

A/S Hydrema Denmark | Denmark

### GENERAL DESCRIPTION

The *Hydrema 910 MCV-2* is a flail system designed for clearing surface or buried AP or AV mines containing up to 10 kg of explosives. The system is an upgraded version of the 910 MCV, based on the pivot chassis of a commercial dumper. The running gear consists of four wheels on two axles. The machine has two 136 kw diesel engines. After thorough modifications, the flail can now be powered by both engines at the same time. In this case, 272 kw can be brought to bear for flailing operations. During transportation, the flail unit is mounted on the platform to the rear of the cab.



HYDREMA | Flail in action

The driving speed on paved roads is up to 35 km/h. The system can be transported by loader vehicle, by rail or airlifted in a Hercules C-130. The vehicle requires one operator or can be optionally operated by a remote control system. For self-recovery, a winch is attached at the front of the vehicle.

The latest version of the Hydrema 910 (Series 2) features comprehensive modifications such as improved air filters and chains, a new depth regulation control system, automatic crawling function and improved engine cooling system.

The cabin of the Series 2 was modified and is now protected by 14 mm Armox thus it can withstand an AV mine detonating underneath of one of the front wheels.

## CLEARANCE METHODOLOGY

Transformation of the flail unit from its road transport position to working configuration can be achieved in approximately five minutes using a special tilting/turning system, hydraulically operated from the cab. The vehicle moves in reverse when working. Pivot steering is designed to ensure that the front and rear wheels move in the same track. The 72 chains of the 3.5 m-wide flail shaft rotate clockwise at up to 440 rpm. The flail action should detonate or break up AP and AV mines. Direction of rotation can be reversed. Effective ground penetration depth is up to 250 mm (up to 400 mm in sandy soil) and can be controlled automatically. The Series 2 machine is equipped with a yaw control designed to prevent ridges of earth forming in a cleared lane. The deflector plate is of armoured steel and protects against blast and fragments. The operator can manually control the vehicle using a joystick or select a computerised automatic pilot steering system.

The improved depth regulation system and the automatic adjustable “crawling system” achieve faster and more effective clearance, according to the manufacturer. The power on the flail unit has been increased significantly (by 30-40%).



HYDREMA | View of the front

### **MACHINES IN USE TO DATE**

Hydrema says there are 54 machines in service with armed forces or mine clearance organisations.

Three systems were in service with the US military clearing Bagram airfield in Afghanistan.

A Danish platoon equipped with two 910 MCV-2 machines is involved in clearance operations at Kabul airport.

Since 2003, 24 machines have been in service to clear the majority of the minefields in a broad zone in Kashmir.

### **ENGINE, FUEL AND OIL**

Average fuel consumption is 60 litres per hour, according to the manufacturer. Oil used in the engine and the hydraulic systems is of general standard.

### **FACTORY SUPPORT**

Spare parts (NATO-codified) sufficient for a two-year operation are part of the normal purchase package. Training courses for operators and mechanics are part of the purchase package. Instruction manuals and documentation are available in English, Danish and Russian.

### **MAINTENANCE AND SUPPORT**

The recommended level of maintenance required is similar to standard commercial engineering construction machines. Since 2005, a team of specially trained Hydrema technicians has been available for worldwide service on request.



HYDREMA | Moving flail unit from transport to clearance position



HYDREMA | Flail unit ready to clear

## TESTS AND EVALUATIONS

- > G. Danielsson, *Hydrema 910 MCV*, by SWEDEC, 2004. The machine was tested on its performance, or effectiveness against AP surrogates targets with live mine fuzes and AT mine surrogate targets with live mine igniters. One test report is available at the website: [www.itep.ws](http://www.itep.ws).
- > Croation Mine Action Centre (CROMAC), Demining Machine Testing Committee: *Possible Effects of Tested Demining Machines, Appendix to CROMAC SOP 05.01: Efficiency Assessment of Technical Survey and Demining, 2007*. Test report is available at the website: [www.hcr.hr](http://www.hcr.hr).

## REPORTED LIMITATIONS AND STRENGTHS

### Limitations

- > As with all flail systems, the Hydrema tends to create lots of dust during operations.

### Strengths

- > Easily deployed to the area of operations and ready to operate in around five minutes.
- > Changing flail rotation direction permits clearance of roads and areas with hard surfaces.
- > Equipped with two engines for driving and flailing.
- > Pivot steering enables the vehicle to drive with front and rear wheels in the same track.
- > Can be transported by trailer, train or plane.

## DIMENSIONAL DATA

1. Length without attachment	9,200 mm
2. Length total	10,000 mm
3. Width without attachment	Transportation position 2,780 mm
4. Width total	2,420 mm
5. Clearing   Working width	4,830 mm
6. Height   Overall	3,600 mm
7. Mass   Basic vehicle	Not given
8. Mass   Detachable unit(s)	Not given
9. Mass   Overall	18,000 kg

## OPERATIONAL DATA

10. Wheels   Tracks (description)	4 standard tyres Goodyear RL-2+17.5R25 foam filled
11. Ground Bearing Pressure (kPa)	Not given
12. Hill climbing ability (in degrees)	34°
13. Number of Chains   Chisels   Tools	72
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	Not given
15. Length of Chains   Tools	900 mm
16. Diameter of drum	Not given
17. Rotation Speed	440 rpm
18. Clearance   Working depth in varying terrain	Up to 40 cm in sandy soil
19. Working Speed (m <sup>2</sup> /h)	400-800 m <sup>2</sup> /h
> Light Soil   Medium Vegetation	
> Medium Soil   Medium Vegetation	
> Heavy Soil   Dense Vegetation	
20. Control of Clearance   Working depth	Computer controlled
21. Additional attachable working tools	
22. Armour	Not given
23. Remote controlled	Yes optional
> greatest distance	Not given
24. Transportation	
> short distances	Maximum 40 km/h on own wheels
> long distances	
> sea transport	
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	80
26. Other types	Series 1
27. Location of use	Afghanistan, Angola, Bosnia and Herzegovina, Croatia, boarder area between Pakistan and India, Denmark (army), India, Kosovo, Mozambique, Norway, United Arab Emirates
28. Totally cleared so far (m <sup>2</sup> )	Not given

## ENGINE | FUEL | OIL

29. Engine	Perkins 1006-6TW, 6 cylinder diesel with turbocharger
30. Engine power at the flywheel	Not given
31. Sufficient power supplied to working tool	Hydrostatic transmission
32. Fuel capacity	600 l
33. Fuel consumption	60 l/h
34. Separate engine for working unit	Yes, the same engine as for driving
35. Cooling system	Driving engine is mounted with reversible propellers and increased cooling capacity and is additionally used as power pack increasing the power of the flail unit
36. Oil capacity (both engines)	Not given
37. Hydraulic oil capacity (both engines)	Not given

## COSTS

38. Cost of system	On request and depending on the configuration
39. Other costs	
> training	Negotiable
> spare part set chains   belts	Not given
> repair costs for one year	Not given
36. Availability for hire	Negotiable

## OTHER

41. Operator comfort	Not given
42. Air conditioning	Yes