

Defense Manufacturing Reserve Accelerator Program

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Short Description

The Defense Manufacturing Reserve Accelerator Program is a pilot effort to create the capability to rapidly retool commercial industry into a manufacturing capability suitable for producing qualified military parts. A pivotal component of this program is the leveraging of the existing Industrial Innovation Laboratory to provide training, foster innovation, conduct demonstrations, and validate parts/processes from commercial suppliers to support surge defense production.

Discussion

Today, the world – including our adversaries – is witnessing the pressure that modern military conflict imposes on a shrinking defense industrial base. While the U.S. is currently providing materiel support to Ukraine and now Israel, the DoD industrial base is challenged with the need to maintain and replenish our own strategic reserves, at a time where we must prepare for the threat of a full-scale conflict in the Asia-Pacific Theater against a potential near-peer competitor with significantly increased air-based warfighting capabilities. Wargaming and other analyses continue to highlight the need for the DoD to be able to rapidly replenish its stocks of advanced aerospace military systems. As one example, a recent study¹ has shown that the U.S. Air Force would exhaust its entire inventory (over 6,000 missiles) of long-range precision-guided weapons family (JASSM, JASSM-ER, LRASM) in just the first 8 air campaign days of a Great Power Conflict. However, production of the stealthy anti-ship LRSAM currently takes over 2 years, in part due to reliance on global supply chains and the dramatic decline in small businesses serving the DoD as lower tier suppliers over recent years.

Key industrial readiness indicators are going in the wrong direction... In 1985, the U.S. had 3 million workers in the defense industry. That number is now 1.1 million workers and remains flat, Norquist said.

From 2016 to 2022, DLA lost about 22%, or 3,000 vendors, according to agency data. Small businesses accounted for 2,300 of those losses. Overall, the Department of Defense lost 43.1% of its small businesses in the same timeframe.

<https://www.defense.gov/News/News-Stories/Article/Article/3389621/industrial-base-strength-necessary-for-future-dod-success/> (9 May 2023)



David Norquist, President and CEO of the National Defense Industrial Association and Deputy SECDEF from 2019 to 2021.

¹ Mark A. Gunzinger, "Affordable Mass: The Need for a Cost-Effective PGM Mix for Great Power Conflict," Mitchell Institute for Aerospace Studies, November 2021, https://mitchellaerospacepower.org/wp-content/uploads/2021/11/Affordable_Mass_Policy_Paper_31-FINAL.pdf.

This PDAC request outlines a comprehensive program to further develop and demonstrate the application of digital engineering, advanced/additive manufacturing, and Industry 4.0 (I4.0) technologies to transform commercial industrial facilities into a manufacturing capacity capable of producing qualified military parts. This initiative thus seeks to outline the necessary steps the DoD must take to enhance national defense readiness, streamline supply chains, and foster innovation, through a deliberate program that seeks to establish reserve/surge capacity leveraging the commercial industrial base. Pivotal to success is the leveraging of the ARCTOS Industrial Innovation Laboratory to perform technology development, provide training in digital/I4.0 technologies, conduct manufacturing demonstrations, and support commercial partners.

The Declining Arsenal of Democracy...

While the United States remains the third largest manufacturer in the world, the effects of de-industrialization and globalization challenge the ability of the industrial base to scale for prolonged conflict. There is no more Rosie the Riveter to fill the role of servicemembers going overseas, or American Locomotive Company to build Sherman tanks, or Ford Motor Company to build B-24s. Then the United States had the advantage of being the world's largest manufacturer, having an underemployed workforce due to the Great Depression, and getting a head start on mobilization after the war began in 1939.

The long process of de-industrialization in the country and the development of global supply chains has allowed for the movement of more labor-intensive manufacturing jobs overseas while keeping, to a degree, finished goods manufacturing. The clearest example is the decline of manufacturing employment from 34 percent of all U.S. jobs in 1950 to roughly 9 percent today. This is reflected across the board in other key areas like forging (lost half of all businesses since 2002), foundries (lost half of businesses since 1984), or machine tools (28 percent of global market share in 1968 to 5 percent in 2019).



<https://warontherocks.com/2023/08/you-go-to-war-with-the-industrial-base-you-have-not-the-industrial-base-you-want/> (16 Aug 2023)

The program is designed to achieve the following objectives:

1. **Transform a commercial manufacturing facility to be capable of supporting the defense manufacturing base using traditionally commercial manufacturing lines.**
2. **Advance/implement digital engineering, advanced manufacturing, and Industry 4.0 technologies to enhance innovation, reduce costs, and expedite production.**
3. **Leverage a dedicated lab to drive research and development, prototype testing, and knowledge sharing. This lab could also serve a role as an “Underwriters Laboratory” clearing house for parts produced from commercial suppliers.**

The following steps will be employed to prove out the manufacturing reserve capability:

- A. **Commercial Facility Selection and Transformation**
 - i. Identify and assess a commercial facility suitable for conversion into a defense manufacturing center. Criteria should include infrastructure, security, and expertise.

- ii. Collaborate with commercial partner to devise comprehensive transformation plans, including the requisite modifications or upgrades to meet defense-grade standards.
- iii. Develop a detailed playbook that informs how to transition a commercial manufacturing facility into a defense industrial capability to include a plan outlining schedules, budgets, and performance expectations.

B. Implementation of Digital Engineering and Advanced/Additive Manufacturing

- i. Define digital engineering standards and tools to facilitate collaborative design, data sharing, and information exchange between defense and civilian manufacturers.
- ii. Establish advanced/additive manufacturing capabilities within the selected industrial site(s), emphasizing certification, quality control, and workforce training.
- iii. Develop a phased roadmap for the integration of digital engineering, advanced and additive manufacturing, and Industry 4.0 technologies.

C. Role of the ARCTOS Industrial Innovation Laboratory

Existing ARCTOS facilities will play a pivotal supporting role through:

- i. **Research and Development:** Investigate best practices and cutting-edge technologies for leveraging digital engineering, advanced/additive manufacturing, and Industry 4.0 technologies to transform commercial manufacturing lines for defense production.
- ii. **Demonstrations and Prototype Testing:** Work with commercial suppliers to demonstrate advanced technologies, and create and test prototypes of defense-standard parts using advanced manufacturing techniques.
- iii. **Qualification Process Development:** Work with the Defense Logistics Agency, the DoD ManTech community, and OEMs to develop and implement qualification processes to ensure commercially produced articles meet defense production needs.
- iv. **Workforce Training:** Establish/conduct responsive training programs to operate digital engineering, advanced/additive manufacturing, and Industry 4.0 equipment.

Conclusion

The envisioned program would be a 2.5-year pilot effort to prove out the capability and establish the playbook, processes, and facilities to transform commercial suppliers to meet reserve/surge defense production needs, through the application of advanced technologies to reduce costs, increase production, enhance versatility, and effectively qualify resulting parts. This is a critical national security challenge and the Dayton ecosystem is ideally well poised to lead the charge.