Novel Family of Multi Option Fuzes for Mortar and Artillery Munitions

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Requirements

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System Requirements for the MFZ M/A, Multi Option Fuze Mortar /Artillery

1. Compatible with NATO Standards for Dimension and Contour of Artillery and Mortar Munition
2. Insensitive Munition according to STANAG 4439 & AOP 39
3. UN-Protocol V on Explosive Remnants of War
4. Improved Aim Point Accuracy by One-Dimensional Course Correction for Artillery Fuzes

5. G-hardened Modular Design of Subassemblies for common Use in Mortar & Artillery Fuzes

6. Two-Dimensional Course Correction Feasibility to be analyzed
1. Programmable Features

- Impact w/o delay incl. Penetration
- Time
- Proximity, Programmable Height of Burst
- 1-D Course Correction for Artillery Fuzing
2. Safety Requirements

- Fuze Design i.a.w. STANAG 4187
- Performance & Safety Testing i.a.w. STANAG 4157
- Overhead Safety better than $10^{-5}$
- Muzzle Safety 150 meters
Design Criteria

Modular Design

- Proximity Sensor
- Explosive Train
- Electromechanical Safety & Arming Device
- Battery
Programmable Features

- Time, Impact and Proximity i.a.w. STANAG 4369
- 1-D Course Correction Programming:
  - Technical Requirements for GPS Signals
  - Joint Ballistic MoU, STANAG 4593 (draft)
Inductive Programming

Target, GPS & Met. Data

Fire Control System

Calculated Fuze Data

Inductive Setter

Programmed Data
- Impact w/o Delay
- Time
- Proximity
- Course Correction

Proxy sensor

Coils

Course Correction

Timer

Impact Sensor

Fuze Electronics

K1.3

Nashville
May 22 – 24, 2007

Chart 9
Technological Solutions

Modular Fuze Concept for Mortar / Artillery

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JUNGHANS Feinwerktechnik GmbH & Co. KG
1861 – Founded by Erhard Junghans

1905 – Start of own fuze development

1957 – Takeover by Diehl

1984 – Separation in JUNGHANS Feinwerktechnik and JUNGHANS watches

2000 – Restructuring of the Diehl-Gruppe: JUNGHANS Feinwerktechnik GmbH & Co. KG becomes part of Diehl VA Systeme

2006 – Relocation of the site Schramberg in Seedorf

2007 – JUNGHANS microtec as a Joint Venture Company between Diehl and Thales
JUNGHANS - Product range

Mechanical and electronic fuzes for:

- Mortar ammunition
- Artillery ammunition
- Rockets
- Medium calibre ammunition
- Tank ammunition
- Submunition
- Anti-tank ammunition
- ...and Safety and Arming devices
Fuze types mortar / artillery – functioning

(1) Time
(2) Proximity
(3) PD Super Quick
(4) PD Delay
### Requirements and Technology Solutions

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<td>Insensitive Fuze</td>
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<td>Penetration capability</td>
<td>Hardened projectile</td>
<td>New development:</td>
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<td>Hardened Fuze</td>
<td>- Hardened fuze structure</td>
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<td></td>
<td></td>
<td>- Micro SAD - MEMSAD</td>
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<tr>
<td></td>
<td></td>
<td>- Small Firing train</td>
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<tr>
<td>EMC stability</td>
<td>EMC stable proximity sensor</td>
<td>Enhanced radar and multi function electronics</td>
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<td>Enhanced precision</td>
<td>Optimized Height of Burst</td>
<td>New multi function electronic</td>
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<td>Trajectory Correction</td>
<td>Trajectory Correction Module</td>
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Technological Solutions

• Penetration Capability
  ➢ Mortar
  ➢ Artillery

• Firing Train - Definition & Design
  ➢ Miniaturization
  ➢ Insensitivity

• Safe and Arm Device - Definition & Design
  ➢ Miniaturization
  ➢ Function with spinning and non-spinning Projectile

• GPS-Receiver - G-Hardening
  ➢ Definition, Design and Tests
  ➢ Design of GPS – Antenna

• Radar and Multi Option Electronics
Synergies Mortar - / Artillery Fuze Family

**Mortar**
- Programming coil (STANAG 4369)
- Antenna
- Multi Option Electronic
- Energizer
- Hardening / Survive Firing Train
- MEMSAD
- Insensitive Firing Train

**Artillery**
- Programming (STANAG 4593)
- 1-D Trajectory Correction Fuze
Novel Family Multi Option Fuze
Mortar / Artillery modular Design

RF Module
Programming STANAG 4369
Programming STANAG 4593
Energizer
Correction module incl. GPS-Antenna
Penetration Shield
MEMSAD
IM-Booster
Novel Family Multi Option Fuze Mortar

Penetration Shield with Energizer and Safety Device

MOF / M
ETF / M
Novel Family Multi Option Fuze Artillery

Fuze Head Multi Operation with Correction

Fuze Head Multi Operation

Fuze Head Time Function

Penetration Shield with Safety Device
DZI & FWT PGK Proposal

- DZI & FWT Proposal was based on novel Family Multi Option Fuze Artillery in Germany
- Essential components are demonstrated during current activities
- The US Version considers the US respective Requirements
- DZI & FWT have not won the competition, but are still prepared to bring in the proposed solution
- FWT is working continuously on the German Multi Option Fuze Artillery, which includes the 1-D Trajectory Correction Fuze
Thank you for your kind attention!

Questions?