shipbuilding industry no longer exists. Large numbers of new technologies and equipment are limited to the building of military-use vessels. This causes unit costs to soar, making American ships extremely expensive to build. This in turn has greatly limited the numbers of vessels that can be purchased. This vicious cycle has already begun to have negative effects on the U.S. Navy.



A Ford-class aircraft carrier, the USS *Enterprise* (CV 80), currently under construction at the Newport News Shipyard. Due to shipbuilding manpower shortages, needed aircraft carrier technical upgrades, and other factors, the USS *Enterprise* could not meet its planned launch and commissioning dates, which have been constantly pushed back.

America's shipbuilding companies are facing even more serious trouble from the shipbuilding industry's talent-flight and its talent development problem. Reports show that the overall number of shipbuilding workers has declined, and the numbers of jobs in the shipbuilding industry have also continued to go down. The U.S. shipbuilding industry has lost over 20,000 American workers since 2000. This has had serious and negative repercussions. As the number of jobs continues to shrink, the number of workers studying ship assembly, welding, and casting will continue to grow smaller and smaller in the foreseeable future. And American technical schools stopped training students how to operate basic shipyard equipment many years ago.

The flight of high-level technicians has left America's new generation of technicians without teachers and "mentorship," and essential shipbuilding knowhow has not been passed along. American technicians, as a result, are less capable and competitive. The disappearance of experienced workers is a microcosm of the U.S. shipbuilding industry's decline. Overall, the jobs available in the American shipbuilding industry are steadily shrinking. The frenzy of building in World War Two and the early Cold War caused serious overcapacity. By the 1990s, insufficient demand led to less building, and America's high labor costs meant it fundamentally could not compete with Asia's three huge shipbuilding industries.<sup>4</sup> The result was that many [American] shipyards closed.

The poor state of its shipbuilding industry has led experienced workers to change careers and caused a shortage of new workers. The American shipbuilding industry was kicked out of the international civil shipbuilding market a full 30 years ago. As early as the 1980s, the average costs of American shipbuilding were already twice those of countries like Japan and South Korea, and it took [the Americans] anywhere from three to 18 months longer to deliver ships. Now the [only] shipyards that the U.S. still has are those that are maintained by the meager contracts of the U.S. Navy. Although America's shipbuilding capacity is kept on life support by the U.S. Navy, the consequences of this approach are starting to manifest themselves. After a large segment of basic infrastructure relocated abroad, the U.S. shipbuilding industry

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<sup>4</sup> **Translator's Note:** This is likely a reference to China, South Korea, and Japan.





Huntington Ingalls Industries is America's largest ship (including aircraft carrier) designer and manufacturer. It includes Newport News Shipbuilding and Ingalls Shipbuilding. The company's total full-time workforce is 44,000. Its headquarters is in Newport News, Virginia.

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was greatly weakened. Its only remaining six large shipyards are Newport News Shipbuilding, General Dynamics Electric Boat, Ingalls Shipbuilding, Bath Iron Works, Austal USA, and National Steel and Shipbuilding Company.

This has resulted in a situation where the amount of time that the U.S. Navy's massive fleet must spend in shipyards waiting for maintenance far exceeds the time it can deploy overseas. For instance, the USS *Boise*, a U.S. Navy *Los Angeles*-class nuclear-powered submarine, spent five years waiting for maintenance work to be completed. And this is not unusual. According to sources, over the past five years the U.S. Navy has had to delay 38 of its 51 ship maintenance projects. American experts that have looked at the current state of the U.S. shipbuilding industry have said that if America really went to war with an enemy nation, the war could be over before the U.S. Navy's [fledgling] ships could leave their nests in the shipyards.

### **A New Maritime Strategy: Closing the Barn Door After the Horse Has Bolted<sup>5</sup>**

Facing the re-emergence of Russia and other strong naval powers, the U.S. Navy has had no choice but to re-formulate its maritime strategy and begin work on equipping itself with a new generation of surface and subsurface warships. Its newest plan will see the U.S. Navy grow to a 355-ship fleet. These new vessels include the next generation nuclear-powered ballistic missile

<sup>5</sup> **Translator's Note:** the expression used in the text is 亡羊补牢式大洋计划. This might be more colloquially translated as "A maritime strategy that's about as smart as mending the pen after the sheep have all been eaten by wolves." The expression implies futility and suggests that it is already too late for the U.S. Navy.



submarine, the next generation 10,000-ton class cruiser, and a medium-sized frigate. But turning plans on paper into actual warships hinges on the American manufacturing industry, and especially its shipbuilders.

At the current time, America's shipbuilding industry is already seriously withered, and it continues to spiral downward. To reverse the decline of the American shipbuilding industry, the U.S. government must establish a stable and long-term spending plan. America especially needs to reduce its acquisitions from foreign manufactures and give those opportunities back to small and medium-sized companies. Only this could strengthen the competitiveness of American manufacturers. Moreover, this is critical for safeguarding the health of its shipbuilding infrastructure.



Located in the U.S. State of Wisconsin, Marinette Marine is a medium-sized shipbuilder that has begun expanding to build the U.S. Navy's *Constellation*-class frigate.

However, given its current situation, the U.S. [government] will find it difficult to execute this kind of steady, multi-year spending plan to revitalize the American shipbuilding industry. If there is no hope of revitalizing the shipbuilding industry, well, there is nothing to talk about then when it comes to rearming the U.S. Navy. America's latest plan is to invest 25 billion into the revitalization of its shipbuilding industry. Although 25 billion U.S. dollars sounds like an extremely large expenditure, this is not very large for the U.S. Moreover, the spending will be spread out over many years. It is said that 21 billion will be spent on accelerating the improvement of basic infrastructure at the shipyards supporting the U.S. Navy, raising the production capacity and repair and maintenance efficiency of four large shipyards. The remaining 4 billion will be used to support private shipyards.

Of course, if this plan could be smoothly executed, there is little doubt that it would inject some new life into the U.S. Navy and could also alleviate some of the pressure on the U.S. Navy's shipbuilding industry. However, the American manufacturing and shipbuilding industries have been in decline for decades, and the trends already seem irreversible. The U.S. Navy now has many programs that are frozen, and the costs of all its programs have greatly overrun their original budgets. Moreover, this has already become a commonplace occurrence in U.S. Navy programs.

### **Supplement: America's Six Large Shipyards**

1. **Newport News Shipbuilding:** A division of Huntington Ingalls Industries, it is the world's largest naval shipyard and the largest private shipyard in the United States. All of America's aircraft carriers are built at this shipyard. This shipyard is responsible for all maintenance work on America's entire fleet of nuclear-powered aircraft carriers. Currently, it is America's only shipyard capable of building aircraft carriers. It employs over 37,000 workers. In addition, this shipyard builds some of the U.S. Navy's nuclear-powered submarines.
2. **Ingalls Shipbuilding:** A division of Huntington Ingalls Industries, located in Pascagoula, Mississippi. This shipyard ranks as a world leader in ship design, manufacturing, maintenance, and repair work in the eyes of the U.S. Navy, military-use shipbuilders around the world, and commercial ship companies. It has built many *Arleigh Burke*-class missile guided destroyers, *Ticonderoga*-class guided missile cruisers, and *Wasp*-class amphibious assault ships for the U.S. Navy.
3. **Bath Iron Works:** Nestled on the banks of the Kennebec River in the U.S. state of Maine, it is one of the two contractors that build *Arleigh Burke*-class guided missile destroyers.
4. **Austal USA:** For nearly ten years, this shipyard has been a contractor for the U.S. Navy in San Diego, where it conducts maintenance and repair work on large deck amphibious ships. It does not build large warships. However, this shipyard has undertaken some work building logistics support ships.
5. **General Dynamics Electric Boat:** This shipyard is a division of America's General Dynamics Corporation. For over 100 years, it has been the U.S. Navy's main producer of submarines. The company's primary facilities are its yard in Groton, Connecticut, and its outfitting and equipment plant in North Kingstown, Rhode Island. In January 1954, this company built the world's first nuclear-powered submarine, the USS *Nautilus* (SSN-571). In 1959, this company then built the world's first nuclear-powered ballistic missile submarine, the USS *George Washington* (SSBN-598). Additionally, most of the *Ohio*-class, *Los Angeles*-class, *Sea Wolf*-class, and newest *Virginia*-class submarines were built by this company.
6. **National Steel and Shipbuilding Company:** A subsidiary of General Dynamics, located in San Diego, California, it is responsible for building logistics support ships.