Requirements for WH Scalable Effect Fuzing

abstract number: 16759

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57th NDIA Fuze Conference
29th – 31th July at Newark
Who is TDW

Why and What is an Scaltable Output Weapon

Fuze Functions within an Scalable Weapon

New requirements on safety, reliability and functional control

New STANAG 4187 definitions not in place

Proposal for closing the Requirement Gap
TDW Where we are

Germany
Schrobenhausen

Employees: ca. 130
Sales 2013: ca. 40 m€
... More than 2 millions warheads produced

- Penetrator
- Anti-Ship
- Shaped-Charge
- Multi Effect Warheads (MEW)
- Blast/Fragmentation
- Lethality Enhancer (LC)
- Underwater

Complex Weapons

- Kormoran
- Kormoran 2
- Roland 1+2
- HOT
- HOT 2
- HOT 2T
- HOT 3
- PARS3 LR

Man Portable

- Milan
- Milan 2
- Milan 2T
- Milan 3

Torpedoes

- Sting Ray
- Spearfish

TDW Our WH Portfolio

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Why and What is an Scaltable Output Weapon

Different Targets require Different Output Power
Why and What is an Scalable Output Weapon

Different Targets require Different Output Power
Differernt Targets require Different Output Power

Why and What is an Scalable Output Weapon

But:
You never have

• The right weapon
• To the right time
• At the right fighter
Why Scalable Output Weapons? SOWs?

with a Standard PGBomb

This is what you want

This is what you get

with a Standard PGBomb

This is what you want

This is what you get
Effect of TDWs NEW Scalable Output Weapon Dial a Yield

Demonstration on Witness-Plates

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low output mode</td>
<td>1 hole per m² → &lt;10%</td>
<td></td>
</tr>
<tr>
<td>Intermediate mode</td>
<td>33 holes per m² → 50%</td>
<td></td>
</tr>
<tr>
<td>Full output mode</td>
<td>65 holes per m² → 100%</td>
<td></td>
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</tbody>
</table>

- Deflagration – ERL IV
- ERL II ... III
- Detonation – ERL I
Advantage of Scalable Output Weapon

Effect with use of a SOW
Scaled to target adapted
WH power

This is what you want

This is what you get
The amount of Collateral Damage is one **deciding factor** in the decision

- to do the mission  
- NOT to do the mission

Weapons Output CD Computing is part of Mission Planning

But than the Weapons Output Power **MUST**
not be greater than commanded

**That is a NEW task** for Scalablen Fuzing Systems
Why is Scaling Safety a Fuze Task

Scalable Effect / Dial a Yield is controlled by the Warhead Fuze System

Scalable Effect is achieved by superposition of the

• Detonative Mode (high order, full performance)
• Deflagrative Mode (low order, fast burning)

Therefore the Fuze System needs TWO (2) initiation points with programable time delay between
Example of Scaling by Commanding a Delay Time

* Not TDWs Technology

Delay Time!
What happens, if the Deflagrative Mode fails?

The Weapon will go >> Full Detonation Output

The Collateral Damage will go far beyond the calculated value, far beyond the acceptable limit??

CNN report show dead children and damaged hospitals (etc.)

In that way the Function of proper Initiation is SAFETY CRITICAL
How to get the Deflagrative Ignition reliable

Qualitative Measures

• By Redundancy of the Ignition Train
• By parallel loading of all 3 Firing Circuits
• By Ignition Output a Watch and action
• By adequate design of all safety critical elements
• By setting Low Output Default Values
• By Safety relevant Data Transfer
Quantitative Values for the SOW Fuzing Functionality

Proposal by the Presenter

Safety Values to intended Deployment  acc. STANAG 4187

On Target Engagement :
DuD rate  acc „remnance of war“:  < 2%
Measure : independent back-up timer for Detonator (~ 500 ms)

Probability of failure / unintended high output power :
Less than one in a million

This value is in accordance with the function requirement of Flight Test Termination systems
The need of fixing rules for designing SOW Fuze Systems is a brand-new challenge in the fusing world.

Within the NATO partners

clear requirements for design & safety have be established for

• Operational Calculations

• Mission Planning Decisions

• Quantitative Values for Analysis and Validations

• Inputs for the development guys
• To do so

Expert Groups should come together and formulate proposals (Add-ons to existing STANAGs) for NATO Approval to fix qualitative and quantitative requirements for the final engagement phase of new Scalable Output Weapon Fuze Systems.

You see, it’s not that easy.
The Whole Team

thanks for YOUR interest

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