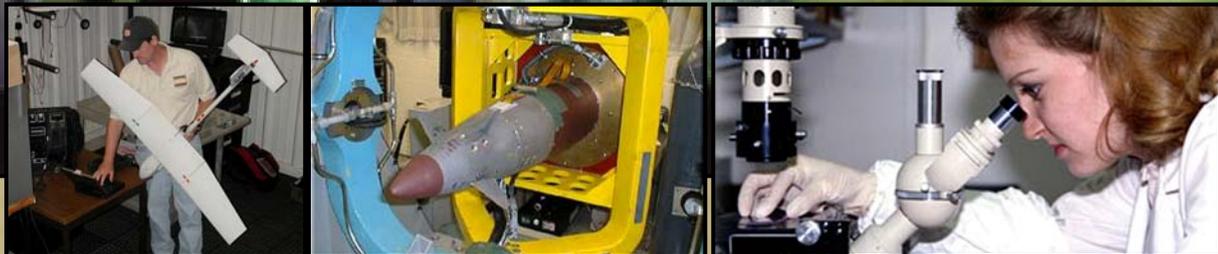




The U.S. Army Aviation & Missile  
Research, Development & Engineering Center



# AMRDEC FACILITIES 2008



**RDECOM**

**TECHNOLOGY DRIVEN.  
WARFIGHTER FOCUSED.**





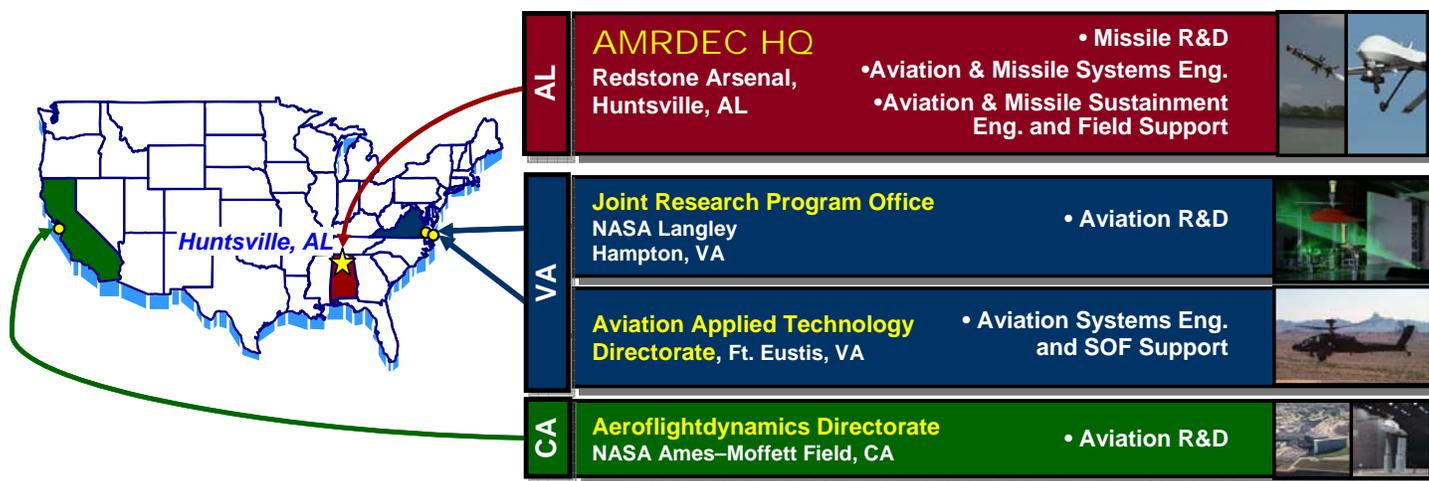
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*AMRDEC Headquarters, Redstone Arsenal, Huntsville, AL*

# INTRODUCTION



AMRDEC plans, manages and conducts research, exploratory and advanced development, and provides one-stop life cycle engineering, technical, and scientific support for aviation and missile weapon systems and their support systems, UAS platforms, robotic ground vehicles, and other assigned systems, programs and projects.

The AMRDEC headquarters are located at Redstone Arsenal, where we have laboratories for innovative work on sensors and electronics, propulsion systems, aerodynamic structures, modeling and simulation, life cycle software development, and technical testing. We also have laboratories at Fort Eustis and Langley, Virginia and Moffett Field, California where Army and NASA aviation facilities, such as instrumented test ranges and wind tunnels, are used for advanced rotorcraft technologies to support our role as lead service for rotorcraft science and technology. Our responsibility in aircraft extends to airworthiness release authority for issuing the technical document that provides instructions and limitations for safe flight of an aircraft system, subsystem, or allied equipment.

One of our strengths is rapid prototyping of advanced technology equipment in the Prototype Integration Facility at Redstone Arsenal and rapid prototyping facilities at Fort Eustis, Virginia. Our engineers and technicians at these facilities are quick reaction specialists, who have produced new and modified equipment for systems that go directly into use by our customers.

The Huntsville, Alabama metropolitan area has the largest concentration of engineers in the United States. AMRDEC is closely linked to this high technology work force through contracts with a large array of the 220 companies located in nearby Cummings Research Park. We also have research and technology agreements in place with many universities including our local ones, University of Alabama in Huntsville and Alabama A & M University. Our Redstone Scientific Information Center is the largest Department of Defense library specializing in aerospace, aviation, engineering, and missile scientific and technical material.



**AMRDEC is divided into eleven Directorates, nine of which are located at Redstone Arsenal:**

**Advanced Science and Technology Directorate (ASTD)** - The Advanced Science and Technology Directorate is the technical staff of the Aviation and Missile Research, Development, and Engineering Center. It is responsible for managing the day-to-day operation of AMRDEC Technology Integration, Advanced Systems Concepts, and Information.

**Aeroflightdynamics Directorate (AFDD)** - The Aeroflightdynamics Directorate (AFDD) pioneers the advancement of knowledge and innovative technology in rotorcraft aeromechanics and human-system integration, providing a decisive advantage for Allied forces in any Aviation mission worldwide and enhancing U.S. rotorcraft competitiveness. It is primarily located at the Ames Research Center of the National Aeronautics and Space Administration (NASA) at Moffett Field, CA. It also has a small contingent at NASA's Langley Research Center in Hampton, VA. AFDD's functions are to: Manage and Execute Mission Programs; Support Near-Term and Long-Range R&D Planning and Forecasting; Provide Technical Consultation and Support to AMCOM, PM's, AMC and DA; Liaison with other Government Agencies, Academia, Industry, and International Organizations; Administer the Army-NASA Joint Agreement at Ames Research Center.

**Aviation Applied Technology Directorate (AATD)** - AATD's mission is to transition critical technologies that enhance and sustain Army Aviation as the premiere land force aviation component in the world. The executing strategy is: (1) develop, demonstrate, and apply critical technologies that enhance the capability, affordability, readiness and safety of DoD aviation systems; (2) provide quality and timely engineering services and rapid prototyping support to Army Program Executive Offices, US Special Operations Command, and other customers; and (3) support worldwide contingency operations through the expedited fabrication, application, and support of innovative material solutions. AATD is located at Fort Eustis, Virginia.

**Aviation Engineering Directorate (AED)** - The Directorate of Aviation Engineering is the Airworthiness authority for Army developed aircraft and provides matrix support to our customers. Our direct customers are the Program Executive Office for Aviation Programs Project/Product Managers (PMs) and the U.S. Army Aviation and Missile Command (AMCOM) Defense Systems Acquisition PMs. Our ultimate customers are the Army aircraft crew, passengers, and maintainers that operate the Army aviation systems.

**Engineering Directorate (ED)** - The Engineering Directorate plans, develops, manages, and conducts AMCOM programs in the areas of total life cycle system engineering, product assurance, test, and evaluation. In order to meet this mission, the Engineering Directorate is home to experts in a wide array of technical specialties with access to numerous prototyping laboratories and facilities.

**Applied Sensors, Guidance, and Electronics Directorate (ASGE)** - The Applied Sensors, Guidance, and Electronics Directorate is a government team of scientists and engineers that provide the Army unsurpassed sensor and guidance, navigation, and control (GNC) technologies which help the soldier shape and ensure victory on the battlefields of today and tomorrow.

**Propulsion and Structures Directorate (P&S)** - The Propulsion and Structures Directorate was established in Oct 1998 by combining the Propulsion Directorate and the Structures Directorate of the Missile RDEC. The current organization provides services in structural, propulsion, warhead and system engineering.

**Software Engineering Directorate (SED)** - The Software Engineering Directorate (SED) is a recognized leader in supporting the acquisition, research, development, and sustainment of some of the Nation's most sophisticated weapon systems. The SED maintains expertise in the Army's prevailing policies and practices on software reuse, software metrics, post deployment software support, process improvement, computer resource margins analysis, and risk management. The SED's risk based approach to performing Verification and Validation (V &V) is designed to focus on identified problem areas to ensure effective software

# INTRODUCTION

engineering support with minimum cost. Using the facilities and the numerous tactical hardware and software laboratories, the SED provides weapon systems with the highest quality support in the areas of joint interoperability testing and engineering.

## **System Simulation and Development**

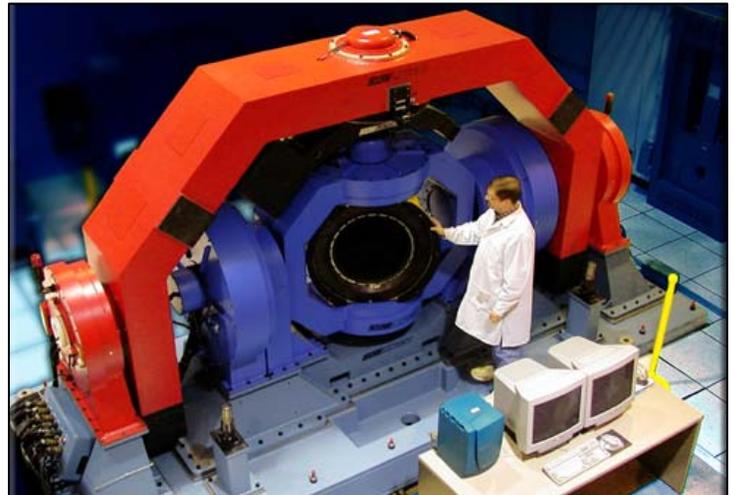
**Directorate (SSDD)** - SSDD assists in the evaluation and analysis of new weapon systems, provides technical and simulation support to all elements of the parent organization, project managers, and other government agencies. SSDD also conducts weapon systems research, exploratory and advanced development and provides engineering and scientific expertise in the following areas: aeroballistics, aerodynamics, system performance, statistical data and error analysis, system simulation, simulation theory and technology, distributed real-time simulation, virtual environment simulation, analog/hybrid computer & interface system, math model verification and validation techniques, real-time time-critical simulation technology.

## **Technical Management Directorate (TM)**

- The Technical Management Directorate provides collocated scientific, engineering, and programmatic support to Project Managers. The Technical Management Directorate's principal functions are system integration, system engineering, engineering management, and software engineering.

## **Weapons Sciences Directorate (WSD)**

- WSD's mission is to plan, perform, supervise, and review basic and applied research in the physical, and engineering sciences. WSD also maintains cognizance of developing technology in the fundamental sciences and provides broad based expertise as related to missile, laser, and beam weaponry. WSD serves as a focal point for the coordination and development of weapons systems programs and technology transfer from the many sources of scientific research to AMCOM weapons systems. It also serves as a focal point for Command activity with the Defense Advanced Research Projects Agency (DARPA) by exercising overall technical and fiscal management of advanced research programs directed to AMCOM by DARPA and other DOD agencies.

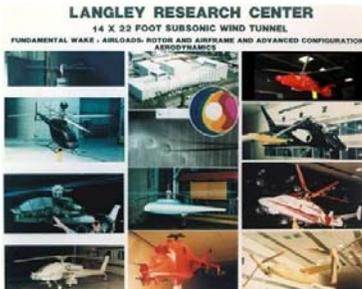


# AMRDEC FACILITIES



## **7 x 10 Foot Wind Tunnel** *AFDD - Moffett Field, CA*

This wind tunnel is used for basic and applied research in aeromechanics on advanced and unique technology rotorcraft. It supports research on advanced concepts and on problem-solving for current rotorcraft. The test section of this wind tunnel has a maximum speed capability of 100 knots.



## **14 x 22 Foot Subsonic Wind Tunnel**

*AFDD - Joint Research Program Office – NASA Langley, Hampton, VA*

The Langley 14x22-Foot Subsonic Tunnel is a closed-circuit, atmospheric tunnel designed for powered and high-lift configuration testing up to 200 Knots. The test section can be configured in several ways: fully-closed, slotted, partially-open, or fully open using its movable walls and ceiling. Rotary wing platform testing includes: performance, loads, acoustics, and fluid physics. The non-intrusive flow measurement systems, resident in the facility, greatly complement the data productivity for complex powered lift configurations. Current model testbeds include complete rotorcraft experimental platforms of 15% and 25% scale, as well as an isolated rotor test system for basic flow investigations of interactional aeromechanics.



## **Advanced Prototyping Engineering & Experimentation (APEX) Laboratories I, II & III**

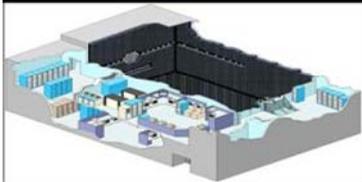
*SSDD – Redstone Arsenal, AL*

These interconnected simulation facilities provide unique collaboration of force-on-force, soldier-in-the-loop, hardware-in-the-loop, and engineering level simulations. The APEX Labs provide two wraparound, out-the-window displays for immersive soldier-in-the-loop interaction with evolving aviation and missile system designs. The labs link virtual, live, and constructive models with geographically distributed participants. Doctrine, tactics, mobility, logistic support, command, control, and communication, and human reaction are modeled in a synthetic battlefield to allow rapid turnaround, realistic testing and analysis.



The APEX III Lab provides the central node at the AMRDEC for distributed simulations (DS). This facility contains ten interconnected application rooms, permits connection of multiple local area networks, and supports hardware/software essential in conducting DS exercises (both DIS and HLA). It houses the Defense Research Engineering Network (DREN) gateway, which facilitates simultaneous distributed experiments between RDEC labs, TRADOC Battle Labs, industry participants, and academia. During FY03 System Simulation and Development Directorate made significant investments in APEX III to accommodate classified local and distributed simulation events, including FASTLANE encryption for wide area simulation activities.





### **Advanced Simulation Center**

*SSDD – Redstone Arsenal, AL*

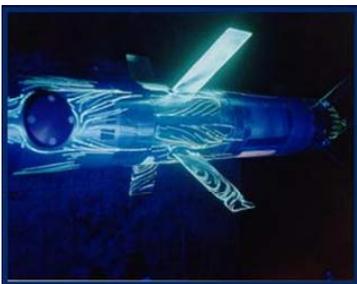
The Advanced Simulation Center consists of 10 individual facilities which provide missile and submunition hardware-in-the-loop simulation capabilities. The following types of guidance signals are included in the range of capabilities: microwave radar, millimeter wave radar, imaging and non-imaging infrared, visible, laser, combinations of radar and infrared signals, and inertial motion. Target signatures and backgrounds scenarios are radiated from special purpose signal generators and received and processed by the missile sensors to give real guidance signals for use in trajectory simulations.



### **Aerial Targets Laboratory**

*SSDD – Redstone Arsenal, AL*

The Aerial Targets Laboratory provides the capability to integrate and evaluate components and technologies on existing towed targets. It provides a facility to design, develop and assess performance of new target configurations. Information collected in this facility allows development and maintenance of detailed mathematical representations of flight dynamics of targets for use in high fidelity simulation. Development and maintenance of system level training hardware and software for fielded target systems is also performed in this unique facility.



### **Aero-Optic Evaluation Center (AOEC), Large Energy National Shock (LENS) Tunnels I & II**

*SSDD – Redstone Arsenal, AL*

The AOEC facility provides world class capability for aero-thermo-chemical, aero-optics and aero-propulsion testing in the Mach number range from 2.5 to 15 using the world's most powerful shock tunnels. The value of the AOEC facility stems from its capability to duplicate flight conditions experienced by supersonic and hypersonic vehicles. LENS tunnels can atmospheric conditions between sea level and 70 km. This ability provides the community an alternative to full scale flight testing at a fraction of the cost with improved variety and quality of data.

# AMRDEC FACILITIES



## **Aerophysics Research Center**

*P&S – Redstone Arsenal, AL*

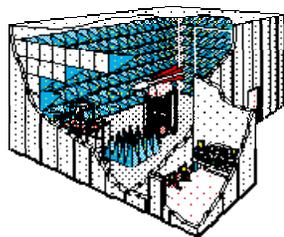
This facility, operated by the University of Alabama in Huntsville, houses three two-stage light gas guns capable of launching a variety of projectiles and missile component simulants at a vast array of targets and impact velocities. Projectiles weighing up to 8 kilograms have been launched at velocities in excess of 2 kilometers per second, and lighter payloads up to 8 kilometers per second. This facility can support testing against a variety of targets ranging from space dust protection to explosive reactive armor (ERA). This facility has extensive data collection capabilities including radar, thermal, event timing, flash x-ray, Schelarian and high-speed photography. A full machine-shop supports the facility with the capability to fabricate all projectiles, targets, and related support equipment.



## **Air Defense Radar Operations Facility**

*ASGE – Redstone Arsenal, AL*

Facility consists of laboratories, experimental test equipment including state-of-the-art test bed radar, and test ranges. The facilities are used to design, develop, and test new advanced air defense radars as well as support of existing fielded systems. Hardware and software laboratory capabilities include development of advanced radar subsystem hardware and advanced signal processing algorithms with test on radar hardware. Advanced signal processing and algorithms include composite tracking with multiple radar platforms to perform data fusion and target identification.



## **Anechoic Radio Frequency Test Chamber**

*WSD – Redstone Arsenal, AL*

This chamber is used for characterization test of such systems as communications gear, tanks, radar, missiles, and helicopters. The dimensions of the chamber are 114 feet long, 26 feet high, and 43 feet wide.



### **Applied Imagery Lab (AIL)**

*SED – Redstone Arsenal, AL*

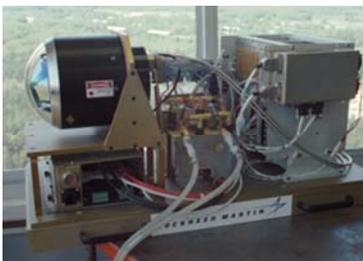
The AIL is a center of excellence for integrating COTS imagery into tactical applications, particularly trainers and system-in-the-loop stimulators for weapon systems. Lab focuses on providing low-cost, supportable, high-end PC-based technologies to solve real-time simulation problems. The AIL leverages these PC products with in-house expertise to provide prototyping, development, integration, demo, and test.



### **Army Air and Missile Defense Network Design Facility (AAMDNDF)**

*SED – Redstone Arsenal, AL*

This facility provides JTIDS network designs and platform initialization load files for all Joint and Army-only tests, exercises, operations, and contingency events in which Army JTIDS-equipment units participate. The AAMDNDF is the Army's only JTIDS network design facility. Additionally, the NDF supports Army platform specific communications subsystem design, analysis, and testing for intra-Army, Joint, and Allied interoperability on this Joint mandated link. While routinely providing on-call technical support, the NDF is frequently called on to provide on-location support for tactical units deployed to field locations for exercises and contingency missions.

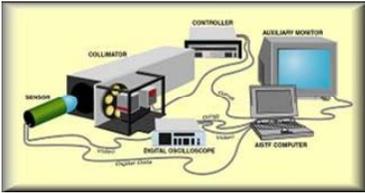


### **Army Missile Optical Range**

*WSD – Redstone Arsenal, AL*

This range supports laser and LADAR measurements of selected material targets. This range is a one-of-a-kind, very large aperture (2 meters), compact laser range capable of illuminating large targets under simulated far-field conditions at short range.

# AMRDEC FACILITIES



## **Automated Infrared Sensor Test Facility (AISTF)**

*ASGE – Redstone Arsenal, AL*

The laboratory includes optical benches, calibrated blackbody sources, target plates, PC controllers and data recording and reduction hardware and software. This AISTF provides capability to perform both manual and automated performance evaluation of infrared seekers and sensors. Measurements include: a sensor's modulation transfer function (MTF), removing human subjectivity, and the measurement of Noise Equivalent Temperature Difference (NETD) and Minimum Resolvable Temperature Difference (MRTD). The AISTF is used to establish benchmark performance testing of all infrared sensors/seekers. Support provided to: (1) Avenger FLIR Upgrades, (2) NLOS-LS PAM, (3) STINGER Block II, (4) UAV sensor payloads, and (5) Cooled/Uncooled SOA Sensor Development.



## **Automated Laser Seeker Performance Evaluation System (ALSPES)**

*ASGE – Redstone Arsenal, AL*

This facility provides complete open-loop test capability for semi-active laser (SAL) seekers/sensors operating at 1.064 microns. ALSPES provides characterizations on prototype/R&D hardware including specification compliance requirements, functional performance, and active electro-optical countermeasures (EOCM) susceptibility. The modular equipment/software interface allows numerous systems to be tested with minimal changeover downtime.



## **Automatic Test Equipment/Test Program Set (ATE/TPS) Laboratory and Sustainment Support Center**

*ED – Redstone Arsenal, AL*

The ATE/TPS Laboratory consists of a 2,000 square foot integration lab that houses both engineering development and sustainment functions with tactical and non-tactical Army standard ATE, Integrated Family of Test Equipment (IFTE). The lab has 4 electronic and 1 electro-optic tester. The laboratory is also a Huntron Gold Disk certified development center. The lab also has the ability to develop and execute test and diagnostics for circuit cards with the VTS-1000. Digital automatic test vector generation is available through Teradyne LASAR software and hardware modelers.

The ATE/TPS Sustainment Support Center (SSC) houses subject matter experts for staging and fielding of Automatic Test Equipment and Test Program Sets. The SSC uses Commercial Equivalent Equipment (CEE) and Base Shop Test Facilities (BSTFs) to provide sustainment functions on AMCOM managed weapon system Test Program Sets (TPS) and Army standard ATE. The SSC currently supports 75 tactical and 13 non-tactical customers with a total of 125 ATEs. The ATE/TPS SSC is performing RESET of the Army's 22 tactical Electronic Equipment Test Facility (EETF). The SSC is authorized as an ATE/TPS minor repair activity.



### **Automatic Tracking Evaluation and Development System (ATEDS)**

*ASGE – Redstone Arsenal, AL*

The heart of the ATEDS network consists of four SGI Octane computers running the IRIX operating system and equipped with V12 hardware graphics to support synthetic image generation. The network also includes over one terabyte of RAID disk drive space for storing captive flight test data for playing back actual data through simulations and to support the development of new tracking algorithms.



### **Aviation Flight Support Facility**

*AATD - Ft. Eustis, VA*

This facility consists of a 75' x 200' hangar with two adjacent helicopter pads located at Felker Army Airfield on Fort Eustis. A staff of Government and contractor personnel provide aircraft maintenance and training for the Army's AH-64, AH-1, UH-60A/L, OH-58D, UH-1 helicopters as well as the C-12 fixed-wing aircraft. The Flight Projects Office provides test planning, airworthiness support, and test pilots for experimental flight test projects.



### **Ballistic Test Facility**

*AATD - Ft. Eustis, VA*

The Ballistic Test Facility is comprised of two outdoor and one indoor test ranges, which are all instrumented for data acquisition and analysis. Full-size aircraft can be tested against ammunition to a maximum of thirty millimeter armor-piercing and high-explosive incendiary ammunition.



### **Battlefield Automation Lab**

*SED - Redstone Arsenal*

The Battlefield Automation Lab (BAL) conducts research, development, and engineering in the field of unmanned systems. Strong focus is given to robotics, remote weapons, and unmanned systems. The BAL is a leader in standardization for unmanned systems along with developing software to support standards compliance testing.

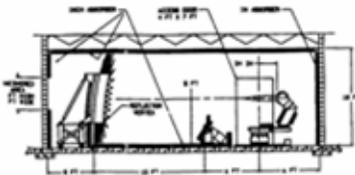
# AMRDEC FACILITIES



## **CMDS System Integration and IAMD End-to-End Laboratory**

*ASGE – Redstone Arsenal, AL*

The Cruise Missile Defense Systems (CMDS) Project Office is establishing a secure System Integration Laboratory at the AMRDEC. This lab will contain tactical Signal and Data Processors (SDP) for the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) system, along with other tactical and modeling and simulation (M&S) components. The lab will be utilized to perform subsystem integration testing, as a risk reduction facility, for pre-test planning and post-test analysis, to analyze tactical software performance, for Independent Verification and Validation (IV&V) of software, and for Verification, Validation, and Accreditation (VV&A) of M&S. Additionally, the lab will be utilized to prototype system changes and potentially for operator training. This facility will also contain an End-to-End Digital Simulation in support of the Integrated Air and Missile Defense (IAMD) Project Office. This will be used to integrate and exercise digital simulations, providing a means for investigating IAMD requirements and architecture designs.



## **Compact Antenna Range**

*ASGE – Redstone Arsenal, AL*

Facility consists of a folded compact antenna range including a computer controlled three axis position table, parabolic reflector and RF sources for the measurement of antenna patterns including quantification of the effect of scan and radomes on the patterns. The range is qualified for RF frequencies from X to W band, Current sources are the Ka frequency band. This facility has been used to quantify RF antennas for LONGBOW, PAC-3, and various advanced technology developments. Additionally the facility includes a Far Field Range that provides a capability for the laboratory development and test of radars transmitters and receivers. This facility has been utilized for the development of both Active Protections Systems and Counter Active Protection Systems and the evaluation of advanced phased array antennas.



## **Composite Structures Manufacturing Facility**

*P&S – Redstone Arsenal, AL*

The Composite Structures Manufacturing Facility specializes in the design, analysis, fabrication and testing of advanced composite structures and materials for both missile and aviation applications. Composite material processing and fabrication capabilities include; filament winding, hand lay-up, compression molding, resin transfer molding, injection molding, vacuum bagging, resin formulation, autoclave and standard oven curing. Composite structures and materials testing capabilities include; Thermo Gravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), Dynamic Mechanical Analysis (DMA), mechanical property, and hydrostatic burst testing. The Composites Manufacturing Facility provides AMRDEC engineers with a "hands on" capability in missile and aviation composites manufacturing from project concept, through fabrication, and testing. This facility is the Government's principal repository of technical expertise in this area.



### **Computer Training Systems Laboratory**

*ASGE – Redstone Arsenal, AL*

The Computer Training Systems Laboratory contains air defense training devices used by the United States Army and Marines, along with training systems used by Foreign Military Sales (FMS) customers. The laboratory provides an area for developing and testing these personal computer (PC) based visual simulation systems, along with the capability of networking them together in distributed simulations. The trainers currently located in the facility include the Avenger Table Top Trainer (TTT), the Stinger Troop Proficiency Trainer (STPT), and the Avenger Institutional Conduct of Fire Trainer (ICOFT), along with an Instructor Station computer that can be used for scenario generation and exercise control.



### **Control Actuation System (CAS) Test Facility**

*ASGE – Redstone Arsenal, AL*

The CAS Test Facility provides capability for development and testing of pneumatic, hydraulic, electromechanical, and cold gas jet reaction control systems. Test equipment available for measuring dynamic performance (stall torque, slew rate, hysteresis, and frequency response) of control systems. Pneumatic, hydraulic, and electrical power supplies are used to support testing. Electronic diagnostic equipment oscilloscopes, data recorders, logic analyzers, and frequency response analyzers. The CAS Facility has equipment for hydrostatic testing pressure vessels to 40 kpsi and pressurizing pressure vessels to 15 kpsi. The facility contains a six-component test stand, with instrumentation, for measuring the forces and moments generated by reaction control systems. The equipment available for measuring CAS performance consists of a Schlumberger 1250 Frequency Response Analyzer, Tetrionix Digital Oscilloscope, Gateway personal computer, and a custom designed ATACMS Automated Test Stand that uses Lab View for data collection and analysis. The Control Actuation System Test Facility supports CKEM, Control Systems Technology, and ATACMS.



### **Countermeasure Test Facility**

*AATD - Ft. Eustis, VA*

Turboshaft engine test stand capable of operating at full power in a simulated aircraft environment to measure acoustic and/or IR radiation and signature. Instrumentation is capable of 96 pressure channels and 105 temperature channels. Mobile Aircraft Infrared Measurement System (AIMS) is field deployable and is used to take full-spectrum IR measurements both at our CTF Facility and remote locations.

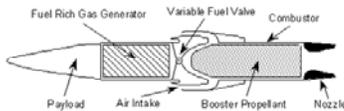
# AMRDEC FACILITIES



## **Design and Analysis Facility**

*AATD - Ft. Eustis, VA*

Provides engineering design of aircraft components, subsystems and installations using Pro/E, Anvil 1000, CADKEY 97, AutoCAD 13. Engineering analysis tools include NISA II and Pro/Mechanica.



## **Ducted Rocket Test Facility**

*P&S – Redstone Arsenal, AL*

This is the most modern, economical, sub-scale direct connect air facility in the world and is used for testing ducted rockets and ramjets. Completed in 1995, it utilizes state-of-the-art computer control to deliver a wide range of airflow rates and temperatures during a single test run, in effect 'flying' a mission while on the test stand.



## **Embedded Processor Laboratory**

*ASGE – Redstone Arsenal, AL*

The Embedded Processor Laboratory provides the means to design, develop, fabricate, and test embedded computers for missile guidance electronics systems in support of technology demonstrations and other missile programs. It consists of equipment and expertise for developing and testing embedded hardware and software for missile and fire control computer systems. Capabilities include: (1) Electronic design tools and expertise, Hardware Description Language (HDL) development, and Field Programmable Gate Array (FPGA) implementation and simulation tools (2) Printed Circuit Board signal integrity analysis tools (3) Integrated Development Environments for multiple processors and Code Generation Tools for development, integration, and test of software (4) Multi-Channel High Speed Logic Analyzers, High Bandwidth Digital Oscilloscopes, and Protocol Analyzers to test and troubleshoot electronic assemblies. This laboratory currently supports several variants of the Guided Multiple Launch Rocket System (GMLRS), the MLRS Trajectory Correction Kit (TCK) program, and M299 launcher software development for Army Unmanned Aerial Vehicles (UAVs).



## **Experimental Fabrication Facility**

*AATD - Ft. Eustis, VA*

Provides aviation fabrication support to special operations aircraft residing at Fort Eustis and other bases in the United States. Support is also provided to AATD for in-house testing and prototype fabrication of Army aviation initiatives. The capability exists to produce almost any machined part that would be found in use on a current Army aircraft. The machinist routinely produced parts with tolerances of less than 1 thousandths of an inch in any configuration.



### **Flight Control Technology Laboratory**

*Aviation Engineering Directorate – Redstone Arsenal, AL*

AED has established an effective helicopter flight control technology development lab targeted at greatly improving the operational capability of existing Army aircraft. The lab is used to develop and evaluate flight control laws for partial authority or fly-by-wire control systems. Integrated handling qualities and flight control system design tools, developed by AFDD, are used to optimize control law gains and time constants against applicable aircraft handling qualities specifications. In addition, manned simulation is used in the lab to assess different control concepts and to evaluate transitions between control law modes.

### **Flight Research Support Facility**

*AATD - Ft. Eustis, VA*

This facility provides support for research and development flight test and test support activities. The hangar includes space and equipment needed for aircraft maintenance, modification, instrumentation, quality control, ground support equipment, and flight planning. Currently, the facility aircraft include manned and unmanned, fixed and rotary wing vehicles.

### **GPS Satellite Simulation Facility**

*ASGE – Redstone Arsenal, AL*

The GPS satellite simulation facility consists of a GPS satellite simulator controlled by either a Silicon Graphics Origin 2000 or PC depending upon unit under test requirements. These simulators are capable of generating RF for a full satellite constellation for both military and civilian signals. The GPS simulators are used to evaluate: (1) total system navigation accuracy, (2) accuracy improvement enhancements (i.e., Local/Wide Area Differential, Wide Area GPS Enhancement (WAGE), pseudolites), (3) acquisition and reacquisition performance, (4) effects of terrain or body masking, (5) satellite geometry and visibility effects including antenna gain pattern modeling, (6) effects of vehicle dynamics, (7) effects of selective availability/anti-spoofing (SA/A-S) operation, (8) inertial navigation system (INS) aided and unaided performance, and (9) interference (i.e., jamming) susceptibility. The GPS Test facility consists of three GPS satellite simulators used to test GPS receiver and integrated GPS/Inertial Navigation System (INS) hardware over a flight environment. The GPS simulator can be used in conjunction with a rate table, centrifuge, or vibration table. The GPS Test Facility supports project office programs including ATACMS, MLRS M270A1 Launcher, GMLRS as well as technology programs including Point-Hit MLRS, and Netfires. The GPS test facility has the capability of supporting any evolving weapon system that utilizes GPS receivers.

# AMRDEC FACILITIES



## **Gel Propellant Rheology Facility**

*P&S – Redstone Arsenal, AL*

This facility is used to determine rheological properties of gelled propellants over the full range of the Army operational temperature limits and for shear rates equivalent to those imposed on the gels by engine injectors. This information is required to minimize the volume and weight of gel propulsion systems.



## **Instrumentation Facility**

*AATD - Ft. Eustis, VA*

Provides instrumentation support for flight tests of prototype weapons systems using a vast array of airborne sensors, transducers, signal conditioning and encoding devices, solid state recorders, telemetry transmitters, telemetry receivers, and decoders. A mobile instrumentation van is maintained to collect, process, and analyze real-time data at test locations both on-site at Fort Eustis or at live-fire test ranges.



## **Javelin Simulation Center**

*SSDD – Redstone Arsenal, AL*

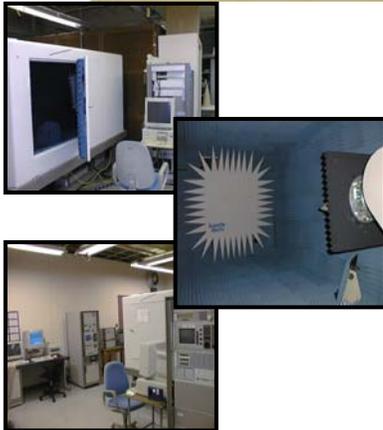
A world class digital simulation capability for design, analysis, and evaluation of the Javelin weapon system. Includes the Javelin Integrated Flight Simulation (IFS) which integrates a six degree-of-freedom simulation with tactical missile code and high fidelity modeling of real world environments. The IFS executes the closed loop simulation using missile tactical processors. The lab is the focal point of the Javelin Integrated Test and Simulation Network that links three other technology areas within AMRDEC, the Redstone Technical Test center, and the prime contractor.

## **Joint Technology Center/System Integration Laboratory (JTC/SIL)**

*SED- Redstone Arsenal, AL*



JTC/SIL facilitates the rapid transition of technologies and products to users and developers, and serves as a testbed for future unmanned initiatives. Core capabilities include system integration & testing, rapid prototyping, system development, software development, simulation, and architecture development. Efforts include trainer systems (proficiency, schoolhouse, field, embedded and portable operator trainers), and rapid prototyping of unmanned systems components to conduct virtual and live experiments.



### ***Ka-Band/W-Band Compact Ranges***

*ASGE – Redstone Arsenal, AL*

Compact test ranges have the capability to measure performance of RF antennas radomes and other millimeter wave devices at the Ka-band spectrum in a 30- by 12- by 10-foot chamber and W-band spectrum in a 9- by 6- by 6-foot chamber. This capability gives the information needed for missile seeker and sensor performance predictions, RF device material selection, foreign system exploitation, and refinement of RF subsystem design. System component evaluations and tests have included the lower tier air defense system, unmanned aircraft systems, foreign system exploitation, and missile and submunition improvement programs.



### ***Kiowa Warrior (OH-58D) Scout Helicopter Cockpit Procedures Trainer with Image Generator (CPTIG) Software Support Environment (SSE)***

*SED – Redstone Arsenal, AL*

The CPT-IG SSE has the capability to maintain, support and upgrade CPT-IG Trainer software. The trainers are used at the Army Flight School, Ft. Rucker, AL to assist in the training of Pilots, Co-pilots and Maintenance Test Personnel in operational/maintenance procedures of the actual aircraft.



### ***Large Rotor Test Apparatus***

*AFDD – Moffett Field, CA*

This test apparatus, when combined with the National Full-Scale Aerodynamics Complex, produces a thorough, full-scale test capability. The Large Rotor Test Apparatus is able to conduct full-flight envelope tests for full-scale components with a complete control and drive system.

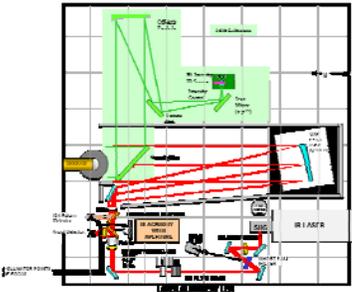


### ***Larry O. Daniel Prototype Integration Facility (PIF)***

*ED – Redstone Arsenal, AL*

The primary goal of the PIF is to support technology activities in the development, fabrication, integration, test/qualification of prototype tactical and ground support systems, subsystems and components. Additionally, the PIF will offer capabilities that allow for the manufacture and integration of unique, difficult-to-procure, and low-rate-production items. The PIF consists of a main 60,000 square foot facility that houses both engineering and manufacturing functions. There is an 11,000 square foot attached high bay that contains two 20-ton bridge style cranes used for ground and airframe platform integration. The low bay area houses machinery and tooling used to produce most mechanical and electrical components at the subsystem level. All engineering and technical data development is contained within the office area of the PIF. Adjacent to the PIF are facilities specializing in printed circuit board plating and another for finishing/painting processes. The PIF also has access to an additional 214,902 square feet of facilities including 3 contractor provided facilities.

# AMRDEC FACILITIES



## **Laser Countermeasure Laboratory**

*ASGE – Redstone Arsenal, AL*

This state-of-the-art laser/optics facility is used to demonstrate laser countermeasures to MANPADS using infrared sensors and seekers. Foreign, domestic, and prototype MANPADS are evaluated with respect to their susceptibilities to laser and expendable flare countermeasures. Techniques are also developed and evaluated to harden sensors and seekers to these families of countermeasures.

The laboratory includes optical tables, mid-wave and long-wave IR laser sources, a blackbody target source, an ultraviolet background source, a flare simulator and optics to combine all of these, which present a realistic (range scaled) scene to an IR seeker. The LCML has been employed for (1) development of laser CCM under Army STO III.WP.2002.02, (2) determination of fundamental laser/detector effects and interaction, (3) evaluation of tactical, developmental and foreign IR seekers, (4) pretest simulation of US/UK laser/flare CM field tests, and (6) laser guidance link experimentation for CKEM.



## **Laser Guidance Analysis Facility**

*ASGE – Redstone Arsenal, AL*

This facility, which provides for real time, closed loop evaluation of semi-active laser guidance hardware, has and continues to be instrumental in the development and life cycle support of such systems as HELLFIRE and Copperhead. It is currently being utilized in the development and demonstration of new laser guidance concepts for the Advanced Precision Kill Weapon System.



## **Life Cycle Software Engineering Center Complex**

*SED – Redstone Arsenal, AL*

294,000 square feet of state-of-the-art workspace, special purpose conferencing and training facilities. Over 900 employees perform work in an environment that is host to over 40 Software/ Computer Engineering laboratories, plus adjoining high bays for tactical equipment operations. The Reconfigurable Tactical Operations Center Lab provides a baseline environment to support integration tasks. The theater missile defense commander-in-chief (CINC) coordination cells were designed and developed here to provide real-time situational awareness for joint commanders. CINC cells were installed at the U.S. Central Command and the U.S. Forces Korea with continuing support for training and joint exercises. The Theater High-Altitude Area Defense (THAAD) Evaluation Center is an integrated suite of THADD digital and hardware-in-the-loop simulation to support engineering analysis and system performance assessments.



### **Liquid/Gel Rocket Test Facility**

*P&S – Redstone Arsenal, AL*

This is the most modern, economical sub-scale gel propellant rocket static test stand in the world. It is used continuously by the Government, Industry, and the Intelligence community for testing of liquid and gel propellant propulsion systems. Completed in the late 1990's, it utilizes state-of-the-art computer control to test bi-propellant, mono-propellant, and hybrid propulsion systems under tactical conditions that can include mission duty cycles and temperature conditions.



### **Longbow/Hellfire and Stinger Systems Integration Facility**

*ASGE – Redstone Arsenal, AL*

This facility is used to design and evaluate the integration of launchers and missiles with aircraft and ground platforms. It provides the capability to assess hardware and software designs for entire weapon systems and supporting equipment such as test sets and training missiles. The Longbow/Hellfire and Stinger Systems Integration Facility currently supports Common Missile, Comanche, Aviation Rockets and Missiles Project Office, and SHORAD Project Office.



### **Materials Facility**

*P&S – Redstone Arsenal, AL*

The Materials Facility is located in Building 7103 and contains approximately 17,000 square feet of laboratory space housing state of the art scientific equipment for materials testing and analysis. The Materials Facility provides support through consultation, quality verification, materials characterization, failure and chemical analysis, mechanical and environmental testing, as well as corrosion prevention & control. The Materials Facility is an invaluable resource for materials support in metals, ceramics, elastomers, platings, finishes, adhesives, sealants, and lubricants. The mission of the facility is to support AMCOM PEO/PMs, MSIC, and other Army needs in the materials area.



### **MEMS and Nano-Technology Clean Room**

*ASGE – Redstone Arsenal, AL*

The MEMS and Nano-Technology Clean Room is a state-of-the-art, 800 square foot, Class 1000-capable facility used for development of micro and sub-micro scale sensors and systems. The clean room contains analysis and test equipment including a Scanning Electron Microscope and Probe Station. Devices developed and tested in this facility will be used for inertial and environmental sensor applications.

# AMRDEC FACILITIES



## **Microfabrication Laboratory**

*WSD – Redstone Arsenal, AL*

The laboratory includes approximately 1,700 square feet of specialized clean-room space up to class 100, plus 1500 sq. ft. of clean-room space housing associated equipment. This area is divided into three separate laboratory areas: mask making and photolithography, mask aligners and spinners for layering of EO polymer materials, and micromachining (DRIE, RIE, and Ion milling) and thin-film metals and dielectric materials deposition. Also, housed in this complex are precision surface analysis instruments (mechanical and optical surface profilers), a scanning electron microscope, and a flip-chip bonder.



## **Modal Analysis and Visualization Equipment**

*P&S – Redstone Arsenal, AL*

This state-of-the-art equipment is used to measure and visualize the vibration characteristics of military hardware. It features a very large and powerful multi-channel data acquisition capability for determining structural mode shapes and natural frequencies. Obtained in 2002, the equipment supports field failure investigations and development of new military systems.



## **NASA Vertical Motion Simulator**

*AFDD – Moffett Field, CA*

This facility consists of four interchangeable cabs and computer image generator visuals on top of the worlds largest amplitude 6 DOF motion base, used to conduct 8-10 simulations a year, including JSF, Comanche, UH-60, Shuttle, and shipboard ops.



### **National Full-Scale Aerodynamics Complex (NFAC)**

*AFDD – Moffett Field, CA*

This facility is utilized by research scientists and engineers in the conduct of advanced research and testing of rotorcraft at full scale. This facility is the world's largest wind tunnel consisting to two separate test sections (40'x80' and 80'x120') capable of accommodating aerodynamic testing of articles up to full-scale, at speeds of up to 250 kts. *Although a NASA facility*, it is operated by the USAF with the Army as the principal customer.



### **Physical Sciences Complex**

*WSD – Redstone Arsenal, AL*

This 88,000 square foot complex is used to investigate basic physical science in support of missile technology development. It incorporates office space, dedicated specialized laboratory spaces, a high-bay area, and a laser beam propagation range with backdrop. The laboratories are equipped with specialized equipment such as optical tables, isolated and filtered power connections in a variety of configurations, water, supplies and drains, vacuum/pressurized air connections, and humidity control. Optical processing and correlator development for automatic target recognition and cueing occupies 5,400 square feet, including laboratories, offices, and storage spaces. Integrated and guided-wave optics research occupies 3,200 square feet in three dedicated Class-100 clean rooms. The focus of laboratory efforts is on micro-electro-mechanical technology for missile navigation and guidance, photonic bandgap materials for sensor protection, conformal missile domes, optical interconnects, and chaos control.



### **Platform Integration Laboratory**

*P&S – Redstone Arsenal, AL*

This 10,000 ft<sup>2</sup> laboratory provides the capability of the AMRDEC to perform hardware modifications and platform integration activities to ground and air weapon systems. This laboratory also develops the AMRDEC LAV test-beds, which demonstrate emerging missile, launcher and fire control technologies in a relative environment.

# AMRDEC FACILITIES



## **Propellant Aging and Mechanical Properties Facility**

*P&S – Redstone Arsenal, AL*

State-of-the-Art laboratory and remote aging facilities, unique to the Army, dedicated to characterization and sensitivity testing of energetic materials used in rocket motors, warheads, and related ordnance devices. Engineering analysis tools and test equipment to assess solid rocket motor structural integrity and service life extension, and to perform analytical chemistry evaluations, forensic investigations on failed hardware, or foreign systems exploitation. Completed in 1988, it meets DoD's rigorous safety requirements for attended operations, storage, and handling of hazardous propulsion materials.



## **Radar Frequency (RF) Technology Facilities**

*ASGE – Redstone Arsenal, AL*

The RF Technology Facilities include a state-of-the-art instrumented microwave laboratory, a bi-static clutter measurements facility capable of measurements from X-band through W-band, W-band and Ka-band compact ranges, and a radar operations facility.



## **Radar Operations Facility**

*ASGE - Redstone Arsenal, AL*

This facility provides an environment for designing, developing, and testing radar and radar subsystems. The main building includes rooftop radar operations, microwave laboratory, high bay, and offices. Other buildings at this facility include a test tower, radar pad, and experimental radar.



## **Redstone Aviation Propulsion Test and Research (RAPTR) Facility**

*AED – Redstone Arsenal, AL*

The Redstone Aviation Propulsion Test and Research (RAPTR) Facility is an advanced, ground level turboshaft engine test facility with capability for test and evaluation of aircraft turboshaft engines and components. Employing extensive and accurate instrumentation into a scalable, highly flexible data acquisition and control system, RAPTR is able to perform single, manually controlled engine operations as well as complex and repeated test sequences in closed loop. MIL-STD-1553 architecture is incorporated into RAPTR. RAPTR incorporates facility safety controls that protect personnel as well as test assets.



### **Rocketball Test Facility**

*P&S – Redstone Arsenal, AL*



This test facility offers the capability to emulate and measure guided missile radar cross-section without requiring flight tests of tactical missiles. This facility was developed in support of vehicle protection systems development efforts.



### **Rotorcraft Advanced System Concepts Airborne Lab (RASCAL) JUH-60A**

*AFDD – Moffett Field, CA*

RASCAL is a full authority, fly-by-wire, glass cockpit in-flight simulator used for a wide range of flight control and advanced guidance display work by both the AMRDEC and NASA. It is the only helicopter in-flight simulator in the US.



### **Russell Measurement Facility (RMF)**

*ASGE – Redstone Arsenal, AL*

The tower is 329 feet tall with an enclosed, 32x17 foot laboratory at the top providing a view of surrounding test ranges. One of two elevators serves as a measurements platform allowing variable lookdown angle capability. Facility includes: fleet of tactical vehicles, track-mounted vehicle tilt/turn table, office space, rest facilities, and both single and 3 phase power. Utilized for the development of visible, IR and RF spectrum sensors/seekers, signature measurement collection of both air and ground vehicles, etc.

### **Sensor Signal Processing System (SSPS)**

*ASGE – Redstone Arsenal, AL*

The heart of the SSPS network consists of two realtime ATR systems with customized 300 Hz. cross correlator engines. This facility consists of a high speed local area network for implementation, development and assessment of target acquisition and ATR functionality for fire control and precision strike weapon applications. The SSPS currently supports NLOS-LS PAM and LAM, the Joint Attack Munition System (JAMS) Project Office, and other evolving weapon systems that plan or potentially could make use of an advanced target acquisition capability.

# AMRDEC FACILITIES



## **Signature Characterization Facility (SCF)**

*P&S – Redstone Arsenal, AL*

This facility is used to characterize the exhaust plumes of rocket motors. The facility consists of a static test stand mounted inside an environmental chamber. Small test motors can be fired under any atmospheric condition of temperature and humidity, and evaluated as to their exhaust characteristics. These include visible and infrared flash, visible and infrared smoke attenuation, toxicity, particle analysis, and mm wave radar absorption.



## **Small Airbreathing Engine Test Facility**

*P&S – Redstone Arsenal, AL*

This is a modern economical static test facility for the performance evaluation of small airbreathing engines for both tactical missile and UAV applications. The facility can accommodate turbojet engines up to the 1000 lbf thrust class and reciprocating engines up to 150 shp. The facility can accommodate either jet engines on a thrust stand or shaft engines on a propeller stand. In addition, shaft engine (turbine or reciprocating) can be evaluated on the dynamometer stand. Completed in the late 1990's, it utilizes state-of-the-art computer control to test airbreathing propulsion systems under tactical conditions that can include mission duty cycles and electrical or shaft power loadings.



## **Small Unmanned Aerial Vehicle (UAV) Facility**

*AATD - Ft. Eustis, VA*

This facility contains sufficient space to assemble and maintain an expendable drone UAV for research and development purposes. The Small UAV Facility also can provide avionics and ground support components for the UAV plus components for smaller radio-controlled model airplanes.



## **Small Unmanned Aerial Vehicle Laboratory**

*SSDD – Redstone Arsenal, AL*

The Small Unmanned Aerial Vehicle Laboratory (SUAVL) is used in research and development of new technologies applicable to small UAV systems, in component integration and subsystem insertion, in evaluating existing airframes, components and subsystems and developing new evaluation and prediction methodologies for small unmanned aerial systems. The facility also serves as the primary repository of Small UAV performance and is the basis for future work in small UAV technologies between RDEC labs, TRADOC Battle Labs, industry, and academia.





### **Structural Test Facility**

*AATD - Ft. Eustis, VA*

Provides a wide variety of testing equipment, fixtures and facilities to perform both unique aviation component testing as well as common types of materials testing capabilities. The facility includes a rotor blade mid-span fatigue test fixture, rotor blade root-end test fixture, torsional fatigue test machine, Instron and 300 kip Tinus-Olsen load frame, and a structural backstop which can accommodate a UH-60 size helicopter.



### **Supersonic Rocket on a Rope (SROAR)**

*P&S – Redstone Arsenal, AL*

This test facility offers the capability to conduct flight and impact tests of various missile components up at velocities up to Mach-3 without the complexity and expense of guided flight tests. This facility utilizes high-tension ropes anchored near the target to accurately guide the missile to the desired hit-point, and can support free-flight of the missile off the ropes for coast-phase in-flight testing. A variety of rocket motors are utilized to replicate the acceleration and velocity profiles of the tactical system. This facility has been used to conduct impact fuze, explosive and flechette warhead, and sensor testing under flight-test conditions.



### **Tactical Systems Integration Laboratory**

*ASGE – Redstone Arsenal, AL*

The Tactical Systems Integration Laboratory is used to design and integrate computer hardware and software and related electronic subsystems for tactical vehicles. This laboratory consists of hi-bay space within a secured building. The lab area includes equipment for electronics fabrication and test, as well as a hardware/software integration test area. The laboratory also includes assets for collecting, processing, and presenting data from field tests. The hi-bay is equipped with an overhead crane and 28 Volt vehicle compatible power supply. Current programs supported include Avenger, Sentinel, SLAMRAAM, and Non Line of Sight – Launch System (NLOS-LS) Precision Attack Missile (PAM).



### **Two-Room Blast Characterization Facility and Explosives Test Area**

*P&S – Redstone Arsenal, AL*

AMRDEC has constructed and is currently doing evaluation of explosives in a two-room, non-responding structure outside of TA-10. In this facility, novel explosive charges of up to 15-lbs. are evaluated for blast overpressure and thermal output within a confined space. The structure, based on a Marine Corp ORD for fire from enclosure (FFE), is one of only two facilities of its kind in the world. The dimension of each room is 12x15x7 feet. The primary blast room is layered with replaceable mild steel. Both rooms are instrumented with an adaptable array of transducers, thermocouples, and calorimeters. The primary room is also fitted with a barrel feature for mechanically measuring total impulse.

# AMRDEC FACILITIES



## **UH-60 System Integration Laboratory**

*SED – Redstone Arsenal, AL*

This facility provides the equipment and resources to analyze problems reported by the user, conduct avionics tests, support air-worthiness analysis and certification, and produce components in conjunction with enhancing the Blackhawk fleet.



## **Vehicle Antenna Measurement Facility (VAMF)**

*AATD - Ft. Eustis, VA*

The VAMF is used to conduct radio-frequency (RF) characterization of communication, navigation, and ASE/ECM antennas and sensors test aircraft. The facility is capable of automated antenna gain pattern measurement and has an adjustable vehicle rotation system, capable of 360 degree azimuthal rotation to conduct RF pattern measurement of antennas and sensors located on vehicles up to 40,000 lbs. gross weight and 36 foot wheel base.



## **Virtual Targets Center (VTC)**

*SSDD – Redstone Arsenal, AL*

The VTC is a joint effort with PEO STRI, PM ITTS TMO to provide signature management and predictive signature design services. It is organized into three areas: 1) The Virtual Targets Program, which creates digital geometry target models. 2) The Target Generation Lab, which generates multiple types of simulation target models ranging in complexity from low resolution stealth views such as used by OneSAF to high resolution Hardware-In-the-Loop and predictive signature codes. 3) The Army Model Exchange, which provides a protected website for the immediate download of thousands of target models.



## **Warfighter Protection Laboratory (WPL)**

*SSDD – Redstone Arsenal, AL*

The Warfighter Protection Lab is a Government Force Protection and Homeland Security Test-Bed that partners to solve problems that keep our customers “awake at night.” Efforts include:

- **Exercise Support and Response Analysis:** supporting customers in the development, planning, execution, and analysis of table-top, functional, full-scale exercises.
- **Operations Support:** working with Operations Center management to optimize sensors, infrastructure, tactical hardware systems, and data sets for maximum Situational Awareness and Decision Support.
- **Simulation-Based Training:** providing highly realistic simulation-based training environments.
- **Live/Virtual Experimentation:** employing traditional simulation techniques to study emerging technologies related to Force Protection and Homeland Security.





### **Weapon System Interoperability Test Facility**

*SED – Redstone Arsenal, AL*

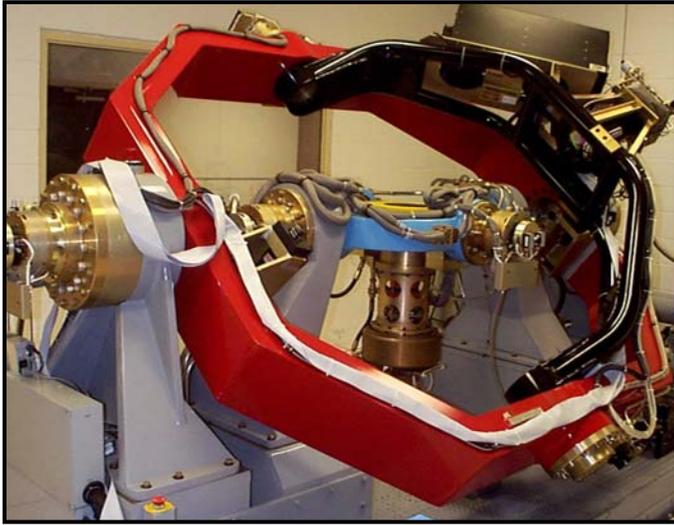
Designed for weapon system software and communication testing, this is the only facility in the U.S. Government having, in residence, Army deployed tactical air defense systems, Unmanned Aerial Vehicle C3 assets, and other ground and fire support weapon and C3 systems. It is regularly used for joint interoperability certification testing, AWE and field demonstration preparation, and soldier training.

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# AMRDEC FACILITIES



# ADDITIONAL FACILITIES AT REDSTONE



## **Airborne & Field Sensors Facilities**

*Redstone Technical Test Center (RTTC) – Redstone Arsenal, AL*

RTTC facilities include an 800' x 60' paved UAV operational area, clear approach/departure zone, concrete pads furnished with 208VAC, 3 phase, 200 amp power, 20,000 sq ft of climate controlled hanger space, with machine shop and integration facilities for sensors on fixed and rotary wing aircraft. Substantial ground sensor testing ranges are available, complete with range control facilities and a raised 5 meter mound with 18,200 sq ft work pad, 75' tower and instrumented trailers. Stabilized airborne instrumentation platforms are also available, as well as a wide variety of target and non-target entities. Capabilities for collecting multi-spectral signatures, ground truthing TSPI information is available, as well as dispensing and characterizing obscurants for supporting detection/recognition tests and system-of-systems tests, over varied terrain. RTTC also has a unique reconfigurable underground 6' concrete tunnel facility, with two connecting tunnels measuring 364' and 100' in length.



## **Climatic Environmental Test Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has an extensive suite of facilities for supporting MIL-STD-810 testing, to include: Temperature/Altitude, Rapid Decompression, Low/High Temperature, Temperature Shock, Humidity, Salt Fog, Blowing Rain, Freezing Rain/Ice, Submersion/Leak, Dust, Blowing Sand, Solar Radiation, Environmental Stress Screening. Capabilities for supporting climatic specification development and thermal modeling are also available.



## **Component and Subsystem Test & Analysis Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has approximately 140,000 sq ft of lab and high bay facilities to include the EO Target Acquisition System Evaluation Lab (EOTASEL) and the EO Sensor Flight Evaluation Lab (EOSFEL) for comprehensive performance testing of Seekers, and Reconnaissance, Surveillance, and Target Acquisition (RSTA) Sensors. Component facilities also include a complete Metrology Lab, the Automated Laser Instrumentation System (ALIMS), RF Laboratories, Multi-Spectral Component Testing, Mechanical, Structural, Kinematics, Fatigue, Pneumatic, Hydraulic, Cable, Optics, and Electrical/Electronic Test Equipment.

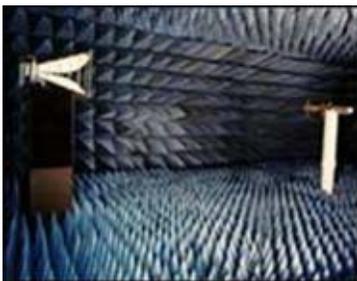




### **Dynamic (Shock & Vibration) Test Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC dynamic field test facilities include a Road/Mobility Testing site, as well as a natural terrain road course. The numerous dynamic laboratory facilities support: Mechanical and Acoustic Vibration, DOF Motion Replication, Shock, Acceleration, Acoustics and includes capabilities for Signal Analysis and Structural Modal Analysis. Capabilities for supporting dynamic specification development are also available.



### **Electromagnet Environmental Effects (E3) Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has full-spectrum facilities for performing MIL-STD-461 and ADS-37A/B testing: Electromagnetic Radiation (EMR) – Operational (EMRO), EMR-Hazards (EMRH), Electromagnetic Interference (EMI), Hazards of Electromagnetic Radiation to Ordnance (HERO), Electromagnetic Vulnerability (EMV), Electromagnetic Compatibility (EMC), Electrostatic Discharge (ESD), Near-and direct-lightning strikes, Electromagnetic Pulse (EMP)/Nuclear, Radar Cross Section (RCS)/signature, Shielding Effectiveness (SE), and other electromagnetic safety/hazards and operational electromagnetic testing. Testing capabilities encompass: noise floor analysis, source/victim, power quality measurement, and electro-explosive device (EED).



### **F.B.I.-OMEMS Hazardous Devices School**

*F.B.I. – U.S. Army – Redstone Arsenal, AL*

The Hazardous Devices School began 35 years ago on Redstone Arsenal, and is managed by the FBI with instructors provided by the Army's Ordnance Munitions and Electronics Maintenance School. The school helps Public Safety Bomb Technicians (PSBT) to become knowledgeable in the detection, diagnosis and disposal of hazardous devices. They are further trained to collect evidence in hazardous devices, and present expert witness testimony in court on bombing cases.

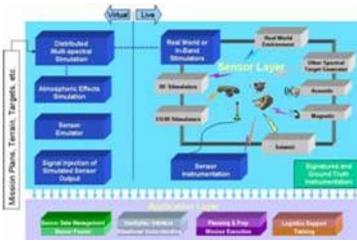


### **Instrumentation Design and Development Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has facilities for design, development and fabrication of: custom instrumentation, mobile instrumentation, miniaturized instrumentation, wireless instrumentation, telemetry, instrumentation integration into ground and airborne platforms, and other specialized test sets for supporting certified real-time data acquisition and signal analysis. Mobile data acquisition and analysis facilities are available to support a multitude of testing, signature collection, and ground truth

# ADDITIONAL FACILITIES AT REDSTONE



## **Modeling & Simulation Infrastructure** *RTTC – Redstone Arsenal, AL*

RTTC has substantial M&S infrastructure, including a High Performance Computer and Virtual Proving Ground (VPG) resources for: thermal modeling, finite element analysis, physical simulation, CAD/CAM, multi-body dynamics, failure analysis, real-time multi-spectral scene generation, atmospheric effects, sensor effects modeling, as well as system-of-systems M&S and virtual ranges for creating and inserting 3-D synthetic environments. The Global Modular Army Node (GMAN) provides an FCS simulation environment for supporting the integration testing of battle command network systems and system-of-systems testing.



## **Redstone Scientific Information Center** *RSIC – Redstone Arsenal, AL*

RSIC, established in 1962, is the World's Largest Aerospace Scientific Information Center. Staffed with degreed information professionals with expertise in a variety of scientific and technical fields, RSIC houses an extensive scientific and technical collection and provides accurate and timely information and services needed by researchers and engineers at Redstone Arsenal and the Tennessee Valley. From hard-to-find historical documents to the newest technical literature, RSIC provides expert personalized assistance in answering specific research questions, selecting or recommending individual information resources, translating documents, making referrals to outside information sources, and conducting literature searches.



## **Redstone Arsenal Airfield** *Redstone Arsenal Garrison, Redstone Arsenal, AL*

In addition to supporting the aircraft assigned to the arsenal, Redstone Army Airfield serves as a refueling stop for all of the military services. The airfield's runway is capable of handling a wide spectrum of military aircraft including some of the world's largest cargo and passenger planes. Among the aircraft which have used the arsenal's airfield are the C-124 cargo plane; the AO1C Mohawk turboprop reconnaissance plane; the Air Force's C-5A Galaxy.



## **Restricted Airspace** *RTTC – Redstone Arsenal, AL*

Redstone Technical Test Center has restricted airspace up to 30,000 feet ASL. Airspace encompasses R-2104 (Redstone). Airspace is used extensively for airborne/UAV testing operations such as acquisition and recognition applications. Ranges are available up to 13 Km within RSA boundaries and over 29Km available that may be coordinated with the Huntsville Air Traffic Control. Support personnel are available for sustained operations.



### **Sensors Laboratory Test Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has extensive laboratory facilities for complete specification/performance testing of: Laser Rangefinders, Laser Designators, Direct-View Optic Telescopes, Visible/TV Sensors, Ultraviolet (UV) Sensors, Near-IR Sensors, Mid-Wave IR Sensors, Long-Wave IR Sensors, RF Sensors, MMW sensors, Microwave Sensors, as well as Multi-Spectral/Multi-Mode/Multi-Band Sensors. Facilities include highly unique in-band scene projectors for real-time dynamic stimulation of reconnaissance, surveillance and target acquisition sensors to support hardware-in-the-loop testing.



### **Urban Test Facilities**

*RTTC – Redstone Arsenal, AL*

RTTC has access to various facilities for use in urban testing applications, including an agreement with the Hazardous Devices School (HDS): a restricted access Urban area located on Redstone Arsenal, with paved roads, urban municipal areas, farm area, strip mall area, residential areas, and commercial areas, which are instrumented with observation cameras and power. RTTC also has an underground cave/tunnel facility that can be used for testing sensors in urban tunnel applications.



# ADDITIONAL FACILITIES AT REDSTONE

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# DOING BUSINESS WITH AMRDEC

**AMRDEC is excited to participate in collaborative efforts with domestic partners, including state and local governments, businesses and universities. Outlined here are a few of the ways that you can work with us.**

## --- TECHNOLOGY TRANSFER ---

Technology transfer is a process where Federal Government technologies and products developed are provided to potential users in a manner that encourages and accelerates their commercial applications. These include CRADAs and PLAs, explained below, as well as Facilities Use Agreements and Cooperative Agreements/Bailment.

### **COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)**

CRADAs are simple, flexible and powerful legal agreements between Federal and Non-Federal parties to collaborate on a common objective.

- Share/Exchange personnel, equipment, facilities, other resources but no direct Federal funding
- Not subject to Federal Acquisition Regulations or competition in contracting act
- Trade secret information protected from Freedom of Information Act

### **PATENT LICENSE AGREEMENT (PLA)**

PLAs license commercial companies to commercially exploit patented government-developed technology.

- The government retains the rights to use the technology for government purposes.
- Royalty fees, legal rights, and other terms and conditions on the use of the technology are negotiated by the company and the government laboratory.
- PLAs can be exclusive, partially exclusive, or non-exclusive.

**CONTACT:** Office of Research and Technology Applications (ORTA), 256-876-8743, orta@amrdec.army.mil

## **TECHNICAL INDUSTRIAL LIAISON OFFICE (TILO)**

The TILO is one of the initial points of entry for those seeking to do business with AMRDEC. The TILO manages the **Unsolicited Proposal Program**. An unsolicited proposal is any proposal or offer of services received that is not the result of a formal advertisement for a specific procurement, request for proposal (RFP), or request for a quotation (RFQ). The TILO also manages the **Unfunded Study Program**, and the **Army Potential Contractor Program**. The TILO provides technical expertise in support of contract opportunities for **Small Businesses and Historically Black Colleges/Universities and Minority Institutions**. **CONTACT:** Industry Liaison, Phone: 256-313-2416, Kathy.Herring@us.army.mil

## **SMALL BUSINESS INNOVATION RESEARCH (SBIR)**

The SBIR program provides small businesses and research institutions with opportunities to participate in government-sponsored research and development. The Program provides seed money for high-tech small business to use in the development of innovative products and technologies. This investment results in a technology, product, or service that the government can potentially use, and that the small business or research institution can commercialize outside the SBIR Program. **AVIATION CONTACT:** P.J. Jackson, 757-878-5400, pj.jackson1@us.army.mil; **MISSILE CONTACT:** Buddy Thomas, 256-842-9227, Otho.Thomas@amrdec.army.mil

## **BROAD AGENCY ANNOUNCEMENT (BAA)**

BAAs are open solicitations for proposals. They provide opportunities for funded scientific research to fulfill identified requirements. AMRDEC posts all BAAs at [www.fedbizops.gov](http://www.fedbizops.gov). Detailed instructions on submitting a proposal are included in the official BAA. \*



## **TEST SERVICE AGREEMENT**

AMRDEC provides testing services to private industry, offering low-cost services, unique testing facilities, highly rated and experienced staff, state-of-the-art equipment, test plan development, data analysis and report preparation.\*

## **MEMORANDUM OF AGREEMENT (MOA)**

Memoranda that define general areas of conditional agreement between two or more parties. The MOA describes that which one party does is dependent on what the other party does. MOAs may establish responsibilities for providing recurring reimbursable support.\*

## **INTERAGENCY AGREEMENT (IAA)**

An IAA is the legal instrument used for an interagency exchange of funds for goods/services between Federal agencies. \*

### **\* General Inquiries May Be Directed to:**

Forrest Ruble  
Director, AMRDEC Strategic Initiatives Office  
AMSRD-AMR-FO  
Bldg 5400, S147 Redstone Arsenal, AL 35898

Phone: 256-876-9159  
Fax: 256-876-9142  
Email: [forrest.g.ruble@us.army.mil](mailto:forrest.g.ruble@us.army.mil)

# DOING BUSINESS WITH AMRDEC



**The U.S. Army Aviation and Missile Research,  
Development and Engineering Center**

Bldg. 5400  
Redstone Arsenal, AL 35898

[www.redstone.army.mil/amrdec/](http://www.redstone.army.mil/amrdec/)

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## **Additional Links/Contacts**



The U.S. Army Material Command (AMC)  
[www.amc.army.mil/](http://www.amc.army.mil/)



The U.S. Army Research, Development and Engineering  
Command (RDECOM)  
[www.rdecom.army.mil/](http://www.rdecom.army.mil/)



Redstone Arsenal  
[www.garrison.redstone.army.mil/](http://www.garrison.redstone.army.mil/)

