An employee processes the metal to fabricate an artillery round at the Scranton Army Ammunition Plant in Scranton, Pennsylvania, 26 March 2024. (Photo by Henry Villarama, U.S. Army)

The "Great Arsenal of Democracy"

Analyzing Limited Surge Capacity in U.S. Defense Ammunition Manufacturing

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The full-scale invasion of Ukraine by Russia in February 2022 has underscored the critical role of a robust defense industrial base (DIB) in safeguarding national security through the provision of essential warfighting capabilities. This article addresses the urgent need to enhance small-, medium-, and large-caliber ammunition and precision munition production within the United States' DIB. Specifically, it focuses on the imperative for production lines to surge capacity effectively during periods of heightened demand.

The need for the United States to maintain a robust DIB is not new or unforeseen. In 1940, just before the United States became involved in World War II, President Franklin D. Roosevelt highlighted the Nation's keystone status as an industrial powerhouse that needed to commit its resources to supporting the "Great Arsenal of Democracy."[1] Roosevelt's insightful caution and guidance were rooted in a keen anticipation of conventional conflict. His foresight resonates with contemporary national security challenges, necessitating the DIB to ready itself for a landscape of diverse global interests that could spark conflicts demanding significant escalations in production capacity.

Through thoroughly examining the national security risks arising from the declining ammunition production within the U.S. DIB, this article identifies tangible policy solutions to bolster production capabilities. Aligned with the Department of Defense's inaugural *National Defense Industrial Strategy*, released in January 2024, this study evaluates potential solutions based on four key criteria: cost-effectiveness, workforce and economic sustainability, supply chain resilience, and acquisition adaptability. This article outlines specific policies and frameworks designed to mitigate vulnerabilities the war in Ukraine has revealed, that the current production capabilities of the DIB in the United States cannot meet the needs of its partners and allies engaged in high-intensity conventional conflicts.

Policy recommendations, rooted in flexible contracting mechanisms with multiyear procurement (MYP) options alongside modernization efforts emphasizing robotics and automation enhancements to existing ammunition production lines, emerge as the most comprehensive and far-reaching solutions for all invested stakeholders. By adopting these strategies, the DIB can not only address immediate capacity challenges threatening national security efforts but also lay a foundation for long-term resilience and competitiveness. Furthermore, these solutions serve to reassure partners, including embattled countries like Ukraine, of the United States' steadfast commitment and capability to meet the needs of its allies. Through these measures, the United States can signal its readiness to uphold international security and support its commitments in the face of shared challenges.

Understanding how to use these policy recommendations to reverse the DIB's atrophy requires an examination of the policies that led the defense industry's current state. With the collapse of the United Soviet Socialist Republics in 1991, the United States took advantage of the fall of its primary geopolitical foe by gradually divesting and consolidating its significant DIB manufacturing capacity.[2] The subsequent reduction in manufacturing capabilities over three decades led Gen. Joseph Dunford, former chairman of the Joint Chiefs of Staff, to refer to the DIB as "brittle." He indicated that this brittleness is defined as the DIB's inability to surge its capacity and production in the event of a conflict.[3] Recent wars worldwide, especially Russia's invasion of Ukraine in 2022, have highlighted the struggles of the United States to meet the demands of its partners and allies in conflict.[4]

Using the current conflict in Ukraine as a real-world highlight of the estimated ammunition manufacturing atrophy in the DIB, the total amounts of precision munitions the United States sent to aid Ukraine were calculated and then compared against their estimated lead times for replacement based on current U.S. DIB surge capacity rates, the results indicate the decline in production capability as both clear and alarming, as shown in figure 1.[5]

In a moderated question and answer forum at Georgetown University, Gen. Charles Q. Brown

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Weapon	Quantity Given to Ukraine as of 9 May 2023	FY23 Base Budget Request	Replacement Contracts[128]	USAI Contracts	Quantity Left to Replace	FY24 Base Budget Request	Production (2024) (Annual Rate + Lead Time)
GMLRS[129]	5,500 missiles	$811 million	$722 million (-4,300 missiles)	No	1,200 missiles	$891 million (5,040 missiles)	Current: 14,004 Lead time: 18 months Max: 14,004 Lead time: 20 months
Javelin[130]	10,000 missiles	$186 million	$653 million (3,100 missiles)	No	6,900 missiles	$254 million (541 missiles)	Current/ Max: 2,100 Lead time: 57 months
Stinger[131]	>1,600 missiles	$0	$624 million (1,300 missiles)	No	300 missiles	$36 million (58 missiles)	Current: N/A Max: 720 by 2025 Lead time: 60 months
Excalibur[132]	>7,000 missiles	$122 million	$84 million >1,000 rounds	No	6,000 shells	$39 million (107 missiles)	Current: 200 Lead time: 18 months Max: 400 Lead time: 27 months
AMRAAM[133]	Not publicly reported	$671 million	$184 million (-180 missiles)	$2 million (-2 missiles)	Cannot determine with public information	$1.141 billion (831 missiles)	Current: 400 Lead time: 24 months Max: 1,200 Lead time: 52 months
Patriot[134]	1 battery and munitions	$1.062 billion	$151 million[135] (40 interceptors)	No	Cannot determine with public information	$1.213 billion (230 missiles)	Current/ Max: 550 Lead time: 29 months
APKWS[136]	N/A	$41 million	No	$64 million (-1,600 missiles)	N/A	$32 million (720 missiles)	Max: 25,000 Lead time: Not reported

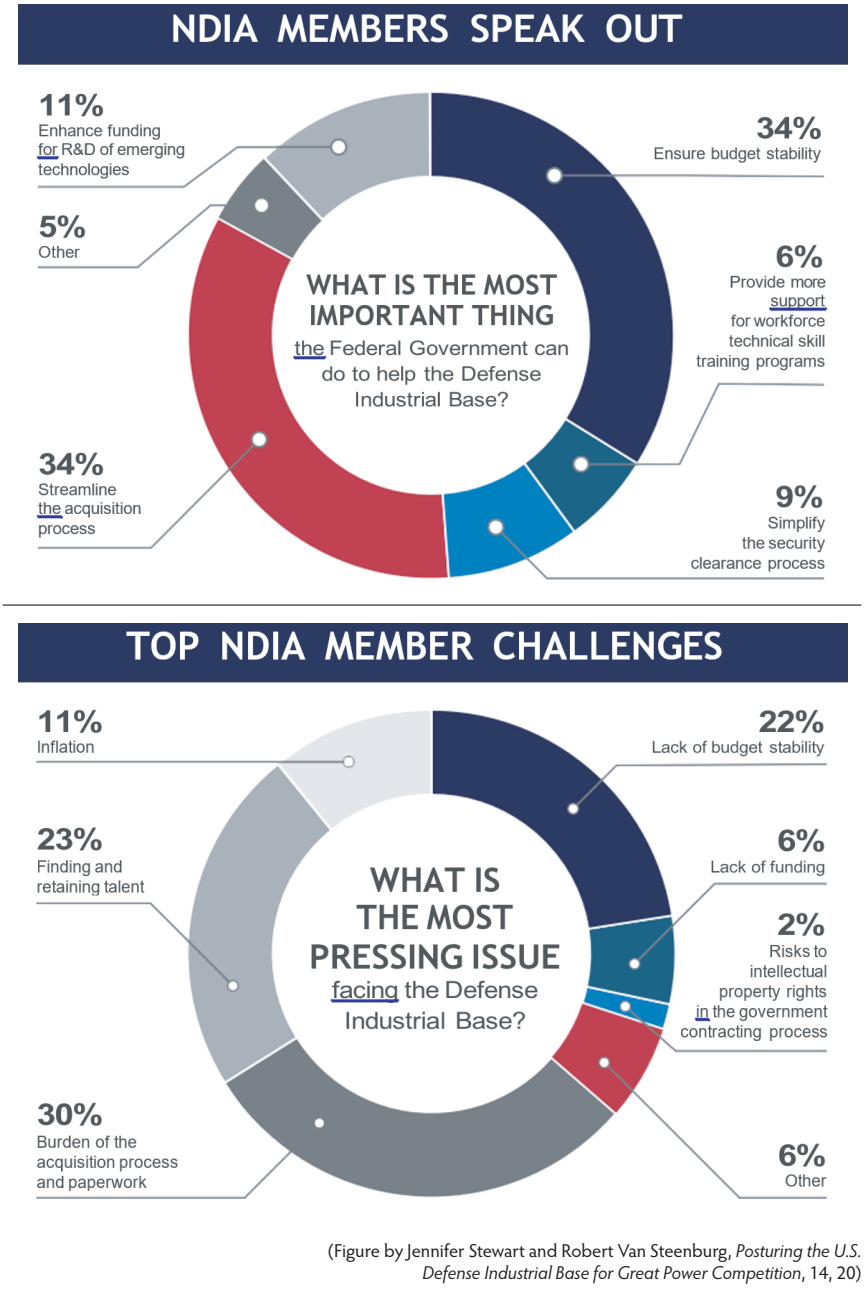
(Figure by Stacie Pettyjohn and Hannah Dennis, *Production Is Deterrence*, 1–2)

Figure 1. U.S. Ammunition Support to Ukraine

Jr., the twenty-first chairman of the Joint Chiefs of Staff, discussed the vulnerabilities highlighted by these figures concerning the current health and future risks of the DIB with the author of this article. Brown stated, "The aspects of how we strengthen the defense industrial base against these production vulnerabilities come from two areas: consistency in the budgetary demand signals we send to the DIB, particularly the smaller vendors, and trust in the production requirements that we project for future needs. This is what private-industry partners have made loud and clear to me on my visits to various production sites."[6]

In addition to precision munitions, the United States has also supplied many large-caliber ammunition products, primarily in the form of 155 mm artillery shells, at a current estimate of just over two million rounds.[7] With Ukraine's current monthly demand of ninety thousand shells a month, the U.S. DIB's surge capacity rate (as of March 2023) of twenty thousand 155 mm shells a month is grossly insufficient and has led to augment the demand for shells through drawdowns in U.S. stockpiles.[8] It must be noted, however, that Secretary of the Army Christine Wormuth has stated that the U.S. Army's production rate for 155 mm shells has increased in 2024 to roughly forty thousand shells, with a goal to end 2024 with the ability to surge capacity to fifty thousand 155 mm shells a month.[9] While these increases are impressive, they represent only a fractional need of what an artillery-centered conflict requires, revealing a still-significant gap in the capability of manufacturing yields in the U.S. DIB.

Using simulation models developed by the Institute for Defense Analysis, researchers used the concepts evaluation model to project significant conventional conflicts between the United States and China during a theoretical conflict over Taiwan.[10] These simulations aimed to identify the conflict's impact on ammunition production needs. Over forty simulations were conducted to identify ammunition production needs for variations of the conflict's intensity, duration, and



(Figure by Jennifer Stewart and Robert Van Steenburg, *Posturing the U.S. Defense Industrial Base for Great Power Competition*, 14, 20)

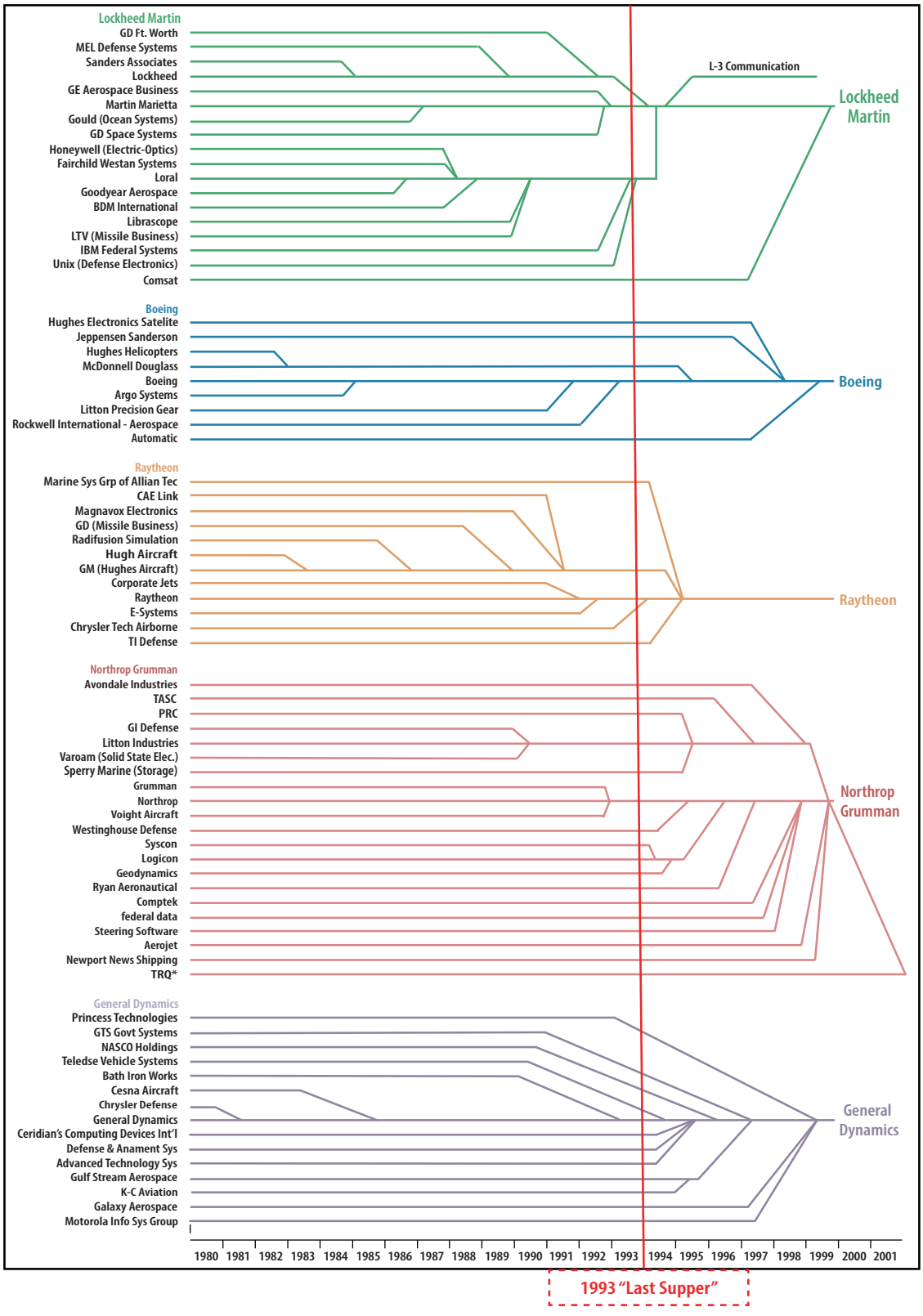
Figure 2. National Defense Industry Association Survey of 370 Defense Industrial Base Private Industries

geographic extent.[11] Although there were many adjustments to variables, an overarching theme emerged: the U.S. DIB production rates were wholly insufficient, even at surge capacities, to replace the anticipated number of precision-guided ammunition used during these conflicts.[12]

With these research results indicating an apparent mismatch between anticipated surge capacity needs and current surge capacity production rates, studies were conducted with defense industry companies and organizations to identify the causes of the limits of current surge capacity. The National Defense Industrial Organization consistently produces annual reports on companies that operate within the DIB with the goal of better understanding the causes of limits to increasing manufacturing capacity. As seen in figure 2, over 60 percent of all DIB manufacturing companies indicated to varying degrees that the administrative burden of the single-year procurement and acquisition contracting process, as well as inconsistent budgetary processes, were the primary obstacles to increasing production.[13]

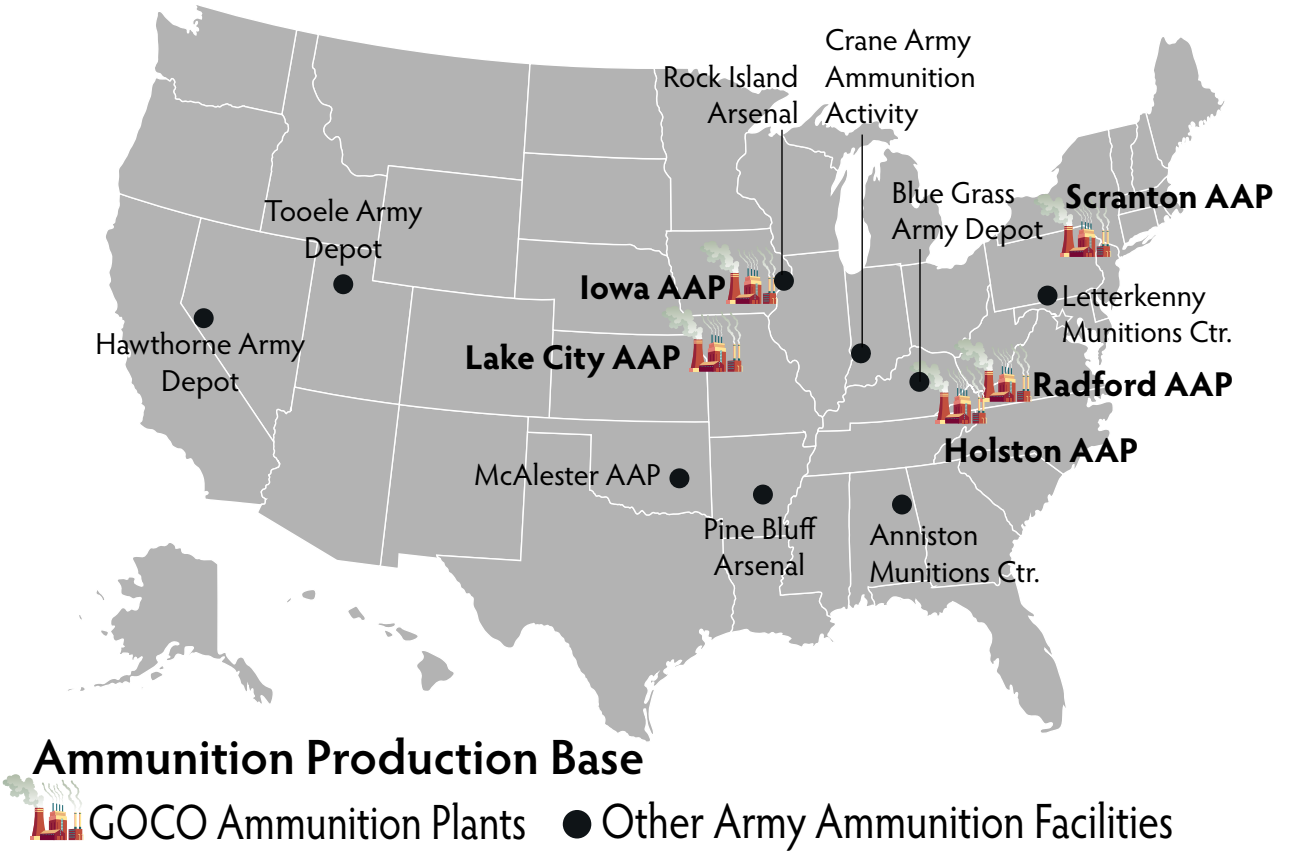
The contracting process is so complicated that it has led to the consolidation of many DIB manufacturers to larger companies with the resources to navigate the bureaucratic nature of DIB production. These larger DIB companies, often knowns as "Prime" contractors are known as the "Big Five" and include Lockheed Martin, RTX, Northrop Grumman, Boeing, and General Dynamics. The totality of prime contractors has experienced enormous consolidation since 1991, with the number of prime contractors shrinking from fifty-one to the "Big Five" today. This substantial consolidation has led to an oligarchy market structure that is clearly depicted in figure 3. This type of market structure makes new entrants (and a correlating increase in production capacity) unappealing to private sector companies.[14]

In 1975, the Department of Defense (DOD) regulated that the U.S. Army be the single



(Figure by Luke Nicastro, *The U.S. Defense Industrial Base: Background and Issues for Congress*, 30)

Figure 3. Consolidation of the U.S. Defense Industrial Base since 1980 with the 1993 "Last Supper" Highlighted Stakeholders



(Figure by Luke Nicastro, *Defense Primer: Conventional Ammunition Production Industrial Base*, 1)

Figure 4. Army Ammunition Plants Involved in Small, Medium, and Large-Caliber Production

conventional-ammunition proponent, manager, and overseer of all small-, medium-, and large-caliber ammunition for the entirety of the Armed Forces. The U.S. Army oversees the DOD's ammunition production needs by using several government-owned, contractor-operated U.S. Army ammunition plants (AAPs).[15] The U.S. Army owns these facilities, but workers who produce the ammunition are contracted from private companies from the DIB. Over the past several decades, the number of AAPs has shrunk to five active plants. The totality of these five plants, as seen in figure 4, makes up the DOD's small-, medium-, and large-caliber ammunition production capacity.[16]

All DIB companies are vested in the DOD's acquisition efforts and can be considered stakeholders. However, BAE, Olin Winchester, and American Ordnance LLC are the primary contractors that handle ammunition production at the U.S. Army's five ammunition plants and certainly constitute a more significant form of stakeholder interest based on their direct exposure to the manufacturing of large-caliber munitions (like the 155 mm artillery shells).

Arguably, the stakeholder with the most significant purview over the DIB is Congress. Congress is responsible for dispensing funding and policy initiatives to the DOD through annual appropriations, which, in turn, impacts the companies that make up the DIB. The two leading legislative levers Congress uses to achieve these goals are its annual National Defense Authorization Act (NDAA) and its funding appropriation. The NDAA is the legislation that directs the DOD in the way of policies and initiatives that Congress wants the Armed Forces to follow. NDAA is, however, toothless without an accompanying appropriation bill that funds all policies and initiatives in the legislation. Both bills must be passed annually, without which the DOD cannot make

new contracts, modernization efforts, or procurements beyond the previous year's authorization limits.[17]

While Congress certainly is a stakeholder, it can become an inhibitor of the DIB by failing to pass either of these annual legislative requirements. Delays to this legislation passing often result in one of two outcomes: a continuing resolution (freezing spending levels at the previous year's authorization) or, in more acrimonious situations, a government shutdown where funding stops completely. Both scenarios inhibit the DIB, the DOD, and all other stakeholders by impeding the ability of production facilities to project out needs for future ammunition orders properly.

International allies and partners constitute another group of stakeholders with a vested interest in the health of the U.S. DIB. Countries that make up the North Atlantic Treaty Organization, in addition to Ukraine, Taiwan, South Korea, Israel, Japan, and Australia, receive varying levels of support to their respective DIBs through cooperation, technology sharing, subsidies, and joint training efforts.

The health and resilience of the U.S. DIB directly impact the capabilities and readiness of these allies and partners. It can be argued that the entirety of the post-World War II global liberal order has been underpinned by the industrial capacity of the U.S. DIB and its ability to support not only the U.S. military but also the support of allies and partners across the globe. Many contemporary examples of the United States augmenting the ammunition production needs of allies and partners highlight this need. Ukraine, Israel, and Taiwan all have demonstrated extreme reliance on support from ammunition production plants in the United States for their respective conventional conflict needs that they need help to meet. Ukraine in particular finds itself as a prime example of a U.S. partner illustrating a demand signal for a healthy and robust DIB to support significant surge capabilities, especially regarding ammunition production.

While many stakeholders are invested in the success of the health of the U.S. DIB, various parties act as inhibitors of this effort. Geopolitically, several nation-states have nonaligned interests to the United States and are actively engaged in efforts supporting the degradation of the U.S. DIB. China and Russia have emerged as opponents to U.S. diplomatic and military operations in their respective geographical spheres of influence.[18] Notably, these countries can exert substantial influence on the U.S. DIB supply chains, especially regarding rare-earth minerals and metals needed to make components of precision munitions. Supply chain vulnerabilities carry large amounts of risk in the event of potential conflict between the United States and nations that supply these materials to the manufacturing efforts of the DIB companies.

Despite the many potential obstacles that face the efforts to reverse the atrophy of the U.S. DIB, policymakers have many options when it comes to working with the stakeholders of this industry to leverage a more favorable environment. Crafting policies for ammunition production that guarantee producers a sustained and predictable source of revenue will ultimately lead to an environment that enables the investments and maintenance of surge capacity infrastructure.

Analysis of Policy Recommendations

Modernization efforts. A policy recommendation that could significantly improve the surge capacity of ammunition production within the DIB is to modernize existing AAPs. Modernizing these facilities through automation and robotic support to become more efficient in ammunition production can significantly increase production rates for many lines of small-, medium-, and large-caliber rounds without necessarily having to invest in a significant number of new production lines.[19] Instead, the emphasis would be on making current ammunition manufacturing lines substantially more productive in terms of yield. Specific policy recommendations that would fall under the umbrella of "modernization efforts" would include automation and robotics, advanced manufacturing techniques, quality control and assurance, and training and workforce development.

Automation and robotics. Passing legislative policy efforts that emphasize a desire to upgrade AAPs (many of which were initially built during the 1940s) to support automation and robotics technologies better will directly correlate to improved manufacturing processes, increase productivity, and enhance worker safety. Automated systems can perform tasks such as loading, assembly, inspection, and packaging of ammunition components with greater speed, precision, and reliability.[20]

Advanced manufacturing techniques. Supported by DIB policy proponents, AAPs can also invest in facility

upgrades by adopting advanced manufacturing techniques such as additive manufacturing (3D printing), laser cutting, and computer numerical control machining to produce complex components and parts more efficiently and cost effectively. These techniques enable rapid prototyping, customization, and optimization of munitions designs.[21]

Quality control and assurance. Modernization efforts focusing on quality control and assurance can improve ammunition production's safety, reliability, and consistency. Implementing advanced inspection technologies and quality management systems reduces defects and enhances product quality, meeting stringent military standards. Adopting advanced manufacturing techniques such as additive manufacturing and computer numerical control machining enables AAPs to produce complex components more efficiently and cost effectively. These technologies facilitate rapid prototyping and customization, allowing agile responses to evolving munitions requirements.

Training and workforce development. Policies that support these modernization efforts must be coupled with parallel investments in training and workforce development programs to ensure that personnel have the skills, knowledge, and expertise needed to operate and maintain modern manufacturing systems and equipment. This includes technical training, certification programs, and continuous professional development initiatives to keep pace with technological advancements.

Automation and robotics technologies can streamline manufacturing processes, increasing productivity, reducing production time, and cost savings. This efficiency improvement ensures that resources are utilized optimally, enhancing the overall effectiveness of the DIB.

Modernization policy recommendations at AAPs focus on improving operational efficiency, productivity, and resource utilization to achieve cost-effectiveness.

Modernization efforts lead to cost savings through decreased downtime, rework, and material usage through streamlining production processes and reducing waste.

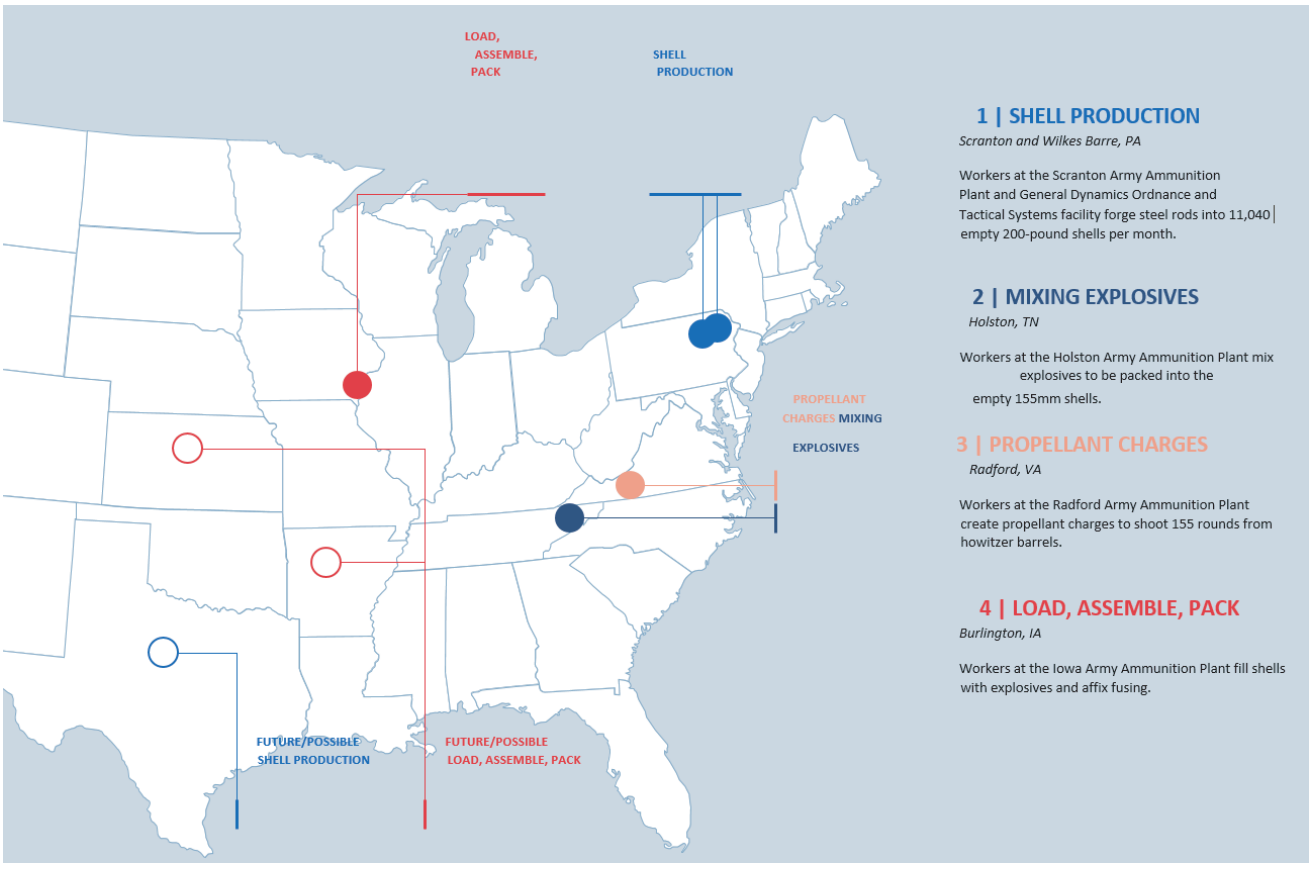
Automation and robotics technologies optimize labor utilization and increase throughput, lowering labor costs and enhancing cost competitiveness. Additionally, adopting advanced manufacturing techniques enables AAPs to produce high-quality munitions more efficiently and affordably, reducing overall production costs and enhancing cost effectiveness.

Modernization efforts strengthen supply chain resilience by improving production flexibility, responsiveness, and redundancy within the DIB. Adopting advanced manufacturing technologies reduces dependency on external suppliers by enabling in-house production of critical components and parts. This mitigates risks of supply chain disruptions caused by geopolitical instability, transportation bottlenecks, or supplier failures.[22]

AAPs, coupled with modernization policy efforts, enhance adaptability, enabling rapid reconfiguration and customization of production processes to meet changing demands and operational requirements. Automation and robotics technologies streamline production workflows, allowing for flexible and agile responses to evolving threats, emerging technologies, or mission priorities. Initial investments into these policy recommendations are in their infancy (as depicted in figure 5) and can greatly benefit from additional growth opportunities. These investments will lead to training and workforce development programs that ensure personnel possess the skills and expertise to adapt effectively to new technologies, processes, and operational scenarios, enhancing the overall adaptability and responsiveness of AAPs.[23]

Modernizing AAPs requires significant upfront investment in automation, robotics, and facility upgrades. Securing funding for these initiatives may pose challenges, particularly amidst competing budgetary priorities within the defense sector. Policy efforts to support these kinds of investments in modernization, such as legislative initiatives promoting automation and robotics, may encounter regulatory hurdles or resistance from stakeholders concerned about job displacement or safety implications.[24]

Flexible contracting. Improving contracting and procurement models within the DOD can significantly assist the DIB and enhance its surge capacity and infrastructure. Many DIB companies cite budgetary instability and unpredictability as one of the top barriers to operating within the defense industry.[25] Altering policy to focus on ammunition orders that reflect long-term MYP contracts and the ability to procure long-lead parts are indispensable tools for restocking and bolstering munition supplies. Legislative and administrative



(Figure by Stacie Pettyjohn and Hannah Dennis, *Production Is Deterrence*, 19)

Figure 5. Future Modernization Efforts/Ammunition Production Infrastructure

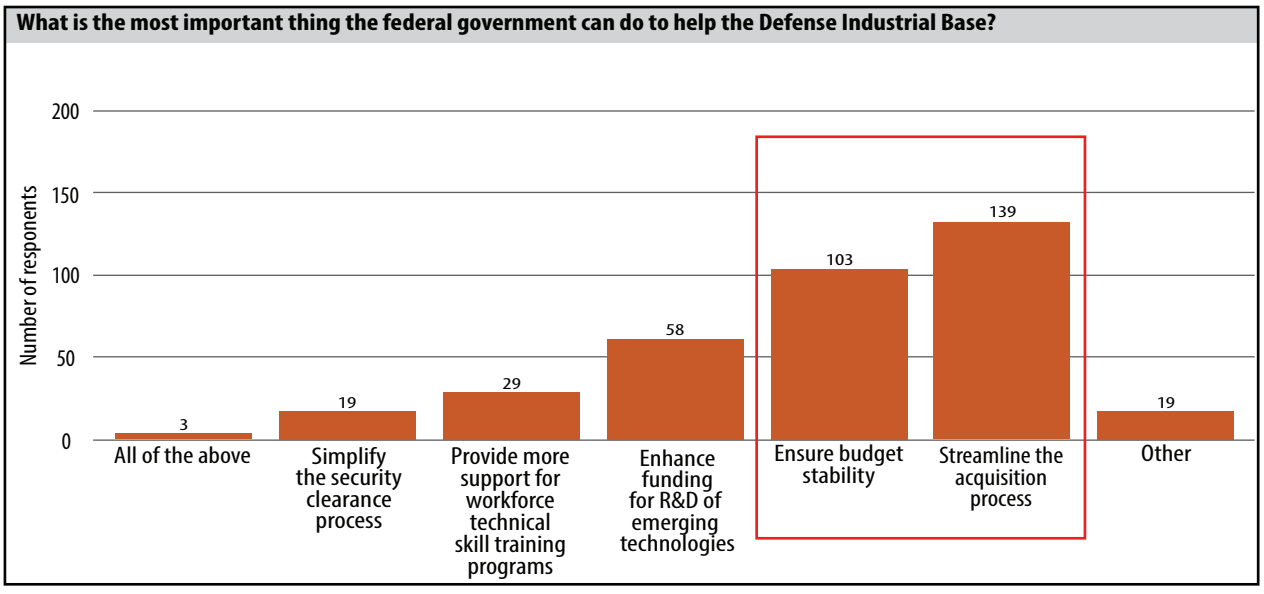
burdens, such as the increasingly common "continuing resolution," add hurdles and setbacks to critical acquisitions essential for strengthening the capacity and effectiveness of the U.S. military.[26] These hurdles are depicted in the NDAA's annual survey of companies that make up the DIB in figure 6.[27]

Anticipating these challenges, policymakers must work on aligning and investing in DIB ammunition production needs against anticipated conflict demands. Changing procurement and contracting policies for ammunition production from annual to multiyear contracts will guarantee producers sustained sources of revenue, enabling investments and maintenance of surge capacity infrastructure.

Several flexible contracting mechanisms can be applied to procurement strategies to provide agility and adaptability in meeting the DOD's dynamic needs. These mechanisms offer alternatives to traditional fixed-price contracts and allow for greater acquisition management flexibility.

Indefinite delivery/indefinite quantity contracts. Indefinite delivery/indefinite quantity (IDIQ) contracts establish a framework agreement between the government and a contractor, specifying terms and conditions for future orders of goods or services. They provide flexibility, especially for ammunition production, by allowing the government to place orders as needed without separating contract negotiations for each procurement.[28] This enables rapid acquisition of supplies and services, particularly during surge situations, while maintaining competitive pricing and minimizing administrative overhead.

Task order contracts. Task order contracts are a type of IDIQ contract where specific tasks or deliverables are defined through individual task orders issued by the government. This approach efficiently manages



(Figure by Col. Wesley Hallman and Robert Van Steenburg, *The Health and Readiness of the Defense Industrial Base*, 54)

Figure 6. Primary Obstacles to Private-Industry Defense Industry Base Companies

complex projects with varying requirements and timelines. Task orders can be tailored to address specific surge needs, such as urgent production of critical components (especially with ammunition production) or rapid deployment of technical expertise.[29]

Modular contracts. Modular contracting involves breaking down large acquisition programs into smaller, more manageable modules or increments. Each module addresses a specific capability or component, allowing incremental development and deployment. Modular contracts facilitate flexibility by enabling the government to adjust requirements, incorporate emerging technologies, and scale production according to evolving priorities. This approach enhances responsiveness to surge requirements while reducing risk and promoting supplier competition. This approach allows for the incremental development and deployment of capabilities, optimizing resource allocation and reducing the risk of costly program delays or overruns. By breaking down large acquisition programs into smaller modules, the government can more efficiently adjust requirements and scale production according to evolving priorities.

Flexible pricing structures. Flexible pricing structures, such as cost reimbursement or incentive-based contracts, provide mechanisms for adjusting contract terms based on performance, cost, or other factors. These pricing models allow for greater risk-sharing between the government and contractors, incentivizing efficiency and innovation. By aligning financial incentives with desired outcomes, flexible pricing structures promote responsiveness to surge requirements and encourage continuous improvement within the DIB.

Flexible contracting mechanisms, such as IDIQ contracts and task order contracts, provide agility and adaptability in meeting the Defense Department's dynamic needs. They enable rapid acquisition of supplies and services, especially critical during surge situations, without the delays associated with traditional procurement processes. Combining this framework with multiyear purchases offers significant mitigation to continuing resolution scenarios or other forms of legislative dysfunction, as a multiyear contract would be protected under its initial approval and not be "frozen" by annual appropriation processes. Flexible contracting mechanisms streamline the procurement process by allowing the government to issue task orders or place orders under IDIQ contracts as needed without separate contract negotiations for each procurement. This saves time and administrative overhead, enabling faster acquisition of critical supplies and services.

Mechanisms within flexible and MYP contracts also aim to enhance supply chain resilience. These approaches mitigate vulnerabilities and enhance the resilience of the defense supply chain by diversifying supplier sources, promoting collaboration with industry partners, and incorporating supply chain risk management into contract requirements. Modular contracts and agile acquisition methodologies enable the rapid integration of alternative suppliers and the adaptation of production processes to minimize disruptions and ensure continuity of operations, even in challenging environments.

Implementation plan. Adopting an implementation plan that recognizes and accommodates each ammunition production program's unique intricacies is imperative. A one-size-fits-all procurement approach needs to be revised due to the distinct requirements inherent in precision munitions and the other various calibers of ammunition at the AAPs. Attempting to force all programs into a singular solution invariably leads to inefficiencies and challenges. A severe disadvantage to the current procurement process that hinders ammunition surge capacity lies in the increasingly recurring practice of operating under continuing resolutions at the onset of each fiscal year. Most single-year contracts are especially vulnerable to continuing resolutions, resulting in notable delays and heightened costs.[30] This phenomenon curtails the commencement of contracting and production activities without prior approval and funding and hamstrings nearly all ammunition production stakeholders due to the limits of single-year contracts. Considering these challenges, this research paper recommends its concept of flexible and alternative contracting vehicles, such as Other Transaction Authorizations (OTAs), as an excellent policy alternative that currently has minimal applications in the Department of Defense, but could be altered and expanded to provide a concrete policy solution that can be applied to offer promising solutions to surge capacity needs.

Opponents of flexible contracting options will indicate that this policy solution also presents drawbacks. They will contend that multi-year contracts can limit transparency and necessitate additional efforts by the government to strike a balance between flexibility and maintaining appropriate levels of discipline. Thus, while MYPs offer advantages in specific contexts, carefully considering their implications is paramount in their implementation. It will be critical to engage all primary stakeholders of the current DIB to combat the opponents of an MYP-like solution to increase flexibility with contracting options, thus increasing the DIB's ability to surge capacity.

The DOD's involvement is crucial because it is the primary entity responsible for defense procurement. Its participation ensures that policies align with national security objectives and operational requirements. Including defense contractors is essential because procurement policies directly impact them. The DOD should appoint the secretary of the Army as the leader of the effort to implement significant policy changes in defense procurement, particularly regarding ammunition production. As the single manager for conventional ammunition, the secretary of the Army holds significant authority, insight, and responsibility over ammunition production within the DOD. This position provides the necessary leverage to drive policy changes and implement reforms effectively. The secretary of the Army and the Army leadership team possess specialized expertise and a deep understanding of the intricacies of ammunition production and procurement. Their insights into operational requirements, supply chain logistics, and industrial base dynamics are invaluable in shaping policy reforms that address specific challenges in ammunition production. Overall, appointing the secretary of the Army as the leader of the effort to implement significant policy changes in defense procurement brings the authority, expertise, accountability, collaboration, advocacy, and strategic vision needed to drive meaningful reforms and ensure the readiness and effectiveness of the DIB.

Conclusion and Implications

Echoing Roosevelt's advocacy for a robust "Arsenal of Democracy" before the United States entered World War II, this article underscores the urgent need for a substantial overhaul of ammunition production policies within the DIB. In a world characterized by evolving global threats and complex geopolitical dynamics, it is evident that current peacetime procurement methods are no longer adequate to meet modern conflict-oriented challenges.

Recognizing the unique intricacies of each ammunition production program, this article strongly advocates for adopting flexible contracting options as a strategic

imperative. By recommending the expansion of MYP contracts and the integration of automation and robotic support in existing Army ammunition plants, this proposal aims to enhance the production capacity of small-, medium-, and large-caliber rounds without the need for extensive investment in new production lines. The primary focus is on improving the efficiency and productivity of current manufacturing facilities.

The implementation and amplification of these flexible contracting policies, in conjunction with modernization efforts, carry profound implications both globally and within the DIB. Policies supporting MYP, underpinned by flexible contracting mechanisms, have the potential to bolster national security by ensuring a resilient and adaptable ammunition production capability. In addition, these measures will not only reassure U.S. allies and partners that proactive steps are being taken to equip the DIB to meet the material demands of potential large-scale conflicts but also present an opportunity for tangible impacts on ongoing global crises.

Furthermore, these policy recommendations are poised to enhance the DIB's competitiveness, foster innovation, and secure the long-term viability of defense contractors, particularly smaller firms reliant on diversification beyond defense contracts. These policies offer concrete steps toward reducing ammunition replenishment lead times by incentivizing industry partners to invest in surge capacity infrastructure, workforce capabilities, and automation technologies.

The integration of flexible contracting methods and the incorporation of robotics and automation represent crucial steps in modernizing ammunition production and strengthening the readiness and effectiveness of the DIB. By enhancing supply chain resilience through improved production flexibility, responsiveness, redundancy, and mitigation of supply chain risks, these modernization efforts also advance sustainability through the integration of energy-efficient technologies and sustainable practices.

Through collaboration with DIB industry partners, the United States can maintain its leadership in defense capabilities and ensure security for both the Nation and its allies in an increasingly complex global environment. This study underscores the critical importance of fortifying and modernizing the DIB to safeguard national security collectively. Notably, the implementation of these policies could potentially have a significant impact on the U.S. ability to support Ukraine in its defense efforts by ramping up ammunition production and providing crucial assistance amidst the ongoing conflict, underscoring the tangible and far-reaching effects of strategic policy initiatives in the defense industry. ■

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US ISSN 0026-4148