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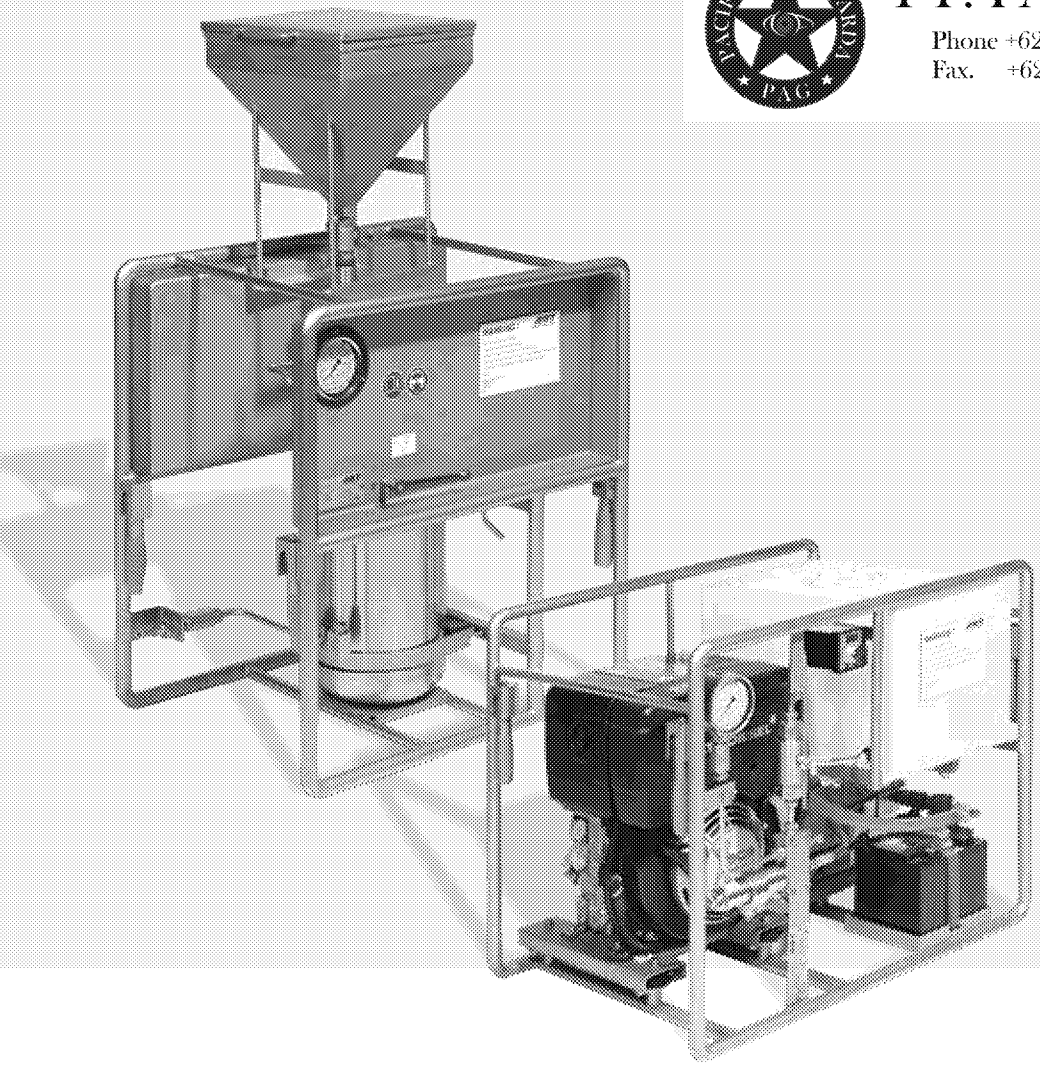


MACE

Mobile Abrasive Cutting Equipment for EOD
NSN 3695-17-116-9522

ANT
APPLIED NEW TECHNOLOGIES AG
a cut ahead

A new tool to disarm unexploded ordnance – MACE

Disarming of unexploded ordnance (UXO), especially of both world wars, will remain as well in future a particular demanding task. In addition the continuous regional armed conflicts worldwide create new further demand for Explosive Ordnance Disposal (EOD) and Improvised Explosive Device Disposal (IEDD).

Environmental exposure over the time has chemical and/or physical effects on ammunition and often leads to a critical in-situ situation of the UXO. Conventional Render Safe Procedure (RSP) is very often not feasible without contacting or shifting the UXO and therefore is considered as not secure. In such situations repeatedly it came to severe accidents with death tolls. Hence safety of transport to carry-off for final removal is also not given. Therefore in such cases blasting the UXO is so far used as a final RSP causing partly heavy collateral damages.

In this context under water detonations additionally create severe environmental damages by harming or killing marine life.

The ecological awareness with regard to damages in connection with detonations has grown and new technologies and procedures have started a process of rethinking traditional methods. For the disarming and deactivation of ammunition there is now a new alternative solution:

ANT has developed a Mobile Abrasive Cutting Equipment (MACE) which allows to remove or deactivate the fuse remotely, risk-free and safe.

The deployment of this technology around the globe has become state of the art today and is an accepted RSP world-wide. It is unrivalled when exclusion of detonations is a must (within the evaluation of the higher interest of goods and values).

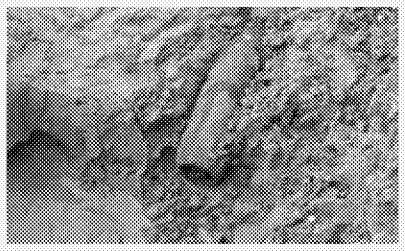
Special Advantages with:

- Not manual removable or deactivatable fuses
- Ammunition with chemically dangerous mutated explosive content
- Problems caused by special materials, e.g. cutting of compression and extensions springs, hardened shafts or cover plates
- Detonators or booster charges, which can be cut without sparks and transfer of kinetic energy
- Opening of containments or objects, without using explosives as opening method (e.g. pressure containments of torpedos, liquid rockets, etc.)

8,8 cm APCT-HE (armor piercing cap traiser – high explosive, with springloaded fuse 5127)

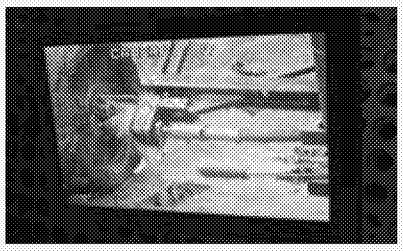
Cutting example

Removing a No 17 fuse from a GP 500 LB MK V (Schiphol, The Netherlands, 2008)

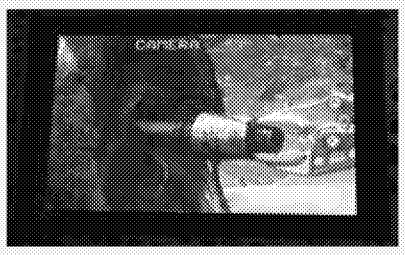


Finding situation GP 500

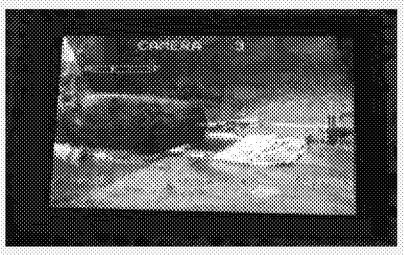
Installation of cutting device



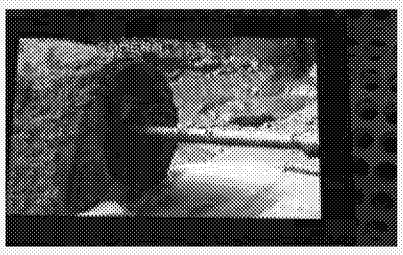
Video control of cutting process



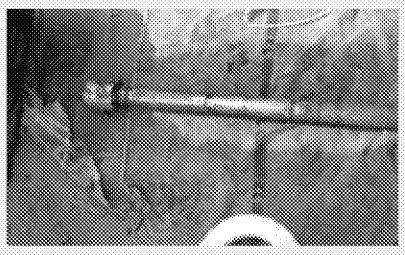
Clamping the fuse



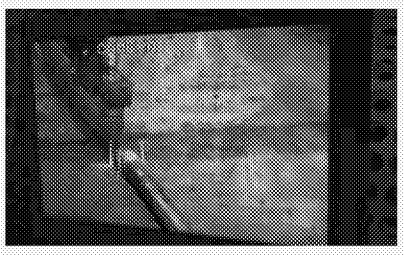
Drawing the fuse with third axis-1



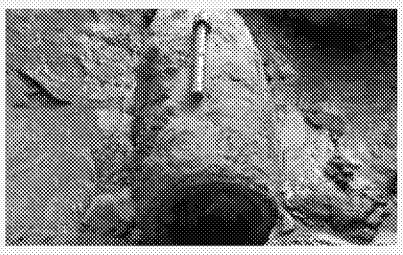
Drawing the fuse with third axis-2



No 17 fuse with booster charge



Cutting off the booster charge



Disarmed No 17 fuse on GP 500 LB MK V

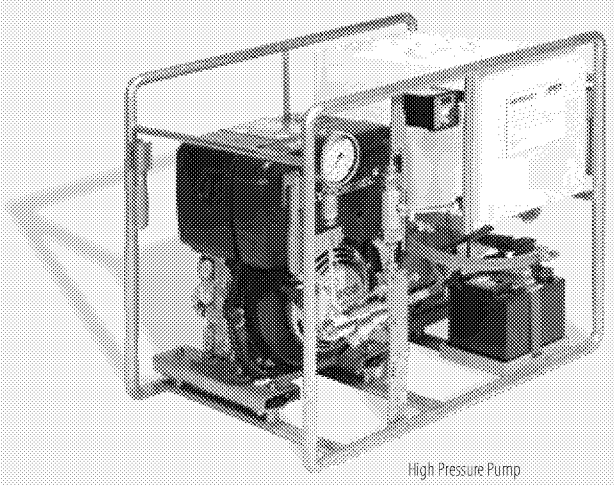
Remote render safe operations with MACE

The portable, multi-component water jet cutting unit for rendering safe unexploded explosive ordnances (UXOs) on land and under water.
Remote controlled operations to remove or deactivate the fuse or open the bomb for flushing in all environments.

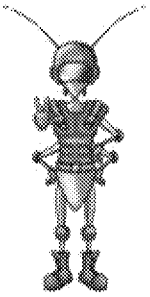
Special Features:

- **Safe**
  Complete remote-controlled operations from several hundred meter distance
- **Self-supporting**
  With fuel operated high pressure pump and generator
- **Easy to operate**
  Control panel designed for intuitive operation
- **Multi-flexible**
  Cutting in any environment, in various positions and under different conditions
- **Under water**
  With hydraulic drive entirely operable under water
- **AMU refilling system with patented technology**
  Easy and quick refilling by patented hopper technology
- **Fully proven by EOD teams world-wide**
  Direct contact to and references from experienced users on request

Abrasive Mixing Unit

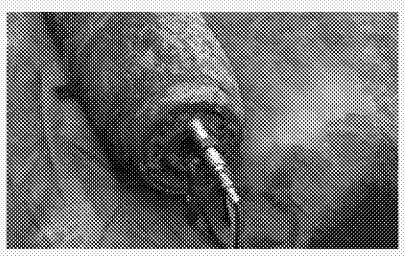


High Pressure Pump

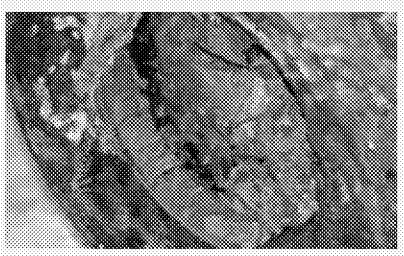


Cutting examples

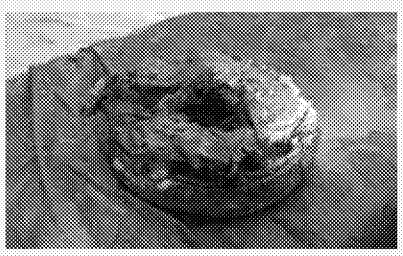
Cutting out the bottom plate



Using the MULTIFLEX Circular Cutter

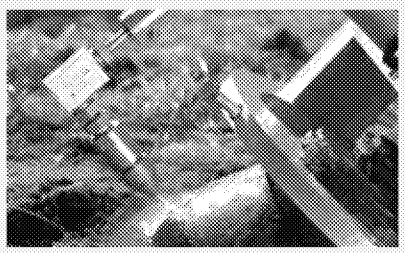


Bomb body without bottom plate

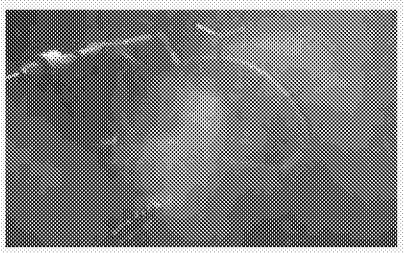


Bottom plate without fuse

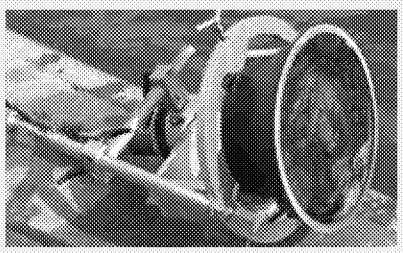
Cutting off the back of the bomb



Cutting with Base Fuse Manipulator

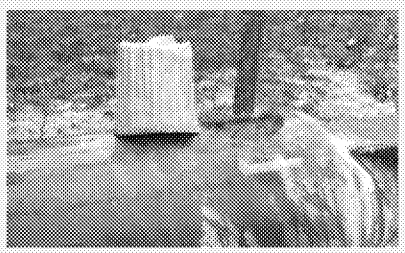


Cutting under water

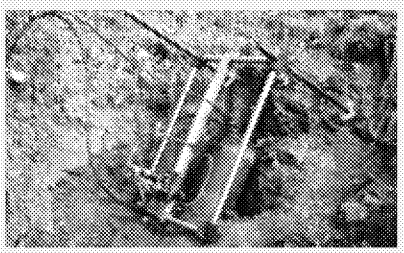


Back of the bomb after salvage

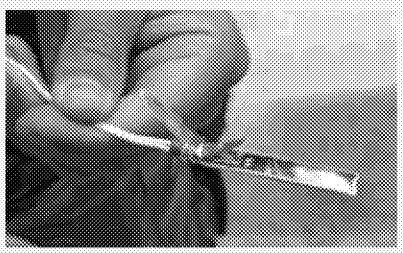
Opening the bomb



Cutting an access hole



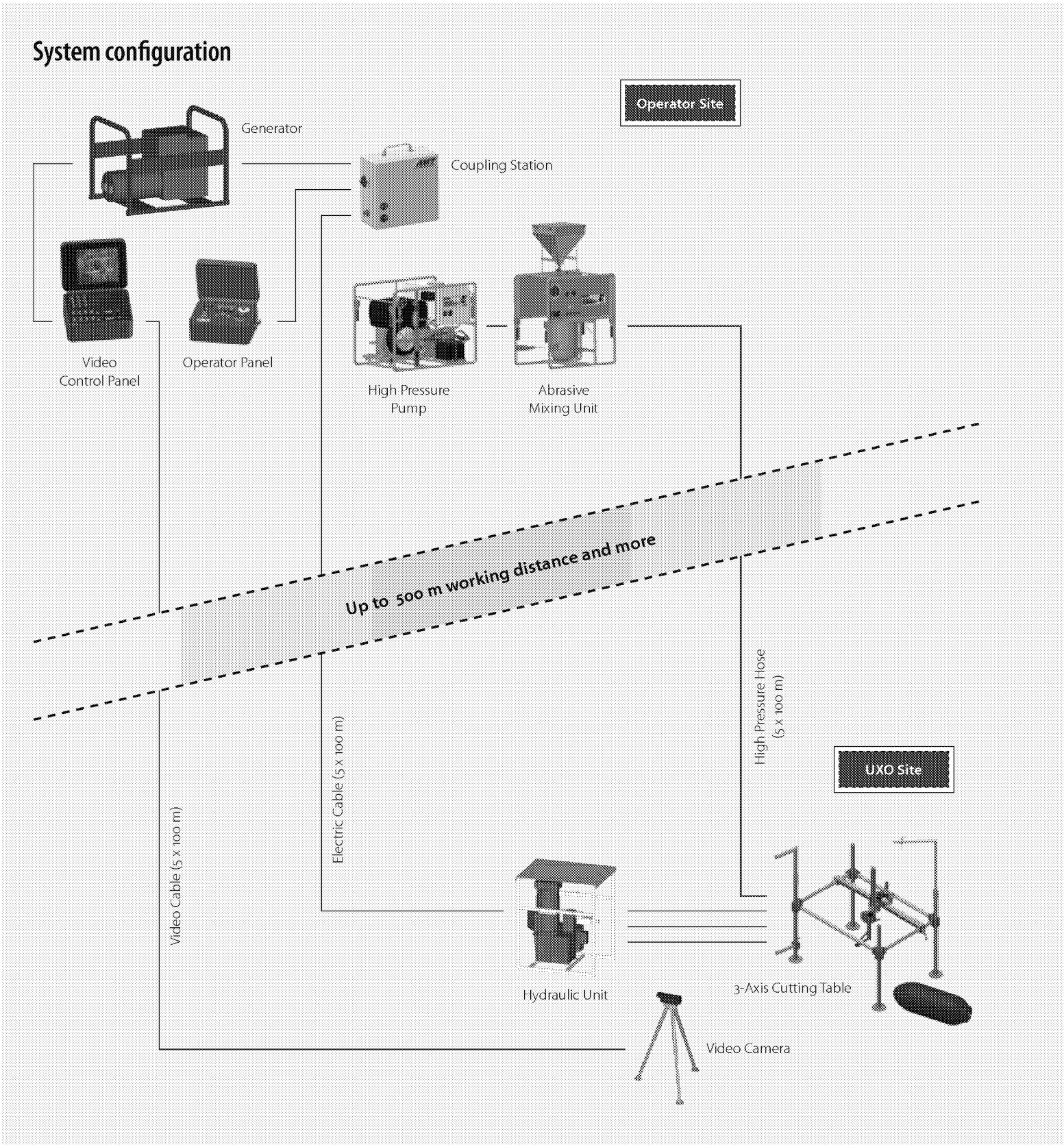
Cutting a burn out hole with 3-Axis Cutting Table

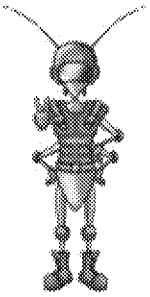


Cutting through a detonator

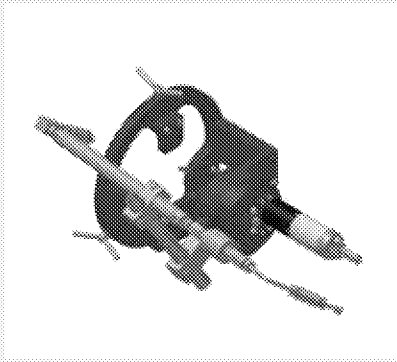
System configuration and Cutting devices

System configuration

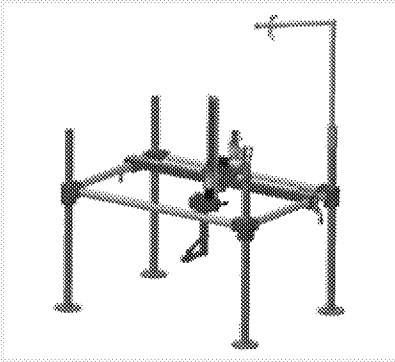




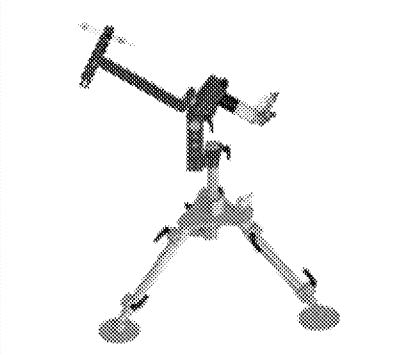
Cutting devices



Base Fuse Manipulator



3-Axis Cutting Table



MULTIFLEX Circular Cutter

Technical data of Cutting devices

Cutting device:	**Base Fuse Manipulator**	**3-Axis Cutting Table**	**MULTIFLEX Circular Cutter**
Working area:	200 mm up to 500 mm circle	1000 mm horizontal, 500 mm vertical max. ø 250 mm rotation	max. 270 mm circle
Adjustable range:	ø 100 mm up to ø 400 mm	see above working area	+ 90° to -45° (=135°)
Vertical linear range:	spacer 50 up to 150 mm	see above working area	200 mm
Traverse speed:	30 – 300 mm/min.	20 – 200 mm/min.	20 – 200 mm/min.
Weight:	10 kg (22 lb)	70 kg (155 lb)	35 kg (77 lb)
Size (L x W x H):	300 x 150 x 100 mm	1450 x 1050 x 1100 mm	900 x 800 x 900 mm
Motor:	hydraulic* (electric optional)	hydraulic* (electric optional)	hydraulic* (electric optional)
Material:	aluminium frame	aluminium frame	aluminium frame, brass,
Controls:	direction selection, speed control	axis selection, direction selection, speed control	direction selection, speed control

**hydraulic as standard for underwater use*

References

MACE and mini MACE are in use with EOD teams world-wide:

Germany: BKA (Federal Criminal Police Office), Wiesbaden
LKA (State Criminal Police Office), Munich
LKA (State Criminal Police Office), Berlin
LKA (State Criminal Police Office), Stuttgart
KMBD Baden Württemberg, Stuttgart

UK: Ministry of Defence
DSTL, Fort Halstead

Japan: Defence Agency

Australia: Department of Defence

Hungary: Ministry of Defence

Slovakia: Ministry of Defence

Bulgaria: Ministry of Defence

USA: Las Vegas Fire & Rescue
Honolulu Police Department
Denver Police Department
University of Missouri-Rolla
HDS (Hazardous Devices School)

The Netherlands: Ministerie van Defensie, Koninklijke Landmacht

France: DGA (Ministère de la Défense)

China: Xinjiaing PSB,
Police Beijing

Sweden: SWEDEC

Lithuania: Ministry of Defence

All data presented in this brochure is subject to change without prior notice

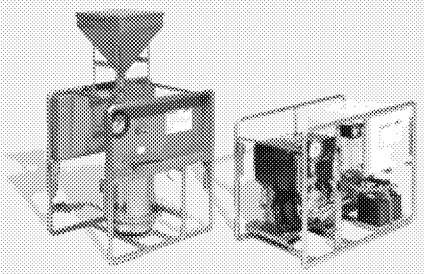
MACE –
Mobile Abrasive Cutting Equipment

The **High Pressure Pump (HPP)** delivers water at 700 bar pressure via a flexible hose to the **Abrasive Mixing Unit (AMU).** When entering the AMU, the high pressure water stream is split into a main water stream and a bypass water stream, the latter feeding the abrasive. Where the two streams merge again, the suspension is generated. From the AMU the suspension is guided through a **High Pressure Hose** of 500 m length or more to the **Cutting Nozzle.** At the Cutting Nozzle the water pressure converts into velocity of the water abrasive jet, this being capable to cut through virtually any material.

The Cutting Nozzle is guided by the hydraulically operated **Cutting Device,** which is powered by an electric driven **Hydraulic Unit.** The power supply of the **Hydraulic Unit** as well as the **Operator Panel** and **Video Control Panel** is supplied from a fuel powered **Generator.**

The cut is observed by a **Video Camera,** which is positioned at the object to be cut and connected with the Video Control Panel, which may be 500 m or more remote. The camera can be zoomed and directed for ideal cut observation. Operator Panel and Video Control Panel are designed for intuitive operation.

Besides other benefits, cuts conducted by **Water Abrasive Suspension (WAS)** technology are characterized by no physical contact to the target object, no significant temperature increases and the proof of working safe with explosives.



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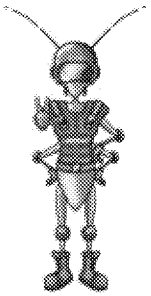

Technical data

Abrasive Mixing Unit (AMU)	
Weight	115 kg (254 lb) empty
Size	725 x 500 x 780 mm
High Pressure Pump (HPP)	
Weight	135 kg (298 lb) empty
Size	900 x 580 x 710 mm
Engine	diesel engine 7.3 kW, electric starter (gasoline optional)
Hydraulic Unit	
Weight	58 kg (128 lb)
Size	700 x 440 x 560 mm
Engine	electric motor (0.25 kW)

Operating parameters

Nozzle size	0.6 mm (0.024 inch)
Working pressure	700 bar (10,150 PSI)
Pressure vessel	12 l volume / 14 kg abrasive
Water flow	6 l/min. (1.6 US gallon/min.)
Hydraulic power at nozzle	7 kW
Abrasive	Garnet, Mesh 80
Abrasive concentration	10% (mass)
Cutting performance (in air)	10 mm (0.39 inch) steel: 115 mm/min. (4.53 inch/min.)
	25 mm (0.98 inch) steel: 46 mm/min. (1.81 inch/min.)
	50 mm (1.97 inch) steel: 21 mm/min. (0.83 inch/min.)
Cutting time with one filling	20 min.