Mobbusters: Non-lethal weapons seek prime time

Less than lethal technologies are set to have an increasing impact across the spectrum of military operations. Kelvin Wong studies the options for today and tomorrow

Contemporary military forces are expected to conduct a diverse range of complex operations spanning the provision of aid in humanitarian and disaster relief (HADR) interventions on one end of the spectrum, through peacekeeping and peace support missions, to full-scale combat operations on the other.

Land-based forces particularly are increasingly contending with asymmetric non-state opponents such as organised insurgent and terrorist groups - amorphous entities that typically do not have comparative access to advanced weaponry and training, but eschew conventional military rules of engagement, coercing or drawing support from the civilian populace and camouflaging themselves within it, and exploiting collateral damage to life and property as a public relations weapon. Moreover, the populace itself could be hostile, with disenfranchised civilians challenging the presence of intervening forces in their homeland.

This contemporary operational reality looks set to endure. For example, a 2014 study by the US Army's Research Development and Engineering Command (RDECOM) Armament Research, Development and Engineering Center (ARDEC) surveyed 314 soldiers who had been involved in recent deployments. Seventy percent of the respondents stated that their unit was involved in civilian crowd control situations, with average crowd sizes ranging from 20 to 200 people. The largest reported crowd size, however, was over 1,000. In most of these scenarios, 84% of the surveyed troops found that responding forces typically had a platoon or less to engage in such crowd management contingencies.

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Hand-carried NLWs

Kelley Hughes, spokesperson for the DoD's Joint Non-Lethal Weapons Directorate (JNLWD), the principal agency for funding and managing NLW research and development for its armed services, told IHS Jane's that its Non-Lethal Weapons Programme (NLWP) provides US operating forces with escalation of force (EoF) options, covering both counter-personnel and counter-vehicle/materiel operations. The annual budget of the NLWP is approximately USD140 million.
FN Herstal's FN 303 is a compressed air launcher capable of engaging targets at close range. (FN Herstal) 1030749

"NLWs are designed and employed to achieve military objectives while minimising human casualties or damage to property and equipment," Hughes said. "NLWs can also help clarify the intent of an adversary."

The NLWP states that it has successfully fielded 14 types of counter-personnel NLWs, a list that includes acoustic hailing devices, non-lethal munitions, and optical distractors. Five counter-vehicle/materiel NLWs, which are designed to disable or inhibit vehicle mobility, have also been deployed.

One of the flexible tools is the FN Herstal FN 303 Less Lethal Launcher, which has been employed to support multiple types of missions, including crowd control, defensive and offensive operations, and force protection. The FN 303 is a compressed air launcher designed to incapacitate individuals up to 50 m using a range of 18 mm fin-stabilised plastic projectiles containing payloads such as blunt impact, marking (washable-pink, permanent-yellow), and Oleoresin Capsicum (OC - 'pepper spray') liquid irritants.

The FN 303 has an overall length of 740 mm and weighs 2.7 kg when fully loaded with its 15-round magazine and compressed air canister, the latter rated at 100 shots before replacement. According to IHS Jane’s Police and Homeland Security Equipment, some of the key features of the FN 303 include high accuracy and ease of use, generating no flash and recoil, and emitting little sound, which reduces the chances of panicking the crowd by separating it from live pyrotechnical fire. The system is also capable of engaging targets at extreme close range, with a minimum safety distance of 1 m.

Other counter-personnel NLWs available on the market include 40 mm non-lethal munitions, deployed through the widely used M203 40 mm under-barrel grenade launcher. As an adjunct tactical accessory, the M203 enables the operator to respond with lethal - with the assault rifle itself and fragmentation/high-explosive grenades - and non-lethal force with munition types such as rubber pellets, impact batons, and crowd dispersal gas.

However, the increasing interest in NLWs has also led to the emergence of dedicated non-lethal grenade launchers from commercial developers in recent years.
South Africa’s Rippel Effect has launched a new multi-shot launcher designed specifically for non-lethal munitions in 37/38 mm and 40 mm calibres. (Rippel Effect)

For example, Pretoria, South Africa-based military equipment and systems manufacturer Rippel Effect has incorporated new non-lethal launch functionality into the latest generation of its well-known XRGL40 extended range 40 mm multi-shot grenade launcher. The company's chief executive, Fritz Visser, told IHS Jane’s on 16 April 2015 that it had to overcome a number of technical challenges to introduce this new capability.

"Multi-shot grenade launchers use the pressures generated by the ammunition exiting the chamber (cylinder in our case) to cycle the cylinder to the next round," Visser explained. "In order for the launcher to be operated in semi-automatic mode it requires sufficient pressure. This is not a problem with lethal 40 mm rounds but it is a very definite problem with the modern less-lethal munitions.

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Vehicle-mounted NLWs

Besides troop-carried NLWs, a number of vehicle-borne systems have also emerged. For instance, the US Marine Corps (USMC) has successfully fielded the Venom Non-Lethal/Tube-Launched Munition System (NL/TLMS) developed by Pennsylvania-based munitions and equipment manufacturer Combined Systems Inc.

The Venom NL/TLMS is designed to be mounted on the gun turrets of Mine-Resistant Ambush Protected (MRAP) and High-Mobility Multipurpose Wheeled Vehicles (HMMWVs). Comprising 30 disposable smoothbore tubes in a 3x10 arrangement - organised in fixed launch elevations of 10°, 20°, and 30° - the Venom NL/TLMS is capable of electronically deploying a variety of 38 mm non-lethal munitions up to a maximum range of 100 m.

According to the company, the system measures 49x38x26 cm, and weighs 15 kg. It is also compatible with a range of fire-control systems, employing an IP-based control technique to launch individual cartridges or perform sequential firing via cable or wireless commands. The USMC announced in August 2014 that the system is being distributed to a number of units, including the II and III Marine Expeditionary Forces (MEFs), Marine Corps Forces Central Command, and reserve units.

"Marines require something to be able to hail and warn from a distance," said Anita Tate, who heads the team responsible for the procurement and logistical support for the Venom NL/TLMS. "What we have is a very safe, very easy-to-use system that will allow marines guarding military checkpoints to better determine the intent of an approaching vehicle."

The USMC is also pursuing another vehicle-mounted system under a programme called Mission Payload Module - Non-Lethal Weapons System (MPM-NLWS). The ongoing development seeks a new vehicle-
mounted, tube-launched system that is capable of delivering a range of selective and scalable non-lethal effects including auditory and visual impairment, as well as thermal heating designed to suppress human targets. The key thrust of the programme - which is presently in the Engineering, Manufacturing, and Development (EMD) phase - is to field a system that is superior in terms of range, coverage, duration of effects, and rate of fire compared with existing vehicle-mounted NLWs.

"MPM-NLWS will enable the tactical commander to employ non-lethal capabilities across the full range of the EoF continuum from early warning, to dispersion, to non-lethal suppression, thus enhancing the tactical commander’s capability to provide a tailored response to threats," the service stated. It added that the first increment of MPM-NLWS is expected to be integrated onto HMMWV gun turrets, although subsequent increments may include systems that are compatible with other tactical vehicles such as the Joint Light Tactical Vehicle (JLTV) and Medium Tactical Vehicle Replacement (MTVR), unmanned ground vehicles (UGVs), and naval surface vessels.

General Dynamics has developed the Medusa 66 mm grenade launcher system, which is being evaluated under a USMC NLW system requirement for the HMMWV and its replacement vehicle. (General Dynamics Ordnance and Tactical Systems)

The leading candidate of the MPM-NLWS programme is the Medusa non-lethal human suppression system in development by General Dynamics Ordnance and Tactical Systems (GD-OTS). Medusa features an integrated fire-control unit, a laser rangefinder, and twin articulating launchers for 66 mm calibre grenades with accuracy at ranges from 30-250 m. According to the company, the spherical error probable (SEP) of the grenades is 0.8 m at a distance of 30 m, 2.5 m at 90 m, and 4 m for targets at 150 m. The grenades, which are being developed in parallel with the launcher, can be programmed to trigger at operator-defined distances to provide varying levels of suppression effects on the targets.

A low rate initial production (LRIP) contract is expected to be awarded should a favourable decision be reached in the third quarter of fiscal year 2016 (FY 2016), with initial operating capability (IOC) targeted at the fourth quarter of FY 2017 and full capability achieved by the same timeframe in FY 2018. The service plans to acquire up to 312 systems.
Additionally, GD-OTS is working with the ARDEC to look at integrating a version of Medusa into the Objective Gunner Protection Kit (OGPK) for potential use on future army vehicles, a company spokesperson revealed to *IHS Jane*’s on 15 April 2015. "The US Army has requirements for EoF [capabilities] for all of their vehicles and Medusa is a good candidate to meet these requirements."

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**Future developments**

Directed-energy technologies also offer promise for future NLW systems. According to Hughes, the NLWP is currently seeking advances in directed-energy techniques capable of deterring human targets at long range with minimal risk of injury and overlapping collateral damage. Current technology employs high-powered vacuum tube-based Gyrotrons to generate millimeter-wave energy in the 95 GHz radio frequency spectrum on a 1.5 m target area out to a maximum range of 1,000 m.

At least two working units have been developed - the Active Denial System (ADS) 1 and ADS 2 - which the NLWP is sustaining for potential demonstration and deployments.

"The NLWP is refurbishing ADS 1 into a new and more robust, mobile platform that will be capable of filling potential operational deployment or demonstration requests," Hughes said. "The programme maintains ADS 2, which is a containerised version of the technology suitable for operational deployment. If an operational user request is received, a plan is in place to deploy the system, train operators, and provide operational support through a field-service representative."

She added that the NLWP and ARDEC have been collaborating to develop a next-generation active denial system that will employ solid-state technology, potentially yielding a smaller, lighter system with a reduction in the start-up time and lower cost.

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**Overcoming the challenges**

Despite widespread recognition in political and military spheres that security and stability type operations will constitute some of the predominant forms of interventions in the future, mainstream employment of NLWs by armed forces have yet to be demonstrated. Well-documented resistance includes the perception that NLWs are unsuitable in the modern operational environment, where lethal force must be met with a corresponding response. Additionally, lingering suspicions over the long-term effects of NLWs on the human anatomy remain.

A thorough understanding of the effectiveness and risk of injuries is therefore at the centre of nearly every effort to develop and field non-lethal capabilities for the US military. According to Lieutenant Colonel Scott McKim, Human Effects Officer at JNLWD, the NLWP co-ordinates these research efforts using subject matter experts throughout the acquisition and development processes, resulting in a fielded non-lethal capability with well-understood injury risks.

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