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Digger DTR

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Vegetation Clearance Equipment: Huge Potential in Productivity Improvement

Upon development of its D-1 vegetation clearance vehicle, DIGGER DTR (Demining Technologies) has successfully responded to many of the demands of the demining community. The second generation, the D-2, will feature several new upgrades and is expected to appear on the market by 2005.

by Nathan Kunz

The Company

DIGGER DTR, a Swiss humanitarian non-profit organization with a mine clearance background in Croatia and Cambodia, has been active in the design of demining assistance tools since 1998. Its aim is to assist mine clearance personnel by developing tools to secure and accelerate mine clearance activities.

DIGGER DTR is based in Tavannes, Switzerland, an area known for its expertise in the machine industry. Two mechanical engineers and three electronic engineers compose the design team. Ten persons with different technical backgrounds handle production, while several more deal with the administrative and organisational tasks. Most of these highly motivated team members are volunteer workers, which allows DIGGER DTR to provide cost-effective solutions to the humanitarian demining world.

The development of this organization has been financed by private donors and sponsors. Partnerships with the Swiss Foundation for Mine Action (FSD), the Swiss Army and two universities of applied science have helped DIGGER DTR during the development of the D-1, its first vegetation clearance vehicle.

The D-1 Concept

Our current product, the D-1, is a lightweight, remote-controlled vegetation clearance vehicle for mine clearance assistance (MCA) work. Deminers in the field stressed the need for this kind of machine. The following extract of a Geneva International Centre for Humanitarian Demining (GICHD) study shows the impact of vegetation clearance in demining:

"The views of practitioners in every programme consulted for the purposes of the study reflected the assessment that vegetation clearance is one of the most time-consuming elements of the clearance task. While the time taken to conduct vegetation clearance varies by scenario, it is clear that, overall, improving the speed of vegetation clearance offers a significant increase in overall mine clearance productivity."1

DIGGER DTR began with the design of the D-1, based on the following requirements given by the FSD; the vehicle must be:

- Able to cut all kinds of vegetation (up to a 10-cm-diameter trunk).
- Able to withstand the denudation of an AP blast and fragmentation mine, or unexploded shell up to 82 mm in diameter.
- Small and lightweight enough to be transported on a small truck on roads of poor infrastructure.
- Remote-controlled, to guarantee full protection of operating staff.
- Designed and constructed using simple technology, so that reparations are possible with the available means of a developing country.
- Inexpensive to manufacture and run.

According to these requirements, DIGGER DTR began the design of the first prototype, the D-1. One of the biggest challenges for the development team was the use of simple technologies. The use of any high-tech components in the D-1 was banned, which allowed the DIGGER DTR vehicles to be easily repaired in the field.

The track design is the best example of this concept. The tracks on the D-1 were developed specifically for this application, because no existing tracks of this dimension offer enough detonation resistance. Moreover, commercial tracks could not be repaired in the field. The tracks that were especially designed for the D-1 offer a good resistance against explosion and can be repaired in the field by simple means.

Another challenge was for the vehicle to maintain a good resistance against fragmentation mines, while limiting the weight. The weight of the machine is a determining factor for such a vegetation clearance unit. A lightweight vehicle can be carried to almost every minefield, even on poor road infrastructures. A second important factor is that small vehicles do not damage the soil or local environments during the cutting of vegetation. The GICHD study shows that the weight and dimensions of future vegetation clearance equipment will be increasingly important to spare soils. Some mechanical methods for clearing vegetation can have a detrimental impact on local soil conditions and the wider environment. There is a growing awareness within the mine action community that future demining technologies should take into account not just the clearance requirement itself but the future productive use of contaminated land.2

The four tons of the D-1 are less than the weight of an agricultural tractor; therefore, the soil will not be damaged during vegetation clearance. This weight also allows the D-1 to be transported on a small truck, even on poor roads.

Technical Description

The D-1 consists of an armoured, V-shaped hull, which gives it a very good resistance against anti-personnel mines (APMs) and fragmentation mines. The vegetation cutter fixed to the front (mulcher or flail) allows it to cut trunks up to 30 cm in diameter. The mulcher unit operates at approximately 500 rpm, using 44 adjustable chisels to remove thick vegetation and trees. The minimal cutting height is two cm above ground.

To increase cutting depth, a flail unit has been developed after the first tests in Albania. The rotor operates at 500 rpm, using 42 claws. A hardened steel hammer is attached at the end of each 50-cm-long chain. The cutting depth is mutually adjustable from plus five cm to minus five cm from ground. By cutting the vegetation, the flail removes trampolines and reduces risks for deminers by neutralizing mines.

The hydrostatic transmission is powered by a 2,706-cubed-cm Kubota diesel engine (46 kW/62 hp). The vehicle is remote-controlled from behind a protection shield from a distance of 50 m to over 300 m. The average working speed in light vegetation is 2,000 sq m per hour; in dense vegetation and heavy soil, the speed is 680 sq m per hour.

DIGGER D-1 working on the Albania-Kosovo border.

DIGGER D-1 carried by a small transporter.
The Information Management System for Mine Action (IMISMA) V3.0 was released June 2003, and early experience with the system has been positive. Sollent features are summarized, including geographic information system (GIS) capabilities based on ArcView GIS.

Recommendations include operations-oriented training focusing on reporting information from IMISMA. The following article describes the new version and discusses local customization. The authors also describe upgrading to IMISMA V3.0 based on experience as IMISMA administrators and trainers within their organizations.

by Mohammed Qasim, MACA and John Walker, former trainer, U.S. DoD HDTC

Introduction

Information technology (IT) is a support function within the bigger world of humanitarian mine action. IT managers need to use data and information about mine action to improve and speed the process. Information systems are crucial for increasing efficiency and effectiveness. The biggest challenge is to develop systems that are powerful, reliable, and cost effective.

This article describes the development of an information system for the Demining Action Program (DAP) of the Swiss Mine Action Committee (SWI). It focuses on a new system implemented in 2003 to replace an older system.

Methodology

The DAP is a unique program that operates in countries with a high risk of landmines. The program focuses on training and equipping deminers to work in the field. The DAP has a specific need for an information system that can support the training process and improve efficiency.

The system was developed in cooperation with the Global Information and Communication Technologies (GICT) program of the Swiss government. The GICT program is responsible for developing and implementing information systems for humanitarian mine action.

The system was developed using the ArcGIS platform, which is a powerful and flexible tool for geographic information systems. The system is designed to be user-friendly and easy to use.

The system includes a variety of features, including:

- A data entry form for collecting mine action data
- A data management system for storing and retrieving data
- A reporting system for generating reports
- A training management system for managing training activities
- A financial management system for tracking and reporting financial data

The system is designed to be scalable and can be adapted to the needs of different mine action programs.

Results

The system has been implemented in a number of countries and has been well-received by users. The system has improved efficiency and effectiveness in mine action programs.

Conclusion

In conclusion, the system developed by the Swiss government for the Demining Action Program is a powerful tool for supporting mine action programs. The system is flexible, scalable, and easy to use.

The system is an example of how information technology can be used to improve the efficiency and effectiveness of humanitarian mine action programs.

by Maryanne John, MACA and John Walker, former trainer, U.S. DoD HDTC

Introduction

The D-2, a small, lightweight, multi-functional IT equipment, was developed as part of the Swiss Mine Action Committee's (SWI) program to assist mine action organizations with their operations.

The D-2 is a compact, portable, and versatile tool designed to perform a wide range of tasks in a mine action environment. It is ideal for use in remote or difficult-to-reach areas where traditional equipment is not feasible.

The D-2 is designed to be used by mine action personnel to carry out a variety of tasks, including:

- Marking and mapping minefields
- Clearing debris and obstructions
- Removing mines and unexploded ordnance (UXO)
- Assisting with mine awareness and education

The D-2 is lightweight and easy to carry, making it ideal for use in areas with limited resources.

The D-2 is designed to be user-friendly and easy to operate. It is also durable and able to withstand harsh environments.

The D-2 is powered by a rechargeable battery and is capable of operating for up to 5 hours on a single charge.

The D-2 is also equipped with a built-in GPS receiver, allowing users to track their location and navigate through minefields.

Conclusion

In conclusion, the D-2 is a valuable tool for mine action organizations. It is lightweight, versatile, and easy to use, making it ideal for use in remote or difficult-to-reach areas. The D-2 is also durable and able to withstand harsh environments, making it an ideal tool for use in mine action operations.

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