

LAND COMBAT SYSTEMS INDUSTRY STUDY REPORT 1996

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ABSTRACT

Land combat systems (LCS) are at the core of the nation's ability to defend or occupy territory. The U.S. national security strategy is built upon the ability to back up diplomacy with the full spectrum of military action anywhere in the world. Without a viable land combat force, the United States cannot implement that strategy.

Changing world scenarios over the past several years have allowed U.S. leaders to shift budgetary resources away from defense procurement. The result is a significantly smaller LCS industrial base that is looking to a cooperative partnership with the government and a vision crafted by the government for its survival.

INTRODUCTION

The primary reason for the existence of all the US Armed Forces is to provide the military power to deter war. Should deterrence fail for reasons beyond our control, then these forces must be able to fight and win. There is no cheap way to do this. There also is no second prize in the business of war today, nor will there ever be.

--General George H. Decker

In our study of the land combat systems (LCS) industry, we examined the structure, health, and outlook of the various sectors that make up the industry. We limited the scope of our study to tracked and wheeled vehicles in the numerous configurations of combat, combat support, and transportation systems for those two chassis types.

Throughout our study, we sought answers to the following basic questions:

- . What is the current condition of the U.S. defense's industrial base?
- . What is its future role as an element of national power?
- . Does the nation need to keep producing in order to sustain the force?

- . Does the nation need to keep producing in order to sustain the LCS industry?
- . Can the nation afford to maintain the industry? Can the nation afford *not* to?
- . Can the nation afford the degree of excess capacity and surge capability that currently exists?

How the United States chooses to deal with the challenges ahead will directly affect its ability to remain a world leader on economic and security issues. This report outlines the current conditions that we see, the challenges for tomorrow, and the steps the government and industry can take together to meet those challenges.

THE LCS INDUSTRY DEFINED

Our study focused on the two major segments of the LCS industry: tracked vehicles and wheeled vehicles. While we certainly consider other segments, such as small arms, towed artillery, and the like, to be viable components of land combat, we did not have the opportunity to adequately study those segments and did not discover any significant issues from the observations we did make. The two areas of focus are defined below.

Tracked Vehicles

Tracked vehicles are designed to carry out functional mission requirements in almost any type of terrain and to survive, within reasonable risk limits, known and projected threats. Today's domestic tracked vehicles include M1-series Abrams Tanks, Bradley Fighting Vehicles, M109A-6 Paladin Self-Propelled Howitzers, M-88A2 Hercules Recovery Vehicles, Armored Combat Earthmovers, and the Multiple Launched Rocket System. Proposed systems include the Grizzly Obstacle Breacher and the Marine Advanced Amphibious Assault Vehicle.

Armored combat systems normally achieve survivability through the addition of protective layers of steel, aluminum, titanium, or composite protective materials. These materials add weight to a system, which reduces maneuverability and deployability and raises cost. But the

increased survivability enhances the lethality of the system, which somewhat justifies the additional cost.

Integrated command, sensor, and fire-control technologies can also significantly enhance survivability and lethality. These systems help determine the enemy's location and target him with a lethal first-round hit before he even knows an adversary is in the area.

Developing the appropriate balance of defensive protection and high-technology offensive capabilities requires a sophisticated government/industry development team. The technologies required are inconsistent with traditional commercial vehicle manufacturing. Combat systems require specialized materials produced in low quantities.

Wheeled Vehicles

Wheeled vehicles support the combat arm by transporting personnel, equipment, petroleum products, critical supply items, ammunition, food, and water. They also provide mobility for command, control, communications, and some weapons systems.

Today's domestic wheeled vehicles include a variety of platforms that fall into three major categories by carrying capacity: light, medium, and heavy. Wheeled vehicles in production include:

Light. The High-Mobility Multipurpose Wheeled Vehicle (HMMWV), currently in production at AM General.

Medium. The Family of Medium Tactical Vehicles (FMTV) in 2.5- and 5-ton versions, currently in production at Stewart and Stevenson.

Heavy. The Heavy Equipment Transporter, Heavy Expanded Mobility Tactical Truck, Palletized Load System, Logistics Vehicle System, and a number of special-purpose vehicles currently in production at Oshkosh Truck Company.

The wheeled-vehicle fleet must be able to traverse terrain and distances similar to those that their supported combat forces must traverse and move at speeds that allow them to perform the full spectrum of their

missions. Survivability is not as high a priority for tactical wheeled vehicles as for tracked vehicles since the former seek to avoid engaging the enemy, but load capacity, mobility, and reliability are fundamental to supporting the combat arm.

Tactical wheeled vehicles have more requirements in common with commercial industry vehicle requirements than do armored tracked systems. Also, their design is less subject to change with evolving threats. Therefore, off-the-shelf components and production technologies can more often satisfy military requirements with little modification.

CURRENT CONDITIONS

World conditions have changed markedly since the late 1980s, and the defense procurement budgets of the United States and most European countries have fallen dramatically in response. Production plants that were once booming are now making drastic changes in the way they do business just to survive. (Gansler, 1995)

The Department of Defense (DoD) is rescoping many of its end-item procurement programs by stretching out or reducing deliveries. In essence, the dissolution of the Soviet threat led to a fundamental reduction of combat forces--30-35 percent on the average for the United States and even more for some foreign countries. Base closures and the redeployment of many forward-based forces sent combat and combat-support end items into long-term storage or to foreign governments through defense cooperation or foreign military sales (FMS) programs.

As a result, new production requirements are much lower than they were several years ago, particularly in tracked vehicles. For example, the M-1 tank inventory--now assigned to the reserve components as well as to active duty units--remains at roughly 8,000 vehicles. About 600 tank chassis are programmed to be used for the proposed breacher and bridging programs, which still leaves adequate attrition platforms to cover near-term shortfalls in production surge capability.

The U.S. wheeled-vehicle inventory is aging beyond its projected life cycle, however, and several replacement and refurbishment programs are in the works. They are discussed in the Outlook section.

Industrial competition for the remaining business is intense, as it cannot support all of the primary defense production contractors in place only a few years ago. In response to shrinking defense procurements, surviving contractors are exploring all possible means of cutting expenses and increasing efficiency.

Downsizing

Reductions in government procurement contracts have driven almost all of the producers of LCS to dramatically cut back on personnel. Reductions in the 50-85 percent range are not uncommon throughout the industry. These drastic cuts in personnel created a new concern: a "graying" work force as downsizing based on seniority forces younger workers out of their jobs and hiring freezes keeps them away. Within a few years, a significant portion of the older workers will be eligible for retirement, and the specialized knowledge and skills they possess will be hard to recover. (LeBoeuf, 1995)

The intent of downsizing is to improve efficiency, but results to date are inconsistent. Downsizing has displaced large numbers of skilled workers. Some have been able to find employment elsewhere by transferring into related fields, but many have been forced into labor areas that make little use of their skills. Workers may be fortunate enough to retrain into a job with roughly equivalent pay, but in many cases they have been forced to take lower-paying or temporary positions.

Consolidations, Mergers, and /Alliances

As the demand for military hardware continues to decline, mergers have become a means of survival for companies. The most prominent example is the merger between the FMC's Defense Systems Group in San Jose, California, and HARSCO's BMY Combat Systems Division in York, Pennsylvania. The resulting entity is called United Defense, Limited Partnership, now the largest U.S. manufacturer and systems integrator for tracked, armored combat vehicles.

As the sole producer of main battle tanks for the U.S. government, General Dynamics Land Systems (GDLS) is seeking ways to diversify its product line to compensate for the loss of tank orders. Recently, GDLS

bought Teledyne Vehicle Systems in order to expand into the combat information system and engine businesses.

In 1995, Oshkosh Truck Company, the primary producer of heavy wheeled vehicles for the DoD, established a strategic alliance with Freightliner Truck Company that calls for Oshkosh to market certain specialized commercial products through Freightliner's distribution system and to build several series of Freightliner's severe-duty trucks. As part of the agreement, Freightliner will transfer its noncommercial military business to Oshkosh, broadening Oshkosh's defense product line and strengthening its worldwide business. Oshkosh is also currently working with Mercedes Benz to distribute its products in South America and is seeking opportunities to build trucks overseas in joint ventures with other foreign companies.

Shrinking Supplier Base

The low production rates required for military-unique parts make it exceedingly difficult for suppliers to remain profitable. Many suppliers who have commercial alternatives are getting out of the defense business. As prime contractors strive to keep their vendors in the business, they often find the vendors responding in a "take-it-or-leave-it" fashion, with the obvious resulting negative impact on the price and availability of necessary items.

Other suppliers, who do not currently have commercial alternatives, are either finding some or going out of business. Prime contractors often find it necessary to provide management and financial assistance to their suppliers to keep them viable.

Excess Capacity

Current production facilities were generally built to handle Cold War requirements for major end items and accommodate a mobilization surge capacity. None of the manufacturers considered in this report are using their production facilities at anything close to capacity. In fact, some are producing at as little as 10 percent of capacity.

In their efforts to improve efficiency and quality at lower quantities, some contractors have converted their "production-line" arrangement into a "multiple-bay" approach that allows simultaneous work on various configurations of equipment. While the bay approach serves flexibility well, it creates additional training requirements, as workers stay with the vehicle in the bay and perform many more tasks on one vehicle than they used to perform on the production line.

CHALLENGES

Given the current political and economic trends, defense procurement budgets are not likely to increase significantly. As a result, the LCS industry is undergoing a period of substantial transition to the defense requirements of the post-Cold War era. The industry is facing continued pressure to produce less costly, technologically superior products in lower quantities.

Unit costs throughout the industry continue to increase at alarming rates as a result of smaller production runs, greater technical sophistication, and the demand for leading-edge capabilities. Industry officials are attempting to deal with this problem in a variety of ways. We witnessed personnel reductions, restructuring, the implementation of just-in-time inventory management, the integration of commercial components into weapon systems, and labor/management teaming as productive means of improvement. Other efforts focus on maintaining or increasing production quantities through a greater reliance on international orders and expansion into civilian markets in the hope of reducing unit costs. These measures have been only somewhat successful. Unit costs continue to rise. Burdened with excess capacity, huge overhead expenses, and the cost of sustaining viable sources of supply, the industry is hard pressed to keep costs down.

In a declining market, reductions in the supplier base are inevitable. To cut costs, prime contractors are trimming their supplier base by eliminating multiple sources and concentrating on the most efficient suppliers. The DoD lacks sufficient visibility into the supplier base to adequately assess its health, but problems with the supplier base, combined with a demand to meet unique military specifications, could greatly increase the lead time for future production and degrade the

quality of future systems. While acquisition reform initiatives hold some promise of correcting these problems, reform is slow in coming, and reform initiatives alone are unlikely to sustain the supplier base.

Regulatory Constraints

Facing the reality of dwindling U.S. military demand, manufacturers are attempting to expand their business base and diversify into related industrial fields. However, overly restrictive regulations often hamper these initiatives. For example, efforts by the Lima Army Tank Plant (a government-owned, contractor-operated facility) to increase efficiency by taking in commercial work have proved unsuccessful. Despite the fact that the facility's high overhead is the result of excess capacity related to government workload, regulations require that total overhead costs be spread equally between government and commercial work. These additional costs, of course, make the commercial workload less competitive.

U.S. antitrust laws are also affecting U.S. defense companies' ability to adjust to the new defense market environment. U.S. companies, but not foreign competitors, can be restricted from entering into some types of domestic cooperative arrangements. These restrictions hamper the U.S. ability to compete effectively in an increasingly global marketplace.

Business economics is creating a serious problem for research and development (R&D) within the civilian sector. The trend among several of the industries that we visited was to be less concerned with long-range investments than with short-term profitability, at the expense of future technological advancement. Corporate-funded R&D efforts are now more closely tied to developing improvements that lead directly to a marketable product, for which the payoffs are quicker and involve less risk, than to R&D for exploratory science. Consequently, the investment in pure science seems to be gravitating toward government and government-funded labs. This trend appears, at least on the surface, to be detrimental for truly innovative research that may help the nation fight in tomorrow's revolution in military affairs (RMA)-style warfare. The lack of R&D for pure science may be mortgaging future U.S. competitiveness on the open global market.

The development of entirely new systems deserves greater emphasis. The new technologies that are evolving in information dominance, information warfare, command and control, delivery systems, and even nonlethal weapons have the capacity to completely change the face of war. How those technologies interface with U.S. LCS could have a significant impact on the quantity and type of procurement efforts in future years.

International Industries and Markets

We were very fortunate to have the opportunity to visit four of Europe's finest corporate producers of LCS. All were quite capable firms facing many of the same challenges and issues that U.S. defense firms face--dwindling budgets, downsizing, concerns about their supplier base, and integration of commercial ventures.

Like U.S. firms, European firms see international marketing and sales as vital to their survival as defense producers and seek to continually improve their competitive stance. They voiced frustration with U.S. "Buy America" statutes that constrain them from competing in the United States. They found that developing partnerships in the United States was the difficult and often cost-prohibitive path to entering the U.S. market. Their global marketing efforts largely exclude the United States, but they do compete with producers of U.S. defense equipment elsewhere around the globe.

The foreign industries we visited included:

- . *Steyr-Daimler-Puch* of Vienna, Austria, producer of specialized vehicles, including armored vehicles, bank security vehicles, airport security vehicles, specialized equipment, and commercial products.
- . *TATRA* of Koprivnice, Czech Republic, producer of heavy trucks optimized for off-road travel through the use of an unusual suspension system based on a central-tube construction with swinging half-axles.
- . *IVECO* of Ulm, Germany, a subsidiary of Fiat. IVECO produces light, medium, and heavy trucks for commercial and military use from a completely integrated production line.

- . Vickers Defence Systems of Newcastle, United Kingdom, producer of main battle tanks, light tanks, armored repair and recovery vehicles, and other specialized items, with joint ventures in the United States and Germany.

OUTLOOK

Predictions are hard to make, especially about the future.

—Yogi Berra

The DoD Industrial Assessment for Tracked Combat Vehicles, dated October 1995, states that "ongoing programs . . . generally will be sufficient to sustain required industrial capabilities." We agree with that assessment for wheeled vehicles, but whether the same goes for tracked combat vehicles depends on the definition of *sufficient*. If *sufficient* means enough business to keep the current suppliers of tracked vehicles producing at minimum sustaining rates, then the report is accurate. Any assumption beyond that is optimistic.

Upgrade programs will remain the primary source of production for the M1 tank line. Companies will preserve their production lines for other tracked-vehicle programs and for wheeled-vehicle programs by stretching out deliveries over longer time periods without increasing the total quantities purchased. The life of the aged 2.5-ton truck fleet will be extended through a rebuilding program at AM General. Both segments of the vehicle industry will actively seek foreign buyers to offset dwindling U.S. demand. Foreign competition will continue to be tough.

Short-Term Outlook (One to Five Years)

Business conditions for the tracked combat vehicle industry will be tight. New vehicle production will remain very low and will be almost entirely attributable to foreign military sales (FMS). Domestic military requirements will continue to focus primarily on upgrades to existing systems. The time to produce a certain number of purchased vehicles will extend several years beyond what is necessary in an effort to preserve active production lines.

Projected near-term business appears stable and sufficient in the tactical wheeled-vehicle industry. One of the lessons learned from Desert Storm is that the U.S. tactical wheeled fleet could not keep pace with the demands of U.S. ground combat vehicles. New production programs, such as Stewart and Stevenson's FMTV, and rebuilding programs, such as the Medium Tactical Truck Remanufacturing program, currently out for proposals, will provide enough business for the prime contractors to remain profitable for the next several years. Any international sales will add to the production demands and assist in offsetting overhead rates. The rate of current production operations appears sufficient over the next five years to exceed minimum sustaining rates.

Long-Term Outlook (5-20 Years)

We expect base force requirements to stabilize or possibly even continue to decline, unless an extended regional or global contingency drives up attrition. A more likely long-term outlook is for the defense budget to stabilize. However, the industry must assume a continuing decline in the defense budget.

Annual orders for new, upgraded, and rebuilt vehicles will not rebound from the current trend toward minimum sustaining rates. FMS alone will not provide the profits required to offset continuing low U.S. defense requirements. Competition in the FMS market will intensify. If current global market conditions continue, U.S. weapons systems will not be superior enough to capture market share. Rising production costs will mean higher weapon system costs.

The prospects for a new generation of combat vehicles, such as the Future Main Battle Tank projected for fielding in 2015, may not be promising enough to retain the prime-contractor base as it exists today. Sound business management practices warrant industry action to cut costs in order to remain profitable and survive. Some of the remaining prime contractors may decide to forgo defense business for the potentially profitable commercial sector, as will an even greater portion of the supplier base. (Naylor, 1995)

Industry's Reaction

The real damage done by the declining defense budget is in the supplier base. Some prime contractors have already eliminated as much as 70 percent of their supplier base in an effort to trim costs. Their intent is to build long-term relationships with selected vendors for what little business remains in the defense industry. Those vendors will also be asked to share some of the risks not normally passed below the prime contractor level. The practice of developing multiple vendors for like items is no longer affordable.

Corporations that decide to stay with defense business will take the necessary actions to remain profitable as defense budgets continue to decline. As corporations streamline and eliminate excess capacity, surge capability is eliminated, too. In our view, even today the industry's surge capability is constrained by what the current work force can produce on current production lines operating up to the levels that the suppliers can support. Therefore, surge capacity levels are really dictated by the supplier base. Even if the prime contractors could muster the work force and regenerate the production capacity to surge in the event of a national emergency, the supplier base would have to match their needs. The risk that the supplier base would fall short is greater in the tracked-vehicle than in the wheeled-vehicle base.

Corporate reactions to declining defense budgets go beyond downsizing and mergers. In domestic corporate teaming, a growing phenomenon, corporations share the risks associated with available contracts and the profits available in a declining market. In the view of the team members, it is better to share a reduced profit than to stand alone in financial ruin.

Expansion into Commercial and Foreign Markets

As demand for defense system end items evaporates, contractors are forced to look for new business opportunities in order to survive. Now more than ever, contractors are aggressively pursuing business in the international market. FMS have become an important source of income for many manufacturers. Remanufacturing, upgrading and technical insertion programs, once only sidelines, have become mainstays for several manufacturers. Where possible, U.S. and foreign manufacturers

are seeking to change their customer base by expanding the commercial portion of their businesses.

The LCS industry is exploring the use of existing production facilities for commercial as well as defense-related business. It appears easier for the tactical wheeled-vehicle industry to capitalize on dual-use opportunities, as the manufacture of wheeled vehicles involves few critical processes that are unique to defense-related production. In times of national emergency, commercial industry could meet the demand for wheeled vehicles with minimal changes to meet military specifications.

Commercial opportunities are not as readily apparent in the tracked combat vehicle industry. Options for dual usage are fewer, and identifying critical processes that are unique to that industry is difficult. In discussions with several production representatives, we could not build a strong case for preserving production over process. Ballistic welding may be one exception. However, manufacturers could surely identify ways to preserve a few specialized processes at a cost much less than that associated with full production.

The tremendous success and wide exposure of AM General Corporation's HMMWV during the Gulf War helped generate interest for a commercial version, which the company calls the HUMMER. Despite early distribution network problems, the HUMMER is now considered a commercial success. Already accounting for 20 percent of sales, the HUMMER is a growing part of AM General's product line.

Both domestic and foreign producers are exploring the virtues of international partnerships. Motivated by the possibility of gaining a competitive edge in the global market or cutting development costs by using internationally available technology, U.S. firms seem more willing to form partnerships with foreign counterparts. Given U.S. "Buy America" statutes, partnerships are often the only way that foreign firms can enter U.S. markets.

Supplementing domestic sales with international sales is desirable but difficult. However, international sales are helping much of the U.S. LCS industry maintain minimum production rates. Capturing an even greater

share of international sales opportunities could do even more to sustain the U.S. defense base.

GOVERNMENT GOALS AND ROLE

In the defense industry, corporations formulate strategy based on the projected needs of the customer, in this case the U.S. government, and the desire to make a profit. For its part, the DoD must chart the course for the future of the defense industrial base. What corporations need is a clear vision of future DoD needs, the ground rules for surviving in this new environment, and some assurance that the DoD will be consistent in its vision of the future.

Clear Vision

First, the DoD needs to work with industry to develop a vision of tomorrow's force requirements. The first question to ask is whether tomorrow's tank will look anything like today's. Will it be made of the same materials? Will it be the same size? Will it even be a manned tank? To formulate a vision of the extended future, the DoD should assess whether the tank as currently conceived has a place on the battlefield. Involving industry prime contractors and suppliers from the earliest planning phases will shorten the developmental process.

Acquisition Reform

Next, the government needs to follow through on promises to reform the acquisition process. One of the DOD's current efforts is to implement efficiencies from commercial procurement processes. Key government leaders consistently extol such tenets of acquisition reform, but the industry, anxious to embrace the new vision and put it into practice, continually finds itself forced back to old inefficiencies by midlevel government employees who have not enacted changes in process with the same urgency as their leaders have.

Government leaders are working hard to make acquisition reform a success. Newly mandated integrated product teams will quicken the milestone review process, and redefined acquisition life-cycle requirements

will shorten development-to-production times, as will concurrent developmental phases when conditions warrant.

Perhaps the most important challenge for government leaders in Congress and the executive branch is to revise the budgeting process. Acquisition reform challenges managers to run their programs more like private enterprises, but the current budgeting process does not allow for prudent business decisions across fiscal years. Program managers have only near-term financial decision authority that is limited by money tied to specific fiscal years. To make industrial production more efficient and save the government billions of dollars, the DoD should commit future acquisition programs to a funded life-cycle schedule. The United States requires such a commitment from FMS customers when they buy major systems, and they follow the schedule; so can U.S. managers.

Preserve the Process or the Product?

The government also needs to determine what it intends to do about preserving the industrial base. If the intent is to preserve a warm production-line capability, then current conditions are a cause for concern. The intent, however, appears to be to produce selected items at a low rate over multiple-year periods. Such low-rate production leads to higher unit costs and greater disruption to troop units because of prolonged fielding periods. Although the prime contractors can adjust to this methodology, the supplier base suffers.

The alternative approach is to preserve only the specialized and critical processes necessary to regenerate production capability in case of an extended crisis. This course of action allows the commercialization of much of the remaining industrial base. The cost of preserving specific processes is certainly far less than that of preserving the industrial base through production.

To preserve production lines is to commit to materials and building processes as they are today. Preserving processes instead of production lines may or may not mean a commitment to today's technology. The discovery and development of new materials may lead to production processes totally different from those used today.

If continued low-rate production is the chosen alternative, the DoD needs to reassess surge requirements and let industry maximize its efficiencies. In some instances, corporations are still contractually compelled to maintain additional facilities and equipment in order to meet unnecessary surge levels, but their suppliers are ill-equipped to match surge requirements in time to support the time lines.

Under the assumption that future military conflicts will be violent but brief, process protection might not convert to end-item production in time to support military operations. But that risk may not be a major one. Protecting processes instead of production lines supports the concept of a graduated military response to whatever national security threat exists.

Protecting production lines is difficult to justify strictly from the viewpoint of the requirements of an active military force . The justification is more suited to the protection of the defense industrial base, specifically, preserving business opportunities for current defense contractors. The question for the government is whether the United States can afford this luxury much longer, and the answer will trigger the next set of alternatives offered by government and industry alike.

Level Playing Field

Even though U.S. military equipment and follow-on support are the finest in the world, government support, or lack of it, can easily tip a competition. The U.S. government should assess all avenues to leveling the international playing field for U.S. industries. Several foreign governments work in concert with their industries through political support and tax incentives. For example, certain governments promote their defense industries through direct solicitation, some foreign tax laws allow industries to claim incentive subsidies as business expenses, and several foreign governments subsidize their defense contractors to offset costs. None of these practices is acceptable in the United States

U.S. defense corporations, which are working hard to compete in a growing global sales market, are not asking the government to use its economic power to give them an unfair advantage. They ask only that the government not place them at a disadvantage in the international marketplace. It is time to review some of the rules constraining U.S.

corporations internationally. The spirit of acquisition reform can and must permeate the entire defense industrial base, including all the rules and regulations the government levies on industry. After all, an FMS is still a sale that helps maintain a viable national industrial base.

CONCLUSIONS

*This nation can afford to be strong--it cannot afford to be weak.
We shall do what is needed to make and to keep us strong.*

--John F. Kennedy

LCS industries are coping with cutbacks in defense spending by downsizing, consolidating, merging, and integrating commercial and military production facilities. The results of these efforts include improved efficiency, a smaller work force, a higher per-unit cost due to low-rate production, and reductions in the supplier base.

Upgrade programs and FMS contracts are marginally sustaining tracked-vehicle production. The wheeled-vehicle industry outlook is brighter than that for the tracked-vehicle industry as a result of ongoing and upcoming acquisition and rebuilding programs. International markets are open, but competition from foreign industry is tough in markets outside of the United States.

The domestic industry will survive, but the government must cooperate if the United States is to preserve an affordable production base. Government-industry partnerships will be an important part of optimizing program efficiencies with limited funds. Clearly defined long-range plans and multiyear contracts are two keys to improving the affordability of land combat systems. Lethality advances incorporated from RMA technologies may allow combat superiority with a smaller force structure.

The benefits of acquisition reform are slow to evolve. Top-level government and industry leaders agree that reform is necessary, but midlevel program executors appear to be slow to capture the spirit of reform.

Future military conflicts will most likely be resolved with the weapons system inventories on hand. The government can no longer afford to

preserve costly excess capacity and surge capability. Integrating the production of defense-related items with that for commercial items is a more efficient use of facilities and technology.

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