Demilitarization

Design for Demil Efforts at GD-OTS

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GENERAL DYNAMICS
Ordnance and Tactical Systems
GD-OTS – Commercial Demil Prime Contactor

- General Dynamics (GD) has been involved in Demil work since mid 1980s
- Since 1999 GD Ordnance and Technical Systems (GD-OTS) is a Systems Contractor for the US Army
  - 5 year program with 43,000 ton ammunition disposal
  - Approximately 600 tons per month processed at various facilities
- Since 2005 GD-OTS is a Demil Sole Source Systems Contractor to US Army
  - Currently 4 years, 106,000 tons ammunition
  - 2,350 tons per month average
  - 4,550 tons – highest month to-date
WHY DEMIL?
Life Cycle Need for Demilitarization

- Weapon Platforms and ammunition have a life-cycle, become obsolete, and end up in the Demil Stock Pile
- Demil stocks decay and create hazards, environmental, and security problems
- Disposal cost continue to increase with changes in environmental regulations
- Demil is the only storage solution that creates space in the depots

Corroded Cartridges

Corroded Projectiles

Corroded Projectiles
Practical Reasons for Demilitarization

- Demil stocks impede the depots’ wartime support mission
- Tax Payers are spending lots of money to secure, maintain and inventory obsolete ammunition
- Obsolete Ammunition is occupying covered storage space at key ammunition out load depots
- Demil stocks occupy space inefficiently
- Stability of propellant and energetics a long-term safety hazard

Store, Secure, Maintain and Inventory obsolete Ammunition is a Waste of Money and Resources
Impacts to Demilitarization

- Political pressure can restrict or eliminate use of many ammunition items
  - Cluster Ammunition
  - Depleted Uranium
  - “Dumb” Ammunition
  - Suspected Carcinogens

- Environmental impact
  - Sea dumping
  - Open Burn
  - Open Detonation
  - Land Filling

![Loaded Ammunition Projectiles](image)
Demil Environmental Requirements

- Open Burn / Open Detonation is not an option – only available to USG Depots and becoming obsolete
- Must meet all local, state, and federal environmental regulations

⇒ adds cost to demil process
Demil Requirements

- Many demil processes require state-of-the-art technologies to deal with ammunition designs from 25-50 years ago
  - adds cost to demil process

GENERAL DYNAMICS
Ordnance and Tactical Systems

DEMIL
Historically, Demil has not been considered part of the Life Cycle
Design for Demil

- Demil needs to be part of the systems engineering throughout the ammunition design and production phases to reduce overall life cycle cost.

Design for Demil Challenges:
- Design is driven by performance, cost, and schedule.
  - Demil adds additional constraints to each.
- Actual Demil does not occur for 10+ years after development and production.
- Design for Demil requirement must be measurable and verifiable.
Requirements for Design for Demil

- Demil design requirements shall be defined in acquisition documentation.
- Demil design requirements shall be included in the systems engineering process and documented in the Systems Engineering Plan.
- Design for Demil activities and status shall be addressed in all program reviews:
  - IPT meetings
  - Preliminary and Critical Design Reviews
  - Milestone entrance / exit reviews
- Valid and realistic demil cost estimates.
- Demil Plan developed prior to milestone C.
- Demil testing conducted during Developmental Testing.
POOR DESIGN → INTRICATE DEMIL
Cluster Bomb Facility Requirements

- Combination of Automated and Manual Operations
  - Maximum Safety / Minimum Risk
  - To Achieve Highest Process Efficiency
- High Volume Throughput
  - To Complete Contract Requirements
  - Enough Capacity to Deplete similar assets in Demil Inventory
- Low Maintenance Requirements
- Bomblet Disassembly Operations are Remote Controlled with Video Monitoring
- Thermal Treatment of Energetics
- Robust process for Asset Variation
General Processes Cluster Bomb Family

Depalletize
Wood/Steel Packing and Strapping
Landfill or Mixed Metal Salvage

Opening of CBU
Remove Bomblets
CBU Skin
Empty Shell
Mixed Metal Salvage

Opening of Bomblets
Remove Fuze
Fuze
Thermal Treatment
Ash

Bomblet
Hemispheres
Thermal Treatment Explosive
Metal Salvage

R³

General Dynamics
Ordnance and Tactical Systems

EBV/EEC
EXPLOSIVES ENVIRONMENTAL COMPANY

DEMIL
Production Methods - CBU Loading of Bomblets
CBU Disassembly Line – Overall Layout

Input Bay  Safety Cell / Disassembly Bay  Output Bay

Top View
Current CBU Demil Line Facilitization

8 Months – Concept, Construction, Completion
Demil Center of Excellence for Cluster Ammunition

- GD-OTS has teamed with EBV EEC to Create the Leading Center of Excellence for Demil of Assets Containing Submunitions
- Engineered Solutions that are Safe, Robust, Efficient, and Low-Cost
- Proven Capabilities across Range of Demil Items
- Design and Implementation of CBU Line in 8 months
- Generation 4 ICM Line in Operation
GOOD DESIGN ➔ SIMPLE DEMIL
In 2002, the Advanced Cannon Artillery Ammunition Program (ACA2P) was created to help modernize conventional artillery ammo

- Need for high effectiveness against soft targets without the use of DPICM’s
- Recently Type Classified
- IM requirements aided design being demil friendly
Demil Processes - M1130 105mm IM HE PFF

Main Demil Processes:
- Basebleed – Unscrew and thermally treat
- HE Explosive Fill
  - Simple access by extracting pins and unscrew plug
  - Waterjet washout of HE and recycling
- Flash projectile body to react booster
- Thermally treat fuze
- >97% Resource Recovery and Recycle (R³) Rate

Simple and low cost Demil solution
GD-OTS Design for Demil Summary

GD-OTS uniquely positioned for Design for Demil activities:
- In-house ammunition development and production expertise
- In-house demilitarization expertise
- Entire life cycle management

GD-OTS Design for Demil Services:
- Design for Demil Requirements Analysis
- Demilitarization Systems Engineering
- Demilitarization Plan Development
- Demil Cost Estimations
- Design for Demil Activity Management
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