New Indirect Fire Capabilities from Industry Cooperation

2004-06-16
Introduction

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- Realities
Technology developments in the 1990’s led to:

- 105mm long range artillery ballistic system
- 52-cal NATO conformal HE projectiles
- 120mm Long Range HE mortar System
Constraints/ Challenges

- Lack of clearly defined User requirement
- Competitive challenge
- Funding
- IM compliance by DoDs
- Intellectual Property Rights
- Licensing
- NIH
- Market base protection
- Licensing
Objective/ Goals

Meet emerging User Requirements through core competencies

Examples:
• 120mm IHE SPH Mortar Program (Wiesel)
• Light weight SPH indirect fire capability (BCT)
• 155mm Insensitive HE projectile (AFASS)
• 105mm Improved HE projectile (LIMAWS)
Required Technologies

PROJECTILES
• Warhead design for high-end ballistic environments
• Setback and spin Insensitive High Explosive for mortar and artillery projectiles
• Filling process
• Enhanced terminal effect
• Insensitive munition characteristics

Howitzer
• Lightweight SP Platform and Turret Design
Options

• Internally funded development
• Co-funded collaborative development
• Government sponsored development
Objectives

- Share technologies for mutual benefit
- Provide User with new and enhanced capabilities
- Reduce NDA lead-time
- Share cost burden
- Maintain revenue potential
- Protect key core competence IP
Technology Partnerships: Examples

- 105mm SPH Howitzer - GDLS/Denel
- 155mm Insensitive HE Projectile - Denel/DMS/Dyno
- 120mm IHE Mortar - DenelDMS/NC/Dyno
Results\(^{(2)}\): 105mm LAVIII SPH Demonstrator
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- Meets the weight threshold for C130 transportability
- Can fly 1,000 mile tactical mission
- Meets aircrew egress requirement
- Reaches 30km range (40km with V-LAP)
- Modular charge system 105mm miniMACS
- Auto-loading (user choice)
- 39-cal 155mm lethality (JMEMS T#1 to #5)
- Insensitive IHE munitions
Convergence of technologies:
- LAVIII platform (GDLS)
- Ballistic system (Denel)
- Turret (Denel/GDLS)
- IHE ammunition (Denel/DMS/GD-OTS)
Results\(^{(1)}\): 155mm IHE Projectile (ACA\(^2\)P)

- 2 x 38 cm (double reinforced), > 6525Psi 90° NATO
- 3 x 23 cm (each double reinforced), > 6525Psi, 90° NATO

M0121 Insensitive High Explosive
Results: 155mm IHE Projectile

- JMBoU conformal architecture
- Range
  - 39-cal  >24km BT and >30km BB
  - 52-cal  >30km BT and >40km BB
- Insensitive Munition Performance (Mil Std 2105B or STANAG 4439)
  - Fast Cook-off Type V reaction
  - Shaped Charge Jet Type V reaction
  - Bullet Impact Type V reaction
  - Sympathetic Detonation Type III reaction
  - Fragment Impact Type V
- Structure Perforation Exceeds BWB requirements
- Fragmentation Exceeds BWB requirements (>L15)
- Accuracy Exceed L15 PE\textsubscript{R} and PE\textsubscript{D}
Convergence of technologies:
- Projectile design (Denel)
- Fragmenting body optimization (Denel)
- Insensitive explosive (Dyno)
- Filling technology (DMS)
- IHE optimization (Denel/DMS)

Results: 155mm IHE Projectile
Results\(^{(1)}\): 120mm IHE Mortar

- HE (IHE) M0310
- PRAC M118
- SMK-RP M115
- ILLM-VIS M116
- ILLM-IR M126
Results (2): 120mm IHE Mortar

- Meets range requirements of €-User
- Meets IM requirements of STANAG 4439
- Has equal increment charge system
- Excellent PE\(_{\text{Range}}\)
- Good low temperature propellant
- Capable of >10km from SANDF M12 mortar
Results\(^{(3)}\): 120mm IHE Mortar

Convergence of technologies:
- Mortar design (Denel)
- Insensitive explosive (Dyno)
- Filling technology (DMS)
- Propulsion system (Denel/NC)
Resolving the Market conflict

- Contractually agreed market share (domain)
- Mutual support
- One team approach
- Lead/support understanding
- Government acceptance
- Competition rules
- Indigenization (USA and Europe)
Greater Partnership

- Nobody has all the technology
- Industry too has valuable technologies
- Shared development cost-load more affordable
- Stable User vision/requirements
- User community committed engagement vital to affordable developments
- DoDs too can be partners
Spin-offs

Application of technologies to other associated munition types:

- 60/81mm IHE long-range mortar
- 76/62mm naval ammunition
- 155mm naval ammunition
- 5” naval ammunition
Looking to the Future

- Greater precision
- Greater range
- Lighter platform recoil absorbing masses
- Greater lethality
- Improved safety
- Improved reliability
- Improved safety
- Lowered cost
- Demilitarization
Realities

- DoDs will have to allow technologies to be shared
- Fewer competitors
- Fewer choices
- Earlier fielding dates
- Enhanced war-fighter capabilities
An Example: 155mm Ram-Jet HE Projectile
Co-operation Opportunities

- Co-funding of program
- Warhead Initiation (annular fuzes)
- Mid-course Range Correction Fuze technology
- Telemetry Capability