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THE PICATINNY VOICE

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Picatinny calibrates collaboration with industry

Tasked with delivering ammunition for weapons ranging from handguns to tanks, PM MAS customizes strategies and partnerships with the private sector to develop the best solutions for the warfighter

BY COL. MOISES M. GUTIERREZ,
LT. COL. JOHN TODD MASTERNAK,
CHRISTOPHER R. SEACORD AND
LT. COL. KYLE A. MCFARLAND
PM Maneuver Ammunition Systems

From the handgun ammo supplier who straddles the commercial demand-driven market to the unique, military-only tank ammunition supplier who must rely on foreign military sales to retain market competitiveness, each segment of the DOD direct fire ammunition portfolio demands different, multiprong, process-driven strategies to gain the best value and profit while maintaining product overmatch.

The project manager for maneuver ammunition systems (PM MAS) develops all Army direct fire munitions and manages DOD direct fire procurements with government-to-industry partnerships. As one of the project managers within the Program Executive Office for Ammunition, which

executes the role of single manager for conventional ammunition, PM MAS leverages multiple strategies, processes and key partnerships for each of the family of products.

SMALL-CALIBER DIVIDENDS

Cooperation between the Army's ammunition enterprise and Orbital ATK Inc. continues to pay dividends three years into the operating contract for the Lake City Army Ammunition Plant (LCAAP) in Missouri. An April -- June 2013 Army AL&T magazine article titled "Competition Case Study" discussed the government-encouraged investment in LCAAP, the Army's premier small-caliber ammunition manufacturing facility, through a competitive acquisition strategy. Bidders responding to the request for proposals had an incentive to propose investment plans in exchange for commercial use authorization. A win-win situation for the Army and the operating

contractor resulted in reduced costs, improved production efficiencies, a continuous workforce and less downtime for equipment. This innovative strategy required documenting governance controls and clearly defined procedures up front.

Orbital ATK's capital investment in LCAAP has resulted in improvements to many areas of the plant: design and implementation of advanced material handling and control; design and implementation of process control technology; replacement of water traps on test ranges; implementation of safer primer delivery containers; and modernization of packaging equipment and processes. The investments have resulted in more efficient and sustainable production; delivery of higher-quality small-caliber ammunition; and a better and safer workforce environment.

Army and Orbital ATK, See **COLLABORATION**, Page 6



A U.S. Army Reserve military police Soldier holds two belts of 7.62 mm rounds for an M240B machine gun qualification range at Camp Atterbury, Indiana, during a three-day training event in November 2015. As the manager for all DOD procurements of direct fire ammunition, PM MAS has learned that there's no one form of military-industry cooperation that works best. Each family of ammunition has to be approached individually. Photo by Master Sgt. Michel Sauret, 200th Military Police Command.

Improved M127A1 handheld signal from Picatinny greatly illuminates the battlefield

BY CASSANDRA MAINIERO
Picatinny Arsenal Public Affairs

If flares are like fireworks illuminating the battlefield, then members of Picatinny Arsenal's Pyrotechnics Division are about to launch the big finale.

Their latest project focuses on improving the chemical composition of the M127A1 White Star Parachute Handheld Signal, so that it burns brighter and covers more area with effective illumination than its predecessor.

An illumination flare is a type of device that produces light and/or heat without an explosion.

They are often used in the military as a way to light the battlefield and visualize nighttime targets or to signal other warfighters.

They can be launched from rockets, artillery, mortars, aircraft, or handheld devices like the M127A1.

"This idea brings two advantages to the warfighter," said Rashmi Mangal, the ARDEC

Tunable Pyrotechnics project officer, about the M127A1 project.

"You have a brighter candle and the potential for a smaller, lighter handheld signal that the warfighter needs to carry," she added.

The project is a science and technology funded project at the Armament Research, Development and Engineering Center, or ARDEC.

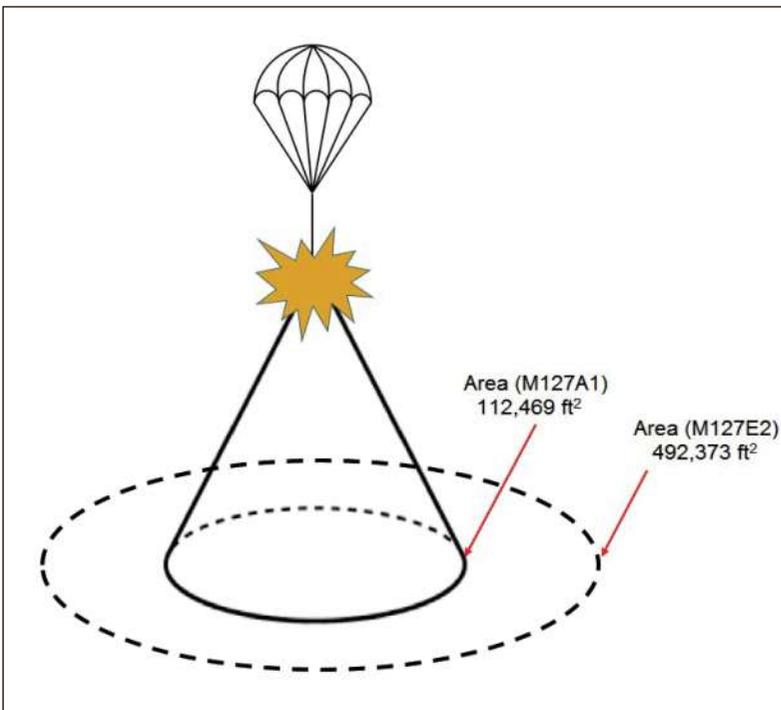
It is managed under the Tunable Pyrotechnics program in ARDEC's Pyrotechnics Technology and Prototyping Division.

Mangal is in charge of the Tunable Pyrotechnics program, which oversees multiple projects, including handheld signals, countermeasures, and environmentally-friendly pyrotechnics.

One of the program's former projects involved removing toxins in rounds and replacing them with an environmentally benign composition.

The new composition could be potentially placed in incendiary projectiles, which are fired

See **HANDHELD**, Page 3



A team of pyrotechnic specialists from Picatinny Arsenal has greatly improved the illumination area for the M127A1 handheld signal. Such signals can be used to light the battlefield and visualize nighttime targets or to signal other warfighters.

TRADOC G-2: Army will augment Navy, Air Force in future conflicts

Army News Service

WASHINGTON-- The U.S. Army is considered the world's premier land force, but it also has the capability to play a greater role in shaping other domains like sea, air, cyber and space.

"We won't duplicate capabilities of the other services. We want to enable the other services," said Tom Greco, deputy chief of staff, G-2, with the U.S. Army Training and Doctrine Command, in his remarks at a Mad Scientist media roundtable on Aug. 23.

Mad Scientist is a series of annual events at which members of academia, industry and interagency partners from around the U.S. and the world gather to discuss the character of warfare through 2050.

During the media roundtable, the G-2 told his audience that he can foresee a time in the near future when Army ground-based systems will be used to create favorable conditions for the Navy and the Air Force, citing several examples.

For instance, he said, Army forces could launch missiles against enemy naval vessels or attack threats in the air. The Army could also create windows of opportunity for the Navy to move through maritime choke points.

In addition, Greco predicted, the Army could augment Air Force capabilities to help open air avenues of approach, and the Army's cyber and space capabilities could provide a layer of protection for the other services operating nearby.

The Army has already used air power during the Gulf War and the 2003 invasion of Iraq "to set the conditions for land operations," according to Greco. In the future, the Army will need to engage in the other domains to increase the effectiveness of the joint force.

Such a transformation will require a revision of the traditional Army mindset, he added.

"That gets back to the culture," he said. "We no longer can think solely 'land domain.' We've got to take a greater level of synchronization across all of the services within a joint umbrella."

The U.S. Army isn't alone in the world in its drive to perfect operations across domains, Greco explained. Russian separatists in the Ukraine have created a very robust air defense umbrella.

"They're essentially dominating the air from the ground," he said. "Because of that, it's very difficult for Ukrainians, or anyone else, to fly over that part of the Ukraine."

Russians in Syria, he added, are synchronizing ground and air operations at a level we haven't seen previously.



Officers from Picatinny Arsenal recently participated in a Re-greening Exercise at Fort Drum, New York. Re-greening provides an opportunity for acquisition officers to refresh their exposure to current tactics, techniques, procedures, and weapons systems in operationally current and relevant environments.

These officers were assigned a M777A2 Howitzer and served as the gun crew for multiple indirect fire missions. They were hosted by the 1-108th FA from the Pennsylvania National Guard, enabling them to observe direct fire missions in addition to effects on target. From left, Maj. Alejandro Gentry, Maj. Michael Pavlisak, Capt. Kevin Hicks, Lt. Col. Anthony Gibbs, Capt. Joseph Phillis, Maj. Kenneth Fowler, and Chief Warrant Officer 3 Michael Tyler. Courtesy photo.



On Aug. 11, the Picatinny Chapter of the National Defense Industrial Association (NDIA), presented three awards for excellence and scholarships of \$4,000 each to deserving students in recognition of their academic achievements, challenging career aspirations, and outstanding leadership potential. Pictured from left, Paul Chiodo, Executive Vice President, Picatinny Chapter NDIA; Ralph Campoli, Chairman of the Picatinny Chapter NDIA; Anton Pezzano, scholarship recipient; Joelle Marston, scholarship recipient; David Barnes, scholarship recipient, and Peter Altavilla, Jr., Director of Scholarships, Picatinny Chapter NDIA. Courtesy photo.

THE PICATINNY VOICE



Senior Commander Picatinny Arsenal and Deputy Program Executive Officer Ammunition

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All manuscripts, photos or artwork may not be returned without prior coordination. Digital images should be submitted at a resolution of at least 200 pixels per inch.

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The PicatinnyVoice reserves the right to select, reject or edit letters and articles to meet space constraints, achieve clarity or for suitability considerations.

<http://www.pica.army.mil/Picatinny/voice/voice.pdf>

HANDHELD SIGNAL BRIGHTNESS INCREASED

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from military weapons such as the M2, M3, and M85 machine guns.

The M127A1 is a single use illuminant device managed by the Project Manager Close Combat Systems, or PM CCS, an office within the Arsenal's Program Executive Office Ammunition. Some other PM CCS products include countermines and explosive ordnance disposals, improvised explosive devices, area denial, combat munitions, such as grenades or non-lethal ammunition and support munitions, such as demolitions and pyrotechnics.

Typically, the M127A1 is used for non-verbal communication between troop emplacements and battlefield illumination. The flare composition in this particular device burns to produce a bright white to yellow flame. Moreover, the M127A1 flare is parachute-suspended and propelled by a fin-stabilized rocket motor, which is all contained in a 10-inch aluminum tube, weighing about 1.2 pounds.

LUMINOUS INTENSITY

"Originally, the main goal for this project was to improve the brightness of a flare by at least 50 percent without compromising any burn time," explained Jared Moretti, a chemist who serves as the team's integrated product team lead.

The brightness of a flare is measured in candela, the SI base unit for luminous intensity. For example, a common candle emits about 1 candela, while a 25 watt fluorescent bulb will emit about 135 candela (assuming the light is distributed equally in all directions).



A warfighter demonstrates proper initiation of handheld signal by hand pumping.

According to the pyrotechnics team, the minimum function requirements for the M127A1 was a burn time of 25 seconds and a light emission of about 90,000 candela. The previous M127A1 composition met those requirements with a typical burn time of about 30 seconds and a typical maximum emission of 125,000 candela.

However, the improved M127A1 burns for 29 seconds and reaches about 150-160,000 candela, meaning it's approximately 75 percent brighter than the

current minimum requirement.

This performance enhancement was induced by changing to a different flare composition called M127E2, which relies on a smaller magnesium granulation. This new composition is manufactured in the same way as the old composition.

The improved handheld signal will require no additional training for warfighters. As added benefits, it can potentially be used in future, smaller handheld signals, and any increase in unit cost will be negligible.

"We had tried a variety of high-nitrogen compounds, and we weren't able to achieve the target objective," said Moretti. "So, we switched gears and resorted to a smaller magnesium particle size. That's what's so remarkable. You change just the size of the one ingredient and you get massive increase in performance."

Additionally, the former M127A1 uses Laminac, a polyester binder that holds the flare together. But, this binder is usually manufactured by only one single point failure company and it can be difficult to obtain, explained Moretti.

For that reason, the improved device uses a two-part epoxy binder, which has a long service history in mortars and artillery rounds and is environmentally benign.

"Basically, you have a M127 candle that is filled with this formula, and that is connected to a parachute," explained Dan Colotti, a chemical engineer. "This assembly is in a payload that is then placed into a rocket. The rocket shoots up to about 800 feet—ts hand initiated. Then, you deploy and ignite the payload and the parachute opens. It floats up, it descends, and illuminates the battlefield."

COMPOSITION DEMONSTRATION

The improved M127A1 project was initiated in 2011 by the U.S. Army Environmental Quality Technology Pollution Prevention program. The organization's goal was to change all military handheld signals by using more environmentally friendly compositions, such as many of the red, white, and green star handheld signals developed at Picatinny.

"White handheld signals were part of that same initiative, where we had to come up with non-toxic substances," explained Mangal. "But, when we started to do research, we found an added benefit of getting the signal to be 75 percent better than the requirement. So, we have met the environmental requirement, but also have accomplished an additional performance capability."

The Pyrotechnics Division has tested the new composition in various demonstrations, including static (in a lab) and dynamic tests. One of these demonstrations was held last year in Somerville, Tennessee, at Security Signals, Inc. (SSI), the prime handheld signal manufacturer. SSI's role in this effort was to produce the illuminant composition and full up signals to specifications and test them in



Rashmi Mangal, left, the ARDEC Tunable Pyrotechnics project officer, and Jared Moretti, the pyrotechnics team's integrated product team lead, hold the launching tube for the M127A1 White Star Parachute Handheld Signal, an illumination flare. Mangal and Moretti are Picatinny Arsenal employees from the Pyrotechnics Branch within the U.S. Army Armament Research, Development and Engineering Center. Other members of the project team not in the photograph are Gary Chen and Dan Colotti. Photo by Cassandra Mainiero.

accordance with the test plan.

During this system demonstration, Picatinny's Pyrotechnics Division tested 126 signals filled with the M127E2 composition in four different environmental conditions: hot, ambient, cold, as well as transportation/vibration.

Along with having no testing failures, the system demonstration revealed that the burn time exceeded the threshold requirements, ranging from 26.5 to 29.8 seconds of burn time. It also showed that the former composition exhibited a brightness that could project across a ground area of about 112,469 square feet. But, the new composition projected an effective ground illumination that could reach 492,373 square feet, making it more than 300 percent more effective in illuminating the ground area.

"The M127E2 provides better illumination over the original illumination round," said Sgt. Maj. James M. Carroll, a TRADOC capability manager, who witnessed a more recent user demonstration

onsite at SSI. "We must analyze the effects of this new round with current and near-term technologies and nest it within our Soldier Modernization Strategy."

Currently, Picatinny's Pyrotechnics Division is done with testing and ensuring that the new composition meets all the Army's energetics material qualification requirements. When it was completed, the M127E2 had achieved TRL 6 and was transitioned to PM CCS.

The team is exploring an initiative to place the new composition into a family of logistically enhanced smaller handheld signals by re-examining their weight, geometry, and overall performance requirements.

"If we can do one as an example, then there are eight others in the family of handheld signals to which we could adapt the reduced-size technology," said Mangal.

"So, we think this might be a start to another big change in the era of handheld signals."



The M127A1 System including (from top to bottom) storage container, initiating tube and cap, and parachute suspended illuminant candle with fin stabilized rocket propelled motor and illuminant housing.

Retired explosive ordnance Soldier was counterweight against enemy bomb makers

Cruz called the love and compassion he received from his family as “the same love and compassion I shared with my Soldiers to get through the war’s darkest days, and the same love and compassion that enabled me not to lose my faith in myself when faced with the brutality of war.”

BY FRANK MISURELLI

Picatinny Arsenal Public Affairs

At a retirement ceremony Aug. 18, Master Sgt. John R. Cruz received the Meritorious Service Medal for his 22 years of service to the U.S. Army from Brig. Gen Patrick Burden, Picatinny Arsenal Senior Commander.

Cruz began his Army career immediately after high school, enlisting as a multiple launch rocket system crewmember. Later, he became an Explosive Ordnance Disposal (EOD) Technician.

Graduating in the top of his class from the Naval Explosive Ordnance Disposal School, Cruz served multiple tours of duty in both Iraq and Afghanistan.

While serving in Afghanistan, Cruz was wounded while attempting to disarm two hand grenades.

With limited EOD personnel available, and after only five days of healing, Cruz voluntarily returned to duty to support sensitive site exploitations. Later, he was part of an operation that involved crawling through dark caves looking for booby traps.

In his two deployments, to Iraq Cruz succeeded in capturing or neutralizing 35 bomb makers and emplacements. On the

same deployment, he was able to identify the trends and components of enemy bomb makers, developing a target support package that led to the capture of six insurgents.

In his final deployment to Iraq, he was selected to be part of the first Army unit to be attached to the U.S. State Department providing IED support. He led a mission to recover and clear the remains of two personnel who had been missing in action, with one of the remains belonging to the last missing U.S. service member unaccounted for in Iraq.

“Since his first duty assignment, Master Sgt. Cruz has made a difference in saving the lives of our Soldiers, ... but his actions prove his dedication to duty, his selfless service and his heroism,” Burden said.

“For over 20 years, these have been more than words to Master Sgt. Cruz, they have been the foundation upon which he built his life,” the general continued.

“They sustained him when times were tough, they energized him when his spirit was weak, and they remind him of his responsibilities when great praise came his way.”

Cruz thanked his family, especially his mother and grandmother, saying, “You are



Brig. Gen. Patrick Burden, Picatinny Arsenal Senior Commander, congratulates Master Sgt. John Cruz and his mother, Nancy Cruz, during an Aug. 18 retirement ceremony at the Lindner Conference Center.

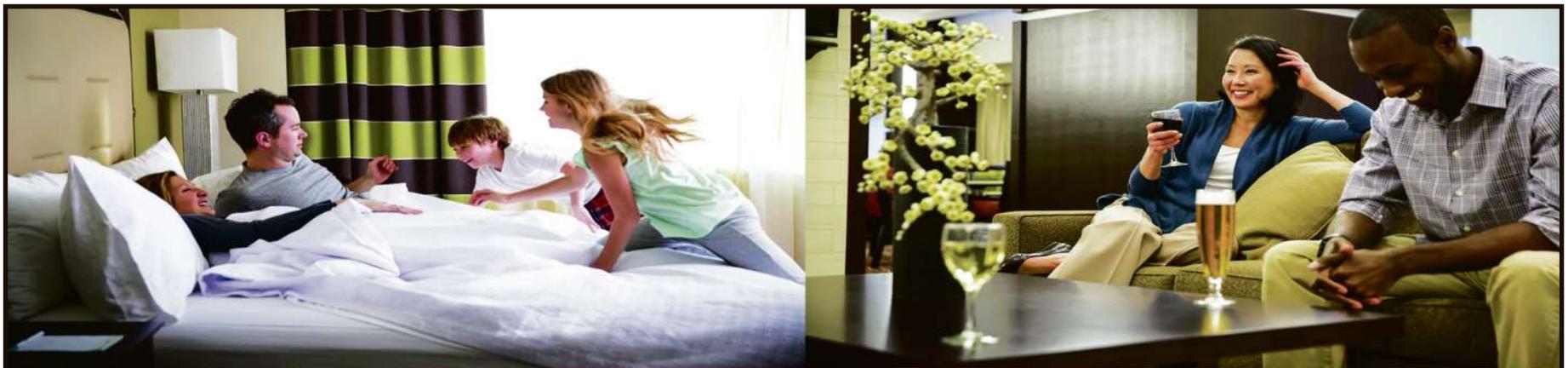
the bedrock of who I am today.”

He spoke of their love and compassion, calling it “the same love and compassion I shared with my Soldiers to get through the war’s darkest days, and the same love and compassion that enabled me not to lose my faith in myself when faced with the brutality of war.”

Cruz has a bachelor of science degree from Excelsior College. He is a graduate of the Basic Leaders Course, Advanced Leaders Course, Joint Military Attaché’ School, United Kingdom IED Defeat Course, Basic Airborne Course and Air Assault Course.

His awards include the Bronze Star

(2nd Oak Leaf); Purple Heart, Meritorious Service Medal (1st Oak Leaf), Joint Commendation Medal, Army Commendation Medal (3rd Oak leaf) Army Achievement Medal (1st Silver Oak Leaf) Army Good Conduct Medal (7th Knot); national Defense Service Medal, Afghanistan Campaign Medal, Iraq Campaign Medal, Global War of Terrorism Expeditionary Medal, and the Global War on Terrorism Service Medal. His badges include the Combat Action Badge, Master Explosive Ordnance Disposal Badge, Basic Airborne Badge, Air Assault Badge and Chilean Airborne Badge.



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COLLABORATION

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responding to the request for proposals, had an incentive to propose investment plans in exchange for commercial use authorization.

A win-win situation for the Army and the operating contractor resulted in reduced costs, improved production efficiencies, a continuous workforce and less downtime for equipment. This innovative strategy required documenting governance controls and clearly defined procedures up front.

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Army and Orbital ATK leadership are generally in agreement on the future vision for LCAAP. However, the team diverges at times on plant priorities and project scopes.

To work through these differences, the government adopted Orbital ATK's proposed establishment of an investment board consisting of two members from the Army ammunition enterprise and two members from Orbital ATK's program management leadership. At its monthly meetings, the board provides joint oversight and coordination at the appropriate level to make sound and timely decisions. This partnership enables the team to resolve conflicts while continuing to move plant improvements forward.

Although Army and Orbital ATK



A tank crew from the 1st Armored Brigade Combat Team, 1st Cavalry Division (1/1 CD), fires the 120 mm main gun of an M1A2 Abrams main battle tank at a target in December 2015 at the Sugar Loaf Multi-Use Range at Fort Hood, Texas, during training before deploying to the Republic of Korea. The industrial base for tank ammunition requires particularly close cooperation with the Army. Photo by Sgt. Christopher Dennis.

leadership agree this structure improves execution of the investment plan, both would recommend establishing and documenting clear governance controls and procedures earlier in contract execution to allow leadership to focus more on developing the vision and making good investment decisions.

MEDIUM-CALIBER ALTERNATIVES

The product director for medium-caliber ammunition (PD MC) strategically focuses on two areas in its partnership with industry: industrial base preservation and development collaboration.

While it may seem counterintuitive that an industrial base could be at risk despite our continued conflicts, the reality is that the medium-caliber sector production quantities have been in decline since 2009. The decline was the result of reaching healthy training and combat stockpiles with a simultaneous reduction in the requirement.

The decline has had a significant effect on the industrial base, leading to consolidation at the supplier and sub-tier supplier levels. In order to preserve the

medium-caliber industrial base, the product office developed a plan to combine calibers across services and limit the playing field to our known suppliers to save key production capabilities at the supplier and sub-tier supplier levels, with the goal of ensuring long-term viability.

The plan, created in partnership with industry, was put into action in 2009 and is known as the Medium-Caliber Family Acquisition (MCFA). The intent was to right-size production lines, preserve dual-source suppliers for key capabilities and lower costs.

The first contract awarded under this plan was implemented in 2013. Since its initiation, the MCFA has met, and in some cases exceeded, its goals by maintaining dual-source viability for key production capabilities, lowering unit costs while reducing quantities and ultimately delivering the highest-quality munitions to the warfighter.

The second area in which PD MC engages our industry partners in a novel way is through the development of new munition solutions to meet identified gaps in warfighter capabilities. As the capability gaps are discussed, we engage our in-house research, development, test and evaluation (RDT&E) asset, the U.S. Army Armament Research, Development and Engineering Center (ARDEC), and our industry partners through industry days spanning our entire portfolio and engagements of more targeted scope (National Defense Industrial Association conferences, market surveys, project industry days, etc.) to get each organization to spend its limited RDT&E funds on the technical solutions that can meet these gaps. We motivate them to invest by showing them the Army's path forward—specifically, the capability gaps we are trying to address for the warfighter.

This targeted development helps refine and advise the requirement as it's being developed and staffed, ensuring that the solution is feasible. It also can accelerate the acquisition development phase, shortening the time from concept to fielding.

Our primary vehicle to share and partner in the development of new solutions is the cooperative research and development

agreement (CRADA). Under a CRADA, government and industry can share ideas and test theories that minimize program risk for each party and ensure the best solution. This approach was initiated several years ago, and we believe it will deliver timely solutions to meet urgent warfighter needs.

LARGE-CALIBER ALTERNATIVES

The product manager for large-caliber ammunition (Product Manager LC) continuously works with industry to maintain critical capabilities and opportunities for competition. Firing projectiles from cannons at high speed is a unique function. As such, there is little to no demand in the commercial marketplace for certain components and materials used in large-caliber ammunition.

Product Manager LC works with suppliers to ensure that budgets and requirements stay at levels appropriate both for Army requirements and industry sustainability.

While maintaining this balance, Product Manager LC also has worked to sustain two qualified system-integrating contractors. This facilitates competition, which drives more innovation in developmental programs and lowers costs in production.

Armor-piercing tank cartridges are one of the last military uses for depleted uranium. No other material has demonstrated the same lethality against hard targets, which makes it a critical component for Product Manager LC. However, working with depleted uranium requires special licensing and handling procedures. While some commercial applications exist, the commercial workload alone will not sustain a full-time depleted uranium supplier. Realizing this, Product Manager LC began working with Aerojet Ordnance Tennessee Inc. in 2012 to reduce its manufacturing footprint by approximately 46,000 square feet, while maintaining sufficient capacity to meet government requirements. The effort led to a \$1.5 million reduction in annual operating costs and decontaminated unneeded facilities for return to other uses. Product Manager LC is continuing to work with

ARTICLE CONTINUES ON NEXT PAGE



LCAAP, with this newly automated 7.62 mm and .50-caliber ammunition can printer, has benefited from a public-private cooperative agreement whereby the government owns the plant and Orbital ATK Inc., operates it and uses the plant to make ammunition for the commercial market. Orbital ATK's investment in equipment upgrades also supports LCAAP's continued operation as the Army's main source for small-caliber ammunition. Photo by Orbital ATK Inc.

PRESERVING THE COMPETITIVE EDGE

continued from Page 6

Aerojet and Orbital ATK to ensure that production continues with minimal gaps to maintain the capabilities essential to national defense.

Combustible cartridge cases are also a unique application for ammunition. The cases are important since they reduce volume of expended material after firing, and space is at a high premium inside a tank. A case that burns completely in under the tenth of a second it takes to fire a tank round is similar to cardboard, yet it must support projectiles weighing over 40 pounds, in some cases.

Balancing these requirements is a niche skill that Esterline Defense Technologies has performed well for several decades.

However, the Army currently requires a fraction of the tank rounds it did 10 or 20 years ago. That has put a strain on Esterline to maintain this needed capability at economical rates. To help sustainment, Product Manager LC worked with Esterline and product offices under the project manager for combat ammunition systems, which rely on related products, to ensure that sufficient business exists. Product Manager LC also works with HQDA G-4 and G-8 to plan future year procurement to avoid large swings in quantities from year to year, which would make it



Pfc. Francisco Rodriguez, an M240B machine gunner with the 24th Infantry Regiment, engages targets at an M4 range at Fort Wainwright, Alaska, in March. Honing the competitive edge across the Army's diverse ammunition portfolio of products, suppliers and users requires an innovative approach that brings industry in on the ground floor. (Photo by Sgt. Corey Confer, 1st Stryker Brigade Combat Team, 25th Infantry Division Public Affairs)

difficult for Esterline to continue efficient operation.

Despite the drastically reduced quantities in tank ammunition requirements, Product Manager LC continues to work with two prime system contractors: Orbital ATK and General Dynamics Ordnance and Tactical Systems.

While either contractor likely has the capacity to produce all of the Army's requirements in the current environment,

maintaining multiple sources offers several benefits. It provides ample surge capacity to the national industrial base, which reduces risk for future contingencies. It also develops secondary sources of supply at component levels, which reduces the overall risks to the product office as a whole. Perhaps most importantly, it sustains competition for development of new ammunition. Maintaining two prime contractors has facilitated competitive

prototyping into the engineering and manufacturing development phase for the last two large-caliber programs of record.

This approach, while marginally increasing administrative requirements for the government, greatly reduces cost and performance risk for development programs. It allows for more innovation going into development, increases the chances of identifying a feasible solution and puts competitive pressure on the contractor's pricing.

CONCLUSION

Preserving the competitive edge for tactical direct fire capability requires multiple, unique relationships with our industrial partners. These partnerships require the unified visions of industry and the government based on give-and-take. Although profit is a significant consideration, it is the joint long-term visions that are unique in function, with industry partners offering capabilities that demand sustainment.

We have taken on the challenge of sustaining those capabilities while increasing performance for the Soldier. Doing so requires routine engagement with industry to adjust to changing environments that meet the government's requirements while respecting industry's economic viability.

This article was originally published in the July-September 2016 issue of Army AL&T magazine.

Latest Stryker vehicles are built to withstand extremes

Army News Service

COLD REGIONS TEST CENTER, Alaska -- When Soldiers in Iraq and Afghanistan were imperiled by the destructive power of improvised explosive devices, a variant of the armored Stryker combat vehicle sporting a specially-designed blast-diffusing hull saved countless lives.

Particularly suited for transporting infantry in urban environments, the Stryker combat vehicle has become popular among Soldiers in the most dangerous and rugged areas overseas. They know the vehicle to be quiet, reliable, and easy to maintain and repair.

The vehicle's stellar performance is doubtless related to the extensive evaluation it has undergone at Yuma Proving Ground and its three subsidiary test centers since 2002, including a six month stint in the jungles of Suriname in 2008.

Earlier this year, a new variant of the vehicle wrapped up a winter of extreme use at the Army Cold Regions Test Center.

Boasting an upgraded chassis and drivetrain along with a variety of mechanical, electrical and digital improvements to enhance its performance, the latest Stryker variant was subjected to more than 3,000 miles driving across rugged terrain in extreme cold.

"It looks like a regular Stryker, but it isn't," said Richard Reiser, test officer. "It has a larger engine that significantly increases horsepower and torque. It has a much greater diagnostic capability that



Boasting an upgraded chassis and drivetrain along with a variety of mechanical, electrical and digital improvements to enhance its performance, a new variant of the Stryker Combat Vehicle underwent a winter of extreme use at the U.S. Army Cold Regions Test Center earlier this year. "It looks like a regular Stryker, but it isn't," said Richard Reiser, test officer. "It has a larger engine that significantly increases horsepower and torque." Photo by Mark Schauer, Army Test and Evaluation Command.

integrates subsystems. This gives operators a greater awareness of vehicle health and potentially improves situational awareness during the actual mission in the vehicle."

In the world's most frigid environments, cold starts can be harrowing even for the most rudimentary vehicles.

For a complex system like the Stryker, each component's ability to function in extreme cold is crucially important and was subjected to keen evaluation in temperatures far below freezing.

"Like automotive trends in general, we have much greater reliance on computer systems in these vehicles," said Reiser. "Those computer systems and subsystems integrated into the hull depend on a great deal of computer software and hardware."

Though a vehicle's performance characteristics are similar in cold weather once a vehicle is started and sufficiently warmed up, dramatic fluctuations in temperature can degrade performance of any number of a vehicle's components.

"Stopping distance and acceleration shouldn't change profoundly in this environment," explained Reiser.

"The real issues tend to be related to rapid temperature differentials. Each sub-zero temperature threshold tends to flush out small anomalies."

Testers went to great lengths to test in potential failure conditions. For example, after a long drive on the range the day before a particularly nasty drop in temperature was forecast, the testers used fans

connected to long tubes snaking into the engine compartment and other vital areas of the vehicle to blow frigid air onto the components overnight.

"We adjust to capture things and be ready for those colder temperatures on short notice," said Reiser. "It's a small crew and it's easy to make adjustments to the mission profile to take advantage."

Throughout the test, the Army evaluators used the same vehicle that had been subjected to punishing hot weather testing the previous summer at Yuma Test Center, Arizona. Personnel travelled to Yuma to take part in the testing and instrumented the vehicle in a configuration that applied to testing in both climates.

"It provides not only continuity in the instrumentation process, but helped our technician get it done quicker while supporting Yuma's effort as well," said Reiser.

The test was more than just endless driving.

The performances of every special feature the vehicle boasts were scrutinized, from its communications suite to the central tire inflation system that adjusts tire pressure as the vehicle is in motion.

"Cross country miles accumulate slowly in this environment," said Reiser.

"We didn't have consistently cold weather, so we were able to move what sub-test activity we were doing based on its environmental relevance. If it is something that's not so much impacted by extreme cold, we moved that to the less-cold times."

National Guardsman on flood response: 'one of my proudest moments'

Army News Service
BATON ROUGE, La. -- Since Aug. 12, the Soldiers and Airmen of the Louisiana National Guard have been working tirelessly, around the clock.

Guardsmen have conducted evacuations, search and rescue, and engineering missions, and even provided security at several shelters.

To date, more than 3,820 Guardsmen have assisted with emergency flood operations and have rescued more than 19,040 citizens and 2,660 pets.

They have distributed more than 78,000 meals, 460 tarps, 439,000 bottled waters and 961,000 sandbags and provided more than 2,200 cots and 1,700 blankets for shelter support.

Although troops may be wet and dirty and tired, morale remains high.

"It brings me back to when Hurricane Katrina passed in 2005, and I saw the National Guard around all the neighborhoods. That's what persuaded me to join," said Sgt. Bryan Campo of the 2225th Multi-Role Bridge Company out of Marrero, Louisiana.

"I signed up to protect my state and country, and it's rewarding to see the impact and the sense of hope we give the community. This is one of my proudest moments."

At one point, troops of Campo's unit were spread among

three cities: Livingston, Ponchatoula and Independence.

Using their powerful bridge erection boats, they navigated floodwaters that were too deep for high-water vehicles and currents that were too strong for other boats.

Susan Black, wife of Sgt. Kevin Black of the 843rd Engineer Company out of Franklinton, Louisiana, admitted that she has been worried for her husband, a high-water vehicle driver who operated in the Denham Springs area during the emergency operation.

"When the cell towers were down, I couldn't call or text him, and it made me very nervous," she said.

"I'm incredibly proud of him, though. I'm proud of the entire Louisiana National Guard for helping the community and the state. This is what they do."

RESCUE WORK CONTINUES

Though floodwaters in hard hit areas are receding, the Louisiana National Guard isn't slowing down.

Search and rescue missions have continued for a week, and now Guardsmen are readying for further rescue efforts that may be needed if more flooding is caused by water moving south.

"We are agile, forward postured and prepared to flex in any direction ... for any mission," said Col. Cindy Haygood,

commander of the 225th Engineer Brigade.

Soldiers and Airmen have also been working at shelters, where they have been assisting local government agencies and law enforcement with security and support, easing the load on other dedicated volunteers and emergency personnel.

Guardsmen in the 139th Military Police Company out of New Orleans and the 239th MP Company out of Carville are providing security at shelters at the River Center in Baton Rouge and the Lamar Dixon Expo Center in Gonzales.

Capt. Dan Gaskins, executive officer of the 773rd MP Battalion, said their main focus now is to help direct evacuees as they come into shelters and ensure that families know they are in a safe environment during their stay.

"These Soldiers volunteer to do this," said Gaskins. "Many of the guys in our units are also affected, and it resonates with me that they would take time from their own personal lives and sacrifice that time to assist those in need."

Spc. Amanda Rishton received the call the night of August 12,

and she quickly reported to the Gillis W. Long Center in Carville.

Now posted in a gym at the expo center, where she is surrounded by piles of clothing, shoes, diapers, cases of water and other essentials, Rishton admitted the 12-hour shifts can be grueling.

But she believes it's time well spent.

"It's rewarding knowing that I can be here," she said. "Doing what I need to do ... making [the evacuees] feel comfortable and protected feels really good."



Stacey and Cassandra Yauch, center in green caps, are shown here during a robotics competition in Mount Olive. Courtesy photo.

Former student reflects on value of STEM experience

BY FRANK MISURELLI

Picatinny Arsenal Public Affairs

For a number of years, Picatinny's Science, Technology, Engineering and Mathematics (STEM) has been the foundation for many northern New Jersey students to launch a career in mathematics and science.

One of the first STEM rookies was Cassandra Yauch, whose mother, Stacey Yauch, is a Picatinny engineer who got her daughter started on the path to a technical career.

Cassandra is currently working at Picatinny as a summer hire assigned to 3-D printing. She is starting her second year at Virginia Tech University, where she is studying mechanical engineering with a minor in biomedical engineering. With these degrees, she says, "I want to be able to create a new prosthetic to help those without limbs."

Her introduction into STEM was nearly five years ago when her mother got her started in STEM camp. "And from then on, it was desire to pursue STEM activities, which eventually led me to going to Virginia Tech," said Cassandra.

"My first robotics competition is when I fell in love with STEM, I just love everything around

me and from that moment on I knew I wanted to pursue engineering," she said.

Cassandra, who at the time was a student from Kittatinny High School, competed in the Junior Solar Sprint car competition and won. She joined her mother as a mentor in the 2014 Junior Solar Sprint competition, assisting the competitors.

Cassandra has been involved in numerous STEM competitions, FRC Robotics as a member and mentor, VEX Robotics, as a founder of the team, and a STEM motivational coach for two years. "Robotics was my favorite because that is where everything started," she said.

On getting Cassandra involved in STEM, Stacey Yauch said, "We need to expose children to STEM at a young age and encourage young children from all backgrounds to participate in STEM related activities."

Reflecting on her involvement in STEM, Cassandra said, "It was the best choice in my life, I would not be where I am today, and I recommend it to anyone to get involved. Being in STEM doesn't mean you have to do it for the rest of your life but it will harvest skills and knowledge that can, and will be, used no matter what your future holds."

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Col. Jay M. Ferreira addresses the audience during a change of leadership ceremony in which he became the latest director of the Defense Contract Management Agency Springfield.

Col. Ferreira new head of DCMA Springfield

BY FRANK MISURELLI

Picatinny Arsenal Public Affairs

Employees, officers and guests of the Picatinny-based Defense Contract Management Agency (DCMA) Springfield witnessed the change of leadership on Aug. 6 at the Lindner Conferencing Center during which Col. Jay M. Ferreira assumed the role of Acquisition Director from the outgoing DCMA Director, Col. Paul D. Shuler.

During the ceremony, Schuler received the Defense Meritorious Service Medal for his achievements during his 18-month assignment as Director from Capt. Michael B. Murphy, U.S. Navy, Eastern Region Commander, Defense Contract Management Agency.

During his command, Schuler oversaw 185 civilian and military members, and 300 contractor facilities in Northern New Jersey, which supported over 4,800 contracts valued at over \$15 billion. Schuler served as the 24th Commander of DCMA.

Schuler, who acknowledged his mother and brother in attendance, said: "Twenty-four years ago I made a commitment to serve the Army and it has been a wild ride."

After accepting the colors, Ferreira said, "I stand before this great organization today, humbled by the opportunity afforded to me to lead our Department of Defense of the future."

This is Ferreira's third assignment to Picatinny Arsenal. His initial assignment was as Project Manager Close Combat System, which is part of the Program Executive Office Ammunition. He returned to Picatinny and served as the Maneuver Support Armaments Technology Manager, Armament Research, Development and Engineering Center. Ferreira's wife, Stacey, is a lieutenant colonel on active duty as an Army Nurse Practitioner at West Point, New York

Ferreira was commissioned in 1990 at Drexel University in Philadelphia. He was an ordnance officer and distinguished military graduate and received a bachelor's degree in mechanical engineering. He also holds a master's degree in mechanical engineering from Arizona State University, and National Resource Strategy from the National Defense University, Eisenhower School.



The Picatinny Arsenal garrison's command sergeant major, Command Sgt. Maj. Hu'Dene B. Wright, was the keynote speaker during Picatinny's Women's Equality Day observance on Aug. 26. Women's Equality Day commemorates the 1920 passage of the 19th Amendment to the United States Constitution, which grants women the right to vote. It calls attention to women's continuing efforts toward full equality. Photo by Erin Usawicz.



Dr. Guy Vézina, (pictured third from left) a top manager with Defence Research and Development Canada, visited Picatinny Arsenal on Aug. 24 for a series of briefings and discussions. Vézina is the Director General Science & Technology Army, and leads the Canadian Army science and technology portfolio while continuing his role as Scientific Advisor to the Chief of the Canadian Army. Shown to the left of Vézina is John Hedderich, Director of the Armament Research, Development and Engineering Center. The visit was hosted by Anthony Sebasto, who is pictured between Hedderich and Vezina in the back row.



During his time in the U.S. Army, Benjamin Bederson's work on the Manhattan Project directly contributed to the development of atomic weaponry that ended the war in the Pacific. Bederson was inducted into the U.S. Army Ordnance Corps Hall of Fame in May, but was unable to attend the ceremony. On Aug. 3, two leaders from Picatinny Arsenal went to New York to present Bederson with his award. His wife, Betty, received the Keeper of the Flame award. Pictured from left, John Hedderich, Director of the Armament Research, Development and Engineering Center; Benjamin and Betty Bederson; and Brig. Gen. Patrick W. Burden, Picatinny Arsenal Senior Commander. Courtesy photo.

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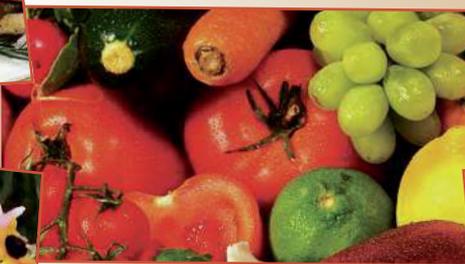
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New tourniquet will save many lives, Army surgeon general predicts

One of the latest advances in treating hemorrhaging on the battlefield is what is known as the “junctional tourniquet,” which can be applied to wounds in ways not possible with conventional tourniquets.

Army News Service

WASHINGTON -- Hemorrhage control is the No. 1 thing you can do to save lives on the battlefield, according to Lt. Gen. Nadja Y. West.

“Stop the bleeding as soon as you can, and stop it as much as you can,” said West, who serves as surgeon general of the Army and commander of the Army Medical Command. She spoke here on Aug. 18, at a meeting of the Defense Writer’s Group.

One of the latest advances in treating hemorrhaging on the battlefield, West said, is what is known as the “junctional tourniquet,” which can be applied to wounds in ways not possible with conventional tourniquets.

Traditionally, a medic or fellow Soldier can apply a tourniquet just to a person’s limb, she explained. A traditional tourniquet cannot be used to stop hemorrhaging in the abdomen, chest, groin, waist, pelvis or armpit.

Developed at Army Medical Research and Materiel Command, Fort Dietrich, Maryland, the junctional tourniquet is essentially a belt with one or more inflatable air bladders that can be puffed up, somewhat like a blood pressure cuff, to apply pressure to a wound.

The device can be deployed to stop hemorrhaging in about 60 seconds.

The junctional tourniquet is now being fielded to Soldiers in harm’s way, but it’s so new—just months since fielding—that West hasn’t yet been briefed on how many lives it has saved, though she believes the number will be significant over time.

The new tourniquet is currently being fielded only to medical personnel, though it may in the future become available to line troops, she said.

LESSONS LEARNED

In developing the design for the new tourniquet, Army medical personnel visited the port mortuary at Dover Air Force Base, Delaware, to examine the remains of Soldiers who didn’t make it. They also examined the body armor they had worn.

“Were there things missing in the body armor? Were their gaps? Were there recurring injuries in a particular spot?” West said, describing the kinds of questions medical personnel asked themselves.

Another capability developed as a result of the same research but which has been around for some time now, she said, is the ballistic undergarment, which can lessen damage sustained in a blast, such as that of an IED.

The protective gear doesn’t just protect genitalia, she said, it also protects the large arteries and vessels found in the groin area that, if damaged, could result in substantial hemorrhaging.

CONVENTIONAL TOURNIQUETS

Conventional tourniquets have a long history in the Army and in the medical community.

While tourniquets were used in World War II and the Civil War, the medical community, including medical practitioners in the Army, for a long time remained concerned that their use could cause limb damage.

Concerns also involved the effects of improper placement of tourniquets and the effects of extended use. “We got away from tourniquets for a while,” West said.

But during recent conflicts in Iraq and Afghanistan, the use of conventional tourniquets saved many lives, she said.

Proper tourniquet use, and proper training for first responders, remains key to ensuring their effective and safe use.

One case in point of how conventional tourniquets can save lives is the story of Lt. Col. Greg Gadson, who lost both of his legs to a roadside bomb in Iraq in 2007. West said Gadson attributes his survival to a fellow Soldier who applied tourniquets to his limbs.

Yuma Proving Ground provides rain and dust on demand

Army News Service

YUMA PROVING GROUND, Ariz.-- Soldiers are accustomed to facing insidious enemies, but rely on testers at U.S. Army Yuma Proving Ground (YPG) to keep them safe from one that can’t be dispatched with weaponry: the ravages of extreme conditions on equipment.

YPG specializes in extreme environmental testing of military equipment, with jurisdiction over test centers in the arctic, tropics, and desert. Among testing activities performed by the Metrology and Simulation Division at YPG’s Yuma Test Center is one that can create rain and dust storms on demand, any time of the year.

The rain facility can accommodate virtually any piece of equipment normally tested at YPG, including ammunition. If necessary, testers can bring in a large fan to simulate wind-driven rains of up to 50 miles per hour and can vary the speeds to mimic gusts of winds of different velocities and intensities.

“We can rain on anything, but the rain facility is primarily used for vehicles,” said Frank Aguilar, engineering technician.

Comprised of over 500 adjustable nozzles on three stationary and two portable walls, the rain chamber can deliver highly pressurized water to simulate a fierce monsoon or a slow, steady, misting rain. Testers can simulate either over the entire item, or concentrate the spray on one part of it.

“We can close off walls and hit the test item from any angle the customer wants,” said Aguilar. “One program wanted only their vehicle’s turret hit at a 45 degree angle, so we adapted the nozzles to do that.”

Two pumps push the pressurized water from a 10,000 gallon tank outside the facility’s test bay through nozzles inside. The rate of spray hitting the item is entered onto a control panel, and is confirmed by a rain gauge inside. Drains in the test bay floor send the water to two sump pits. When the test is completed, the collected water, which could possibly contain oil or grease residue, is transferred to tanker trucks, which transport it for disposal in an environmentally friendly way.

Exterior cameras monitor the test item’s experience inside the facility, and occasionally video is taken from inside a vehicle during the mock storms. A wet vehicle compartment caused by inadequate sealst could be potentially life-threatening if the water shorts out important electrical equipment inside, a threat that YPG testers keep close watch for during evaluations.

Looking Back ... At Picatinny

THE PICATINNY MAGAZINE

Vol. 2 Picatinny Arsenal, Dover, N. J. July 26, 1919 No. 4

Sentinels Awarded Twilight League Championship

The Sentinels have won the Championship of the Picatinny Arsenal Twilight Baseball League. Three cheers for the Sentinels. All the Arsenal congratulates them upon their success. The final issue was to have been de-

Arsenal Employees Organize Union

On June 25th, 1919, a meeting of about 125 employees of Picatinny Arsenal resulted, under the direction of Mr. W. E. Junker, First Vice-President of the National Federation of Federal Employees and Mr. Alexandre, President of the Naval Powder

BY PATRICK J. OWENS, ARDEC HISTORIAN

This holiday weekend seems an appropriate time to recall the start of unionization at Picatinny. The accompanying illustration shows how The Picatinny News of July 26, 1919, noted the formation of the Federal Employees Union at Picatinny.

The event was momentous enough to split the front page with the installation’s baseball news. Formed under the auspices of the national Federation of Federal Employees, there were 60 charter members at the first meeting on June 25, 1919.

Within one month, the number grew to 125. The new chapter promised to avoid strikes or other labor troubles and to settle all disputes by arbitration.

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