FMCW Proximity Technology with Advance EM Insensitive Features

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Fuzing Innovations for Tomorrow’s Weapons
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EXPAL Systems – Luis Abad, Product Manager
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  From Despair to Success

• Testing EM Immunity
  Land Testing
  AEGIS Proof Fire test

• Overall, Reliability
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ABOUT OUR GROUP
MAXAM is a global leader; a company technologically specialized in the design, development, manufacturing and application of energetic materials.

- **Blasting and initiation systems** for the mining, quarry and infrastructure industries
- **Cartridges and gunpowder** for hunting and sporting use
- **Products and services for defence and security industry**
- **Key raw materials for nitro chemical activity**
- **Terra Solutions**
- **Outdoors**
- **Defense**
- **Chem**
History

19th Century
- 1872 Alfred Nobel founded the SED Sociedad Española de la Dinamita, Privilegios A. Nobel

20th Century
- 1911 First supply to the Spanish Navy
- 1979 Ammunition’s loading plant, one of the most important for NATO
- 1986 Management of entire life cycle of munitions

21st Century
- 1990 Development of high capacities and advanced technological elements
- 1990 Strategic partnership for engineering services and systems’ integration

International Expansion
- Consolidation as a global leader
- Worldwide presence consolidation by extending our activities
- Commercial activity in 5 continents
- 3 Technology centers
- 11 Industrial sites: US Establishment & R&D propellants plant
Allies of Armed Forces

**AIR**
- Solutions to + 25 Air Forces worldwide
- Complete air-to-ground warheads portfolio
- Compatible with most advanced precision guidance systems

**LAND**
- Leaders in mortar systems
- Complete ammunitions for Indirect fires support global solutions from 60mm to 155mm

**SEA**
- + 100 years providing naval solutions
- Vertical integration of key components
Fuzing Solutions for Every Scenario

- Fuzing since 1940
- Presence in +45 countries
- +500,000 units/year manufacture (60mm up)
- STANAG Qualified solutions for Mortar Grenades and Field Artillery
- In-house production of key components (energetics and electronics)
Fuzing Solutions for Every Scenario

- **Unique competences** as complete rounds manufacturer (availability and know-how)
- **Complete Portfolio** for large calibre ammunition (+60mm)
- **U.S design** based mechanical fuzes (M739, MTM/MTSQ)

- Fuzing since **1940**
- Presence in **+45 countries**
- **+500,000 units/year** manufacture (60mm up)
- **STANAG Qualified** solutions for Mortar Grenades and Field Artillery
- **In-house production** of key components (energetics and electronics)
- **Leading electronic & proximity fuze technology**
Directly Supporting the US Armed Forces

2 Industrial Sites:
- Texarkana, TX
- Minden, LA

Texarcana
- 200 acres site, Currently Ammo LAP, demilitarization, recycling and recovery of munitions and components.

Minden
- 100 acres flexible explosive processing plant (incl. twin-screw extruder) with analysis lab
- DCMA site safety survey approved
- BATF&E Type 2X permits
- Louisiana explosive licenses

Capabilities for bringing in EXPAL’s expertise in other ammo solutions (Fuzes M739, MTM/MTSQ)
A Story of Frustration and Success
Key Elements of Frustration

- Current standard ordnance solutions not at the same level than Combat Systems
  - Low Reliability (<90%)
  - Dramatically affected by EM Environments
  - Potential Safety Issues (prematures)

- Proximity detection and processing based in 80’s available technologies
  - Complete Obsolescence (transistors/oscillators/mixers)
  - Big Supply Chain Problems and Manufacture unproductiveness (Big Scrap)

- Suprisingly, a very common worldwide non recognized situation
Key Elements of Frustration

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From Despair To success

- Development Program started in 2009 sponsored by the Spanish Navy.
- Several Stages, concluding proximity in 2015.
- Operative Fuzes in service since 2016.
- Still, 76 and 127mm subjected to improvements until 2017, wrapping up the project.
Testing
Testing EM Immunity

On-Board Immunity Testing

- 5 inch mk45 mod.2 Gun
- HE Shell with full service charge
- EF-127C Fuzes Long Intrusion

- Most adverse EM (precise configuration Classified as Confidential)
- 23 secs trajectory illuminated, 10,000 yards target
- 100% fired rounds performed satisfactory (no premature and proximity detection evidenced)
Overall, Reliability
PRODUCTION KEY FACTS

+10,000 76mm & 5” Fuzes put in service

5 countries already trusting us

4 guns Compatibility tested

~ 300 Fuzes tested

+95% Reliability in Prox.Detec. (~98% combined)

0 Premature
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<tr>
<th>In constant R&amp;D&amp;i</th>
<th>Applying stable &amp; reliable solutions</th>
<th>Focused in customer needs</th>
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<td>• Improvements for present products profiting of everyday new techs.</td>
<td>• In-house production &amp; integration of key components</td>
<td>• Engineering answering to the Armed Forces needs</td>
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<tr>
<td>• R&amp;D’s for Multi-option an Combat Sys. integration with Spanish Navy</td>
<td>• Reliable mechanical solutions</td>
<td>• Tailored solutions</td>
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Thank you