

IEDs: detection, disarmament and disposal



IED training plays a crucial role in combating the threat.

Improvised explosive devices (IEDs) remain a constant threat to combatants and civilians. In Afghanistan in particular IEDs endanger life and also hamper efforts to rebuild the war-torn country. **Berenice Baker**, editor of the online resource Strategic Defence Intelligence, reveals how bomb disposal experts counteract IEDs.

In Afghanistan in 2009, a total of 7,228 IED attacks were recorded and, of the 448 servicemen killed in action in the country, IEDs were responsible for 280, a figure equal to 62.5% of deaths.

The IED casualty rate has continued to rise. In September 2009, 179 soldiers were wounded in IED attacks, but this figure climbed to 388 in September 2010. Since the beginning of the conflict, more than 500 servicemen and women have been killed, and over 5,000 have been injured as a result of IED attacks.

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Bomb disposal technicians are brave, skilled and highly trained, and the details of many of the techniques they use are a closely-guarded secret, in order to prevent the information from falling into enemy hands and to reduce

the opportunity for bomb-makers to design anti-handling devices such as procedure-resistant fuse designs.

Safely rendering devices harmless depends on a number of factors, the most important of which is maintaining distance between an explosive and any people or essential amenities that might be affected by a blast.

Remote handling

The grandfather of all present-day remote-control, robotic bomb disposal devices was the Wheelbarrow,

designed by Lieutenant-Colonel Peter Miller in 1972 for use by bomb disposal teams in Northern Ireland.

Modern variants can carry cameras, microphones and sensors to detect chemical, biological and nuclear material

and relay the information to trained bomb disposal experts in order to determine the correct course of action.

One of the newest additions is the Tanglefoot, adopted by coalition forces in March 2010 and attached to 8,000 robotic bomb disposal devices deployed in the field. The system is a trip-wire mitigation device that incorporates an



A bomb-disposal technician with an IED detonator.



Talon robots are widely used.

interface kit, wire rake and mast in a simple, low-cost, universal tool to help safely dispose of IEDs and clear routes.

Talon robots are one of the most widely-deployed counter-IED technologies in use today. Developed by QinetiQ, over 3,000 of the small-tracked robots have been used in combat. The design carries a number of sensors and a robotic manipulator for the disposal and disarming of IEDs.

Harris Corporation has also developed a robotic arm incorporating haptic technology to enable soldiers to disarm IEDs from a distance with tactile feedback. Paul Bosscher, chief robotics engineer at Harris, told ABC News that the robot soldier has human-like dexterity and precision and high-fidelity control.

“The robot can cut wires, pull blasting caps, surgically defeat the explosive device and in the process save all of this forensic evidence that they use to ID who the bomb-makers are and what their bomb-making methods are,” Bosscher said.

Water weapons

Deactivation tools incorporated into disposal robots evolve to meet the nature of threats they must counteract. A relatively recent development is the projected water disruptor, which is particularly suited to deactivating modern IEDs.

Projected water disruptors use a carefully designed explosive charge to send a powerful shaped water jet inside the device in order to sever the detonation cord and render it safe. The two main varieties are the ‘Boot Banger’, so called because its highly directional jet can eject a bomb through the roof of a

vehicle, and the ‘Bottler’, which uses an omnidirectional jet to defeat circuits and expose the contents of a device for further investigation.

Laser solutions

Although robotic disposal solutions can be carried out at a distance from humans, they still put expensive, remotely operated equipment at risk. A number of solutions use lasers to deactivate IEDs from a distance without risking lives or equipment.

The Zeus laser ordnance neutralisation system (HLONS) is fitted to HMMWV vehicles and uses an industrial solid-state laser to disrupt

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devices from up to 300m away. The 10kW beam is aimed at the device causing the explosive filler to ignite and burn, resulting in a low-level explosion that is far less likely to cause damage.

Zeus has been deployed in Afghanistan since 2003 and has been used in Iraq since 2005. It can be fired up to 2,000 times a day, and can therefore be kept in theatre for longer than one-use devices or those that require reloading or resetting.

Currently, no detection technology has been able to match the traditional use of a sniffer dog as the challenging environment includes a large number of chemical compounds that mask the select few molecules being sought.

However, researchers at Michigan State University in the US have developed a highly sensitive laser that could detect improvised explosive devices (IEDs) from a safe distance.

The new method uses a laser no more powerful than a presentation pointer that can identify bombs from up to 40ft (12m) away, with the potential to extend the range to 100 yards (91m).

The system uses a method called the single-beam coherent anti-Stokes Raman scattering technique, which was originally developed for use in microscopes.

Training

Without adequate training in place, the new technologies being developed and deployed would not be used to their full potential. The US Army Training and Doctrine Command (TRADOC) is developing a prototype simulator to train combatants for the most complicated, lethal scenarios they may face in theatre.

The Enhanced Dynamic Geosocial Environment (EDGE) system trains soldiers to search for and destroy an IED, and to track and disrupt bomb-making networks by simulating the physical environments in which they might be found.

Matt Kaufman, chief of technology and integration at TRADOC, said: “Our goal is to be able to recreate the devices, people and activities [that make up the counter-IED effort] in the operational environment as accurately as possible to forces in training.”

The future

As the nature of missions and IEDs themselves change, disposal tools and techniques must evolve to remain one step ahead of bombers. The defence industry should therefore seek to design flexible solutions that not only cope with current threats but that can also be adapted to address future risks. ■