

**REPUBLIC OF CROATIA  
CROATIAN MINE ACTION CENTRE -  
CENTER FOR TESTING, DEVELOPMENT AND TRAINING**

**„SAMSON 300 “DEMINEING MACHINE  
TESTING REPORT**



Sisak, February 2005

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# 1. Technical data for the “Samson 300” machine

## 1.1. Demining machine description

„Samson 300“ demining machine is used by „L.M.B.S. d.o.o.“ demining company from Zagreb. The machine was designed and manufactured by „VILPO“ company from Ljubljana, Slovenia. The machine is categorized as a medium size demining machine, weighing 9.8 metric tons. It has a DEUTZ BF6M 1013FC engine with a power of 212 kW. The working tool is a flail. The machine moves on wheels. It can be operated both from the cabin and via remote controls.

The „Samson“ prototype was produced in 2001, and since then have been used on demining projects in the Republic of Croatia. On the basis of experience, improving the spotted flaws, another machine was designed and produced, the „Samson 300“ machine. A more powerful engine replaced the previous one, and other construction and installation parts of the machine were adjusted accordingly.

## 1.2. Technical data

<input type="checkbox"/> Machine dimensions	
▪ Length	7.90 m
▪ Width	3.00 m
▪ Height	2.70 m
▪ Weight	9.80 tons
<input type="checkbox"/> Engine type	DEUTZ BF6M 1013 FC
<input type="checkbox"/> Engine power	212 kW
<input type="checkbox"/> Number of engine cylinders	6
<input type="checkbox"/> Engine volume	7,146 cm <sup>3</sup>
<input type="checkbox"/> Engine fuel type	D-2
<input type="checkbox"/> Fuel tank capacity	230 liters
<input type="checkbox"/> Average fuel consumption	18 l/h
<input type="checkbox"/> Oil tank capacity	120 liters
<input type="checkbox"/> Engine cooling	water
<input type="checkbox"/> Machine frame number	04-520/01
<input type="checkbox"/> Working tool	rotation flail
<input type="checkbox"/> Working tool width	2.530 mm
<input type="checkbox"/> Flail diameter	1.400 mm
<input type="checkbox"/> Number of striking heads	73
<input type="checkbox"/> Striking head weight	800 grams
<input type="checkbox"/> Striking head shape	mushroom
<input type="checkbox"/> Chain width with striking head	52 cm
<input type="checkbox"/> Armored protection of the machine	ARMOX-500T
<input type="checkbox"/> Protective glass type	BLINDOVIS 27-29 R
<input type="checkbox"/> Machine suspension	fixed chassis axles, joint rotation
<input type="checkbox"/> Movement	4 wheels
<input type="checkbox"/> Wheel dimensions	600/55-26,5 TRS-LS2 16PR (filled with plastic)
<input type="checkbox"/> Specific wheel pressure on the ground	110 N/cm <sup>2</sup>
<input type="checkbox"/> Wheel axle distance	2.60 m



Figure 1 – „Samson 300“ demining machine

- |                                    |                              |
|------------------------------------|------------------------------|
| □ Horizontal rotation of the joint | +/- 40 <sup>0</sup>          |
| □ Vertical rotation of the joint   | +/- 16 <sup>0</sup>          |
| □ Flail drive                      | hydrostatic, hydraulic pumps |
| □ Machine speed:                   |                              |
| ▪ Moving                           | up to 25 km/h                |
| ▪ Operating                        | up to 3 km/h                 |
| ▪ Average operating speed          | 0,4-0,7 km/h                 |
| □ Soil treatment depth             | 25 cm                        |
| □ Flail rotation                   | back and forth               |
| □ Machine operation:               |                              |
| ▪ From the cabin                   |                              |
| ▪ Remote control device «ALAN H56» |                              |
| □ Machine turning radius           | 5.50 m                       |
| □ Longitudinal slope surmounting   | 30 <sup>0</sup>              |
| □ Transversal slope surmounting    | 20 <sup>0</sup>              |
| □ Self recovery winch              | no                           |

**Servicing equipment** for maintenance and minor repairs of the machine, as well as spare disposable parts, are placed in the servicing vehicle situated on the demining site. Major and more complicated repairs and maintenance is conducted at the „VILPO“ company in Ljubljana. For transportation on smaller distances (10-20 km), no trailer is needed, and for longer distances a trailer is used.

## 2. Testing plan

### 2.1. Performance testing plan

The „VILPO“ company, designer and manufacturer of the machine, has not conducted any performance tests of the machine, because the machine was manufactured on the basis of experience gained with the „Samson“ prototype and results achieved in the operational work.

## 2.2. Acceptance testing plan

### 2.2.1. Testing goal and tasks

The **testing goal** is to acquire knowledge and information about operational capabilities of the machine, its endurance and quality in test site conditions, as well as in realistic field and mine field conditions.

The following **tasks** should be accomplished during the tests:

- ❑ to determine **general technical characteristics of the machine and of the working tool**
- ❑ to determine **the soil processing depth for different types of soil and the speed of motion of the machine**
- ❑ to establish **the information about the noise and acceleration inside the cabin in the moment of activation of an antitank (AT) mine**
- ❑ to determine **machine endurance in the moment of antipersonnel (AP) mine activation**
- ❑ to determine the **efficiency and effectiveness of the remote control device**
- ❑ to determine **possibilities of using the machine in mine-suspected areas**



Figure 2 – „Samson 300“ demining machine prepared for transportation

- ❑ to determine **possibilities** of the machine use in **different types of soil, terrain slopes** (horizontal and vertical slope) **as well as for vegetation clearing**
- ❑ to determine the **level and scope of deminer's inspection** after mechanical treatment
- ❑ to determine **required machine logistics, servicing and regular maintenance**



Figure 3 – The rollers on „Samson 300“ machine

### 2.2.2. Testing criteria

Evaluation criteria are defined in accordance with the proposed *Programme for Testing and Usability Evaluation of Machines used in Humanitarian Demining Operations*, as well as with *Standard Operating Procedures for Humanitarian Demining in the Republic of Croatia* contained in the *Regulation on Performing Demining Operations*.

### 2.2.3. Testing location and time period

The testing will be conducted at the **Cerovac test site for demining machines near Karlovac and at a demining site** to be determined later, on a mine suspected area covering 50,000 m<sup>2</sup>. This demining project will be developed by the Project Department of the Croatian Mine Action Center.

**Testing period** – October and November 2004, divided into several stages, depending on the purpose:

1. **stage: 1 day – preparation of the Cerovac test site for the testing**
2. **stage: 1 day – testing on test lanes containing different kinds of soil**
3. **stage: 1 day – testing on antipersonnel mines**
4. **stage: 2 days – testing on antitank mines**
5. **stage: 1 day – measuring of noise and acceleration inside the cabin**
6. **stage: 6 days – testing on a demining site**
7. **stage: 6 days – deminers' inspection of mechanically treated mine suspected area**

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**total: 18 days**

After preparing the test site and the machine, the testing of the machine and the working tool is performed on test lanes with different soil types, while measuring the depth of the soil processing and the speed of motion. Then, the testing with AP and AT mines and measuring of noise and acceleration using a TM-3 mine is conducted. When the above is completed, testing on the demining site covering 50,000 m<sup>2</sup> is performed.

## 2.2.4. Testing structure

### a) First stage – PREPARATION OF THE TEST SITE AND THE MACHINE

- **Preparing the test site for machine testing**
  - Preparing the test lanes
  - Placing a fiberboard panel at a depth corresponding to the predicted soil processing depth of the machine
  - Preparing the site for the machine testing with AP and AT mines
- **Preparation of the machine**
  - Transportation of the machine to the Cerovac test site
  - Inspection and preparation of the machine
    - ❖ **duration: 1 day**

### b) Second stage – TESTING ON TEST LANES CONTAINING VARIOUS SOIL TYPES

- a. **Testing on the topsoil lane**
- b. **Testing on the sand lane**
- c. **Testing on the gravel lane**
  - i. **Measuring the soil processing depth**
  - ii. **Measuring the motion speed while in operation**
- d. **Duration: 1 working day**

### c) Third stage – TESTING ON AP MINES

- **Five PMA-1A** mines are placed in front of the working tool in a linear layout with 4 m spacing, at depths of 5, 10, 10, 15 and 20 cm, and they are armed with appropriate fuses. The placed mines should be destroyed by the machine and the results should be analyzed.
- **Five PMA-2** mines are placed in front of the working tool in a linear layout with 4 m spacing, at depths of 5, 10, 10, 15 and 20 cm, and they are armed with the appropriate fuses. The placed mines should be destroyed by the machine and the results should be analyzed.
- **Five PMA-3** mines are placed in front of the working tool in a linear layout with 4 m spacing, at depths of 5, 10, 10, 15 and 20 cm, and they are armed with the appropriate fuses. The placed mines should be destroyed by the machine and the results should be analyzed.
- **Two PMR-2A mines are placed, of which:** one **PMR-2A** mine is placed in front of the working tool and equipped with the corresponding fuse while the tripwire is tightened towards the machine.
  - **another PMR-2A** mine is placed in the same way as the first one, but only after the first mine has been destroyed
  - the placed mines should be destroyed by the machine, and the results should be analyzed
- **Two PROM-1 mines are placed, of which:**
  - **One PROM-1** mine is placed in front of the working tool at the distance of around 5 m, equipped with the corresponding fuse and **prepared for activation by pressure**
  - **One PROM-1** mine is placed in front of the working tool at the distance of around 15 m, equipped with the corresponding fuse and **prepared for activation by tripwire**, where the tripwire is tightened from the mine to the machine.

- The placed mines should be destroyed by the machine, and the results should be analyzed.

❖ **Duration: 1 working day**

#### **d) Fourth stage – TESTING WITH ANTITANK MINES**

- **TMM-1:** the mine is placed in front of the working tool, 5 m away from the flail axle, 10-12 cm deep. The mine is prepared for activation with appropriate fuse. **The process of the mine activation is recorded from a safe distance using a video camera (the camera is placed, fixed, switched on and left recording until the end of the detonation).** After activation of the mine, impact on the machine and possible damage on the working tool and machine is analyzed.
- **TMRP-6:** - the mine is placed in front of the working tool, around 5 m from the flail axle, at a depth of 10-12 cm. The mine is prepared for activation **by pressure. The process of the mine activation is recorded from a safe distance using a video camera (the camera is placed, fixed, switched on and left recording until the end of the detonation).** After the mine activation, the detonation effects on the machine should be analyzed, as well as potential damages on the working tool and on the machine.
- **TMRP-6:** - this mine is prepared in the same way as the first TMRP-6 mine, but this one is armed for activation **by tripwire**, and the procedure is repeated.

❖ **If there are damages on the working tools and on the machine, they have to be repaired or replaced, and the machine has to be prepared for the continuation of the tests**

❖ **Duration: 2 working days**

#### **b) Fifth stage – MEASURING OF NOISE AND ACCELERATION**

- The machine is prepared at a location foreseen for testing of machines with AT mines
- **The TMA-3 mine is prepared and placed in front of/bellow the machine flail**
- The mine is prepared for remote activation
- Instruments and devices inside the cabin are prepared for measuring noise and acceleration.
- ❖ **After mine activation, the working tool and the machine are inspected for possible damage and it is determined weather the instruments and devices have recorded the necessary data.**

#### **c) Sixth stage – WORKING CAPACITY OF THE MACHINE ON A DEMINING SITE**

- **The machine works on a mine suspected area at a demining site, treating the area of 50,000 m<sup>2</sup>**
- The machine works 1 shift of 5 hours a day
- Daily efficiency of 7,000 – 9,000 m<sup>2</sup>/5 h is expected
- **Effective time of work of the machine should be measured, together with possible standstills and failures, size of the treated area, soil and vegetation conditions, climatic conditions, mine conditions and the minimum of 20 soil treatment depth samples are taken**
- **The foreseen time of 6-7 working days depends on the actual machine efficiency. The important thing is to treat 50,000 m<sup>2</sup> of a mine suspected area.**

❖ **Duration: 6-7 working days**

**d) Seventh stage – DEMINER'S INSPECTION OF THE MINE SUSPECTED AREA PROCESSED BY THE MACHINE**

Deminer's inspection of the terrain is performed by a team of deminers using a **manual method - a metal detector and a prodder**. During the deminer's inspection, daily capabilities of deminers are estimated and the found mines and explosive devices are recorded and destroyed.

❖ **duration: 6-7 working days**

**2.2.5. Testing participants list**

The following persons will participate in the preparation, organization and implementation of the testing:

**a) First stage – preparation of the test site and the machine**

- ❑ testing leader, machine operator, mechanics, military personnel

**b) Second stage – testing on test lanes**

- ❑ Testing leader
- ❑ Machine operator
- ❑ CROMAC Machine Testing Committee
- ❑ „L.M.B.S.“ company representative
- ❑ 3 Croatian Army soldiers

**c) Third stage – testing with AP mines**

- ❑ Testing leader
- ❑ Machine operator
- ❑ 3 deminers, „L.M.B.S.“ company
- ❑ Demining site security personnel, “L.M.B.S” company
- ❑ „L.M.B.S.“ company representative
- ❑ CROMAC Machine Testing Committee
- ❑ Medical team, „L.M.B.S.“ company

**d) Fourth stage – testing with AT mines**

- ❑ Testing leader
- ❑ Machine operator
- ❑ 3 deminers, „L.M.B.S.“ company
- ❑ Demining site security personnel, “L.M.B.S” company
- ❑ „L.M.B.S.“ company representative
- ❑ CROMAC Machine Testing Committee
- ❑ Medical team, „L.M.B.S.“ company

**e) Fifth stage – measuring of noise and acceleration inside the cabin**

- Testing leader
- Machine operator
- 3 deminers, „L.M.B.S.“ company
- Demining site security personnel, „L.M.B.S.“ company
- „L.M.B.S.“ company representative
- CROMAC Machine Testing Committee
- Medical team, „L.M.B.S.“ company
- Personnel authorized for noise and acceleration measuring

**f) Sixth stage – testing on a demining site**

- Testing leader
- Machine operator
- Demining site leader
- „L.M.B.S.“ company representative
- 3 deminers, „L.M.B.S.“ company
- Medical team, „L.M.B.S.“ company

**g) Seventh stage - deminers' inspection of mechanically treated land**

- Testing leader
- Demining site leader, „L.M.B.S.“ company
- „L.M.B.S.“ company representative
- „L.M.B.S.“ company deminers
- Medical team, „L.M.B.S.“ company

**2.2.6. List of equipment and supplies**

7.1. „Samson 300“ demining machine .....	1 item
7.2. Servicing set for the machine and for the working tool .....	1 set
7.3. Set of spare parts for the machine and for the working tool .....	1 set
7.4. Ambulance with appropriate equipment .....	1 item
7.5. Personal protective equipment for deminers, machine operators and assistants .....	1 set
7.6. Metal detectors .....	3 items
7.7. Set of demining tools .....	3 sets
7.8. Set of tools for destroying mines and UXOs .....	1 set
7.9. Set of tools and material for temporary marking .....	1 set
7.10. Short range communication devices (Motorola).....	10 items
7.11. Explosive (TNT or plastic).....	1 kg
7.12. Electric detonator cap.....	5 items
7.13. Miner's cable .....	1,200 m
7.14. Isolation tape .....	1 item
7.15. Slow-burning fuse .....	10 m
7.16. Detonator cap no.8 .....	5 items
7.17. 4 WD vehicle.....	1 item
7.18. Protective equipment for the test leader.....	1 set
7.19. Digital photo camera .....	1 item
7.20. Stop-watch.....	1 item
7.21. Digital video camera .....	1 item

7.22. Binoculars.....	1 item
7.23. Laser meter.....	1 item
7.24. Lap-top.....	1 item
7.25. Mobile phone.....	(098) 1 item
7.26. Meter.....	1 item
7.27. Measuring tape (50 m).....	1 item
7.28. PMA-1A.....	5 items
7.29. PMA-2.....	5 items
7.30. PMA-3.....	5 items
7.31. PMR-2A.....	2 items
7.32. PROM - 1.....	2 items
7.33. TMM-1.....	1 item
7.34. TMA-3.....	1 item
7.35. TMRP-6.....	2 items

**NOTE:**

- ❖ „L.M.B.S.“ company provides items listed under 7.1. to 7.16.
- ❖ HCR-CTRO provides items listed under 7.17. to 7.35.
- ❖ HCR-CTRO will provide and transport the mines to the test site

### **2.2.7. Safety and protective measures**

#### **a) Safety measures for deminers**

- Obligatory protective equipment at the work site (protective helmet with visor, bullet-proof vest)
- During work the minimum distance between deminers is 25 m and from a deminer to the machine 300 m
- Metal detectors should be inspected and checked before use; only those detectors which work properly can be used in the testing
- It is only allowed to use correct and complete devices and equipment
- During AP and AT mine laying and arming operations, it is obligatory to comply with the safety measures relevant to the types of mines used
- While destroying the remaining mines and explosive devices, it is obligatory to comply with the relevant safety procedures and measures

#### **b) Safety measures during the machine operation**

- Before using the machine, the operator is obliged to inspect the machine, to correct the observed deficiencies and to inform the test leader
- When the machine hits a mine or an explosive device, the engine should be switched off and the test leader should be informed using a radio device. **No action should be undertaken on the machine without the permission of the test leader.**
- The machine operator is always located in the supporting vehicle or inside the cabin, and he operates the machine from there. If there is no supporting vehicle, the operator may be out in the open with the protective equipment, no less than 300 m away from the machine. The supporting vehicle is located outside the demining site, outside the mine suspected area, on the land which has been inspected by deminers and proclaimed to be safe. The machine can be operated from the cabin as well.

- During a break, the machine should be returned to a safe terrain and should be inspected while in operation; the observed deficiencies should be corrected, and the test leader should be informed.
- After completion of daily work, the machine should be moved to a safe terrain, it should be inspected, fuel and oil should be filled in, the observed deficiencies should be corrected and the test leader should be informed
- **Any activity with the demining machine without the permission of the test leader is forbidden**
- During the machine work the minimum distance between testing participants and the machine is 300 m
- During work, the SOP for the „Samson 300“ machine should be obeyed

#### c) Safety measures at the test site

- The test site should be marked in accordance with the Croatian Humanitarian Demining SOP.
- All the activities and procedures in the preparation of and during the „Samson 300“ machine testing must be conducted in accordance with the *Law on Demining* (National Gazette 19/96 and 86/98), with *Rules and Regulations on Conducting Demining Activities* and with *Standard Operating Procedures in Humanitarian Demining in the Republic of Croatia*.
- all the testing participants shall obey the procedure and the testing leader's instructions
- the machine may work for one 5-hour shift a day
- deminers work for 5 working hours a day with a 30 minutes break
- the medical team must be ready to provide medical assistance at any time
- the communication system must function flawlessly during the testing
- the work site leader must organize all the work site elements in accordance with the rules

#### 2.2.8. Communication scheme

The communication scheme will be determined in the certified and approved Final Plan of the Demining Project where the acceptance test of „Samson 300“ demining machine will be conducted.

### 3. TESTING PROCESS

#### 3.1. Testing with AP and AT mines

##### 3.1.1. Testing with AP mines

On 21 October 2004, from 10.00 to 15.00 hours, testing was conducted with antipersonnel mines at the test site for demining machines. The following results were achieved:

- a) **PMA-1A** – 5 mines were placed at the planned depth (5,10, 10, 15 and 20 cm) at 4 m distance and armed with appropriate fuses. The machine activated the **1., 2., 4. and 5. mine** (at a depth of 5, 10, 15 and 20 cm). The mine in the position 3 (10 cm) was shattered. **Neither the working tool nor the machine was damaged.**



Figure 4 – PMA-1A mine prepared for testing

- b) **PMA-2** – 5 mines were placed at the planned depth (5, 10, 10, 15 and 20 cm) at 4 m distance and armed with appropriate fuses. **The mines in positions 1, 2, 3 and 4** were activated (at 5, 10, 10 and 15 cm) by the machine. The mine in position 5 (at 20 cm) was shattered. **Neither the working tool nor the machine was damaged.**



Figure 5 – PMA-2 mine prepared for testing

- c) **PMA-3** – 5 mines were placed at the planned depth (5, 10, 10, 15 and 20 cm) at 4 m distance and armed with appropriate fuses. **All mines were activated by the machine. There was no damage either to the working tool or to the machine.**



Figure 6 – PMA-3 mine prepared for testing

d) **PMR-2A:**

- **First mine** – was placed in front of the machine at around 8 m distance and armed with appropriate fuse. **The mine was shattered by the working tool (flail). Neither the working tool nor the machine was damaged.**
- **Second mine** – was placed in the same manner. **It was shattered by the working tool. Neither the working tool nor the machine was damaged.**



Figure 7 – Testing with PMR-2A mine



Figure 8 – Shattered remains of the PMR-2A mine

e) **PROM-1:**

- **First mine** was placed and prepared for tripwire activation. **The mine was activated** by the machine; **the working tool was damaged at some 20 spots** by mine fragments. **The flail cover was penetrated in three places.** **The machine was not damaged.**
- **Second mine** was placed and prepared for pressure activation. **The mine was activated** by the machine; **the working tool was damaged at some 20 spots** by mine fragments. **The machine was not damaged.**



Figure 9 – PROM-1 mine prepared for testing



Figure 10 – Remains of the activated PROM-1 mine

- f) **On 22.10.2004** the inspection was conducted on the test site, all the remains of the shattered mines were found, collected and destroyed.



Figure 11 – Damage on the flail inflicted by the PROM-1 mine

### 3.1.2. Testing with AT mines

**On 22.10.2004** from 9.00 to 12.00 hours testing was conducted as follows:

1. The machine was placed at the foreseen place, 1.5 m in front of it a TMRP-6 mine was armed and placed for tilt rod activation. The machine operator (and the Testing Committee members) entered armored supporting vehicle WOLF. The machine operator was supposed to operate the machine, which was supposed to destroy the placed mine with the flail. The machine operator was not able to turn the machine engine on or to operate the machine from the armored vehicle located some 200 m away from the „Samson 300“ machine. Several attempts were made. The operator turned the engine on from the cabin and then gradually moved away from the machine, but the remote controls did not function from this distance. He was trying for 2 hours and then I decided to stop

such work. I disarmed the TMRP-6 mine, cleaned it and returned it to the field storage place.

2. The noise inside the cabin and acceleration in the moment of activation of a TMA-3 mine set up in front of/bellow the flail was measured. The instruments for noise and acceleration measuring were prepared by the staff of the „Shipbuilding Institute “from Zagreb. The flail was raised for some 40 cm above the mine, and the TMA-3 mine was activated with an electronic detonator cap from the WOLF armored vehicle. Neither the machine nor the flail was damaged. The recorded data about the noise and acceleration will be submitted to HCR-CTRO after processing.
3. The mines which were not used (one TMM-1 and two TMRP-6) mines were returned to the Croatian Army warehouse in Jamadol for safekeeping until the „Samson 300“ machine is adapted for continuation of the tests.
4. **The foreseen testing with AT mines was not conducted because the remote control system was not prepared.**



Figure 12 – TMA-3 prepared for testing



Figure 13 – Measuring instruments inside the cabin for noise and acceleration measuring in the moment of a TMA-3 mine activation

On 05.11.2004 from 09<sup>00</sup> to 12<sup>00</sup> hours, the testing with AT mines was conducted as follows:

- a) **TMM-1** mine was placed in front of the working tool (in the middle part of the flail) at around 2 m distance, buried at a 10 cm depth and armed with appropriate fuse. **The mine was activated by the machine and the working tool. The machine and the flail had the following damage:**
- **4 chains with striker heads were knocked off**
  - **1 striker head was knocked off**
  - **the flail cover was deformed**
  - **the vegetation rod was deformed**



Figure 14 - The crater caused by the activation of a TMA-3 mine



Figure 15 – TMM-1 mine prepared for testing

b) **TMRP-6:**

- **The first mine** was placed in front of the working tool middle axle, at a distance of around 2 m, buried at a 10 cm depth and armed with appropriate

fuse for tilt road activation. **The mine was activated** by the working tool. **The following damage was caused to the machine and the working tool:**

- **The vegetation rod was broken in the middle**



Figure 16 – TMRP-6 mine prepared for tilt rod activation



Figure 17 – Damaged vegetation rod after TMRP-6 activation

- **The second mine** was placed in front of the working tool middle axle, at a distance of around 2 m, buried at a 10 cm depth and armed with appropriate fuse for pressure activation. **The mine was activated** by the working tool. **The following damage was caused to the machine and the working tool:**
  - **One chain with a striker head was knocked off**

### 3.2. Testing at test lanes

On 05.11.2004 the testing was conducted at the Cerovac test site for demining machines. The testing was conducted on three different soil types. Soil treatment depth was

measured as well as the machine movement speed. The following people were present: Ivan Šteker, Nikola Gambiroža and Željko Malinac, and Damir Lukić, representative of the “L.M.B.S.” company. **Before the testing, the machine was prepared on a leveled and compacted ground without vegetation, on a 50 m long lane, where the machine achieved the average soil processing depth of 19.00 cm (10 samples were taken), and completed the work in 5 minutes and 50 seconds.**

**1. Testing results at test lanes:**

<b>SOIL TYPES</b>	<b>average depth (cm)</b>	<b>time (minutes, seconds)</b>	<b>speed (km/h)</b>	<b>efficiency (m<sup>2</sup>/5h)</b>
TOP-SOIL	17.33	7 min 40 sec	0.392	5,194
SAND	19.33	6 min 5 sec	0.481	6,373
GRAVEL	19.33	5 min 55 sec	0.605	6,717



Picture 18 – Testing on the top-soil lane



Figure 19 – Testing on the sand lane



Figure 20 – Damaged fiberboard on the topsoil lane

### 3.3. Testing on a mine suspected area

In accordance with the Testing Plan, the testing was conducted on the following demining sites: „Islam Latinski Settlement – Area around the Cemetery“ (Code: PR-ZAPO-187-09-04) and „Kašić – Agricultural Land Toward Veljane Settlement – II part“ (code: PR-ZABE-172-09-04), in the total area of 50,844 m<sup>2</sup> in the duration of 33 hours and 5 minutes of effective work. This testing period lasted from 31 January to 7 February 2005.



Figure 21 – Damaged fiberboard on the sand lane



Figure 22 – Damaged fiberboard on the gravel lane

**On 31.01.2005** the machine was prepared for work and testing on the demining site „Islam Latinski Settlement“. After inspection of the machine and establishment of all the work site elements, the machine was working in the following conditions:

- Ground:
  - I. part was I. class, sand
  - II. part was II. class, wet loam
- Vegetation: low dry grass, 50-70 cm high
- Weather conditions: sunny, temperature 8-10<sup>0</sup> C



Figure 23 – „Samson 300“ at the beginning of the testing on a demining site

- Mine situation: - There are no minefield records
- The machine was working from 10:20 to 17:00, **4 hours and 45 minutes of effective work**
- **The machine treated 5,418 m<sup>2</sup> of ground, i.e. an average of 1,140.63 m<sup>2</sup>/h**
- **The soil treatment depth was measured on 30 samples, and the average depth was 21.9 cm**
- The machine did not activate any mines

- The machine work was stopped for 7 times: there were six 15-minute stand-stills due to traffic regulation and 1 stand still for fuel refill
- There was no malfunctioning or damage to the machine during the work. 3 striker heads were knocked off from the flail.
- There were no other Testing Committee members present than the testing leader



Figure 24 – Vegetation on the demining site

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	26.00	16.	17.00
2.	18.00	17.	12.00
3.	28.00	18.	19.00
4.	23.00	19.	17.00
5.	32.00	20.	15.00
6.	23.00	21.	17.00
7.	23.00	22.	18.00
8.	23.00	23.	21.00
9.	27.00	24.	24.00
10.	26.00	25.	19.00
11.	25.00	26.	17.00
12.	20.00	27.	29.00
13.	18.00	28.	27.00
14.	23.00	29.	28.00
15.	19.00	30.	23.00

Table 1 – Treatment depth on 31.01.2005



Figure 25 – The Demining site ground treated with the „Samson 300“ demining machine

On 01.02.2005 the „Samson 300“ machine continued the work on the same demining site and achieved the following results in the following conditions:

- Soil: I. – II. class, wet loam
- Vegetation: low dry grass, 50-70 cm high
- Weather conditions: sunny, mild wind, temperature 4-7 °C
- Mine situation: - no minefield records
- The machine was working from 07<sup>30</sup> to 15<sup>20</sup> hours,, **6 hours and five minutes of effective work**
- **The machine treated 7,773 m<sup>2</sup> of land, i.e. an average of 1,278.45 m<sup>2</sup>/h**
- **Soil treatment depth was measured in 30 samples, and the average depth was 24.46 cm**
- No mines were activated by the machine
- The work had to be stopped 7 times because of the traffic regulation
- There were no other Testing Committee members present except for the testing leader

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	25.00	16.	21.00
2.	18.00	17.	27.00
3.	30.00	18.	29.00
4.	19.00	19.	30.00
5.	20.00	20.	28.00
6.	22.00	21.	27.00
7.	28.00	22.	29.00
8.	27.00	23.	23.00
9.	28.00	24.	26.00
10.	20.00	25.	24.00
11.	19.00	26.	24.00
12.	26.00	27.	28.00
13.	21.00	28.	26.00
14.	20.00	29.	22.00
15.	27.00	30.	20.00

Table 2 – Soil treatment depth on 01.02.2005

On 02.02.2005 the machine was moved to another demining site entitled „Kašić – Agricultural Land Toward Veljane Settlement“, project code: PR-ZABE-172-09-04, where it accomplished the following results:

- Soil: I. class, sand
- Vegetation: low dry grass, 30-50 cm high
- Weather conditions: sunny, windy, temperature around 10 °C
- Mine situation: - there are no minefield records
- The machine was working from 08<sup>00</sup> to 17<sup>00</sup> hours, **4 hours and 20 minutes of effective work**
- **The machine treated 9,065 m<sup>2</sup> of land, i.e. the average of 2,093.53 m<sup>2</sup>/h**
- **Soil treatment depth was measured in 30 samples, and the average depth was 20.66 cm**
- No mines were activated by the machine
- The work had to be stopped 3 times for the purpose of removing the wire wrapped around the flail. At 14:00 o'clock the oil started leaking at a joint of a hydraulic hose. After a washer was changed and the machine worked for 20 minutes, the oil started leaking again and the rest of the time was spent in finding the original washer.
- There were no other Testing Committee members present except for the testing leader



Figure 26 – chains with striker heads

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	22.00	16.	22.00
2.	21.00	17.	21.00
3.	20.00	18.	24.00
4.	21.00	19.	22.00
5.	22.00	20.	16.00
6.	23.00	21.	20.00
7.	19.00	22.	19.00
8.	26.00	23.	17.00
9.	18.00	24.	20.00
10.	24.00	25.	22.00
11.	20.00	26.	20.00
12.	21.00	27.	21.00
13.	18.00	28.	20.00
14.	22.00	29.	19.00
15.	19.00	30.	21.00

Table 3 – Soil treatment depth on 02.02.2005.

**On 03.02.2005** the machine continued working on the same demining site with the following conditions and results:

- Soil: I. class, sand
- Vegetation: low dry grass, up to 40 cm high
- Weather conditions: sunny, occasional wind, temperature 5-9 °C
- Mine situation: - There are no minefield records
- The machine was working from 10<sup>00</sup> to 17<sup>00</sup> hours, **4 hours and 35 minutes of effective work**
- **The machine treated 9,958 m<sup>2</sup> of land, i.e. an average of 1,784.58 m<sup>2</sup>/h**
- **The soil treatment depth was measured in 30 samples, and the average depth was 20.63 cm**
- No mines were activated by the machine
- The work had to be stopped 3 times for the purpose of removing the wire wrapped around the flail and once for the fuel refill.
- From 07<sup>30</sup> to 10<sup>00</sup> the machine was repaired, i.e. the washer on the hydraulic hose junction was being replaced.
- There were no other Testing Committee members present except for the testing leader

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	22.00	16.	22.00
2.	16.00	17.	19.00
3.	15.00	18.	22.00
4.	25.00	19.	25.00
5.	21.00	20.	17.00
6.	24.00	21.	20.00
7.	21.00	22.	18.00
8.	27.00	23.	19.00
9.	22.00	24.	19.00
10.	22.00	25.	16.00
11.	17.00	26.	20.00
12.	22.00	27.	24.00
13.	17.00	28.	19.00
14.	17.00	29.	24.00
15.	21.00	30.	26.00

Table 4 – Soil treatment depth on 03.02.2005

**On 04.02.2005** the machine continued working on the same demining site with the following conditions and results:

- Soil: I. class, sand
- Vegetation: low dry grass, up to 40 cm high
- Weather conditions: sunny, windy, temperature around 3 °C
- Mine situation: - There are no minefield records
- The machine was working from 08<sup>00</sup> to 17<sup>00</sup>, **effectively for 4 hours and 25 minutes**
- **The machine treated 7,215 m<sup>2</sup> of land, i.e. the average of 1,632.35 m<sup>2</sup>/h**

- **The soil treatment depth was measured in 30 samples, and the average depth was 26.20 cm**
- No mines were activated by the machine
- The work was stopped 3 times in order to repair the hydraulics malfunctioning, i.e. to replace the washer because the oil was leaking at one hydraulic hose junction.
- There were no other Testing Committee members present except for the testing leader

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	26.00	16.	28.00
2.	28.00	17.	17.00
3.	27.00	18.	25.00
4.	30.00	19.	23.00
5.	31.00	20.	29.00
6.	26.00	21.	22.00
7.	31.00	22.	26.00
8.	31.00	23.	26.00
9.	24.00	24.	22.00
10.	27.00	25.	26.00
11.	31.00	26.	28.00
12.	26.00	27.	25.00
13.	23.00	28.	18.00
14.	29.00	29.	26.00
15.	30.00	30.	25.00

Table 5 – Soil treatment depth on 04.02.2005

**On 05.02.2005** the machine continued working on the same demining site with the following conditions and results:

- Soil: I. class, sand
- Vegetation: low dry grass, up to 40 cm high
- Weather conditions: sunny, windy, temperature around 2-7 °C
- Mine situation: - there are no minefield records
- The machine was working from 08<sup>00</sup> to 16<sup>30</sup> hours, **effectively for 4 hours and 35 minutes**
- **The machine treated 6,163 m<sup>2</sup> of land, i.e. an average of 1,345.63 m<sup>2</sup>/h**
- **The soil treatment depth was measured in 30 samples, and the average depth was 26.40 cm**
- No mines were activated by the machine
- The work was stopped 2 times due to the air filter cleaning and fuel fill up
- At the end of the day, during the last hour of work, 42 striker heads fell of the flail
- There were no other Testing Committee members present except for the testing leader

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	19.00	16.	22.00
2.	29.00	17.	22.00
3.	25.00	18.	22.00
4.	26.00	19.	30.00
5.	25.00	20.	32.00
6.	29.00	21.	29.00
7.	28.00	22.	29.00
8.	22.00	23.	30.00
9.	16.00	24.	30.00
10.	18.00	25.	32.00
11.	20.00	26.	32.00
12.	19.00	27.	31.00
13.	32.00	28.	31.00
14.	26.00	29.	26.00
15.	30.00	30.	30.00

Table 6 – Soil treatment depth on 05.02.2005

On 06.02.2005 the machine continued working on the same demining site and achieved the following results:

- Soil: I. class, sand
- Vegetation: low dry grass, up to 40 cm high
- Weather conditions: sunny, windy, temperature around 0-3<sup>0</sup> C
- Mine situation: - there are no minefield records
- The machine was working from 08<sup>00</sup> to 09<sup>00</sup> hours, **effectively for 40 minutes**
- **The machine treated 940 m<sup>2</sup> of land, i.e. the average of 1,411.41 m<sup>2</sup>/h**
- **The soil treatment depth was measured in 30 samples, and the average depth was 23.80 cm**
- No mines were activated by the machine
- The machine had to stop working because the right hand site flail belt had broken and there was no possibility to replace it immediately (it was Sunday and the shops were closed). A new belt was ordered from the „VILPO“ Ljubljana company, which designed and manufactured the machine.
- There were no other Testing Committee members present except for the testing leader

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	26.00	6.	25.00
2.	26.00	7.	19.00
3.	25.00	8.	23.00
4.	21.00	9.	25.00
5.	27.00	10.	21.00

Table 7 – Soil treatment depth on 06.02.2005

On 07.02.2005, after the flail belt was replaced, the machine continued working on the same demining project and achieved the following results:

- Soil: I. class, sand
- Vegetation: low dry grass, up to 40 cm high
- Weather conditions: sunny, windy, temperature around 9 °C
- Mine situation: - there are no minefield records
- The machine was working from 13<sup>50</sup> to 17<sup>00</sup>, **effectively for 2 hours and 40 minutes**
- **The machine treated 4,312 m<sup>2</sup> of land, i.e. the average of 1,621.05 m<sup>2</sup>/h**
- **The soil treatment depth was measured in 20 samples, and the average depth was 24.10 cm**
- No mines were activated by the machine
- There were no break-downs during the machine work. There were two stand-stills due to removing the wrapped up wire from the flail.
- There were no other Testing Committee members present except for the testing leader
- **As of today, the total treated area on demining site was 50,844 m<sup>2</sup>, which means that the foreseen plan of 50,000 m<sup>2</sup> work on demining sites during the tests was fulfilled.**

No.	DEPTH (cm)	No.	DEPTH (cm)
1.	23.00	11.	24.00
2.	25.00	12.	24.00
3.	26.00	13.	30.00
4.	25.00	14.	26.00
5.	24.00	15.	21.00
6.	24.00	16.	27.00
7.	27.00	17.	25.00
8.	24.00	18.	20.00
9.	21.00	19.	27.00
10.	20.00	20.	19.00

Table 8 – Soil treatment depth on 07.02.2005

During the testing on demining site, the machine was operated by Mr. Esad Pršić, and the representative of the L.M.B.S. d.o.o. Zagreb company was Mr. Siniša Mohač, who was present during the entire testing.

### 3.4. Deminers' inspection of the mine suspected area processed by the machine

After completion of work of the „Samson 300“ machine on demining sites, in accordance with safety conditions and work site organization, the “L.M.B.S.” company deminers, applying a manual method (using a metal detector and a prodder) performed the inspection of the area processed by the machine as follows:

- a) On the „Islam Latinski Settlement – area around the cemetery“ demining site, code: PR-ZAPO-187-09-04

No.	Date	Number of deminers	Number of working hours(h)	Inspected area (m <sup>2</sup> )
1.	02.02.2005.	9	45	2,700
2.	03.02.2005.	9	45	3,557
3.	04.02.2005.	9	45	3,405
4.	05.02.2005.	9	45	3,435
		<b>TOTAL</b>	<b>180</b>	<b>13,097</b>

Table 9 – Deminers' inspection of mechanically processed ground on Islam Latinski demining site



Figure 27 – Deminer's inspection of mechanically treated ground

- b) On the „Kašić – Agricultural Area Toward Veljane Settlement – II part“ demining site, code: PR – ZABE – 172 – 09 – 04

No.	Date	Number of deminers	Number of working hours(h)	Inspected area (m <sup>2</sup> )
1.	06.02.2005.	11	55	4,063
2.	07.02.2005.	14	70	4,674
3.	08.02.2005.	15	75	5,562
4.	09.02.2005.	15	75	5,614
5.	10.02.2005.	15	75	5,865
6.	11.02.2005.	15	75	5,951
7.	12.02.2005.	15	75	5,651
8.	13.02.2005.	1	5	400
		<b>TOTAL</b>	<b>505</b>	<b>37,780</b>

Table 10– Deminers' inspection of mechanically processed ground on the Kašić demining site

### 3.5. Testing participants list

1. **Ivan Šteker**, HCR-CTRO
2. **Nikola Gambiroža**, HCR
3. **Zlatko Vukelić**, HCR
4. **Željko Malinac**, HCR
5. **Damir Lukić**, «L.M.B.S.»d.o.o.-Zagreb
6. **Siniša Mohač**, «L.M.B.S.»d.o.o.-Zagreb
7. **Esad Pršić**, «L.M.B.S.»d.o.o.-Zagreb
8. **Damir Antunović**, «L.M.B.S.»d.o.o.-Zagreb
9. **Stjepan Španić**, «L.M.B.S.»d.o.o.-Zagreb
10. **Dražen Špoljar**, «L.M.B.S.»d.o.o.-Zagreb
11. **Josip Selinger**, «L.M.B.S.»d.o.o.-Zagreb
12. **Tomislav Bevc**, «L.M.B.S.»d.o.o.-Zagreb
13. **Marin Stefanović**, «L.M.B.S.»d.o.o.-Zagreb
14. **Veljko Esondić**, «L.M.B.S.»d.o.o.-Zagreb
15. **Ivica Ferenc**, «L.M.B.S.»d.o.o.-Zagreb
16. **Krešo Polaček**, «L.M.B.S.»d.o.o.-Zagreb
17. **Darije Zormančić**, «L.M.B.S.»d.o.o.-Zagreb
18. **Zoran Gjurkinjak**, «L.M.B.S.»d.o.o.-Zagreb
19. **Branko Matijević**, «L.M.B.S.»d.o.o.-Zagreb
20. **Ivan Arapović**, «L.M.B.S.»d.o.o.-Zagreb
21. **Branimir Surhić**, «L.M.B.S.»d.o.o.-Zagreb
22. **Darko Tonžetić**, «L.M.B.S.»d.o.o.-Zagreb
23. **Josip Felinger**, «L.M.B.S.»d.o.o.-Zagreb
24. **Alan Štimac**, «Shipbuilding Institute» , Zagreb
25. **Josip Mučnjak**, «Shipbuilding Institute», Zagreb

## 4. TESTING RESULTS

### 4.1. Testing results with AP and AT mines

The following results were achieved in the testing with live mines:

#### a) Blast AP mines

MINE TYPE	BURIAL DEPTH (cm)				
	5	10	10	15	20
PMA-1A	A	A	S	A	A
PMA-2	A	A	A	A	S
PMA-3	A	A	A	A	A

Table 11- Testing results with blast AP mines

A= activated

S= shattered

- 15 mines were placed
- **13 mines were activated**

- **3 mines were shattered**
- **There was no damage to the working tool or to the machine**

**b) Fragmentation AP mines**

<b>MINE TYPE</b>	<b>1. mine</b>	<b>2. mine</b>
<b>PMR-2A</b>	<b>S</b>	<b>S</b>
<b>PROM-1</b>	<b>A</b>	<b>A</b>

Table 12- Testing results with fragmentation AP mines

- 4 mines were placed
- **2 mines were activated**
- **2 mines were shattered**
- The flail was dented at several spots, but this damage has no impact on the operational characteristics of the machine and the working tool

**c) Antitank mines**

- **TMM-1 mine was activated by the flail, causing the following damage to the flail:**
  - 4 chains with striker heads were knocked off
  - 1 striker head was knocked off
  - The flail cover was deformed
  - The vegetation rod was deformed
- **TMRP-6 (pressure activation): the flail activated the mine,** causing the following damage to the machine and the flail:
  - 1 chain with a striker head was knocked off
- **TMRP-6 (tilt rod activation): the mine was activated** causing the following damage to the machine and the flail
  - The vegetation rod broke in the middle
- **TMA-3:**

❖ **Measurement process description:** - In accordance with the requirements listed in the norm, measuring devices were installed inside the cabin. The top level of noise produced by the impact wave in the demining machine cabin, as well as mechanical acceleration in the three directions (x, y, z) on the cabin floor and the seat were measured. The signals from measuring transformers (microphones and acceleration meters) were recorded on a magnetoscope and analyzed later in a laboratory. The evaluation of results was conducted in accordance with: FMV – The Swedish Defence Material Administration – Mine Clearance Vehicles; Crew Safety Standard» (1).

❖ **Measuring results:**

- **NOISE** – The top noise measuring results in the machine cabin are shown in Figure 1. The measured top value was 155 dB re 20 Pa, and the signal duration (B-duration) of 40 mS.

- **MECHANICAL IMPACT** – the value of the top acceleration levels is shown in the table. The picture shows the example of the time flow of the impact in the z-axis of the cabin floor.
- **CONCLUSION: The top noise level indicates the necessity to use protective devices (ear protection). The acceleration level is such that it does not cause any injuries to the spine and foot/leg ankle.**
- **Detailed Report is kept in the HCR-CTRO d.o.o. evidence**

#### 4.2. Testing results at test lanes

Soil type	Average depth (cm)	Time (minutes, seconds)	Machine movement speed (km/h)	Efficiency (m <sup>2</sup> /5h)
Topsoil	17.33	7 min 40 sec	0.392	5,194
Sand	19.33	6 min 5 sec	0.481	6,373
Gravel	19.33	5 min 55 sec	0.605	6,717

Table 13 – Testing results at test lanes

#### 4.3. Acceptance tests results

The following results were obtained in the testing on demining sites:

##### 4.3.1. The surface of the processed area

No.	Date	Effective time (h)	PROCESSED AREA (m <sup>2</sup> )
1.	31.01.2005.	4 hours 45 min	5,418
2.	01.02.2005.	6 hours 05 min	7,773
	<b>TOTAL</b>	<b>10 hours 50 min</b>	<b>13,191</b>

Table 14- Processed area at Islam Latinski demining site

No.	Date	Effective time (h)	PROCESSED AREA (m <sup>2</sup> )
1.	02.02.2005.	4 hours 20 min	9,065
2.	03.02.2005.	5 hours 35 min	9,958
3.	04.02.2005.	4 hours 25 min	7,215
4.	05.02.2005.	4 hours 35 min	6,163
5.	06.02.2005.	0 hours 40 min	940
6.	07.02.2005.	2 hours 40 min	4,312
	<b>TOTAL</b>	<b>22 hours 15 min</b>	<b>37,653</b>

Table 15- The surface area processed on the Kašić demining site

No.	Demining site	Effective time (h)	PROCESSED AREA (m <sup>2</sup> )
1.	Islam Latinski	10 hours 50 min	13,191
2.	Kašić	22 hours 15 min	37,653
	<b>TOTAL</b>	<b>33 hours 05 min</b>	<b>50,844</b>

Table 16 – Total surface area processed on demining sites

The following facts can be observed from the above tables:

- The machine was working for a total of **8 working days**
- The machine was effectively working for **33 hours and 5 minutes**
- The overall surface area processed by the machine is **50,844 m<sup>2</sup>**
- The average surface area processed in 1 working hour was **1,537.00 m<sup>2</sup>/h**
- During a 5-hour shift, the **average surface area processed was 6,916.50 m<sup>2</sup>/5h** (including a 30 minutes break).
- **On the I. class soil, the average efficiency is 6,000 – 8,000 m<sup>2</sup>/5h**
- There were standstills due to traffic regulation, removing the wire wrapped up around the flail and fuel refill. Two malfunctioning (oil leak at a hydraulic hose junction and breaking of the flail belt) were repaired at the demining site.
- The soil was flat, without slopes, I. class, sand (except in a smaller part in Islam Latinski). Vegetation was low and dry grass. There were no minefield records, the machine did not detonate any mines.

#### 4.3.2. Soil treatment depth

The soil treatment depth was measured in a flat processed part of the land at 210 samples, and the results were the following:

No.	Date	Number of samples	Average depth (cm)
1.	31.01.2005.	30	<b>21.90</b>
2.	01.02.2005.	30	<b>24.46</b>
3.	02.02.2005.	30	<b>20.66</b>
4.	03.02.2005.	30	<b>20.63</b>
5.	04.02.2005.	30	<b>26.20</b>
6.	05.02.2005.	30	<b>26.40</b>
7.	06.02.2005.	10	<b>23.80</b>
8.	07.02.2005.	20	<b>24.10</b>
	<b>TOTAL</b>	<b>210</b>	<b>23.52</b>

Table 17- Average soil treatment depth

The **average soil treatment depth** in 210 samples is **23.52 cm**. The largest depth measured was 32 cm and the smallest 12 cm.

#### Deminers' inspection of mechanically processed land

**Total in the two demining projects:**

No.	Demining site	Number of working days	Number of working hours (h)	Inspected area (m <sup>2</sup> )
1.	Islam Latinski	4	180	<b>13,097</b>
2.	Kašić	8	505	<b>37,780</b>
	<b>TOTAL</b>	<b>12</b>	<b>685</b>	<b>50,877</b>

Table 18 – Deminers' inspection of mechanically treated land on demining sites

The tables about deminers' inspection of mechanically treated land show the following:

- There were **12 working days**
- The machine **worked for 685 hours**
- **50,877 m<sup>2</sup> were inspected**
- No remains of mines were found during the inspection
- The number of false alarms on metal detectors was very high because there was a certain quantity of wire on the land, which the machine partly cut in pieces.
- The average surface area inspected by one deminer's shift was **371.35 m<sup>2</sup>/1 deminer/5 h**
- Efficiency of one deminer in inspection of mechanically processed land of I. class is **350-450 m<sup>2</sup>/1 deminer/5h**

## 5. Draft usability evaluation

On the basis of this Testing report and on Article 5.6 of the “Program of the Testing and Usability Evaluation of the Machines used in Humanitarian Demining”, **we propose:**

### THE USABILITY EVALUATION OF THE “SAMSON 300” DEMINING MACHINE

1. It is well-suited for the mechanical processing of a mine suspected area
2. It can be used on a terrain with a soil class ranging from I to III
3. It removes low, medium and high vegetation successfully
4. It destroys all types of antipersonnel and antitank mines successfully
5. The machine operator may work from the cabin (direct operation) or from outside (remote controls operation). In the later case, the operator should wear protective equipment and should be standing at a minimum distance of 200 m to the machine or in an armored vehicle at a minimum distance of 50 m to the machine.
6. The machine operator is not allowed to walk on the terrain processed by the flail until the deminer's inspection of the terrain is performed.
7. The noise inside the cabin and the speed of the front part of the machine in the moment of a TMA-3 mine activation is within permitted limits and there is no danger for the health of the machine operator inside the cabin. It is recommended that the operator wears ear protection.
8. The results on the test lanes are the following:

SOIL TYPE	Average depth (cm)	Time (minutes, seconds)	Speed of motion of the machine (km/h)	Potential capacity (m <sup>2</sup> /h)
TOPSOIL	17.33	7 min 40 sec	0.392	5,194
SAND	19.33	6 min 5 sec	0.481	6,373
GRAVEL	19.33	5 min 55 sec	0.605	6,717

9. During the operational testing in the demining project, the results were as follows:
  - Terrain: I class, flat, without slopes

- **Vegetation: low dry grass, 30-70 cm high**
- **Average efficiency: 1,537.00 m<sup>2</sup>/h**
- **Average depth: 23.52 cm**

**10. Once a mined area is processed mechanically using the “Samson 300” flail, application of a second method of deminer’s inspection is obligatory. Daily efficiency per deminer during a 5-hours shift is 350-450 m<sup>2</sup>/5h.**

**Given the current technical solutions, and based on the testing results as well as on the criteria of the “Program of Testing and Usability Evaluation of the Machines Used in humanitarian demining”, the machine may be used, with its flail, for performing humanitarian demining tasks in the Republic of Croatia.**

Sisak, 15. February 2005

**Ivan Šteker, M.A.**