



Keeping Track of Horseshoe Nails

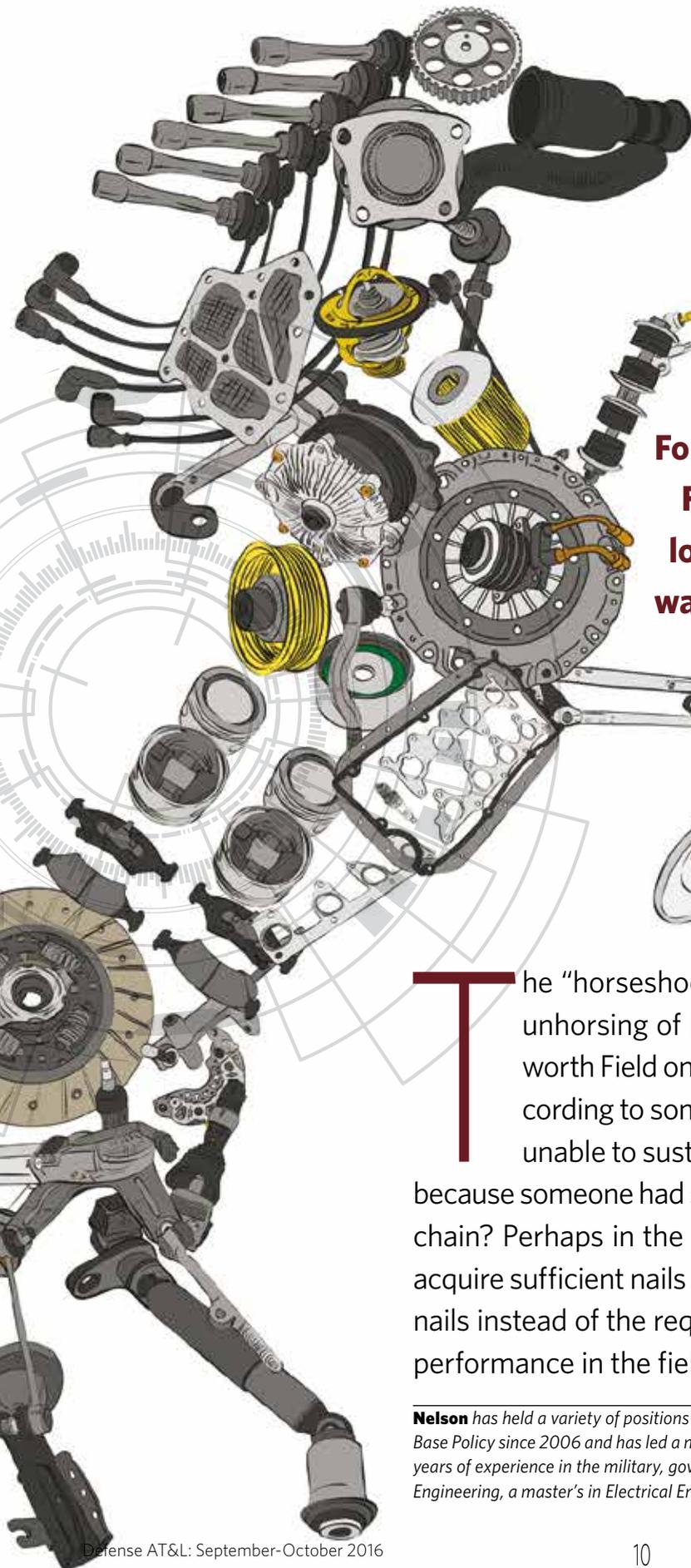
Industrial Base Analysis and Sustainment

Bradley K. Nelson

**For want of a nail, the shoe was lost;
For want of a shoe the horse was
lost; For want of a horse the battle
was lost; For the failure of battle the
kingdom was lost—
All for the want
of a horseshoe nail.
—English Proverb**

The “horseshoe nail” proverb may have its origin in the unhorsing of King Richard III during the Battle of Bosworth Field on Aug. 22, 1485. Richard III’s warhorses, according to some accounts, were poorly shod and proved unable to sustain themselves against their rivals. Was it because someone had sabotaged the king’s horseshoe nail supply chain? Perhaps in the buildup phase, his forces were unable to acquire sufficient nails and for each horse tried to get by with five nails instead of the requisite eight to 10, leading to poor combat performance in the field?

Nelson has held a variety of positions in the Department of Defense Office of Manufacturing and Industrial Base Policy since 2006 and has led a number of industry-wide capability assessments. He has more than 30 years of experience in the military, government, and private sector, holds a bachelor’s degree in Mechanical Engineering, a master’s in Electrical Engineering and is a licensed Professional Engineer.



The specific details matter less than the central issue: the need for modern armies, including America's, to ensure an adequate and reliable supply of critical warfighting materials long before the outbreak of hostilities. Moreover, this concern applies not just to the big-ticket items—the equivalents of your horses and the armor for them and your horsemen—but includes simpler and more generic items like horseshoe nails. While the former may seem more pressing, it is the latter that more often are neglected, partly because one might assume that simpler components are plentiful in the commercial market and easily adapted to military use.

In today's warfighting environment, planners aren't worried about the availability of horseshoe nails but about items such as thermal batteries needed to ensure that rockets can operate under harsh cold-weather conditions, or the stockpiling of rotary heads for combat helicopters and propeller aircraft. But, just as in Richard III's time, the greatest concern may lie at the more invisible subtier supply level, where items might have dual commercial and military uses. Making an assumption that there is a naturally abundant supply of these items in the open market might result in unforeseen equipment failures, leading to catastrophic battlefield loss.

Fortunately, America's defense planners have learned the lesson of history. The Pentagon is carefully monitoring the gaps

and vulnerabilities of the industrial base as a whole. In 1994, the Department of Defense (DoD) established an office, now known as Manufacturing and Industrial Base Policy (MIBP), to monitor production capabilities, stockpiles and supply chain flows and prospective bottlenecks of critical subtier defense items. In 2014, the DoD began a special program, known as Industrial Base Analysis and Sustainment, or IBAS, to fund mitigation of identified industrial base issues. If America goes to war, it wants to be able to surge its forces to match any level of threat. That means ensuring that America's forces have enough of the war supplies they need available on demand at all tiers and that those supplies are reliable and will hold up under the stress of combat.

IBAS follows the Office of MIBP methodology in evaluating risk to the industrial base by assessing both the fragility and criticality of a capability or product. How important is it to defense readiness? In what measure is it vulnerable to loss or disruption?

The sweet spot for the IBAS program is reducing the risk of losing industrial base capabilities that are important but invisible and whose maintenance is under-incentivized. In addition, the goal is not to sustain all capabilities indefinitely but to avoid reconstitution costs when capabilities are likely to be needed in the foreseeable future. IBAS makes investments only when

Where Can You Get the Latest on the Better Buying Power Initiatives?

- **BBP Gateway (<http://bbp.dau.mil/>)** is your source for the latest information, guidance and directives on Better Buying Power in defense acquisition
- **BBP Public Site (<https://acc.dau.mil/bbp>)** is your forum to share BBP knowledge and experience



DEPARTMENT OF DEFENSE

Better Buying Power

Acquisition, Technology, and Logistics



sustainment is more cost-effective than reconstitution and results in overall cost savings to the DoD.

The three main areas of IBAS focus are:

- **Unique Capabilities**—Lifelines and safe harbors for critical, unique capabilities with fragile business cases.
- **Design Teams**—Preserving critical skills for technological superiority.
- **Industrial Base Supply, Expansion and Competition**—Supporting expansion of reliable sources.

Proposals for IBAS funding are evaluated in a four-step process. First, proposals are scored with established fragility and criticality criteria. Fragility examines characteristics that make a specific capability likely to be disrupted. Criticality examines characteristics that make a specific capability difficult to replace if the capability is disrupted. Second, proposals are reviewed for alignment with IBAS objectives. Third, proposals are ranked by a multi-Service/multi-agency Joint Industrial Base Working Group review panel. Fourth and finally, the Deputy Assistant Secretary of Defense for MIBP evaluates the review panel results and makes the final selections for IBAS funding.

Thus far, IBAS has initiated roughly 20 different projects in various areas. The following are a few representative examples:

Butanetriol. The IBAS program addressed a situation where a prohibited source, China, was a sole-source provider for Butanetriol, a precursor chemical used in solid rocket propulsion that enables smokeless/low-signature operation. Butanetriol is a “fine chemical,” the production of which involves dozens of steps that take several months for a single batch. It also is a defense-specific product with little or no commercial application. Annual defense industrial base purchases are substantially less than \$5 million per year. As a result, there is no interest among large domestic chemical manufacturers to meet the need. IBAS funds were used to design minor modifications to the facilities of Penn A Kem in Memphis, Tennessee, enabling the first full-rate production of this material in the United States since 2002. This project ensures the sustainment of this capability across many DoD programs including the HELLFIRE air-to-surface missile, Joint Air-to-Ground Missile, the TOW and Javelin anti-tank missiles and Griffin lightweight rocket system.

Infrared sensors. After the Second Generation focal plane array production ended in 2012, funding from IBAS program in 2014 and 2015 allowed key technical personnel of DRS Infrared Sensors & Systems in Dallas, Texas, “to continue advancing the technology base for the Army’s Third Generation focal plane arrays,” said Shawn Black, vice president and general manager of DRS. “In addition, it has allowed DRS to recruit new critical technical and production personnel in support of this effort.” Recognizing DRS’ sustained technological capability, the Army on March 16, 2016, announced a contract award to DRS Technologies to develop the Third Generation Forward

Looking Infrared in the engineering and manufacturing development phase of the program.

ESAD fuzes. Missiles and many of their subcomponents obviously have no commercial counterparts. At very low production rates, some of these subcomponents are at risk of becoming unsustainable. In many missile systems Electronic Safe and Arm Devices (ESADs) have replaced mechanical fuzes and are one of the at-risk components. In order to ensure a reliable supply of ESADs in the future, IBAS is funding a two-phase project. The primary aim of the first phase is cost reduction. The second phase is meant to increase commonality and expand ESAD usage to higher-production gun-fired and air-delivered munitions. Expanding to additional munitions would improve the overall business case for the subcomponent and thereby improve its sustainability.

A number of industrial base assessments are under way that might well result in new IBAS funding. For example, the micro-electronic sector remains an area of priority focus. IBAS has provided critical investments in research and development and in qualification testing to develop trusted foundry technologies. These technologies include focal plane arrays to meet advanced imaging requirements for the space, ground, and aviation sectors, as well as radiation-hardened microelectronics, and a specialized integrated circuit approach to ensure the preservation of strategic national security systems, such as the Trident missile in high-threat environments.

MIBP also is paying increased attention to the problem of single-source vulnerability in the defense industrial base. For a number of critical products or capabilities, the loss of a single supplier could lead to a catastrophic failure of the DoD’s ability to supply the warfighter. A fire at a factory in the United Kingdom in February 2015 destroyed the DoD’s only source of rotary heads for C-130J aircraft. In these sorts of cases, the DoD especially wants to be able to expand and upgrade the number of defense-unique and defense-focused suppliers. The IBAS program is not intended to rescue individual suppliers. However, in zeroing in on subtier capabilities and the manufacturing processes that sustain them, IBAS invariably becomes involved with a relatively small number of suppliers that might be affected by adverse market or procurement trends. As in the C-130J case, IBAS could play an important role in helping to fund and promote new suppliers on U.S. soil to shore up vulnerable areas in the supply chain.

As the IBAS program evolves to meet its statutory mission, it will increase its focus on innovation, employ the most effective acquisition methods, and seek out non-traditional commercial suppliers. This focus is a clear indication that the DoD cannot afford to consider horseshoe nails a lesser capability—or a strategic afterthought.

For more information, see the website at <http://ibasp-public.ria.army.mil/>



The author can be contacted at bradley.k.nelson2.civ@mail.mil.