RDECOM magazine
A publication of the U.S. Army Research, Development and Engineering Command (Provisional)
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Commander discusses the year ahead

Major General John C. Doesburg

Maj. Gen. John C. Doesburg
Commander, U.S. Army Research, Development and Engineering Command

This is a new year for our new organization. As 2004 begins, the U.S. Army Research, Development and Engineering Command is at a crossroads. Behind us is the past; we're still provisional, which means some of our people and organizations still feel unsettled. The road ahead, however, shows that we're coming together as a powerful organization that can put technology in the hands of our Soldiers faster than ever possible in our nation's history. Powering this organization are more than 30,000 scientists, engineers, technicians and administrative personnel, civilian, military and contractor, all driven by that goal.

As we enter 2004, I challenge everyone who is part of the RDECOM family to make this resolution: Each day, as you come to work, ask yourself, "How will my actions today help the Soldier?"

I don't think any one of us can watch the footage of our brave troops struggling to keep the peace overseas, and not feel a sense of urgency to make life easier for those Soldiers, and the ones who will follow them in the future. Our mission is to ensure our Armed Forces are relevant and ready, and that the products we provide, from our eyes in the sky to our boots on the ground and everything in between, reflect that commitment to our Soldiers. They are the best, and they deserve the best.

We certainly have the right organization to reach this goal. RDECOM has elements in more than a dozen states and nine countries, plus access to the world's greatest minds through our international agreements and direct liaisons to the field, funded by a $3.5 billion annual budget. The Army has never before brought together such diverse technological elements into one organization, all with the common goal of getting the right technologies into the hands of Warfighters quicker. That's our mission, our commitment and our promise.

We're fortunate to have at our disposal the most precise weapon on the battlefield – the Soldier. No matter what technology we develop, whether it's the Future Combat System, the Objective Force Warrior, transport or training, computers or communications, all of it supports the Soldier. By keeping their best interests foremost in our minds, we can ensure that we'll equip the strongest, most ready fighting force in American history. That's our resolution for the New Year, and our promise to the citizens of the greatest nation on Earth.

Have a safe and happy holiday, and keep your eye on the road ahead.

RDECOM achievements highlighted in AMC Technology Gallery

Jack Byers discusses RDECOM equipment with Vice Chief of the Army Gen. George W. Casey, with AMC Commander Gen. Paul J. Kern, left, and AMC Deputy Commander Lt. Gen. Richard A. Hack. Photo by Sgt. Scott Meinhardt.

FORT BELVOIR, Va. – U.S. Army Research, Development and Engineering Command innovations highlight the Technology Gallery at the new U.S. Army Materiel Command Headquarters Building at Fort Belvoir, Va.

Visitors get a close look at AMC's contributions to Army transformation and the successes of Operation Enduring Freedom and Operation Iraqi Freedom.

Among those technologies are winners of the AMC Greatest Inventions Award, presented by AMC Commander Gen. Paul J. Kern on Nov. 12. This includes the Interceptor Body Armor, a modular, multiple-threat body armor which reduced the weight of the previous military personnel vests personnel by 10 pounds. Military personnel have credited the armor's Small Arms Protective Insert plates with saving their lives or preventing serious injury.

RDECOM, headquartered at Aberdeen Proving Ground, Md., is the newest AMC major subordinate command. The command brings together the Army's research, development and engineering elements to put the latest technology into the hands of Soldiers as quickly as possible.

The AMC Technology Gallery highlights equipment developed by RDECOM. Photo by Sgt. Scott Meinhardt.

The AMC Technology Gallery provides an overview of AMC equipment and missions, said Michelle McCaskill of the AMC Public Communications Office, which led the team that created the gallery.

"We're looking forward to highlighting the very latest AMC developments in the Technology Gallery," McCaskill said. "Of course an integral part of those developments will be successes from RDECOM. This gallery will reflect the best of the equipment we're putting into the hands of our Soldiers."

Jack Byers, chief of AMC's Technology Review and Communications Division, explained that the Technology Gallery displays how the underlying science is transformed into weapon systems.

"These weapon systems employ 'state-of-the-art' developments, for which RDECOM is responsible," he said.

The Interceptor Body Armor, with the Small Arms Protective Insert plates, are among the RDECOM items on display at AMC's Technology Gallery in the command's new headquarters building at Fort Belvoir.

Soldiers in Afghanistan getting new Army shotgun

By Jodi Daubert, Office of Program Manager Soldier Weapons

PICATINNY ARSENAL, N.J. – The 18th Airborne Corps, currently deployed in Afghanistan, is the first unit receiving the Army's new lightweight shotgun system, said Col. Michael J. Smith, project manager for Soldier Weapons.

The multi-use lightweight shotgun system has been deployed in Afghanistan.

A team from PM Soldier Weapons and the U.S. Army Armament Research, Development and Engineering Center, part of the U.S. Army Research, Development and Engineering Command, fielded the system.
Smith said that 199 of the new shotguns are on their way to Afghanistan for use by the elite 10th Mountain Division unit in response to an urgent operational need.

Until now, he explained, Soldiers performing non-lethal and door-breaching missions carried two separate weapons – an individual combat weapon and a separate shotgun.

"This lightweight, multi-use shotgun provides Soldiers with the capability to breach doors quickly and efficiently without requiring them to carry an additional weapon," he said.

The LSS, which is fastened beneath the barrel of an M4 carbine, eliminates the need for a second weapon.

The new shotgun fires 2.75 and 3-inch lethal, non-lethal and door breaching rounds, weighs slightly less than three pounds, and has a detachable five-round magazine. It attaches to the M4 as an accessory and includes a standoff device for firing door-breaching rounds.

"Our job is to support the Soldier," Smith said. "That includes current individual and crew served weapons, urgent requirements from Operations Enduring Freedom and Iraqi Freedom and the next generation of weapons."

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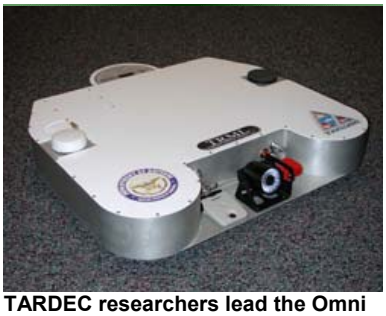
TARDEC to field robot to help save troops' lives in Iraq, Afghanistan

By Rae Higgins, U.S. Army Tank Automotive Research, Development and Engineering Center

WARREN, Mich. – Civilian researchers from the U.S. Army Tank Automotive Research, Development and Engineering Center head to Iraq in January to field advanced prototype robots designed to help protect U.S. Soldiers.



TARDEC researchers lead the Omni Directional Inspection System, or ODIS, program, an Army initiative to create a family of stand-off inspection tools enhancing Soldier survivability and to provide a variety of homeland defense applications. Photo courtesy Tank Automotive Research, Development and Engineering Center.

TARDEC scientists lead the Omni Directional Inspection System program, an Army initiative to create inspection tools that will enhance Soldier survivability and provide homeland defense applications.

Two TARDEC civilian engineers, in conjunction with the Army's Rapid Equipping Force, will spend two months in Iraq training Soldiers to use the 10 advanced ODIS prototypes being deployed. Plans also include sending ODIS robots to Afghanistan.

ODIS performs under-vehicle inspections to detect explosives, contraband, radiological, and in the future, biological and chemical elements. William Smuda, TARDEC's project lead, said ODIS enables Soldiers to perform inspections from a safe stand-off distance, rather than using "mirrors on sticks."

"This is an example of Army R&D at its best," Smuda said. "We took ODIS out of the R&D pipeline on Sept. 12, 2001, and have worked hard to transition it to the field ever since."

Smuda said he is confident ODIS will prove beneficial in increasing Soldier survivability, and "will help bring them home."

ODIS' fielding is timely and relevant, as deployed Soldiers have recently been killed or injured while performing such inspections.

A security guard uses the Omni Directional Inspection System, or ODIS, during a security checkpoint inspection. Photo courtesy Tank Automotive Research, Development and Engineering Center.

ODIS, which combines omni-directional drive technology and robotic operations, weighs just 40 pounds and is less than four inches tall. It operates on a single charge via a nickel-cadmium or SINCGARS military pack battery for up to two hours.

Potential homeland security applications include airport and seaport inspections, hazardous substance detection, and preliminary area surveillance during first responder situations. In addition to Soldiers using ODIS in Operation Iraqi Freedom, TARDEC has paired with Virginia law enforcement officials to augment the security inspections associated with the Lee Malvo sniper trial.
TARDEC's ODIS program partners include the Department of Defense Joint Robotics Office, technical research partner Utah State University, and prototype manufacturer Kuchera Defense Systems of Windber, Pa.

TARDEC, headquartered in Warren, Mich., is part of the U.S. Army Research, Development and Engineering Command. Its mission is to research, develop, engineer, leverage and integrate advanced technology into ground systems and support equipment throughout the life cycle. TARDEC's 1,100 associates develop and maintain military ground systems for all U.S. Armed Forces, many federal agencies and more than 60 foreign countries.

'Super Roadrunner' breaks land speed record

By Jim Bowne, Public Affairs Office, U.S. Army Aviation and Missile Command

The rocket sled test sets the world record at Holloman Air Force Base. Photo courtesy U.S. Army Aviation and Missile Command.

REDSTONE ARSENAL, Ala. – "It" is now the fastest thing on Earth…attached to the Earth. "It" can travel more than 6,000 miles per hour.

"It" was the final stage of a four-stage sled train, which included the sled, a Super Roadrunner rocket motor, and a 192-pound payload on top. The sled train delivered the payload into a target at a velocity of 9,465 feet per second, or 6,453 mph.

The record-breaking sled test, conducted in April 2003 at Holloman Air Force Base, N.M., broke the previous world record established in 1982. During the latter sled test, also conducted at Holloman's High Speed Test Track, the sled train traveled at 8,974 feet per second – that's 6,119 mph – with a 25-pound payload.

"The primary objective of the sled test was to validate the Super Roadrunner sled train at the maximum attainable speed," said Dr. Jay Lilley, government program manager for Super Roadrunner, and chief of the Propulsion Technology Function, Propulsion and Structures Directorate, U.S. Army Aviation and Missile Research, Development and Engineering Directorate, Redstone Arsenal, Ala. "It was over before you even heard it, just some sonic booms and explosions. It was kind of unreal."

The test was the culmination of the Hypersonic Upgrade Program that began in 1998, greatly increasing capabilities at Holloman's High Speed Test Track to meet Department of Defense testing needs.

"The test demonstrated improvements in rocket sled design, rail alignment, rocket propulsion, and modeling and simulation," Lilley said. "The program actually started with some conversations we had with Holloman Air Force Base in 1997. They needed to update the capability to reach velocities that would meet the next generation of kinetic energy interceptor missiles — missiles that hit missiles. And they needed a test environment that would be cost effective."

Holloman's High Speed Test Track is the world's premier rocket sled test track. During the tests, payload and instrumentation are moved along a straight-line path by rocket sleds, which operate on a set of heavy-duty crane rails. The 50,988-foot-long rails are continuously welded and aligned to rigid tolerances to ensure a straight, smooth surface.

The Test Track, a critical link between laboratory-type investigations and full-scale flight tests, provides an efficient, safe and cost-effective ground test alternative to expensive developmental flight tests.

"In order to meet the Defense Department's hypersonic test needs, Holloman upgraded its High Speed Test Track to handle faster speeds," Lilley explained. "They also upgraded the sled system so it could operate at 10,000 feet per second. Our part of the program was to upgrade the propulsion system. We subsequently convinced Holloman that we were the right manager for the upgrade program for the rocket motor."

The Propulsion and Structures Directorate was responsible for program and contract management, propellant ballistics and processing technical support, design and analysis for the composite rocket motor case, and the design and analysis of thermal protection materials. The directorate also was involved with the propulsion system design and analysis, coordination of the qualification text program, and data analysis.

"We ended up being responsible for overseeing the development of the Super Roadrunner rocket motor, which was 'state-of-the-art' in a lot of areas. We acted as the go-between for Holloman Air Force Base and Atlantic Research Corporation, which designed, built, and shipped the Super Roadrunner Rocket motors to Redstone Arsenal for static tests."

The rocket sled at world record velocity, 6,453 miles per hour. Photo courtesy U.S. Army Aviation and Missile Command.

All the motors underwent environmental and static testing at the Redstone Technical Test Center, Lilley added, noting all organizations involved cooperated.

“The motors were subjected to a variety of environmental conditions, including things like dust, lightening strikes, and static electricity, to mention a few,” he said.

A sled train test is expensive, but cost effective.

“When you add the costs of setting up the test, the rocket motors, the sled, the helium tent, instrumentation, along with probably about 100 people, it comes close to a million dollars,” Lilley said. “However, when you crunch the numbers, it’s still cheaper than doing a flight test. And you can get data at a fraction of the cost. Actually, it’s a very cost effective way to go.”

The Super Roadrunner motor developed specifically for the Hypersonic Upgrade Program produced 228,000 pounds of thrust for 1.4 seconds and weighed only 1,100 pounds. The maximum acceleration of the sled was 157-g’s, or 157 times the force exerted by gravity. When the payload impacted the target, it had 363 mega joules of energy – that’s equal to a car impacting a brick wall at 2,020 miles per hour.

“We developed the technical requirements, and we continue to monitor the contract work,” Lilley said. “We conducted the analyses and validated the performance of ARC’s predictions. And we did a lot of work on the composite rocket case. Our two main efforts were the in the areas of propulsion technology and aerospace materials. We’re in the production mode now, and it’s operational. We are still doing quality control on rocket propellant to determine the burn rate of the propellant.“

He noted that these new capabilities will be used on an upcoming missile defense warhead test program, since Holloman’s High Speed Test Track is the only ground test facility that can achieve the speed and payload combinations to simulate full-scale intercepts of missile defense systems.

“We will continue to push the boundaries of state-of-the-art technologies,” Lilley said. “The Super Roadrunner rocket motor is certainly a superior motor, and it combines most of what we know about the state-of-the-art in solid rocket propulsion. However, the end product is always to deliver a payload on a target, at a specific velocity, at a precise location. And records are meant to be broken, aren’t they?”

For Cerberus, three heads are better than one

Communications-Electronics Research, Development and Engineering Center, Night Vision and Electronic Sensors Directorate

FORT BELVOIR, Va. – With the terrorist threat in a post 9/11 world, force protection has become a top Army priority. However, bigger and better force protection translates to more manpower, a demand being met by outstanding support of our forces here and overseas.

But this support draws Soldiers away from other areas where their help is needed, a dilemma that has caused some to wonder if technology could help to reduce the heavy manpower demand. This is the same question that the Chemical Materials Agency and the U.S. Army Materiel Command had in mind in considering ways to reduce manpower requirements at chemical weapon storage sites.

To address this challenge, CMA and the AMC Provost Marshall turned to the Special Products and Prototyping Division at the Night Vision and Electronic Sensors Directorate, part of the Communications-Electronics Research, Development and Engineering Center. The division's goal was to innovatively apply COTS/GOTS technology into an integrated sensor suite package that offers a force multiplier to force protection elements at AMC's chemical weapon storage sites.

SPPD first designed a low-cost mobile sensor suite tower that offers multiple detection and assessment capabilities, to extend the eyes and ears of current force protection personnel. The team wanted a more descriptive name than the usual Army acronyms, and decided upon Cerberus, for the mythical three-headed dog that guarded the entrance to the Underworld.

"This seemed appropriate as the tower is made up of three different cameras," said Mike Jennings, deputy division director.

These 50-foot-tall sensor towers offer a relocatable, self-sufficient, multi-tower net workable sensor capability that provides standoff detection and assessment of distances up to 300 meters, day and night. This increases user efficiency, reduces manpower for similar coverage, and enhances response time.

Cerberus accomplishes all of this through the use of its three detection modes:

- Perimeter Ground Radar, which presents an alarm and tracking of the target;
- Unattended Ground Sensors, for coverage in radar skip zones or in heavily vegetated areas that the radar cannot penetrate;
- Video Motion Detection, which uses staring cameras that can be independently positioned to fill gaps in radar, or to cover avenues of approach.

In either application, the VMD software offers an alarm to any motion in its field of view and presents an image and a track of the target, representing the first time NVESD has integrated the VMD component.

In addition to the staring camera in the VMD, a camera suite that switches to infrared at night sits atop the tower. The radar feeds target location data to the camera's pan and tilt, updating information as the target moves, providing a tracking capability. The camera will also slew to alarms from the unattended ground sensors placed in radar skip zones.

In addition to this three-tiered system of detection and the imaging suite, one of Cerberus's finest features is its self-sufficiency. Powered by a small generator with battery backup, it can also accept house power if needed. It uses a two-way wireless link for sensor commands and data flow, and the electronics are configured in a waterproof container. The sensor control software is similar to what is being used for chemical sensors and offers "plug and play" architecture with a host of fielded chemical sensors, enabling them to be added to the tower easily.

The height provides adequate line of sight for most terrain conditions, and multiple towers can be netted to achieve full perimeter coverage and a Windows-based alarm/image display and control segment provides one operator the situational awareness needed to monitor the site's status and direct response forces to an incident.

While Cerberus is still in development stages, two towers and an operator control station have been fabricated and under gone initial operational assessment. During one of these recent assessments, the commanding generals of AMC and the U.S. Army Research, Development and Engineering Command, CERDEC's higher headquarters, and representatives from CMA reviewed the system and agreed on its continued effort to achieve fully operational capability at Blue Grass Army Depot, Ky. The intent is to establish BGAD as an initial "model site" from which the remaining sites will be built. The operational Cerberus system of eight towers and an operator control station will be turned over to BGAD in June 2004, one year from the date of design.

Enhancements will examine techniques to extend the detection range to 1.5 kilometers, deal with low flying airborne threats, open sensor architecture to accept new sensor inputs like Unmanned Ground Vehicles and Unmanned Aerial Vehicles and the ability for multiple tiers of situational awareness.

Once fully fabricated, Cerberus will offer a new solution to rising force protection needs worldwide. It also opens up the possibility for application in civil Homeland Security roles in areas of protection such as borders, ports, and infrastructures. Innovative training and support concepts will insure initial field support until a more formally established Integrated Logistic Support program can be implemented. To this end, SPPD has been working with the Program Manager for Force Protection Systems to place Cerberus on a transition path into the PM-FPS acquisition program for an overarching concept of tactically deployed Force Protection Equipment.

New fibers could lighten body armor

U.S. Army Soldier Systems Center Public Affairs Office

NATICK, Mass. – Two new fibers are vying to replace the respected but heavier Kevlar, the staple of body armor for decades, as the Army strives to enhance mobility by reducing Soldier load.

Body armor is one of the more riveting individual equipment successes, especially from the ongoing conflicts in Afghanistan and Iraq, with reports of dozens of saved lives directly attributed to the bullet and shrapnel-halting ability of the helmet, flexible vest and rigid chest plate combination worn by troops.

Although it protects well, body armor ranks with water, ammunition and weapon as the heaviest items worn or carried by troops, according to engineers on the Ballistics Technology Team at the U.S. Army Soldier Systems Center in Natick, Mass.

"The Army is putting the best available armor materials into Soldiers' armor," said Philip Cunniff, a research mechanical engineer. "Part of our work in the Ballistics Technology Team is to develop new materials and techniques to lighten the load of those armor systems."

Body armor technology has advanced in the past century to protect the head and torso against high-velocity handgun bullets and fragmenting munitions, such as those from artillery shells, mortar shells, mines and grenades. Lightweight small arms protection also is available for the torso.

The nylon "flak" vest for ground troops and steel helmet from the 1960s were replaced by Kevlar vests and helmets during the 1980s in a product called Personnel Armor System, Ground Troops. At the users' request, performance increased with the PASGT system but weight remained about the same, Cunniff said.

The next major change was in the 1990s with an improved version of Kevlar that helped lighten the vest by 25 percent and increased ballistic protection.

The team's objective is to reduce the weight again, this time by 25-30 percent, without losing performance. Zylon and M5 fibers show potential in meeting or exceeding that goal.

Zylon, a commercially-available fiber first developed by the Air Force in the 1980s and now produced in Japan, turned in a solid performance in testing, said Cunniff. A prototype helmet made last year with Zylon was developed as part of the Human Systems Defense Technology Objective for Ballistic Protection for Improved Survivability. The Zylon helmet weighs 1.79 pounds, compared to 3 pounds for the PASGT at the same protection levels.

Cunniff said two possible roadblocks with Zylon are environmental degradation and the law requiring certain military products to be manufactured in the United States with domestic materials. Zylon has shown to break down with exposure to light, high heat and humidity, although Cunniff said there may be solutions to these problems.

An alternative material to Zylon is M5, an ultra-high performance fiber developed by Magellan Systems International in Bethesda, Md.

According to Cunniff's mathematical model for the estimation of impact performance based on the mechanical properties of armor materials, M5 appeared to provide exceptional impact performance. His model indicated that M5 could cut weight by at least 35 percent compared to currently available fragmentation armor at the same protection level. So far, ballistic impact test results with a limited, relatively low-strength sample of M5 are glowing.

"We shot it, and it came out better than we expected," Cunniff said. "We found there was something wrong with the model; we underpredicted the performance of the material. Of everything we looked at, it looks like M5 will be a really big improvement in reducing the weight of armor."

Another feature of M5 fiber is excellent thermal and flame protection. Besides helmets, fragmentation vests and composites for use in conjunction with ceramic materials for small arms protective plates, M5 fiber could also be used for structural composites for vehicles and aircraft.

"The military market for ballistic material is cyclic," Cunniff said. "The beauty of this fiber is that it should have a lot of other markets when Army demand falls. We're hoping it becomes cost-competitive to Kevlar."

The plan is to acquire sufficient quantities of M5 fiber by next fall to make a prototype helmet, vest and small arms protective plate.

"Then we can find out how well high-strength M5 performs and find out what kind of armor we can develop for Objective Force Warrior and the Army," Cunniff said.

Personal coolers become smaller

U.S. Army Soldier Systems Center Public Affairs Office

NATICK, Mass. – Every Soldier will carry some high-temperature relief when a microclimate cooling system is incorporated into the upcoming Objective Force Warrior uniform.

Microclimate cooling has been researched and developed at the U.S. Army Soldier Systems Center in Natick, Mass., since the 1980s, beginning with the Portable Vapor Compression System, a system shaped like a vacuum cleaner canister weighing 27 pounds, leading now to a couple of prototype compact systems weighing less than 5 pounds that resemble an oversized brick.

Engineers on the Chemical Technology Team are focused on having a system that weighs less than 4 pounds by 2008 and a system weighing less than 3 pounds by 2015 which will still provide the desired cooling to enhance Soldier safety and performance.

"Cooling is a medical and safety issue," said Brad Laprise, a mechanical engineer. "Comfort is a by-product. You'll never feel like you're in an air-conditioned room (with these systems), but the idea is to mitigate the Soldier's heat stress, allowing them to do their jobs safely and more effectively."

Cooling also can be a force multiplier because troops can work longer without taking frequent breaks necessary because of high ambient temperatures. It also can reduce the logistics load by decreasing the amount of drinking water, said Walter Teal, a chemical engineer.

Various microclimate-cooling systems are used for different needs. In 1989, sailors aboard ships started wearing a vest that holds ice packs slipped into its horizontal pockets front and rear. Explosive Ordnance Disposal technicians and those encapsulated in outfits protecting them from toxic agent exposure use the Personal Ice Cooling System, which pumps ice-cold water from a two-liter bottle carried by the individual through a tube-lined cooling garment. M1 tanks and Bradley infantry fighting vehicles have built-in systems that circulate filtered and conditioned air through a Natick-designed vest worn by crewmen.

The latest application of microclimate cooling will benefit Army helicopter pilots beginning next year, Laprise said. From the initial Portable Vapor Compression System to an intermediate unit weighing about 21 pounds, a system called the Advanced Lightweight Microclimate Cooling System weighing 6.6 pounds was developed by 1997, eventually leading to the Air Warrior Microclimate Cooling System program. Built into the helicopter, the system is worn in conjunction with a new stitchless cooling garment also designed at Natick.

In testing, Teal said pilots using the cooling system could safely extend their mission from 1.6 hours to no less than 5.3 hours.

Still, what works for pilots in their aircraft isn't desirable for a dismounted Soldier. Laprise said it's impossible to have one microclimate system for everyone.

The personal coolers designed by Aspen Systems, Inc. in Marlborough, Mass., and Foster-Miller in Waltham, Mass., are unique prototypes using the same technology as the Advanced Lightweight Microclimate Cooling System but in a smaller package.

"These prototypes are stepping stones. The next step is to take the lessons learned from the Aspen and Foster-Miller units and go to something smaller," Teal said. "We know we are pushing the envelope of vapor compression, but we think there are things we can do to lower the weight and power use."

Vapor compression technology works like a refrigerator or air conditioner, with a compressor, condenser, evaporator, thermal expansion tube, fan and pump working to move heat to the ambient environment. In microclimate cooling, liquid is chilled and pumped through a vest lined with a network of tubing, removing excess body heat.

The Foster-Miller prototype provides 110 watts of cooling at 95 degrees F ambient temperature and weighs 4 pounds. The Aspen prototype weighs 4.65 pounds and provides 120 watts of cooling under the same conditions. Both require 50 watts of power, but engineers hope to achieve similar cooling capacity with only 30 watts of power in the future.

Although 300 watts of cooling is ideal, at least 100 watts of cooling is needed to lower core body temperature according to studies they've seen, Teal said. Lower cooling capacity is a trade-off for reduced weight.

Shrinking size an inch or two and trimming a few ounces here and there will work for the next phase, but Teal said breakthrough technology is needed to achieve the most compact cooler for Objective Force Warrior.

"Taking off those last two pounds will take more effort than the first 22 pounds," he said.

Water Immersion Lab measures responses to heat, cold

U.S. Army Soldier Systems Center Public Affairs Office

NATICK, Mass. – If the 14-foot depth of the Water Immersion Laboratory tank at the U.S. Army Research Institute of Environmental Medicine seems excessive, there's a good reason for it.

"Visitors are always surprised at how deep it is, but once (the water) gets to temperature, we can keep it at that temperature within a few tenths of a degree," said John Castellani, a research physiologist in USARIEM's Thermal and Mountain Medicine Division. "That's the benefit of a deep tank."

Researchers at USARIEM, located at the U.S. Army Soldier Systems Center in Natick, Mass., have used the laboratory to evaluate human responses to cold or hot environments for studies since the building was constructed in 1968. Renovated in 2000, the lab's premier feature is its 10-foot by 10-foot stainless steel tank filled with 10,000 gallons of chlorinated water.

Besides water depth, the facility is unusual for its ability to test humans exercising on a single underwater walking treadmill or with two cycle ergometers while sitting on accompanying bolted-down stainless steel chairs.

Each type of exercise machine is independently operated and raised or lowered on separate platforms into water with an operational temperature range of 41-122 degrees F, although the majority of human exposures in test protocols range from 59-104 degrees F. Each cycle ergometer has a moveable plate system to adjust to individual leg length, and attaching or removing fins to the wheel adjusts resistance.

Human research volunteers are connected to a data acquisition system, a computer nearby on the platform that surrounds the tank, to measure and record physiological status.

Work in the facility has been wide-ranging. The lab helped validate the core body temperature pill against conventional methods of measuring body temperature. Sometimes the exercise equipment is untouched, as with one nutrition study where the human research subjects sat still in the water.
Nearly five years ago, a commercial hot tub was acquired as a re-warming pool to help test subjects raise their body temperature quickly after soaking in chilly water, and the cold has been the research focus in recent years.

"We're interested in how hypothermia affects humans," Castellani said. "This facility works out well because it gives you a great place to recreate a cold or cold-wet environment."

Water takes away heat 25 times faster than air, which makes it easier for researchers to reduce core body temperature without risking a cold injury that could occur in an air chamber, he said.

Motivation in studying hypothermia was spurred after four Army Rangers died while going through Ranger school at Eglin Air Force Base, Fla., in 1995. Scientists used the water immersion lab along with the climatic chambers to pursue research on how cooling affects performance.

A repeated immersion study in 1996-1997 simulated what happens when a Soldier enters the water for two hours at a time and then emerges, three times per day. By the second and third immersion, researchers learned that body temperatures decreased because the test subjects couldn't shiver as well.

Researchers also used the facility in studies to learn if exercise fatigue causes thermoregulatory fatigue. Human research volunteers exercised or remained motionless in the water, which was then followed by cold air exposure. Those exercising and fatigued had a lower body temperature because they could not keep their body heat in as well.

"The idea is to feed data into our cold (temperature) models. We're trying to add fatigue factors into the existing model, which is now good, but we're building on it," Castellani said.

The treadmill, a relatively new addition, is helpful because it can simulate wading in a swamp, which is more realistic than the cycle, said Castellani. Researchers can vary the treadmill speed, water temperature and, by raising or lowing the platform, vary the water depth to test responses at different points along the body.

A study that has just begun is looking at how long people can stay in water at different depths and temperatures. A second part of the study will take hypothermic human research volunteers into a cold chamber to test their cognitive and physical performance through a series of Special Operations Command tests.

"We don't have much information on this at the temperatures and depths we're looking at," Castellani said. "We've been able to understand that stressors Soldiers undergo cause a degradation on thermal regulation. That information will help us design better physiological models."

Ultimately, the idea is to be able to predict under what conditions a Soldier declines in performance and may become a casualty, he said, giving troops the information to make the right decisions and avoid harm.

New testing opens window into how the brain sees camouflage

By Dr. Thomas Meitzler, U.S. Army Tank Automotive Research, Development and Engineering Center, and Dr. Joy Hirsch, Director, Columbia University Functional Magnetic Resonance Imaging Research Center

A test subject uses the Visual Perception Laboratory to test the visibility of camouflaged vehicles. Photo courtesy U.S. Army Tank Automotive Research, Development and Engineering Center.

WARREN, Mich. – Understanding how the human brain works during target acquisition – finding threats on the battlefield – is integral in developing vehicle camouflage. A laboratory at the U.S. Army Tank Automotive Research, Development and Engineering Center is determining the effectiveness of camouflage faster and more accurately, using a combination of technologies.
Previously, 30 to 40 volunteer test subjects would go to the field for a few weeks and undergo a variety of tests to rank how well they could see vehicles.

Now, those test subjects enter TARDEC's Visual Perception Laboratory, where high-resolution photos from the field enable researchers to control experiments and uniformly introduce factors such as range, lighting and atmospheric conditions, rather than rely on varying conditions in the field. From a prone position, they "click" on where they think they see the vehicle by pointing. After literally hundreds of clicks, the results of their positive and negative answers will help generate an effectiveness ranking between zero, which means it's difficult to see, and one, which denotes it's fairly visible.

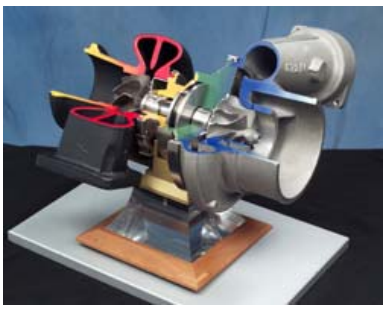
Now add to that technology the latest in functional magnetic resonance imaging, and you literally have a window in to how the brain works during decision making, identification, and search.

The fMRI is available through a Cooperative Research and Development Agreement between TARDEC and the Colombia University Medical School, to see how this tool can provide an auxiliary and enhancing technique to existing psychophysical techniques. An fMRI from a subject who doesn't see the camouflaged object shows general activity, but once a target is recognized, the scan shows a flurry of activity in the areas of the brain responsible for language, recognition and processing of visual information.

The fMRI research, coupled with the Visual Perception Laboratory, will augment the existing methods of predicting the probability of detection of ground vehicles. Equipment such as paint and netting can be evaluated faster and more accurately, and in a variety of conditions, using this technology.

ARL researchers work on oil-free turbochargers

By Tonya Johnson, U.S. Army Research Laboratory Public Affairs Office



This oil-free turbocharger technology will use air rather than oil for lubrication.

CLEVELAND, Ohio – Researchers at the U.S. Army Research Laboratory co-located, with NASA in Cleveland hope the oil-free turbocharger technology they're working on will improve the performance and reliability of heavy diesel powered military vehicles.

Currently, most diesel engines rely on a turbocharger that is lubricated by oil. Kevin Radil, a mechanical engineer, and his colleagues, who started working on this technology in the mid-1990s, hope to change that. The oil-free turbocharger technology is composed of high-speed rotating equipment that operates without oil-lubricated rotor supports such as bearings, dampers, and seals.

"This technology is significant because you eliminate oil coking (burning oil), oil leakage, oil consumption, and contamination so the oil won't spill or leak onto other parts," Radil said.

The new technology consists of foil bearings and tribological coatings. Instead of oil, the foil bearings use air for lubrication. These bearings operate at high speeds and temperatures. The tribological coatings provide protection and increase the durability of the bearings. The coating is a NASA-developed, high-temperature, solid lubricant coating tailored for foil bearings that operate from a cold start to 1,500 degrees Fahrenheit without vaporization or emissions.

Among the numerous benefits to using oil-free technology is the 15 percent reduction in engine weight by eliminating the oil system. The oil-free turbocharger also operates at a higher efficiency, which improves the power density of the engine.

"The logistics burden goes down because foil air bearing technology is maintenance free. This technology is more reliable and more durable and it enhances the readiness of diesel military vehicles," Radil said. "Another big thing is that the bearing will last the entire life of the system it's used with."

ARL researchers are working with NASA and private industry – Borg-Warner Automotive, Mohawk Innovative Technologies, and Caterpillar – in their on-going efforts to improve and test the technology. In the future, the researchers hope the technology can be applied to the Stryker and medium-sized tactical vehicles.

The group is also working on technology that can enable oil-free gas turbine engines in helicopters and unmanned aerial vehicles.

NATO Advanced Vehicle Technology panelists include TARDEC engineers and scientists

By Rae Higgins, U.S. Army Tank Automotive Research, Development and Engineering Center

WARREN, Mich. – Secretary of Defense Donald Rumsfeld's recent trip to the North Atlantic Treaty Organization headquarters in Brussels has put the international spotlight squarely on the alliance, its mission and its role. Although NATO and Brussels may seem a world away, engineers and scientists at the U.S. Army Tank Automotive Research, Development and Engineering Center are actively involved in NATO-sponsored international military research and development.

NATO is an alliance of North American and European countries committed to fulfilling the goals of the 1949 North Atlantic Treaty. Its mission is to protect the freedom and security of its member countries by political and military means. During the last decade and a half, it has played an increasingly important role in crisis management and peacekeeping.
All member countries participating in the alliance's military facet contribute forces and equipment, which when combined, make up NATO's integrated military structure.

It is widely thought that the advent of NATO formed the foundation for the greatest international mechanism ever in defense S&T. According to the March 2003 issue of the National Defense University's Defense Horizons, from its earliest days, NATO involvement in science and technology has sought to build cooperation and promote security and stability.

The core of NATO's current S&T program is the Research and Technology Organization, or RTO. This historic body began as the Advisory Group for Aerospace Research and Development in 1952 and became an agency under the NATO Military Committee in 1966. According to officials, AGARD's task was to foster and enhance the information interchange relating to aerospace R&D between the NATO nations. AGARD also provided the NATO Military Committee S&T advice and assistance in aerospace research and development, especially as it pertained to military applications.

Another forebear of the RTO was the NATO Defense Research Group, formed in 1967. The DRG's primary purpose was to foster cooperation on research and new technology leading to future defense equipment. This body established and executed cooperative research projects, including collaborative research via joint experiments or studies; developing test beds, prototypes or computer models; cooperative field trials for data collection or prototype validation; and technical knowledge exchange through workshops and symposia.

In early 1998, a new organization was formed when the AGARD and the DRG merged to create the NATO Research and Technology Organization.

The RTO enables collaboration among the most technologically advanced countries and administers alliance nations' plans and execution programs covering all aspects of technologies key to current and future security.

The RTO's scope, magnitude and potential are unrivaled anywhere in the world. It fosters long-term relationships among senior executives, scientists and engineers; shares information and research; and enhances military capabilities.

The RTO is governed by a board, and the work is carried out by technical panels and teams. All promote and/or conduct cooperative research and information exchange, develop and maintain a long-term NATO research and technology strategy, and advise all NATO elements on research and technology issues.

The board directs and coordinates NATO's defense research and technology, whereas the technical panels are made up of senior-level member-nation-appointed technical experts. Each technical panel is comprised of national members from each NATO nation; and initiates, plans and manages technical activities within its respective area of responsibility.

As such, NATO's Applied Vehicle Technologies Panel is comprised of an international team of scientists devoted to future military land, air, sea and space vehicle research, development and engineering.

TARDEC Executive Director for Research Dr. Grace Bochenek is the U.S. national representative on the NATO RTO Panel for Applied Vehicle Technology, and as the primary land representative, she coordinates research activities across the Army. Other panel members include representation from the U.S. Navy, Air Force and NASA.

The AVT panel's mission is "to improve the performance, affordability and safety of vehicle platforms, propulsion and power systems through the advancement of appropriate technologies. The panel addresses technology issues related to vehicle platforms, propulsion and power systems operating in all environments including land, sea, air and space, for both new and aging systems."

Appropriately, TARDEC provides representation to several of the panel's technical teams.

"A number of our associates have been involved in the NATO AVT technical teams over the years, and these engineers and scientists are highly respected among their international colleagues," Bochenek said. "It's important for people to know about our involvement in NATO, as TARDEC plays a key role in many of the U.S. military's vital S&T programs. Our associates' R&D efforts impact not only our military, but they also have the opportunity to make a difference on a joint and coalition level."

AVT panel activities focus in two distinct areas: vehicle and platform technologies, and propulsion and power technologies. The vehicle and platform technologies include vehicle and platform design; configurational fluid dynamics and fluid mechanics; stability and control; noise and vibration control; structural loads and dynamics; smart structures; structural materials and manufacturing processes; nonstructural materials; environmental effects; affordability, availability, survivability and supportability; reliability, maintenance and repair, and test facilities, techniques and instrumentation.

The propulsion and power technologies are air-breathing engine design (piston, gas turbine, ramjet/scramjet); rocket motors and rocket-based combined cycles; electric propulsion, including hybrid systems; engine control and thrust vectoring; power generation and storage; fuels and combustion; power plant materials and structures; propellants and explosives; operation, condition monitoring, reliability, maintenance and affordability; environmental impact; and test facilities, techniques and instrumentation.

The panel typically meets bi-annually, and meetings are always combined with a technical symposium and special interest group meetings, Bochenek said. The next meeting is June 7-10, 2004, in Williamsburg, Va. The symposium will focus on Weapons Integration with Land and Air Vehicles. The forum is open to NATO and Partnership for Peace nations.

For more information on the NATO, the RTO or the Advanced Vehicle Technology Panel, go to www.rta.nato.int/AVT.htm.

U.S. to host NATO vehicle integration symposium June 7-10

U.S. Army Tank Automotive Research, Development and Engineering Center

WARREN, Mich. – The NATO Research and Technology Organization's Applied Vehicle Technologies Panel will hold the Weapons Integration with Land and Air Vehicles Symposium in conjunction with a NATO specialists' meeting on "The Control and Reduction of Wear in Military Platforms" June 7-10 in Williamsburg, Va.

U.S. Army Research, Development and Engineering Command associates are invited to attend.

The symposium will address the problems and possible solutions connected with weapon platform interface interactions through in-depth presentations and discussions among international researchers, academicians and engineers. The meeting will focus on recent and current research and development related to land and air platforms. It is open to NATO and Partnership for Peace Nations.

TARDEC Technical Director Dr. Grace Bochenek is the U.S. national representative on the NATO RTO Panel for Applied Vehicle Technology. As the panel's primary land representative, she coordinates research activities across the Army. Other panel members include representation from the U.S. Navy, Air Force and NASA. All have a hand in organizing the event.

The meeting will feature two technology tracks, one dealing with land vehicle applications, while the other will zero in on air vehicle applications. The focus will be on weapon integration with the carrying vehicle. Tentative agenda topics include:

- Impulse loadings produced by medium- and large- caliber guns on lightweight armored vehicles and their equipment
- Vehicle dynamics under impulse loads
- Vehicle designs to take recoil, including powered active suspension, long-recoil systems, low-recoil systems, etc.
- Impact of integration on intermediate ballistics (muzzle brakes etc., but not internal ballistics)
- Impact of integration on external ballistics
- Ammunition autoloading
- Missile integration on land vehicles (e.g. kinetic energy missiles, vertical launch)
- Integration of guns into helicopters and aircraft
- Predictions and measurements of store and air vehicle loads and structural interaction during carriage
- Store separation from external and internal installation (CFD modeling, experimental, and flight testing)
- Pneumatic and pyrotechnic racks and ejectors, bay release mechanisms
- Release shock prediction on both the weapon and the platform

- Weapons bay environment (acoustics, cavity flow, active and passive control)
- Prediction (analytical, computational and experimental) methods and subscale measurements
- Full-scale testing and validation of land and air vehicle systems
- Weapon system certification/material release processes for land and air vehicle systems.

Elmer Doty, vice president of United Defense Ground Systems Division, will deliver keynote remarks.

The NATO Research and Technology Organization conducts and promotes cooperative research and information exchange supporting the development and use of national defense research and technology to meet the military needs of the alliance, to maintain the technological lead, and to advise NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

The mission of the RTO's Applied Vehicle Technology Panel is to improve the performance, affordability and safety of vehicle platforms, propulsion and power systems through the advancement of appropriate technologies. The panel addresses technology issues related to vehicle platforms and propulsion and power systems operating in all environments, including land, sea, air and space, for both new and aging systems.

For more information on the NATO Applied Vehicle Technology Panel's Weapons Integration with Land and Air Vehicles Symposium, log on to www.rta.nato.int/AVT.htm.

TARDEC associates travel to Poland for NATO panel meetings

U.S. Army Tank Automotive Research, Development and Engineering Center

WARREN, Mich. – Vehicle technologists from around the world convened in Warsaw, Poland, in early October for the NATO Research and Technology Organization's Applied Vehicle Technology Panel's Vehicle Propulsion Integration Symposium.

The Military University of Technology for the Polish Ministry of Defense coordinated the meeting locally.
The mission of the NATO Research and Technology Organization is to conduct and promote cooperative research and information exchange. The RTO is a three-tiered unit composed of the Research and Technology Board, specified focus panels and technical teams. The mission of the Applied Vehicle Technology Panel is to improve the performance, affordability and safety of vehicle platforms, propulsion and power systems by advancing appropriate technologies. The panel addresses technology issues related to vehicle platforms, propulsion and power systems operating in all environments, including land, sea, air, and space, for both new and aging systems.

Patrick Nunez is the chairman of AVT-107, a technical group devoted to the NATO Reference Mobility Model. His group's objective is to create software that provides standard modeling methodologies and virtual tests related to NATO ground platform mobility. In Poland, he briefed AVT-107 activities to the larger AVT panel.

"Our group is breaking new ground for the AVT panel in a few ways," Nunez said. It is creating software for use by all NATO nations, and the group was given the green light to pursue collaboration with Australia, a non-NATO country. Additionally, AVT-107 has petitioned the AVT Panel to investigate a long-term commitment to software management."

Nunez said this is significant because typically, NATO technical groups are chartered for a maximum of three years.

"We are also pursuing a collaboration between the AVT Panel and another NATO research and technology group, the Modeling and Simulation Group," he added, noting that the panel is parallel to the AVT group.

Nunez said his group had significant discussions regarding NATO standard mobility modeling tool requirements, and all the countries presented their respective viewpoints. Each country rep returned home with the assignment to identify what their country could contribute to the NATO standard.

"The group has a very good rapport and the discussions were very frank and honest … each national representative left the meeting with high hopes for the group and an inspiration to contribute to the products of the group," he said.

Anna Wojciechowski of TARDEC's Engineering Business Group attended the NATO specialists' meeting on Advanced Environmentally Compliant Paint Removal Technology. At this forum, specialists presented the latest advanced technologies for environmentally compliant paint removal. A roundtable discussion was held on the participating NATO nations' implementation of new processes, centering on current status, economic issues and future implementation plans.

Paint removal is an important issue, as it is a key step in inspecting military land, air and maritime systems' structural integrity and corrosion damage. As such, paint removal and repainting is common over a system's lifecycle. NATO nations are developing and investigating new paint removal methods that comply with the environmental regulations of the member nations.

Wojciechowski explained that representatives from several of NATO countries gave briefings on their latest paint stripping technology.

"I listened to the presentations which concentrated on paint stripping from aircraft. The last day we had a discussion on which way the nations should go in the future with paint stripping. Drawing from my experience with paint formulation and

environmental compliance, I suggested that the paint stripping group should work closer with the paint formulation group to reduce the life cycle costs of paint stripping," she said.

She added that vehicle paint stripping should be added to future discussions.

"The challenge to uniform stripping methods comes from varying regulations and painting specifications which differ between the countries and systems painted," she explained. "Having the opportunity of sharing the various approaches to paint stripping could, however, help, and collaboration and exchange of information should be continued."

Dr. Jay Dusenbury of TARDEC's Petroleum and Water Technology Area attended the Warsaw meeting to deliver a presentation in the Vehicle Propulsion Integration Symposium. TARDEC spearheads the U.S. Army's Science and Technology Objective efforts in researching, developing innovative, efficient water purification, recovery and generation technologies to reduce military water sustainment requirements.

During the briefing, the attendees learned how TARDEC leads the U.S. Army's efforts for a developmental water from exhaust system that yields about one gallon of water for each gallon of fuel consumed by a vehicle or generator engine. This system, if embedded into platforms, could help revolutionize battlefield water sustainment by reducing overall logistics footprint. Additionally, water from exhaust systems would make water production more mobile, flexible and decentralized and would help reduce water storage and distribution requirements.

TARDEC Technical Director Dr. Grace Bochenek attended the meeting as the U.S. national representative on the NATO RTO Panel for Applied Vehicle Technology. As the panel's primary land representative, she coordinates research activities across the U.S. Army. She explained that other American AVT panel members include representatives from the U.S. Navy, Air Force and NASA.

The next AVT panel meeting, scheduled June 7-10, 2004, in Williamsburg, Va., is open to citizens of NATO and Partnership for Peace nations, and RDECOM associates. For more information on the NATO Research and Technology Organization and its associated panel, logon to: http://www.ndu.edu/inss/DefHor/DH24/DH_24.htm or http://www.rta.nato.int/AVT.htm.

Employee efforts lead to Director's Awards

Aviation Applied Technology Directorate, U.S. Army Aviation and Missile Research, Development and Engineering Center

Dr. Thomas H. Killion, left, acting deputy assistant secretary for research and technology, Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology), and Col. William Gavora, right, commander, AATD, stand with winners of the Director's Awards. From left are Ned Chase, who accepted the Technological Achievement Award for Dr. Marc Portanova; Jerome Clifford, Engineering and Science and/or Program Management Award; Brian McGhee, Technical Support Award; Elizabeth Jackson, Business and/or Professional Administrative Support Award; and Terry Lewis, General Excellence and/or Administrative Support. Photo by Ronald Bowman

FORT EUSTIS, Va. – Five employees of the Aviation Applied Technology Directorate at Fort Eustis, Va., recently earned the Director's Awards for their outstanding contributions during the fiscal year 2003.

The directorate is part of RDECOM's U.S. Army Aviation and Missile Research, Development and Engineering Center.

Five people were selected for general excellence in the following categories; technical support; business and/or professional administrative functions; general and/or administrative support; engineering and science and/or program management; and technological achievement.

Dr. Thomas H. Killion, acting deputy assistant secretary of the Army for research and technology, Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology) was the guest speaker.

Each awardee received the Department of the Army Citation, an engraved plaque, and cash award of $1,500.

Brian K. McGhee received the Technical Support Award for providing superior levels of electronics support to the integration of Blue Force Tracking system onto UH-60 Blackhawks and CH-47 Chinook helicopters.

Terry Lewis earned the General and /or Administrative Support Award for maintaining the AATD grounds and buildings in top-notch condition and the Director's recycle program.

The Excellence in Business and/or Professional Administrative function was awarded to Elizabeth A. Jackson for administering 20 contracts for the fiscal year 2003 that have a value of more than $14 million.

Receiving the Excellence in Engineering and/or Program Management Award was Jerome Clifford for the successful design, development, and testing of a new infra-red suppressor system for the Kiowa helicopter Project Manager's office.

The Technological Achievement Award went to Dr. Marc Portanova for serving as the project engineer for the flight test, managing all aspects of the budget, schedule, in-house instrumentation and flight-test support, and flight-test support, and airworthiness substantiation process for the Wing-Store Launched Unmanned Aerial Vehicle.

Col. William Gavora, commander, AATD assisted by Killion presented the awards.

Seventh annual Robert A. Trifiletti Memorial Award presented

By Sergio Aponte, U.S. Army Armaments Research, Development and Engineering Center

Frank Dindl stands beside a portrait of the late Robert A. Trifiletti, to whom the prestigious annual memorial award is dedicated. Photo by Remi Chian.

PICATINNY ARSENAL, N.J. – Frank Dindl, a senior mechanical engineer from the Weapons Systems Team, Light Armament Division of Close Combat Armaments Center, recently was honored at the seventh annual Robert A. Trifiletti Memorial Award Ceremony.

Six outstanding LAD nominees and four honorable mentions that were recognized for their inspiration to all of the "Trif" spirit. Along with Dindl, the other Ronny Alzamora, Mary Azagra, Anthony Cautero, Lucian Sadowski and Sheila Speroni. Honorable mentions were given to the following: Michael Clune, Tammy Lanier, Frank Puzycki and Dixie Sutton.

Robert Trifiletti's wife, Pat, and son, Robert Trifiletti Jr., who is assigned to the Small and Medium Caliber group of the Weapons Systems Team.

The award is dedicated to the memory of Robert "Trif" Trifiletti, a former LAD chief, after his death seven years ago. It is presented to an individual who exemplifies the highest traditions established by Trifiletti during his distinguished government career.
This year the award process involved the nomination, review, and selection by all fellow LAD peers throughout Picatinny and Rock Island. The votes were registered through the LAD website maintained by Michael Chinni. In short, this year's award was truly an opportunity for fellow employees to honor and recognize one of its own. Nominees are evaluated based on the actions that reflect their commitment to the mission and organization, demonstrated by: their passion for the job, capabilities for setting objectives and achieving them, honesty and fairness, leadership and ability to motivate, their willingness to take on a challenge and their improvement of the quality of life for others. All of the above play an essential part of the evaluation.

The criterion for nomination, and eventual selection, is based not only on his/her professional accomplishments and performance, but also on what they do to positively affect those around them, an accurate reflection of the "Trif" spirit.

Civilians learn about 'a day in the life of the Army'

Communications-Electronics Research, Development and Engineering Center

Greening course students look for the enemy, plot a grid coordinate and call for fire to defeat the enemy.

FORT MONMOUTH, N.J. – The first 21 graduates of a newly designed learning concept called "The Greening Course" completed training recently at the Communications-Electronics Research, Development and Engineering Center.

The course helps to create teambuilding and a sense of camaraderie among civilian members of the total Army team, and provides basic understanding of the Army through informal classroom instruction and hands-on, face-to-face experience with Soldiers.

"I learned about this type of program at Aberdeen Proving Ground and believed we could do the same thing here at Fort Monmouth," said Master Sgt. Dwayne Davis, career development specialist/trainer for CERDEC's Human Resource Office. "So I collaborated with the instructors of the Army Research Laboratory Greening Course at Aberdeen Proving Ground, Army Materiel Command, CERDEC Flight Activity, and Fort Dix National Guard Battle Lab to establish a Greening Course here at Fort Monmouth."

Davis noted that Col. Angel Colon, military deputy director of CERDEC, and Master Sgt. Javier Perez-Sanchez, CERDEC sergeant major, were instrumental in the development of the course by providing oversight, assisting in securing resources, and making a presentation about the military chain of command.

Participants spent a typical "Army" day receiving instruction in combat arms, night vision, combat support, and special operations, as well as weapon familiarization and map reading. The students were also treated to a tour of the Signal Museum to emphasize the significance of military history, and the Physical Fitness Center to learn about the importance of physical fitness.

As designated squad leaders for the class, Michael Ip, a computer scientist from CERDEC Integrated Battle Command Directorate, and Darlene Worsley, an electronics engineer from the Logistics and Readiness Center quickly learned the responsibilities of receiving orders from noncommissioned officers and disseminating them to the rest of the "platoon." To effectively execute the orders, both leaders also had to familiarize themselves with each person and were responsible for outbriefing the class and the staff of the CERDEC Human Resources Office at the conclusion of the course.

"This course was a success because it met its intended goal which was to further educate civilian workers on military organization and how the military does its job," Ip said. "I enjoyed gaining hands on experience with simulated weapons and vehicles, and active duty Soldiers giving instruction from their respective branches was invaluable. It gave their work a more realistic overview and how they apply the technologies we help develop. The Greening Course also gave us a better view of our 'mission' and who our 'customer' is. I think any civilian employee, intern or career, can benefit from this class."

Worsley said the course provided an exceptional insight into Soldier life and gave her the opportunity to see there is more to a Soldier's job than just attacking when ordered.

"Now I see there's so much dedication, concentration, skill and accuracy required in completing a mission. Now I realize how much the Soldier depends on their fellow squad members, who in turn depend on the civilian employees," she said. "Together we are one big family working to achieve a common goal. Thanks to the Greening Course, I know the United States Army is the best in the world and I'm proud to be a part of it. Hooah!"

Retired Lt. Col. Robert DeAdder demonstrates how homing pigeons performed in World War I and II.

Participating in simulations such as shooting targets with a M16 rifle at the Fort Dix battle lab definitely had Rosa Miranda, a computer engineer from CECOM Software Engineering Center, feeling like a Soldier in training. Sampling Meals Ready to Eat was the real thing, however, and helped her realize what it's like to consume this type of food for weeks to months.

"The helicopter ride was the most highly anticipated activity for the week," Miranda said. "We were able to experience an amazing view of Monmouth County. However, the idea being a Soldier in the helicopter on duty somewhere in an unfamiliar enemy territory is quite daunting.

She noted that the course "really taught me how physically and mentally prepared Soldiers must be to serve in the Army.

"I feel strongly that the Greening Course should be made mandatory for all new civilian employees coming into the Army family so they can gain a better understanding of its mission in supporting the warfighter," Miranda added.

The overwhelming success of the Greening Course has prompted CERDEC to schedule classes for January and February and, with the long-term goal of hosting one course every quarter.

Army and employees both benefit from patents on inventions

By John Biffoni and Vicki Upchurch, Office of the Chief Counsel, U.S. Army Research, Development and Engineering Command

ABERDEEN PROVING GROUND, Md. – Technology changes quickly. It used to be what's here today is gone tomorrow but now, what's here today sometimes is gone today.

Army scientists and engineers develop new technology to solve problems and improve capabilities. As in industry, the Army applies for patents to protect intellectual property. The patent system was developed to propel technology by granting rights to inventors in exchange for disclosing their inventions to the public.

Government and military personnel have contributed to patenting technological breakthroughs such as the CAT scan, solid-state technology, new stronger and lighter metals, lasers, nuclear power, aircraft technology, and the first modern computer.

A primary reason the Army patents inventions is to prevent an outside inventor or contractor from obtaining a patent for an invention by a government employee, then suing the government for damages for government use. In addition, the Justice Department can sue infringers for money damages and stop infringing activity.

More importantly, technology transfer allows the government to license patents in exchange for royalties and other income to the lab/agency and inventors, and provide a basis for industry to invest in creating new commercial products and services. Government patents also can lower acquisition cost because the government will not have to pay royalties on the patented technologies prior to contract award.

Army personnel, particularly scientists and engineers, have a professional obligation to protect the Army's intellectual property interests in their research and development. On a more personal level, inventors gain financially through incentive awards and licensing royalties and receive a considerable amount of recognition for their accomplishments. Government inventors are entitled to receive up to $150,000 per year in royalty income. Patents play a part in Factor IV promotions criteria.

What most people don't realize is that the patent standards do not require pioneering, ground breaking inventions unrelated to previous inventions. A small percentage of pioneering inventions may launch whole new industries, but most patents are simply improvements made to existing products and technology. For example, several patents issue every year for small improvements made to the toothbrush.

The Supreme Court once wrote that "anything under the sun that is made by man" is patentable subject matter. However, one cannot patent anything that occurs naturally in nature and purely scientific or mathematical principles. Typically, patents protect useful machines, products, processes, methods, and compositions of matter.

The U.S. Army ranked 119th out of the top 300 organizations receiving U.S. Patents in 2002, and receives 200 in a typical year. The patent process takes two to three years from the time an application is filed in the U.S. Patent Office until the patent is issued. While this may seem like a long time, the Patent Office has significantly improved the process.

First, submit a detailed written invention disclosure to the legal office supporting your organization. This disclosure should have enough information to teach a person of ordinary skill in the field to make and use the invention. The disclosure is reviewed to determine if the invention merits patent protection. If it does, a patent attorney prepares an application that includes a detailed description, claims that legally define the invention, and drawings if necessary to understand the invention.

Once the application is filed in the Patent Office, an examiner determines whether the item is patentable and complies with patent laws. The inventor works closely with the patent attorney to provide a timely response to the examiner's technical questions. The examiner considers the arguments and amendments until the inventor's claims are rejected or allowed. If the examiner allows the claims, the patent is granted.

After the Army earns a patent, both the Army and the inventor have an opportunity to make money through licensing. Current regulations allow inventors to receive the first $2,000 per inventor per year of royalty income and 20 percent of the remainder up to a maximum of $150,000 per year per inventor. The residual funds return to the laboratory where the invention was made. By law, royalties are used to reward scientific, engineering, and technical employees of the lab; to further scientific exchange among the labs; education and training of employees consistent with research and development missions; to increase potential transfer of the technology of the labs; for payment of expenses incidental to the administration and licensing of intellection property; and for scientific research and development consistent with the research and development missions and objectives of the lab.

Patents are the primary mechanism for protecting the government's investment in research and development. By working together, both the Army and the inventor can win together. It doesn't take a pioneering, groundbreaking invention to obtain a patent. Don't hesitate to contact your patent counsel to discuss any new developments or ideas that may be patentable inventions.