Insensitive Munitions Programmes Overview
Approach To Insensitive Munitions:

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

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

- 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:

- 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
- Igniter Taguchi trials
- Reduced vulnerability booster explosive
- PBX formulation
- Liner
- Castable PBX filling Process

System Design (Concurrent Product & Process Development)

Approach To Insensitive Munitions:
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 & Suitability for Service’