MEADS – Open Architecture, 360° Missile Defense Capability Nears Test Phase

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What Is MEADS?

- Tri-national air and missile defense (AMD) program for German, Italian, and US forces
- Replaces Patriot, Hawk, and Nike Hercules
- $3.4B EUSD contract signed 28 September 2004
- 110-month Design and Development (D&D) program
- Tri-national contractor team includes Lockheed Martin, LFK, and MBDA Italia
  - Operations at six primary locations
  - Workforce of over 1800 skilled personnel
Key System Requirements

**TARGET SET**
- Next-generation threats
- Tactical ballistic missiles/UAVs
- Cruise missiles and aircraft
- Conventional/unconventional

**TRANSPORTABILITY & MOBILITY**
- Strategic and tactical airlift
- Continuous air and missile defense coverage for maneuver force
- Cross-country mobility

**OPERATING CONCEPTS**
- Maneuver force protection
- Area defense
- Homeland defense
- Weighted asset protection

**DEGREE OF PROTECTION**
- 360-degree coverage
- Defended area – ABTs, TBMs

**INTEROPERABILITY**
- Designed for coalition warfare
- Operational with a range of systems
- Dramatic improvement in combat effectiveness and situational awareness

**NETTED DISTRIBUTED ARCHITECTURE**
- Plug-and-fight
- Open architecture
- Non-proprietary software
- Operational flexibility

MEADS is the solution for challenging requirements not addressed in any single previous AMD system.
MEADS System Elements

Surveillance Radar (SR) • 360-degree coverage • Pulse Doppler radar • Active phased array antenna • Digital beamforming • IFF subsystem • 0 and 7.5 rpm rotation

BMC4I Tactical Operations Center (TOC) • Single-shelter TOC • Real-time battle monitor links Engagement and Force Operations • Coalition warfare • Nation-specific features in common software package • Tailorable workspace for Higher Echelon Unit operations

Multifunction Fire Control Radar (MFCR) • 360-degree coverage • Pulse Doppler radar • Active phased array antenna • Digital beamforming • 0, 15, and 30 rpm rotation • IFF subsystem • Interceptor communication link

Launcher/Reloader Launcher • High firepower • 8 missiles full load • Near-vertical launch angle • Can self-load flatracks Reloader • Full or partial reload • Subsystem commonality • Comm equipment • Pallet Load Handling and Erection System • Crane

Certified Missile Round (CMR) • Improved capability vs. PAC-3 CRI • RF uplink and downlink

Highly mobile, force tailorable, System-of-Systems capable
MEADS Interceptor Enhancements

**PAC-3 MSE**
- MEADS baseline missile
- Increased performance, greater altitude and range
- Threat-driven upgrades to defeat the advancing threat set
- Successful intercept test on 18 February at White Sands Missile Range

**IRIS-T SL**
- First use of MEADS open architecture design to integrate other sensors and shooters in a robust system-of-systems solution for national air defense
- Integration benefits from inherent MEADS plug-and-fight capabilities
MEADS Program

- Successful SRR in 2005
- Successful PDR in 2007
- MEI CDRs complete – July 2009
- System-level CDR – August 2010
- Flight tests in 2012

Design & Development (D&D)

- SRR
- PDR
- System CDR
- 1st Flight

Risk Reduction Effort (RRE)

Risk Reduction Effort Modification (RREM)

MEI CDRs complete – hardware designs approved

G:/BMIT/PRESENTATIONS/M037-1800 per NAMEADSMA Letter OC-2505-25122-OL, 3/10/2008 and cleared photos
Critical Design Review Progress

- Successfully completed final design reviews for all MEADS Major End Items and subsystems
- Engineering designs finalized for production of remaining hardware
- System-Level CDR events ongoing through August 2010
- System events permit final evaluation of MEADS survivability, logistics, safety, integration and test, life cycle cost, and performance

Significant progress toward final system design approval
System integration has begun and continues with deliveries of tactical hardware and software.
Multifunction Fire Control Radar
Hardware Progress

Transmit/Receive Modules

Column Rack

IFF Group Prototype Integrated with Cooling System Tool

Antenna Elevation Tests

Exciter

Partial Array under Test at Cazenovia Range

SprayCool® Chassis

Transmit/Receive Assembly under Test

Environmental Control Unit Heat Exchanger

Mechanics and Positioning System in Test Fixture

Surveillance Radar Hardware Progress
Tactical Operations Center
Hardware Progress

Operator Engagement Stations
Unsheltered Tactical Operations Center

Tactical Operations Center on Italian Prime Mover

German Air Force Operator during User Assessment
Launcher Hardware Progress

8-Missile Launch Emulator

Integrated Launcher Electronics System

Launcher Prototype on M1086 Prime Mover

Single-Missile Round Canisters

G:/BMIT/PRESENTATIONS/M059-2367 per T-POF-3613-28295-OL, 22 September 2009, and POF-5100-29175-OL, 11 February 2010
Improvements in IFF have always been a high design priority for MEADS

- European IFF device selected for MEADS
  - Protects friendly aircraft from being engaged by air defenses
- First U.S. system ever to rely on a non-U.S. cryptographic device
  - Performs multiple identification modes
  - Interoperable with NATO forces
- MEADS radars have greater range and sensitivity than legacy radars
  - Part of a comprehensive solution to address fratricide
MEADS and the Phased Adaptive Approach for European Missile Defense

• US Ballistic Missile Defense Review sets priorities
  – Protect allies and enable them to defend themselves
  – Provide defensive flexibility to adapt
  – Expand international efforts
• MEADS satisfies PAA tenets
  – Relocatable, reconfigurable, interoperable
• MEADS addresses short- and medium-range ballistic missiles – the primary threat to Europe
• MEADS complements THAAD and SM-3 with 360-degree protection against threats upper-tier systems cannot defeat
  – Aircraft, UAVs, cruise missiles
• MEADS forward-based German and Italian units would be interoperable with arriving US MEADS elements
• MEADS provides an opportunity for Germany and Italy to contribute to the PAA and European missile defense

Ideally matched to requirements of the PAA
MEADS provides superior battlefield capabilities with unprecedented flexibility

- 360-degree capability against entire threat suite
- Enhanced strategic transportability and tactical mobility
- Open architecture with plug-and-fight capability
- Tailored/scalable battle elements ensure coalition interoperability

MEADS program is making significant progress

- All hardware designs approved
- Production of radars, launchers, tactical operation centers, and reloaders is underway
- Program continues System-Level CDR; completion scheduled for August 2010
- Flight tests planned for 2012

Joint NAMEADSMA/MEADS International team committed to providing a world-class theater AMD system
Work distribution capitalizes on national expertise to minimize development risk
**Key Supportability Features**

### Design Requirements
- Reliable
- Maintainable
- Built-In Test
- Prognostics
- Embedded Training
- Over-the-Air Software Update
- Highly Transportable
- Commonality

### Improve Ao by reducing Administrative Logistics Delay Time (ALDT) through onboard spares requirements
- MEIs required to allocate storage space for spares
- Additional unit-level spares carried in System Support Vehicle (SSV)

### Scope Requirements
- Interactive Electronic Technical Manuals
- Modular Training Packages
- MEADS System Trainer
- Missile Handling Trainer
- Explosive Ordnance Disposal Trainer

**Supportability attributes maximize Ao**
MEADS Program Structure

Germany
United States
Italy

MEADS Board of Directors

NAMEADSMA
General Manager – Gregory Kee (US)
Deputy GM/Director Business – Vincenzo Lops (Italy)
Director Technical Integration – Gerhard Brauer (Germany)

Lockheed Martin 50%
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