Demilitarization as a Systems Engineering Requirement

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Performs end of lifecycle management for conventional ammunition to include disposition and demilitarization
Outline

- The Demil & Disposal Requirement
- Demil Challenges
- Design for Demil (DFD)
- DFD Design Considerations
- Summary
- POCs
The Demil & Disposal Requirement

- “At the end of its useful life, a system shall be demilitarized and disposed …” DoDI 5000.02
- Demil is “… destroying the military offensive or defensive advantages … to prevent the further use …” DoD 4160.12-M-1
- Responsibility for demil of all Services’ conventional ammunition is assigned to the Army as the Single Manager for Conventional Ammunition (SMCA)
- The Army Product Manager for Demilitarization (PM Demil) executes the SMCA demil mission through the “Demilitarization Enterprise”
Demil Execution:
Then/Now/Future
Demil Challenges

Demil Stockpile History

- Growing Stockpile
- Limited Funding
- Limited Storage
- Increasing Cost
- Environmental Regulations
- Recycle & Reuse

Projected

Year

Stockpile Size (k-S)
Generations (k-S/Tons)
Accomplishments (k-S/Tons)
Funding ($M's)
Demil is a life cycle requirement that must be adequately addressed in design phase

Goal: Include demil as a systems engineering requirement early to influence the design & positively impact future Demil execution
Traditionally, munition designers focus on item performance & may not be aware that design decisions can lead to difficult demil problems at the end of the item’s life cycle.

In the past, OB/OD “took care of the problem”

Munition design historically had little impact on the ability to conduct effective and efficient demil (OB/OD)

But things have changed …
Design decisions made early in the life cycle have a significant impact on end of life cycle Demil operations!

**Why DFD?**

- Reduced OB/OD, Advanced Demil Tech.
- Life Cycle Cost
- Environment
- Readiness
- Safety
- Resource, Recovery, & Recycling (R3)

**DFD is a proactive approach to addressing future Demil challenges.**
Design Impact on Demil

**SPARROW 17A/B WARHEAD**

- Depleted Uranium Salt requiring $1M+ additional demil equipment

**ADAM MINE**

- Glue requires extra process steps

**HARM WDU-21B NAVY**

- Conduit traps explosives
- Small wash out hole
- PBXN-107 fill does not melt

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DFD Policy

DFD policy signed 4 Aug 08 by Mr. John Young, Undersecretary of Defense for Acquisition, Technology & Logistics

"Good systems engineering addresses all aspects of the life cycle, including systems’ demilitarization and disposal."

This policy supports the Department’s objectives in Total Life Cycle Management. While the focus remains primarily on conventional ammunition, Design for Demilitarization is a good systems engineering practice that should be applied to all defense programs.

My point of contact is Mr. Joe Gasbari at 703-692-9260. Additional assistance can be obtained from Mr. Gary Massengale, with the Armament Research, Development, and Engineering Center, at 973-724-3349.

Attachment:
As stated.
DoD I 5000.02 (Dec 8, 2008) amended (para. 8.c.(2)) to increase emphasis on demil consideration during design ...

(2) Disposal. At the end of its useful life, a system shall be demilitarized and disposed of in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment. During the design process, PMs shall document hazardous materials contained in the system in the Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE) (see Section 6 in Enclosure 12), and shall estimate and plan for the system’s demilitarization and safe disposal. The demilitarization of conventional ammunition (including any item containing propellants, explosives, or pyrotechnics) shall be considered during system design.
# Demil Plan vs Design for Demil

<table>
<thead>
<tr>
<th>Demil Plan</th>
<th>≠</th>
<th>Design for Demil</th>
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<tbody>
<tr>
<td>Typically done late in the design</td>
<td></td>
<td>Done throughout design</td>
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<tr>
<td>Prescribes a procedure for demil</td>
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<td>Influences the design for efficient demil</td>
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<tr>
<td>Afterthought</td>
<td></td>
<td>Forethought</td>
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<tr>
<td>Reactive</td>
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<td>Proactive</td>
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Demil Plans can encourage but do not assure design for demil!
Item Performance

- Design for Demil is not intended to detract from achieving item performance
- Design trade offs will be handled by the Item PM
- **Low cost** design changes that **do not impact performance** could be made ... if demil is included up front and early as a requirement
Design for Demil IPT & Implementation

- DFD is a key strategic goal of the PEO Ammo approved Demil Enterprise Strategic Plan
- Multi-Service DFD Integrated Process Team (IPT) chartered to establish DFD strategy and approach
- Multi-faceted approach is being pursued to implement DFD
DFD Policy Requirements

“… include in acquisition documentation how (you) intend to address demilitarization design requirements throughout system design.”

- Define a demilitarization design requirement
  - Include in acquisition documentation
  - Include throughout systems engineering process
- Address DFD activities in program reviews
- Include valid estimates of demilitarization in Life Cycle Cost/affordability estimates
- Develop a demil plan demonstrating DFD features
- Include in Developmental Testing
DFD Design Considerations

- Easy disassembly
- Easy access to and removal of energetics
- Materials & components that are reusable, recyclable, and non-hazardous
- Accommodates existing Demil capabilities and avoids special tools
- Consider demil operator involvement

Key: Incorporate DFD considerations early to mitigate Demil impact and cost while not affecting mission capability
Summary

- Demil is a life cycle requirement that must be included early in the systems engineering process.
- Early ammunition design decisions impact Demilitarization operations.
- DFD is a policy requirement and a proactive way to mitigate future Demil challenges.
- Forethought during early development will reduce the cost associated with end of life cycle management, with little impact to development cost.
DFD POCs

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https://www.pica.army.mil/pmdemil