

## COMBINED SYSTEMS AND DUAL CAPABILITY FLAIL OR TILLER | MEDIUM SIZE | MACROHARD MH-05

Macrohard Mechanic d.o.o. | Bosnia and Herzegovina

### GENERAL DESCRIPTION

The *Macrohard Mechanic MH-05* is built on the chassis of an armoured personnel carrier but all other parts, structure and systems are new. The medium-size machine is designed to detonate or destroy all types of AP and AV mines. It has two replaceable work tools, a tiller and a flail. The standard crew of three men needs around one hour to replace the tools in the field.

The driver's cabin is armoured with 13 mm Armox steel and the windows are of 46 mm protective glass. There are two doors on the cabin, in case the vehicle overturns.

Clearance operation is controlled manually and a ground penetration depth up to 30 cm can be achieved by both the tiller and the flail, depending on soil conditions. The machine is operated by only one joystick and works at between 0.2 and 2 km/h. The MH-05 base vehicle can be transported with an ordinary truck trailer if the flail or tiller attachment is dismantled.



MACROHARD MH-05 | With flail and cabin detail

### CLEARANCE METHODOLOGY

The tiller's work spindle has two spirals of 36 hard metal chisels each. The working width is 3.06 m, with a clearance depth up to 30 cm. The tiller drum diameter is 80 cm and it rotates at up to 400 rpm. Tiller clearance speed is 3,360 m<sup>2</sup>/h (as measured by BHMACH while issuing accreditation).

The flail has 72 chains rotating at up to 550 rpm. Each chain has a 60 mm diameter hammer (mushroom-shaped) attached to the end to detonate or break up AP or AV mines. The chains are 500 mm with the hammer and are set 41 mm apart. The flail's working width is 2.97 m and its maximum clearance depth, depending on soil conditions, is 30 cm. The flail's clearance speed is 2,400 m<sup>2</sup>/h (as measured by BHMACH while issuing accreditation).

## **MACHINES IN USE TO DATE**

Seven machines are currently in use, five in Bosnia and Herzegovina and two in Sudan. In B&H, two belong to NGOs, two to the armed forces and one to the Macrohard Mechanic company.

## **ENGINE, FUEL AND OIL**

The V-55 diesel engine, which originally produced 426 kw per 2,000 rpm, has been adjusted to new needs and now produces 300 kw per 1,800 rpm. There is a spare engine power of 126 kw. The engine is constructed to work under difficult dusty conditions. Fuel consumption is 35 - 40 litres per hour. The machine uses normal hydraulic oil.

## **FACTORY SUPPORT**

Spares for the MH-05 are provided directly by Macrohard Mechanic. A package of training, spare parts and equipment support is negotiable with the manufacturer. Instruction manuals are available in English and Serbo-Croatian.

## **MAINTENANCE AND SUPPORT**

Daily, weekly and monthly maintenance checks are laid down in the standard operating procedures. Preventive daily maintenance checks and servicing takes two mechanics about one hour to complete. A two-man crew is recommended. The MH-05 is supported by a mobile maintenance vehicle on site. A one-year warranty is provided.

## **TESTS AND EVALUATIONS**

The machine was tested and certified by the Bosnia and Herzegovina Mine Action Center (BHMACH). The machine is accredited for ground preparation and technical survey operations.

## **REPORTED LIMITATIONS AND STRENGTHS**

### **Limitations**

- > It creates huge dust clouds, as with all flail systems in dry environments.

### **Strengths**

- > Combined system: tiller or flail can be interchanged.

**DIMENSIONAL DATA**

1. Length without attachment	5,000 mm
2. Length total	6,500 mm
3. Width without attachment	2,600 mm
4. Width total	4,000 mm
5. Clearing   Working width	3,000 mm
6. Height   Overall	3,200 mm
7. Mass   Basic vehicle	12,000 kg
8. Mass   Detachable unit(s)	2,500 kg
9. Mass   Overall	14,500 kg

**OPERATIONAL DATA**

10. Wheels   Tracks (description)	The track with an elastic suspension
11. Ground Bearing Pressure (kPa)	70
12. Hill climbing ability (in degrees)	25°
13. Number of Chains   Chisels   Tools	72   72
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	1,500 - 3,000 hits per m <sup>2</sup>
15. Length of Chains   Tools	500 mm
16. Diameter of flail drum	Flail: 1,300 mm   Tiller: 800 mm
17. Rotation Speed	Flail: 0 - 550 rpm   Tiller: 0 - 400 rpm
18. Clearance   Working depth in varying terrain	Flail and tiller: 300 mm
19. Working Speed (m <sup>2</sup> /h)	
> Light Soil   Medium Vegetation	Flail 2,700   Tiller 3,500 m <sup>2</sup> /h
> Medium Soil   Medium Vegetation	Flail 1,500   Tiller 2,000 m <sup>2</sup> /h
> Heavy Soil   Dense Vegetation	Flail 900   Tiller 1,200 m <sup>2</sup> /h
20. Control of Clearance   Working depth	Mechanical – front ski
21. Additional attachable working tools	No
22. Armour	AB 13 mm ARMOX
23. Remote controlled	No
> greatest distance	
24. Transportation	
> short distances	Truck trailer
> long distances	
> sea transport	
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	7
26. Other types	No
27. Location of use	Bosnia and Herzegovina, Sudan
28. Totally cleared so far (m <sup>2</sup> )	6,000,000 m <sup>2</sup>

## ENGINE | FUEL | OIL

29. Engine	V, 12 cylinders, diesel
30. Engine power at the flywheel	300 kw
31. Sufficient power supplied to working tool	240 kw
32. Fuel capacity	450 l
33. Fuel consumption	35 - 40 l/h
34. Separate engine for working unit	No
35. Cooling system	Water
36. Oil capacity (both engines)	80 l
37. Hydraulic oil capacity (both engines)	600 l

## COSTS

38. Cost of system	Negotiable
39. Other costs	
> training	Negotiable
> spare part set chains   belts	Negotiable
40. Availability for hire	Yes

## OTHER

41. Operator comfort	The cabin is air-conditioned, upholstered, the seat has the spring shock absorber and safety belt, driving with one joystick, clear view insured through 4 armoured panes on each side of the cabin one respectively.
42. Air conditioning	Yes