Event #4610
May 12 - 15, 2014
Phoenix, AZ

“Balancing Armament Innovation and Readiness Improvements within Budget Constraints”

GD-OTS’ 25mm Non-Energetic Fragmenting (NEF) Cartridge
(Enhanced 25mm PGU-20)

Approved for Public Release
25mm NEF Cartridge – Enhanced PGU-20

Joint development by:

General Dynamics – Ordnance and Tactical Systems (GD-OTS) Marion, Illinois and

Army Research and Development Engineering Center (ARDEC) Picatinny, New Jersey
25mm NEF Cartridge – Enhanced PGU-20

Advanced Tungsten Core

Premier, Dual-Purpose, F-35A Solution

GAU-22/A Weapon System

Enhanced PGU-20 Projectile

GENERAL DYNAMICS
Ordnance and Tactical Systems

U.S. AIR FORCE

GENERAL DYNAMICS
Ordnance and Tactical Systems

U.S. AIR FORCE
F-35 Lightning II Warfighting System

GD-OTS supports the F-35 warfighter with the weapon system and ammunition

F-35 Lightning II

25mm NEF Cartridge

25mm GAU-22A Cannon
F-35 Lightning II – 3 Variants

**F-35A (USAF)**
The USAF F-35A Variant is designed for conventional take off and landings (CTOL) and carries the GAU-22/A Weapon System internally.

**F-35B (USMC)**
The USMC F-35B Variant is designed for short take off and vertical landing (STOVL) and carries the GAU-22/A Weapon System externally.

**F-35C (USN)**
The USN F-35C Variant is designed as the carrier version (CV) and carries the GAU-22/A Weapon System externally.
F-35A US Air Force – Dual Mission

Air-to-Air

- Projectile must react upon impact with thin-skinned targets
- Fragmentation effects to enlarge area of damage
- High density fragments to carry deep into target
Air-to-Ground

- Projectile must penetrate light armored ground targets
- Penetration effects to destroy/disable ground vehicles
GAU-22/A Gatling Gun

Weapon System

- Designed by GD-OTS’ Medium Caliber Ammunition & Weapon Systems (formerly GD-ATP)
- Upgrade from GAU-12/U, 25mm Weapon
- Light Weight, 4 Barrel, Gatling Gun System
- In production since 2009

http://www.f-16.net/f-16_forum_download-id-12524.html
25mm NEF Cartridge – Enhanced PGU-20

Fragmentation (Air-to-Air Combat)

- Two-Piece Nose Cap – specially designed for transfer of forces to body and core.
- Projectile Body – incorporates features to promote separation and fragmentation of body upon impact with thin-skinned targets.
- Advanced Tungsten Core – provides a large pattern of high density fragments creating damage within the target.

High Density Fragments = More Damage = More Kills
25mm NEF Cartridge – Enhanced PGU-20

Armor Penetration (Air-to-Ground Combat)

• Advanced Tungsten Core – developed by ARDEC to provide significant improvements to standard tungsten alloys.

• V50 Data and Performance Capabilities are classified.

• The 25mm NEF Cartridge (“Enhanced PGU-20”) easily exceeds penetration capabilities of alternative Joint Strike Fighter configurations.

More Penetration = Lethality Against More Targets
25mm NEF Cartridge – Enhanced PGU-20

25mm Non-Energetic Fragmenting (NEF) Cartridge

• **Low Qualification Costs** (Delta Qual to PGU-20/U & PGU-20A/U)
  • No change to energetics (propellant & ignition system)

• **Low Unit Costs**
  • Comparable to PGU-20/U & PGU-20A/U

• **Enhanced Performance**
  • Advanced Tungsten Core
    • Beyond state-of-the-art penetration
    • Excellent fragmentation upon release from projectile body
  • Customized PGU-20 projectile body to release core after impact
# 25mm NEF Cartridge – Enhanced PGU-20

## PGU-20 Progression

<table>
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<tr>
<th>PGU-20/U</th>
<th>PGU-20A/U</th>
<th>PGU-20 (NEF)</th>
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<tr>
<td>Depleted Uranium Core/Penetrator</td>
<td>Standard Tungsten Core / Penetrator</td>
<td>Advanced Tungsten Core / Penetrator with Fragmentation Effects</td>
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<tr>
<td>Standard 1-piece PGU-20 Nose Cap</td>
<td>Standard 1-piece PGU-20 Nose Cap</td>
<td>Advanced 2-piece Nose Cap</td>
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25mm NEF Cartridge – Enhanced PGU-20

NEF Testing

Set-up:

- Line of flight
- 20°
- ~2 ft
- .080" Al witness plate
- .080" Al trigger plate
25mm NEF Cartridge – Enhanced PGU-20

1) Projectile approach

2) Projectile impact

3) Projectile fragmentation
25mm NEF Cartridge – Summary

Verification Testing at ARL by US Army
- Fragmentation - Testing Complete - Very Effective
- Penetration - Testing Complete - Very Effective

Qualification
- 25mm NEF is modified PGU-20/U
- 25mm PGU-20/U has been fielded for years
- 25mm NEF uses PGU-20/U energetics (primed case & propellant)
  WSESRB approved
- Full compatibility with F-35 GD-OTS 25mm GAU-22A Cannon
- 25mm NEF is ready for Delta Qualification (projectile only)

High Volume Manufacturing Capability
- US Army ready to transfer Advanced Tungsten design to US Industrial Base
- All other components are poised for high volume (>1M/yr.) production
- Cartridge pricing will be very similar to PGU-20/U unit cost
Points of Contact

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