The R&D Requirements Workshop

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standard bucket parallel to the minefield. It then makes a second pass with the same bucket inserted. This second pass is made with the CT and a second Rotor sifting bucket attachment. The Rotor sifting bucket is used to sweep up and sift the collected soil to remove mines and large debris at a separate location. Although it is a time-consuming process, testing has shown this system to be very promising. Deployment to Honduras is scheduled for November 2003.

Tempest

The Tempest is another great example of an HD R&D Program success. The Tempest was specifically designed to be an affordable remote-controlled mechanical system for clearing medium vegetation, neutralizing trip wire mines, and removing metallic debris on the surface of AF minefields. It utilizes interchangeable vegetation-clearing components (flail, matching mower), and it integrates robotics to prepare the land for follow-up detection technologies. For heavy vegetation, two V-shaped chains and hardened sacrificial wheels enable it to survive AP minefield trenches. The latest version of the Tempest, the M2, is capable of cutting 4000 sq. m of two-m-rll vegetation per hour. It has been deployed in Cambodia, Thailand, and most recently in Mozambique to under Minefield Evaluation. The first five months of operation in 2001, one Tempest cleared 54,400 sq. m of land in three separate minefields in Mozambique for the United Nations Accelerated Demining Program (UNADP), while another continues to be an integral part of TMAC's mine clearance program.

MAXX

The MAXX system is a small, remote-controlled mechanical system designed to clear medium vegetation in various environments. It incorporates several COTS tools (mechanical, cutting blade, sifting fork and commercial bucket) mounted on a small commercial platform. It is ideal for clearing vegetation in hard-to-reach areas and around obstacles. The MAXX design places interchangeable heads at the head of a 360-degree rotating articulating arm providing a ‘reach’ in capability to clear vegetation ahead of the machine. This mode of operation allows the system to operate from cleared areas, reducing the risk of damage if a mine is detonated. MAXX was recently deployed and is being used in Rwanda on an Operational Field Evaluation. Early results are very promising.

Conclusion

The U.S. HD R&D Program is making steady progress towards achieving its goal of making demining safer, faster, and more efficient than current methods. Mechanical clearance equipment currently being Operational Field Evaluations has helped clear over 500,000 sq. m of land in just the first six months of 2003. The HD R&D Program is conducting new site assessments and is planning for new Operational Field Evaluations in FY2004. The results of the 2003 Annual Humanitarian Demining Requirements Workshop have been analyzed and the program execution plan has been developed for FY2004. The project engineers, logistics, and technicians working on the program have

The NVESD Process

What the Night Vision and Electronic Sensors Directorate (NVESD) does is simple. They find out what needs completing and determine what will make the biggest difference by prioritizing their funding, develop field test prototype equipment and technologies, and not all output is from pure research. For example, RDECOM CERDEC NVESD takes an existing piece of equipment and modifies it, tests and conducts field trials in a variety of "live" conditions. The cost to the host nation that requests these operational tests is minimal since all they fund are essentially the daily operations costs. Thus, the host country does not have to absorb the huge expense of development and engineering.

During the test and evaluation, performance data is collected on the technology. This information is used to change the configuration, make improvements, and even change the procedures to get the optimal benefit to the deminer from the innovations being fielded. It is this continuous path of process improvements that results in a lower, less expensive, more efficient, safer path to a mine-free world.

Of course, there is always some paperwork involved, but a visit to the U.S. Embassy, a letter of request and a phone call to the right office is all it takes to start the process of testing these technologies. Once approved, a team of specialists is dispatched to assess the demining situation and lay the foundation for future action. The tests and in-country evaluations are normally set up for six months to a year. The host country then decides whether or not that particular technology or equipment should be acquired on a permanent basis.

At the end of the evaluation, everyone benefits. The NVESD receives feedback on performance and suggestions to improve the product or technology. The host nation's minefields are cleared or mines are detected with the technology or equipment on loan. The operators on the ground get hands-on experience and training with new and updated technologies. The company or manufacturer of the technology collects invaluable marketing and performance data for future sales of more appropriate and affordable tools targeted to address the landmine crisis.

Inside the Workshop

The workshop has evolved over the years and has grown in participation. The number of countries supported by the United States is well over 40 and representatives from most of these countries have, at one time, attended one or more of these workshops. The past few years have averaged attendance from 16 to 18 various country demining programs. Others have also attended as guests from countries, such as the People's Republic of China.

The mix of attendees is also critical to the success of the workshop. In addition to all the major non-governmental organizations (NGOs) involved in demining, there are many military
This hands-on field visit is the ultimate opportunity to see, touch, bear and feel the possible solutions to any demining challenge. It is no longer just a picture on a briefing slide, the attendees are able to see the equipment up close and, in some cases, operate it themselves to get a full and complete understanding of the improvements being made and the results that may come with these improvements.

- **Mines Advisory Group (MAG)** emphasized criteria they considered in acquisition, such as being robust, being easy to use and repair, having access to parts, and being transportable across bridges in austere environments.

### Getting Good Ideas

The workshop is the biggest and best opportunity for country demining programs to focus their needs on technology as a solution to their biggest challenges. The staff of NVESD also harnesses new and innovative ideas by a variety of other venues and forums.

**Site Assessments**

During visits to minefields around the world, NVESD engineers and scientists get a firsthand look at the conditions and environments within which deminers operate. This experience enhances the technology solution and ensures a full understanding of the operational field conditions that will challenge their technology improvements.

### Conferences and Workshops

Nearly all of the staff at the NVESD HD R&D team travels to where the solutions may be found. Whether it is a technical workshop, field demonstration, commercial demonstration or scientific presentation, they are busily building the foundation for the next good idea or next breakthrough innovation. As the attendees of the workshop found out, the staff at NVESD is eager to listen and also ask all the right questions. The response to their demining challenges seem to demonstrate that clearly.

**Website**

The attendees at the workshop were also reminded that all the equipment and technologies they saw were also described in great detail on the NVESD website at www.humanitarian-demining.org, along with many other items of interest.

The website has recently been updated and now offers the following:

- Catalogue of available technologies
- R&D publications and reports
- Development process description
- Global landmines background

Online demining is also encouraged to leave feedback on how the site addresses their issues. Finally, the current video of R&D efforts available and underway may also be ordered online through this site.

**No Silver Bullets**

Anyone engaged in creating workable, pragmatic and cost-effective solutions for mine detection and clearance knows there is no "silver bullet," or any one solution that solves every problem. There are, however, a considerable number of areas in our current methodologies where the application of science can make demining safer, faster and less expensive. These solutions do not come from a laboratory but have their foundations in the daily routines of deminers looking for a better way to do their jobs. Getting these ideas and challenges to the people at NVESD, who have the skills and experience to address them, is the first step toward achieving advances that can quickly lead to a mine-safe world.

The value of these workshops is clear. At the close of this year's event, Hendrik Ehlers, CEO of MGm, closed the session by saying, "I am fairly certain I speak for most here in expressing gratitude for this very special event. It is different from anything else in the world and unique in many aspects. What you are doing here has a direct beneficial outcome into what we are doing in the field."

*All photos courtesy of the author.*

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