MECHANICAL DEMINING

The solution for a mined world

KMMCS

Mechanical Mine Clearance and Soil Rehabilitation

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I. The landmine problem

- There are approx. 80-100 million landmines laid around the world.
- Mines claim some 20,000 victims per year.
- Every twenty minutes a man, woman or child is killed or mutilated by a mine.
- Statistically every thousandth attempt to clear a mine by hand ends in death or severe injury.

1. The originators of the problem

- Numerous governments ordered and financed the production and laying of mines.
- The arms manufacturing industry developed and produced landmines at the instruction of these governments.
- Mines are found in previous war zones. They are usually covered by bushes and grass and have become invisible deadly traps.
- They kill or mutilate men, women, and children and endanger animal populations.
- They prevent the return of refugees back to their homelands.
- They destroy the structure of society.
- They prevent economic and socio-economic development by hindering access to key resources.
3. General conditions within mined areas

- There are over 344 different types of personal and anti-tank mines of which 70% contain no metal and cannot be found by metal detectors.

- Most mine fields are scattered with other metal, iron, and steel objects which makes conventional detection almost impossible.

- Mine fields differ in size and density of laid mines.

- These deadly traps are often overgrown and hidden by vegetation.

- While producing mines worth billions of dollars, the manufacturers forgot about future demining solutions.

- They forgot about the misery and danger people would face after their conflicts are over.
II. Present demining technology

Manual demining, done with metal detectors, prodders (needles) and shovels, is still the only method that is propagated by UN mine experts.

Manual demining is unsuitable

- Terrible accidents are a common threat.
- It does not achieve the intended goal, because not all mines can be detected and cleared on fields that have been searched.
- It is extremely expensive.
- It is extremely slow.
- Manual demining cannot solve the problem of a mined world not even within lifetime of several generations.

Despite this UNMAS (United Nations Mine Action Service) claimed that manual demining is a "safe standard procedure". Annex II of their regulations until 1997 demanded 99,6% safety and consequences were as follows:

"From 1115 mines laid, the tolerance for the manual demining method stands at 5 unexploded mines throughout the whole cleared area. These 5 mines are not considered as a clearance failure."

The UN authorities know that this method is unreliable and unsuitable.

The affected countries continue however to use UNMAS standard operating procedures as a basis to develop their own guidelines.

This always costs victims during and after demining operations.
The KMMCS is the first and only functioning Mechanical Mine Clearance System in the world.

The KMMCS is capable of destroying all mines on almost any terrain.

- Only one of our machines clears about 30,000 m² of land per day completely free of mines and explosive ordnance.
- This is 10,000 times more effective than manual-demining.
- At only 10% of the cost.
- We guarantee 100 % clearance.
- With no loss of life or injury.

- Not one single functioning mine or dangerous explosive ordnance has ever been found on land after we have cleared it.
- The machine can easily manage a gradient of up to 40 degrees.
- Strong natural plant cover like bushes or even trees or solidly frozen soil are no obstacle.

The KMMCS
is the fastest, safest, and cheapest system in the world.
The KMMCS has proved these extensive capabilities on several thousand hectares all over Europe.

KMMCS  - Stand Alone Mechanical Mine Clearance  -  6/17
3. Comparison between mechanical and manual demining

Only one of our machines clears about 30,000 m² of land (= 4 football fields) \textit{per day}. This land is then completely free of mines and explosive ordnance.

This is 10,000 times more effective than manual-demining.

A group of 10 manual-deminers would need about 2.5 years to clear the same area that the KMMCS can clear in one day. There are only very few trained manual deminers available at those sites.

Statistically every thousandth attempt to clear a mine by hand ends in death or severe injury. The KMMCS clears the whole terrain without any loss of life or injury.

\textbf{Cost per mine:}
At a comparable sized and mine affected area in Mozambique the KMMCS’s working costs were only 8.5 \% of those for manual demining done by ADP*.

\textbf{Cost per hectar:}
At a comparable sized and mine affected area in Mozambique the KMMCS’s working costs were only 10.5 \% of those for manual ADP demining.

*ADP: Accelerated Demining Program = UN manual-demining
V. Examples of our work

The KMMCS searches, finds and destroys mines of all kinds.

The KMMCS can easily manage gradients up to 40° forwards or backwards.

Vegetation of up to 30 cm in diameter and more is no obstacle and gets embedded into the soil.

VI. Clearing of explosive ordnance on military training areas

Detonation tests with up to 9 kg TNT did not cause any damage.

The driver is not endangered even by stronger explosive charges.
Clearing of explosive ordnance on military training areas in industrialised countries is much more expensive than manual-demining in the “Third World”. In comparison the savings due to the deployment of the KMMCS are dramatic and in contrast to usual clearing the KMMCS prepares the soil for recultivation. Even strong natural plant cover is dispersed into the ground.

Destruction of several kinds of ammunition at the US-Combat Maneuver Training Center near Hohenfels in Bavaria, Germany.

In Germany alone there are about 250,000 ha of military training areas that are contaminated with dangerous ammunition.

An anti-tank mine, a bazooka round, and a 90 mm handgrenade with a wall thickness of 5 mm of cast iron – before clearing.

The destroyed ammunition, harmless shrapnel – after clearing.

After the clearing process people can walk on the demined fields safely.
**VII. The most important reports and performance data for the KMMCS from 1992 to 2004**

**14th June 1992**  
A test with anti-personal mines under the supervision of the Julius Tischer Anhaltinische Fabrik in Schoeneberg near Magdeburg, Germany.

**Conclusion in short:**  
"Nothing opposes the employment of the milling machine for mine clearing operations. An endangerment for the driver of the milling machine or the environment cannot to be recognized." (Julius Tischler)

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**15th October 1992**  
A test with anti-personal mines under the supervision of the Julius Tischer Anhaltinische Fabrik in Schoeneberg near Magdeburg, the BMVg (Federal Ministry of Defence of Germany) and the BAM (Federal Institute for Material Research and Testing).

**Conclusion in short:**  
"The milling machine is the most effective tool for the fight against anti-personal mines." (Pioneer School, Munich)

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**22nd December 1992**  
A test with anti-personal mines under the supervision of the Federal Institute for Material Research and Testing in Horstwalde near Berlin.

**Conclusion in short:**  
"The combination of milling machine, chisel cultivator and windrower is to be regarded as the most favorable procedure concerning clearance security and economy." (Federal Institute for Material Research)

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**16th February 1993**  
A test with dummy anti-personal mines in Wiesenfeld under the supervision of the German Federal Defence Ministry.
**Conclusion in short:**
“The procedure offers at least the same clearance security as the plow procedure and thereby promises a time saving effect that should not be underestimated in its size.” (Pioneer school and technical school of the army for civil engineering)

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**08th March 1993**
The German Federal Ministry of Defense gives the GRV (The society for the recultivation and utilization of real estate) permission to clear mines on the inner German border.

**Conclusion in short:**
“In comparison to other methods of clearance the personnel needed is reduced from 25 to 6 men or less and success increases substantially. This method meets the official safety requirements.” (Internal report of the contractor - GRV)

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**16th June 1993**
The German Department for Geophysics examined the environmental compatibility of the milling procedure at a site on the inner German border.

**Conclusion in short:**
“This milling procedure is to be used wherever the conditions permit it, and in relation to the plowing procedure offers the following advantages:

- Calculable exposure of time.
- Smaller personnel requirements.
- Higher probability of discovery.
- No endangerment of the personnel.

These characteristics would be arguments for the employment of the milling machine." (The pioneer school and civil engineering technical school of the army, special staff ATV)

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**17th September 1995**
In a test in Moamba/Mozambique under the supervision of the UNDP-ADP for anti-personal mines.
**Conclusion in short:**
"No functional mines were found." (UNDP-ADP)

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**18th September 1995**

A test in Mozambique.

**Conclusion in short:**
"The test with the KMMCS in Mozambique was successful. With this newly developed mine clearing technology it will become easier, faster, and safer to clear mines. By passing this test the KMMCS has proved that it is the most effective mine-clearance system available today." (Press statement by the German Ministry of foreign affairs)

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**05th and 06th May 1996**

In a test in Sabie, Mozambique under the supervision of the UNDP-ADP 264 anti-personal mines were professionally laid. 260 mines were totally destroyed and 4 mines were so badly damaged that they did not represented danger any more.

**Conclusion in short:**
According to the definition of the UN for manual demining this test was 100% effective.

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**25th August 1995 to 02nd October 1996**

Clearing in Moamba and Sabie (Mozambique) with anti-personal mines under the supervision of the National Mine Clearance Commission of Mozambique (CND).

**Conclusion in short:**
Approximately 150 hectares (1.5 million square meters) were cleared from anti-personal mines in 100 nine-hour working days. Over 20,000 mines were destroyed.
The German Ministry of Foreign Affairs and the Mozambique National Clearance Commission officially confirmed the 100% clearance of this area.

Since then the area has constantly been used agriculturally by the civil population. No mines have ever been found.

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26th June 2000 until 29th July 2000
Mine clearance at the Hohenfels Combat Maneuver Training Center

Conclusion in short:
200,000 m² were cleared.

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Autumn 2000
Mine clearance at Gera and Brandenburg (Germany).

Conclusion in short:
340,000 m² were cleared.

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21st August 2000 until 15th December 2000
In a test in Ceretinci, Croatia under the supervision the CROMAC (Croatian Mine Action Center) 10 anti-personal mines, 5 anti-tank mines, 7 spring mines, 1 Rob 75, and 19 PM1 anti-tank mines were laid on an area of about 113,000 m² under controlled conditions and destroyed.

Test result in short form:
After clearance 10.5 ha were searched and no dangerous explosive ordnance were found.

"The KMMCS is suitable for the mechanical treatment of mined land.

It can be used on all soil categories (category I to V). The best results are obtained with the soil categories III and IV (plain agricultural soil).

It overcomes all kinds of vegetation (low, high).
The driver works in an armored cab that protects him from all kinds of anti-tank mines.

In one ten-hour-working day the mine clearance machine can clear 25,000 to 30,000 m\(^2\) of mined land. (Depending on the degree of mining, the kind and density of the vegetation, the soil category and the provided logistic support.)" (CROMAC)

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08\(^{th}\) August 2001
Near Tenja, Croatia, under the supervision of the Dinamid company 30 TM3 anti-tank mines were destroyed.

Result of the manual search by the manual deminers:
After the clearance on an area of 105,000 square meters behind the machines no dangerous explosive ordnance were found.

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December 2001 until January 2002
Near Tenja, Croatia, under the supervision of MKA Deming 5 anti-tank mines were destroyed.

Result of the manual search by the manual deminers:
After the employment of the machines on an area of 50,000 square meters with 20 degrees frost and frozen soil no dangerous explosive ordnance were found by hand-deminers.

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December 2001 until January 2002
Near Ivankowo, Croatia, under the supervision of MKA Deming anti-tank mines and stick mines were destroyed.

Result of the manual search by the manual deminers:
After the employment of the machines on 298,000 square meters of land no dangerous explosive ordnance were found.
01\textsuperscript{st} March 2002 until October 2002
In Croatia under the supervision of MKA Demining anti-tank mines and anti-personal mines were destroyed.

**Result of the manual search by manual deminers:**
After the employment of the machines on an area of 150 ha 40 manual deminers then searched it centimeter for centimeter with metall detectors and found no dangerous explosive ordnance.

The KMMCS cleared about

- \(2,600,000\) m\(^2\) in Croatia
- \(1,500,000\) m\(^2\) in Mozambique
- \(240,000\) m\(^2\) at the Military training area in Gera (Germany)
- \(200,000\) m\(^2\) at the Hohenfels Military training area (Germany)
- 454 ha

International demining experts have performed complex searches on our demined terrain.

Not a single functioning mine or dangerous explosive ordnance has ever been found on land after we have cleared it.

These facts have been certified by the UN and the German government.

Translation:
The German Foreign Ministry certifies that the Krohn Company has performed mine clearance activities in Mozambique from 1995 to 1996 on behalf of the German Foreign Ministry.

In Mozambique the Commission for National Demining (CND) has certified that the Krohn Company cleared about 144,95 ha of mined terrain. The cleared area has been certified to be "mine-free".
Addendum:

**Annual test of KMMCS renamed Zeus-1, latest at May 2011**
Renamed as "Zeus-1" the KMMCS machines are tested each year since 2004 by CROMAC. They succeed in the test, even when they are permanently working with the mill clockwise, which constructor Krohn regarded as to be avoided. Zeus-1 leasing taker also does not work regarding our SOP which includes internal quality control also by mechanical support. Instead Zeus-1 works as vegetation cutter with the effect of minefree area, lucky for follow-up manual deminers, but waisting Stand Alone Mechanical Mine Clearance Potential.

Croatia

KMMCS renamed Zeus-1
Renamed as "Zeus-1" three of the KMMCS primary machines made more than 10.000.000 m² (1000 ha) (as of June 2011) as subcontractor in a Non Stand Alone Manner in Croatia. Thereby the control was done usually by manual deminers, not as given in our SOP following our internal quality control where mechanical supported control provides best efficiency.