

## COMBINED SYSTEMS AND DUAL CAPABILITY FLAIL OR TILLER | MEDIUM SIZE | MINI MINEWOLF

MineWolf Systems AG. | Switzerland and Germany

### GENERAL DESCRIPTION

The *Mini MineWolf* has been developed by MineWolf Systems, a Swiss-German provider of mechanical mine clearance machines. It is a medium class (8 tonnes) remote-controlled mechanical demining machine combining flail or tiller. Both applications withstand AP and AV mine detonations. The undercarriage and chassis are protected by Hardox armour plates. The easily interchangeable tiller and flail units are designed so that detonations cause minimum damage to the working tool. With its highly reliable 240 hp Deutz diesel engine and enhanced filtering and cooling instalments the vehicle can withstand extreme conditions of hot, cold, dry and dusty environments.

Output has been recorded at 5,000 m<sup>2</sup> to 12,000 m<sup>2</sup> per day depending on the conditions (Class I to Class IV terrain with slopes up to 35°). Clearance width is 1,860 mm (optional: 2,000 mm).

Standard features include automatic depth control, hydraulic winch and fire-fighting system. The system is designed for 20 ft container transport by road, rail, ship or air. A standard low-loader or 6 x 6 truck can be used for transporting between worksites.



MINI MINEWOLF | With tiller attachment

### CLEARANCE METHODOLOGY

The tiller has 40 teeth mounted on an open-basket drum which rotates in the driving direction with a speed of 500-800 rpm. It is designed so that every piece of ground is processed in a tight pattern to a depth up to 25 cm, depending on machine speed and soil conditions.

A flail with 26 chains with hammers can be attached. The system is effective against vegetation up to 15 cm diameter. Automatic depth control facilitates consistent ground penetration quality.

## **MACHINES IN USE TO DATE**

Since 2006 when the machine was introduced, a substantial number of Mini MineWolfs have been produced and deployed in the following countries: Afghanistan, Bosnia and Herzegovina, Colombia, Croatia, Congo, Georgia, Iraq, Jordan, Lebanon, Sudan and USA.

## **ENGINE, FUEL AND OIL**

The machine is equipped with a 176 kw (240 hp) Deutz diesel engine with:

- > V6 engine with exhaust turbo super-charger, water-cooled
- > oil sump, designed to accommodate a tilt angle of 45°
- > cold start equipment (motor built according to exhaust norm COM1)
- > cooling systems for outside temperature up to 55°C
- > direct mechanical drive via power take-off shaft
- > air filtering system including ejectors optimised for desert conditions of extreme dust
- > tank volume of 210 litres including explosion prevention system to avoid tank detonations

Fuel consumption is 19 to 25 litres per hour. The hydraulic system requires standard oil.

## **FACTORY SUPPORT**

The manufacturer provides all necessary training, documentation, workshop, consumables and spare parts to render any mine clearing operation completely independent. Project management and consulting services are also available.

Factory support includes:

- > delivery of machines, support vehicles and hardware from the factory
- > decentralised warehousing in country of operation
- > all major spare parts in stock and ready for shipment
- > predefined fast delivery schedules with renowned forwarding partners worldwide
- > warehousing and efficient resource planning software for customers
- > training schedules and spare part packages available, based on the customer's requirements
- > instruction manuals, documentation and SOP (according to IMAS) are available, on request in any language

The spare part package anticipates long delivery times in remote areas. If necessary a fully equipped mobile workshop unit is also supplied. Only standard commercial off-the-shelf components are used and most suppliers have worldwide service networks.

## **MAINTENANCE AND SUPPORT**

Daily, weekly and monthly maintenance checks are laid down in the operator's manual. The manufacturer also provides:

- > in-country support for major incidents
- > assistance on annual inspection with an option for check-up of mechanical competence



MINI MINEWOLF operating in Iraq

## **TESTS AND EVALUATIONS**

- > **2006** CROMAC tested the Mini MineWolf in November 2006 against live AP mines. A full test report can be provided by the manufacturer.
- > **2007** MineWolf Systems successfully tested the Mini MineWolf's flail attachment against TMRP 6 AT mines in June 2007 at the CROMAC test site at Cerovac.
- > **2007** The German Army conducted an extensive test series of the Mini MineWolf tiller and flail against medium to heavy AV mines.

Six test reports are available at [www.itep.ws](http://www.itep.ws):

- 1.** Mini MineWolf Test and Evaluation, Bundeswehr Technical Center for Weapons and Ammunition (WTD 91), Germany 2007:  
[www.itep.ws/pdf/FinalReportMiniMineWolf2007.pdf](http://www.itep.ws/pdf/FinalReportMiniMineWolf2007.pdf)
- 2.** Steker, Mini MineWolf demining machine testing report, by Croatian Mine Action Centre / Testing, Development and Training Centre, 2006:  
[www.minewolf.com/fileadmin/user\\_upload/documents/Reports/CROMAC\\_report\\_Mini\\_MineWolf\\_Nov\\_2006.pdf](http://www.minewolf.com/fileadmin/user_upload/documents/Reports/CROMAC_report_Mini_MineWolf_Nov_2006.pdf)
- 3.** Christoph Frehsee and Carl Fenger, Remote Operation of the Mini Mine Wolf in High-Threat Mine Environments, The 7th IARP International WS HUDEM'2008, AUC, Cairo, March 28-30, 2008:  
[www.itep.ws/pdf/MiniMineWolf\\_HUDEM2008.pdf](http://www.itep.ws/pdf/MiniMineWolf_HUDEM2008.pdf)



MINI MINEWOLF

4. Thomas Sponfeldner, Testing the Effectiveness and Survivability of the Mini MineWolf, Journal of Mine Action, Issue 12.1, Summer 2008:  
[www.maic.jmu.edu/journal/12.1/rd/sponfeldner/sponfeldner.htm](http://www.maic.jmu.edu/journal/12.1/rd/sponfeldner/sponfeldner.htm)
5. Christoph Frehsee, Humanitarian Mine Clearance in the Balkans, Journal of Mine Action, Issue 11.1, Summer 2007:  
[www.maic.jmu.edu/journal/11.1/r-and-d/frehsee/frehsee.htm](http://www.maic.jmu.edu/journal/11.1/r-and-d/frehsee/frehsee.htm)
6. Geoff Coley, Machine Demonstration Analysis and Preliminary Results, International Symposium "Humanitarian Demining 2007" 24 - 27 April 2007, ŠIBENIK, CROATIA, 2007:  
[www.itep.ws/pdf/MachineDemoSibenik2007\\_Coley.pdf](http://www.itep.ws/pdf/MachineDemoSibenik2007_Coley.pdf)

## REPORTED LIMITATIONS AND STRENGTHS

### Limitations

- > Over longer distances the system requires transportation on a trailer or in a container.
- > With flail attached, creates dust clouds as with all flail systems in dry environments.
- > Difficult to operate with precision from greater distances, as with all remotely controlled machines.

### Strengths

- > Proven effective against AP and AV mines with minimum damage to the working tool (CROMAC, manufacturer's test).
- > Easily transported.
- > Consistent ground penetration quality.
- > Effective against dense vegetation and various terrains (hard, rocky, soft, sand).
- > Combined system: tiller or flail may be interchanged.
- > The machine is comparatively lightweight for its output and class.
- > Rugged design based on mature technology, proven in challenging terrain.
- > Tiller working tool minimises dust generation for improved visibility.
- > Low running-costs as compared to flail-only systems.
- > Additional multi-purpose attachments available (lifter, fork list, dozer shield, bucket, sifter bucket).

**DIMENSIONAL DATA**

1. Length without attachment	3,860 mm
2. Length total	5,130 mm (with flail)   5,561 mm (with tiller)
3. Width without attachment	1,700 mm
4. Width total	2,500 mm (with flail)   2,292 mm (with tiller)
5. Clearing   Working width	1,860 mm (with flail)   1,860 mm (2,000 mm option with tiller)
6. Height   Overall	2,219 mm
7. Mass   Basic vehicle	6,100 kg with fuel
8. Mass   Detachable unit(s)	2,035 kg (flail)   1,900 kg (tiller)
9. Mass   Overall	8,135 kg (tiller)   8,000 kg (tiller)

**OPERATIONAL DATA**

10. Wheels   Tracks (description)	Tracks
11. Ground Bearing Pressure (kPa)	0.5 - 0.7 kg/cm <sup>2</sup>
12. Hill climbing ability (in degrees)	Max 30° (longitudinal and transversal)
13. Number of Chains   Chisels   Tools	Flail: 26 chains   Tiller: 40 chisels
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	Not given
15. Length of Chains   Tools	400 mm
16. Diameter of flail drum	Tiller: 830 mm
17. Rotation Speed	500 - 800 rpm
18. Clearance   Working depth in varying terrain	0- 250 mm
19. Working Speed (m <sup>2</sup> /h)	
> Light Soil   Medium Vegetation	1,500 m <sup>2</sup> /h
> Medium Soil   Medium Vegetation	750 m <sup>2</sup> /h
> Heavy Soil   Dense Vegetation	500 m <sup>2</sup> /h
20. Control of Clearance   Working depth	Automatic
21. Additional attachable working tools	Fork lift, bucket, sifter bucket, dozer shield
22. Armour	Armour plates 4, 5, 8 mm
23. Remote controlled	Yes
> greatest distance	1,000 m
24. Transportation	
> short distances	20 ft containers, standard means of transport
> long distances	
> sea transport	
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	19
26. Other types	MineWolf, MineWolf Bagger
27. Location of use	BiH, Croatia, Jordan, Colombia, USA, Iraq, Sudan, Georgia, Afghanistan, Lebanon, Congo
28. Totally cleared so far (m <sup>2</sup> )	10,000,000 m <sup>2</sup>

## ENGINE | FUEL | OIL

29. Engine	176 kw (240 hp) at 2100 rpm
30. Engine power at the flywheel	Not given
31. Sufficient power supplied to working tool	Not given
32. Fuel capacity	210 l
33. Fuel consumption	19 - 25 l/h
34. Separate engine for working unit	No
35. Cooling system	Yes
36. Oil capacity (both engines)	21 l (engine)
37. Hydraulic oil capacity (both engines)	Not given

## COSTS

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

## OTHER

41. Operator comfort	Remote controlled
42. Air conditioning	N/A