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Research – White Paper

Forging the Future Fleet: A Modern Blueprint for U.S. Shipbuilding Workforce and Infrastructure Renewal

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1. Objective:

The U.S. shipbuilding industry stands at a defining crossroads. Recent federal actions—most notably the *Ships for America Act* and President Trump's April 9, 2025 Executive Order on *"Restoring America's Maritime Dominance"*—have created a renewed national imperative to rebuild the country's maritime strength and industrial base. These directives recognize that a strong shipbuilding sector is vital not only for sustaining naval superiority, but also for fueling economic growth, advancing manufacturing innovation, and securing the nation's long-term strategic interests. Yet despite this momentum, the industry faces deep-rooted challenges that threaten to undermine these goals. Skilled tradespeople are in critically short supply, legacy training facilities have fallen behind modern standards, and the pipeline of qualified instructors is shrinking fast. At the same time, global competitors continue to invest aggressively in shipbuilding modernization, widening the gap in both capacity and technological edge. Without immediate and coordinated action, the U.S. risks falling further behind at a moment when maritime readiness and industrial self-sufficiency are more important than ever.

This white paper offers a practical three-part solution—**Workforce Development, Global Talent Pipeline, and Digital Transformation**—designed to directly tackle the labor and infrastructure challenges holding back the U.S. shipbuilding industry. The approach focuses on rebuilding a strong and skilled industrial workforce, upgrading outdated training facilities, and integrating modern technologies into every phase of ship design and construction. These efforts are intended to strengthen America's ability to build and maintain a world-class maritime fleet, reinforce national security, and ensure long-term competitiveness in a rapidly evolving global market.

2. Understanding Challenges in the U.S. Shipbuilding Industry

A critical and persistent challenge in the U.S. shipbuilding industry is the lack of qualified instructors and experienced mentors essential for workforce training and

upskilling. These individuals play a vital role in preparing workers for complex shipyard environments, yet many educational institutions struggle to recruit instructors with recent, hands-on shipbuilding experience. As a result, training programs often fail to reflect the current demands of modern ship construction, particularly as the industry adopts more advanced digital and modular techniques.

According to the Congressional Research Service, industry leaders and Navy officials have cited shortfalls in workforce experience and training infrastructure as major obstacles to achieving shipbuilding goals. The absence of experienced mentors slows the learning curve for new hires, raises safety risks, and contributes to delays in production. Strengthening the pool of maritime instructors is foundational to restoring the pipeline of skilled labor needed for both naval and commercial shipbuilding expansion[1].

The impact is significant. Without seasoned mentors, new hires require more time to become proficient, increasing onboarding costs and reducing productivity. Mistakes during the early stages of employment often lead to costly rework, project delays, and safety incidents. Instructors also serve as key drivers of technological adoption in training, and their absence slows the infusion of digital shipbuilding skills into the talent pipeline.

Beyond mentorship, the broader U.S. shipbuilding workforce suffers from systemic shortages in skilled trades. Welders, pipefitters, electricians, and machinists are in especially high demand. The American Welding Society projects a shortage of more than 360,000 welding professionals by 2027—a gap that threatens to halt ship production if left unaddressed [2]. Contributing factors include the closure of industrial education programs, waning interest in blue-collar careers, and stiff competition from other sectors like oil, gas, and construction.

Further complicating the labor crisis is the outdated state of physical shipyard infrastructure. Many shipyards still operate with legacy equipment, insufficient training facilities, and little room to scale operations. These conditions hinder the adoption of modern production tools such as CAD/CAM software, simulation environments, and automated welding systems. As highlighted by the U.S. Government Accountability Office (GAO), lack of investment in infrastructure and digital integration directly affects performance and delays modernization efforts[3].

The convergence of these factors—the scarcity of instructors, a depleted skilled trade pipeline, and antiquated shipyard infrastructure—presents a systemic challenge to

[1] Congressional Research Service. https://www.congress.gov/crs-product/RL32665
[2] American Welding Society. https://weldingworkforcedata.com/
[3] Government Accountability Office (GAO) Report. https://www.gao.gov/assets/gao-25-106286.pdf

rebuilding U.S. maritime strength. According to the National Defense Industrial Association (NDIA), workforce constraints remain the top barrier to expanding shipbuilding capacity and supporting national security priorities. NDIA has called for urgent investment in training, mentorship, and industrial revitalization to avoid undermining the Navy's long-term fleet objectives[4].

3. Projected Outlook Over the Next 3, 5, and 10 Years

The U.S. shipbuilding industry is facing a critical labor shortage that is projected to intensify over the next decade. This shortage spans various roles, including engineers, skilled trade technicians, and digital shipbuilding professionals, and poses significant challenges to meeting the nation's naval and commercial shipbuilding demands.

3-Year Outlook (2025–2028):

In the short term, the U.S. Navy's immediate goals for expanding its fleet will confront bottlenecks in skilled labor supply. Without a reliable pipeline of certified instructors and experienced mentors, new entrants to the workforce will continue to underperform, prolonging ramp-up times and increasing project delays. Shipyards will also struggle to implement digital shipbuilding processes due to an undertrained labor pool. Strategic interventions in education, mentorship programs, and foreign talent recruitment will be critical to avoiding further erosion in production capacity[5].

5-Year Outlook (2025–2030):

In 2030, the U.S. shipbuilding industry must be fully engaged in a dual-track modernization effort: expanding the skilled workforce and retrofitting legacy infrastructure. The projected global shipbuilding market growth to $193 billion will further increase pressure on U.S. yards to stay competitive. However, unless significant progress is made in upgrading training facilities and integrating instructors into the education system, the U.S. risks becoming a secondary player in the global maritime supply chain. Investing in instructor development and public-private workforce partnerships will be essential[6].

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[4] National Defense Industrial Association (NDIA). NDIA and Navy TPP Team Up to Grow Next-Gen Shipyard Talent https://www.ndia.org/about/press/press-releases/2025/4/30/talent-pipeline-program

[5] National Academies of Sciences, Engineering, and Medicine. Research and Education for Maritime Progress. https://nap.nationalacademies.org/catalog/20405/research-and-education-for-maritime-progress

[6] Fortune Business Insights. Shipbuilding Market Size, Share & COVID-19 Impact Analysis. https://www.fortunebusinessinsights.com/shipbuilding-market-103351

10-Year Outlook (2025–2035):

Over the next decade, the U.S. aims to grow its Navy fleet to nearly 390 ships, an ambition dependent on both industrial capacity and workforce strength. If the training pipeline remains fragmented and instructor shortages persist, these goals may be missed by years. To keep pace with global shipbuilding leaders, the U.S. will need thousands of skilled tradespeople proficient in both traditional and digital manufacturing techniques. National coordination among shipyards, technical institutions, and international recruitment partners will be required to scale operations and close the labor gap[7].

4. A Three-Pronged Approach to Bridge the Gaps

To meet the urgent workforce and modernization needs of the U.S. shipbuilding industry, a coordinated and scalable national strategy is needed—one that moves beyond piecemeal hiring and fragmented training initiatives. This white paper proposes a three-pronged approach that aligns with current federal priorities and addresses both immediate labor shortages and long-term competitiveness. The approach consists of three interdependent pillars: **Workforce Development**, **Global Talent Pipeline**, and **Digital Transformation**. Together, these components form a cohesive framework for revitalizing American shipbuilding.

1. Workforce Development

A robust domestic workforce remains the foundation of any successful industrial revival. This effort begins with strengthening the pipeline of skilled U.S. tradespeople through updated training programs, mentorship from experienced maritime professionals, and modern simulation-based instruction. Key elements of this workforce development initiative include:

- Curriculum modernization to align with U.S. Department of Labor standards in welding, pipefitting, marine electrical systems, and mechanical trades
- Integration of simulation-based and hands-on training methods to build real-world readiness
- Establishment of regional training and mentorship hubs to expand access to industry-certified skill development

[7] U.S. Government Accountability Office. Navy Needs a Strategic Approach for Private Sector Industrial Base. https://www.gao.gov/products/gao-25-106286

This approach supports the rapid upskilling of new entrants and returning workers, while ensuring that training quality and safety standards match evolving shipyard demands.

2. Global Talent Pipeline

Where domestic labor alone cannot meet demand—particularly in specialized technical roles—international recruitment can play a supportive role. A structured and lawful pathway for bringing in **foreign talent from allied countries** can help fill critical skills gaps without undermining domestic hiring priorities.

Strategic use of **cap-exempt visa programs and certification equivalency standards** allows for the deployment of highly qualified global professionals in fields such as:

- Naval architecture, marine engineering, and systems integration
- Digital ship design using CAD/CAM and PLM tools
- Smart ship systems, robotics, embedded technologies, and AI

Workers from **allied countries** like **South Korea, Japan and the Philippines** can be recruited based on certification equivalency, U.S. credential alignment, and maritime experience. To ensure alignment with U.S. operational standards, pre-deployment orientation programs can provide cultural, legal, and technical training. These efforts should complement domestic workforce development by bringing in expertise that is scarce or unavailable within the U.S. labor market.

3. Digital Transformation

To remain globally competitive, the U.S. shipbuilding industry must embrace digital innovation. Shipyards can dramatically increase efficiency, reduce downtime, and improve quality by embedding advanced technologies into production systems and workforce tools,

Digital transformation should prioritize:

- AI-powered labor forecasting and supply chain optimization
- Real-time monitoring dashboards and automated quality control
- Immersive environments for virtual design, testing, and training
- Predictive maintenance tools to extend asset lifespan and reduce cost overruns

Workforce training must also evolve to include proficiency in modern platforms such as Siemens NX, Aveva Marine, and other shipbuilding software suites. These tools enable more agile, data-driven operations that support both current production needs and future innovation.

5. Target Countries for Workforce Development

Solving the labor crisis in U.S. shipbuilding will require strategic international partnerships—particularly with **allied countries, South Korea, Japan, and the Philippines,** which offer strong maritime education systems, experienced personnel, and certification frameworks that align with U.S. industry standards. Identifying qualified global talent sources can help accelerate training capacity, enhance shipyard productivity, and build a pipeline of instructors and technical mentors to support long-term workforce development.

South Korea

As one of the leading nations in commercial shipbuilding, South Korea is known for its advanced modular construction techniques and extensive use of automation in shipyards such as Hyundai Heavy Industries and Samsung Heavy Industries. South Korea's maritime training institutions, including Korea Maritime and Ocean University, produce highly skilled engineers, technicians, and quality control professionals. These individuals possess deep expertise in digital shipyard operations and can contribute significantly to U.S. shipbuilding modernization efforts and training initiatives.

While South Korea is a global leader in shipbuilding, it is also currently grappling with significant labor shortages exacerbated by an aging population and declining birth rates. The shipbuilding industry faces an estimated shortage of around 14,000 workers, with projections indicating a need for an additional 45,000 to meet current demands[8]. Efforts to mitigate this include expanding skilled worker visa quotas and establishing training partnerships with neighboring countries.

Japan

Japan has a long-standing tradition of precision shipbuilding and is a global leader in robotics and smart manufacturing. Educational institutions such as the National Institute of Technology (KOSEN) and the Japan Maritime College focus on hands-on

[8] Stimson Center. (2023). *Waypoints and Course Adjustments: Toward Naval Shipbuilding Cooperation with South Korea*. Retrieved from: https://www.stimson.org/2025/waypoints-and-course-adjustments-towards-naval-shipbuilding-cooperation-with-south-korea

engineering, automation, and safety practices. Japanese professionals are known for their discipline, attention to detail, and expertise in integrating advanced technologies into production workflows. These capabilities make Japan a valuable source of instructors, mentors, and innovation leaders in digital shipbuilding environments.

Japan's shipbuilding sector is similarly affected by demographic shifts, with a rapidly aging population and a shrinking workforce. A recent Reuters survey revealed that two-thirds of Japanese companies are significantly impacted by labor shortages due to the country's declining and aging population[9]. The government has implemented measures such as raising the retirement age and encouraging older individuals to remain in the workforce. Despite these efforts, the labor shortage remains a pressing issue, particularly in industries like shipbuilding that require specialized skills.

Philippines

In contrast to the aging workforces in South Korea and Japan, the Philippines boasts a young, dynamic, and highly skilled maritime labor pool. The country is the world's largest supplier of maritime labor, with over 30% of global seafarers originating from the Philippines[10]. Filipino professionals are renowned for their strong English proficiency, adaptability, and hands-on shipyard experience. The Philippines' robust network of maritime training institutions, certified by the International Maritime Organization (IMO) and overseen by agencies like the Technical Education and Skills Development Authority (TESDA), ensures a steady supply of competent maritime workers.

Moreover, the Philippines has a history of providing skilled labor to both South Korea and Japan to support their shipbuilding industries. This established track record positions the Philippines as a reliable partner for workforce development initiatives aimed at revitalizing the U.S. shipbuilding sector.

6. Conclusion

Revitalizing the U.S. shipbuilding industry calls for more than small-scale hiring efforts or policy discussions—it requires bold, coordinated action grounded in long-term strategy. The challenges are clear: a shrinking labor pool, outdated training infrastructure, and the need to keep pace with rapid technological change. Meeting this moment will take

[9] Reuters. (2025). *Japan Firms Face Serious Labour Crunch as Aging Population Bites*. Retrieved from: https://www.reuters.com/sustainability/sustainable-finance-reporting/japan-firms-face-serious-labour-crunch-aging-population-survey-shows-2025-01-15

[10] Institute of Developing Economies – JETRO. (2020). *Maritime Education in the Philippines: Nurturing the World's Seafarers*. Retrieved from: https://www.ide.go.jp/library/English/Publish/Reports/Brc/pdf/re32_03.pdf

a national commitment to rebuilding the workforce, tapping into global talent from allied countries where needed, and modernizing how ships are built and maintained.

This white paper proposes a practical, scalable framework centered on three key areas: **strengthening domestic workforce development, establishing structured international talent partnerships with allied countries, and embracing digital transformation across shipyard operations.** Together, these efforts can close the skills gap, modernize production processes, and restore U.S. leadership in global shipbuilding.

Success will depend on strong collaboration between government, industry, and international partners. With the right investments and shared vision, the United States can build a shipbuilding workforce ready for the future—rooted in skilled labor, supported by smart technology, and sustained by long-term strategic commitment.