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Maritime MRO in the South Korea-U.S. Alliance Under the Second Trump Administration

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I. INTRODUCTION

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The shifting balance of naval power between the United States and China has elevated maritime industrial capacity—especially shipbuilding and sustainment—to the forefront of Indo-Pacific strategy. China’s shipbuilding output now exceeds that of the United States by orders of magnitude, generating a structural asymmetry that threatens U.S. naval primacy and constrains operational flexibility. At the same time, the U.S. shipbuilding and repair sector faces structural impediments: obsolescent infrastructure, workforce shortages, and prolonged maintenance delays that renders major naval assets non-operational for months or even years. These industrial limitations have become so severe that Washington increasingly seeks to leverage allied capacity to offset domestic shortfalls, a trend reflected in successive U.S. initiatives such as the National Defense Industrial Strategy,¹⁾ Maritime Statecraft,²⁾ and more recently the *Make American Shipbuilding Great Again (MASGA)* initiative.³⁾ In this context, South Korea—home to the world’s most competitive commercial and naval shipyards—has emerged as a pivotal partner. South Korean firms such as HD Hyundai Heavy Industries and Hanwha Ocean have already conducted major overhauls of U.S. naval auxiliary vessels, demonstrating that the ROK’s industrial base can reduce turnaround delays and strengthen the resilience of regional sustainment networks.

Against this backdrop, the ROK–U.S. alliance is undergoing an important, though underexamined, industrial transformation. Maintenance, repair, and overhaul (MRO) cooperation is no longer a purely logistical matter but a strategic instrument for

1) US Department of War, “DOD Releases First Defense Industrial Strategy,” January 12, 2024. <https://www.war.gov/News/News-Stories/Article/Article/3644527/dod-releases-first-defense-industrial-strategy/>

2) US Navy, “SECNAV Del Toro Calls for a New, Bold Maritime Statecraft in Era of Intense Strategic Competition,” September 26, 2023. <https://www.navy.mil/Press-Office/Press-Releases/display-pressreleases/Article/3539151/secnav-del-toro-calls-for-a-new-bold-maritime-statecraft-in-era-of-intense-strategic-competition/>

3) Jihoon Yu, “How South Korea’s MASGA Proposal Could Reshape US Shipbuilding” *The Diplomat* (August 14, 2025) <https://thediplomat.com/2025/08/how-south-koreas-masga-proposal-could-reshape-us-shipbuilding/>

coping with China's rise and revitalizing U.S. maritime power. Yet it also exposes political-economic frictions: U.S. domestic defense contractors view sustainment as a high-margin sector and therefore resist offshoring maintenance work, while U.S. Congress maintains regulatory barriers such as International Traffic in Arms Regulations (ITAR) restrictions and legal limits on foreign shipyard repair. South Korea, for its part, sees MRO cooperation not only as burden-sharing but as a pathway toward industrial upgrading, deeper alliance cooperation, and long-term defense-technological autonomy. These dynamics illustrate the dual nature of MRO cooperation: it strengthens allied resilience but is simultaneously conditioned by political, economic, and institutional constraints on both sides.

This study is therefore motivated by a central research question: *What strategies can be employed to enhance alliance resilience through ROK-U.S. MRO cooperation?*

To address this question, the analysis focuses on the concept of alliance resilience, defined as the ability of an alliance to maintain credible deterrence, operational readiness, and political cohesion under strategic and industrial stress.⁴⁾ Examining the ROK-U.S. alliance through the lens of industrial capacity reveals that resilience is shaped not only by strategic alignment but also by the geography of production and repair—where ships are built, sustained, and modernized. Understanding how to strengthen alliance resilience requires examining factors that enhance cooperation—such as South Korea's industrial scale, proximity, and cost efficiency—as well as factors that constrain it, including U.S. congressional preferences, regulatory barriers, protectionist political economy dynamics, and South Korea's demographic or strategic vulnerabilities.

To systematically analyze these drivers and obstacles, this book integrates both strategic and domestic political-economic considerations. At the international level, the study examines how China's maritime expansion, Indo-Pacific contested logistics, and shifting U.S. global posture create demand for deeper industrial cooperation. At the domestic level, it evaluates how congressional politics, industry

4) NATO, "Resilience, civil preparedness and Article 3" (November 13, 2024). <https://www.nato.int/en/what-we-do/deterrence-and-defence/resilience-civil-preparedness-and-article-3>

lobbying, regulatory structures, and South Korea’s own industrial policy shape the feasibility and durability of cooperative arrangements. This two-level approach allows for a multi-dimensional assessment of alliance resilience:

- Factors that contribute to alliance resilience include South Korea’s shipbuilding scale, forward MRO capacity, industrial-technological complementarities, and the emerging alignment between U.S. industrial strategy and South Korean capabilities.
- Factors that hinder alliance resilience include U.S. regulatory constraints (ITAR, Byrnes-Tollefson Amendment), industry resistance to value offshoring, congressional skepticism, South Korean demographic decline, and strategic vulnerabilities to Chinese and North Korean threats.
- Balancing constraints and opportunities requires identifying pathways—such as phased MRO expansion, regulatory reform, co-investment frameworks, and institutionalized industrial cooperation—that align incentives at both the strategic and domestic levels.

By analyzing these intersecting pressures, this introduction situates shipbuilding and MRO cooperation as a critical but politically contested foundation of future ROK–U.S. alliance resilience. The chapters that follow build on this logic to show how industrial integration is becoming a central arena in alliance management—where political economy, maritime strategy, and technological capability converge to shape the future of deterrence and regional security. Furthermore, this study grounds its analytical framework in two detailed empirical cases. Chapter 3 examines Japan’s evolving role as a forward sustainment hub—highlighting how geography, industrial depth, and U.S.–Japan institutional coordination shapes the competitive landscape for regional MRO cooperation. Chapter 4 then turns to South Korea’s shipbuilding and MRO ecosystem, demonstrating how South Korean shipyards have emerged as credible alternatives—and in some domains, superior options—to support U.S. naval repair and sustainment needs in the Indo-Pacific. The conclusion offers policy recommendations on how ROK–U.S. cooperation in MRO can be leveraged to strengthen the resilience of the alliance. Together, these cases provide comparative insights into how allied industrial capabilities can enhance, constrain, or reshape the resilience of U.S.-led maritime architectures in the region.

II. ROK-U.S. MRO Cooperation and the Political Economy of Alliance Industrial Policy

Darcie Draudt-Véjares

1. Introduction

Maintenance, repair, and overhaul (MRO) cooperation between the United States and South Korea is often framed as a narrow logistical task—but in reality, it represents a strategically overlooked dimension of alliance management. Military planners in both countries recognize the strategic benefits: South Korean shipyards can maintain U.S. Navy vessels more efficiently, more cost-effectively, and closer to theater than American facilities, while South Korean excellence in defense capabilities offers opportunities across multiple domains. Yet despite clear operational logic and high-level political support from multiple administrations, MRO cooperation remains limited to a handful of naval contracts.

This chapter argues that ROK-U.S. MRO cooperation illustrates an emerging form of *alliance industrial policy*: routine sustainment that reallocates where value is created, embeds cross-border standards, and incrementally transforms the alliance's economic base. What appears a logistical issue is in fact industrial policy in practice—shaped by decisions over production location, value distribution, technology transfer, and long-term business ties.

Yet efforts to scale this cooperation beyond limited naval contracts expose a core tension between the strategic logic driving U.S. interest in allied capacity and South Korea's pursuit of industrial upgrading within the alliance—each shaped by domestic political economy constraints that complicate implementation. The United States seeks to leverage South Korean industrial capacity to address readiness shortfalls while maintaining strategic control, while South Korea treats MRO as a strategic opportunity to enhance its alliance role through expanded defense market access and technology transfer. These divergent objectives, layered atop regulatory barriers and shifting strategic priorities, reframe MRO cooperation as a contested site of industrial policy—highlighting enduring frictions over value capture, regulatory gatekeeping, and the governance of industrial gains within the alliance.

2. The U.S. Perspective: MRO as Strategic Capacity Supplement

From Washington’s perspective, the appeal of South Korean MRO cooperation lies in its ability to supplement overstretched domestic capacity. Yet this logic—grounded in operational necessity—is often at odds with entrenched industrial interests and political constraints. What appears militarily rational at the Pentagon can register as economically threatening in Congress or industry. Understanding this tension is key to explaining why ROK–U.S. MRO cooperation remains limited despite high-level endorsement.

Ally contributions to U.S. MRO capabilities address two critical strategic challenges. First, American defense production across all domains faces severe capacity constraints. The U.S. naval shipbuilding industry exemplifies these limitations: a U.S. shipbuilding and repair sector with total annual revenues of approximately \$27.9 billion in 2019, according to the U.S. Maritime Administration.⁵⁾ Industry analysts estimate that the naval maintenance, repair, and overhaul (MRO) segment alone accounts for roughly \$20 billion annually.⁶⁾ In 2021, the Army and Air Force reported that operating and support accounts for more than 70 percent of a weapon system’s total lifecycle costs, making aftermarket maintenance and support services highly profitable revenue streams for sustained income over many years.⁷⁾

China’s massive shipbuilding industrial capacity intensifies the strategic urgency. According to the Center for Strategic and International Studies, China’s shipbuilding output now exceeds the entire U.S. shipbuilding industry’s cumulative production since World War II.⁸⁾ Multiple assessments find China’s commercial and naval

5) U.S. Maritime Administration, *The Economic Contributions of the U.S. Shipbuilding and Repairing Industry* (Washington, DC: U.S. Department of Transportation, June 2021), 3, <https://www.maritime.dot.gov/sites/marad.dot.gov/files/2021-06/Economic%20Contributions%20of%20U.S.%20Shipbuilding%20and%20Repairing%20Industry.pdf>.

6) Naval News, “South Korea’s HD HHI Inks MRO Agreement with the U.S. Navy,” July 2024, <https://www.navalnews.com/naval-news/2024/07/south-koreas-hd-hhi-inks-mro-agreement-with-the-us-navy/>.

7) U.S. Government Accountability Office, “Weapon System Sustainment: The Army and Air Force Conducted Reviews; the Army Identified Operating and Support Cost Growth,” GAO-20-390, Page 1, April 2020, <https://www.gao.gov/products/gao-23-106341>.

shipbuilding output vastly exceeds U.S. capacity, underscoring a pronounced scale asymmetry.⁹⁾ For every one oceangoing vessel that the U.S. can produce, China can produce 359 in one single year.¹⁰⁾

U.S. forward MRO capabilities for certain essential platforms remain limited in the Indo-Pacific, leading to delays in turnarounds and maintenance bottlenecks for deployed units. The U.S. Government Accountability Office (GAO) reports that the F-35 sustainment enterprise continues to face “depot-maintenance delays, component repair backlogs, and readiness shortfalls.”¹¹⁾ In-theater repair capabilities help avoid costly transit back to the U.S. mainland, minimize exposure to attack during transit, and return systems to the field faster—enhancing readiness and operational flexibility.¹²⁾ Similarly, Army ground systems often rely on U.S.-based depots, creating costly delays and constraining operational tempo. GAO reporting indicates steep declines in major overhauls at Army depots over the past decade, with impacts acknowledged on mission-capable rates across multiple vehicle platforms.¹³⁾ These limitations highlight the value of allied, in-theater MRO options that can sustain readiness without strategic lift or base access vulnerabilities.¹⁴⁾

8) Matthew P. Funaiolo, “The Threat of China’s Shipbuilding Empire,” Center for Strategic and International Studies, April 2024, <https://www.csis.org/analysis/threat-chinas-shipbuilding-empire>.

9) Alliance for American Manufacturing, “China’s Shipbuilding Capacity is 232 Times Greater Than That of the United States,” February 2024, <https://www.americanmanufacturing.org/blog/chinas-shipbuilding-capacity-is-232-times-greater-than-that-of-the-united-states/>.

10) Naval News, “China Produces 359 Ships Per Year Compared to One for the U.S.,” July 2024, <https://www.navalnews.com/naval-news/2024/07/china-produces-359-ships-annually-compared-to-one-in-the-u-s/>.

11) U.S. Government Accountability Office, “F-35 Aircraft Sustainment: DOD Needs to Address Substantial Supply Chain Challenges,” GAO-23-105341, April 2023, <https://www.gao.gov/assets/gao-23-105341.pdf>.

12) Cynthia R. Cook, Nicholas Szechenyi, Henry H. Carroll, Audrey Aldisert, Sarah Hendrick, and Javier Nater, *Enabling Forward Sustainment: Japanese Industry’s Potential Role in U.S. Airpower Readiness* (Washington, DC: Center for Strategic and International Studies, June 2025), https://csis-website-prod.s3.amazonaws.com/s3fs-public/2025-06/250625_Cook_Forward_Sustainment_1.pdf?VersionId=TTwH9eEMXoWeDaBqE.5VkzqMoCe_.kQW

13) U.S. Government Accountability Office, *Weapon System Sustainment: Various Challenges Affect Ground Vehicles’ Availability for Missions*, GAO-25-108679, September 25, 2025, p. 20-21, <https://www.gao.gov/assets/gao-25-108679.pdf>

Second, the Indo-Pacific strategic environment increasingly depends on distributed maintenance and logistics networks capable of supporting forward-deployed assets across all domains. According to the Congressional Research Service, the U.S. military’s evolving posture in the region emphasizes dispersed sustainment nodes and partner-based repair facilities to strengthen resilience against contested logistics environments.¹⁵⁾ RAND researchers similarly note that multinational and allied maintenance capabilities are critical for sustaining operations across extended distances and under potential denial conditions.¹⁶⁾

The Pentagon released its first-ever National Defense Industrial Strategy in January 2024, which explicitly calls for modernized defense ecosystems incorporating government-industry-allied cooperation.¹⁷⁾ During the Biden administration (2020–2024), Secretary Carlos Del Toro’s Maritime Statecraft vision emphasizes partnerships with “the most advanced shipbuilders in the world”—which included a clear reference to South Korean capabilities.¹⁸⁾ The focus on industrial alliances continues in the second Trump administration since coming into office in January 2025. The White House’s Make American Shipbuilding Great Again (MASGA) initiative signals executive-level support for deeper industrial integration with key allies.

In the U.S. Congress, developments further demonstrate this shift: Senators Mike Lee and John Curtis introduced the “Ensuring Naval Readiness Act” in February 2025,

14) Assistant Secretary of Defense for Sustainment Christopher J. Lowman and Deputy Assistant Secretary Steve Morani, “Media Roundtable on Defense Sustainment and Industrial Base Strategy,” U.S. Department of Defense, June 25, 2024, <https://www.defense.gov/News/Transcripts/Transcript/Article/3845394/assistant-secretary-of-defense-for-sustainment-christopher-j-lowman-and-deputy/>.

15) Emma Chanlett-Avery and Caitlin Campbell, *U.S. Defense Infrastructure in the Indo-Pacific* (CRS Report R47589, Washington, DC: Congressional Research Service, June 6, 2023).

16) Derek Eaton, Timothy Bonds, and Jennifer Moroney, *Sustaining U.S. Army Operations in the Indo-Pacific* (Santa Monica, CA: RAND Arroyo Center, RAND Corporation, 2025).

17) U.S. Department of Defense, *National Defense Industrial Strategy* (Washington, DC: Department of Defense, January 2024). <https://www.defense.gov/News/Releases/Release/Article/3643326/dod-releases-first-ever-national-defense-industrial-strategy/>

18) Carlos Del Toro, “Secretary of the Navy Carlos Del Toro Delivers Remarks at Harvard Kennedy School,” *U.S. Navy*, October 3, 2023, <https://www.navy.mil/Press-Office/Speeches/display-speech/Article/3538420/secnav-delivers-remarks-at-harvard-kennedy-school/>

which would “authorize an exception to the prohibition on the construction of naval vessels in foreign shipyards” by allowing the Navy to construct vessels “in a foreign shipyard if the shipyard is located in a NATO member country or in an Indo-Pacific country with which the U.S. has a current mutual defense agreement” and “the cost is cheaper in such shipyard than it would otherwise be in a domestic shipyard.”¹⁹⁾

However, this industrial strategic logic confronts systematic domestic resistance rooted in the structure of American defense contracting. United States Government Accountability Office (GAO) analyses indicate that roughly seventy percent of a weapon system’s total life-cycle expenses stem from sustainment activities, and that maintenance and support services represent one of the most reliable sources of long-term revenue for defense contractors.²⁰⁾ External industry analysts note that maintenance and aftermarket support constitute a particularly profitable segment of the defense industry because contractors can sole-source spare parts at negotiated prices, charge for upgrades, and thereby create a form of vendor lock that gives suppliers significant pricing power.²¹⁾

This creates a structural contradiction: the same capacity constraints that make South Korean MRO cooperation strategically attractive also make it economically threatening to established contractors. The Department of Defense’s own *Contract Finance Study Report* from April 2023 shows that defense contractor operating margins rose from the mid-single digits to the low double digits over two decades,²²⁾

19) U.S. Congress. “S. 406 — Ensuring Naval Readiness Act.” 119th Cong., 1st Sess., introduced January 24, 2025. Library of Congress, Congress.gov. Accessed November 10, 2025. <https://www.congress.gov/bill/119th-congress/senate-bill/406>

20) United States Government Accountability Office (GAO), *Weapon System Sustainment: DOD Identified Operating and Support Cost Growth but Needs to Improve the Consistency and Completeness of Information to Congress*, GAO-24-107378 (Washington, D.C.: Government Accountability Office, 2024), 4, <https://www.gao.gov/assets/gao-24-107378.pdf>

21) Umbrex, “*How the Defense Contractor Industry Works*,” accessed November 10, 2025, <https://umbrex.com/resources/how-industries-work/aerospace-defense/how-the-defense-contractor-s-manufacturing-industry-works/>.

22) Department of Defense, *Contract Finance Study* (Washington, D.C.: Office of the Under Secretary of Defense for Acquisition and Sustainment Defense Pricing and Contracting, April 2023), 21, <https://www.acq.osd.mil/asda/dpc/pcf/docs/finance-study/FINAL%20-%20Defense%20Contract%20Finance%20Study%20Report%204.6.23.pdf>.

and external analyses increasingly identify sustainment and aftermarket services as major contributors to margin stability and growth.²³⁾ In this sense, domestic commercial incentives undercut strategic objectives, as the U.S. defense industrial base’s interest in sustainment revenue could serve as a political-economic damper on conversations toward deeper defense industrial cooperation. These tensions suggest that industrial interests, not only strategic logic, shape where and how allied sustainment cooperation advances—a pattern classic to political-economy analysis of defense industries.

The U.S. regulatory framework compounds these challenges. Defense maintenance requires compliance with the International Traffic in Arms Regulations (ITAR), which define sustainment activities and set limits on cross-border repair or overhaul.²²⁾ Under ITAR (C.F.R. §§ 120.45, 123.4, 124.3), allied maintenance work may include inspection or repair but generally excludes performance-enhancing modifications—effectively shaping the scope of allied MRO collaboration.²⁴⁾

The United States requires security clearances for personnel and facilities involved in maintenance or overhaul of classified systems, with additional safeguarding and facility-control measures to protect sensitive information.²⁵⁾ Under the National Industrial Security Program, allied MRO providers performing sustainment or overhaul work on U.S. defense systems that involve classified information must obtain facility clearances, designate vetted personnel, and implement compliance programs aligned with U.S. standards for classified work.²⁶⁾ In practice, these legal obligations

23) McKinsey & Company, “How Aerospace and Defense Players Can Win in Aftermarket Services,” *McKinsey & Company*, April 2022, 2–3, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/how-aerospace-and-defense-players-can-win-in-aftermarket-services>.

24) U.S. Department of State, *International Traffic in Arms Regulations*, 22 C.F.R. §§120.45, 123.4, and 124.3 (Washington, D.C.: U.S. Government Publishing Office, current through 2025), <https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M>.

25) Defense Counterintelligence and Security Agency. “Facility Clearances (FCL).” Washington, DC. Accessed November 10, 2025. <https://www.dcsa.mil/FCL/Maintaining-Personnel-Security-Clearances/>.

26) U.S. Code of Federal Regulations. Title 32, Section 117.19. *National Industrial Security Program Operating Manual (NISPOM)*. Washington, DC: Government Publishing Office. U.S. Department of Defense. *Instructions for DD Form 254*. Washington, DC. Accessed November 10, 2025. <https://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd0254-Inst.pdf>.

can add steps that reduce some of the cost and efficiency advantages allies typically achieve through co-located commercial and dual-use manufacturing.

The logic of expanded allied industrial integration appears increasingly strained as alliance management and defense-industrial coordination come under renewed political and strategic scrutiny. Debates inside Washington about prioritizing homeland and Western Hemisphere defense over Indo-Pacific commitments have intensified, raising questions about the future demand for forward sustainment.²⁷⁾ Current debates in Washington's strategic community over whether the United States can sustain a multi-theater defense posture further challenge the rationale for South Korean MRO cooperation, as growing voices call for re-centering U.S. focus on the Western Hemisphere and continental defense.²⁸⁾ Alternatively, a U.S. rebalance toward the Americas—without a full retrenchment from Asia—could bolster the rationale for relying on key regional allies such as South Korea to maintain forward sustainment capacity.

For South Korean MRO cooperation, this strategic reorientation creates particularly acute complications. The original operational case—Pacific theater proximity and Chinese capacity competition—loses urgency when Pentagon priorities shift toward Latin America and homeland defense. South Korean investments in U.S.-oriented MRO capabilities could become stranded assets if strategic priorities fundamentally change. Yet this moment of uncertainty also underscores the analytical core of alliance industrial policy: that cooperation in areas like MRO is not simply a function of defense logistics, but a test of how far the alliance's industrial and strategic integration can adapt to shifting geopolitical logics.

27) Carla Babb, "New Pentagon Strategy to Focus on Homeland, Western Hemisphere," *Defense News*, September 25, 2025, <https://www.defensenews.com/pentagon/2025/09/25/new-pentagon-strategy-to-focus-on-homeland-western-hemisphere/>

28) Meghann Myers, "New National Security Strategy Could Redefine Homeland Defense, Experts Say," *Defense One*, October 23, 2025, <https://www.defenseone.com/policy/2025/10/new-national-security-strategy-could-redefine-homeland-defense-experts/409024/>

3. The ROK Perspective: MRO as Alliance Upgrading Strategy

Where Washington views MRO as capacity supplementation, Seoul sees it as industrial upgrading within the alliance framework—a proactive, not reactive, strategy. Whereas the United States seeks to leverage allied industrial capacity to address readiness shortfalls while maintaining strategic control, South Korean policymakers treat MRO collaboration as a deliberate form of alliance industrial policy—a mechanism for economic upgrading and industrial integration within the alliance framework. Many government officials and alliance experts view current MRO contracts not as end goals but as strategic investments that reposition South Korea from a dependent security partner into a co-producing industrial and technological ally.²⁹⁾

South Korea's MRO cooperation builds on clear comparative advantages, especially in naval systems where its world-class shipbuilding sector enables partnership rather than subordination. The ROK government's goal to develop medium-sized shipyards for U.S. Navy MRO work has now taken shape through the November 2025 partnership between Huntington Ingalls Industries and HD Hyundai, expanding U.S.-Korea shipbuilding and maintenance cooperation.³⁰⁾ South Korean officials have highlighted K Shipbuilding, HJ Heavy Industries, and HD Hyundai Gunsan as candidate shipyards for U.S. Navy MRO operations, and the new partnership advances that agenda.³¹⁾ The initiative envisions starting with maintenance contracts and later expanding to shipbuilding once U.S. legal barriers ease—a sequencing that illustrates South Korea's stepwise approach to industrial policy, using MRO as a measured step toward broader defense industrial participation within the alliance.

29) Author notes, Seoul and Daejeon, September 8–12, 2025.

30) Wilson, Alex. "Largest Shipbuilders in US, South Korea Agree to 'Deeper Collaboration.'" *Stars and Stripes*, October 29, 2025. Accessed November 10, 2025. https://www.stripes.com/theaters/asia_pacific/2025-10-29/shipbuilding-military-commercial-south-korea-19583434.html

31) Kim Nam-hui and Yi In-a. "Han-Mi hyeopnyeok jeonyong joseonso huboro HJ Jung·Keijoseon georon" [HJ Heavy Industries and K Shipbuilding Mentioned as Candidates for Korea-U.S. Cooperation-Exclusive Shipyard]. *Biz Chosun*, August 11, 2025. <https://biz.chosun.com/industry/company/2025/08/11/XCNCWKPYBPF5FMIUSHKPQ5IEEQ/>

At the corporate level, South Korean defense conglomerates carry this strategy forward in practice. HD Hyundai's securing of the first major U.S. Navy MRO contract for the USNS Alan Shepard in August 2025,³²⁾ and Hanwha Ocean's completion of work on the USNS Charles Drew and Wally Schirra,³³⁾ demonstrate how firm-level actions advance national objectives. While South Korean firms also pursue aerospace and ground-system sustainment—such as the ROKAF F-35 MRO depot³⁴⁾ and Hanwha's helicopter overhaul projects³⁵⁾—these remain well-positioned within defense industrial priorities, where shipbuilding excellence provides market entry and may contribute to shaping alliance industrial interdependence, highlighting potential influence rather than asserting definitive leverage.

Recent U.S. legislative changes have further reinforced these prospects. The Ensuring Naval Readiness Act seeks to address “the critical shortfall in [U.S.] naval forces”³⁶⁾ and cites the Navy's force-structure goal of reaching a 355-ship fleet.³⁷⁾ To meet these goals, the proposed legislation underscores the U.S. need for expanded maintenance capacity. The legislation marks the first significant revision to the Byrnes-Tollefson Amendment since 1965, signaling the potential end of six decades of protectionist restrictions and a turning point for alliance industrial integration. Markets have recognized the opportunity: shares in HD Hyundai Heavy Industries

32) Kan, Hyeong-woo. “HD Hyundai Heavy Industries Secures First U.S. Navy MRO Contract for USNS Alan Shepard (T-AKE 3).” *The Korea Herald*, August 6, 2025. <https://www.koreaherald.com/article/10548288>

33) Fontana, Grady T. “USNS Wally Schirra Completes Major Maintenance at South Korean Shipyard.” *U.S. Navy Press Release*, March 13, 2025. <https://www.navy.mil/Press-Office/News-Stories/Article/4118860/usns-wally-schirra-completes-major-maintenance-at-south-korean-shipyard/>

34) Kim, Minseok. “South Korea To Establish F-35 Maintenance Depot By 2027.” *Aviation Week*, April 18, 2024. <https://aviationweek.com/mro/aircraft-propulsion/south-korea-establish-f-35-maintenance-depot-2027>

35) Yi Hyeon-il. “Hanhwaeoro, Mi yukgun Chinuk helgi enjin jeongbisaneop matneunda” [Hanwha Aero to Oversee U.S. Army Chinook Helicopter Engine Maintenance Project]. *Hanguk Gyeongje*, July 22, 2025. <https://www.hankyung.com/article/202507224834i>.

36) Senator Mike Lee, “Utah's Senators Introduce Bills for Navy and Coast Guard Readiness: Ensuring Naval Readiness Act,” February 12, 2025, <https://www.lee.senate.gov/2025/2/utah-s-senators-introduce-bills-for-navy-and-coast-guard-readiness>.

37) Ronald O'Rourke, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, CRS Report RL32665 (Washington, D.C.: Congressional Research Service, March 31, 2025), <https://www.congress.gov/crs-product/RL32665>.

and Hanwha Ocean rose more than 15 percent each following the bill's introduction.³⁸⁾ South Korean shipbuilders are positioning themselves to meet this demand in what analysts describe as a U.S. \$61.38 billion naval vessel MRO market,³⁹⁾ where industry commentary suggests profit margins for MRO work could be two to four times higher than for new-vessel construction.⁴⁰⁾ These developments matter not only as commercial opportunities but as indicators of how regulatory change in Washington expands the scope for allied industrial participation.

Together, these dynamics suggest Seoul's pursuit of MRO partnerships functions as a vehicle for alliance expansion and restructuring—transforming routine maintenance cooperation into a strategic platform for industrial policy coordination and deeper economic integration within the ROK–U.S. alliance.

South Korea's turn toward alliance-based MRO cooperation cannot be understood in isolation from its shifting strategic environment, which introduces new pressures and uncertainties that shape how industrial coordination is pursued and evaluated—paralleling the way U.S. strategic integration faces potential political and operational scrutiny under the second Trump administration. Over the past decade, broader geopolitical and economic changes have reshaped Seoul's calculus, redefining how it balances industrial development with alliance commitments. South Korean MRO expansion unfolds within a transformed strategic context that mirrors the shifts driving U.S. policy. The combination of U.S.–China competition,⁴¹⁾ pandemic-era supply chain disruptions, and tightening technology export controls

38) Lee, Jae-Lim. "Shipbuilding Stocks Surge to Year High as U.S. Considers Outsourcing Its Fleet." Korea JoongAng Daily, February 12, 2025. <https://koreajoongangdaily.joins.com/news/2025-02-12/business/industry/Shipbuilding-stocks-surge-to-year-high-as-US-considers-outsourcing-its-fleet/2240785>

39) Mordor Intelligence, *Naval Vessels Maintenance, Repair, and Overhaul Market - Growth, Trends, and Forecasts (2025-2030)* (2025), <https://www.mordorintelligence.com/industry-reports/naval-vessels-maintenance-repair-and-overhaul-market>.

40) McKinsey & Company, "Rising Tide: How Private Equity Can Lift the Shipbuilding Industry," McKinsey Insights, 2024, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/rising-tide-how-private-equity-can-lift-the-shipbuilding-industry>

41) Evans J. R. Revere et al., "How Will South Korea Navigate US-China Competition in 2025?," Brookings Institution, January 22, 2025, <https://www.brookings.edu/articles/how-will-south-korea-navigate-us-china-competition-in-2025/>.

has made the *anmi gyeongjung* (security with the U.S., economy with China) paradigm increasingly untenable. South Korea's dual-track strategy from the 2000s and early 2010s—hedging between economic opportunity in China and security dependence on the United States—no longer fits a world where economic and security domains are so closely intertwined.

In this changed environment, Seoul has embraced moves toward an “economic security alliance” approach, aligning industrial resilience with national security objectives. Post-COVID disruptions, and especially after the 2017 THAAD crisis, South Korean policymakers and public alike have grown more willing to view alliance-based industrial cooperation as a stabilizing alternative to Chinese economic coercion.⁴²⁾ MRO cooperation thus represents not only an industrial opportunity but also a manifestation of this broader strategic reorientation—anchoring South Korean industry in trusted allied networks while reinforcing the economic foundations of alliance durability.

As an essential case within this broader realignment, naval MRO cooperation represents a tangible pathway for translating economic security principles into alliance operations practice. Naval MRO cooperation offers distinctive advantages that make it the centerpiece of South Korea's alliance industrial strategy. While MRO and shipbuilding are distinct activities—one focused on sustainment, the other on production—their underlying industrial capabilities overlap in essential ways. Shipbuilding experience confers workforce skills, design expertise, infrastructure, and logistical networks that directly enhance a shipyard's ability to perform high-quality maintenance and repair. South Korea's comparative advantage in shipbuilding thus serves as a strong proxy for its competitiveness in MRO, particularly in large-vessel repair and modernization. In this sense, the two sectors form interdependent pillars of maritime industrial capacity rather than substitutes.

The scale of unmet U.S. Navy maintenance demand underscores the potential value

42) Gwang-seop Song, “Ban jung jeongse simhwa...hanguk-in 83% ‘gyeongje-neun yeoksi miguk’ [Anti-China Sentiment Intensifies...83% of Koreans Say ‘For Economy, It’s Still the US’],” Mael Business News Korea, November 7, 2023, <https://www.mk.co.kr/news/world/10868600>.

of South Korean participation. A GAO assessment found that only about 40 percent of U.S. Navy ships receive timely maintenance due to aging facilities and workforce shortages, leaving major assets like amphibious warships and submarines idle.⁴³⁾ South Korean yards, by contrast, have demonstrated their capacity through steady MRO work on smaller U.S. vessels and the successful overhaul of a 40,000-ton support ship in Geoje. Analysts estimate that roughly \$4.3 billion in MRO contracts, particularly for the Seventh Fleet, could be open to South Korean firms, provided they meet Federal Acquisition Regulation (FAR), Defense Federal Acquisition Regulation Supplement (DFARS), and facility-clearance requirements.⁴⁴⁾

The MASGA initiative, which identifies naval shipbuilding as a critical U.S. national priority, provides a political and market opening through which South Korea can position its naval MRO capabilities. From this vantage point, Seoul views its contribution less about offsetting the U.S.–China production gap and more about offering flexible, allied sustainment capacity that strengthens operational resilience across the Indo-Pacific.⁴⁵⁾ This contrast with the U.S. perspective underscores how both sides interpret the same strategic dynamic differently: Washington focuses on operational constraints, while Seoul emphasizes industrial opportunity. But for now, the two perspectives are complementary, highlighting both the demand and supply sides of alliance industrial policy.

Yet regulatory frictions persist. The shipyard co-location efficiencies that underpin the competitive advantages of South Korea’s naval-commercial model—shared facilities, integrated workforce, and joint technology platforms—face potential challenges from U.S. security requirements mandating segregated defense operations. To maintain compliance, South Korean firms must create ITAR-compliant facilities,

43) Grady, John. “GAO Tells Senate Panel U.S. Shipyards Are Major Readiness Concern.” USNI News, 7 May 2024. <https://news.usni.org/2024/05/07/gao-tells-senate-panel-u-s-shipyards-are-major-readiness-concern>

44) Namgung Seon-hui. “Mi haegun jeollyeok ganghwa choejeok pateuneoro tteoreun Hanguk joseoneop” [Korean Shipbuilding Industry Emerging as the Optimal Partner for Strengthening U.S. Naval Power]. *Maeil Gyeongje*, May 26, 2025. <https://www.mk.co.kr/news/economy/11326526>

45) Author notes, Seoul and Daejeon, September 8–12, 2025.

separate data systems, and retrain workforces, eroding some of the cost and efficiency advantages that first made South Korean partnerships attractive.⁴⁶⁾ These implementation constraints reveal how industrial cooperation simultaneously deepens alliance interdependence and exposes structural frictions.

Taken together, South Korea's MRO strategy demonstrates how defense maintenance and sustainment activities have evolved into a central pillar of alliance industrial policy. By leveraging comparative advantage in naval systems, aligning industrial and geopolitical priorities, and managing external dependencies, Seoul transforms routine operational cooperation into a platform for economic upgrading and strategic alliance transformation.

4. The Political Economy of Alliance Industrial Integration

The divergent logics underpinning U.S. and South Korean approaches to MRO cooperation expose how distributional conflicts and institutional incentives—core concerns of political economy—shape the limits of industrial integration. MRO thus emerges not merely as operational logistics but as a site where industrial and alliance politics intersect. Its trajectory reflects three interlocking political-economic tensions: (1) expectations mismatch; (2) value capture and regulation; and (3) strategic reorientation risk, which together explain both the limits and persistence of alliance industrial integration.

At the heart of the political economy of MRO cooperation lies a potential expectations mismatch. For Washington, allied MRO is a capacity supplement—a pragmatic tool to alleviate bottlenecks and extend force readiness without eroding domestic control. For Seoul, MRO is a platform for upgrading—a steppingstone toward defense-industrial parity and greater strategic voice. The tension between these logics—reliability without dependence versus integration without

46) J. James Kim, "Waypoints and Course Adjustments: Towards Naval Shipbuilding Cooperation with South Korea." *Stimson Center*, April 9, 2025. <https://www.stimson.org/2025/waypoints-and-course-adjustments-towards-naval-shipbuilding-cooperation-with-south-korea/>.

subordination—explains both the promise and the limits of current cooperation. It defines where projects succeed (mutual benefit under shared urgency) and where they stall (when domestic constituencies perceive a threat to rents or autonomy).

As discussed in detail above, defense sustainment is the most profitable segment of the U.S. military-industrial economy.⁴⁷⁾ Aftermarket maintenance and support services generate stable margins and long-term revenue streams for prime contractors. That profitability gives industry and congressional stakeholders structural incentives to resist offshoring even when operational logic favors allied cooperation. South Korean shipyards offer cost and efficiency gains, but their entry into U.S. sustainment markets redistributes those rents. Regulation shapes how these interests are mediated: ITAR classifications define permissible repairs, facility-clearance requirements govern participation, and supply-chain transparency rules impose transaction costs that favor incumbents.⁴⁸⁾ In practice, regulatory frameworks can shape how these interests are mediated and whose participation they enable—illustrating how compliance mechanisms, while grounded in security priorities, also influence the distribution of industrial value within the alliance.

The industrial time horizons underlying MRO cooperation extend decades; political and strategic time horizons do not. South Korea's investments in U.S.-oriented facilities, workforce training, and compliance infrastructure are premised on enduring Indo-Pacific demand and U.S. dependence on allied capacity. Yet if Washington's strategic posture shifts toward homeland and Western Hemisphere priorities—as current Pentagon debates suggest—the operational rationale for forward MRO diminishes. South Korean firms could find themselves with stranded assets and declining political protection, while U.S. unions and contractors revert to protectionist defaults. This asymmetrical logic—industrial persistence versus strategic volatility—represents a fundamental vulnerability of alliance industrial

47) For example, McKinsey & Company, “Rising Tide: How Private Equity Can Lift the Shipbuilding Industry,” McKinsey Insights, 2024, <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/rising-tide-how-private-equity-can-lift-the-shipbuilding-industry>.

48) U.S. Department of State, *International Traffic in Arms Regulations*, 22 C.F.R. §§120.45, 123.4, and 124.3 (Washington, D.C.: U.S. Government Publishing Office, current through 2025), <https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M>.

policy.

Even constrained cooperation produces lasting effects. MRO generates material interdependence that can outlive political cycles. Investments in facilities, security clearances, and shared standards create switching costs that make disengagement expensive. For South Korea, these sunk costs yield bargaining leverage and reputational capital; for the United States, they anchor forward presence in tangible industrial ties. In this sense, MRO cooperation reflects the industrialization of alliance politics: not just coordination through treaties or commands, but through factories, standards, and the everyday logistics of sustainment. It institutionalizes the alliance in material form.

Execution exposes how political economy constrains strategic ambition. U.S. multi-agency governance—Defense, State, Commerce—creates overlapping jurisdictions and inconsistent enforcement, while South Korea’s centralized industrial policy apparatus must navigate these fragmented gatekeepers. Differing security-classification systems complicate personnel clearances, and U.S. supply-chain transparency rules clash with South Korea’s integrated commercial-defense production model. These recurring frictions reveal a deeper pattern: alliance industrial policy evolves less through grand design than through the frictions of compliance—an adaptive process that embeds industrial integration in bureaucratic routine.

5. Conclusion

The evolution of ROK-U.S. MRO cooperation reveals how industrial coordination has become the new terrain of alliance management—where political-economic incentives determine strategic outcomes. Routine maintenance agreements now function as instruments of statecraft, determining not only readiness but also who controls technology, captures revenue, and sets the rules of cross-border production. The alliance’s industrial base is, in this sense, its strategic base.

Three core insights emerge. First, operational cooperation and industrial policy have

converged: what advances readiness also advances national competitiveness. Second, alliances today are sustained not only by shared threats or values but by shared production and maintenance systems—forms of material interdependence that can either stabilize or strain partnerships. Third, the success of alliance industrial policy depends on managing political economy asymmetries as much as strategic ones: balancing domestic rent preservation with credible upgrading pathways for partners.

Strategic uncertainty magnifies these tensions. If U.S. defense priorities pivot away from the Indo-Pacific, the rationale for South Korean-based sustainment weakens even as China's industrial scale advantage persists. The mismatch between industrial and political time horizons means that long-term investments can be undone by short-term reorientation. In that volatility lies the true test of alliance resilience.

Ultimately, MRO cooperation illustrates that the future of the ROK–U.S. alliance will be decided less by summit communiqués than by the economic geography of production and repair. As alliances become defined by the geography of production and sustainment, the political economy of where defense value is created will increasingly determine the balance of influence within them. Whether in Geoje or Pascagoula, the question is no longer who defends whom, but who builds, maintains, and profits from the machinery of defense—the answer that will define the future of the alliance.

III. Japan's MRO CAPABILITIES AND INTERNATIONAL COOPERATION

Dylan Motin

1. Japan's MRO Capabilities: Geographic Advantages and Industrial Outlook

Japan is one of the United States' most loyal and most capable allies. The country, thanks to its geographic location close to the Asian mainland, its robust industrial base, and its increasingly active security posture, has unsurprisingly emerged as a key node in the MRO infrastructure for U.S. forward forces. In order to extract insights for South Korea's ambitions in support of U.S. MRO efforts and potential trilateral cooperation, this chapter examines the structure, advantages, and challenges of Japan's MRO capabilities and its evolving cooperation with the United States.

Since the end of World War II, Japan's and the United States' threat perception has generally aligned closely. During the Cold War, both saw the Soviet Union as their primary threat, and now, both consider China their most imminent challenge. Also, both have the Taiwanese issue as the pacing contingency. Despite the legacy of World War II, the rapid postwar alignment against the Soviet Union led to unprecedented defense cooperation. Already in 1947, the Navy established the 'Ship Repair Department,' Fleet Activities in Yokosuka. The outbreak of the Korean War in June 1950 accelerated U.S.-Japanese MRO cooperation, a mere five years after the end of World War II, as Japan served as the UN Forces' key rear-area logistics base. Among U.S. allies, Japan is unique because the Seventh Fleet is permanently homeported there. Yokosuka hosts the only forward-deployed U.S. carrier strike group in the world. No other ally hosts a permanently assigned U.S. aircraft carrier. In that sense, Japan is the strategic anchor of the U.S. maritime posture in the Western Pacific, and the United States can hardly conduct major Indo-Pacific operations without Japan. Thereby, U.S.-Japan defense cooperation is deeper and more institutionalized than almost any other U.S. alliance.

Geography renders MRO cooperation with Japan particularly attractive for U.S. planners. The country's offshore position, located close to the Asian mainland, puts it near key flashpoints, especially the Taiwan Strait and the Korean Peninsula.

Moreover, its insularity isolates it from land threats, making it a relatively safe shelter for U.S. ships. The Japanese archipelago offers more strategic depth and dispersal opportunities than small Pacific islands like Guam. Central Japan also provides protection to American forces due to its distance from Chinese and Russian shores, thereby reducing the threat from short-range weapons and offering additional warning time in the event of an attack. In that sense, the Bay of Tokyo is especially attractive: it provides some protection and opens onto the Pacific Ocean while being situated in the economic heart of the country.

This makes Japan uniquely suited to support and service forward-deployed American forces, reducing the time and risk involved in trans-Pacific logistical operations. This proximity also supports rapid emergency repairs for damaged ships. In future conflict scenarios, such as the all-consuming Taiwan contingency, the ability to repair American ships, aircraft, and other platforms near the theater will be critical. Without local MRO capacity, U.S. forces would face longer downtime and reduced operational tempo, thus losing even more edge to China.

Japan's shipbuilding prowess compounds the importance of its geography. The maritime industry accounts for approximately one percent of Japan's GDP. The country ranks third after China and South Korea in the shipbuilding market, accounting for roughly 10 percent of the global market. Tokyo can boast a mature industrial base with deep experience in naval and aerospace engineering and precision manufacturing. Japan's shipbuilding and ship repair sector is highly advanced, with around 20 major companies (*Table 1*). Companies like Mitsubishi Heavy Industries (MHI), Kawasaki Heavy Industries, and IHI Corporation have decades of experience maintaining both Japanese and U.S. systems. Of note, Japan has a robust capability for floating dry-dock MRO at several commercial shipyards and military naval facilities; floating docks are essential for MRO as they enable the convenient and cost-effective lifting of vessels out of the water for hull inspections, propeller repairs, painting, and major overhauls.

Looking forward, Japan is advancing in next-generation MRO technologies and practices. Software-defined manufacturing, 3D printing, and automation, which are

now taking root throughout Japan's industries, are key enablers for future high-velocity sustainment.⁴⁹⁾ These technologies could dramatically reduce the time required for part replacement and repairs, especially in contested logistics environments. Japan's robust civilian manufacturing sector, especially in robotics, electronics, and precision tooling, also provides a foundation for expanding military MRO capabilities. The integration of digital twin technology (virtual modelling of real machines, updated with live data to predict problems before they happen) and predictive maintenance software across air and sea platforms promises to cut unscheduled failures and further enhance the resilience and responsiveness of Japan-based MRO operations.⁵⁰⁾ Indeed, MHI and other Japanese shipbuilders are already working to integrate such technologies into their operations.⁵¹⁾

49) AviTrader, "Japan Airlines to Modernise Aircraft Maintenance with IFS Cloud," June 3, 2025, <https://avitrader.com/2025/06/03/japan-airlines-to-modernise-aircraft-maintenance-with-ifs-cloud/>; Henry Canaday, "Japanese Carriers Make Predictive Maintenance Progress," *Aviation Week Network*, April 4, 2023, <https://aviationweek.com/mro/emerging-technologies/japanese-carriers-make-predictive-maintenance-progress>; Masahiko Fujikubo et al., "A Digital Twin for Ship Structures — R&D Project in Japan," *Data-Centric Engineering* 5 (2024), <https://doi.org/10.1017/dce.2024.3>; Mitsubishi Heavy Industries, "The Heart of a Rocket," *Spectra*, July 14, 2020, <https://spectra.mhi.com/the-heart-of-a-rocket>; Kiuko Notoya, "How Japan Built a 3D-Printed Train Station in 6 Hours," *New York Times*, April 8, 2025, <https://www.nytimes.com/2025/04/08/world/asia/japan-3d-station.html>; Rob O'Dwyer, "Japanese Firms Collaborate on Digital Twin Data Sharing Project," *Smart Maritime Network*, May 22, 2024, <https://smartmaritimenetwork.com/2024/05/22/japanese-firms-collaborate-on-digital-twin-data-sharing-project/>.

50) Phil Goldstein, "Navy Explores Digital Twin Tech to Enhance Maintenance, Innovation," *FedTech*, June 18, 2020, <https://fedtechmagazine.com/article/2020/06/navy-explores-digital-twin-tech-enhance-maintenance-innovation?>; Ben Rosenzweig, "If It Ain't Broke, When Do We Fix It?" *Proceedings* 147, no. 6 (2021), <https://www.usni.org/magazines/proceedings/2021/june/if-it-aint-broke-when-do-we-fix-it?>.

51) ClassNK, "Cross-Industry Collaboration Launches to Accelerate Digital Twins Uptake in Shipping," press release, May 22, 2024, https://www.classnk.or.jp/hp/en/hp_pressrelease.aspx?id=11482&layout=1&; Shunsaku Matsumoto, Tadashi Sugimura, Shin Terada, Satoshi Miyazaki, Hidekazu Ishii, and Keisuke Tsukahara, "Development of Asset Integrity Management System Using Digital Twin for Large Floating Structures," *Mitsubishi Heavy Industries Technical Review* 61 no. 2 (2024), <https://www.mhi.com/technology/review/abstract-61-2-140?>.

Table 1. Major Japanese Companies' Shipbuilding and Ship Repairing Capabilities, 2024

Major companies	20
Distinct shipyard facilities	48
Total available docks	121
Repair docks	43
Floating docks	9

Source: Japan Ship Exporters' Association, "Shipbuilding and Marine Engineering in Japan 2024," <https://www.jsea.or.jp/en/publications/sameij/>.

Note: This table does not include shipyards possessed by smaller companies.

If it were necessary to scale up MRO services for U.S. ships quickly, the Japan Maritime Self-Defense Force (JMSDF) could additionally offer its in-house capabilities. The JMSDF can provide extensive dry dock facilities, piers, and workshops at its key naval bases, such as Yokosuka, Sasebo, Maizuru, and Kure Naval Bases, and all can handle large ships. These sites support regional deployments and provide redundancy in case of congestion at larger bases. A weakness remains, however. The JMSDF maintains only fixed dry docks, and there is no public evidence that it possesses in-house large auxiliary floating dry docks like those historically used by the Imperial Japanese Navy during World War II. It means that in case of emergency and wartime, the JMSDF can only provide on-site MRO to damaged American capital ships through commercial vessels.

The strategic rationale for greater MRO integration with Tokyo is clear. U.S. vessels based in Japan are often sent back to the United States for major overhauls, which frequently take months or even years to complete. Meanwhile, ships receiving MRO in Japanese ports could remain deployed in the region for more extended periods. Moreover, many in Washington hope that Japan's formidable shipbuilding capabilities can help the United States overcome its own shipbuilding bottlenecks and increase the production of warships to keep pace with China.⁵²⁾

52) Gabriel Dominguez, "U.S. Secretary of the Navy Weighs 'Dual-Use' Shipbuilding with Japan," *Japan Times*, April 28, 2025, <https://www.japantimes.co.jp/news/2025/04/28/japan/politics/japan-us-shipbuilding/>; Miyeon Oh and Michael Cecire, "Why the United States, South Korea, and Japan Must Cooperate on Shipbuilding," *RAND*, May 6, 2025, <https://www.rand.org/pubs/c>

2. U.S.-Japan MRO Cooperation

Since at least the Korean War, Japan has been an integral part of the U.S. sustainment network in the region, particularly under the umbrella of bilateral security agreements. An agreement signed in the 1970s allowed MRO work for Japanese ships to be performed at the two American repair facilities (Yokosuka and Sasebo bases) alongside U.S. ships.⁵³⁾ The Japan-U.S. Acquisition & Cross-Servicing Agreement, signed in 1996 and revised several times since, allows Japanese forces to provide logistical support, supplies (such as ammunition), and services (including repair and maintenance services).⁵⁴⁾ But integrated naval MRO cooperation took off only recently.

Japanese-American MRO cooperation received significant political impetus under the Biden administration. Then U.S. ambassador to Japan Rahm Emanuel pushed for the MRO for U.S. Navy ships to be done at Japanese commercial shipyards, underlining in 2023 that “whether Washington is focused on maintaining our ships or on building overall naval strength, Japan is key to our regional deterrence strategy.”⁵⁵⁾ Japan is now a central piece of the Regional Sustainment Framework announced in 2024 to build a network of dispersed, faster, and more resilient forward MRO capabilities, alongside South Korea, Australia, Singapore, and the Philippines. Recent defense cooperation and industrial base discussions between the U.S. and Japan have included expanding ship repair capacity in Japan to mitigate fleet strain and shipyard backlogs in the United States.

The U.S. Navy’s Seventh Fleet (headquartered in Yokosuka) operates numerous vessels in the Western Pacific. Routine and maintenance, repairs, and overhauls for these ships are frequently performed at U.S. Fleet Activities Yokosuka (est. 1947,

ommentary/2025/05/why-the-united-states-south-korea-and-japan-must-cooperate.html.

53) U.S. Navy, “CFAY Port Ops Supports Dry Dock Evolution for JMSDF Ship Enshu,” July 3, 2019, <https://www.navy.mil/Press-Office/Press-Releases/display-pressreleases/Article/2238315/cfay-port-ops-supports-dry-dock-evolution-for-jmsdf-ship-enshu/>.

54) Japanese Ministry of Defense, “Defense of Japan 2020,” 312-313, https://www.mod.go.jp/en/public/w_paper/wp_2020.html.

55) Quoted in Moyuru Tanaka, “Navigating the Competitive Seas: U.S.-Japan Future Collaboration in the Shipbuilding Industry,” *CSIS*, August 13, 2024, <https://www.csis.org/analysis/navigating-competitive-seas>.

the Navy's largest overseas maintenance facility, located in Tokyo Bay) and Sasebo (est. 1984, on the island of Kyūshū). Both facilities form the Ship Repair Facility and Japan Regional Maintenance Center (SRF-JRMC), which is under the responsibility of the Naval Sea Systems Command. Fleet Activities Yokosuka is a major facility equipped with six large graving docks that can accommodate a combined 530,000 tons of displacement, along with numerous workshops, 19 wet berths, and piers, including one specifically designed for aircraft carriers (SRF-JRMC is responsible for the Japan-based USS *Ronald Reagan*). Nevertheless, these two maintenance centers often fail to deliver ships on schedule, accumulating delays. The SRF-JRMC's workforce comprises about 3,000 individuals, including 120 U.S. military members, over 325 U.S. civilian personnel, and approximately 2,500 Japanese workers.⁵⁶⁾

The U.S.-Japan Status of Forces Agreement enables cooperation on logistical and repair operations. Japanese shipyards such as Mitsubishi Heavy Industries and Japan Marine United are now regularly contracted for work on U.S. Navy ships stationed in Japan. These services may include hull and mechanical repairs, propulsion system maintenance, structural modifications, painting and coatings, and sometimes even complex dry-dock overhauls. Japanese contractors are thoroughly vetted and must meet U.S. military standards for quality and security. MHI, JMU, and Sumitomo Heavy Industries (SRF-JRMC's main contractor in the past) have secured Master Ship Repair Agreements. This certification allows private companies to work on Navy vessels.⁵⁷⁾ In January 2024, the U.S. Navy and Japanese shipyards launched a new partnership set to transform naval maintenance capabilities across the Indo-Pacific. The initiative sought to significantly reduce vessel downtime and bolster fleet readiness by conducting comprehensive maintenance, repair, and overhaul operations at Japanese facilities.⁵⁸⁾

56) NAVSEA, "Command Operations," <https://www.navsea.navy.mil/Home/RMC/SRFJRMC/JapanTours/WorkingInJapan/SRFJRMCYokoOperations/>; United States Government Accountability Office, "Navy Ship Maintenance: Actions Needed to Address Maintenance Delays for Surface Ships Based Overseas," Report to Congressional Committees, February 2020, GAO-20-86.

57) Already in 2013 for JMU. Highergov, "Japan Marine United Corporation," <https://www.highergov.com/awardee/japan-marine-united-corporation-10407649/>.

In April 2024, Japanese Prime Minister Fumio Kishida visited Washington, where he met with President Joe Biden. The resulting joint statement outlined a range of initiatives to strengthen defense and security cooperation. Among these was the creation of the Forum on Defense Industrial Cooperation, Acquisition, and Sustainment (DICAS), designed to mobilize both nations' industrial bases to bolster production and sustain long-term readiness. The first DICAS meeting took place in Tokyo in June 2024, and the Ship Repair Working Group, one of DICAS's four working groups, started its work of coordinating efforts among the U.S. Navy, the Japan Maritime Self-Defense Force, and private shipyards. It aims to expand the scope to full-scale repairs, including destroyers, and to standardize systems for greater efficiency.⁵⁹⁾

In late 2024, MHI's shipyards in Yokohama were awarded a contract to overhaul the Lewis B. Puller-class expeditionary sea base USS *Miguel Keith* for \$12 million. Until then, the Navy had only granted Japanese shipyards small projects. However, the ship had no planned visit to the United States in the coming months, and since the project was to last less than six months, the Japanese option was selected. About the same time that the work on the *Keith* was completed in April 2025, newly appointed Secretary of the Navy John Phelan visited shipyards in Japan and South Korea to push the new Trump administration's agenda of reviving and expanding shipbuilding capabilities. This episode represented the first time a Japanese shipyard undertook such a massive overhaul of a U.S. Navy ship. According to Captain Wendel Penetrante, Commander of SRF-JRMC:

The ability to use Mitsubishi Heavy Industry's shipyard to conduct this level of maintenance availability has allowed SRF-JRMC's organic workforce in Yokosuka to focus their efforts on the three other warship maintenance availabilities being conducted simultaneously. We were even able to complete one of those availabilities 3 days early and respond to two unplanned voyage repairs.⁶⁰⁾

58) DSEI Japan, "Japan-US Naval MRO Partnership Opens New Opportunities for Business at DSEI Japan 2025," April 10, 2025, <https://www.dsei-japan.com/news/japan-naval-mro-partnership-opens-new-opportunities-business-dsei-japan-2025>.

59) Tanaka, "Navigating the Competitive Seas."

Another type of Japanese support to U.S. MRO needs is Master Labor Contract (MLC) employees. These are Japanese civilian experts directly employed by the Government of Japan under a formal agreement with U.S. Forces in Japan. At SRF-JRMC Yokosuka, over 80% of the workforce are MLCs, performing the majority of ship repair and overhaul tasks. Thanks to this subsidized labor, using Yokosuka is cheaper than sending U.S. ships back to U.S. yards or using private contractors. Moreover, SRF-JRMC has employed local Japanese contractors for many years; around 80% of the workload is done by the organic workforce, and the rest by outside contractors.⁶¹⁾

In domains adjacent to ship maintenance, cooperation is advancing as well. In ports, ships need to replenish their ammunition stocks. Japan has recently proposed co-production and co-sustainment of advanced missile systems, such as the ship-to-air missile SM-6, aligning with statements from Japanese defense officials promoting mutual industrial support.⁶²⁾ If this initiative bears fruit, American ships undergoing maintenance in Japanese ports could also be loaded with anti-air missiles manufactured in Japan, which would further shorten American logistical chains. In addition, the U.S. Air Force Sustainment Center, under its Global Enterprise Network for Universal Sustainment initiative, is considering establishing a joint maintenance center in Japan to perform repairs on American and Japanese aircraft, thereby eliminating the need for aircraft to cross the Pacific.⁶³⁾ This could one day lead to Navy aircraft being refitted on Japanese soil, further accelerating response times,

60) The Maritime Executive, “Japan’s Mitsubishi Shipyard Completes Largest Overhaul Contract for US Navy,” May 2, 2025, <https://www.maritime-executive.com/article/japan-s-mitsubishi-shipyard-completes-largest-overhaul-contract-for-us-navy>.

61) Randall Baucom, “SRF-JRMC Completes Its Second CVN Hanger Mezzanine Installation,” *DVIDS*, April 21, 2025, <https://www.dvidshub.net/news/496772/srf-jrmc-completes-its-second-cvn-hanger-mezzanine-installation>; NAVSEA, “Command Operations.”

62) Kosuke Takahashi, “Japan Proposes Co-Production of SM-6 Missiles to the U.S.,” *Naval News*, April 3, 2025, <https://www.navalnews.com/naval-news/2025/04/japan-proposes-co-production-of-sm-6-missiles-to-the-u-s/>.

63) Unshin Lee Harpley, “USAF, Japan Look to Share Maintenance on Common Aircraft Closer to the Fight,” *Air & Space Forces Magazine*, March 14, 2025, <https://www.airandspaceforces.com/usaf-japan-share-maintenance-common-aircraft/>. See, also, Cynthia R. Cook et al., *Enabling Forward Sustainment: Japanese Industry’s Potential Role in U.S. Airpower Readiness* (Washington, D.C.: Center for Strategic and International Studies, 2025).

reducing wear and tear, and eliminating the cost of back-and-forth trips across the Pacific.

3. Challenges

Despite this deepening cooperation, five key challenges limit Japan's current and future role in American MRO: U.S. law, China's growing strike capabilities, demographic decline, decreasing commercial shipbuilding, and South Korea's competition.

First, U.S. law remains a key limitation for a larger-scale MRO cooperation. Japanese shipyards are legally prohibited from servicing Navy ships based in American territory. As a general rule, vessels whose homeport is in the U.S. or Guam may not be overhauled, repaired, or maintained in foreign shipyards. Voyage repairs, combat damage fixes, or preventive maintenance on deployed ships might be performed overseas only if the work is limited to 21 days or less. Annually, such overseas maintenance cannot exceed 2% of the homeport's average annual workload. This may be one of the reasons why MRO for American ships is less advanced than for aircraft. Such regulations made sense in earlier times, when domestic shipyard capabilities were plentiful. However, in the current naval industry crisis, they are very hard to justify. Unless U.S. law changes, MRO work in Japan or South Korea is bound to remain limited to a small portion of the Navy's fleet.

Second, whether American ships immobilized in Japanese shipyards, and these Japanese shipyards themselves, are truly safe from enemy attack is doubtful. During the last few decades, China's capabilities to strike at long range have grown in versatility, quantity, and quality.⁶⁴⁾ One wonders how well MRO services in Japan would perform in wartime against an adversary as formidable as Beijing. For instance, bases on Kyūshū open on the East China Sea and face China directly, and would thus likely suffer intense attacks in wartime. To offer a safe MRO environment, South

64) Nicholas D. Anderson and Daryl G. Press, "Access Denied? The Sino-American Contest for Military Primacy in Asia," *International Security* 50, no. 1 (2025): 118-151.

Korea, too, will have to ponder the security of its shipyards.

Third, Japan's demographic decline is a persistent hurdle. The shipbuilding industry, and especially expert manual labor, is already struggling to form and employ enough specialists. The Japanese shipbuilding workforce declined by over 12% in the past five years.⁶⁵ In the future, the intensifying Japanese labor shortage could seriously compromise Tokyo's ability to scale up MRO work for the U.S. Navy, leading to delays. As South Korea also experiences rapid demographic collapse, there is little doubt that Seoul will soon face similar headwinds. Hence, how Japan addresses specialized labor shortages should be of great interest to South Korean industries and planners.

Fourth, the decline of the Japanese shipbuilding industry may end up reducing its MRO capabilities. Japan now receives fewer new orders for commercial ships than a few years ago. As Japan's market share shrinks and the overall orderbook diminishes, industry consolidation follows. Several key shipyards have already exited the commercial market in recent years, and Sumitomo Heavy Industries ceased commercial shipbuilding altogether. This results in a decline in shipyard capacity. Japan had 194 shipbuilding facilities in 2018, and only 178 remained in 2024. Over the long run, and without government attention, this may reflect in the available capacities of private industries to scale up for the military sector. Japan is aware of the issue; it is preparing a \$6.9 billion 'national dockyard' initiative to expand and modernize domestic shipyards to secure the capacity to handle repairs for U.S. Navy vessels. Under the plan, the government would fund the refurbishment or construction of shipyard infrastructure, which it would later transfer to private companies.⁶⁶

65) Mfame, "Japan's Government Leads Effort to Reclaim Global Shipbuilding Leadership," June 24, 2025, <https://mfame.guru/japans-government-leads-effort-to-reclaim-global-shipbuilding-leadership/>.

66) Georgios Georgiou, "Japanese Shipyards Face Declining Market Share amid Full Orderbooks, Consolidation," *Riviera*, April 3, 2025, <https://www.rivieramm.com/news-content-hub/news-content-hub/japanese-shipyards-face-declining-market-share-amid-full-orderbooks-and-consolidation-84374>; Julian Ryall, "Japan Plans US\$6.9 Billion Shipyard Push: For US Trade, Defence Talks Leverage?" *SCMP*, July 2, 2025, <https://www.scmp.com/week-asia/politics/article/3316542/japan-plans-us69-billion-shipyard-push-us-trade-defence-talks-leverage>.

Finally, and this is the topic of this report, there is a sharpening of South Korean concurrence over American MRO contracts. In 2024, Hanwha Ocean won a contract to service the U.S. Navy's replenishment oiler *Yukon*, a job previously assigned to Japanese bases. This has raised concerns in the Japanese shipbuilding sector that its centrality to U.S. logistics could erode. As a shipbuilding industry insider explained: "The fact that the U.S. Navy's 7th Fleet has entrusted all ship MRO work that had been conducted at Japanese bases to South Korea shows a change in the landscape."⁶⁷⁾ While South Korea's growing capabilities add redundancy to the regional MRO network, Japan may lose market shares, thus reducing its long-term appetite for MRO cooperation.

4. Conclusion: What Space for Trilateral Cooperation?

Japan is a natural partner for supporting American MRO efforts. It faces the same threats as the United States, considering China is its most dangerous rival. Its geographical position is both close enough to the Asian mainland to provide a forward base and distant enough to provide some shelter. Tokyo can bring formidable industrial resources to bear. U.S.-Japanese MRO cooperation has become increasingly institutionalized in recent years. Challenges (legal limitations, demographics, commercial shipbuilding decline, and facility security) exist, but are unlikely to put a stop to this trend. Even South Korea's rise as a competitor is probably no definitive shift away from Japan. Secretary of the Navy Carlos Del Toro visited Mitsubishi Heavy Industries in February 2024, before visiting Hanwha Ocean, which was ultimately awarded the contract to maintain the support vessel USNS *Wally Schirra* in August.⁶⁸⁾ This suggests that Japan remains competitive and is still a serious contender for such contracts. For instance, in the near future, experts expect U.S.-Japanese naval MRO to widen to encompass full-fledged repair work on destroyers.⁶⁹⁾ Since intense thinking has been done in Japan since 2024, the MRO

67) Nam-hee Kim, "South Korea, Japan Compete for U.S. Shipbuilding and MRO Contracts," *Chosun Biz*, December 26, 2024, <https://biz.chosun.com/en/en-industry/2024/12/26/JZ5GH5XCHZBATCPC3UJNQV6WD4/>.

68) Kim, "South Korea, Japan Compete."

cooperation seems to have now found its cruising speed.

Building on the comparison, South Korea presents several weaknesses that may limit its attractiveness relative to Japan. Threat perceptions may be misaligned, as Seoul devotes far more attention to North Korea than either Washington or Tokyo. Due to their geographic proximity, South Korean shipyards might be more vulnerable to potential attacks from China or North Korea. Indeed, Beijing now enjoys a clear-cut military superiority in the West Sea (Yellow Sea), and in times of war, docking on the western coastline of South Korea would be unthinkable.⁷⁰ While large U.S. naval forces are based in Japan, the Navy's presence in South Korea is very limited. Thus, there is no 'captive market' for South Korean dockyards. Moreover, South Korea faces similar legal restraints from U.S. regulations on foreign MRO services, and considering the country's abysmal fertility rates, its demographic crisis is likely to worsen dramatically and impact its long-term industrial potential. All in all, South Korea will likely gain market shares from Japan, but it is highly unlikely to replace it. Hence, South Korea should go to great lengths to market itself as a cog in a redundant Indo-Pacific MRO network to offer additional resilience and speed, and allow greater dispersal than relying only on Japan.

This leads to the issue of trilateral cooperation. At the Camp David Summit in 2023, South Korea, Japan, and the United States laid the groundwork for increased trilateral defense cooperation. The Department of War's 2024 Regional Sustainment Framework aims to develop MRO capabilities distributed across Japan and South Korea (alongside Australia, Singapore, and the Philippines), showing Washington's interest in integrating the two closely to optimize the distribution of MRO works and minimize ship downtime. Yet, ROK-U.S. and U.S.-Japan cooperation is highly siloed, and proper trilateral integration remains absent. Establishing trilateral MRO cooperation among South Korea, Japan, and the United States will be difficult, as Tokyo and Seoul will compete for the same market. Due to legal hurdles, only

69) DSEI Japan, "Japan-US Naval MRO Partnership."

70) Sang Hun Seok, "The Yellow Sea: An Overlooked Geopolitical Hotspot," *RUSI*, January 29, 2025, <https://www.rusi.org/explore-our-research/publications/commentary/yellow-sea-overlooked-geopolitical-hotspot>.

American ships based in the region will be able to benefit from MRO in South Korea. Hence, these ships will have to come overwhelmingly from Japan. Moreover, there is little industrial complementarity between South Korea and Japan, as both excel in the same areas.

Since the United States would likely eagerly accept any trilateral cooperation, the ball is in Tokyo's and Seoul's court. The first and unescapable step is political impetus: high-level decision-makers should drive their bureaucracies and industries forward, as seen recently at the August 2025 summit between Lee Jae Myung and Donald Trump. Then, it would be necessary to create a coordinating group comprising senior defense officials from the three countries, navy representatives, and industrial stakeholders — à la DICAS — to iron out the who-does-what. Such a group should promote cooperation in a way that does not hurt Japanese or South Korean industrial interests to the extent it creates resentment in Tokyo or Seoul. Only then could the three countries move to an efficient division of labor that maximizes MRO efficiency and alliance coordination.

IV. SOUTH KOREA'S MRO CAPABILITIES AND INTERNATIONAL COOPERATION

Kuyoun Chung

1. Introduction

Maintenance, repair, and overhaul (MRO) has emerged as one of the most critical yet underexamined domains in alliance defense cooperation. Unlike procurement or arms sales, which are often politicized and episodic, MRO addresses the long-term sustainability of military capabilities by ensuring that complex defense system – from aircraft engines to naval vessels– remain mission ready. Globally, MRO accounts for approximately 70% of the lifecycle cost of weapon systems, highlighting its critical role in defense management and operational readiness.⁷¹⁾ For middle powers like South Korea, MRO capability is more than an industrial sector: it is a strategic lever to deepen defense self-reliance, enhance alliance interoperability, and contribute to broader regional security architectures.

South Korea's MRO sector has evolved rapidly alongside its broader defense industry, now ranked as the eighth largest arms exporter worldwide.⁷²⁾ Indigenous companies such as Hanwha Aerospace, Korea Aerospace Industries (KAI), and HD Hyundai Heavy Industries have built sophisticated capabilities in engine maintenance, avionics, and naval vessel overhaul. Hanwha Aerospace, for instance, has provided engine MRO service for over four decades and recently won contracts to overhaul the engines of the U.S. Army's CH-47 Chinook Helicopters in Korea.⁷³⁾ In the naval domain, Korean shipyards such as Hanwha Ocean and HD Hyundai Heavy Industries

71) Hanwha, "How maintenance, repair and overhaul is modernizing global defense capabilities" (April 29, 2025). <https://www.hanwha.com/newsroom/news/feature-stories/how-maintenance-repair-and-overhaul-is-modernizing-global-defense-capabilities.do>

72) Reuter, "South Korea's Hanwha Ocean target US Navy orders as Trump seeks shipbuilding ties" (May 5, 2025) <https://www.reuters.com/world/asia-pacific/south-koreas-hanwha-ocean-targets-us-navy-orders-trump-seeks-shipbuilding-ties-2025-05-05/>

73) Breaking Defense, "South Korea to perform engine overhauls for US Army Chinooks" (July 25, 2025). <https://breakingdefense.com/2025/07/south-korea-to-perform-engine-overhauls-for-us-army-chinooks/>

have begun servicing U.S. Navy supply and logistic ships, including the USNS Wally Schirra and USNS Alan Shepard – a development that extends the operational life of U.S. vessels without requiring costly transits to American Shipyards.⁷⁴⁾ These cases demonstrate that Korean MRO capabilities are no longer limited to domestic requirements but are increasingly integrated into allied force sustainment.

For the United States, strengthening MRO partnerships with South Korea is not merely a matter of efficiency but of strategy. The Indo-Pacific theater poses unique logistical challenges: vast distances, contested sea lines of communication, and the risk of Chinese anti-access/area-denial (A2/AD) strategies disrupting forward presence. By localizing MRO functions in South Korea, the U.S. military reduces downtime, shortens supply chains, and secures reliable forward sustainment hubs. This aligns with the U.S. Indo-Pacific strategy's emphasis on resilience, distributed basing, and alliance burden-sharing. It also reflects a broader evolution of the U.S.-ROK alliance from a patron-client security relationship to a partnership of shared industrial and technological responsibilities.

At the alliance level, MRO cooperation is politically significant because it reinforces the credibility of extended deterrence and alliance modernization. By investing in shared sustainment capacity, Washington signals trust in Seoul as a dependable industrial partner, while South Korea gains a concrete role in supporting U.S. force posture in the region. This dynamic may help offset alliance tensions over cost-sharing and troop deployments by embedding cooperation in long-term industrial frameworks. Moreover, MRO integration advances interoperability, not only at the tactical level of shared equipment but also in the strategic management of defense supply chains—an increasingly vital element of collective security.

Yet, challenges remain. U.S. technology transfer regulations, such as the International Traffic in Arms Regulation (ITAR), constrain the scope of Korean firms' access to sensitive systems, while competition with Japan, Australia, and Singapore for MRO

74) US Forces Korea, "USNS Wally Schirra Completes major Maintenance at South Korean Shipyard" (March 12, 2025). <https://www.usfk.mil/Media/Newsroom/News/Article/4119997/usns-wally-schirra-completes-major-maintenance-at-south-korean-shipyard/>

contracts underscores the geopolitical stakes of becoming the Indo-Pacific’s premier sustainment hub. Additionally, South Korea must balance its ambition to become a global MRO leader with the imperative to maintain cost-competitiveness and meet exacting NATO-aligned standards. These issues highlight the dual nature of MRO cooperation: it is simultaneously an opportunity for alliance deepening and a test of how industrial integration intersects with national autonomy.

2. South Korea’s MRO Capabilities

South Korea’s Maintenance, Repair, and Overhaul (MRO) sector has evolved into a vital component of its defense industrial base, encompassing both aerospace and naval domains. While aerospace MRO has been the traditional strength—supporting fighter jets, helicopters, and transport aircraft—the naval and shipyard segments have recently gained prominence. With global-class shipbuilders such as HD Hyundai Heavy Industries, Hanwha Ocean, and HJ Shipbuilding & Construction, South Korea is now positioned as a serious contender to serve as an Indo-Pacific hub for U.S. and allied naval sustainment. This chapter provides an expanded overview of South Korea’s MRO capabilities, with a particular emphasis on the naval sector, examining recent cases, strategic opportunities, and the constraints that shape South Korea’s ambition to emerge as a regional leader in ship maintenance and overhaul.

1) Aerospace and Engine MRO

South Korea’s aerospace MRO capabilities provide an important baseline for understanding its broader sustainment strengths. **Hanwha Aerospace** has developed robust capabilities in gas turbine engines, offering services for the **T700** engines powering UH-60 Black Hawks and AH-64 Apaches, as well as the **F100** and **F404** engines used in F-15K and KF-16 fighters. In 2025, Hanwha secured a high-profile contract to overhaul **T55 engines** for U.S. Army CH-47 Chinooks deployed in South Korea, eliminating the need for long-distance repairs in the continental United States.

Meanwhile, Korea Aerospace Industries (KAI) has focused on integrated life-cycle

support for the ROKAF's T-50 and FA-50 aircraft, while Korean Air's Aerospace Division continues to provide MRO services for military transports and surveillance platforms. Also, South Korea will build its own maintenance facility for its F-35A stealth jets by 2027, which is a move that would enhance operational efficiency.⁷⁵⁾

2) Naval and Shipyard MRO

South Korea's global reputation as a shipbuilding powerhouse—consistently ranking among the top three in the world alongside China and Japan—forms the basis of its naval MRO strength. Unlike many countries that separate naval and commercial shipyards, South Korea's dual-use industrial base allows it to apply cutting-edge techniques from commercial shipping to naval vessels.

Initially, South Korean shipyards focused on sustaining the ROK Navy's growing blue-water fleet, including KDX destroyers, Aegis-equipped KDX-III ships, and KSS submarines. Domestic requirements provided a steady workload: routine dockings, system upgrades, and life-extension projects. As the ROK Navy expanded its regional role—deploying to anti-piracy missions in the Gulf of Aden and participating in multinational exercises—the need for timely and reliable MRO services grew in parallel.

A turning point came in 2025, when South Korean shipyards began servicing U.S. Navy vessels. In March, Hanwha Ocean completed a major overhaul of the USNS Wally Schirra, a dry cargo and ammunition resupply ship. The project involved extensive structural repairs and systems updates, extending the vessel's operational life by an estimated 15–20 years. This marked the first time such large-scale U.S. naval maintenance had been conducted in South Korea, signaling Washington's trust in Seoul's industrial base.

Soon after, HD Hyundai Heavy Industries secured a contract for the USNS Alan

75) Korea Joongang Daily, "Korea to build F-35 fighter jet maintenance facility at Cheongju air base" (April 18, 2024). <https://koreajoongangdaily.joins.com/news/2024-04-18/national/defense/Korea-to-build-F35-fighter-jet-maintenance-facility-at-Cheongju-air-base/2028503>.

Shepard, another dry cargo ship. These cases underscored the cost and efficiency advantages of using South Korean facilities compared to sending vessels to Pearl Harbor or the U.S. mainland. For the U.S., this diversification of sustainment hubs directly supports the Pentagon’s emphasis on distributed maritime logistics in the Indo-Pacific.

South Korea’s shipyards are now competing to secure a larger role in U.S. naval sustainment contracts. A 2025 survey identified three shipyards—HD Hyundai Heavy Industries in Gunsan, HJ Shipbuilding in Busan, and Shipbuilding in Geje—as candidates for expanded cooperation. Each offers different advantages: Hyundai has massive capacity and advanced facilities; Hanwha Ocean specializes in complex naval vessels; HJ Shipbuilding is efficient in medium-scale refits. Together, these firms position South Korea as a comprehensive MRO partner for U.S. and allied fleets.

This dovetails with the policy under the Make American Shipbuilding Great Again (MASGA) initiative, which seeks to leverage allied shipyards to offset U.S. domestic capacity shortfalls. The MASGA initiative reflects the U.S. desire to revitalize its maritime heavy-industrial base while simultaneously enhancing its operational sustainment posture in the Indo-Pacific. With China dominating global shipbuilding and the U.S. shipyard workforce atrophying, Washington has sought to allied partnership to bridge both short-term sustainment gaps and longer-term industrial renewal.⁷⁶⁾ As part of this strategy, MASGA identifies three major thrust: rebuilding U.S. naval and commercial shipbuilding capacity, outsourcing non-strategic repair and overhaul(MRO) work to trusted partners, and shortening force-generation timelines by forward-locating maintenance and logistics in allied yards. For South Korea, which is a home to world-class shipbuilders such as HD Hyundai Heavy Industries and Hanwha Ocean, the initiative offers a dual opportunity, which includes deepening defense-industrial integration with the U.S. and the position South Korean yards as strategic sustainment hubs for the alliance. Indeed, Seoul pledged roughly

76) Peter K. Lee. “MAASGA, Making American and Allied Shipbuilding Great Again,” Asan Institute for Policy Studies Issue Brief (No. 2025-07).

USD 150 Billion of shipbuilding cooperation under the MASGA banner to secure more favorable tariff treatment and industrial access.⁷⁷⁾

At the August 2025 summit between President Lee Jae Myung of South Korea and President Donald Trump of the US, the MASGA emerged as a central component of the industrial and security agenda. Two leaders agreed to deepen manufacturing, shipbuilding, energy and defense ties, with Trump explicitly stating that U.S. shipbuilding would “buy ships from South Korea... but also have them made here with our people, using our people.”⁷⁸⁾ Seoul welcomed the initiative as part of a broader contribution to Washington’s industrial-security posture, while South Korean companies committed to large-scale investments in the U.S., anchored by the MASGA shipbuilding partnership. Yet the details remain uncertain. How much work is relocated to the U.S, how much South Korean yards will integrate into U.S. regulatory frameworks (e.g. Jones Act, Buy American) and how the industrial control tower for this initiative will be structured, are yet to be decided.

Another area of uncertainty is about two countries’ recent decision on nuclear-powered attack submarine. During the ROK-US summit in November 2025, Trump stated on social media that he had “approved South Korea to build a nuclear-powered submarine,” as a response to South Korea’s request to enhance undersea deterrence capabilities. A detailed joint fact sheet released shortly afterward noted that “the United States has given approval for South Korea to build nuclear-powered attack submarines,” situating this decision within a broader package of bilateral shipbuilding and defense-industrial cooperation agreement.⁷⁹⁾ However, the summit outcome seems to include the understanding that the US

77) Reuters, “‘Make America Shipbuilding Great Again’ package key to reaching trade deal, South Korea Says” (July 31, 2025). <https://www.reuters.com/world/china/make-america-shipbuilding-great-again-package-key-reaching-trade-deal-south-2025-07-31/>.

78) Korea Times, “Lee, Trump Agree to deepen industrial ties, highlighting shipbuilding, energy, defense” (August 26, 2025). <https://www.koreatimes.co.kr/foreignaffairs/20250826/summit-lee-trump-agree-to-deepen-industrial-ties-highlighting-shipbuilding-energy-defense>.

79) Korea Times, “South Korea, US released details of deal including Korean investment in Shipbuilding.” (November 14, 2025). <https://www.koreatimes.co.kr/foreignaffairs/20251114/south-korea-us-release-details-of-deal-including-korean-investment-in-shipbuilding>.

endorsement for Seoul to begin preparation for a nuclear-powered submarine program, though the agreement centers on enabling South Korea to meet advance requirements for the project, including avenues to source fuel, rather than the immediate transfer of reactor or propulsion technology covered under longstanding U.S. legal restriction.⁸⁰⁾ Also, congressional authorization remain undefined and will require extensive follow-up negotiation. Taken together, this development suggest a dramatic political breakthrough, which is mainly driven by Trump's personal decision, while still leaving the structural legal barriers unresolved, which have historically constrained U.S. submarine-propulsion cooperation with any ally outside the AUKUS framework.

In any case, all of these initiatives are politically framed as bolstering U.S. industry, in practice it acknowledges the value of partnerships with allies such as South Korea.

Compared to other Indo-Pacific allies, South Korea holds several advantages:

- Scale and capacity: South Korean yards rank among the largest globally, handling both mega-container ships and advanced naval combatants.
- Proximity: South Korea's geographic position, close to the Korean Peninsula, Japan, and northern Pacific routes, makes it ideal for servicing U.S. Seventh Fleet assets.
- Technical sophistication: South Korea's experience in nuclear submarine construction support (albeit indirectly through component supply chains) and advanced Aegis destroyer maintenance places it ahead of Southeast Asian facilities.

However, South Korea faces competition from Japan's Yokosuka base, Singapore's Sembawang Shipyard, and Australia's Perth facilities. Each is expanding its MRO offerings for U.S. forces. The challenge for South Korea is to consolidate its comparative advantage by emphasizing speed, cost-effectiveness, and reliability.

80) Reuter, "U.S. South Korea unveil details on shipbuilding investment and subs in trade deal" (November 14, 2025). <https://www.reuters.com/world/asia-pacific/us-south-korea-release-deals-deal-including-korean-investment-shipbuilding-2025-11-14/>.

A distinctive feature of South Korea's naval MRO sector is its dual-use integration. Shipyards that build and service some of the world's largest LNG carriers and container vessels apply the same infrastructure to naval sustainment. For example, Busan and Ulsan shipyards that handle commercial supertankers can easily dry-dock large naval auxiliaries. This integration generates economies of scale, ensuring that South Korea's naval MRO costs remain competitive despite relatively higher labor expenses compared to Southeast Asia.

Moreover, civilian MRO capacity provides surge resilience in wartime. Should a conflict disrupt naval operations, South Korea could redirect commercial yard capacity toward military sustainment, a flexibility that few regional competitors possess.

Despite these strengths, South Korea's naval MRO ambitions face several constraints:

- Technology transfer limits: U.S. export control regimes restrict South Korean access to sensitive systems, including nuclear propulsion. This prevents South Korea from servicing U.S. aircraft carriers or nuclear submarines.
- Strategic competition: Japan and Australia are actively lobbying for greater U.S. MRO contracts, leveraging their geographic advantages and longstanding political trust.
- Domestic capacity management: South Korean shipbuilders must balance lucrative commercial contracts with military sustainment, creating potential bottlenecks.
- Strategic vulnerability: As MRO facilities become critical to U.S. force projection, they could become priority targets for adversaries in conflict scenarios.

3. Strategic Significance in the ROK–U.S. Alliance

The development of South Korea’s Maintenance, Repair, and Overhaul (MRO) capabilities carries profound implications for the U.S.–ROK alliance. Beyond its technical and industrial dimensions, MRO cooperation reshapes how the alliance sustains military readiness, shares burdens, and signals credibility to adversaries and partners alike. This chapter explores the strategic significance of South Korean MRO capacity in three key areas: enhancing operational resilience, advancing alliance modernization, and reinforcing deterrence and interoperability in the Indo-Pacific.

1) Enhancing operational resilience in the Indo-Pacific

The Indo-Pacific is characterized by vast geography, contested chokepoints, and adversary anti-access/area-denial (A2/AD) strategies, all of which complicate logistics and sustainment. Traditionally, U.S. forces deployed to the region have relied on maintenance hubs in Japan, Guam, Hawaii, and the continental United States. However, these facilities face capacity limits and are vulnerable to geopolitical disruption or adversary targeting in a conflict scenario.

By leveraging South Korea’s advanced industrial base, the United States gains access to a forward sustainment hub that reduces repair turnaround times and lowers operational risk. For example, the 2025 decision to overhaul U.S. Army CH-47 Chinook engines in South Korea cut months off the repair cycle compared to shipping them back to the U.S. mainland. Similarly, U.S. Navy auxiliary ships repaired in South Korean shipyards—such as the *USNS Wally Schirra* and *USNS Alan Shepard*—demonstrated the feasibility of distributing maintenance beyond traditional hubs.⁸¹⁾

In this sense, MRO cooperation enhances resilience, ensuring that U.S. and ROK

81) Business Insider, “A South Korean Shipyard just picked up a new repair job from the US Navy as it turns to allies to help fix the fleet” (April 7, 2025) <https://www.businessinsider.com/key-pacific-allies-shipyard-to-repair-us-navy-ship-2025-8>

forces can sustain operations even under pressure. It also aligns with strengthening Department of Defense's push for distributed logistics and contested sustainment in the Indo-Pacific.⁸²⁾ For South Korea, hosting these functions not only strengthens its role as a frontline ally but also creates a credible stake in regional stability.

2) Alliance Modernization and Industrial Integration

MRO cooperation also reflects a deeper trend of alliance modernization, moving beyond traditional security guarantees toward industrial and technological integration. Historically, the U.S.-ROK alliance was defined by asymmetry: the U.S. provided extended deterrence, while South Korea relied heavily on American arms sales and troop presence. Today, however, South Korea's defense industry is increasingly seen as a partner rather than a client, capable of sustaining U.S. assets as well as producing indigenous systems.

Joint MRO projects institutionalize this shift. They embed cooperation into long-term industrial frameworks that are less politically volatile than troop deployments or burden-sharing negotiations. For Washington, investing trust in South Korean firms signals confidence in Seoul's industrial maturity. For Seoul, participation in allied sustainment chains elevates South Korea's status within the alliance. Moreover, MRO cooperation complements broader initiatives such as the South Korea-U.S. Integrated Defense Dialogue, which emphasizes defense science and technology integration.

This industrial integration also creates economic spillovers. South Korean firms gain access to high-value contracts and advanced maintenance standards, while U.S. forces benefit from cost-effective and geographically proximate services. Over time, this could establish South Korea as a regional MRO hub, competing with Japan, Australia, and Singapore. The strategic consequence is a more interdependent alliance, where industrial ties reinforce security commitments.

82) US DOD, "Joint Press Statement for the 25th Korea-U.S. Integrated Defense Dialogue" (September 24, 2024). <https://www.defense.gov/News/Releases/Release/Article/3915402/joint-press-statement-for-the-25th-korea-us-integrated-defense-dialogue/>

3) Deterrence, Interoperability, Signaling

At the strategic level, MRO cooperation strengthens both deterrence and alliance credibility. By ensuring rapid and reliable sustainment, the alliance demonstrates that its forces will remain operationally ready in a crisis, undermining adversary expectations of attrition. The ability to repair U.S. and ROK assets in South Korea itself enhances interoperability, as shared logistics systems and standards reduce friction in joint operations. Equally important is the signaling dimension. When U.S. naval vessels undergo refits in South Korean shipyards, or when American helicopters are maintained by South Korean engineers, adversaries perceive a visible symbol of allied trust and integration. This is particularly significant in the context of North Korea's asymmetric threats and China's maritime assertiveness, both of which test alliance cohesion. By embedding sustainment cooperation into alliance structures, Washington and Seoul send a clear message to the rest of the world that their partnership is not limited to rhetoric or temporary deployments but is rooted in long-term industrial collaboration.

4) Trade-off and Risks

Despite its benefits, MRO cooperation is not without trade-offs. South Korea must navigate the tension between alliance integration and strategic autonomy. Overreliance on U.S. platforms for MRO contracts could constrain Seoul's ability to diversify its defense industrial ties, especially with European or Southeast Asian partners. Meanwhile, U.S. export control regimes—such as ITAR—still limit the extent of technology transfer, leaving South Korea dependent on American approvals for servicing advanced systems.

Competition also poses risks. As Japan and Australia expand their own MRO facilities, South Korea faces pressure to maintain cost competitiveness and technical excellence. Failure to do so could relegate South Korea to a secondary role in regional sustainment networks. Finally, adversaries may interpret alliance industrial integration as escalatory, prompting countermeasures such as targeting MRO facilities in crisis scenarios.

Nonetheless, one of the most risks associated with South Korea participating in MRO cooperation with the US Navy is the heightened likelihood that South Korean shipyards would become targets of attack in the event of a U.S.-China conflict. If bilateral cooperation between South Korea and the U.S. expands beyond auxiliary and logistic vessels to include surface combatant, aircraft carriers, or nuclear-powered submarines, it would almost certainly raise concerns about explicit targeting, making South Korean facilities more vulnerable in a wartime scenario.

4. Conclusion

The expansion of South Korea's MRO capabilities carries important policy implications for Seoul, Washington, and the broader U.S.-ROK alliance. For South Korea, the development of advanced MRO infrastructure represents a pathway to strengthen defense industrial autonomy and reduce dependence on foreign sustainment. Establishing facilities such as the planned F-35 heavy maintenance depot at Cheongju Air Base by 2027 will allow South Korea to internalize capabilities previously outsourced to overseas hubs. Until now, ROK Air Force relied on overseas facilities such as the US-Japan depot at Misawa and the Australian depot at Williamstown for deep level F-35 maintenance, creating long turnaround times and logistic vulnerabilities. Bringing this capability onto South Korean soil will not only enhances operational efficiency and availability of Seoul's fifth-generation fleet while reducing alliance dependence on distant hub. Also, the position of South Korea is integrated into the global defense MRO network, elevating its status as both a regional provider and a "global pivotal state."

For the United States, leveraging South Korea as a forward MRO hub offers strategic advantages in the Indo-Pacific theater. By shifting certain sustainment activities from distant U.S. or Pacific Island facilities to South Korea's world-class shipyards and aerospace centers, Washington can reduce turnaround times, increase resilience against adversary disruption, and maintain a more flexible and distributed force posture. Such integration also helps the U.S. mitigate domestic industrial shortfalls by tapping into allied capacity without compromising on quality or reliability.

As of 2025, there is no formally institutionalized trilateral MRO cooperation framework between the United States, South Korea, and Japan. However, trilateral defense dialogues increasingly address logistics, interoperability, and defense industrial cooperation. Bilateral sustainment frameworks such as Acquisition and Cross-Servicing Agreements (ACSAs) and combined logistics arrangements provide a legal foundation for potential future expansion into trilateral MRO cooperation. Besides, South Korea and Japan possess distinct strengths and industrial foundation in MRO, making their capabilities highly complementary. South Korea excels in the maintenance and overhaul of large naval platforms, while Japan holds advantages in precision electronics and sensor-related MRO. Their geographic dispersion further enhances the survivability and resilience of allied maintenance networks in times of crisis or conflicts, and their industrial and technological supply chains offer different components and processes that support a more diversified and distributed sustainment system.

In any case, for the Alliance, expanding MRO cooperation modernizes the partnership beyond traditional deterrence frameworks. It embeds the alliance in long-term industrial and technological collaboration, providing a stable foundation less susceptible to short-term political tensions over cost-sharing or troop levels. By ensuring that allied forces can be repaired, sustained, and deployed seamlessly, MRO integration enhances both the credibility of deterrence and the sustainability of joint operations. Ultimately, this shift transforms the alliance from a primarily military deterrent arrangement into a resilient, technologically integrated partnership capable of addressing prolonged competition in the Indo-Pacific.

V. CONCLUSION

Kuyoun Chung

This study demonstrates that maritime maintenance, repair, and overhaul (MRO) cooperation is no longer a peripheral logistical activity but has become a central pillar of alliance management, industrial strategy, and Indo-Pacific deterrence. Against the backdrop of China's unprecedented shipbuilding scale, persistent U.S. naval maintenance bottlenecks, and intensifying geopolitical competition, MRO capacity has emerged as a strategic asset shaping both the operational readiness of the U.S. Navy and the broader architecture of allied resilience in the Indo-Pacific.

The comparison among the United States, Japan, and South Korea highlights a shared strategic logic—forward sustainment reduces readiness gaps and operational downtime—but also reveals divergent political-economic constraints that shape the scale and direction of alliance industrial integration. Japan provides decades of institutionalized repair capacity, geographic proximity to the Western Pacific, and a mature defense-industrial base. Yet demographic pressures, strike vulnerabilities, and legal limits on foreign MRO constrain its ability to scale further. South Korea, by contrast, offers unmatched industrial efficiency, world-class commercial-military shipbuilding integration, and rapidly strengthening ties with the U.S. Navy. South Korean shipyards have already demonstrated the ability to deliver high-quality, cost-efficient repairs within shorter timeframes, thereby offering a complementary—and in some cases superior—option for U.S. forward sustainment.

At the same time, political economy frictions on both sides of the Pacific limit the expansion of U.S.-ROK MRO cooperation. In Washington, defense contractors and congressional stakeholders view sustainment as a high-margin market and resist offshoring repair work that threatens domestic rents. Regulatory barriers such as ITAR restrictions, facility-clearance requirements, and statutory limitations on foreign shipyard involvement further constrain the scope of cooperation. In Seoul, demographic decline, strategic vulnerability to North Korean and Chinese missile threats, and the need for compliance-oriented infrastructure raise the costs of expanding MRO capacity.

Despite these constraints, the structural logic for deeper MRO cooperation continues to strengthen. The U.S. defense industrial base cannot meet its own sustainment demands; China's naval power projection continues to accelerate; and Indo-Pacific contested logistics conditions require distributed, redundant, and resilient repair networks. South Korea's industrial advantages, Japan's geographic positioning, and the emerging American recognition of allied capacity underscore that forward sustainment will define the next phase of alliance industrial integration. Notably, even incremental MRO cooperation generates long-lasting institutional effects: shared standards, integrated workforce training, cross-border technology management, and embedded sustainment infrastructure create material interdependence that stabilizes the alliance even during political fluctuations.

Ultimately, this report concludes that MRO cooperation is a test case for the future of alliance resilience—one that requires managing political-economy asymmetries, aligning domestic incentives, and institutionalizing industrial interdependence. The alliances that can coordinate production, sustainment, and repair will be best positioned to preserve deterrence and operational advantage in a rapidly changing Indo-Pacific strategic environment.

Building on the preceding analysis, this chapter proposes a stepwise roadmap to structure the way forward and anchor the chapter's concluding recommendations.

- Phase 1: Regulatory Alignment and Bilateral Foundations

The first phase focuses on harmonizing the legal, regulatory, and procedural foundations that underpin cross-border sustainment. MASGA's political logic places new expectations on allies to supplement U.S. maritime capacity, making it important for Seoul and Tokyo to streamline export controls, classification protocols, workforce access, and quality-assurance standards that governs the maintenance of U.S. naval assets. Bilateral channels – ROK-U.S. and U.S.-Japan- should serve as the primary vehicles for this alignment, building upon existing ACSAs, host-nation support agreements, and standing working groups on logistics and sustainment. During this phase, each ally would map its industrial capabilities, workforce constraints, and infrastructure limits in consultation with U.S. Navy Systems Commands, producing

shared, data-driven understanding of where bilateral repair and overhaul activity can realistically expand.

- Phase II.: Bilateral Deepening and Pilot Interoperability Projects

Once regulatory clarity and bilateral frameworks are established, the second phase centers on expanding practical cooperation. For the ROK-U.S. dyad, this may involve targeted expansion of destroyers and auxiliary-class MRO conducted at South Korean shipyards, beginning with maintenance categories that the U.S. Navy already performs overseas - primarily hull, mechanical, and electric work - before expanding to more sensitive system. For the U.S.-Japan dyad, pilot project might include high-precision electronics and combat system calibration, where Japan retains a comparative advantage. To test combined interoperability, both dyads should conduct synchronized maintenance cycles on selected U.S. platforms, using shared digital maintenance log, standardized inspection codes, and common certification procedures. There pilot projects serve to identify technical friction, bureaucratic bottleneck, and political sensitivities while obtain experiences for trilateral cooperation.

- Phase III: Trilateral Synchronization and Distributed Sustainment Architecture

In the final phase, bilateral experiences are woven into a trilateral MRO architecture. Rather than creating a single, unified maintenance hub, the United States, South Korea, and Japan would establish a coordinated network of complementary nodes: South Korea specializing in large-platform hull, mechanical and electrical work; Japan focusing on precision systems and high-end electronics; and the U.S. facilities managing nuclear propulsion and sensitive weapons technologies, for example. This trilateral MRO platform will be sustained by existing security and defense agreements between three countries both bilateral and trilateral format, there by strengthening the resilience of alliances. Such an architecture operationalizes MASGA's call for forward, flexible, and allied-supported sustainment while distributing risk geographically and technically.

Together, these three phases chart a realistic yet ambitious pathways for transforming MRO from a series of bilateral agreements into a trilateral sustainment network that strengthen the readiness, reduces operational downtime, and enhances the alliance's collective capacity to withstand the pressures of great-power competition in the Indo-Pacific.

Authors' Bios

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Dr. Kuyoun Chung is an Associate Professor of Political Science at the Kangwon National University and Non-resident fellow at the Asan Institute for Policy Studies in South Korea. Her research focuses on US foreign policy, Korean peninsula, alliance politics, regional security architecture, maritime security, nuclear politics, and emerging technologies. Her academic articles have been published in Australian Journal of International Affairs, Asia-Europe Journal, Korea Observer, Korean Journal of Defense Analysis, Asian Politics and Policy, Asia policy, Journal of Indo-Pacific Affairs, and others. Her commentaries have appeared in Foreign Policy, The Diplomat, The Brookings Institution Commentary, East Asia Forum Quarterly, Global Asia, and The Asan Forum. Also, she regularly contributes columns to *Segye Ilbo*, South Korea.

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