Conventional 3300 lbs

Composite 2450 lbs

Abstract

The Future Combat System (FCS) is envisioned to be *extremely lethal*, *easily sustainable*, *highly deployable* and under *18 tons*.

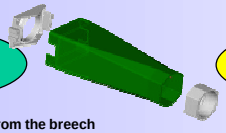
The Multi-Role Armament and Ammunition System (MRAAS) is designed to meet the Army's FCS needs.

Advanced Composites *must* be used to meet the 18 ton goal.

MRAAS's Swing Chamber Launcher is doing this:

- **-Conventional material design weight – 3300 lbs**
- **-Goal weight – 2450 lbs**
- **-Needs to loose 850 lbs while meeting key system requirements**

Designed for Composites



All Titanium 207 lbs

Supports tube 40" from the breech

-Improves accuracy by increasing tube stiffness

Rear section of the thermal / environmental shroud

Designed as a composite part

-Carbon fiber composite shell

-Titanium end frames

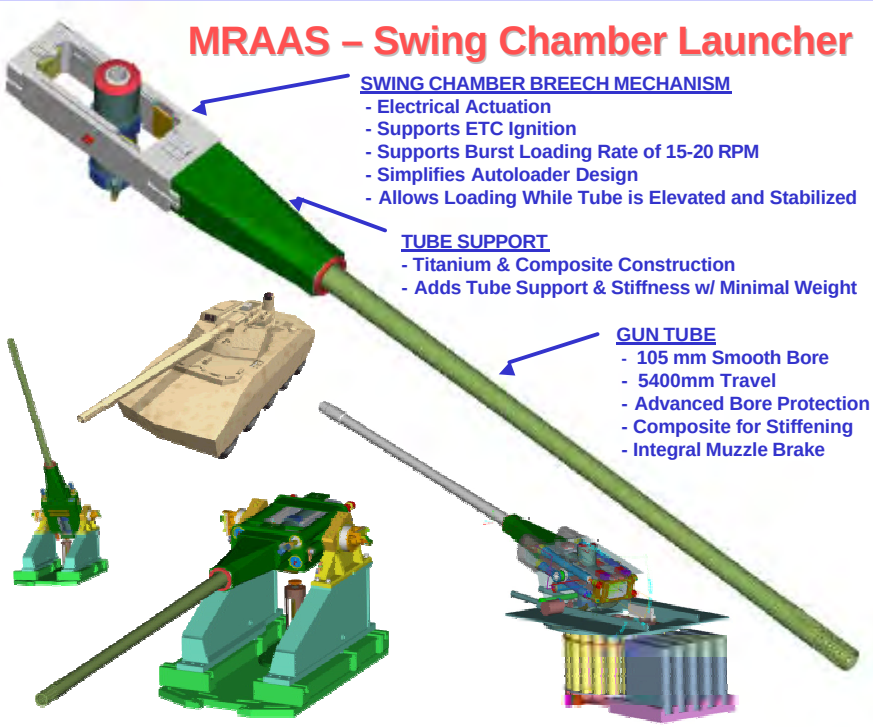
-Bonded together

Ti / Composite 70 lbs

Composite provides same deflections as titanium with 1/3 weight

Being designed and built at Benét

MRAAS – Swing Chamber Launcher

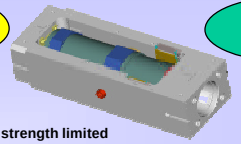


SWING CHAMBER BREECH MECHANISM
- Electrical Actuation
- Supports ETC Ignition
- Supports Burst Loading Rate of 15-20 RPM
- Simplifies Autoloader Design
- Allows Loading While Tube is Elevated and Stabilized

TUBE SUPPORT
- Titanium & Composite Construction
- Adds Tube Support & Stiffness w/ Minimal Weight

GUN TUBE
- 105 mm Smooth Bore
- 5400mm Travel
- Advanced Bore Protection
- Composite for Stiffening
- Integral Muzzle Brake

Conventional 1400 lbs



Composite 925 lbs

Design is stiffness not strength limited

-Stretching and deformation cause a dynamic head space challenge

Polymer matrix composites have high stiffness to weight ratios

-Unidirectional composite wraps meet the dynamic head space challenge

-Reduced component weight

Imbalance Challenge

-Pivot point is rotation axis of the swing chamber

-Center of gravity is 93.5" from the trunnions

Conventional 925 lbs

Dynamic Strain Problem

-Fast moving projectiles cause strains to increase to several times static levels

Organic Composite Wrap Provides

-Reduced tube weight

•Helps with Imbalance

-Increased natural frequency

•Hoop wraps at muzzle

•Axial fibers in the middle of the tube

-Lower dynamic strains

•Composite XM25 fired in 2002 showed significant dynamic strain reductions

Composite 750 lbs

Partnered with the *University of Delaware Center for Composite Materials*

CONCLUSION

Advanced composites are an enabling technology for lightweight armament systems. Only by using them can the FCS weight goal of 18 tons be met. The MRAAS – Swing Chamber Launcher is using them on the tube, breech ring, and tube support for this reason. Additionally they will help with other challenges such as the imbalance of the tube and dynamic strains.