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Mechanical Demining: From 1942 to the Present

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The challenge remains: With a myriad of priority areas to be funded, resources are limited. Clearance itself relies heavily on industrialized world technology and funding. Paradoxically, it costs as little as US$3 to produce a landmine yet as much as $1,000 to remove it once it has been emplaced. Mozambique has benefited from financial and technical support from the donor community; however, due to the country’s low level of economic development, Mozambique’s needs always exceed the resources available.

It is vital to mention that the Convention has played a very important role in limiting the proliferation of anti-personnel mines; however, actual mine clearance is an essential component of the solution to the global problem.

Contrary, the flow of funds from donors for clearance activities has declined year after year. In the case of Mozambique, different international nongovernmental organizations have left the country or are in the process of phasing out their activities. This situation is of great concern because landmine-affected States Parties are faced with insufficient funding to continue demining activities and, thereby, fulfill their Ottawa Convention deadlines.

What is the Next Step?

Article 6 of the Ottawa Convention states that each State Party has the right to seek and receive assistance for the fulfillment of its obligations and to request assistance in case of Mozambique, the Convention’s deadline is not met.

The Mine Ban Convention will be judged on the basis of States Parties’ capacity to manage clearance deadlines. Although the government of Mozambique has been increasing its funding to mine action, mine clearance has proven costly, and external funding is crucial for Mozambique to reach its final goal.

It is clear that the failure to meet the deadline means that Mozambique, and many other countries, will need more resources. Mine action must compete for the same resources as other problems, namely poverty, endemic diseases, and the effects of high oil and food prices. This battle of priorities has put immense pressure on donors and States Parties, and mine action is likely to lose the tug of war for funding.

As Oliver Vodon, then-President of the International Committee of the Red Cross, mentioned on his statement to the 8th Meeting of the States Parties in Jordan in 2017, “every day during which the Convention’s deadline is not met is a day in which civilians are put at risk. The Mine Ban Convention will be judged on the basis of States Parties’ capacity to manage clearance deadlines in a way which maintains the visibility of the Convention and creates maximum pressure for clearance before the deadline or within a realistic, well-planned and adequately funded extension period.”

As such, the necessity is to look at different countries, their level of contamination, and the resources available to assist nations in safely and clearly clearing their lands of these deadly weapons. Mozambique benefited from the recent baseline assessment conducted by The HALO Trust. The results of the survey informed the five-year strategic plan (2008–2012) written to guide the implementation of mine-action activities during the extension deadline. According to Mozambique’s national program, an estimated US$19 million is needed every year for more than six years in order to meet the Convention’s deadline. Efforts undertaken to release cleared land to communities have had positive socioeconomic consequences. Communities and their inhabitants are the ultimate beneficiaries of land release. In areas still considered affected, the presence of landmines and UXO has a major negative impact on communities. Completing mine clearance will clearly benefit the communities by allowing the citizens to work on their land, and therefore contribute to the reduction of poverty.

It is time to look into the problems that most States Parties have encountered along the 10 years of the treaty’s existence. Collective analysis of each state’s challenges and shortcomings will help provide adequate information to support reaching the goals the Convention was ultimately set to achieve. For countries like Mozambique, the extension must be granted and coordinated, and donor support should follow to enable the implementation of the national strategic program.

States bear the primary responsibility in designing and implementing strategies, plans and programs for mine action within their borders. However, many States Parties like Mozambique are still in need of assistance. The United Nations Development Programme, other international organizations, nongovernmental organizations and governments able to do so should play a vital role by mainstreaming mine action into their activities in mine-affected countries. In addition, local capacity building should be at the center of every effort to ensure sustainability of mine action in these countries.

The challenge is great, but there is an equally great opportunity to attain the goals of the Convention through coherent, coordinated and collective action.

Lodhammar: Mechanical Demining: From 1942 to the Present

Mechanical Demining: From 1942 to the Present

Although demining machines have been in existence since 1942, they were not used in the field of mine action until after the early 1990s. Demining machines were initially only used by the military. With the growing number of casualties stemming from landmines, especially among civilians, it became necessary to employ machines for humanitarian purposes. From the first demining machine constructed in early 1942 to the present, tremendous improvements have been made.

by Pehr Lodhammar
( Geneva International Centre for Humanitarian Demining )

The first demining machine is believed to have been developed by Major Abraham du Toit, a South African soldier and engineer. In early 1942, he was sent to England to refine a demining prototype he had constructed in South Africa.

Before leaving for England, du Toit discussed his ideas with Captain Norman Berry, a British mechanical engineer. Berry conducted his own unofficial experiments with flails in Libya before providing the results to another British officer at an enemy workshop in Egypt. The collaboration resulted in the development of the Matilda Scorpion, a Matilda tank fitted with a rotor mounted on two arms at the front. The rotor carried 24 flails and was driven at 100 revolutions per minute by a 105-horsepower Ford V8 engine. A second engine was fitted with an armored box mounted on the right side of the tank. This box included space for a crew member, who operated the flail.

A number of these vehicles were produced and became operational in October 1942 when they were used in the Second Battle of El Alamein (23 October to 5 November 1942). Although the clearance speed was slow, the Scorpion operators were able to conceal the machines from German soldiers because of the huge dust cloud they formed; however, the dust cloud also blinded and afforded the breathing of the drivers, so crews had to wear gas masks in order to breathe.

These flails were not as successful as expected. They were unreliable, with frequent breakdowns. Problems were also encountered with the heat and dust, a problem encountered with flails today. The first Matilda Scorpion was followed by several similar machines such as the Mark II, III, IV and V versions of the Scorpion. Version IV was mounted on the Sherman tank.

Other flails that followed included the Matilda Baron and the Sherman Crab. The Crab ran on the tank’s main engine, had 43 flail hammers and included a rotor for cutting hedges to prevent the flail from getting entangled. The flail also had a mechanism to ensure that it followed ground contours and had extra protection in the form of a blast shield. This flail did not clear all mines and could only move at very low speeds; however, the Crab was used during and after the D-Day landings and allowed the Allied Forces to advance through the German minefields.

Up to the end of the 1980s, demining machines were only used by the military. In the early 1990s, however, the need for demining machines for humanitarian purposes was recognized, and the machines were introduced into countries such as Afghanistan and Angola. Initially, military carriers were used, but later purpose-built carriers were developed. Early machines were often clumsy, unreliable and underpowered. The clearance results also fell below the minimum United Nations’ requirement.

The revolving drum and chains on a Matilda Scorpion flail tank, 17 April 1942. Photograph courtesy of Imperial War Museum.

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The revolving drum and chains on a Matilda Scorpion flail tank, 17 April 1942. Photograph courtesy of Imperial War Museum.
Present

Today, varieties of demining machines are available on the open market and are much improved. Some have been produced in relatively large numbers, while others have been made in limited series or only as single machines. The Geneva International Centre for Humanitarian Demining’s Mechanical Demining Equipment Catalogue 2008 includes 42 different demining machines; however, there are also several others being developed, excluding those that are locally constructed. Local demining ma-

chines were not included in the catalog since they only produce very small quantities, i.e., only one or two machines.

Demining machines include various types of mine-detection machines, ground-preparation machines and mine-protected vehicles. There are foot, roller and combiner systems. In addition, there are double flails, rollers, rock breakers, soil disrupters, mowers, brush cutters, slackers and magnets. There are also combinations of the above-mentioned tools. Cultivators are now protected with state-of-the-art ar-

nor plating and outfitted with air conditioning.

Standards

International standards for mechanical demining involve rigid testing of demining machines. In addition, the market is demand-

ing complete, after-sale service packages and delivery of spare parts within days to some of the remotest locations in the world.

The practice in the demining community has been that all mechanical demining be followed by manual deminers or mine-detection dogs; however, as the quality of available machines improves, this is changing. In June 2008, two Comité Européen de Normalisation Workshop Agreements for mechanical demining were published: one for quality management and assurance/quality control for mechanical de-

mining, the other for follow-on processes, af-

ter the use of demining machines. The latter states the following: “Follow-on operations after technical survey may not be required if the machine does not encounter a hazard, and has been proven capable of detecting and destroy-

ing similar expected hazards in similar condi-
tions. If a machine does encounter a hazard, then follow-on will be required in all but ex-

ceptional cases. The specific follow-on activity can only be determined at the site—and would normally be either by manual demining or mine-detection dogs. The specific area for fol-

low-on operations will be determined on the site on a case-by-case basis.”

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GICHID Offerings

Three more International Mine Action Standards are under development, in addition to IMAS 09-50 Mechanical Demining. The new IMAS will include operator safety, quality management and the application of mechanical demining machines.

In 2008, the GICHD published the seventh edition of the Mechanical Demining Equip-

ment Catalogue and A Guide To Road Clear-

ance*. The Mechanical Demining Handbook was published in 2008. Beginning in 2009, a mechanical demining reference library will be available on the GICHD Web site. The refer-

ence library will include most documents re-

lated to mechanical demining that have been published over the years and will be available to all interested in mechanical demining.

As seen above, demining machines have evolved enormously since 1942. The GICHD will continue to follow and assist in the fur-

ther development and improvement over the coming years.

See Endnotes, page 112

Odor-detection Conference

The GICHD organized an international conference, “Odour Detection by Animal Research and Practice,” held in Oslo, Norway, in mid-June 2008. Around 120 participants attended including practitioners and experts involved with animal-detection systems particularly those with animal systems for hu-

manitarian demining detection. The purpose of this unique meeting was to encourage those with expertise in this area to share it and to highlight the research findings that are appli-

cable across a range of animal species search-

ing for various target odors. End-users—such as humanitarian-demining administrators, police, customs officials, defense specialists, and search-and-rescue organizations—were also represented. They discussed their prac-

tical experiences and contributed views on how animal detector systems can best meet the many detection requirements. The outcomes of this meeting can be found at http://snuprl.com/45463.

New Publications

The GICHD has recently released a num-

ber of new publications. These have included A Guide to Road Clearance, which aims to contribute to the development of safe, more ef-

cient and cost-effective road-clearance sys-

tems by providing recent examples, data and methodologies from the field. Along with the information gathered in this guide, the GICHD has gathered supplementary technical data through visits to road-clearance projects in four countries.

The Guide to Marking and Fencing in Mine Action Programme has also been developed. Based on research conducted by the GICHD on 15 mine-affected areas and territories, the guide describes the extent to which marking and fencing are carried out in existing mine-action programs. It assesses the impact of different methods of marking and fencing of hazardous areas. It also discusses the con-

tribution of medium- and long-term marking towards casualty reduction in situations where clearance cannot be conducted immediately.

See Endnotes, page 112