



MAG

take action **clear mines**

MAG ARMTRAC 100 ACCREDITATION PROCESS & RESULTS

MAG Operational Concept

- Aggressively target the mines
- Process only areas that need processing
- Have a flexible approach to each individual site.
- Determine the process based on determined risk – information driven!!! (information technology driven requires knowledge of the limitations of the technologies and methods)
- Machines used as follows
 - Rapid entry to mines (tech survey)
 - Ground Prep – disrupted minefields
 - Verification of suspect only areas
 - QC

OPERATIONAL NEEDS

- Rapid and reliable information gathering in low threat areas. (Verification & QC)
- Support to other assets – manual and MDD
 - What affect can be reduced here
 - Metal contamination – main problem
 - Hard Soils (seasonal)
 - Some vegetation (seasonal)
 - Tripwires (occasionally)

CHOICE OF MACHINE

- Must be safe!!
- Must be able to perform the role required to meet the operational needs.
- Must simple and easy to operate and maintain.
- Must be sustainable – parts, responsive supplier.
- Must have a good power to weight ratio.
- Must be able to move itself distances upto 30km
- Must be proven – reliable, with estimated outputs.
- Desirable to possible accredited elsewhere
- Desirable to have flexibility for other uses

ARMTRAC 100



- Medium Flail (18t all up)
- New Holland Tractor
 - Add any PTO driven tool
 - Can move by road at <30km/hr
 - Simple/Reliable/Proven
- Tested at international level
- Safe – many features (Armour, fire suppression, emergency cut off, wheel shear etc)
- Used in many countries by commercial operators.
- Manufacturer good reputation for responding to problems.

What is accreditation for?

- To ensure that the Armtrac 100 is fit for purpose
- Essential part of the QM Process

WHAT INFORMATION IS NEEDED?

- Safety record of the machine – Desktop
 - Blast testing if required
- SOP evaluation/Org Evaluation – Desktop
- In country test to see how the machine performs.
- Understanding the limitations of the system and possible weaknesses (essential for operational use)
 - Looking at the tools working
 - Inspecting the machine

The Test Design

- Three Phase Test
 - 1 – Affect of ground on the machine (mobility, SOP safety, tool action on the ground)
 - 2 – Machine affect on targets (mines)
 - 3 – Organisational monitoring during operations (ongoing and part of the machine management system).

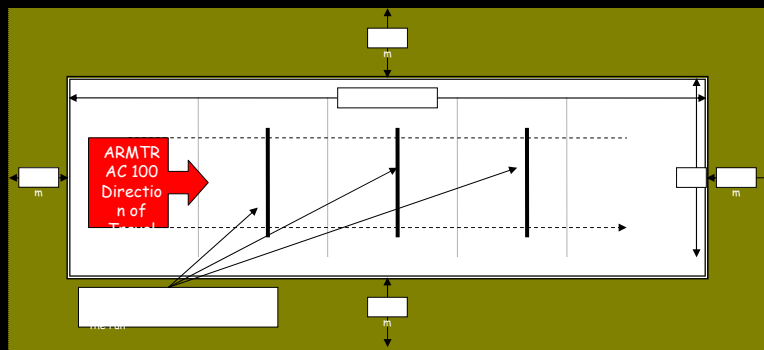
PHASE 1



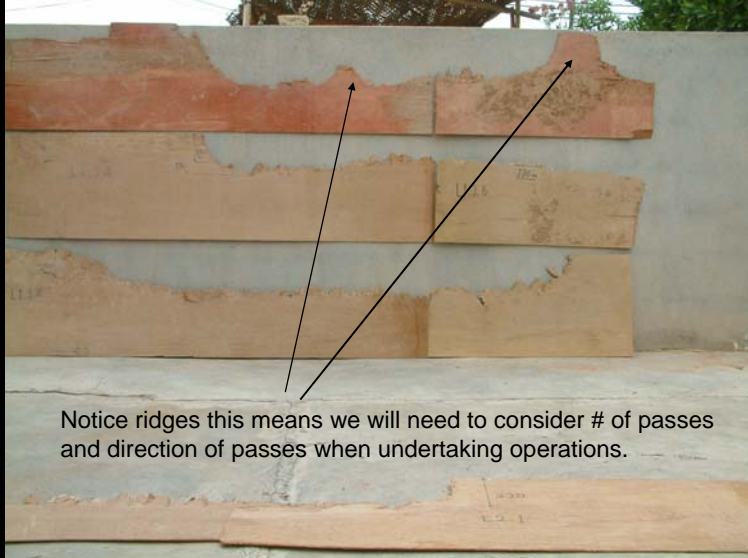
- Demonstrate the machine over different terrain
- Demonstrate the machines tool action.
- Demonstrate SOP issues
 - Overlapping
 - Recovery procedures

TOOL CUT PROFILE

- To see what affect the ground has on the machine and vice versa
- Wet and Dry conditions



Measuring the Soaked Area Profile Boards



Wet Area Average Depth Samples

Depth Record	1	2	3	4	5	Average
Box 1	26	27.5	28	19.5	23	24.8
Box 2	22	20.5	22.5	23	23.5	22.3
Box 3	27	23.5	23	22	19	22.9
Box 4	30	30	19	29	24	26.4
Box 4	21	23	21	23	21	21.8
Total						23.64

Measuring the Dry Area Profile Boards



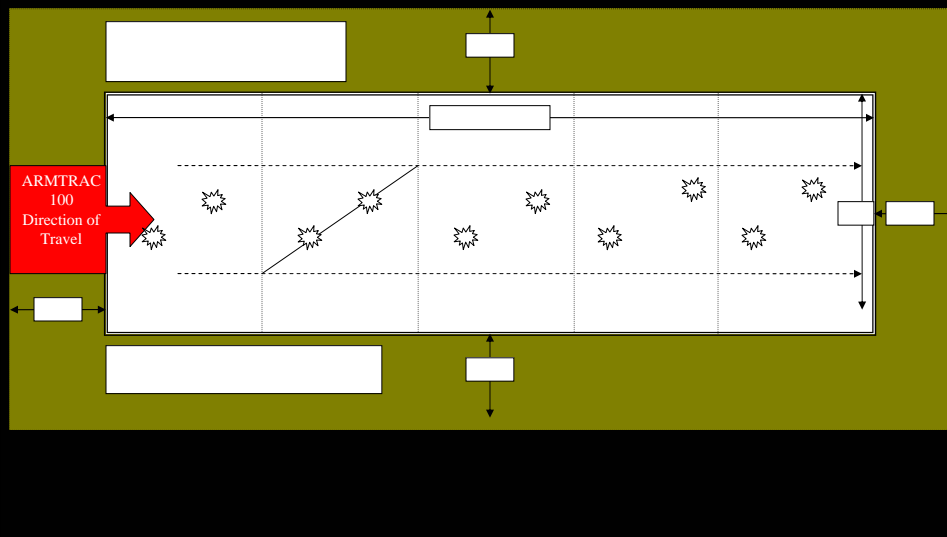
Dry Random Depth Samples

Depth Record	1	2	3	4	5	Average
Box 1	18	20	22	19	24	20.6
Box 2	22	20	19	21	19	20.2
Box 3	19	21	18	20	18	19.2
Box 4	19	20	19	21	24	20.6
Box 4	18	25	23	17	19	20.4
					Total	20.2

TEST CONDITIONS

- 4 common mine types VS50, T72a, PMN & No4
- Provided a range of function mechanisms, shapes, sizes, materials,
- 5 depths
 - Flush to surface
 - 5cm
 - 10cm
 - 15cm
 - 20cm
- Minimum of two mines at each depth
- All lanes in same area and 25m x 5m long
- Mine pattern zig zag at precise measurements

MINE TARGET TRIALS



Measurements

- Location of targets before and after flailing.
- Mine hit or missed by the flail (in the flail path)
- Condition of mine when recovered. (standard)
- Also measured
 - Average depth of cut
 - Speed
 - Climate
 - Operator
 - # detonations heard averaged

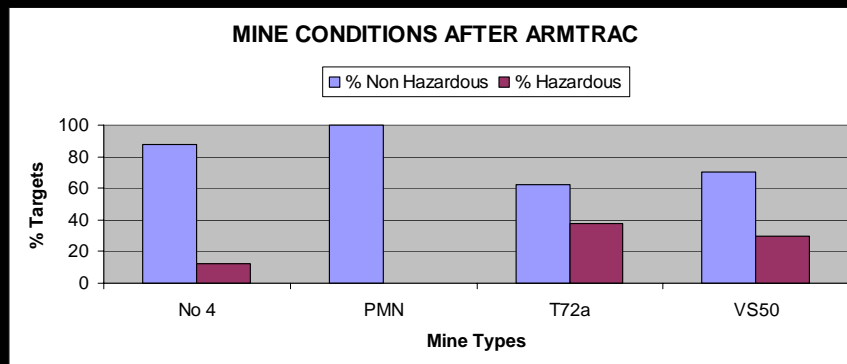
RESULTS

Mine Number	No 4	PMN	T72a	VS50
1	Destroyed	Destroyed	Operator missed mine	detonated
2	Destroyed	Destroyed	Partial Detonation	Partial Detonation
3	Destroyed	Destroyed	Operator missed mine	mine undamaged
4	Destroyed	Destroyed	Partial Detonation	Unaccounted for
5	Mine undamaged	Destroyed	Partial Detonation	Only fragments found
6	Destroyed	Destroyed	Hit firing mech in place	Firing mech inplace
7	Destroyed	Destroyed	Hit firing mech in place	Firing mech inplace
8	Destroyed	Destroyed	detonated	Hit firing mech removed
9		Destroyed	Partial Detonation	mine undamaged
10		Destroyed	hit no damage	detonated
Total # Mines Trafficked	8	10	8	10

Results of action

	No 4	PMN	T72a	VS50
Detonations	na	na	1.00	1.00
Partial Detonations	na	na	4.00	2.00
Hit Broken safe		100	0.00	3.00
Hit Unsafe/complete	0	0	3.00	6.00
Unaccounted for	0	0	0.00	1.00
Total Misses	1	0	2.00	0.00
<i>% Of hits</i>	<i>87.5</i>	<i>100</i>	<i>75</i>	<i>100</i>

INTERPRITATION



General Conclusions

- The machine has a good strike rate against the targets.
- There is degradation of effectiveness against smaller targets.
- Movement of mines must be considered and follow up adapted to allow for throw outs and targets being deeper than original position. This is prevalent on targets with a smaller surface area.
 - Factors for consideration when deploying the machine
 - Minefield type –
 - » Patterned
 - » Disrupted – Level of disruption
 - Mine type/threat
 - Terrain type

LIMITATIONS & RESTRICTION of TEST CONDITIONS

- Mines !!!
 - Condition and serviceability
 - # available
 - Limited detonators (firing chain)
- Standards to be achieved
 - How are decisions made on the type of task the machine is suitable for?
 - What value are the test based on applying the machine during operations?
 - What is hazardous what is not?
 - Should a machine be asked to perform better than MDD 10cm or detection at 13cm?

QUESTIONS

- IS THIS TEST A SOUND AND TRANSPARENT BASIS FOR ACCREDITING FLAILS & TILLERS?
- HOW CAN RESULTS BE ANALYSED TO ACCREDIT MACHINES?
- WHAT RESULT WILL DETERMINE A MACHINES FITNESS FOR PURPOSE?

**The only true measurement
comes from the field &
quality of the product
(safe land returned)**