When soldiers progress to the live elements of training – either with real or blank ammunition – they will have to show that they are proficient with their weapon systems, can operate in real-world environmental conditions and terrain, and employ relevant tactics to succeed in engagement with the enemy. To enhance realism and the quality of training, it helps to have realistic targets on the ranges that perform like the humans and vehicles they are meant to represent, as well as instrumentation that can give accurate feedback for aspects such as after-action review (AAR).

Almost all service personnel, independent of branch or country, will learn to fire weapons on a range through a variety of static positions (prone, seated or kneeling, for example), with fighting units progressing onto more complex ranges involving dynamic training such as fire-maneuuvre in pairs, moving up to section- and platoon-level training. Not so long ago (and still in the case of some older ranges), targetry had to be manually lifted by soldiers who would reside in a reinforced concrete shelter. They would also have the job of marking off the fall of shot and tallying up scores for firers. This is both manpower-intensive, as it requires one man per target, and inaccurate, as soldiers tend to add extra points to help their buddies qualify.

Update and automate

For several years now there has been a concerted effort among many of world’s militaries to upgrade and modernise ranges, reducing the amount of manpower required and introducing much more automation. Whether it is infantry or armoured targets, static or moving, many ranges are now controlled from a centralised exercise control centre (EXCON) – removing the need for personnel to individually control targets.

Home on the range

Troops can learn weapons skills and tactics in the classroom or use indoor trainers to hone their procedures – but it’s live training, out in the field and on ranges, where they truly perfect their craft as warriors. Increasingly, live-fire training is being enhanced by laser-based and virtual simulation.
One provider of these new modernised targets and mechanisms is Meggitt Training Systems, which, along with Action Target, Lockheed Martin, Saab Training USA and Strategic Systems has supplied the US Army as part of its Army Targetry Systems (ATS) programme. Meggitt is also delivering systems under the USMC’s Range Training Systems programme.

‘We are delivering equipment to every USMC installation,’ said Chris Barrette, Meggitt Training Systems’ military live-fire sales manager. ‘They are making a big push to go from non-automated targetry to automated targetry and ourselves, partnered with General Dynamics, have automated targetry and ourselves, have been an integral part of that. All of the USMC ranges that are being upgraded have Meggitt Training Systems targets on them now.

‘They are switching to computer-controlled systems, so they are going to automate a lot of their ranges to where there is one operator. It’s cost saving for the marine corps in the long run because they are not using that much manpower, whereas [before] you had 25 or 50 marines [manning the targets], now you have one marine running a computer.’

Meggitt can provide stationary and moving infantry targets, the latter being able to simulate walking (4-6km/h), jogging (8-10km/h) and running (12-14km/h) on flat terrain. It also offers a multi-function stationary target that can pop up with either an enemy or friendly representation, requiring judgemental actions from the firer. To enhance realism further, different effects such as muzzle flashes or sound can also be integrated.

The company also supplies mobile and stationary armour targets that can simulate a tank or other vehicles for live-fire training and qualification programmes. All targets can be controlled from a range control system (RCS) or be part of a pre-programmed scenario.

British selection

The UK has also selected Meggitt Training Systems to provide targetry equipment for the British Army Training Unit Suffield (BATUS) in Alberta, Canada. This is where the British Army carries out large-scale training exercises each year involving both mechanised infantry and armoured assets, such as Challenger 2 main battle tanks.

Barrette told MTSN that the majority of targetry equipment at BATUS is wireless and is controlled by staff using ruggedised computers.

‘All of them have been fitted with GPS tracking. Part of the reason is so that they can find the targets, but it’s also used for AAR,’ he explained. ‘We use an open infrastructure that allows the incorporation of these auxiliary systems to tie into our network.’

Tilmann Rumpf, senior VP at the US division of Theissen Training Systems, told MTSN that today’s firing ranges are becoming much more instrumented than in the past, particularly with technology such as location of miss and hit (LOMAH).

‘The US Army is pushing towards electronic scoring. You have targets in the field and you have immediate feedback to the shooter’s position, which makes live fire much more efficient,’ he explained. LOMAH uses acoustic sensors to detect a supersonic round fired from a rifle, which is then graphically portrayed on a computer display, showing either a miss or hit for immediate performance feedback.

LOMAH-capable targets enable quick zeroing of weapons at the beginning of a shoot, as well as accurate and efficient qualification shoots as the sensors communicate with the RCS to provide real-time scoring and data.

The only downside of LOMAH is that, as it relies on the projectile exceeding the speed of sound, it doesn’t function with subsonic rounds from 9mm pistols, or 5.56mm rounds fired from a certain distance.

Theissen can offer infantry and armour target mechanisms that are both fixed and moving. Its newest offerings include targets that are used for counter-terrorism and judgemental training. One that was displayed at this year’s ITEC exhibition in London was a hostage target system that places one moving target in front of another, the simulated hostage being at the front with the hostage-taker behind. Target providers can also integrate a capability to simulate heat signatures through thermal and low-light optics.

Another key trend identified by Rumpf is the integration of laser equipment, such as the British Army’s Tactical Engagement Simulation System (TESS) or the US Army’s Multiple Integrated Laser Engagement System (MILES), onto range targetry. This means that a target could actually ‘fire’ at a soldier, if they are wearing the requisite laser receivers that are part of TESS and MILES. If the soldier is advancing towards the target, it forces them to think about taking cover, or moving position between firing so they don’t get hit by the ‘laser ‘bullet’.

Another benefit of this set-up, said Rumpf, is that you don’t need as many people when it comes to creating a scenario. ‘Our targets would be the red force, while the blue force is being trained,’ he explained.

Keith Taylor, general manager at Cubic Range Design Services, told MTSN that some of the company’s recent work has involved linking other companies target mechanisms into laser-based trainers,
such as TESS. Cubic does not supply target mechanisms like the above-mentioned companies, but can be an integrator, and is currently the contractor responsible for the laser training devices for many militaries including the British Army on Salisbury Plain and at BATUS.

‘At BATUS, because they have a mixture of live-fire targets and laser, we’ve linked our [laser-based] system to the target mechanisms,’ Taylor explained. ‘That’s so we know where the target mechanism is geographically located, because of GPS, and we know whether it is up, exposed or otherwise, and we know whether it has been hit.’

‘Under the laser engagement system [tank crew] would be shooting at another tank, and we would know where that other tank is. But if it’s shooting at a target board in the live-fire mode, we do not know where it is currently, but we want to. We want to know where it is, whether it’s a moving target and was it hit? It’s all part of the AAR of the overall system.’

‘You’ve paid your money for your tracking system, why don’t you combine it with the live fire? The tracking system exists: we know where that tank is, we know when it fired, we know where it was maneuvering to and from in the AAR, so why shouldn’t we know when the target was up and did it hit?’

**Future systems**

As with much of the defence and aerospace world, both suppliers and end users of range and targetry systems are looking to open architectures to ease this type of integration and reduce overall life-cycle costs. For the US Army, this is the Future Army System of Integrated Targets. This provides a target system architecture and standard solution set – incorporating specifications and interface standards – for live-fire training range devices.

The most realistic type of target that you can encounter is, of course, another human being or vehicle, as that is more often than not, the type of target you will be engaging within a real operational scenario. Some manufacturers are responding to this need for smarter targets by introducing autonomous technologies, which do not require fixed installations or pre-defined routes and instead move freely.

In February, the USMC tested human-shaped robots as targets, which were capable of changing speed and direction when engaged. Manufactured by Australian company Marathon Targets, the robots can be guided through ranges using GPS and can sense objects up to 25m away using laser technology. The targets can be programmed to take a pre-defined number of hits before being killed and can give instant feedback to range controllers.

The US Army has funded similar trials with unmanned ground vehicle technology, known as the Autonomous Electric Vehicle Target. Designed to enhance training and reduce the predictability of current rail-based systems, the prototype system has been developed by Michigan-based Pratt & Miller. It can follow a GPS route autonomously, give hit feedback and has already been utilised by US Army sharpshooters at Fort Benning.

Despite these advances in robotic technology, human OPFOR will always provide the best training. Obviously it’s not possible to fire live bullets at those playing enemy in training, which is why systems such as TESS and MILES are utilised. Laser-based systems see soldiers wearing receivers, usually integrated into a combat vest and helmet cover, and weapons fitted with transmitters that detect the recoil from the weapon and ‘fire’ the laser.

Dependent on how many laser receivers are fitted to the soldier, the system can determine if they have been hit and what kind of injury they have. Integrated GPS can also determine soldiers’ positions on the battlefield. All this data is then transmitted back to an EXCON, where it can be processed for evaluation and be used as part of an AAR.

‘There are two reasons for TESS on Salisbury Plain and BATUS,’ remarked Taylor, ‘one is pure safety – you can’t have people firing live rounds at each other – and secondly, it’s because it’s cheaper than firing live rounds.’

Another provider of laser-based range systems is German company Rheinmetall. For the live simulation domain, it has developed Legatus, a family of modular systems that includes personal equipment, weapon equipment and vehicle equipment, along with communications infrastructure to integrate all the disparate parts. Rheinmetall can also provide the EXCON...
Marathon Targets provides autonomous targets that can be used for a variety of different live training scenarios. (Photo: Trevor Nash)