

DEMINING NATIONAL STANDARD 09.50

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Mechanically assisted clearance in Mozambique

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Introduction

Humanitarian demining is a relatively new activity. It was not until the late 1980s that the increasing global landmine problem raised the international community's consciousness, and generated an effort to remove landmines worldwide. This awareness caused an increased number of international organizations becoming involved in humanitarian demining, and with them, there has been a search for methods of increasing the clearance rates and at the same time improving the safety for the personnel involved in demining activities. Mechanical machines have increasingly been used to assist in the preparation of the ground and removing vegetation and tripwires. These machines have become essential tools for humanitarian mine clearance operations and when they are applied as part of an integrated structure with the associated organizational structures, logistic and maintenance support, they can act as a force multiplier to ensure increased production rates.

Mechanical equipment are rarely used as stand-alone systems and there is still a requirement that they are followed-up by either manual deminers or mine detection dogs. In addition, they shall be subjected to the same quality assurance and quality controls as described in NS 07.40 and NS 09.20.

This guide has been prepared in the absence of a specific IMAS and will be revised when the IMAS 09.50 Mechanically assisted clearance is issued.

Guide for the use of Mechanically Assisted Mine Clearance Machines

1. Scope

This document is a guide on the application of standards to describe the general use of Mechanically Assisted Mine Clearance (MAMC) machines and their application to demining operations in Mozambique. Other National Standards may be developed pending the release of IMAS 09.5.

This NS does not deal with the manufacturing of machines to assist demining operations and it assumes that machines will be utilized in accordance with the manufacturer's specifications. Equipment testing and evaluation is covered in IMAS 03.10 (Not yet issued)

2 References

A list of normative references is given in Annex A. Normative references are important documents to which reference is made in this NS and which form part of the provisions of this NS.

3 Definitions

A list of terms and definitions used in this standard is given in NS 04.10. The terms and definitions in this NS are in compliance with IMAS 04.10 (Glossary of mine action terms and abbreviations) and all terms that have been developed locally have been captured in NS 04.10 (Glossary of mine action terms and abbreviations in Mozambique)

4 Concept of operations

MAMC equipment includes a variety of ploughs, rakes, flails, rollers, rotating tillers and excavators, will often significantly reduce clearance costs and increase production rates when incorporated correctly into the overall demining process. Specifically, mechanical equipment can be utilized as a tool for rapidly determining the extent of the minefield supporting area reduction tasks or for the preparation of the ground and removal of vegetation and tripwires. The introduction of machines into the process must however be controlled and the performance measured and data is recorded to determine the capabilities of each mechanical option.

Inherently machines can redistribute broken or damaged mines, parts of mines and UXOs and in some cases undamaged or fully functional mines. In most cases the damage caused to the mine, if it is not detonated (by the flail or roller) will render it incapable of operation; however, in some cases the explosive chain may not have been broken. When using mechanical machines there is a requirement for the removal and destruction of the mines at the completion of the task. All machines require another QA process to be applied to the soil they have worked on to ensure 100% clearance is achieved. Undulating ground can affect the coverage that a machine can do. Mechanical machines will not be used as a primary means of clearance, and shall be augmented by a QA process to ensure the area is free of all mines and UXO to the predetermined depth. Demining agencies shall ensure the machinery that is utilized has a thorough secondary process which provides 100% clearance.

5 Guiding principles for the use of mechanical ground preparation

Machines will be used in accordance with the manufacturer specifications and although the parameters for each system will vary, however each system in Mozambique shall:

- a) Have all the area (ground) the machine works on subsequently worked on by a secondary process. No ground shall be declared safe until this secondary process has been conducted and undergone internal QA. For example if the soil is removed to another location in the first process then this soil shall be subject to a secondary process e.g. sifting, tilling, MDD, etc.

- b) Have well defined Standard Operational Procedures (SOP) that describes the deployment and integration of the machines into demining operations. These SOP shall comply with Mozambique NS.
- c) Have specifications that are clear, unambiguous, and easily understood that outline the machines capabilities in order to enable IND to access the machine for accreditation and licensing. These specifications shall include proven safety distances for observation in the open. The specification shall also list the construction requirements for protected observation e.g. sandbag bunker, shields etc.
- d) Be safe for the operator and cater to the specific mine threat and terrain conditions.
- e) Have the organizational structure to integrate with other mine clearance tools and organizations as required.
- f) Be designed and structured in such a way that it speeds up mine clearance operations as a supporting tool in a cost-effective productive and safe manner.
- g) Be sustainable in the area of operations by integrating administrative, logistical, and maintenance support.
- h) Take into account the local infrastructure i.e. roads, bridges, traffic, availability of fuel and workshop facilities.

6 Deployment of machines

The deployment of machines into Mozambique should be done in two phases:

- a) Phase 1 – Preparation Phase
 - Manufacturing and delivery of the mechanical equipment to Mozambique.
 - Identification and establishment of adequate maintenance/repair facilities.
 - Recruitment and training of local staff.
 - Evaluate the operations of the mechanical systems to identify and demonstrate their capabilities and to conform to the SOP. A license will be issued to the Contractor in accordance with NS 07.30. A license may be issued without the need of a trial if the agency provides sufficient evidence of performance from other Mine Action Programs (MAP). If IND determine a trial is necessary, once the trial has been successfully carried out a license will be issued. This evaluation will also include the assessment of the machine into joint operations with manual deminers and mine detection dogs to achieve integrated operations.
- b) Phase 2 – Operational Phase. The deployment and use of the machines as part of the total clearance capacity in Mozambique.

7 Mechanical system evaluation

The aim of the evaluation is to categorize mechanical mine clearance systems capabilities in varying soil and local mine conditions with the aim of fully integrating this equipment into demining operations in Mozambique. The following in-theatre evaluation is required before machines are licensed to work in support of all the demining organizations. During the evaluation and trial period the following tests will be carried out:

- a) The initial evaluation of machines will be conducted in areas free of mines, for ground preparation and vegetation removal.

- b) Deploying the machine into controlled minefields and assessing its capabilities to withstand mine detonations and the wear and tear associated with ground preparation operations.
- c) The machines will also be evaluated for reliability and of ease of maintenance, along with the staff and equipment to perform these functions.
- d) Evaluation will be an ongoing process; live deployment will commence only once the machine is capable of fulfilling all required tasks in a safe manner.
- e) The details of the evaluation process will be determined according to the machines' specifications and capabilities.
- f) During the evaluation process the intention is also to finalize and test the SOP for the utilization of the machine.
- g) The Contractor should make all necessary modifications to the machines following the result of the trial.
- h) IND shall not be held liable for any damage to any machine or to any of the Contractor's personnel during any trial or actual operations.
- i) Written SOP will detail mechanical ground preparation procedures, safety precautions and the appropriate integration manual and explosive detection dog's clearance drills.
- j) During the evaluation and deployment of the machines they should be followed-up manually to monitored and document what is found behind the machine. This information will assist in the provision of both data for the evaluation and quality control for the demining site. It will also provide documented evidence of the machines capabilities.
- k) This empirical statistical data collected over the initial evaluation period should include data on buried and surface laid mines, surface irregularities produced by rocks or ditches and maneuverability in different soil types. This data should give a high degree of reliability to the conclusions of the report and recommended future use of the equipment.

8 Method of operations

Machines will carry out the following tasks:

- a) Prepare the ground in order to create a safer environment for manual deminers and mine detection dogs to operate in. During this process the machine must be capable of primarily removing all vegetation, disrupting and removing all trip wires and as a secondary function destroying or uncovering mines.
- b) The greatest potential for mechanical machines is area reduction. An important task in which machines can greatly assist is determining minefield boundaries in Mozambique. Mechanical machines can work in areas with a low mine density and are thus extremely suitable to detect mines while conducting ground preparation. MDD resources can then be tasked to work on the ground the machine has prepared. This is an efficient method of reducing a suspected mined area (SMA) and determining the accurate boundaries of the mined area which can then either be demarcated and left or allocated as a clearance task in due course. The impact the machine has is that it removes/reduces the vegetation and tripwire threat to enable MDD to work more effectively. In essence the machine has a multiplying affect on potential production.
- c) Clear access lanes in the event of emergencies by driving the machine into the dangerous area and effecting a level of clearance that will assist the follow up teams to move faster.
- d) Conduct quality control checks by traversing over previously cleared land and to uncover or detonate any previously undetected mines or UXO or pieces of munitions.

- e) Mechanical machines are extremely suitable to indicate the absence of mines in an area, but either manual deminers or mine detection dogs must follow it up. It is often possible to eliminate areas containing no mines much faster than by manual mine clearance.

9 Safety

When machines, mine detection dogs or manual deminers are working on the same site, there must be strict control and greater safety distances imposed than those used for manual clearance. Each type of machine has different safety distances. (See paragraph 5c). Safety distances will be specific to each machine and it is the responsibility of the MAMC agency to establish safety distances for each machine. Minimum safety distances shall be detailed for:

- a) Personnel wearing PPE at the work site,
- b) Personnel outside the work site not wearing PPE or directly involved in operations.
- c) Personnel conducting observation duties in bunker/shield protection while the machine is in operation.
- d) Personnel operating the machine by remote control and any protective measures.

All mines or mine parts found that include the fuse shall be destroyed in situ. Under no circumstances are these objects to be remotely moved or neutralized and recovered because of the possible unstable nature of the mine, firing train or firing train component.

The SOP shall detail extraction procedures for the operator in the event of a breakdown, fire and or mine incident. The machine shall provide adequate blast protection for the operator.

10 Clearance guidelines

Machines should not be deployed into areas where the danger exists that the machine will be exposed to mine/UXO threat beyond the manufacturer's specifications.

A minimum number of passes and overlap shall be applied.

Mechanical preparation lanes should be as straight as possible, to ensure a better overlap in the lanes. If this is not possible then the overlap should be increased to ensure the correct overlap. Areas that have not been able to be prepared due to undulating terrain shall be clearly marked with a physical barrier to prevent movement into the area. An alternative means to clear these areas shall be determined.

The mechanical agency shall have a system in place to carefully record all detonations and visible toss-outs of possible mines/UXO. This will assist the quality assurance and ease the work of the manual clearance follow-up afterwards.

Accurate recording and mapping is required to record where the machine has worked, daily records shall be kept by the mechanical agency and the demining agency (lead agency). Any areas worked where there is doubt or errors as to the exact area worked shall be reworked at no cost to IND.

Where mine detection dogs are used to follow up after mechanical machines in areas that have been prepared, a minimum soak period of 48 hours shall be allowed.

Annex A (Normative) References

The following documents should also be referred to when reading this NS

- a) NS 04.90; Glossary of terms and definitions
- b) NS 07.10; Guide for the management of demining operations
- c) NS 07.30; Accreditation of demining organizations
- d) NS 07.40; Monitoring of demining organizations
- e) NS 09.10; Clearance quality
- f) NS 09.20; Post clearance inspections & sampling
- g) NS 10.20; Demining worksite safety

The latest version of these references should be used. IND, Maputo holds copies of all references used in this NS.