

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

MineWolf Systems AG | Switzerland and Germany

GENERAL DESCRIPTION

The *MineWolf* has been developed by MineWolf Systems, a Swiss-German provider of mechanical mine clearance machines. It is a medium- to large-scale mechanical demining machine equipped with either a flail or a tiller. Both applications withstand AP and AV mine detonations up to 15 kg TNT. The easily interchangeable tiller and flail units are designed so that detonations cause minimum damage to the working tool. Protection of the operator and machine is assured by Armox steel and armoured glass. The machine can also be operated by remote control. With its highly reliable 367 hp V8 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 15,000 m² to 30,000 m² per day depending on the project characteristics (Class I to Class IV terrain with slopes up to 40°), corresponding to the size of two to four football fields. Clearance width is 2,800 mm.

Standard features include automatic depth control, communications system, hydraulic winch, air-conditioning, and an automatic fire-fighting system. A GPS system, mine debris lifter and multi-function attachments (such as a fork or bucket) are also available. The system is designed for transport by road, rail, ship or air. A standard low-loader can be used for transporting between worksites.



MINEWOLF | In Jordan with tiller attachment

CLEARANCE METHODOLOGY

The tiller has 64 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 of up to 35 cm depending on machine speed and soil conditions. Depending on project requirements, a flail with 72 chains with hammers can be attached. The system is effective against vegetation up to 15 cm in diameter. Automatic depth control facilitates consistent ground penetration quality.

MACHINES IN USE TO DATE

Since 2004, a substantial number of MineWolfs have been produced and deployed in the following countries: Afghanistan, Angola, Bosnia and Herzegovina, Chile, Croatia, Georgia, Jordan, Rwanda, Sudan and United Arab Emirates.

ENGINE, FUEL AND OIL

The 367 hp (270 kw) Deutz diesel engine has:

- > V8 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 optimised for desert conditions of extreme dust
- > tank volume of 440 litres including explosion prevention system to avoid tank detonations

Fuel consumption is 40 to 50 litres per hour. The hydraulic system requires standard oil.



MINEWOLF | With flail attachment



Two MineWolfs with lifter attachment

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 are 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.

MAINTENANCE AND SUPPORT

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

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

TESTS AND EVALUATIONS

The following test reports are available at www.itep.ws

1. W.C. Roberts and J.L. Eagles, MineWolf Tiller Test and Evaluation, Defence Research and Development Canada, Canada, 2007: www.itep.ws/pdf/MineWolf_Tiller_DRDC_finalR.pdf
2. H. Rath, D. Schröder, MineWolf Flail and Tiller Machines: Testing the Difference Between Two Demining Technologies, in Journal of Mine Action, Issue 10.2, Winter 2006: www.maic.jmu.edu/journal/10.2/r&d/rath/rath.htm
3. I. Steker, Testing of the demining machine MineWolf, by Croatian Mine Action Centre / Testing, Development and Training Centre (Republic of Croatia), 2005: www.itep.ws/pdf/Minewolf_CTRO2005.pdf
4. O. Nies, Mine-Clearing Vehicle MineWolf. Biomechanical Assessment of Mine-Clearing Tests with Live Mines, by BWB, WTD91, 2004: www.itep.ws/pdf/Report_subtask_MineWolf2004.pdf
5. M. Wagner, MineWolf - Clearing of Live Mines. Final Report, by BWB, WTD 91, 2004: www.itep.ws/pdf/Final_report_MineWolf2004.pdf
6. RUAG Land Systems, Mine Effects to Flail and Engine Armor Shields of the MineWolf, 2003: www.itep.ws/pdf/MinewolfRUAG1.pdf
7. BRTRC Technology Research Cooperation, Area Mine Clearing System (AMCS), Study Report, by US Army Project Manager for Close Combat Systems (PM - CCS), 2002: www.itep.ws/pdf/AMCSStudyReport.pdf

REPORTED LIMITATIONS AND STRENGTHS

The DRD Canada report said the MineWolf was a “capable” machine with “good but not exceptional” performance, which could be improved by minor changes to the tiller configuration and ensuring that operators understood the need for lower forward speed in certain operations (eg clearance rather than follow-on).

Limitations

- > Over longer distances the system requires transportation on a low-bed trailer.
- > The flail creates dust clouds, as with all flail systems in dry environments.

Strengths

- > Proven effective against AP and AV mines with minimum damage to the working tool (German Army, ITEP, CROMAC, RUAG, EOD trials).
- > Consistent ground penetration quality.
- > Effective against dense vegetation and various terrains (hard, rocky, soft, sandy).
- > Maximum flexibility: tiller or flail working tool.
- > High safety standard for the operator (German Army Biometric Survivability Trial).
- > 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 lift, dozer shield, bucket, sifter bucket).

DIMENSIONAL DATA

1. Length without attachment	5,940 mm
2. Length total	7,820 mm (with flail) 7,420 mm (with tiller)
3. Width without attachment	2,600 mm
4. Width total	3,610 mm (with flail) 3,480 mm (with tiller)
5. Clearing Working width	2,800 mm
6. Height Overall	3,795 mm (manually operated) 2,750 mm (remote control)(without cabin)
7. Mass Basic vehicle	19,150 kg (without cabin)
8. Mass Detachable unit(s)	4,800 kg (flail) 4,500 kg (tiller)
9. Mass Overall	26,600 kg (flail) 26,300 kg (tiller)

OPERATIONAL DATA

10. Wheels Tracks (description)	Tracks
11. Ground Bearing Pressure (kPa)	0.7 (with 600 mm plates)
12. Hill climbing ability (in degrees)	40°
13. Number of Chains Chisels Tools	Flail: 72 chains Tiller: 64 chisels
14. Beat pattern (hits per m ²) at different operating speeds	With tiller: ca. 570 at 0.9 km/h; ca. 510
15. Length of Chains Tools	950 – 1,115 mm (depending on terrain)
16. Diameter of flail drum	1,100 mm (tiller)
17. Rotation Speed	330 - 740 rpm
18. Clearance Working depth in varying terrain	0 - 350 mm
19. Working Speed (m ² /h)	
> Light Soil Medium Vegetation	3,800 m ² /h
> Medium Soil Medium Vegetation	2,500 m ² /h
> Heavy Soil Dense Vegetation	1,200 m ² /h
20. Control of Clearance Working depth	Yes
21. Additional attachable working tools	Lifter (quality control tool), fork lift, bucket, sifter bucket, dozer shield
22. Armour	Armoured steel: 6-10-25 mm Armoured glass: 54 mm
23. Remote controlled	Yes (optional)
> greatest distance	1,000 m
24. Transportation	
> short distances	Standard means of transport
> long distances	
> sea transport	
> air transport	

SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	17
26. Other types	Mini MineWolf, MineWolf Bagger
27. Location of use	BiH, Croatia, Jordan, Sudan, U.A.E, Angola, Rwanda, Georgia, Afghanistan, Chile
28. Totally cleared so far (m ²)	> 16,000,000 m ²

ENGINE | FUEL | OIL

29. Engine	270 kw (367 hp) at 1900 rpm
30. Engine power at the flywheel	Not given
31. Sufficient power supplied to working tool	Not given
32. Fuel capacity	440 l
33. Fuel consumption	40 - 50 l/h
34. Separate engine for working unit	No
35. Cooling system	Yes
36. Oil capacity (both engines)	45 l (engine)
37. Hydraulic oil capacity (both engines)	Not given

COSTS

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

OTHER

41. Operator comfort	Radio communication, depth control, superior view, 4-point safety belt, sound and heat insulation, joystick steering integrated in armrests, GPS (optional)
42. Air conditioning	Yes