Standardizing Metal Detector Testing

CEN Workshop 7:
Humanitarian Mine Action
- Test and Evaluation
- Metal Detectors

Secretariat hosted by JRC
Standardizing Metal Detector Testing: CW07

- Description of the CW07 project; objectives and progress
- What tests do we need to specify?
- Conclusions
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The Origin of CW07

- Mandate from EC for standardization in humanitarian mine action

- Creation of CEN BT/WG 126 which identifies standardization priorities
  - Metal detector T&E is a priority! Many trials performed already.

- Both ITEP and CEN BT/WG 126 mandate JRC to initiate standardization of metal detector test and evaluation
  - CEN Workshop route chosen
The Objectives of CW07

• Specify standard tests for evaluating metal detectors

• Give guidelines, principles and procedures

• Quantify performance

• Give more value to end-users from comparable results of metal detector trials - based on sound scientific principles

• Publish a CEN Workshop Agreement (CWA)

• Aim of integrating into IMAS system; first as Technical Note
CW07 Progress to date

• Kick-off meeting at CEN in Brussels, November 2001

• First CW07 meeting (35+ participants from all over the world) at Ispra in December 2001

• Second CW07 meeting at JRC, Ispra in April 2002

• Drafting Working Group meeting at DRDC Suffield, Canada, June 2002

• Drafting Working Group meeting at Ispra, September 2002

• Third CW07 meeting at JRC, Ispra in December 2002

• CWA submitted to CEN for publication in May 2003
CW07 Plan

- CEN to publish CWA
- User training and verification in 2003 in various global locations
- Experimental verification in collaboration with MACs, demining organizations
- Review CWA and publish new version if necessary
Who is involved?

• CEN gives overall standardization advice

• GICHD (responsible for IMAS)
  – active participation in CW07 meetings - UNMAS also involved
  – advice on how CW07 can be compatible with IMAS structure

• Chairmanship and Secretariat of CW07 provided by JRC

• Process co-coordinated with ITEP
Who is providing the technical input?

- Metal detector “end-users”
  - Experienced demining engineers and consultants
  - NGOs and others operating demining programmes using metal detectors

- Manufacturers of metal detectors

- R & D institutions with experience of developing or testing metal detectors
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What tests are needed?

- In-air tests
  - Performance in controlled conditions

- In-soil tests
  - Performance in soil (still well-controlled)

- Field tests
  - Can the detector really find that mine in this soil?
  - Other tests; e.g. ergonomics, durability, maintenance
In-Air Tests

- Controlled conditions, no soil!
- Max detection height used to measure sensitivity
- Standard targets
- Sensitivity stability
- Low-tech alternatives
In-Soil Tests

- Controlled conditions, but with soil also.
- Max detection height used to measure how sensitivity is affected by soils
- Low-tech alternatives
Field Tests

- Less-controlled, but “realistic” conditions
- Targets buried at standard depths - detection performance recorded as yes/no
  - standard targets
  - inert real mines
  - rocks...
Other Tests

- Maintenance, battery considerations etc.
- Robustness
- Ergonomics
- EMC
JRC Supporting Work

• Which are the best targets to choose as standard?
  – Experiments in air and in soil are giving some answers
  – Theoretical study will reinforce the conclusions
  – Central provision of standard targets to user community (e.g. JRC)

• CW07 has revealed gaps in knowledge about how to characterize soils that affect metal detectors
  – Classify soil by its (complex) magnetic susceptibility and (to a lesser extent) electrical conductivity
  – Devise simple ways of in-situ soil measurement and classification according to its effect on metal detectors
Supporting Work

• Do the agreed standard tests support the user community?
  – JRC is verifying some tests by experimental work
  – Proposal to make training and verification campaign through MACs

• How do we measure detection reliability?
  – Can we avoid using large test target populations?
  – Apply ideas from non-destructive testing
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Conclusions

CW07 will produce a testing standard giving:

- Quantified metal detector performance
- Assessment whether detector is suitable for the user’s target/soil combination
- Comparable, repeatable results from standardized trials