Posturing the U.S. Ammunition Industrial Base for the Future

Matthew T. Zimmerman

The Single Manager for Conventional Ammunition (SMCA) Industrial Base Strategic Plan establishes a management framework for posturing the ammunition industrial base supply chain to effectively respond to current and future conventional ammunition requirements. Its initiatives and strategies provide the underpinnings for optimizing acquisition planning and decision making that affects the ammunition production base's preparedness.

Sonar Technician Third Class Jon Kristoffersen inspects an explosive charge before entering the water from an airborne CH-46D Sea Knight helicopter. (U.S. Navy photo by Photographer's Mate Third Class Joshua Word.)

Figure 1. Ammunition Family Commodity Categories

The Industrial Base

The ammunition industrial base supply chain is a vast global network of critical core competencies, capabilities and capacities that provide the required raw materials, components and assembled end items for military training and combat. The industrial base's dimensions are organized and managed by commodity family categories as depicted in Figure 1 and by base functional area industrial sectors that include:

- Propellant.
- Small caliber ammunition.
- Metal parts.
- Explosives.
- Load, assemble and pack (LAP) operations.
- Electronics, sensors and fuzing.

Program Executive Office Ammunition (PEO Ammo), Picatinny Arsenal, NJ, and the Joint Munitions Command (JMC), Rock Island Arsenal, IL, jointly manage the ammunition industrial base, which absorbs DOD resources in excess of $2 billion annually. It comprises commercial and organic suppliers supporting more than 365 ammunition end items and an expansive bill of materials. The commercial supply side extends well beyond 100 suppliers, while the organic supply base comprises 11 government-owned, contractor-operated (GOCO) Army Ammunition Plants (AAPs) and three government-owned, government-operated (GOGO) plants that support the Army, Navy, Air Force, Marine Corps and Special Operations Command product lines.

Assistant Chief of Staff for Installation Management/Army Environmental Center
Assistant Secretary of the Army for Acqusition, Logistics and Technology
Assistant Secretary of the Army for Installations and Environment
Chemical Materiel Agency
Defense Contract Management Agency
General Services Administration
HQDA G-3
HQDA G-4
HQDA G-8
Joint Munitions Command
Munitions Industrial Base Task Force
PEO Ammunition
PEO Tactical Missiles
PM Aviation Rockets and Missiles
PM Close Combat Systems
PM Combat Ammunition Systems
PM Maneuver Ammunition Systems
U.S. Air Force
U.S. Army Armament Research, Development and Engineering Center
U.S. Army Materiel Command Headquarters
U.S. Marine Corps
U.S. Navy
U.S. Office of the Undersecretary of Defense for Acquisition, Technology and Logistics

Figure 2. SMCA Industrial Base IPT Organizations

Strategic Planning Process

Strategic planning commenced with the establishment of a multiservice, multiorganizational integrated product team (IPT). The SMCA Industrial Base IPT's diverse composition ensured maximum industrial base stakeholder representation as illustrated by Figure 2. The IPT followed a disciplined approach to structure the planning process and strategic plan content, employing Six Sigma methodologies throughout the effort. The top-level planning process condenses simplistically to the logic of establishing where we want to be in 2015, where we are now and how are we going to get there. These are outlined in Figure 3 on Page 61. The processes' execution was iterative and required periodic reality checks to ensure all goals and objectives were realistically attainable.

At the "tank line of the future" at Iowa Army Ammunition Plant, a 120mm tank round is filled with propellant.

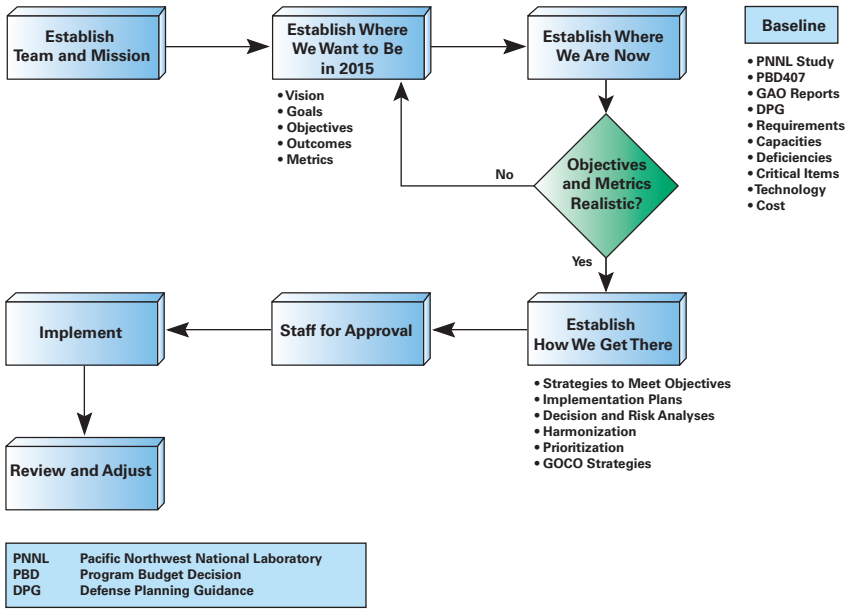


Figure 3. Strategic Planning Process, Level 1 Process Map Using Six Sigma Principles

Several IPT brainstorming sessions and the application of Six Sigma affinity diagramming and quality function deployment techniques generated our strategic vision, goals and overarching strategies. Simply stated, our vision is to create *"A responsive, innovative and efficient manufacturing base capable of meeting national security requirements while preserving critical core competencies and relying to the maximum practical extent on competition and private ownership."*

Goals and Objectives

In addition, strategic objectives were formulated for each goal, followed by the expected outcomes and performance measures as follows:

Goal 1. Balance industrial base and acquisition management risk.

- *Objective 1.1.* Ensure critical core competencies and capabilities are available to meet requirements.
- *Objective 1.2.* Balance cost, schedule and performance with "need-to-have" capability.
- *Objective 1.3.* Establish right-sized ammunition industrial base.

Goal 2. Transform to meet current and future requirements.

- *Objective 2.1.* Reduce GOCO AAP operating costs/footprint and dispose of excess AAP capacity.
- *Objective 2.2.* Increase manufacturing capability and readiness.
- *Objective 2.3.* Determine effective requirements process and replenishment definition/strategy.
- *Objective 2.4.* Implement an integrated data environment (IDE) to facilitate optimizing acquisition planning and industrial base preparedness.

Goal 3. Incentivize industry to reinvest in capital equipment and processes.

- *Objective 3.1.* Increase industry investment in equipment and facilities.
- *Objective 3.2.* Maintain a financially viable industrial base.

Goal 4. Modernize utilized manufacturing capacity.

- *Objective 4.1.* Increase manufacturing readiness to meet current and future requirements.
- *Objective 4.2.* Promote Six Sigma, Lean and flexible manufacturing practices.

Goal 5. Operate efficiently and effectively.

- *Objective 5.1.* Reduce ammunition life-cycle costs.
- *Objective 5.2.* Maximize customer satisfaction.

Overarching Strategies

The IPT also developed seven overarching strategies to support the new vision as follows:

- Acquisitions will determine and posture the production base.
- Acquisitions and investments will be synchronized to ensure required manufacturing capabilities remain available.
- Industrial base considerations will be factored into the acquisition process.
- The industrial base infrastructure will be sized to maximize operating efficiencies and to reflect DOD planning guidance and economic realities.
- Private industry, as the principal ammunition supplier, will be provided incentives for investing in and sustaining the production base.
- Systems acquisition will be used to the maximum extent practicable.

The ammunition industrial base supply chain is a vast global network of critical core competencies, capabilities and capacities that provide the required raw materials, components and assembled end items for military training and combat.

Objectives →	Outcomes →	Strategies*
Objective 1.1 — Ensure critical core competencies and capabilities are available to meet requirements. **Objective 1.2 — Balance cost, schedule and performance with need-to-have capability.** **Objective 1.3 — Establish right-sized ammunition industrial base.**	**a. Industrial base is prepared to respond to all requirements.** **b. Increased industrial base stabilities.** **c. Improved surge capabilities.** **d. Possible increase in ammunition unit price.**	**a. Synchronize ammunition procurements core competencies and manufacturing capabilities.** **b. Use science-based production and prototyping for attaining surge capabilities and emergency requirements.** **c. Pursue feasibility and overall business case for GOCO AAP sell, long-term lease and/or consolidation focusing on preserving critical capabilities. (Pending BRAC outcome.)** *Truncated list of strategies

Figure 4. Strategic Goal #1 — Balance Industrial Base and Acquisition Management Risk

- Opportunities for greater Joint service activity will be identified and implemented.

Metrics

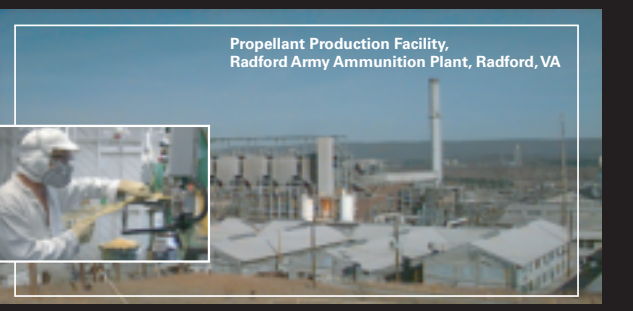
In addition to the performance measures for the strategic goals and objectives, overarching metrics were developed to characterize and baseline the state of the industrial base and to measure the effectiveness of implemented strategies. Because of the magnitude of the data involved, data collection will be a significant challenge requiring maximum use of an ammunition IDE. The overarching industrial base metrics follow:

- Operational — overarching and technical. Overarching: munitions readiness ratings by ammunition family for capability, capacity and availability to meet current and emergency requirements. Technical: supplier production delivery adherence, percent capacity utilization, facility condition, minimum sustaining rate and single point failures.
- Quality — requests for waiver submitted, quality deficiency reports and percent tests passing lot acceptance tests.
- Financial — corporate financial risk assessment.
- Facility Safety — number of Occupational Safety and Health Administration violations.
- Environmental — violations, national priorities list/ hazardous rating score and off-site contamination.
- Supplier Assessment Rating — customer satisfaction (cost, schedule, performance and business relations).

Tactical Strategy Formulation

The strategic planning process evolved from "overarching" to "tactical" following significant baselining activities involving data collection and assessment of ammunition requirements, capabilities, utilized capacities and supplier deficiencies. Deficiencies centered on supplier infrastructure and manufacturing inefficiencies, limited availability of critical components or raw materials, single qualified suppliers (see related information on single point failures in the sidebar on Page 65) and unavailability of manufacturing technology, capability and capacity to meet future advanced munitions needs.

Using the baselining activity and other assessments, lists of strategies for attaining each strategic goal and



Operating Contractors	Manufacturing Capabilities
Alliant Techsystems Lake City, MO	Small-Arms Manufacturing
Alliant Techsystems Radford, VA	Propellant Manufacturing (Rocket, Artillery, Tank, Medium Caliber; NC for Small Caliber)
American Ordnance Iowa	Load, Assemble & Pack (LAP) — Tank/Artillery, FASCAM
American Ordnance Milan, TN	LAP — Mortars, 40mm Cartridges; C-4 Extrusion
Chamberlain Manufacturing Scranton, PA	Large Caliber — Artillery/Mortar Metal Parts
Day & Zimmerman Kansas	LAP — Sensor-Fuzed Weapon; Mortar/Artillery
Day & Zimmerman Lone Star, TX	LAP — Grenades, Initiators, Detonators, Mines, Cargo Munitions
Day & Zimmerman Mississippi	Semiactive — Cargo Metal Parts
Norris Inc. Riverbank, CA	Steel/Brass Cartridge Cases, Grenade Metal Parts
Ordnance Systems Inc., BAE Holston, TN	Energetics — HMX, RDX
Valentec Louisiana	Semiactive — Large Caliber Metal Parts

Figure 5. Operating Contractors' Manufacturing Capabilities

objective were developed. To turn the strategies into a manageable and implemental plan, a hierarchical prioritization process (HPP) based on an expert system computer model was used to perform parallel comparisons of strategic goals and objectives to their corresponding tactical strategies. The HPP quantifies the relative importance of each strategy to achieving the most important goals and objectives, effectively determining which strategies should be a priority and which could be consolidated or eliminated. This process condensed 50 strategies to less than 30.

The strategic planning events' connectivity and logic flow is illustrated in Figure 4 on Page 62. For each strategic goal, the IPT developed objectives, expected outcomes, tactical strategies and performance measures.

Organic Industrial Base

The organic industrial base consists of 11 GOCO AAPs and three GOCO plants that were constructed during the World War II era. The operating contractors and a summary of their manufacturing capabilities are shown in Figure 5 on Page 62.

Overarching AAP Strategies

In a March 2003 memorandum, the Secretary of the Army (SECARMY) directed no GOCO AAP consolidation or divestiture implementation other than as part of the FY05 Base Realignment and Closure Process (BRAC). Thus, the SMCA Industrial Base IPT developed the following overarching AAP strategies in preparation for BRAC's conclusions:

- No GOCO AAP consolidation or divestiture implementation other than as part of the FY05 BRAC process without SECARMY approval.
- Reduce AAP cost of ownership.
- Reduce excess physical capacity and infrastructure.
- Identify and implement opportunities for greater Joint service activity.

> The HPP quantifies the relative importance of each strategy to achieving the most important goals and objectives, effectively determining which strategies should be a priority and which could be consolidated or eliminated.

In addition, the AAP facility-use contracts will be aligned with the FY05 BRAC timelines to the maximum extent practicable. Following the BRAC decisions, the feasibility and overall business case for sale, long-term lease and/or consolidation of capabilities to maximize efficiencies will be pursued.

Conclusion

Following Six Sigma methodologies, the SMCA Industrial Base IPT developed a strategic plan that establishes a management framework for posturing the ammunition industrial base supply chain to effectively respond to current and future conventional ammunition requirements. The plan is an important communication tool to all industrial base stakeholders. Further, it is understood that strategic planning is an ongoing process requiring constant evaluations and that all strategies are subject to modification to adjust to conditions in the surrounding global environment. Implementation of any strategic plan requires corporate and organizational buy-in at all levels to be successful. The Ammunition Enterprise and the SMCA Industrial Base IPT have that buy-in and are making significant progress to ensure the industrial base supply chain is postured to effectively respond to current and future requirements. Progress is being made. Much more work lies ahead. As former General Electric Chairman and Chief Executive Officer Jack Welsh said, "You've got to come up with a plan. You can't wish things will get better."

MATTHEW T. ZIMMERMAN is the Associate PEO Ammo, Industrial Base, and is the SMCA Industrial Base IPT leader. He has a B.S. in mechanical engineering from Penn State University, an M.S. in engineering from Stevens Institute of Technology and an M.S. in technology management from the University of Pennsylvania. Zimmerman is Level III certified in program management and systems engineering.