Transparent Armor Cost Benefit Study

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Standard Form 298 (Rev. 8-98)
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Agenda

- Background
- Current Demand Data
- Government Cost/Benefit Analysis
- Timeline
Equipping Our Soldiers in Iraq and Afghanistan

Up-Armored HMMWVs (M1114s)

![Graph showing the increase in up-armed HMMWVs from 2003 to 2006.]

- 2003: 2000
- 2005: 6000
- 2006: 12000

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Recent History

2004-2005 - GPK

2006

“Iraqi Pope Glass”

- A jerry-rigged glass cocoon of (3) 2-inch thick bulletproof windshields welded around the top of the turret.
- Adds an additional 400 lbs to an already overweight vehicle.
- Soldiers have already added this cocoon to approximately 100 HMMWVs in Ramadi.
Future Transparent Gun Shields

- Requirement: Upgrade GPKS with transparent armor for enhanced situational awareness while maintaining soldier cover within armor envelope.

Baseline

Initial

Interim

Objective

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Over $5.2 Million was spent per month in FY05 for the Up-Armored HMMWV windshields and door windows.

Demand for both right and left windshields increased 133% and 101% respectively from FY05 to FY06.

Demand for door windows increased 658% from FY05 to FY06.

Bottom Line: Army needs a better Transparent Armor solution!
Increase In Door Glass Demand

- Soldiers are adding another piece of glass to each door for added protection.

- Adds additional weight to an already overweight vehicle and reduces payload capacity!
Causes Of Current Glass Failures

- Insurgent Attacks
  (IEDs, RPGs, shrapnel, bullets)
- Sandstorm Damage
- Rock Strikes
- Improper removal and installation
- Clouding
  - Delamination caused by environmental degradation
  - Improper curing process
  - Improper cleaning techniques
Other Problems with Current Glass

- **Weight**
  - Weight of current glass adds significant weight to vehicle.

- **Visibility**
  - Thickness of glass can cause distortion and glare
Basic Research Effort

- GE Global Research and Nanocerox partnership
- Goal is to develop nano-structured ceramic bodies with a combination of high optical transmission and exceptional mechanical properties and capable of effective performance in an outstanding transparent armor system.

- Two Funding Opportunities of Effort:
  - FY05: Develop design rules from the system level armor requirements to the mechanical and optical properties of the ceramic body and then into the properties of the nanopowder. Objective is for a process to be in place for the fabrication of 2” x 2” x 0.375” samples.
  - FY06: Scale up the materials systems to a final dimension of 4” x 4”x 0.375”. Characterize and deliver samples for ballistic testing.
Government Cost Benefit Study

Purpose: Determine break-even cost for new transparent armor solution based on expected reliability improvement and required investment.

- Use current fleet of Up-Armored HMMWV as the study platform for initial look.
- Approximately 11,000+ vehicles in Army inventory.
- NSN 2510-01-435-9693
  - Right Windshield $2,759 (FY06$)
- NSN 2510-01-435-9690
  - Left Windshield $2,759 (FY06$)
- NSN 2510-01-435-9692
  - Door Window $1,025 (FY06$)
- Expand analysis to include rest of TWV fleet.
**Cost-Benefit Methodology**

1. **Obtain current demand data and cost data to determine operations cost for status quo.**

2. **Obtain investment costs for new transparent armor.**

3. **Determine operations cost for transparent armor solution.**

4. **Determine savings between status quo and transparent armor alternative.**

5. **Calculate Net Present Value and Savings to Investment Ratio.**

6. **Contractor provides reliability improvement factor estimate and estimated cost for transparent armor Material at end of Phase I.**

**Completed**
Cost Benefit Parametric Analysis
Up-Armed HMMWV Glass

Curves Based on the FY05 Demand Data
### Timeframe

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