Army Materiel Command:

Using 'Lean Thinking' To Transform the Army

By Gen. Paul J. Kern
Commanding General,
U.S. Army Materiel Command

I grew up in a part of New Jersey where oil refineries, red brick and commuters defined the landscape. Across the river, the highest point on the New York skyline was the Empire State Building—sadly, the same as today. Blue collar workers took metal lunchboxes to work and spent their evenings talking about what was going on at the plant—how the line was going—the production line, that is. Talk among the families was about overtime when business was good and a new car when things were really good. Commuters envisioned taking their new cars across the newly constructed Tappan Zee Bridge. When business was not as good, talk in the neighborhood was about cutbacks, unemployment checks and families going someplace else to find work in another factory town.

Unfortunately, the manufacturing plants of the area were older and could not keep up with newer plants that had the latest in manufacturing equipment and more efficient, automated manufacturing processes. In the mid-1970s the plants in New Jersey were forced to close down and the factory workers were forced to move out, taking their families with them, but leaving behind a way of life that had seemed so stable and enduring for decades.

That experience taught me an important lesson: that you cannot assume the ways of the present will endure. You must look ahead and see why changes may be needed, and then make those changes happen.

The Chief of Staff understood this and reminded us frequently that the Army must change or it would become irrelevant. Our nation and our Army are undergoing tremendous change. It did not begin with the events of September 11 because our Army had already commenced on a transformation course, yet the events of September 11 definitely underscored the need for such transformation and the need to do so more quickly.

The Secretary of Defense declared last year:

> There is no question but that we as an institution simply must recognize that we've got to be much faster, swifter, more deft. We have to collapse the planning processes that take place in this institution. They're too long. ... We have to be able to recognize that times have changed and circumstances have changed. ... One of the significant challenges is shortening the time between technological advances and the translation of those advances into materiel for our soldiers. ... A quarter of a century ago, ... the period between the beginning of a weapons system and the deployment of a weapons system might have been eight, 10, 12 years. In the meantime, it's elongated out to 20, 25 years.... ... And that's not good enough. We have to fix that.

Secretary Donald H. Rumsfeld is absolutely right—we must do better. We must become more efficient to eliminate waste of taxpayers' dollars. We must become faster to get new technology into the hands of our soldiers sooner. We must become swifter with our logistics support to soldiers who may be serving in harm's way. We must become more deft in supporting the acquisition of new systems and replacement parts.

Army Materiel Command (AMC) is working hard to fix our shortcomings by focusing on ways to improve the efficiency and effectiveness of our operations. We are looking at ways to revamp, rethink and revolutionize the way we support soldiers and Army Transformation. We are continually reviewing our operations and organization structure to develop new processes, new paradigms and new management concepts such as "lean thinking" and the "balanced score card." We are striving to make our processes and infrastructure more efficient and effective, and we are well on our way.

"Lean thinking," a technique developed by James Womack and Daniel Jones in their book of the same title, is "one feasible way to cut costs while also shortening production lead times and time-to-market, improving quality and providing customers with exactly what they want, precisely when they want it." Lean thinking techniques "also make it possible to design, order, produce and deliver goods at smaller production scales and by means of dedicated product teams without paying a scale or investment-cost penalty."

To reduce the time needed to develop and deliver new technology into the hands of soldiers, AMC is reorganizing our laboratories, the way they interact with each other, and how we can improve the way they do business. We will connect to soldiers through Training and Doctrine Command (TRADOC) and evaluate our developments with support from the Army Test and Evaluation Command.

To get new technology out of the lab and into the hands

GEN. PAUL J. KERN assumed the duties of commanding general, U.S. Army Materiel Command in October 2001. Before this assignment, he served as the military deputy to the Assistant Secretary of the Army for Acquisition, Logistics and Technology and was the senior military advisor to the Army Acquisition Executive and the Army Chief of Staff on all research, development and acquisition programs and related issues. He supervised the program executive officer system and served as the director, Army Acquisition Corps. Gen. Kern was commissioned in 1967 following graduation from the U.S. Military Academy. He commanded the 4th Infantry Division (Mechanized) at Fort Hood, Texas, which spearheaded the Army's reorganization around a networked force. He was the assistant division commander of the 24th Infantry Division at Fort Stewart, Ga., and commanded the 2nd Brigade, 24th Infantry Division at Fort Stewart and during Operations Desert Shield and Desert Storm. He commanded the 5th Battalion, 32nd Armor, 24th Infantry Division also at Fort Stewart. Gen. Kern was a battalion operations officer with the 3rd Armored Division in Germany and served two tours in Vietnam with the 11th Armored Cavalry Regiment as a troop commander and platoon leader. In other key assignments, he served as the senior military assistant to the Secretary of Defense and Deputy Secretary of Defense; military staff assistant, Defense Research and Engineering for Test and Evaluation, Office of the Secretary of Defense; and director of requirements (support systems), Office of the Deputy Chief of Staff for Operations and Plans. He was also the team chief, light combat vehicle team, Office of the Deputy Chief of Staff for Research, Development and Acquisition, Washington, D.C., and the program branch chief, Bradley fighting vehicle systems, Warren, Mich. He taught weapon systems and automotive engineering at the U.S. Military Academy and was the department's research officer. He earned master's degrees in mechanical and civil engineering from the University of Michigan. His military education includes the Army Command and General Staff College, the Defense Systems Management College and a Harvard University senior service college fellowship.

of soldiers faster—in time to make a difference—AMC is looking at ways to improve our support for program managers and program executive offices in the acquisition process.

To ensure that our soldiers have enough of what they need, when they need it, AMC is looking at new ways of projecting our logistics support for our soldiers and our allies—anywhere in the world.

AMC is committed to supporting our soldiers around the world, and we are always looking for ways to make that process more effective and more efficient. Each line item of equipment produced and delivered, each requisition processed, every automation system is a candidate for lean thinking to make it better.

Bar-coded materials make it easier to get needed supplies to our soldiers around the world.

AMC logisticians manage production and delivery of end items and parts for more than 1,200 major weapon systems, more than 10,000 line items of equipment and almost 160,000 national stock number items. They process more than 8 million requisitions every year to support our soldiers and allies around the world from Army and Defense Logistics Agency stocks.

AMC is the Department of Defense executive agent for conventional ammunition, providing ammunition and missiles for all the services and our allies with a production program of more than $3.1 billion annually and an ammunition stockpile of more than 3.9 million tons valued at more than $33.2 billion.

To support our soldiers in the global war on terrorism, AMC deployed more than 400 military, civilian and contract personnel to seven countries throughout Southwest Asia in support of Operation Enduring Freedom. AMC was there working side by side with soldiers, solving technical problems with vehicles, weapons and other equipment.

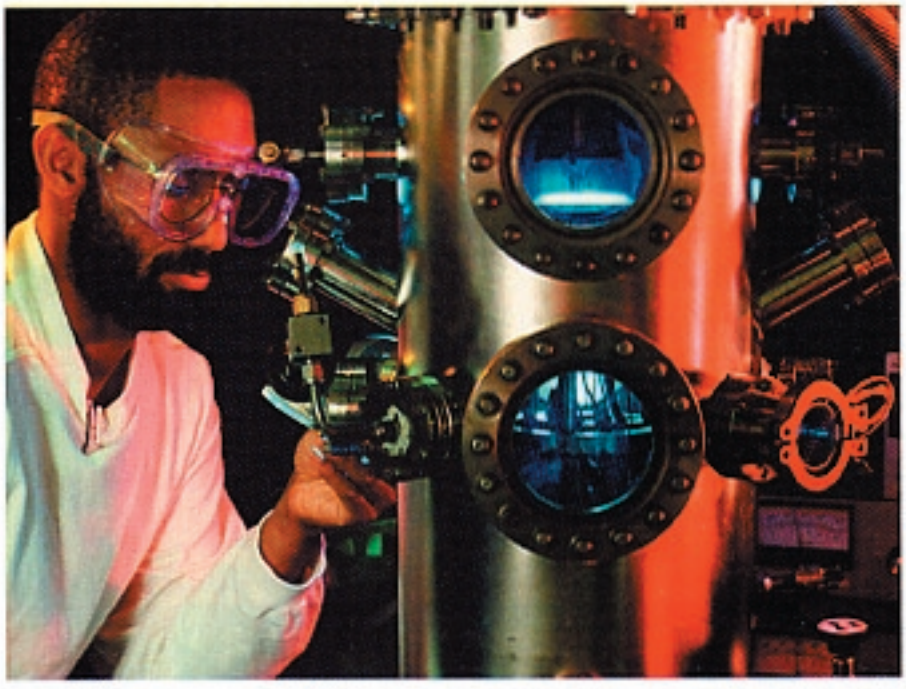
Rick Tavares and Cathy Hardman are master technicians for all Army and Air Force tactical generators. More important, they possess an excellent knowledge of power distribution because giving a unit a generator is the beginning. You must go backward from the light bulb to the power source. Rick is on his 13th deployment and Cathy is on her first deployment as a logistics assistance representative (LAR), but she is highly qualified. She is a retired sergeant first class and was the Communications and Electronics Command LAR of the year in 2000.

Juan Ortega is a small arms senior systems technical representative but he is also an expert on AH 64, M1A1/2 and Bradley armament systems, as well as the reverse osmosis water purification unit. In Uzbekistan he gathered all of the small arms repairmen from the various units and created a small arms repair facility or, as we jokingly called it, Juan's gun shop. He is a veteran of 13 previous deployments.

To support soldiers in the Army's Interim Force—the Stryker combat teams—AMC provided 43,481 new equipment items in 2001, provided new equipment training for soldiers, filled more than 46,000 requisitions for spare and repair parts and provided an on-site staff of technicians and logistics assistance representatives to work on engineering and technical problems.

AMC is modernizing Army logistics to save time and money. We are changing the way requisitions are processed, changing how inventories are managed and centralizing management and control of maintenance activities.

To centralize control and management of all Army inventories, AMC has been combining wholesale and retail inventories through the single stock fund program. With AMC as the single manager of Army inventories, the Army will know where everything in the Army is—even at the



Army Materiel Command has seven world-class Army laboratories and hundreds of academic partners at home and abroad.

The mobile gun system (MGS) undergoes a live fire test. The MGS will provide firepower for the Stryker brigade combat teams.

unit level. Knowing where stocks are will give the Army the knowledge to redistribute Army assets where and when they are needed.

So far, more than $208 million worth of inventory has been recovered and returned to service from stocks that had been declared excess and not available for redistribution. Customer wait time has been reduced by more than 3.4 days. The savings generated by the single stock fund program will pay for investments in less than two years.

To centralize management of all Army maintenance activities for components and end items, the Army leadership has designated the Army Materiel Command as the Army's national maintenance manager. In leading this effort, AMC will establish uniform standards of performance for all maintenance activities.

To modernize logistics automation systems that are more than 30 years old, AMC has contracted with Computer Sciences Corp. to process procurement requests and materiel release orders with an enterprise resource planning system developed by SAP, America. The transfer to SAP will begin in January 2003 and be operational by January 2004. This will establish the basis of an enterprise system that will complement the Defense Logistics Agency's business system modernization and the Defense Department's future logistics enterprise.

The last part of the enterprise will be the global combat service support-Army, which will create a uniform information logistics network for combat service support that can interface with other Army logistics support systems.

Once again, looking back to my New Jersey roots, I recall how my grandfather emigrated from Germany to work in the research labs of Thomas Edison and how the efforts of but one laboratory can transform the way of life.

Providing the Army, our soldiers and our allies with an overwhelming technological advantage on the battlefield is a complex process that involves a large number of scientists and engineers working together at many different facilities. Although initially designed for manufacturing processes, lean thinking is also suitable to expedite the flow of ideas and development of new technology.

To reduce the cycle time required to get new technology to the field, AMC will be "leaning" the process by looking at the flow of individual projects within our large and complex network of seven world-class Army laboratories, more than 220 academic partners in 50 states and 11 countries, and more than 977 private industry contractors—with an annual budget in excess of $3 billion.

Central to this effort will be those projects supporting new technologies for the new future combat system and the Objective Force. The list of the first technologies scheduled for early fielding by 2008 includes innovations that will give soldiers better protection, greater firepower and enhanced capability to engage enemy forces at greater distances. Unmanned ground vehicles will be able to go into hazardous places, reducing risks for soldiers while increasing the soldier's lethality. Lightweight armor technologies, using advanced materials, ceramics, and energetic, smart and electromagnetic armor, will make new vehicles tougher without adding weight. Electro-thermal chemical ignition technology will ignite propellants with advanced chemicals to increase the lethality of large caliber 105 mm and 120 mm guns to that of 120 mm and 140 mm guns.

Another project, the active protection system (APS), will ensure that our vehicles and soldiers do not get hit by enemy missiles and projectiles. APS can deflect most missiles and guided projectiles with sophisticated electronics and laser systems long before they get close to friendly vehicles. APS can also destroy projectiles with interceptor rockets before they reach our soldiers on the battlefield.

Although management of all major weapon systems has been transferred to the Army Acquisition Executive, AMC continues to provide acquisition support—legal, engineering and contracting officers—to program managers and program executive offices. More than $21 billion worth of contract actions are processed with AMC contractor support.

AMC is working to adopt evolutionary acquisition, also

known as spiral development. It uses available, mature technologies to produce weapon systems that will meet many, but not necessarily all, of a system's operational requirements when the system is first deployed. A series of subsequent upgrades represent the spirals that increase capabilities over time. As technologies evolve and become available, needs can be met more quickly, more precisely and more economically.

Ultimately, spiral development will help keep development and requirements in sync, control costs and offer greater opportunities for collaborative development with our allies.

At Corpus Christi Army Depot, the power up team improved the efficiency of the overhaul line for the Black Hawk/Apache-series airframe T700 engine. Partnering with General Electric to expedite parts' availability and training, Corpus Christi Army Depot reduced turn-around time for overhaul from 261 days to 180 days. (The goal is a 100-day turn-around time by 2005.) Modifications to engine overhaul increased performance in shaft horsepower margin by 43 percent and mean time between removal from 483 hours to 1,120 hours. Engine performance and reliability translate to improved readiness—an 80 percent reduction in not mission-capable due to supply—substantial savings in operating and support costs, reduced workload on soldiers and a reduced burden on Army training, maintenance and supply systems.

At Red River Army Depot in Texas a lean team was set up to improve part of its production operations. It focused on an existing line to refurbish the small emplacement excavator. The team broke down the axle production line into four workstations and found ways to improve efficiencies on each. Parts were moved within easy reach of the operator. The brake disk turning equipment was moved to the axle line area. A paint booth was activated near the axle line to reduce the travel time between workstations. The wash system was moved closer to the workstation using it.

The workforce saw immediate results—lean thinking made their work easier and faster. They expanded the lean thinking process to include more than 15 stages in the production line of the entire small emplacement excavator.

The next major lean project at the Red River Depot will be the heavy expanded mobility tactical truck engine program—a recapitalization program to refurbish a legacy system to like-new condition and upgrade it with the newest technology.

At Tobyhanna Army Depot a value engineering program has been taken to a new level with lean thinking. The Tobyhanna team recently identified a design problem with power supply in the Apache helicopter video display unit for navigational and weapons information that cost $10,108 to replace. The high failure rate was causing supply and readiness problems for the Apache. To correct the problem, the Tobyhanna engineers designed a more effective and more efficient unit with a mean-time-between-failure of 100,000 hours for a cost of $1,500. Estimated dollar savings is expected to be $1,291,200 per year.

In July 2002, Tobyhanna completed value stream analyses on three product lines, the Sidewinder missile guidance and control assembly (a critical Air Force program for Operation Enduring Freedom), the AN/TRC-170 tropospheric microwave radio terminal and the AN/TPQ-36 firefinder radar. With planned rapid improvement events on these systems through October, Tobyhanna anticipates major reductions in overhaul and recapitalization timelines, reduced customer costs, gains in customer satisfaction and, equally important, greater employee satisfaction as depot workers take the lead in transforming their work.

More than 96 percent of AMC's employees are civilians, and a large percentage of them will be eligible for retirement within the next five years. With this in mind, we must recruit civilians for AMC while they still have the opportunity to learn from those people with years of experience.

To accomplish this, AMC has developed a number of initiatives to attract, train and retain the future workforce.

To meet the demands of a transformed Army and to de-

Civilian technicians move ordnance out of a storage facility. More than 96 percent of AMC's employees are civilians.

A soldier fires a Javelin antitank system. Without logistics transformation to support and equip the soldier, there will be no Army Transformation.

velop the systems for the Objective Force, AMC will need to create a workforce with the knowledge and skills to make transformation happen.

Intern programs have been established and revitalized to train technicians and mechanics at our maintenance depots. Cooperative and work study programs have been used at the Communications and Electronics Command (CECOM) in the Fort Monmouth, N.J., area so that students can combine their education and work experience in CECOM research laboratories. AMC has plans in place to modernize and diversify workforce skills with a number of new retraining, certification and licensing programs.

The University of North Carolina has created a "logtech" master's degree program in business administration for the Army, Marine Corps and Defense Logistics Agency. The program will develop logisticians with a focus on military applications.

A uniformed scientists program is being proposed to allow officers with talent, education and training in specialized areas to pursue long-term research and engineering studies while contributing to scientific efforts for the Army. We are also working with Duke University, the University of North Carolina and North Carolina State to develop a short course on technology for Army officer basic and advanced courses.

AMC is working hard to develop the wide range of skills required for the Objective Force and for the high-tech systems supporting Army Transformation and the future combat system.

We did not think out of the box; we just made the box bigger and applied that thinking to Army logistics to see if we could find a new paradigm for logistics support to the Objective Force. The Army Science Board and AMC have been looking for new ways to streamline operations and better support our soldiers and Army readiness. We are looking for new ways to expedite the resupply of soldiers, use private industry capabilities and experience in fleet management for the Stryker armored vehicle, drive down surcharges at depots and arsenals, and review relationships with the Defense Logistics Agency to maximize our joint relationship.

Without a transformation in logistics there will be no Army Transformation, so the Army set up a logistics transformation task force led by AMC and the G-4 to create a plan that will provide the way we transform logistics to support the Objective Force. To develop new technology faster, we are streamlining the organization and communication capabilities among research and development labs and AMC research, development and engineering centers.

One initiative is a new Research, Development and Engineering Command within AMC that will build on a virtual interaction among scientists and engineers via the Army knowledge management system. This virtual approach to sharing ideas is designed to reduce duplication of effort and competition among different labs. The virtual approach will allow more collaboration with industry and academia, and enhance information exchange within the research community.

The Research, Development and Engineering Command will forge an enhanced synergy among AMC laboratories; scientists; engineers; research, development and engineering centers; scientists from academia; and our industry partners.

The soldiers and civilians of AMC are tackling Army Transformation with innovation and creativity—leaving behind old ideas, setting new standards and finding new ways to provide for the defense of our nation. We are finding new ways to do our many jobs that will make the Army more responsive, deployable, agile, versatile, lethal, survivable and sustainable.

I look back to my New Jersey roots and recognize the failures that occur when one does not look far enough ahead. As I look forward, I realize there will be no lean missions, but we must be lean in our thinking. A paramount objective is that we must be the best stewards of America's resources and execute change with vigor and imagination. Collectively, we will remain the best protectors of America's freedom. The mission is clear—commitment to supporting soldiers, leading with new technology and sustainment processes to transform the Army and reshape the workforce for the 21st century.