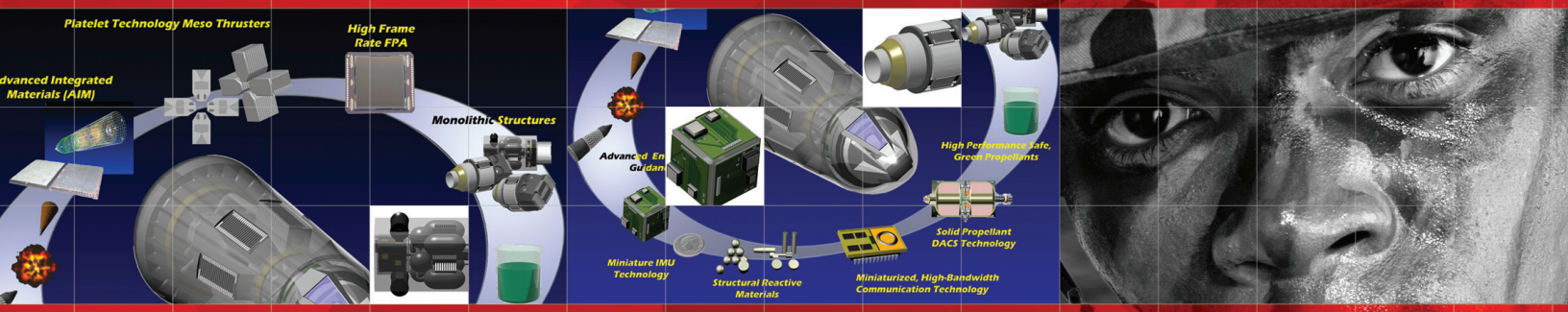
SMDC/ARSTAT

Technical Center

AKV

Agile Kill Vehicle Program



Summary

- Ability to engage and defeat advanced targets
- Potential to engage threats in the boost, midcourse, and terminal phases
- Marked improvement in robustness of the Ballistic Missile Defense System
- Relevant technologies mature prior to major system development effort

The Agile Kill Vehicle (AKV) Program goal is to provide robust capability to negate threats that stress current Ballistic Missile Defense System (BMDS) architecture.

The Agile Kill Vehicle (AKV) Program identifies, develops, and transitions advanced capabilities for future Ballistic Missile Defense System (BMDS) weapon systems. Infusion of AKV Program products will provide new capabilities for Boost, Midcourse, and Terminal Defense to counter new and evolving threats and countermeasures. The AKV Program will deliver revolutionary new system concepts, advanced components, and subsystem technologies to enable next generation interceptors and discrimination approaches as well as upgrade and enhance existing kill vehicles to allow them to keep pace with the evolving threat. In 2007, the AKV Program focused on identifying technologies needed to support kill vehicles by conducting trade studies, reviewing historical data, soliciting inputs from industry, assessing technology shortfalls, and planning development projects. This work served as a foundation for current efforts in which AKV technology projects will be selected for continued development and eventual insertion into the BMDS architecture.

AKV

Agile Kill Vehicle Program

Technical Center

Overview

The U.S. Army Space and Missile Defense Command/ Army Forces Strategic Command, under the direction of the Missile Defense Agency's (MDA's) Advanced Technology Directorate (MDA/DV), is pursuing technologies to enable development of new systems that will form the cornerstone of enhanced capabilities to defeat advanced countermeasures and advanced targets. The Agile Kill Vehicle Program is developing tomorrow's kill vehicle technologies and system concepts for potential integration into the Ballistic Missile Defense System in order to ensure the system continues to outpace the evolving ballistic missile threat. The program addresses critical needs identified by systems engineering studies based on current and postulated threat capabilities. The program's primary focus is on maturing and delivering technologies to enable development of next generation interceptors and discrimination approaches.

Benefits for Tomorrow's Defense

- Ability to engage and defeat advanced targets
- Potential to engage threats in the boost, midcourse, and terminal phases
- Marked improvement in robustness of the Ballistic Missile Defense System
- Relevant technologies mature prior to major system development effort

Technical Concept

Today's BMDS interceptors were not designed to engage and defeat advanced threats. In order to address the emergence of advanced threats, lightweight, lethal kill vehicles will be required. The program will address the following barriers to developing kill vehicles with the lethality and performance to address advanced threats:

- Divert and attitude control systems which can produce the required performance are far too large and heavy to be used in a lightweight kill vehicle
- Materials and integration processes are not available to produce robust kill vehicle structures in the size needed to facilitate the agility required to address advanced threats
- Seekers of the size needed are not available with the required field of view

A robust Multi-Discipline Optimization methodology will be utilized during the design phase of AKV. Multi-Discipline Optimization methods are used where the engineering design space spans a number of technical disciplines, where the technology choices may be large, and in situations where there may be conflicting requirements or where special synergistic effects among technologies may exist. The most innovative aspect of this next generation multi-discipline optimization and design tool will be use of a Genetic Algorithm (GA) search engine to provide an efficient means of technology selection and interceptor concept synthesis. GAs were developed as part of the broad field of artificial intelligence in the 1980s. GA-based design and assessment tools have also been applied to the missile axial propulsion and aerodynamic design problems for tactical missile missions.

A GA-based, endo-atmospheric interceptor optimization tool was developed in 1999 and is being updated and expanded for the Agile Kill Vehicle design process. This optimization tool will also include embedded cost and performance simulation models which will provide a powerful, new, beyond the state-of-the-art capability to the designer. The outputs of this tool will allow program officials and engineers to identify those technologies and concepts with the greatest potential for improved performance at lower cost for candidate insertion into the future BMDS architecture.

For more information, please contact:
U.S. Army Space and Missile Defense Command/
U.S. Army Forces Strategic Command
P.O. Box 1500
ATTN: (SMDC-PA), Bldg. 5220
Huntsville, AL 35808
Phone: 256-955-3887
Fax: 256-955-1214
Email: webmaster@smdc.army.mil
www.smdc.army.mil

Distribution A 0308/0161