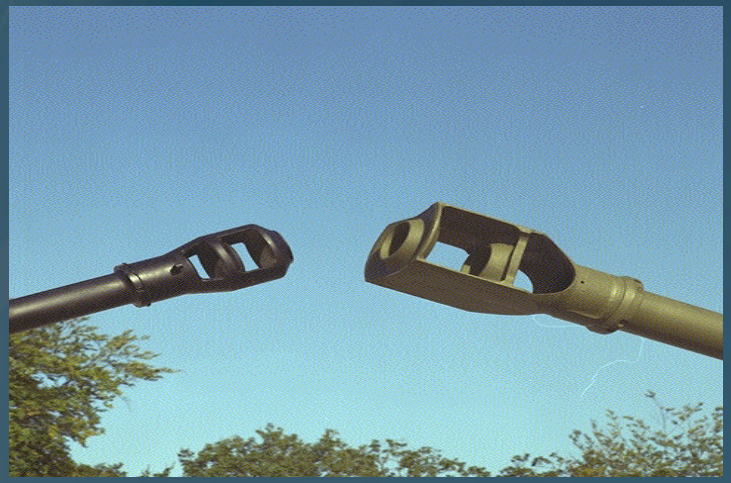
BAE SYSTEMS

Insensitive Munitions Programmes Overview



Approach To Insensitive Munitions:

BAE SYSTEMS

IM (MURAT) DEFINITION

"Munitions which reliably fulfil their performance, readiness and operational requirements on demand but which minimise the probability of inadvertent initiation and severity of subsequent collateral damage to weapon platforms, logistic systems and personnel when subjected to unplanned stimuli"

POTENTIAL THREATS

Threat	Test	Pass Criteria
• Magazine, store, vehicle or fuel fire	• Liquid fuel fire test	
• Fire in adjacent store, magazine or vehicle	• Slow heating	
• Enemy or terrorist SA attack	• Bullet attack	No reaction more severe than burning
• Explosion in store, magazine or vehicle	• Sympathetic detonation/reaction	
• Attack of armour or HAS	• Spall impact	
• ATGW attack	• Shaped charge jet impact	
• Fragmenting munition attack	• Fragment attack	
• Accident or mishandling	• Drop test	•Not applicable

Approach To Insensitive Munitions:

BAE SYSTEMS

- Strategic Goal for IM

> To become the Centre of Excellence for the production of High Performance IM compliant munitions

- By:
  - Being first to market & achieving preferred supplier status to UK MoD and other Customers
  - Taking a pro-active approach to investment
  - Recognise that compliance with IM requirements is dependent upon overall system design
    - Using a generic design where possible
    - Forming appropriate partnerships with Customers and Industry
  - Conducting a comprehensive technology programme culminating in a series of successful demonstrations:
    - Medium Calibre Ammunition
    - 4.5” Naval Shell
    - 105mm Artillery Shell
    - 155mm Artillery Shell

Approach To Insensitive Munitions:

BAE SYSTEMS

- IM System Approach/Technologies

- IM Compliance is dependent on the design of the overall weapon system
- Munition responses influenced by sub-systems & component technology

•HE Main Charge - PBX

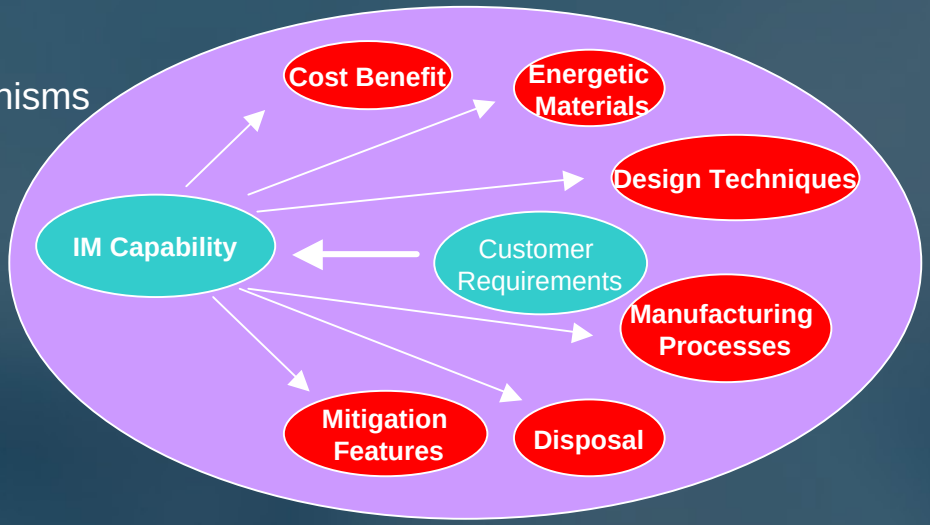
•HE Initiation train - Cook-off resistant Exploder, Booster & Stemming

•Fuze - IM compliant Pellet/Booster

•Propelling Charge System
- LOVA Gun Propellant & Primer
- Pressure relief for Fixed Cartridge Cases

•Mitigation Features
- Active & passive pressure relief mechanisms
- Stress raisers
- Composite cases
- Fusible links
- Thermal/shock attenuating liners
- Insulating coatings

•Packaging & Stowage
- Heat resistant & Tumescent coatings
- Inter-spaced barriers



Approach To Insensitive Munitions:

BAE SYSTEMS

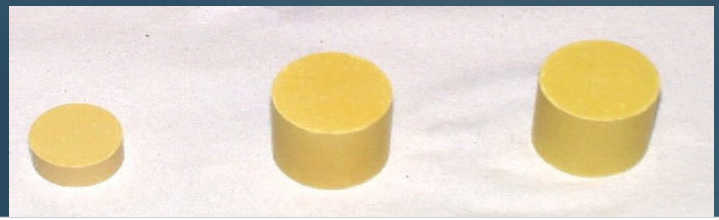
- Energetic Materials

Rowanex 1100 Main Charge Filling

- •NTO based compositions have reduced performance and increased sensitivity
- •Cast and Pressed PBXs have similar characteristics - casting approach preferable (backward compatibility & design flexibility)
- •Perceived technical risks associated with gun firing cast PBX filled projectiles have been eliminated through technology demonstrator programmes

Castable PBX (ROWANEX 1100) is the most compliant option in terms of performance & safety

Rowanex 3601
Reduced Vulnerability
Booster Explosive



Approach To Insensitive Munitions:

BAE SYSTEMS

- System Design (Concurrent Product & Process Development)

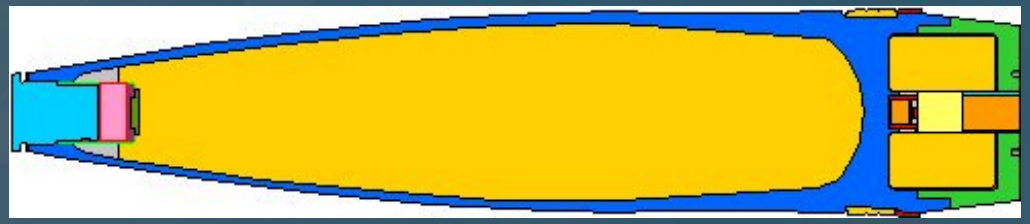
IM mitigation design features

Package design IM mitigation

Environmental survival

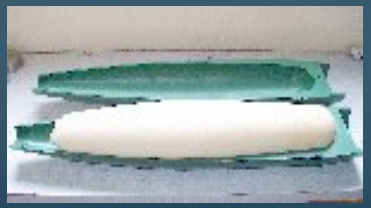
Gun firings & recovery fragmentation trial

Base bleed static burn rig



Reduced vulnerability booster explosive

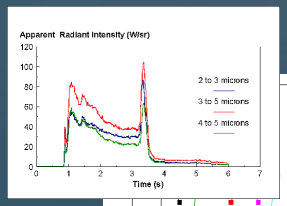
PBX formulation

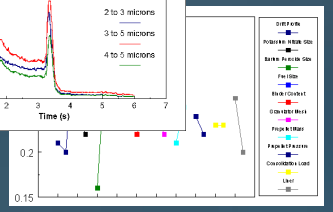


Liner

Castable PBX filling Process

Igniter Taguchi trials





IM Programmes Overview:

BAE SYSTEMS

RO Defence demonstrated ‘world’s first’:

- successful live firings of IM compliant 105mm, 155mm and 4.5” Ammunition
- objective evidence of lethality
- firings at extremes of system parameters
- demonstrated initial ‘Safety & Suitabilty for Service’