
The Changing Defense Industrial Base

[The following is a reprint of an article which appeared in the July/August issue of the Department of Defense publication, *Defense* 92, pp. 47-52. The original article was based on the Defense Industrial Base White Paper, May 20, 1992.]

U.S. national military strategy for nearly five decades focused on the threat imposed by the Soviet Union and its communist ideology. The most demanding military requirement was to be prepared for a quick-thrust, major Soviet attack in Europe that could rapidly escalate into a global conflict. The United States and its allies would be forced to fight against massive Soviet forces equipped with the most modern weapon systems. To meet this threat, the United States had to field relatively large numbers of systems while pushing modernized weapons into production as quickly as possible.

With the demise of the Soviet threat, the need for development, production, and fielding of a large number of modernized weapon systems and munitions has ended, as has the need to provide industrial capacity to surge the production of major weapon systems during a crisis.

Certain realities remain, however. There are still threats to our security, and the United States is still looked to for world leadership. We must be able to deal with future threats to U.S. interests in an uncertain and unstable world.

These future challenges can be met with a smaller force, as long as that force maintains the kind of technological edge demonstrated in Operation Desert Storm. Less equipment is required, and, in many cases, the service life of that equipment can be extended because the pressures for modernization and replacement have greatly diminished. Defense spending will continue to be reduced, with a shift in priority toward science and technology, including manufacturing process technology.

BETTER SIZE, MORE EFFICIENCY

These changes have obviously affected, and will continue to affect, the industrial base. After a period of rapid growth in the early 1980s, the defense acquisition budget has been declining, with defense firms reacting accordingly. Companies and organic defense depots continue to downsize and streamline and divest excess capacity by sale, merger, or plant shutdown. Further changes are likely. Prime contractors may decide to bring subcontracted work in-house, and some suppliers may leave the defense business. The result should be a smaller, more efficient industrial base—one better sized to meet our reduced needs.

The Department of Defense has four principal objectives for the industrial base over the next 10 to 20 years. First, and most importantly, it must support the base force structure in peacetime. Second, beyond peacetime, it must be capable of supporting planned contingency-related needs. Third, the industrial base must be able to build up production capacity faster than any newly emerging global threat can build up its capacity. Fourth, the industrial base must be as efficient and cost-effective as possible.

The department has formulated a four-step approach to meet these objectives:

- Continue to invest a significant amount of funds in procurement of cost-effective, producible, and necessary systems or system upgrades to maintain the superiority of U.S. weapon systems.

- Continue to develop new and innovative manufacturing technologies to improve the efficiency of production.

- Establish an industrial base oversight process that will identify critical processes, products, or capabilities; monitor changes occurring in the industrial base to obtain early warning of the potential loss of these critical items; and take actions to preserve a needed critical process, product, or capability in those exceptional situations where it may be lost and cannot be recovered in time to meet an emerging threat.

- Stimulate changes in the industrial base that will increase efficiency and competition.

ACQUISITION INVESTMENTS

Generally speaking, the industrial base will not reach a new equilibrium overnight nor will the transformation be drastic. The department continues to invest a sizable amount of resources in research and development and weapon systems procurement.

Under current plans, between fiscal 1993 and fiscal 1997, we will spend nearly \$190 billion in research and development. This represents about 14 percent of the defense budget. Projected procurement expenditures for the same period total more than \$300 billion, or about \$60 billion per year—22 percent of the DoD budget.

There is no reason to believe that continuation of the current competitive acquisition practices will cause either the technology base or the major defense prime contractor and subcontractor production base to reach dangerously low levels. Accordingly, the primary department approach to the downsizing will be to continue to let the free market prevail through competition. Some exceptions to this approach may be necessary.

NEW MANUFACTURING METHODS

DoD is pursuing a specific thrust area within the Science and Technology Program entitled "Technology for Affordability." This initiative examines new technologies for time, cost, and production efficiencies in the areas of hardware/software prototyping, flexible production capabilities, and advanced manufacturing processes. This process-oriented thrust supports the development of new product technologies within the science and technology strategy.

The department is committed to expanded research and development to make flexible manufacturing processes that can be adapted to produce more than one type of item. This makes the production of a smaller number of each type of item more efficient, which will reduce reliance on economies of scale. It also has the potential to provide entirely new manufacturing methods that could replace existing critical processes.

The department also will continue to make design and manufacturing processes more efficient by investing in modernization. An example is Computer-aided Acquisition and Logistics Support, which serves as the framework for a joint DoD-Department of Commerce-industry initiative for standardizing product design data in digital form. This data standard will enable production of designs in a common computer format so they can be replicated easily anywhere in the acquisition cycle for design improvements, manufacturing work instructions, or maintenance. This concept facilitates rapid prototyping, production efficiency, and production restart/reconstitution.

DoD oversees the industrial base to ensure that critical manufacturing processes are maintained, even during gaps in production. We know some critical production elements would be difficult to reconstitute. Thus, support may be needed to maintain their timely availability. Such

manufacturing capabilities, including not only technologies but also critical engineering and unique worker skills, must be protected.

However, where technology or a manufacturing process is not critical for reconstitution, it will not be funded. We cannot support noncritical elements of industry just to keep them going.

The department divides the industrial base into six major sectors: aircraft, ships, combat vehicles, missiles and space, munitions, and electronics. The oversight process starts with identification of critical industrial processes, products, and capabilities. The industrial base is then monitored to provide early warning that a critical process, product, or capability may be lost. The department takes action if the situation requires an extraordinary measure.

IDENTIFYING CRITICAL ITEMS

Identifying critical processes, products, and capabilities is a complex, multifaceted endeavor. The department applies a three-step approach to address this problem, and the approach is similar whether a product, process, or a capability is in question. For simplicity, they will be referred to as items. The first step is to screen the item to identify potential candidates for further analysis in a prioritized order. Items that are obviously noncritical are eliminated at the start. Remaining items are then put in order of priority for further consideration.

Major defense acquisition programs are examined as part of this process at each milestone. Items about to go out of production are also reviewed because they could become critical. Finally, out-of-production items are analyzed for criticality.

The second step is to determine whether there is likely to be a critical shortfall for a particular item under consideration. A set of criteria is applied to determine whether the item is, or will likely be, needed to support reconstitution requirements or other future acquisition needs. Once this requirement is established, the item's availability is determined. Availability includes on-hand inventory, including assets in long-term storage, and the amount of production that may be obtained from the industrial base. The potential to reconstitute production facilities is also considered. A shortfall exists if the item's availability does not meet known requirements.

The third step in the process is to determine the nature of the shortfall; that is, whether the problem is with a process, technology, skill, material, equipment, or facility. Detailed analyses are routinely made as part of the acquisition process, the programming and budgeting process, or a special study. Once identified, the critical item moves to the next step in the process—a determination of whether some special DoD action is required.

MONITORING CHANGES

A primary reason to proceed to the next step in the process is a significant decline in the business base for an industry. Therefore, the department monitors defense spending for products and services by industry over time to provide an early warning that an industrial or technological capability essential to production might be in jeopardy.

Our basic plan has been to examine the industrial base in sufficient detail to understand and describe relationships among industrial sectors. Fiscal 1990 and 1991 editions of the *Report to Congress on the Industrial Base* were written to provide that description. Our ongoing analyses continue to pursue this effort.

Monitoring is carried out on an industry-by-industry basis for several hundred industries. If a significant decline in anticipated purchases is observed, the department examines the industry in

much more detail. Additional factors such as non-defense business, vulnerabilities specific to defense programs, foreign sales, involvement of unique skills and trades, need for specialized facilities, and long-lead time industrial equipment, and the number and type of items involved are also considered. Focus is on the viability of minimum essential capabilities to provide a future, timely response, not survival of any particular firm.

In general, this careful monitoring approach is working. There are very few candidates for extraordinary measures. In those few cases where it appears an essential, unique capability may be lost in a way that will likely preclude timely reconstitution, the department is taking action. Criteria for action are:

- There is no other product or process solution available now.
- The product or process solution available now will not be available when it may be needed in the future.
- There is no other solution on the horizon.

Resources required to maintain a specific capability until it might be needed are weighed against affordability, time, and other resources required to regenerate that capability in the future. Alternative sources or substitutes will be sought for potential needed future capability.

If there is no substitute or alternative source and if analysis shows reconstitution would take too long or be too expensive, other options are examined. They include related DoD contract work, opening additional maintenance and repair work to competition between the public and private sectors, related research and development efforts and directed procurements. Continuation of actual production is not expected to be needed except in rare circumstances.

Nuclear propulsion technology is one area identified as an essential, unique capability that will be difficult to maintain during a period in which there is a gap in submarine production. The department is examining options to ensure that nuclear propulsion and other submarine technology capabilities will be available when needed.

Chemical agent antidote autoinjectors are an example where the department has in the past and will in the future maintain a very limited production capability.

Tank production, on the other hand, is an example of a situation in which no action is required beyond research and development of armor. M-1 Abrams tank production is about to end, and production of a new-generation tank is not expected to begin until later in this decade or after the turn of the century. Realizing this, the department used the methodology just described to perform a comprehensive industrial base analysis for tank production.

This analysis addressed the implication of plant layaway, startup and rampup with regard to cost, lead time, spares, major subcontractors and vendors, critical skills, and environmental conditions. The study identified risks associated with varying production rates for electro-optics, engines, transmissions, weapons, basic material, complex machining, and assembly.

As a result of these detailed analyses, the department concluded that no extraordinary actions beyond prudent shutdown planning and execution were required. There are enough tanks available now to meet any perceived contingency, and there is enough time to reconstitute the tank industrial base if a global threat emerges. Therefore, tank production will cease as planned.

EFFICIENCY AND COMPETITION

The department has several initiatives under way to stimulate efficiency and competition and to minimize the needs for exceptions.

The department is streamlining weapon systems maintenance operations by allowing military maintenance depots and private firms to compete for maintenance work. Historically, most weapon systems maintenance was performed within the services after a period of transition during which the system developer performed maintenance.

Since inception of the competitive program several years ago, our primary goal has been to receive the best services at the best price. At the same time, we seek to preserve appropriate surge, or core, capability, while assuring a fair comparison of costs between the public and private sectors.

This competition has encouraged all participants to become more efficient through consolidation of operations and streamlining of support costs. These improvements continue to be demonstrated with each round of depot maintenance competition.

In addition to working toward greater efficiency in the depots, force structure reductions have enabled the department to return some overseas maintenance capabilities to the United States. For example, depot maintenance work from Mainz Army Depot in Germany and Subic Bay in the Philippines will be performed in the United States. For Mainz Army Depot, about half of the workload will go to other Army depots in the United States and the other half will be opened for competition among defense depots and private industries.

As part of an effort to integrate production capabilities and technologies, the National Defense Manufacturing Technology Plan has been developed. It outlines DoD efforts to apply manufacturing technology advances in a wide variety of specialized areas, like precision machining, composites fabrication, and electronics packaging. It also addresses specific service initiatives for improving unique manufacturing processes. This plan is serving as the framework for a more comprehensive Defense Manufacturing Strategy which will consolidate DoD manufacturing process improvement initiatives.

To broaden its access to the national industrial base, the department is shifting from military-unique products and processes to commercial counterparts wherever possible. To satisfy new materiel requirements, we first research the marketplace to identify commercial alternatives and, if necessary, perform trade-off analyses to avoid the development of new military-unique items. By using commercial items, we capitalize on economies of scale and achieve efficiencies in peacetime. We also gain access to a larger industrial base that becomes an important foundation for a capability to regenerate forces to meet an emerging major threat. Commercial capability enables our downsizing to proceed more coherently; for example, commercial engine production is the foundation for automobile, truck, and tank engine manufacturing. It is not necessary to specifically keep a tank engine industrial base in operation when efficient commercial processes exist.

CONCLUSION

The Department of Defense will continue to emphasize the importance of the industrial base. Although total defense spending will decrease, the department has an approach that capitalizes on our technological flexibility to assure the industrial base can meet peacetime needs, while maintaining the ability to reconstitute larger forces faster than any potential enemy.

DoD policies emphasize the maintenance of design, production and technological capabilities in special areas critical to future defense needs. These policies rely on a free market approach, which, with limited exceptions, provides the basis for what we need.

The reduction in the force structure and the defense budget mean we cannot sustain programs or production capacity that we do not absolutely need. Sustaining them would divert scarce resources from the real muscle of defense—trained and ready forces equipped with first-rate weapons. Unnecessary products and programs sap readiness and hinder our ability to pursue the technological advances that are the basis of the qualitative advantage of U.S. weapons.