The AGM-114K-2A Missile Enhanced Lethality Design and Test

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BACKGROUND

- HELLFIRE II Missile
  - Air to ground precision weapon
  - Combat proven
  - Versatile
    - Multiple target types
    - Multiple launch platforms
    - Multiple missions
  - Several Types of warheads
  - Used by U.S. and other nations

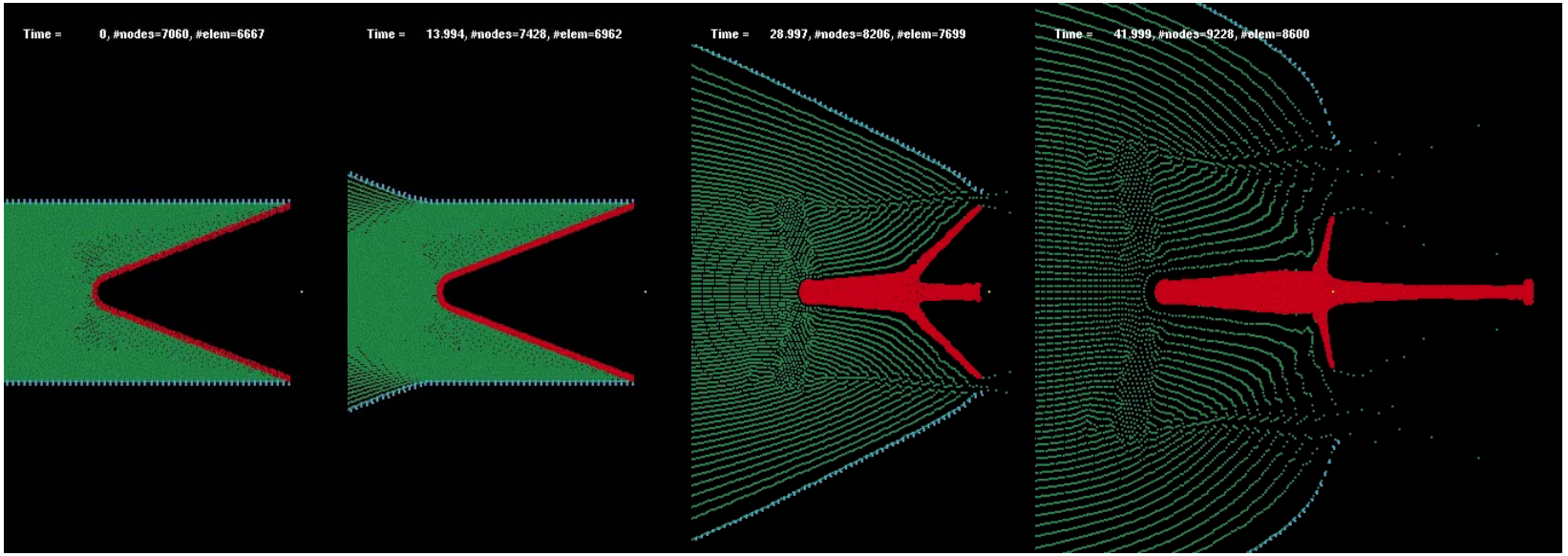
BACKGROUND

- AGM-114K/K-2
  - Tandem Shape Charge Warhead
    - No steel case containing the energetic
  - Designed to defeat Heavy Armor
  - Limited effectiveness against targets in the open – limited frags
  - K-2 is a revised K variant HELLFIRE with an Insensitive Munitions compliant warhead

- New Target Sets
  - Mortar Teams
  - Mounted guns
  - Light vehicles
  - Soft targets

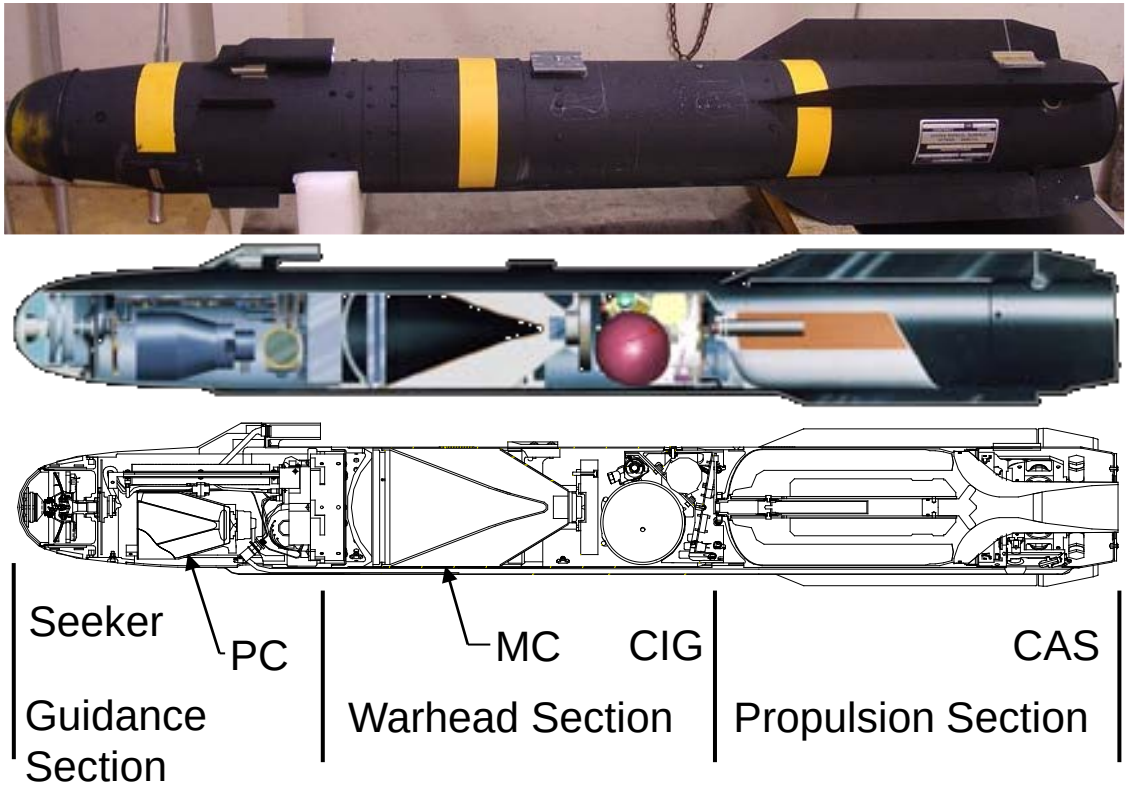
- How to improve? → More Frags!!!

Shaped Charges and Fragmentation Sleeves



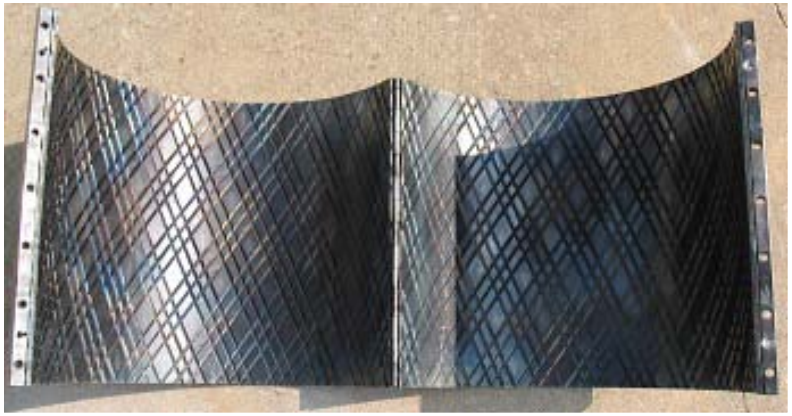
Shaped charges focus a high energy jet of material through a narrow focal point, enabling deep penetration into targets like armor. The blast pressure created is local in effect. Because the primary objective is the shape charge, no outer case is used. In order to achieve lethality on secondary targets across a larger radius from the weapon detonation, a sleeve which breaks apart into small fragments upon warhead detonation, is wrapped around the warhead. The pressure pushes these fragments at a high rate outwards, creating a larger kill radius for targets.

AGM-114K/K-2 OVERVIEW

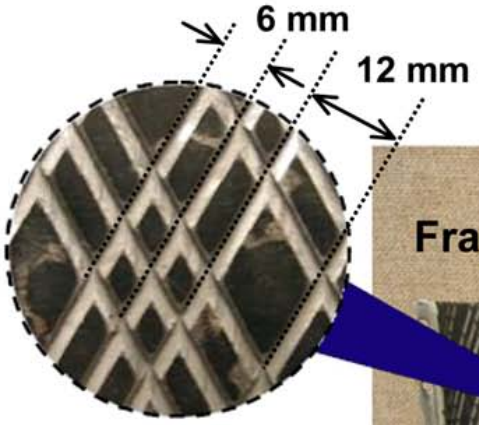


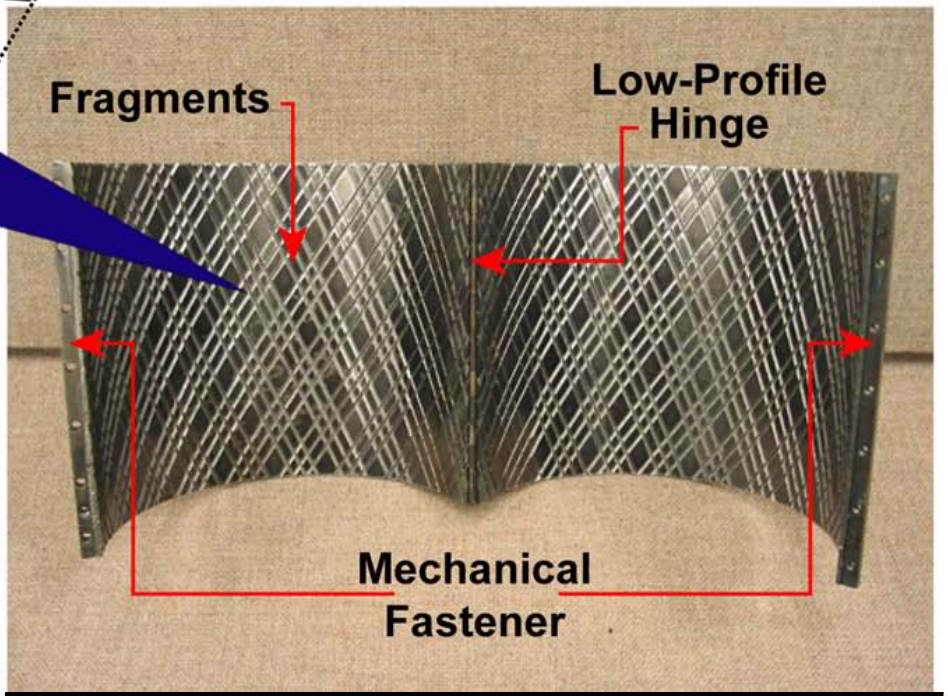
Specifications:
Length: 64 inches
Weight: 100 lbs

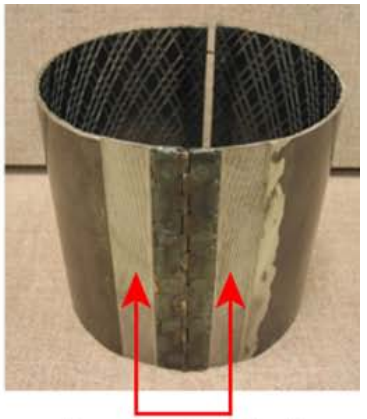
AGM-114K-2A

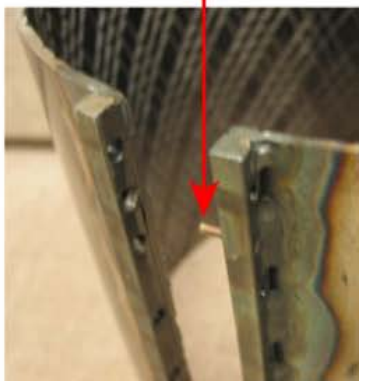


FRAG SLEEVE







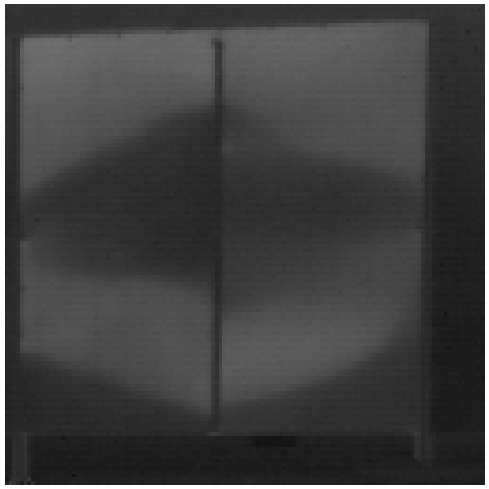


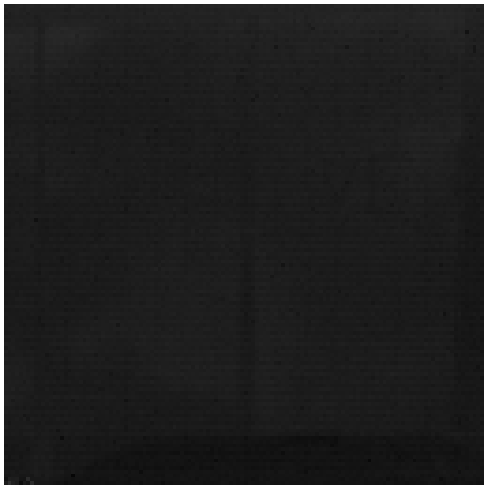
Length: 6.75 inches
Thickness: 1/8”

Fragment Designation	Size (mm)	Mass (g)
Small	6 by 6	0.8
Medium	6 by 12	1.7
Large	12 by 12	3.4

COMPARISON OF BASELINE MISSILE & FRAGMENTATION SLEEVES

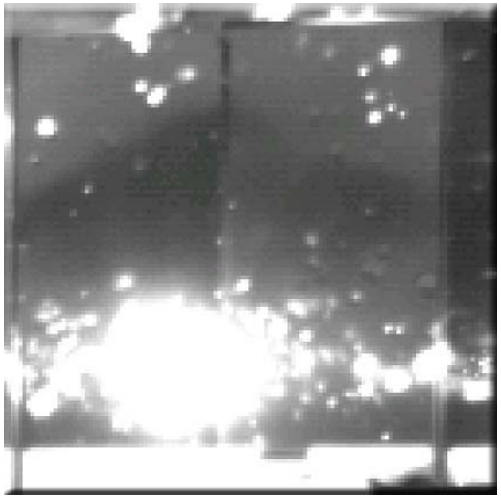
Before

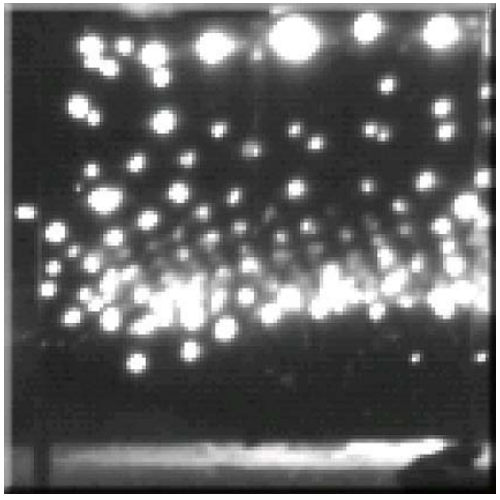


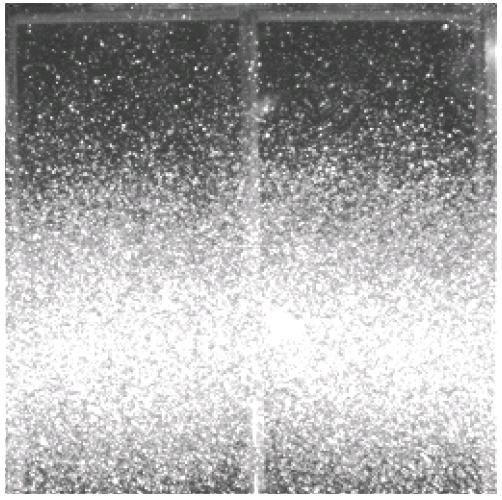


Baseline Hellfire II (K-2) | **Steel Sleeve (K-2A)** | **Tantalum Sleeve (K-2B)**

After







114K/K-2 vs. K-2A Testing

- Conducted AGM-114K vs. AGM-114K-2A (Steel Sleeve) testing against personnel in the open mortar team
- Conducted AGM-114K-2 vs. AGM-114K-2A (Steel Sleeve) testing against technical targets
  - Aim point AAA target is bed of truck
  - Aim point truck motor
- Missiles with and without the fragmentation sleeve were both effective against the primary target

Personnel in the Open Soft Sand (Site 1)

Before

After K-2

After K-2A

Steel Sleeve

Personnel in the Open Concrete (Site 2)

Before

After K-2

After K-2A

Steel Sleeve

Personnel in the Open Hardpan Dirt (Site 3)

Before

After K-2

After K-2A

Steel Sleeve

Technical Target Set
2.5 Ton Truck

Before

After K-2

After K-2A

Steel Sleeve

Aim Point: Gun in back of truck

Technical Target Pickup Truck

Before

After K-2

After K-2A

Steel Sleeve

Aim Point: Engine compartment

SUMMARY of FINDINGS

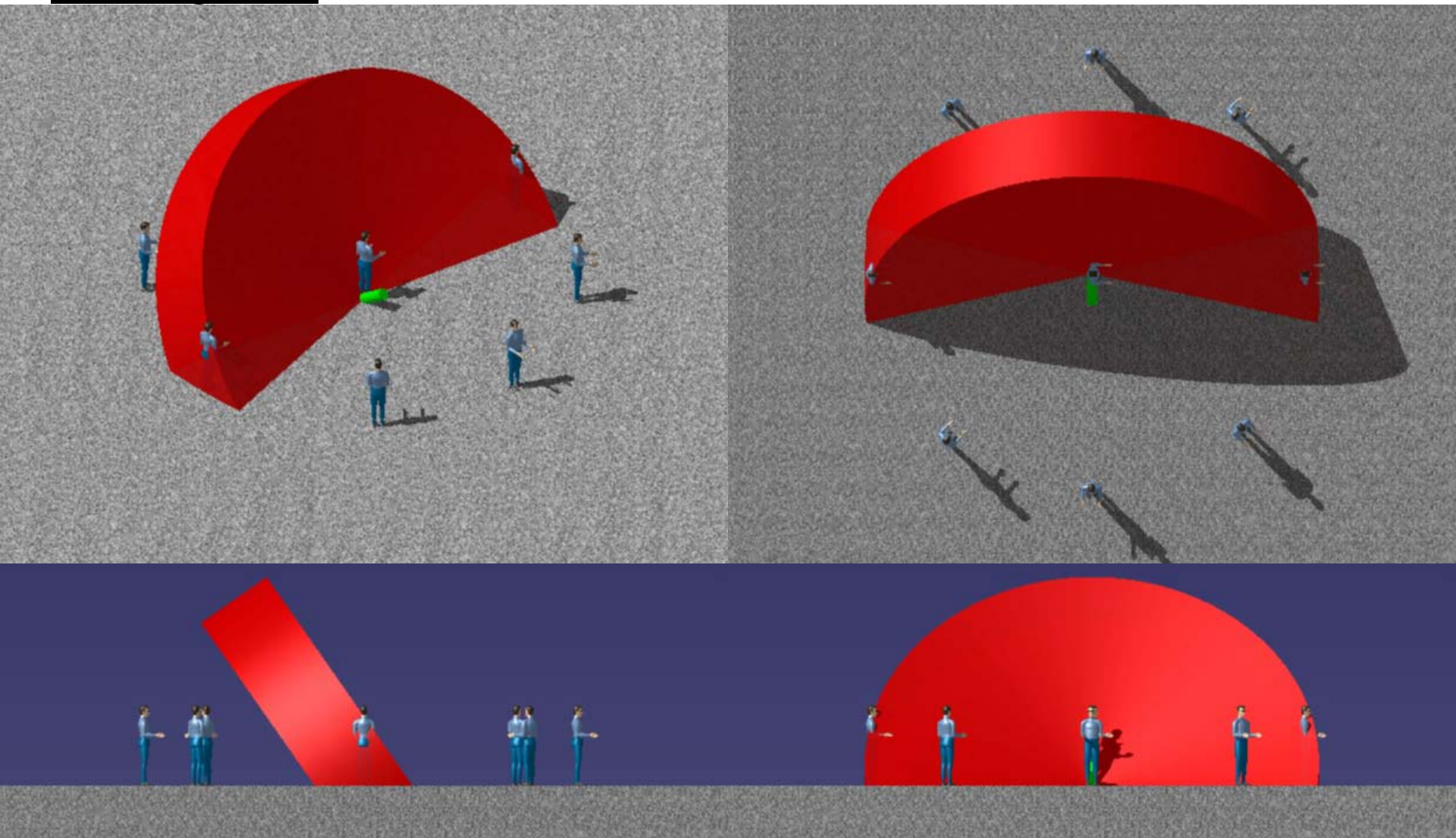
- Frag Sleeve provides only marginal (if any) improvement against primary targets
- Frag sleeve only increases effectiveness against secondary target IF the target is in the frag pattern
- Frag Sleeve is less effective against targets outside of the frag pattern
  - Frag Sleeve trades blast pressure for frags
  - Close secondary targets NOT neutralized by blast

SUMMARY of FINDINGS

- Low impact angle does not optimize the frag sleeve's potential
  - Targets need to be in the frag pattern
  - Steeper impact angle is better
  - Newer variants with blast sleeve use a higher attack angle changing the direction of the frag pattern to hit more targets.

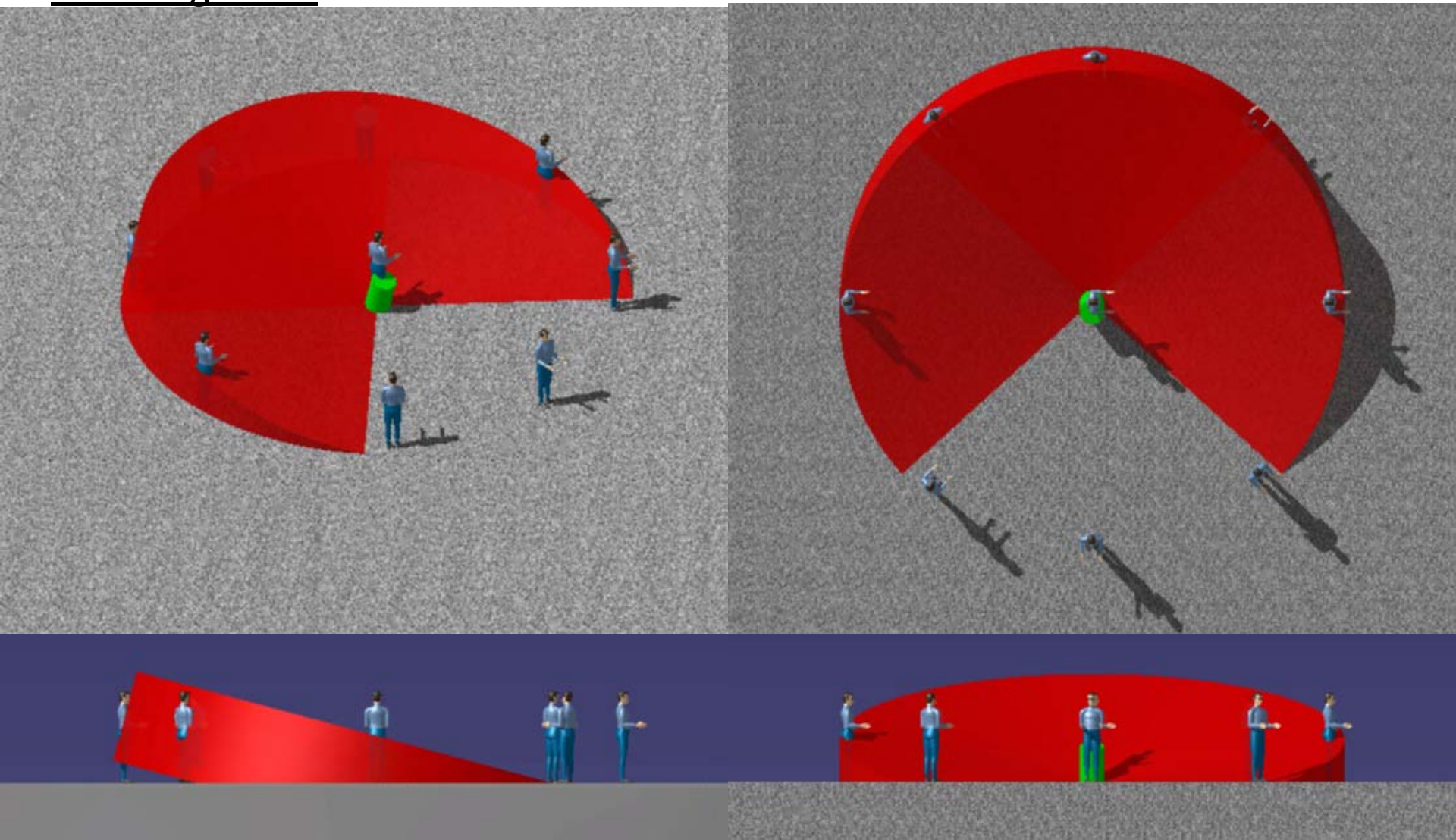
Predominant Frag Spray
Dependence on Impact Angle

Dive Angle: 35



Predominant Frag Spray
Dependence on Impact Angle

Dive Angle: 75



SUMMARY

- Frag sleeve CAN increase effectiveness against soft targets
- Frag sleeve ONLY increases effectiveness against secondary target IF the target is in the frag pattern
- Impact angle is critical
  - No net increase in effectiveness at shallow angles
  - Large increase in effectiveness at steeper angles