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CLAIM AND REALITY: MECHANICALLY ASSISTED DEMINING

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CLAIM AND REALITY: MECHANICALLY ASSISTED DEMINING

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INTRODUCTION

To be able to discuss demining technology and to differentiate between *claim* and *reality*, we must first look at what we are trying to do. We want to clear mines from infected areas as safely and as rapidly as possible, and be able to return the land to the local population for economic and development use.

How do we achieve this? We achieve it by implementing a set of principles:

- ***Safety***
- ***Efficiency***
- ***Speed***
- ***Cost***

These four principles correctly implemented equal *production.* Production is what the donor should expect; square meters for dollars in cost effective time.

The demining companies organisations and NGOs can only sell one thing, and that is confidence. The techniques that are implemented to achieve production should be so well executed among the local populations and donors that a high level of confidence in the system is produced through safe and effective production. There are many factors that affect mine clearing operations. These ultimately have impact on the people who live in the mine-infested areas. Recently the head of an international donor agency stated:

"As a donor agency we may ultimately be party to high level political agreements between ministers or heads of state in which token gestures can lead to quite major programmes being undertaken with little or no reference to ground level reality." The big men move a pawn or two and a few million dollars are spent on a mechanised clearance programme which may not be what is required. Instead of assessing what factors may affect the achieving of the aim in a particular theatre, the major players insist on implementing a programme because *their* priorities are trade agreements, food,

security, political alliances, and other major objectives.

Throughout the world, where mines are planted, be it one mine on a soccer field or two hundred mines in an agricultural area, the local people are the ones who are affected and denied this ground. They are the ones who "more or less" know where the mines are. Thus, they don't go there. In time this area becomes totally moribund with re-growth and there is no marking. For safety reasons, the locals give a wider and wider berth to the problem area. The overgrowth gets thicker and thicker and spreads, and more and more ground is denied for agriculture, building, or any other form of development. The deminers' greatest problem is born.

THE PROBLEM

The thick undergrowth produces the most difficulties and the greatest danger the deminer faces. Take away the bush, produce clear, open ground and the clearance and removal of the mines becomes a routine exercise to deminers. Deminers, in the main, are constantly seeking a safe and effective means of penetrating the bush. More sophisticated metal detectors or detectors that can find minimum metal mines are required. But the greatest problem is that of ground preparation. This means producing a safer access to the target area by getting rid of the bush and undergrowth first.

There are numbers of inventors who are addressing this problem. They all do so in the apparent isolation of their own thinking, without any reference to practitioners who are out on the ground and who experience the problems on a daily basis. These inventors *do* produce good equipment (very often totally impractical, with millions of dollars wasted on huge research and development programmes, without any practical reference to the man on the ground). A number of these inventors very rapidly get the ear and support of a high placed politician or political body. These people, who frequently have no direct experience of the problem, believe all the claims of the inventor. To sell his machine, or to get financial backing to develop the machine the designers frequently make unrealistic claims. Frequently, the inventor has no practical experience either.

The politician or donor, who has only partially seen the problem, becomes involved. Because of their political aims and national requirements, they drive a totally incompetent and sometimes embarrassing programme. Whereas with professional, experienced, and totally unemotional advice from practitioners, these programmes could be highly successful and could produce land that is rapidly cleared and returned to the local people for their own uses. It is not my intention to denigrate any of the devices that have been manufactured because all of them do have a use, albeit often very limited.

The first problem that emerged with the appearance of machines was the phrase "mechanical mine clearing." There is absolutely no such thing because no machine can clear ground to the 99.6% standard set internationally. All machines are designed on various military prototypes that the military have previously used for "breaching operations." Military breaches have never had the requirement for a 99.6% clearance rate!

For people to have confidence in such a machine, the follow-up to this machine must indicate that there are no mines, unexploded pieces of ordnance, detonators, or the like, to be left in the wake of the machine. It is only after a protracted period of operation where follow-up operations find *absolutely nothing* behind the machine, that one can talk about mechanical demining. Until such time, the phrase should be *mechanically assisted mine clearing.* And even then, there are areas where machines cannot go, and the job has to be done by men. These men can be very ably assisted by dogs which can at least double the rate of clearance.

How do we overcome the problem of misguided, well-intentioned inventors and patrons?

The simplest way is to ensure that the inventor and the practitioner are put together in the embryo stages of attacking the problem. There are many practitioners who can see the answer to a problem by working where there is a specific need, there are many inventors "out there" who are dying to become part of a noble cause. By being brought together in the beginning the enthusiastic amateur is eliminated from the operation and financial savings will be made by the correct direction being taken at the outset.

The meetinghouse or clearinghouse for such ideas does not really exist. Many conferences produce papers by the kilogram, and all are very well intentioned. Well thought out talks, standards, procedures, methods of documenting, planning, and preparing for mine action are discussed and agreed upon. While all this is happening there are still practitioners on the ground who never get to hear of the conference and who very seldom reap any of the benefits of the conference.

There has to be a more practical hands-on and immediate answer to mine clearing. A clearinghouse for ideas might well be the numerous Mine Action Centres (MAC) that exist around the world and their role should be enhanced by making them responsible for a meeting of the minds of the practitioners and the inventors. Research and Development should be done in the field. There are many that will cry, "this is not safe!" Nonsense.

The practitioner is only too well aware of the dangers of the mines and he is well able to advise the inventor on safety. The two together, with the funding that is available for these ideas, will actually be doing a useful job of clearing mines in the field while they refine their mechanical dreams. Testing on the job will eliminate time wasted on phoney or practise fields to simulate minefields. Too often machines spend years blowing up either practice mines or simulated mines in test areas, where nobody benefits and the money just goes up in smoke.

It should be noted that organisations such as MGM, operating in Angola, have been successful in developing machines to assist them in their tasks there by just getting on with it and doing the trials (safely) in the field.

TARGET AREAS: ROAD AND AREA CLEARANCE

In general there are only two areas where mine clearing is carried out, on the road, and off the road. It is as simple as that. Each area has its own set of problems to be overcome. Roads primarily have anti-vehicle mines planted. In general these are up to 7 Kg of explosive each and are designed to destroy tanks! The areas off the road are scattered with anti-personnel mines of various types. These are designed to maim, and consist of devices of up to 200gm of explosive. We can see that just these two areas immediately pose two different problems to a machine.

Access for machines on roads is not normally difficult but the threat requires very heavy protection. There are few machines, I believe, that can withstand 400 anti-tank mine blasts in one single operation. This example is from a minefield that I have personally cleared.

Off the road, terrain can vary considerably, from bush, which could be Category A and therefore very simple and easy to penetrate, down to Category C, which is virtually impossibly to penetrate (or particularly difficult anyway!). In this example, a machine does not have to withstand huge blasts, but it has to penetrate thick bush, producing a slightly different modification.

In the main, 90% of the problem world wide are off the road. Roads are relatively easy to clear with or without machinery. A number of the machines that exist today are excellent when deployed in Category A ground. Some other devices cannot even penetrate a domestic garden and require more of a football field type terrain!

Five years ago, we did indicate to a manufacturer of mine detecting equipment that equipment designed to clear the tennis courts of Europe was not much use in the jungles of Africa. He took the point and today all manufacturers of hand held mine detection equipment are aware of the fact that conditions such as laterites in soils, volcanic soil, sea sand (wet and dry), wet jungle conditions, ambient temperatures, etc., all have an effect on the performance of a detector.

There are a number of items of mechanical equipment which are capable of detecting mines and UXO's, but because of their platform, cannot penetrate thick brush, and cannot penetrate a mine field for anything other than quality assurance operations. Examples of these pieces of equipment are the Vamits System by Schiebel, and many forms of ground penetrating radar (GPR). All can identify, and some can mark a mine. In isolation they are not capable of performing mine clearing, but this is not their task anyway. They are, however, very effective tools when used in the correct situations to support other techniques. Note that they will only mark or indicate where mines are, men are still required to do the actual destruction. It is necessary to clear all the ground covered by the machine as no one has yet proven what level of success these devices can guarantee.

We see the requirement for ground preparation (or bush clearance) if these devices are to work off road. It can be done by hand, which could take an incredibly long time, or a machine can prepare the ground to allow for much more rapid clearance for the follow

up techniques employed by the practitioner charged with clearing the mines. Here again, it is necessary to achieve a correct balance of techniques to achieve maximum and cost-effective productivity.

Most mechanical ground preparation will leave the road in an impassable state, and this has to be taken into consideration when deciding on the technique to be used when clearing a road. *Is ground preparation necessary or can the detection device be deployed on its own? If it is deployed on its own, on a road, will the platform detonate anti-tank (vehicle) mines? Has a platform with a low ground pressure been designed? If not, can the operation afford the replacement of the platform at each detonation? If not, can another technology suffice? Can dogs and men achieve the same results?* These questions can only be practically answered in consultation with men on the ground.

USE OF LOCAL DEMINERS / OR LOCAL CAPACITY

A great number of donor agencies have forgotten or wish to overlook the requirement of the Four Principles and insist on the employment of local, unskilled, deminers. These people, frankly, are counter-productive in any operation, and if donor agencies just allowed NGOs and commercial mine clearing companies to employ their own professional people, the tasks would be done twice as fast, with greater efficiency and cost-effectiveness, and with minimum accidents.

In most operations in the world, an analysis of the accidents would indicate that they were brought about by unskilled deminers whom the contractor was forced to employ because of the wish of the donor. Although these people are trained, they lack the discipline and experience of the professional deminers and rapidly become a hindrance and slow down the operations.

Donors should decide whether they want to spend five years in a country employing the locals to clear mines, or one year in the country employing professionals to clear the mines, and then spend the additional four years using the money saved to help develop the country.

SELECTION OF TECHNIQUES

There are presently three techniques that exist for land mine clearance; two of these techniques are able to stand-alone:

- **Manual:** Men with prodders or metal detectors.
- **Dogs:** Trained to detect explosives or explosive contaminated metal.

Ground preparation ahead of clearance (to speed up the process) can be carried out mechanically, or chemically, by the application of airborne defoliants. While defoliants exist that are totally environmentally friendly, this form of preparation is not going to be

considered here, as it can be too costly.

Mechanical Preparation:

a. Machines capable of preparing the ground by converting various categories of ground into Category A, typically flails and milling machines.
b. Machines that can detect mines. These would need ground to be prepared for them to penetrate the bush. They include Vamids and GPR.
c. Machines that can both prepare the ground and destroy a high percentage of mines, such as milling machines and steel wheels.

A combination of these techniques produces the greatest level of productivity, which will, in turn, rapidly release land to local people.

In planning one should be aware of the rate of progress in the use of the three techniques:

- Commercial manual mine clearing will clear Category A ground at the rate of 800m2 per day with an eight man team.
- Category B ground will be cleared at the rate of 600m2 per day per eight man team.
- Category C ground will be cleared at the rate of 400m2 or less per day.
- Dogs can reduce ground at the rate of 3000m2 per day in Category A, 2000m2 in Category B and sometimes cannot even penetrate Category C because of brambles, thorns, etc.

In a day, a machine such as the Krohn, FFG, Agri Bush Flail, or MAK, can prepare 10,000m2 in Category A ground, about 7,000m2 of Category B, and 4,000-5,000m2 in Category C.

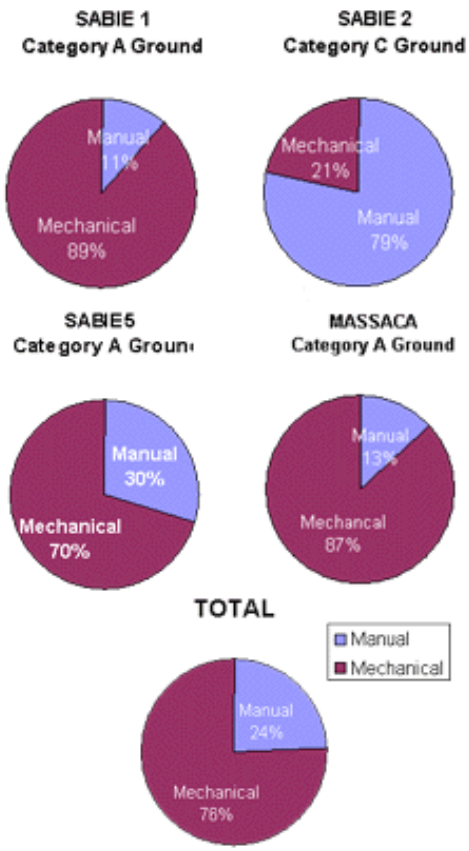
All the ground prepared by machine is Category A. However, all the ground behind *any* machine is still a minefield. The pie chart shows that one particular type of machine, Krohn, can destroy 40% of mines in Category C ground and 70% of mines in Category A ground. The ground behind the machine is clear of all brush and vegetation, but it is still particularly dangerous because the debris left behind the machine has been "disrupted" and may not function as designed. Therefore, all explosive debris should be destroyed. Because the machine breaks up munitions, the use of dogs in this operation further increases the level of safety to the hand deminers. This applies to all mechanical means – the Krohn system, MAK, steel wheels, and flails.

The prepared ground (10,000m2) can be cleared in three days using men and dogs, as opposed to 11 days using men only. In Categories B and C – without machine preparation – one can see that the period of time on the ground and cost would be far greater.

The secret to the cost-effective use of the machine is not to cost in a machine on a contract that is

likely to last six months, for the entire six months. Rather to assess initially how much the machine can produce in the target area, perform the machine work and then release the machine to other areas.

The problem that arises from this technique is that the machine rapidly outruns the manual and dog back up. This means that re-growth can become a problem in the area prepared by the machine. This can be overcome by employing more hand/dog teams before the re-growth is established, or by the use of environmentally friendly defoliants in the area already prepared by the machine. These can be applied from the machine, while it works, if necessary.



Another factor to be considered is that the local population might well enter the prepared area believing it to be cleared of mines. This can be overcome by the correct use of the IHDD community awareness concept and boundary marking. By using the machine in this fashion clearance time on the ground can be cut by as much as 70%. This has a very positive effect on cost and production.

Mechanical assistance or ground preparation, as conceived by a great number of inventors, has failed to recognise the shortcomings of operating in the countries where mines are to be cleared, mainly third world countries where the road infrastructure is poor at best. Thus, even in Bosnia, 60-ton monsters being transported around the country require military over-bridge to assist their movement. This form of assistance does not exist in Africa and so even the relatively light (25 ton) Krohn machine has severe mobility shortcomings. This again is the result of the difference between dreams and reality where the inventors and the practitioners have not met.

There is a tendency in Europe to produce huge, cumbersome machines, (supposedly to combat the threat of anti-tank mines, which are only 10% of the problem), which limit the options open for the use of the machine in ground preparation.

The time has come to get inventors to custom design machines to handle specific tasks. Such machines are relatively inexpensive to produce. A cost of US $ 150,000 would be quite adequate for any machine for any task. Additionally, machine operators must be realistic in pricing their equipment at a square meter rate to achieve the principles already stated. Because a number of inventors are not commercially minded, it often appears that the designer is attempting to achieve all his design and start up costs in the first contract!

CONCLUSION

In discussing the claims and reality of demining the main theme has been that of the mechanical aspect. This is because more inaccurate claims are made by mechanical operators, manufacturers, and sponsors/ donors, than in any other form of mine clearing.

This is possibly because the mechanical school all believes that they have discovered a silver bullet. This is not so, and the greatest danger to the industry is that this myth persists. Should any donor organisation allow mechanical appliances to operate in isolation in a mine-clearing role, at this time they are guilty of murdering the subsequent victims of the "cleared area."

It should be clearly understood that until a machine has a record of no dangerous devices being left behind, the area prepared is still a minefield. Manual clearing and/or dogs must be used to verify that the area is safely cleared of all minefields. Notice that the term "dangerous devices" is used. This is specifically directed at some operations where the mines left behind are no longer mines because an external fuse has been knocked off and the device is no longer a mine. It does however contain explosive and a detonator and has been roughly handled by the machine. It could be much more dangerous than a mine.

By allowing the machines a chance to operate in the role of ground preparation, then using the appropriate technology in the form of manual clearing assisted by mine detection dogs, all the principles are achieved. In this way it is believed that the amount of money presently spent on demining world wide will achieve far greater results than those already seen and many more peasant populations will get back on the ground and become productive.