

GENERAL DYNAMICS

Ordnance and Tactical Systems

2014 NDIA Joint Armaments Conference

25mm Non-Energetic Fragmenting Cartridge

USAF F-35 Joint Strike Fighter

Rick Wright
12-15 May 2014

GENERAL DYNAMICS

Ordnance and Tactical Systems

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)



25mm NEF Cartridge – Enhanced PGU-20

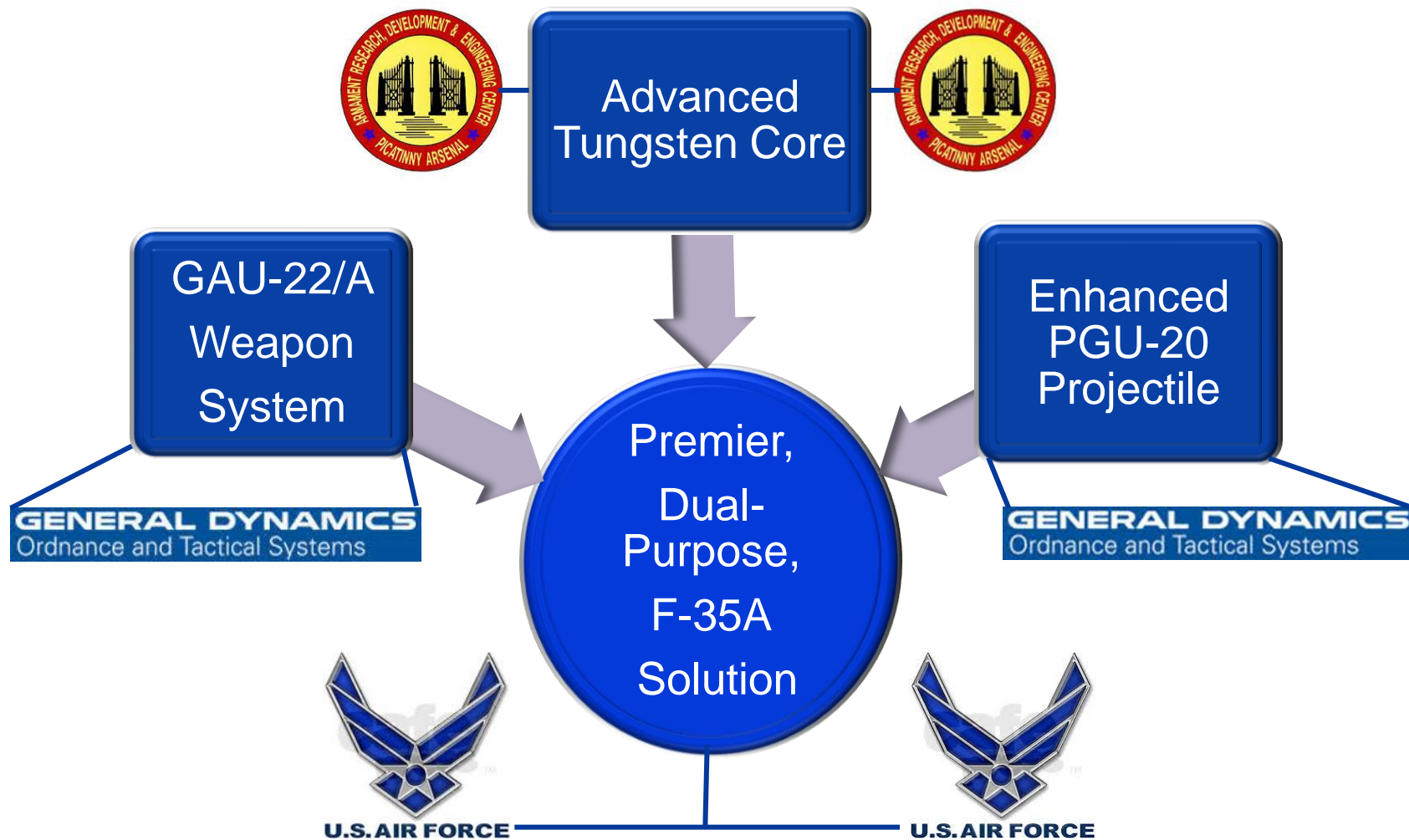
Joint development by:

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



F-35 Lightning II Warfighting System



**F-35
Lightning II**

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



**25mm
GAU-22A
Cannon**

**25mm NEF
Cartridge**



F-35 Lightning II – 3 Variants



F-35A

Conventional Take Off
& Landing (CTOL)

F-35B

Short Take Off &
Vertical Landing (STOVL)

F-35C

Carrier Variant (CV)

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



F-35A US Air Force – Dual Mission

Air-to-Ground

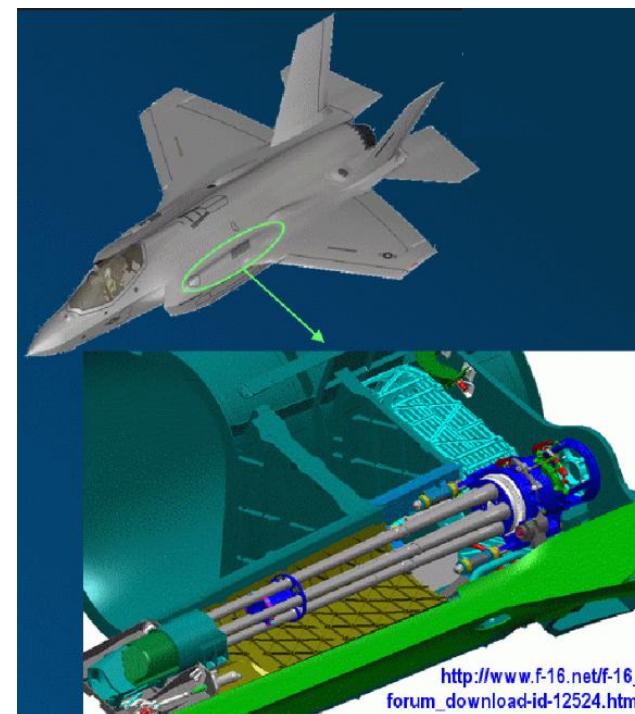
- Projectile must penetrate light armored ground targets
- Penetration effects to destroy/disable ground vehicles



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



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

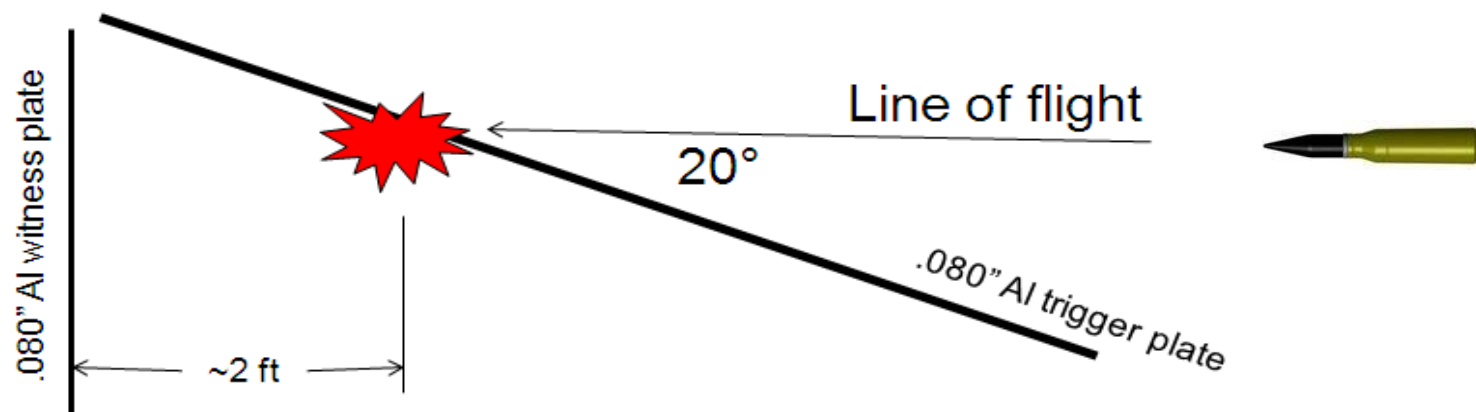
PGU-20/U	PGU-20A/U	PGU-20 (NEF)
Depleted Uranium Core/Penetrator	Standard Tungsten Core / Penetrator	Advanced Tungsten Core / Penetrator with Fragmentation Effects
Standard PGU-20 Projectile Body	Standard PGU-20 Projectile Body	Enhanced PGU-20 Projectile Body
Standard 1-piece PGU-20 Nose Cap	Standard 1-piece PGU-20 Nose Cap	Advanced 2-piece Nose Cap



25mm NEF Cartridge – Enhanced PGU-20

NEF Testing

Set-up:



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

Medium Caliber Ammunition and Weapons Systems

Marion, IL Operations

6658 Route 148 South

Marion, IL 62959

www.gd-ots.com

Matt Solverson

Director of Marketing and Business Development

618-993-9306

Matthew.Solverson@gd-ots.com

Rick Wright

R&D Sr. Associate Engineer

618-993-9208

Rick.Wright@gd-ots.com

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