The Landmine Menace: The Great Humanitarian Challenge

Thomas Himmler
Institut Dr. Förster

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The Landmine Menace: The Great Humanitarian Challenge

On the basis of the conflict scenarios and the resultant threat, it is necessary to develop methods and means to eliminate the threat. Simply using available tools is not always easy. What is necessary is to optimally combine existing detection and clearance methods and, if necessary, to develop new, promising technologies in a targeted manner.

by Thomas Himmler, Institut Dr. Förster

Introduction

Lien Ta had just started to repair the irrigation ditch in his field when an explosion shattered the tranquility of the early morning. One small step on the wrong spot wiped out the life of this farmer. A family lost a member of its community and children lost their father and the security of their existence.

Regardless of whether a farmer sells his field in Vietnam, a woman in Angola fetches drinking water from a well or children in Bosnia go to school, they should all be able to do this on safe ground and on safe footpaths. But this is far from the case. Even years after conflicts and wars have almost disappeared into oblivion, the menace from landmines and UXO in these areas is extreme.

The United Nations is aware of over 60 affected countries in which the civilian population is still constantly threatened by hidden mines. Estimates extend from 60 to over 100 million mines laid during times of war and conflict. In many areas, the number of items of UXO still substantially exceeds the number of mines.

Besides the resultant personal threat to the individual, this also block traffic routes on land and water. Urban areas are considered risky and unsafe, and valuable agricultural land necessarily lies fallow. But this is not all. Landmines and UXO and the contamination of vital structures are delayed or prevented to an unacceptable extent. It is only an immediate and targeted solution to the problems that can provide a quick remedy and make a contribution to the urgently required restoration of a situation in which the public can live their lives safely in former conflict areas.

Detection

We must first fundamentally differentiate between surface and near-surface threats and the threat posed by UXO, frequently at great depth. The criterion of clear and, thus, reliable signal indicators has absolute priority. In addition, other essential deciding factors include how easy the method is to apply and its efficiency and economy in use.

Near-Surface Detection

In the majority of cases, metal detectors based on eddy-current technologies are used for near-surface detection today. Regardless of whether they are handheld, individual sensors or large-area scanners, which are sometimes designed as robots, they are mainly used for mining areas, grass fields, landmines, and UXO in these areas. The United Nations is aware of over 60 affected countries in which the civilian population is still constantly threatened by hidden mines. Estimates extend from 60 to over 100 million mines laid during times of war and conflict. In many areas, the number of items of UXO still substantially exceeds the number of mines.

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Minfield, Malawi

Where are the Problems?

Well, minefields may be laid anywhere: not only level and easily accessible areas may be mined, but also slopes, road embankments, wooded areas, desert areas or beach areas, even front yards. One other factor is extreme infiltration with rainwater or water saturation, which must be clearly detected. In addition, many of the areas are covered by vegetation that grows back constantly and has a subjective constant change as the result of erosion or floods.

The detection tasks required will largely be performed by metal detectors until the above-mentioned methods and method combinations are advanced enough to a stage at which they can be introduced on a large scale. Here we will further advances have been made in recent years.

The continuous Comeback Wave (CRW) and Pulse metal detectors in use worldwide have undergone substantial development. They are thus still the method that most widely covers the listed requirements of practical use. In regard to the metal detectors, we shall explicitly illustrate further development by way of example of the Minex.
The Versatile Tank-like Flail

The University of Rhode Island may soon get to test a new minefield clearance vehicle. With its sturdy frame and versatile design, this machine may be suitable for areas like farmlands.

by Harry Einstein, PE

NERETCO Engineering in Rhode Island has developed a new self-contained, affordable, rider-controlled machine for safely disarming land mines in farmlands and other accessible areas. The operator is well protected by heavy steel plates and sits ten feet behind the mine discharge, the force of which is confined and directed away from the operator. The heavy steel structure of the machine is designed to withstand the explosive force of an AP mine. Should AP mines be encountered, some damage to the machine could result, but the operator should be unharm ed. The machine is designed to clear a four-foot wide path and to clear one acre in two to four hours depending upon the ground conditions. If desired, the described machine can be remotely op erated. This operation would be desirable where AP or heavy concentrations of UXO are suspected.

When not needed for mine elimination, the machine can be used to add-on accessories, serve as a churn cutter, a till ing or cultivating machine, a small tractor, a portable hydraulic supply for other machinery or as a portable electric supply with the addition of a generator. Some of these operations can be performed at the same time as mine clearance.

The design features three wheels and a narrow track providing for operation on uneven ground. The machine is relatively simple and could be manufactured in countries with limited facilities. The machine can be driven on ramp boards on a trailer bed or a medium steel open or closed truck. Most if not all countries would permit such mobile machines to be driven on paved or unpaved roads for short distances from one area to another.

The mine discharging section shows a revolving square or round tube to which are affixed rows of nozzles of hinged, flat pounding plates or heavy chains which fly outward by centrifugal force and repeatedly strike the earth. The hinged plates are flat, but contoured plates could be more efficient. Additionally, spikes could be incorporated on the outer plate of the string that could help break up the soil. Rotation is provided by a hydraulic motor. The power source is an internal combustion engine driving a hydraulic pump. Hydraulic power is also supplied to the two hydraulic motor wheels that provide (motive) power. Individual valve control of each hydraulic motor wheel provides for speed and steering. The permitted wheels are pneumatics with heavy thrusts. Automotive type chains may be used to increase traction. A second driving arrangement is the use of tracks instead of wheels. An alternativ e to pneumatic wheels or tracks is all steel wheels with steel ears that were common on very early tractors.

The machine is supported by the two wheels, or tracks, and a single rear free swiveling wheel that is designed to

be raised or lowered hydraulically as required by the operator for the desired depth of engagement with the earth. Several accessories could be used with the basic machine. It is also possible to have the machine pull a tiller or a cultivator while clearing minefields at the same time. A simple addition is the installation of a row of tires or a cultivator installed on the underside of the machine behind the driving wheel or tracks. If such operation is desired, a larger engine will probably be required, depending upon the land conditions. The operation and depth of entry would be under the control of the operator.

Safety of the operator has been provided for. The revolving mine discharging rotating mechanism is housed in heavy steel plates with openings in front for discharge of earth andexploded mine fragments. The small opening between the rotary mechanism and the wheel housing, which is also housed in heavy steel plates, is covered by a heavy steel wearer-flexible blanket. In addition to the heavy steel plates, the operator sits above a heavy steel floor. Additional protection can be provided by a heavy reinforced plastic enclosure as needed.

Contact Information
Harry Einstein, PE
98 Telford Drive
Kingston, RI 02881
Tel: 601-792-9139
E-mail: einsteins@cox.net

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