Eurathlon 2013

Scenario Application Paper (SAP) – Review Sheet

Team/Robot Telerob/Telemax
Scenario Reconnaissance and Surveillance in Urban Structures (USAR)

For each of the following aspects, especially concerning the team's approach to scenario-specific challenges, please give a short comment whether they are covered adequately in the SAP.

Keep in mind that this evaluation, albeit anonymized, will be published online; private comments to the organizers should be sent separately.

Robot Hardware

The robot hardware adequately covers the scenario, but taking in account that 1) stairs and slopes are covered up to 45 degrees, 2) narrow passages are covered if their dimensions are no less than 45-50 cm wide and 80 cm height.

Processing

The SAP does not detail the robot's processing, but since the team is going to tele-operate the vehicle this is not so critical.

Communication

The robot covers adequately the scenario with radio (1km) and fibre optic communication systems.

Localization

The robot is tele-operated by the team thus localisation will be the task of the robot's operator. The robot is also equipped with GPS.

Sensing

The robot adequately covers the scenario, with cameras and several CBRN sensors.

Vehicle Control

The vehicle will be tele-operated by the team via radio or via a fiber optic cable.

System Readiness

Robot Technology Readiness Level (TRL) is very good: 9/9 for hardware and software.

<u>Overall Adequacy to Scenario-Specific Challenges</u>

The SAP is clearly laid out, and the independent test results included are very helpful. The overall adequacy of the robot to the scenario-specific challenges is high, notably including battery autonomy. If possible, a more autonomous performance would be desirable.

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23-27. September 2013,

Berchtesgaden, Germany

Scenario Application Paper

Team – telerob

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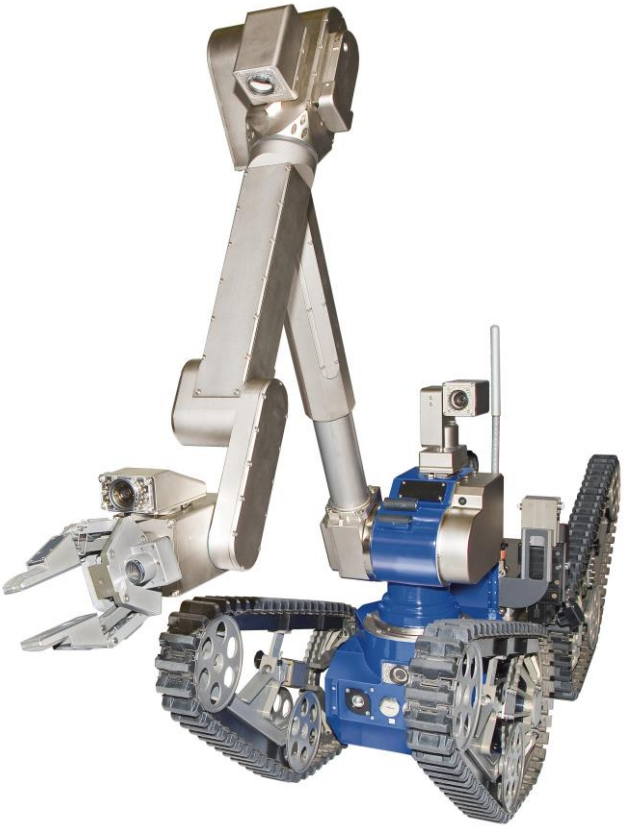


tele*rob* - tele**MAX**

Dr. Andreas Ciossek

Telerob – Gesellschaft für Fernhantierungstechnik mbH

Vogelsangstrasse 8

D-73760 Ostfildern, Germany

Abstract:

The tele**MAX** is an easy to use, small and versatile remote controlled vehicle designed to be operated by bomb disposal engineers. It is best suited for operation in narrow spaces like on planes, underground trains and coaches. The 4-track running gear system displays superior mobility. It can easily cope with inclines of 45°, overcome obstacles measuring up to half a metre in height or 600 mm wide gaps in the surface. It is the world's first EOD robot that features TCP-Control of its manipulator. The telemax has a tool change capability for various tools and can be equipped with a broad spectrum of CBRN sensors. The system is worldwide in service for several years.

The Team

To develop machines, equipment and systems that protect or replace human beings in situations where their presence would be either impossible or place them at great risk.

This is the motto, motivation and mission of telerob Gesellschaft für Fernhantierungstechnik mbH. Whether it's one of our Master- Slave Manipulators being used to dismantle a nuclear facility or an EOD robot being used to disarm a dangerous explosive device, protecting people and their surroundings is always our paramount concern anytime one of our products is deployed.

Our engineers and specialists in the fields of electrical engineering, electronics and precision mechanical engineering combine creativity and competence in the quest for advanced solutions in the worlds of bomb disposal and remote handling technology.

The telerob range of products encompasses EOD robots (tEODor and teleMAX), completely equipped bomb disposal vehicles (TEL600), bomb disposal equipment, non-magnetic special tools (NOMATOOLS), as well as manipulators for servicing, maintaining and dismantling nuclear facilities (EMSM).

A highly qualified and highly motivated staff provides our worldwide client base not merely with innovative products developed and manufactured in accordance with the very highest standards but also with the training and instruction needed to ensure their effective use. Telerob is an official NATO supplier and development partner (NATO supplier code: C 5152).

Furthermore we conform to the requirements of AQAP 2130.

Competitions, trials

Telerob is since 2006 participating at the European Land Robot Trial (ELROB) and has won several awards for its performance at the trials.

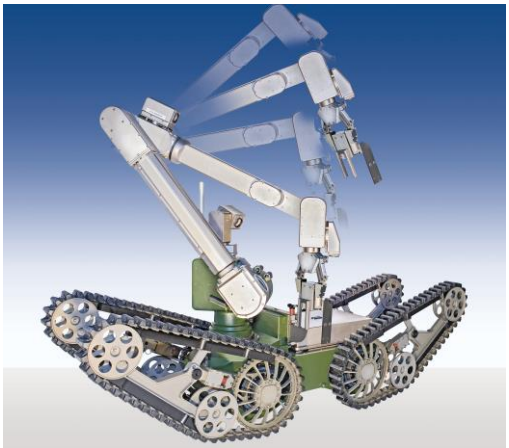
Regularly in Disaster City (Texas, USA) a special evaluation of the newest Standard Test Methods for robots from the NIST takes part. Telerob is already participant for several years and sets especially in all manipulation Test Methods the standard and is therefore best in class in manipulation.

As well we are regularly on customer specific evaluation trials to display our performance in comparison with the ones of our competitors.

Technical Data

The telemax was introduced into the market in 2005 and is worldwide in service.

The Technology Readiness Level (TRL) is 9/9 for hard- and software.

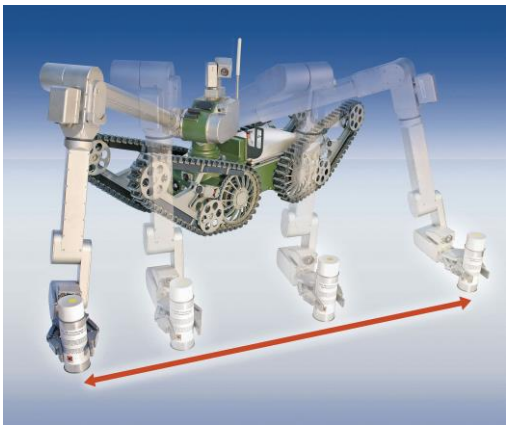


Dimensions if the vehicle is in stowing position

Height:	75 cm
Width:	40 cm
Length:	80 cm

Maximum dimensions of the vehicle

Height:	260 cm
Length:	160 cm
Weight:	80 Kg base system
Ground clearance:	10 cm, more depending on configuration
Climbing performance:	45 degree
Wheel or track driven:	4 tracks
Propulsion:	battery
Endurance:	up to 4 hours
Max. Speed:	10 Km/h
Payload:	10 Kg

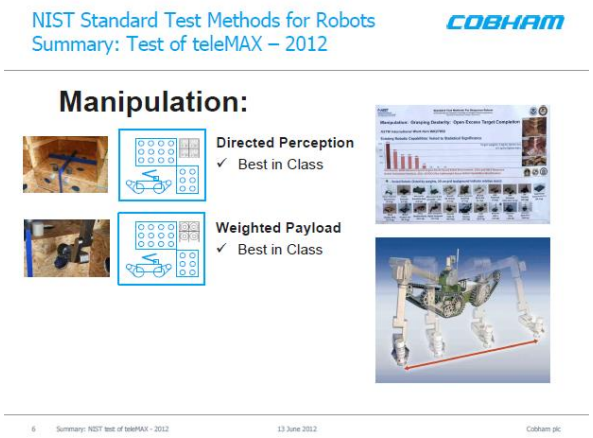


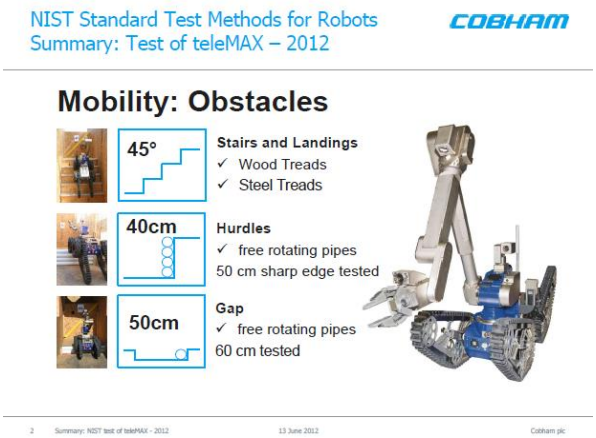
Highlights:

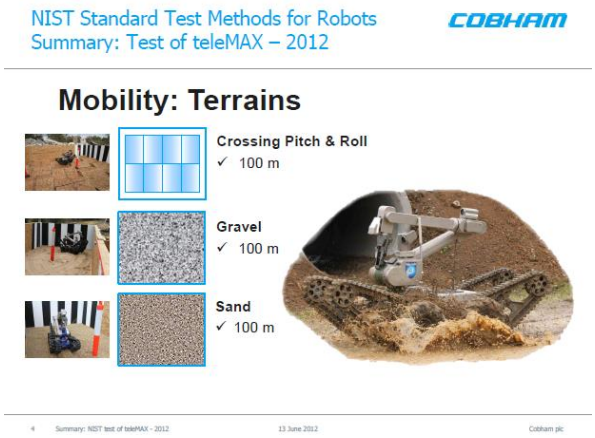
- Programmable manipulator arm with tool centre point control
- Excellent mobility thanks to four-track running gear
- 7-Axis manipulator with turret and linear axis
- Outstanding reach owing to the telescopic arm and height-adjustable chassis
- Tool changing system
- Full functionality (dismantling and manipulation) at maximum height extension
- Deploying Aquaset, RE70 and shot gun and several more.
- Several CBRN sensors available. Customer specific sensors can be implemented on request via universal interfaces.

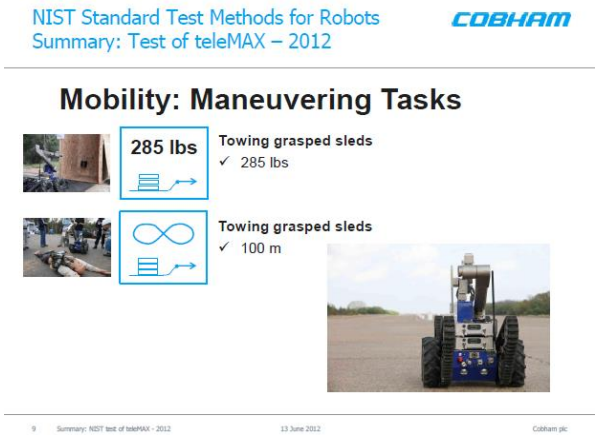
Independent test results

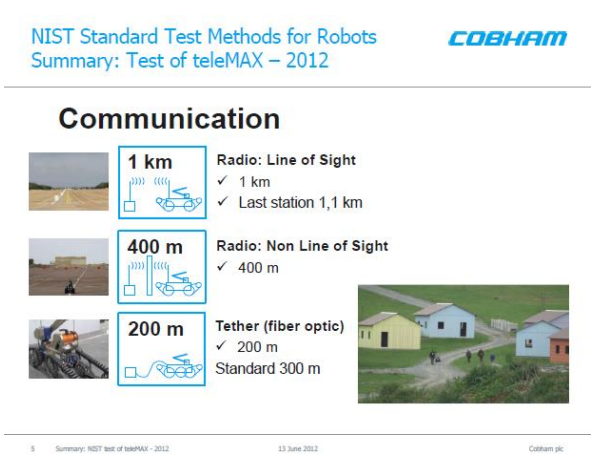
Standard Test Methods Results for Robots from National Institute of Standards and Technology (NIST, USA). Tests conducted by the NIST.

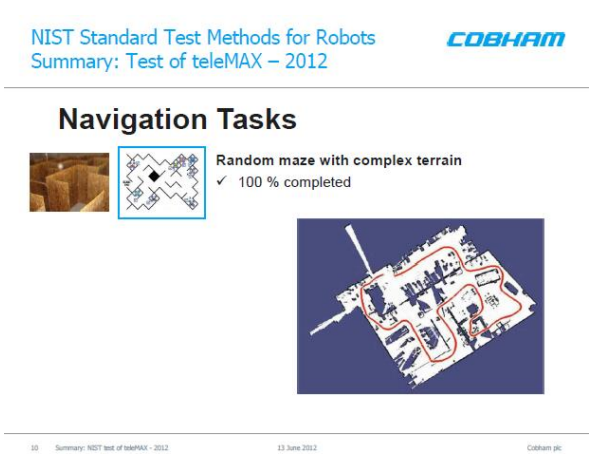












Handling of the scenario

The telemax will be teleoperated either via radio or tethered by a fiber optic cable. Teleoperation is the best choice especially in varying, high complex terrains and for the time being superior to any know autonomous assistance functions. The operator can adjust the chassis configuration of the telemax to cope with different terrains and obstacles. Interaction with the environment is possible by using the very versatile manipulator to for example open doors, open or close valves do some specific measurements with sensors or take samples. In the case it is necessary the operator can choose to use tools from the integrated tool magazine.

The telemax is equipped with GPS and as long as the GPS-Signal is available the telemax could be located by the GPS. In indoor environments an optional mapping module can be used to draw a map with vehicle position etc.

A broad spectrum of CBRN sensors allows the user search, characterize and identify dangerous material thus enables the operator to take action from a safe distance, to initiate the safe handling of that material and if possible to neutralize the dangerous item.

The telemax is in service since 2005 and is used by several task forces worldwide under very different environmental conditions. Of course rain, dust, mud in combination with hot or cold whether faces no problem for the telemax.

Figure 1: M-ELROB 2010 Robo-Dorf RSTA, EOR.

Figure 2: Disaster City: Pan-Cake house, rubble pile.

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Figure 3: telemax at M-ELROB 2010 on training area.

Figure 4: telemax under different environmental conditions.

Figure 5: telemax doing CBRN search, location and identification.

Telerob Gesellschaft für Fernhantierungstechnik mbH

Vogelsangstrasse 8

D-73760 Ostfildern, Germany

telerob@telerob.de

www.telerob.de