National DEFENSE

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2019 SMALL ARMS OUTLOOK

The Army's New Rifle ■ Improved Ammo for Military Small Arms ■
Training and Simulation ■ Special Ops Weapons ■
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SPECIAL REPORT

2019: A Pivotal Year in Small Arms

With the Army finally getting serious about modernizing its M4 carbine and M249 squad automatic weapon, 2019 promises to be a pivotal year for U.S. military small arms.

For this, credit must go to former Secretary of Defense James Mattis, the former Marine Corps general who came into the job with an idea to make ground troops more lethal.

Mattis established the Close Combat Lethality Task Force in March 2018 with a goal to ensure that infantry combat teams can have complete overmatch when facing adversaries.

Now, the Army is in the throes of developing the new weapons along with considering the implications, benefits and possible drawbacks to changing its ammo from the standard 5.56 mm NATO round to 6.8 mm. It's a big decision and one that can't be taken lightly considering the logistics of changing standard ammunition.

Meanwhile, four manufacturers have secured spots for a "shoot-off" sometime this summer that will inform a possible replacement for the M4.

National Defense in this eBook takes an in-depth look at some of the potential game-changing weapons — along with other technologies such as high-fidelity simulators and night-vision goggles — that will help ground forces achieve the overmatch Secretary Mattis demanded.

Stew Magnuson
Editor in Chief
National Defense

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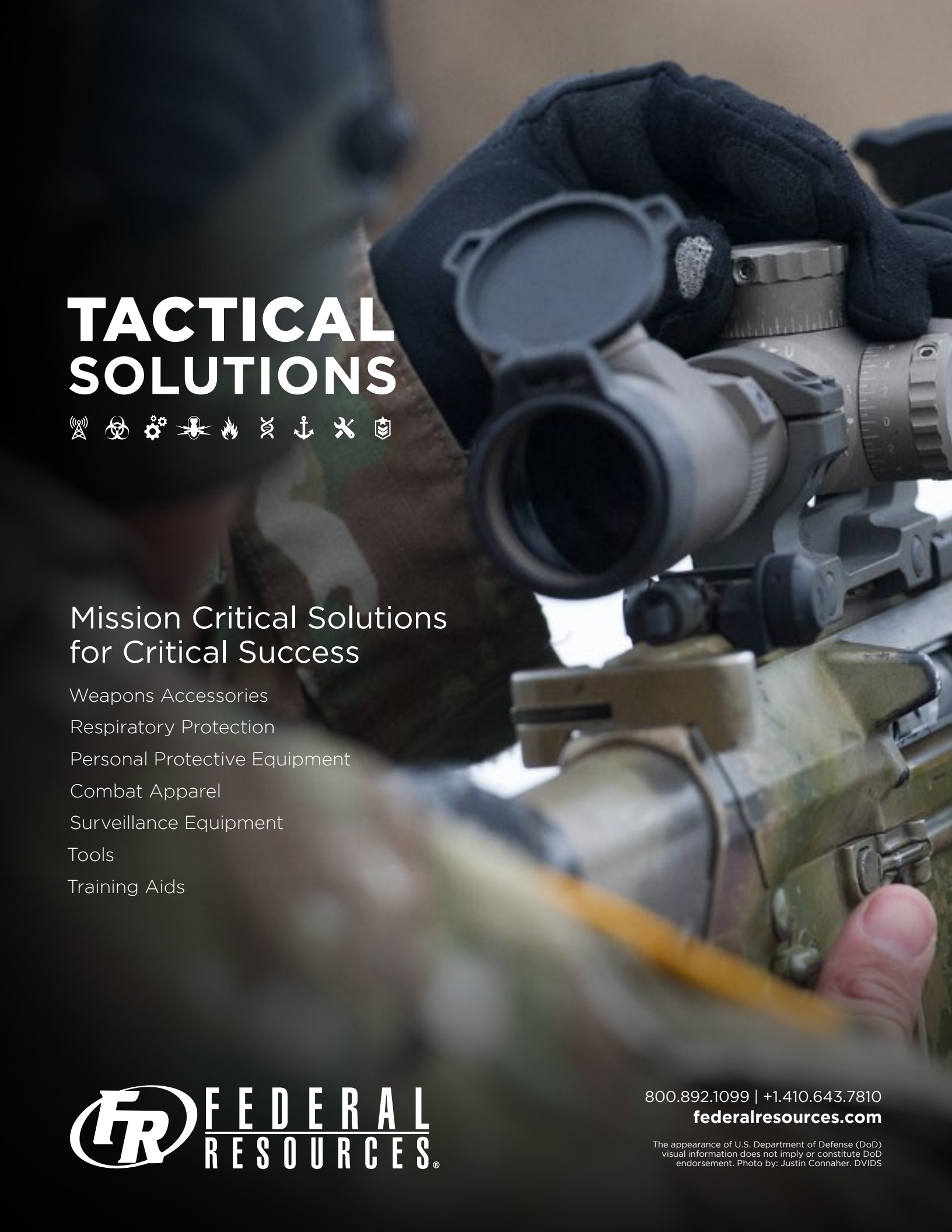

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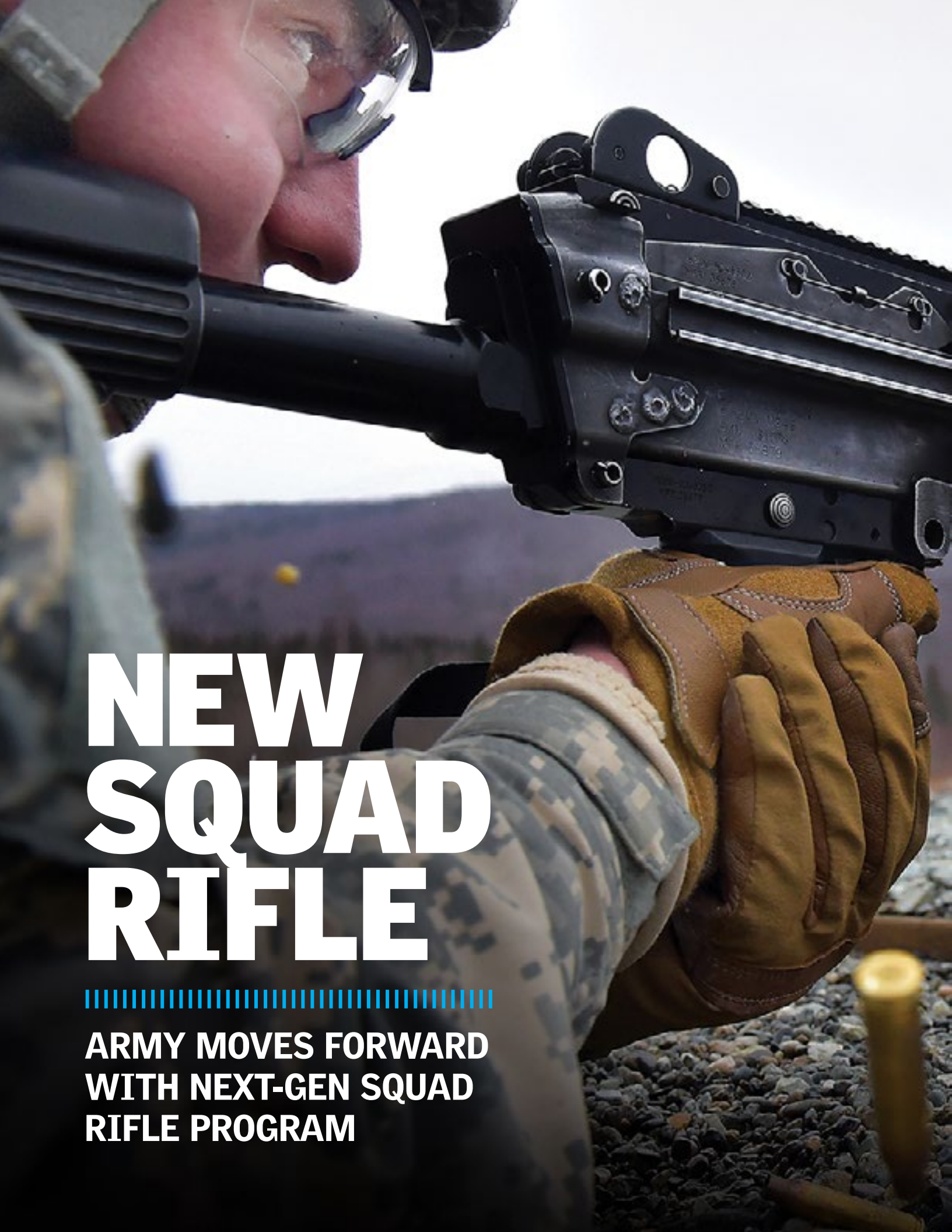

NEW SQUAD RIFLE

ARMY MOVES FORWARD WITH NEXT-GEN SQUAD RIFLE PROGRAM

BY NICK ADDE

Now that the Army is set upon going forward with plans to field a new squad automatic rifle, the service is committing to proceed as expeditiously as possible to move the project from the testing stage to the field.

Exactly how soon soldiers should expect to use their new Next-Generation Squad Weapons (NGSW) in combat, with variants that would replace both the M4 carbine and the M249 squad automatic weapon, however, is still to be determined.

The new weapon would fire a 6.8 mm round, which both the service and representatives from industry who are vying for the contract to build it are embracing. The round, they say, would provide the right balance of lethality required in both close- and long-range fights. Proponents say it is both lighter and deadlier than the

5.56 mm NATO round, the ammunition it would replace.

"Ninety percent of our casualties are coming from 4 percent of our force," said Daryl Easlick, small arms deputy at the lethality branch of the maneuver capabilities and integration directorate, at Fort Benning, Georgia. "This means those close-combat [military occupational specialties] that close with and destroy the enemy are the most likely to be injured. Those are the ones we're concentrating on the most when looking at these modernization efforts."

But while the Army team that is working on the new weapon's development is optimistic that they are on the right track, they fully understand that more testing will be necessary before the project emerges from its present prototype stage.

Factor in the current political and budgetary climate, and any visions of a closing date for the project become even murkier. In essence, if the money is there, testing would be completed sooner. If not, that date would slide to the right accordingly.

"Budget cycles are painful at best," Easlick said. "We try to read the tea leaves and make sure we have some sort of plan. It's dependent upon our senior leaders going back to lawmakers, and making sure they're dotting I's and crossing T's."

The cost concerns cannot be underestimated. In time, every soldier, Marine and special operator who directly engages the enemy would need the new weapon, delivered as close to the same time across the spectrum as reasonably possible. Otherwise, troops could be forced to fight under circumstances in which units would be carrying different ammunition.

Additionally, supply chains would have to change accordingly to ensure that new weapons and replacement parts are readily available.

As such, Army Chief of Staff Gen. Mark A. Milley told an audience at the Association of the U.S. Army's annual conference in Washington, D.C., last October that the new weapons would be distributed first to the 100,000 troops who engage in close-quarters combat.

"Right now, the feedback looks like we are going to a 6.8 ... round," Milley said last fall. The service selected five contractors to develop prototype rifles: AAI Corp.-Textron Systems; FN America LLC (producing two rifles); General Dynamics-OTS Inc.; PCP Tactical LLC; and Sig Sauer Inc.

The prospective manufacturers are largely cautious in discussing their plans to meet the Army's requirements. Most declined to be interviewed.

"Textron Systems has developed automatic rifles and rifles in a variety of configurations and calibers, ranging from 5.56 mm to 7.62 mm, and is supporting the Army's current efforts to revolutionize its small arms capability," Wayne Prender, a senior vice president with the company, said in a written statement.

"The Army has outlined a set of requirements that demand a new technology baseline in small arms — one that more accurately reflects the demands on users today in mission and environment. We are confident that our CT [case-telescoped] weapons technology meets, and in many cases exceeds, its requirements in the areas of lethality, weight reduction and overall performance."

Textron began producing CT weapon systems and ammunition in 2004, with ammunition encased in polymer rather than brass. The technology results in lighter, lethal and proven ammunition, Prender stated.

FN America released an announcement in July, stating that the company would produce prototypes of both a lightweight machine gun and a heat adaptive modular rifle — both of which would meet Army weight-reduction requirements.

"The Army has tried this on a number of occasions, and has not brought a new weapon into the field," said Mark Cancian, senior adviser with the Center for Strategic and International Studies, a Washington, D.C.-based think tank.

"The problem with a new infantry weapon, particularly if you adopt a new caliber, is it can be extremely disruptive and expensive," said Cancian, who retired from the Marine Corps as a colonel after a 30-year career.

Cancian also cited the overall unease and unwillingness to rush a new weapon out too soon, because leadership is still "haunted by the experience of Vietnam."

Specifically, Cancian is referring to the Pentagon's decision to introduce the M16 during the conflict, before it was adequately tested.

"The result was [the M16] had a bad reputation and caused both problems and casualties because of unreliability," Cancian said.

The Army, for its part, is moving forward on a course that balances the cross-purposed needs for speed and caution. Indeed, when the service began soliciting ideas from industry last October, it did so in a draft prototype opportunity notice rather than a formal request for proposal. The listing on FedBizOpps specifically sought "industry questions and comments to assist in shaping the NGSW program strategy to rapidly develop and deliver prototype weapons and ammunition."

At this point, the service is moving accordingly along this somewhat open-ended timeline.

"We are in a prototyping effort [now], not production," Easlick said. "We can do what we say we need to do."

Prototype testing would take place at a host of Army installations and facilities. Aberdeen Proving Ground, Maryland, and Picatinny Arsenal, New Jersey, will play key roles. Combat soldiers at major U.S. Army Forces Command installations like Fort Bragg, North Carolina, will get the opportunity to provide their input as well.

Project managers want to determine if the weapon prototypes allow soldiers to do the same tasks they now must perform in the same or a shorter time duration, based on the load they must carry. Such tests can be performed anywhere, Easlick said. Determining when and where they would take place would depend upon scheduling, costs and the amount of temporary duty time.

Possible concerns about making the weapon suitably effective at both close range and longer distances are being addressed throughout the development process, Easlick said. He realizes, however, that the related concerns are well founded.

"We understand [the rifle will have to] do short- and mid-range engagements and still meet long-range requirements. If I want to get better at long range, it's a push-pull on other

requirements. That's just the way it is — physics," Easlick said.

To approach a solution for this issue — and any other they are encountering — entails meeting the threat-based requirement and "walking it backwards, to put it into a soldier's hands so that he will be able to do the tasks he's supposed to do," Easlick said.

Subject-matter experts in Easlick's shop — former non-commissioned officers, retirees, National Guard and reserve-component types — are working on capability development. These experts have a "high degree of ability to conduct infantry tasks," he said.

They are using their expertise to understand what industry has that is technically feasible, and will be both controllable and able to be fired during any of the maneuvers and movement techniques soldiers use during engagements, Easlick said.

"That's the crux of being able to figure this out," he said, adding that any final product would have to fit in with the concept of treating each soldier as an individual platform — akin to the way services regard larger systems such as tanks, aircraft and Navy ships.

The approach to the new squad weapon must be developed based on both operational needs and emerging technologies in other areas. It is no longer acceptable, he said, to "hang stuff on the soldier like a Christmas tree."

The weapon likely would be able to provide a soldier with information about signature suppression — making it harder for him or her to be spotted by adversaries — fire control, or interaction with other nearby friendly weapons systems.

At this point, the discussion and experimentation becomes quite conceptual, Easlick said.

"What if the next-generation weapon system can send reports for me, so that the ground commander in a fight doesn't have to [do it] anymore. The soldier can concentrate on the fight, rather than [telling higher-ups] what's going on around him," Easlick said.

The weapon itself could interact with other systems contained in future combat uniforms — telling the soldier, comrades in arms who are nearby, and commanders who monitor the fight if help is needed in supplying more ammunition, or treating and evacuating casualties.

Night-vision goggles and other visual-augmentation systems and sensors on display inside helmets all would function with the weapon as a single system.

The weapon's self-contained systems would also be seamlessly integrated with other systems so that initial indoctrination and fostering familiarity with future upgrades would not require extensive bouts with new learning curves. Soldiers would be able to adapt to changes with "no training detriment," Easlick said, as they move through their infantry careers.

"A lot of this sounds very next-century — very far out there," he said. "We're being realistic. It's not going to happen soon. But we have to make sure we have the ability to integrate things into the system, instead of hanging things onto the soldier. It's difficult to do when you don't know what's technically achievable." The visual-augmented integration systems Easlick refers to are not available yet. As such, the concepts are "pretty aggressive, pretty imaginative," he said. "Even so, we're being realistic about what's able to be fielded in a short period of time." ND

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New 6.8 mm Round A Game-Changer For Ground Troops

BY NICK ADDE

Army leadership is committed to moving toward the adoption of 6.8 mm round for the Next-Generation Squad Weapon. However, its development hinges upon addressing two key concerns.

The round must be suitable for close- and medium-range conflicts, such as house-to-house urban engagements. Likewise, it must function properly in long-range environments, such as those found in the mountains of Afghanistan.

Additionally, the larger ammunition should not add to the weight — and ideally, would lessen the burden — soldiers now currently carry. Of equal importance, it must be lethal.

The Army team responsible for the project believes that while it will take some time to come to fruition, they are on the right track.

"We're looking at it holistically. We want our soldiers to never go into a fair fight, and always have an overmatch with their adversaries," said Col. Travis Thompson, chief of staff for the soldier lethality cross-functional team at Fort Benning, Georgia.

Under the holistic approach, the three components — ammunition, the weapon and fire control — all must function together, in any and all combat situations, Thompson said.

The ammunition and weapon must perform within 200 meters — where history shows most combat confrontations take place — and at distances, where present-day enemies are increasingly seeking to engage U.S. and allied soldiers, he said.

The decision to settle upon a 6.8 mm round resulted from extensive testing and research by Army laboratories, staffed by experts who closely examined factors such as threats, target sets, weight, performance and controllability, Thompson said.

The research entailed looking at a multitude of combinations of barrel and weapon lengths, weights and calibers of both commercial and military systems.

"A lot of effort was done by our labs in looking at what's the right caliber for the next-generation weapon," Thompson said. "The decision was not taken lightly."

Mark Cancian, a senior international security advisor with the Center for Strategic and International Studies and a retired Marine Corps officer, said the Army "is trying to fix a tension that has existed in small arms for a century."

Cancian noted the institutional desire on the Army's part to improve the lethality of small arms, with the focus on ammunition. When the service published a semi-formal request for ideas on FedBizOpps last October, it specifically mentioned the intent to move to the higher caliber from the current 5.56 NATO round now in use with the M4 carbine and M249 squad automatic weapon.

In the announcement, contractors were told to submit their ideas under an other transaction agreements authority, which is used specifically to solicit prototype ideas. The service would then review the proposals after 27 months, and then award a follow-on production contract.

The plan to adopt the higher caliber represents a "compromise" on the Army's part, Cancian said, but not one without inherent challenges.

"It's very expensive and very hard to change calibers," he said. "Improving the ammunition is by far an easier way to improve lethality."

The "tension" exists between proponents of ammunition suitable for short-range and longer-range fights. This, he said, is what the lethality team is coming to terms with today as it seeks to develop the new round and its corresponding weapon.

"The marksmen in the services would like to optimize long-range precision fire, and they point to engagements where that is important. These people say that in Afghanistan, particularly, there are opportunities to take long-range shots," Cancian said.

Even though the history of infantry conflict shows that most engagements happen at close ranges, he said, shooters who want to hit a target at ranges of 500 meters or greater would need larger rounds with heavy bullets.

"But if you're going to be fighting close in — at 100 meters or under 50 meters — you want something that can fire rapidly and then quickly," Cancian said. "The 5.56 is very good for that."

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The compromise to which Cancian refers would entail development of a bullet that would fit in a relatively small weapon like the 5.56 does, but also could reach out to long ranges and still hit targets.

"That is what the Army is trying to do," Cancian said. He believes the service is taking the right approach.

"If you don't do anything, you're more optimized for close-in. If you adopt a heavier caliber, you have to replace everything in the inventory. That gets very expensive," he noted.

Moreover, once the U.S military makes such a change, allies and partner nations would feel compelled to follow suit, he said.

"It's hugely problematic, and it's not clear that you're going to improve your performance close-in. You might get better at the long shot, but worse at the shots that are more common," Cancian said.

Army Chief of Staff Gen. Mark Milley, a strong proponent of the round and new rifle, believes the weapon system will prove to exceed any military rifle in existence, and penetrate any body armor in use now and in the next 25 years.

"This weapon has an accurate range far in excess of any known existing military rifle today," Milley said during a speech at the Association of the United States Army's annual meeting in October in Washington, D.C.

The lethality branch team also is well aware of the issue of compatibility with the NATO round.

"We're not ignoring it," said Daryl Easlick, the branch's small arms deputy. "First of all, the U.S. Army is going to have 5.56 and 7.62 weapons systems for the foreseeable future."

Easlick and his team are in continuous contact with NATO allies. "They know what we're looking for and why we [want] different calibers. They understand it's threat-based, and that we're trying to improve our capabilities," Easlick said.

Also, NATO countries do not have the research-and-development capabilities inherent in the U.S. military, he noted.

"They sit back and watch what we do. Once we get the [research and development] out of the way they will … see about piggy-backing," Easlick said.

Likewise, the team is aware of the concerns about efficacy at divergent distances. "Finding that balance in an acceptable way is the entire intent of the program," Easlick said. "An infantryman's engagement range is not fixed. Nor is it very predictable. He has to be proficient in that entire engagement band that he is subjected to."

Easlick noted that commercial, off-the-shelf products exist that can provide long-range fires. Such ammunition, he said, may not necessarily be suitable for other scenarios. These products tend to be specific in what they are designed to do, he said. That specificity may prove of little use under the stress and duration of combat.

Thompson said that comparisons of military-grade 6.8 and 5.56 ammunition with civilian ammunition of the same ilk are irrelevant. Commercial manufacturers make good products for consumers, but "they're not in the business of making bullets that kill our enemies," he said.

Adaptation of the new round and weapon will follow guidelines set forth by the Close Combat Lethality Task Force, the group of experts Defense Secretary James Mattis established last March to respond to what he sees as an erosion of close-combat capability as it relates to threats U.S. forces now face.

Improvement in training and equipment is one key element among many, Mattis believes, that is necessary to counter threats from adversaries that are becoming more capable at a pace the United States may not be able to match unless changes are made.

Mattis specifically ordered the task force to "identify or develop options for investment that include more lethal and discriminating individual weapons systems, while recognizing the imperative to lighten load for infantry squads."

Individual soldiers are carrying too much weight, Mattis' directive stated. The result is a negative impact on an infantry squad's ability to move, survive and destroy the enemy.

"This is all about the ballistics of a heavier bullet, moving at a high velocity," Easlick said. "We did look at multiple calibers, and determined that we [wanted] something somewhere between the 5.56 and the 7.62. That landed us in the realm of 6.5 to 6.8."

Based on that understanding, the team wants to emerge from the project with the right capability, and something that soldiers accept and use, and are able to do what they can do today with their automatic rifles, Easlick said.

With testing likely to take place at Aberdeen Proving Ground, Maryland, Picatinny Arsenal, New Jersey, and other sites, Easlick and his team want to see how prototype weapons and ammunition fare as soldiers carry and use it on load effect assessment program courses, which are designed to assess the effects equipment and clothing have on performance.

"It's a measure to see if soldiers can do the same tasks in the same amount of time, or maybe a little less, based on what their load is," Easlick said.

The lethality branch performs such tests frequently, to conduct proof-of-concept assessments and ensure they are moving projects in the right direction. The 6.8 mm round will undergo such tests, Easlick said, but the Army is choosing to keep the testing schedule close to the vest.

All of this is evolving, Thompson said, with a mindful effort to minimize costs and maximize value for the taxpayer. Hence, the initial focus is to deliver the new ammunition and weapon to the 100,000 soldiers who do 90 percent of the fighting.

"We need to have an overmatch for the soldiers who look into the eyes of the enemy," Thompson said. "The 6.8, and the Next-Generation Squad Weapon, will do just that." ND

HELLBUS VIA WIKI

Army Serious About Fielding 6.8 mm Round

BY STEW MAGNUSON

"Right now, the feedback looks like we are going to a 6.8 mm round," Army Chief of Staff Gen. Mark Milley said recently.

The service has a list of its top six modernization priorities and "soldier lethality" is one of the items. The most high-profile program in that category is the squad automatic rifle. Army Secretary Mark Esper at the Association of the United States Army annual conference — while promising the service is speeding up the way it does acquisition — singled out the program as one that would see prototypes in the near future.

"The bottom line is that we are committed to a new rifle," Milley told reporters.

The 6.8 round would replace the 5.56 NATO round, which would mean two types of ammo for rifles on the battlefield, at least initially, Milley suggested. The 6.8 mm round was first developed by Remington and Special Operations Command. It is more lethal and accurate than the old rounds and 10 percent lighter.

If Milley's prediction is correct, it would be used in one of six rifles being developed for the squad automatic rifle competition by five contractors. The competitors are: AAI Corp.-Textron Systems; FN America LLC (with two rifles); General Dynamics-OTS Inc; PCP Tactical LLC; and Sig Sauer Inc.

The new rifle is apt to be expensive, so not every soldier will have it from day one, Milley said.

"It's a very sophisticated weapon. It's a very capable weapon. And it has an integrated sight system," he said. It will also integrate into the soldier's wearable information technology.

"Not surprisingly, with a weapon like that it's probably pretty expensive. We expect it to be expensive," he said.

The initial buy would be in the 100,000 range, he said. "We will prioritize those soldiers who are in close-quarters combat type duties such as infantry and armor, cavalry, rangers, Special Forces, combat engineers and maybe selected others in the active Guard and Reserve," Milley said. Fielding to the remaining forces would spin out from there, he added.

Milley was clearly a fan of the technology.

"This weapon has an accurate range far in excess of any known existing military rifle today. It will fire at speeds that far exceed the velocity of bullets today," he said. It will penetrate any known body armor or any expected to be developed in the next 25 years, he added.

He hoped to start testing the new weapons at Fort Benning, Georgia, in the summer of 2019.

He added: "We don't want to speak too much about its technical capabilities because our adversaries watch these things very closely." ND

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Special Operators Look to Make M4A1 Lighter, Deadlier

BY CONNIE LEE

Special Operations Command is examining ways to convert its current M4A1 carbine into a personal defense weapon.

It will give "the operator the ability to have a personal defense weapon that can be used in environments that require a close-quarters battle or variant assault rifle with the additional capability of minimizing weapon signature," Army Lt. Col. Mark Owens, ammunition and weapons program manager in the program executive office for special operations forces warrior, said in an emailed statement.

Special operators typically work in small units, heightening the need to equip the commandos with technologies for small unit dominance — Green Berets usually form groups of 12, while SEALs usually form groups of 16.

SOCOM this year awarded a contract worth about $77,000 to Sig Sauer for 10 personal defense weapons kits, Owens noted. The firm-fixed-price contract requires the company to provide limited test articles for combat evaluation, he said. The award encompasses both the weapon and the optic.

"This will enable [the] government to assess the weapon system's potential to meet the size, weight, overall length and reliability articulated by the user," he noted. The 10 systems will help inform future acquisition decisions and plans, he said.

The complete kit includes the upper receiver and folding skeleton stock kits; tools required for the conversion; and an attachable light and sound reducing suppressor, according to the request for information released on FedBizOpps.

The system, including the M4A1 itself but not the magazine, must not weigh more than 5.5 pounds, according to the RFI. With the stock extended, the weapon must not be longer than 26 inches. With the stock collapsed, the weapon must be no longer than 17 inches; however, the desired length is 15 inches.

Additionally, the kit must have a 5.56 mm barrel that can be switched in less than three minutes to fire the .300 Blackout cartridge, the RFI stated. SOCOM hopes to have a weapon that is the same length and size for both calibers.

An announcement of the intent to award the contract, also released on FedBizOpps, states SOCOM chose Sig Sauer because the company was the only one that could meet the requirements for the commercial off-the-shelf kit. Acquiring products from other companies would not have met the schedule requirements, the announcement stated. Owens said SOCOM expects the upper receiver group and scope to be available in August for combat evaluations.

The command did not pursue an entirely new weapon system because there was no codified requirement that demanded one, he noted.

"We are assessing various technologies to increase warfighter lethality while reducing SOF signature," he said.

Although not specifically stated in the contract announcement, some observers expect that the kit will convert the weapon into the MCX Rattler, a personal defense weapon by Sig Sauer that contains a 5.5 inch barrel and a foldable stock.

"This gun was designed from the ground up to be as [discreet] as possible while retaining all the capabilities of the MCX," the company's website states. The weapon features free-floating handguards and a folding aluminum stock.

Mark Mitchell, principal deputy assistant secretary of defense for special operations and low-intensity conflict, earlier this year stated the importance of having special operators adopt new capabilities to adjust for the changing warfare environment.

"Russia today is not the Soviet Union and China today is not the China of the '70s or '80s," he noted at the National Defense Industrial Association's annual Special Operations/Low-Intensity Conflict Symposium and Exhibition. "There are many ways in which [these nations] are much more integrated into the international security architecture and the economic systems while also trying to manipulate and undermine it." ND

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Industry Develops High-Fidelity Small Arms Simulators

BY YASMIN TADJDEH

New small arms trainers equipped with high-fidelity simulations and realistic weaponry could give soldiers and Marines the ability to hone their skills well before they ever set foot on a battlefield.

Among the many gadgets a modern foot soldier carries, their rifle is one of the most important. The military puts a premium on small arms training, and in an effort to reduce costs is eyeing more investment in virtual reality.

The Army, for example, has listed the development of the synthetic training environment as one of its top modernization priorities under the soldier lethality category. Developers of the STE — which encompasses all aspects of training for troops — are working closely with the Army's soldier lethality cross-functional team, noted Maj. Gen. Maria Gervais, head of the team for STE and the deputy commanding general of the Combined Arms Center-Training.

Together "we have put a focused effort to increase the lethality of our close-combat soldiers and Marines," she said during remarks at the Association of the United States Army's annual conference in Washington, D.C. "We've done that in a couple of ways: No. 1 is an immediate training capability — a squad advanced marksmanship trainer — to get that out in the field to our close-combat soldiers so they could start training immediately."

That is being delivered as a training-as-a-service capability, she noted.

Another is the development of a squad immersive virtual trainer that the service hopes to field much sooner than its anticipated 2025 timeframe, she said.

"[We want to] get after what the secretary of defense has challenged us with — and that is to provide a simulation training capability to our close combat soldiers … in order to get the sets and the reps … and to execute 25 bloodless battles before the first [real] battle," she said.

Brig. Gen. Michael E. Sloane, program executive officer for simulation, training and instrumentation, or PEO STRI, said the Army wants to work closely with industry to develop new technologies. He noted that the service is leveraging rapid prototyping and entering into other transaction authority agreements.

The Army is putting a premium on engaging with industry so it can better understand where technology is today and tomorrow, Sloane added.

"[We want to help] you make informed decisions on where … to put your investment dollars, your IRAD dollars, so you know on the backend that there's going to be a capability you can help us deliver," he told members of industry.

During the conference, numerous companies marketed small arms trainers that executives said could reduce overall training costs and increase proficiency.

Meggitt Training Systems, which is based in Suwanee, Georgia, recently finished deliveries of marksmanship trainers for the Army's engagement skills trainer II, or EST II, program, said Jonathan Ayala, a virtual sales representative at the company.

Since 2016, Meggitt has delivered more than 895 systems for the program, as well as 700 platforms for the Marine Corps under a similar effort known as the indoor simulated marksmanship trainer, he noted.

Before soldiers participate in live-fire training, they take part in what is known as "dry-fire" training where they learn the basic fundamentals of shooting. Now, however, the service can use simulated training supplied by EST II in between those two phases, Ayala said.

"It augments their training by using compressed air and simulated firearms in a virtual environment," he said. This "increases their safety [and] they've come to find out that it increases … marksmanship course scores drastically."

The system consists of large screens, a projector and a tethered rifle, he said. The simulator projects a virtual 3D image of a range and targets pop up and move. "We can create any course of fire that exists in real life," he added.

It also provides users with analytic information that can be used to track a soldier's performance and score, Ayala said.

The simulator is based on the company's commercial FATS 100MIL product. Newer versions of the system have since been released, such as the FATS 180 and 300, which offer 180 degrees of view and 300 degrees of view, respectively.

Meggitt can provide the Army with upgrades to those simulators, he noted. It can also swap out the current tethered rifles for wireless ones that use its BlueFire technology.

AEgis Technologies Group, a Huntsville, Alabama-based simulation company, showed its reconfigurable virtual trainer, or RVT, during the conference. The system — which was originally designed to train for Stinger operations — has now been modified to include a number of weapon platforms such as the M4 carbine rifle, said Del Beilstein, vice president of business development for the company.

"We thought, 'Well, if we've already got the architecture, the core of the system worked out, why wouldn't we extend it to other weapons systems?'" he said.

With the RVT, users would be able to employ the same system for different training scenarios and would only need to swap out the mock weapon, Beilstein noted.

"The whole idea is that we will have weapons system modules," he said. If one day someone wants to train with Stinger they can, and another day they can with the M4. Stingers are man-portable air-defense systems.

The company plans to demonstrate a room-clearing scenario using the M4 trainer during the Interservice/Industry Training, Simulation and Education Conference in Orlando, Florida, he said.

The company plans to eventually expand to other weapons such as the M17 pistol, M249 and M240 machine guns and the

M27 automatic rifle, he said.

Beilstein said he sees small arms trainers as a burgeoning market opportunity for the defense industry.

"If you look at M4 rifles or really any of the weapons systems that are in the Army's [inventory], … a lot of those weapon systems are high density, which means there are a lot of soldiers carrying those things around," he said. "There's a big demand for training because ranges are finite, ammunition is finite, live training is finite. But if you could provide an ability to train more frequently then competency improves."

Pratish Shah, CEO of Zen Technologies USA, said he sees a growing number of opportunities for U.S. military training with simulation and particularly for smalls arms.

Zen Technologies USA was established earlier this year, he noted. Its parent company, Zen Technologies, is based out of India and has been around for 25 years. It has shipped more than a thousand simulators over that time to countries throughout South and Southeast Asia, the Middle East and North Africa, he said.

The company opened up its U.S. branch as a way to get after the market in the Western Hemisphere and to set up U.S. operations that can support the global business as well, Shah said.

"We're focused on combat training, but our higher-level mission and our goal is to focus on combat readiness," he said. "What we look for is how do we support improvement of combat readiness through our hardware, through our software, through our innovation, through our systems, … through things like data analytics and analysis and mathematical modeling and adaptive training."

The company provides over 40 training devices to support live training and virtual training, he said. The U.S. office is able to connect back to India and access the company's entire portfolio of capabilities including its intellectual property, software and hardware, he said.

"Needless to say, there will be some unique development work" on the U.S. side, he noted.

During the conference, Zen displayed a small arms trainer that was customized for U.S. military weapons such as the M4. However, the company is easily able to swap out other systems used by different countries, he noted.

"Whether it's for the U.S. Army or whether it's the Canadian Forces or any other global forces out there that needs an arms trainer or virtually any of our type of software, the technology is built in house so we have control over it and … [can] adapt it and customize it for each military's needs," he said.

Data from Zen's small arms trainer feeds into the company's adaptive training system which is powered by Paladin's artificial intelligence data analytics capability, he noted. The system generates a combat readiness score, compares how a user performed against others and can gauge how that user would affect the overall performance of a squad, Shah said.

"Many in the industry feel adaptive training is … [the] future of training," he said. Adaptive training "looks at your experience level, your performance compared to lots of other data and then puts it all together to then come up with recommendations … based on what you've done, how you perform and where you need to be."

Rather than following the same checklist for every individual soldier, the training curriculum is adapted based on user needs, he added.

Another technology demonstrated at the show was an app developed by Double Shoot, an Israel-based startup, that was primarily designed to help streamline the zeroing process for rifles and pistols but can also help with marksmanship training, said Tal Tinichigiu-Abergil, co-founder of the company. Zeroing is the process of aligning the sights on a rifle with a weapon so a rifleman can accurately aim at a target.

The system works by utilizing an advanced image processing system through a smartphone application that allows users to quickly and efficiently zero high accuracy weapons as well as take advantage of the platform's scoring system.

The app is compatible with all of the rifles employed by the Israeli Defense Forces such as the M4 and AR-15, Tinichigiu-Abergil noted. However, more weapons can easily be added, she said.

"Our system is very versatile and we can adjust to any sight and to any weapon that a customer would ask" for, she said. It takes two to four weeks for the company to upgrade the app for a new sight or weapon.

The app utilizes data-analytics and information is stored in the cloud for easy access, Tinichigiu-Abergil said. ND

MEGGITT

New Wave of Night Vision Tech to Boost Soldier Lethality

BY NICK ADDE

When Billy Fabian was serving as an infantry officer in Iraq a little more than a decade ago, the U.S. Army had a decided advantage when it came to pursuing the fight at night. It was not, however, without flaws. The goggles he and his fellow soldiers used were sophisticated, but simplistic. At times, they were ineffective.

Though they amplified ambient light, the goggles did not work in complete darkness. They were drowned out by bright light as well. Moreover, although the gear still provided a distinct advantage to troops who wore them, the tactical-advantage gap was closing. Insurgent forces were getting their hands on night-vision goggles. Additionally, soldiers who wore them would use infrared lasers to target adversaries bearing small arms — effectively providing these foes with an indicator of their enemies' locations.

Though much has changed since then, Pentagon leadership still views regaining the night-vision advantage as a critical goal. Defense Secretary James Mattis has prioritized improving the lethality of close-combat warfighters. Better night-vision goggle systems are a key element of the secretary's push. Though the armed forces and industry are making steady forward strides, challenges remain.

"A key question is, how do you balance performance with soldier load?" said Fabian, now a senior research fellow at the Center for Strategic and Budgetary Assessments, a Washington, D.C.-based think tank. "As our dismounted soldiers get more protection — body armor, etc. — as well as advanced optics such as night vision, it adds a lot of weight."

The next generation of night-vision technology will address these issues, Fabian believes. Such capabilities would amount to a "pretty huge step," he said. "All of the improvements would make the dismounted soldier and Marine more lethal and survivable."

The Army's soldier lethality cross-functional team, headquartered at Fort Benning, Georgia, is conducting the main work in advancement of night vision.

"We're looking at improvements across the board," said Col. Travis Thompson, the team's chief of staff for soldier lethality.

"With an increase in situational awareness, you may not have to call in on the radio to identify where friendly units are," Thompson said. "You're more likely to detect the enemy and be able to engage them in that close fight faster."

The Army wants new equipment that would increase field of view and depth perception for soldiers in a close fight, and allow soldiers to manipulate the gear "in quick order" when operating, for instance, inside a building, Thompson said.

The effort focuses upon moving toward a binocular system, to replace the monocular one that has been in use for roughly two decades.

Last June, the Army awarded L3 Technologies a three-year, $391 million contract to produce and provide the next-generation Enhanced Night Vision Goggle–Binocular (ENVG-B).

For its part, L3 is following the Army's "system of systems" approach, Lynn Bollengier, vice president and general manager for the company's warrior missions solutions division, said in a written statement to *National Defense*.

"There is greater integration amongst the equipment the soldier is carrying, much like the commercial world has integrated consumer products. As a result, our customers are very interested in next-generation and leap-ahead technologies that can improve lethality and reduce warfighter workload," Bollengier wrote.

L3's ENVG-B is a prime example. It would allow soldiers to view maps from the Army's Nett Warrior integrated situational-awareness system, as well as video from their weapons' sights.

Its binocular capability will increase field of view and depth perception for soldiers involved in close fighting, said Thompson. The visual itself also is changing to white phosphorus from the familiar green phosphorus.

"It will help us as we start to overlay [the display soldiers see] with color from augmented reality. SOCOM [Special Operations Command] soldiers have been using this for quite a few years," said Thompson.

Fused thermal capability would allow troops to have day-night capability that would function in all environments, Thompson said.

"If you look around a dark corner with no light, unless you have some [enhancement], you won't identify anything. With thermals, [objects will] stick out quickly," said Thompson. "You know the enemy is out there. You have to poke your head up to look for him, but the last thing you want to do is expose yourself to the enemy [and] you don't have a choice."

The technology, which would include augmented reality as well, has been available for combat vehicles like the M2/M3 Bradley fighting vehicle and M1 Abrams tank for awhile, but only now is making its way to the soldier level. Once it is available, the system would allow soldiers to view everything they would conceivably need to see while looking straight ahead.

No longer would they have to look downward to discern information, as they do with present systems. Besides a visual of what is in front of them, they would know their compass heading, locations of friendlies and potential enemies, and a host of other readings.

The first prototypes should make their way into the field sometime within the next 11 months. Which units would get them still has not been determined. Army Forces Command will make that call in due time, Thompson said. The idea is to place it among the dismounted troops who would need it the most — infantry, combat engineers, combat medics, special operators and scouts.

Also, the new devices would be issued to entire squads rather than two or three members, so that everyone is fighting at the same level of capability. Throughout the process, soldiers will

provide their assessments of which components work well and which do not, he said.

A second system under development, the integrated visual augmentation system, or IVAS, would include significantly more sophisticated notification and identification capabilities than the current technology affords.

Instead of a goggle system through a tube, the new system would allow for what Thompson calls "true see-through display" — that is, goggles and glasses that include artificial intelligence and machine learning.

It would be more powerful and robust, but maybe slightly heavier because it entails two lenses instead of one. Still, developers are acutely aware of the weight factor and are working to make it more manageable.

"One system we're actually looking at [would determine] where we put chips to process information," Thompson said. If the soldier's head is closer to the data source, less energy is needed to transfer it from source to user.

"We're taking this holistic approach to power demand, the amount of power soldiers need, in a package that makes sense," said Thompson. "This whole process is not about the next, newest and coolest thing. It's about providing soldiers what they need on the battlefield today and in the future."

More details about the program should begin to emerge within the next two years, as the system is being developed.

Because the night-vision enhancement initiative would apply to Marines as well, the two services are working closely together and with Special Operations Command to ensure that such systems are acceptable to their missions.

"In the long term, we want improvements and capabilities and are working with the Army and SOCOM … to see where, we align and leverage with each other," said Billy Epperson, the Marine Corps' infantry weapons and optics capabilities integration officer.

"It's no secret that the PDS-14 (night vision monocular) we have currently deployed through the Marine Corps first entered the service with the Defense Department in the mid- to late-1990s," Epperson said. Input from Marines is essential, he added.

"We always have representatives from warfighters and operating forces as a voice — from the beginning all the way to final selection," Epperson said. "The last thing we want to do is field something they absolutely hate and refuse to carry."

Industry participants who are vying for roles in future night-vision development understand that their main goal is to enable individual soldiers and Marines to see better in the battlefield.

"When the [most recent] requirements for the enhanced night vision goggle came out, we immediately started developing a binocular system that would meet them," said Darrell Hackler, Harris Corp. senior director of global business development for night vision.

The team at Harris is applying its experience in infrared technology and light amplification to "turn night into day for operators," said Christian Johnson, who manages the company's Army account.

The Harris system incorporates image-squared technology — which the company touts as having superior capabilities than the past and current night-vision iterations.

"If there is no ambient light to be amplified, [the user] can switch to the thermal camera. Or, in an area where it's freezing cold and nothing seems to be giving off a thermal image, [it can] put in a thermal image," Johnson said.

With augmented reality technology, infantry troops would be able to garner navigational information such as compass headings, Johnson said. Goggle displays also would include a blue-force tracker, an indicator of air asserts on station, a means of marking target reference points, and the ability to share information and send text messages to fellow soldiers, Johnson said.

"U.S. forces will have a capability that no one else has," Johnson said.

Dave Smialek, director of business development, precision guidance and sensing solutions at BAE Systems, said: "The main issue we're trying to address is improvement for the soldier who is looking to see farther in the battlefield."

With its Enhanced Night Vision Goggle III and Family of Weapon Sights-Individual (ENVG III/FWS-I) systems, BAE also would provide sharp imagery through thermal technology and rapid target acquisition. Infantry fighters would be able to fire at foes without having to shoulder their weapons.

Each potential supplier of the next night-vision system would be expected to deliver a package that offers greater range, the ability to see through glass, and manageable weight and size — in addition to the aforementioned display enhancements, said Mark Cancian, a senior adviser specializing in international security with the Center for Strategic and International Studies in Washington, D.C.

"The problem we've always had in the past is weight and power. They're interesting technologies, but if they weigh too much and you have to plug in a battery every two hours, it's not very practical," Cancian said. "These new suites of systems will have to prove themselves in testing and on the battlefield."

What ultimately could determine how quickly new night-vision gear makes its way to ground troops has little to do with shaking down the technology, Cancian believes.

"The whole close-combat lethality initiative hinges on two things: One is Secretary Mattis sticking around. The other is budget and funding," Cancian said. "If one of those were to go away, it might take some of the impetus out of this initiative."

ND

ARMY

U.S. to Streamline Small Arms, Ammo Export Regulations

BY LISA MAYS AND REID WHITTEN

U.S. regulations are being rewritten to remove certain guns and ammunition from defense export controls. A plan has been proposed within the State Department to migrate articles on the first three categories of the International Traffic in Arms Regulations U.S. Munitions List to the less restrictive Department of Commerce's Export Administration Regulations in Spring 2019. The change is expected to become effective by Summer.

Whether the State Department will go so far as to rename the United States Munitions List, the "United States List" remains to be seen. The removal of certain guns and ammunition from the munitions list will be a big change for small arms manufacturers who will soon be able to sell to a number of countries with a lower licensing requirement.

The proposed amendment to the International Traffic in Arms Regulations, or ITAR, first appeared in notes on the Defense Trade Advisory Group meeting on Sept. 8, 2017. For those who don't live and breathe the trade regulations, this is the State Department's working group that provides the bureau of political-military affairs with a formal channel to consult the private sector on all things concerning munitions exports.

On May 14, 2018, the Department of Commerce's bureau of industry and security, in conjunction with the State Department's directorate of defense trade controls, published proposed rules regarding the amendment.

Under the proposed rules, certain articles under USML Categories I (firearms, close assault weapons and combat shotguns), II (guns and armament), and III (ammunition/ordnance) will be moved from the USML to the Export Administration Regulations' commerce control list. Those articles are mainly commercial and not military items. The proposed rule acknowledges that there is a significant worldwide market for firearms in connection with civil and recreational activities such as hunting, marksmanship, competitive shooting and other non-military activities; and that the proposed changes burden U.S. industry without any proportionate benefits to national security or foreign policy objectives.

American gun and ammunition manufacturers will have an increased capacity to reach a larger customer base without as many restrictions on the export of their products. U.S. firearm manufacturers and exporters will likely see a reduction in export compliance administrative burden. Arms sales from the United States will likely grow, and the nation will likely continue to hold and expand its share of the international small arms market.

As just one example of the reduced regulatory burden, firearm, ammunition and ordnance manufacturers would likely not have to register as ITAR manufacturers or exporters. That registration requires yearly renewal and the base cost of registration is more than $2,000. Thereafter, those exporters would not need to apply for ITAR export licenses, which are generally more difficult to obtain than EAR licenses, in order to sell their products to foreign countries.

The change in control does not equate to a free-for-all. The proposed rule creates 17 new export control classification numbers under the commerce control list to control the items moved from the munitions list, and the rule further revises several other numbers. In addition, certain Category II items will migrate to the "600 series" of the commerce control list. Those 600-series items generally require licenses for exports or reexports, except when the item is exported or reexported to Canada or, when operating under license exception, any of the countries party to the Strategic Trade Authorization.

Where a license is required, exporters will still need to apply for a license through the Simplified Network Application Process Redesign (SNAP-R) maintained by Commerce's bureau of industry and security. Customs will also continue to require exporters to file an electronic export information submission. Moreover, exporters will need to continue to control certain information related to the design, development, manufacture, operation and repair of articles still controlled under the State Department's trade regulation.

State Department and Department of Commerce parallel rules to implement the removal of firearms from the munitions list are in the proposed stage. The final regulations may be published around April. Those regulations will likely have a delayed effect with an effective date set in the months following the publication of the final regulations.

As ever, a company's approach to compliance will depend on its risk tolerance. In preparation for the finalized regulations, affected companies may choose to analyze their compliance controls and create logistics plans for exporting Category I, II, or III items under the new regulations.

It may be useful to examine current company procedures and operations to anticipate how to adjust business operations to adapt to the changes. Planning ahead may help companies realize compliance efficiencies and reduce administrative costs. It is important to note, however, that the U.S. firearms industry will remain regulated under the National Firearms Act, Gun Control Act, and other federal and state firearms laws. ND

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