

Conference Report

Full name: 5th international symposium on Technology and the mine problem. Organised by the Society for Counter Ordnance Technology and the Mine Warfare Association.

Date and Venue:

April 22-26, 2002, Naval Postgraduate School, Monterey (CA), USA

Type:

Fifth symposium in a series, biannual.

Number of attendees: 300

Cost: 450 dollars (dinner and wine tasting included)

Note: The conference is dominated by US military representatives. Also, one should recognise that approximately 50% of the program is dedicated to sea mines. The morning program consists of plenary talks, in the afternoon 4-5 parallel sessions were organised with approximately 120 technical papers. Only sessions on land mine clearance were attended. Proceedings will be available from the two web sites, <www.demine.org> and <www.minwara.org>.

Summary of the Most relevant Topics and Presentations:

Plenary sessions:

1. The Army Keynote Address – LT GEN Robert.B. Flowers, Chief of Engineers and Commanding general, US Army.

Beside the demining activities by the army, LT GEN Flowers described the efforts made by the army to prevent mine placement and to maintain momentum of operations. From 2008 onwards, a new Transformation Force Brigade will use both currently available equipment and new, technology-driven systems.

2. Opportunities in Land Mine Warfare Technologies – Dr. Tom Altshuler, DARPA

Dr. Altshuler gave a nice overview of current landmine technologies. His main interest is self healing minefields. He showed some examples of mines that can hop 5-10 meters and can make more than 100 jumps. The self healing minefield is designed to achieve an increased resistance to dismounted and mounted breaching.

3. Attribute sensors – Dr. George Vourvopoulos, University of Western Kentucky

Three different type of sensors can be distinguished during demining: area reduction sensors, screening sensors and confirmation sensors. Attributes of a mine are its shape and content. Attribute sensors use either one or both of these features to detect a mine. Dr. Vourvopoulos described a nuclear technique, neutron activation from which the exact elemental

composition of a object can be determined. Currently, this technique is rather slow, in the order of five minutes per object.

4. Improvements to munitions reliability - LT GEN Robert Gard, USA (Ret), PhD, Consultant to the Vietnam Veterans of America Foundation (VVAF)

Dr. Gard discussed the initiatives of the VVAF and the International Committee of the Red Cross to reduce the number of Explosive Remnants of War, for example cluster bomb remnants. There are a number of inexpensive manufacturing changes that can reduce current dud-rates from the 20% range to about 1%. On a world-wide basis casualties to ERW exceed those from anti-personnel landmines.

5. Biomimetic robots - Dr. Joseph Ayers Northeastern University

Beside his impressive lobster robot for shallow water mine countermeasures, Dr. Ayers presented several other biomimetic sensors that may be used for demining in the future. One of the main problems at the moment is the power consumption of these robots. One of the solutions may be refuelling stations.

6. Acoustic detection of landmines – Dr. James Sabatier, University of Mississippi.

This technology uses acoustic waves to make landmines resonate. The resonance frequency of AP-mines is in the order of 150 Hz, for AT-mines it is about 400 Hz. These resonances are detected with a vibrometer (for example based on the laser doppler effect). This technique can be used in combination with GPR, which is a complementary detection method.

7. Australian Land mine initiatives – Dr. Colin Coleman, Australian Embassy.

The Australian Defence Science and Technology Organisation (DSTO) is developing new sensors for both handheld and vehicle mounted landmine detection. A vehicle mounted combination of an array of GPR and EMI sensors and a multiband imaging system for route clearance is developed to achieve a speed of 5 km/h. A new handheld detector with a combination of a metal detector and GPR is also being developed. Other research is done on airborne hyper spectral imagers, spinal injury protection in vehicles, synthetic legs for testing of energy absorbing materials, new neutralisation techniques (pyrotechnic torches, microwaves and a shaped charged attack (the whacker).

8. Dr. E. Lawrence Saiers, Vice-President RONCO Corp (A principal Humanitarian Demining contractor for the US Department of State).

Dr. Saiers briefly addressed the Annual Meeting of SCOT. He described RONCO activities and provided operational insights from the field in Afghanistan regarding the capabilities and limitations of flails and mechanical devices now being employed as area clearance tools. He noted the great value of dogs in inspection and proofing.

9. Various speakers on sea mines

The US Navy and Marine Corps are currently working on the modernising of the Mine Countermeasures force. The main areas of interest are: integration of organic offshore mine countermeasures systems, reducing vulnerability to sea mine threats, operations in shallow water/surf-zone environments and approaches for operations on landing beaches. The importance of Underwater Unmanned Vehicles (UUVs) was stressed. Similarly, a underwater autonomous sensor network (seaweb) received a lot of attention. It can be used to detect/track/localise and attack ships

Some interesting subjects in the parallel sessions were:

- the efficiency of deminers that use metal detectors can be increased from 30% to 80-90% for low-metal content mines by addition training. For example, by showing them afterwards what they did wrong during scanning.
- more and more people start to realise that the 99.6% demining standard is also not achieved with prodding.
- several groups combine GPR and metal detectors in experimental hand-held devices, but that the soil conditions are very important for GPR. Results from tests were presented by J. Hendrickx from New Mexico Tech.
- A fully functioning prototype detector based on NQR in combination with GPR and EMI detectors was presented. A 100% Pd was claimed with a low false alarm rate ($<0.1/m^2$).
- the artificial nose is becoming very good, but can only be used for area reduction, not for localisation.
- a new detection technique based on neutron backscattering in combination with metal detector was presented. This Delft University Neutron Backscattering Landmine Detector is currently made two dimensional for the imaging of landmines.
- the "Donovan Controlled Detonation Chamber (CDC)" is a compact, movable chamber that can be used for the disposal of unexploded ordnance to reduce open burn/open detonations (OB/OD).

Additional Comments:

- This conference is a good place to get an impression of what the armed forces of the USA are involved with in matters related to the (de)mining problems. Unfortunately, there were very few people present that have field experience. Rather annoying was the fact that many talks were cancelled without any notice. This meant that people were late for some of the talks. A speaker even missed his own talk as two or three speakers before him didn't turn up and the session was closed before he arrived.
- My advice would be to separate the sea and land mine conferences, because there is hardly any overlap. From a technology point of view, the land mine part of this conference should be combined with other conferences (for example, the SPIE, NATO and IAEA demining conferences). There are already too many conference like this one as it is. Also make sure that speakers are present, if not, readjust the parallel sessions per day so that switching is possible without missing sessions.
- The audio and visual arrangements were excellent. The high-lights being a video conferencing session with Washington DC and (which is remarkable) almost no hick-ups

with the PowerPoint presentations. This all in contrast with the web site for the conference, from which it was difficult to get any information. The wine tasting and conference dinner were nice venues with plenty of liquid refreshments.

References:

<http://www.minwara.org> and <http://www.demine.org>

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