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Canadian Centre for Mine Action Technologies

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Funded by the Canadian Landmine Fund, the Canadian Centre for Mine Action Technologies (CCMAT) works with Canadian and other international organizations to enhance the mine action community. To date, they have tested and evaluated a number of now widely used pieces of mine action equipment as well as researched new techniques to further develop demining technologies.

by Susanna Sprinkel, *MAIC*

Introduction

CCMAT was established in 1998 at the Canadian Forces Base in Suffield, Alberta (Canada). Their mission is "to carry out research and development of low-cost, sustainable technologies for mine detection, mine neutralization, personal protection and victim assistance."[1] In its first five years, CCMAT has become a valuable resource for testing and evaluating the development community's newest technologies. So far, they have collaborated with Canadian industry on a number of different projects.

Product Testing

One of the most important functions of CCMAT is to guide Canadian companies through the process of developing mine action technologies. This element includes setting up and carrying out a means for effectively evaluating equipment throughout its development. As a result, a company is able to weed out inefficient equipment or to improve their designs at an early stage, saving both time and money. Initial testing and evaluation by CCMAT is conducted at three main sites: the Mine Effects Site, the Mechanical Equipment Site and the Mine Detection Test Site. Previous activities include the development of the Promac Brush Cutter and Deminer (BDM48), the Mechanical Reproduction Mine (MRM), the Binary Explosive FIXOR, and the Niagara Foot.

Promac Brush Cutter and Deminer

The BDM48 uses a revolving drum to clear heavy vegetation, tripwires and most mines, preparing an area for manual deminers. Through extensive testing, the BDM48 has demonstrated more power than previous brush cutters and has become a valuable tool in clearance efforts in Thailand. For more information on the BDM48—developed by Promac Manufacturing Limited of Duncan, British Columbia—visit http://www.promac.bc.ca/.

Mechanical Reproduction Mines

Produced by Amtech Aeronautical Limited, the MRM has become a valuable tool at CCMAT and other demining organizations for testing mechanical equipment and training deminers. For more information about the MRM, visit http://www.amtech-group.com/.

Binary Explosive FIXOR

Since its development, FIXOR has been used in major demining operations throughout the world. This binary explosive consists of two non-explosive elements that can be mixed together to form an explosive immediately before being placed next to landmines/UXO. Because FIXOR includes two separate non-explosive elements, it can be carried on commercial aircraft, making it more readily available than alternative solutions. For more information on FIXOR—produced by MREL Specialty Explosive Products Limited—visit http://www.fixor.com/.

Niagara Foot

Developed by Niagara Prosthetics and Orthotics Limited (NPO), the Niagara Foot is an injection-molded prosthetic foot that is less vulnerable to failure from fatigue than other prosthetic feet. This product has been tested by mine victims in Thailand, where results gathered by survey have reported that the Niagara Foot is not only easy to use but also requires little muscular exertion, thus enhancing mobility in the opposite leg. For more information on the Niagara Foot, visit http://www.ccmat.gc.ca/CCMATProgram/VictimAss/index_e.html/.

Research & Development

Aside from testing and evaluating mine action technologies, CCMAT also has an extensive research and development (R&D) program carried out, in part, through contracts. Ongoing R&D projects include the use of hyperspectral imaging for aerial mapping of minefields and for detecting tripwires, the use of ground penetrating radar (GPR) and thermal neutron activation in mine detection, the development of a sonar device for underwater detection, and the development of an instrumented prodder that can differentiate between rock and metal/plastic objects, thus reducing false alarms. Additionally, CCMAT has been researching the influence of soil conditions on metal detectors in order to enhance mine detection. Prototypes for many of these research projects have already been developed and are currently being tested at CCMAT facilities. Full reports of these projects can be found under the Technical Reports section of the CCMAT website (http://www.ccmat.gc.ca/).

Hyperspectral Imaging

Hyperspectral Imaging can help identify potential mine-affected areas during the area reduction survey process. The Compact Airborne Spectrographic Imager (casi), developed by Itres Research of Calgary and Defense Research and

Development Canada (DRDC)-Suffield, was able to detect surface-laid mines obscured by vegetation but has been less effective in identifying buried landmines. Consequently, CCMAT is researching the use of short-wave and thermal infrared wavebands for detecting buried targets.

Ground Penetrating Radar

In the past, GPR has only been effective in detecting large AT mines. As a result, CCMAT has been researching the necessary factors for identifying AP mines through GPR. These factors, including sensor height, polarization, soil type, surface roughness and variation in soil water content, are being investigated by Sensors and Software, Inc., of Toronto in an attempt to enhance current GPR technology. If this technology is proven effective, CCMAT will use the results of these studies to develop a handheld or small robotic vehicle-mounted GPR sensor.

Sonar Detection

Currently, a parametric sonar detection device is being developed by Guigne International Limited in order to detect landmines/UXO in flooded minefields and economically important canals and waterways. Initial trials indicated that this technology could detect munitions buried in up to 30 cm of sediment and 75 cm of water.

Protective Footwear

In order to better protect deminers from mine blasts, CCMAT and collaborating organizations have been researching enhanced protective footwear. To test this footwear, they are developing a surrogate leg and a numerical model that mimic the response of a human leg to a mine blast. The aim is to develop protective footwear that prevents catastrophic injury from the most common AP mines.

Conclusion

Since 1998, CCMAT has worked with a number of Canadian and international organizations to enhance mine action technologies. They have also helped establish the International Testing and Evaluation Program (ITEP) in order to designate a standard for testing and evaluating mine action equipment before it is used in the field. CCMAT welcomes the opportunity to assist the mine action community through test and evaluation as well as R&D. ■

**This piece was compiled from the first three issues of the CCMAT Newsletter. To obtain a copy of this newsletter, please contact Chris Weickert at chris.weickert@drdc-rddc.gc.ca For more information about CCMAT or any of the projects mentioned in this article, visit http://www.ccmat.gc.ca/.*

References

1. CCMAT Newsletter No. 1.

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