

AVIATION AND MISSILE RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

By Dr. Steven Patrick Decland Smith

The Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Redstone Arsenal, AL, brings to the new Research, Development and Engineering Command (RDECOM) a world-class research, development, and engineering center with approximately 2,300 employees, including more than 1,700 scientists and engineers who provide technical services and conduct scientific research and development in disciplines that support AMRDEC customer platforms and weapons systems. AMRDEC's budget is more than \$880 million per year. AMRDEC conducts its operations in approximately 1.7 million square feet of facilities with a total investment exceeding \$975 million.

AMRDEC employees have embraced the very challenging vision of "*Swift Decisive Victory Without Casualties*," which is based on the precept that combat effectiveness can be increased tremendously by shortening the soldier's engagement cycle, giving the soldier "one shot, one kill" capability, and helping the soldier survive to continue to take the battle to the enemy. AMRDEC primarily focuses on inherently survivable standoff weapon systems that are rapidly deployable, lethal, flexible, sustainable, and affordable. AMRDEC employees build on a well-planned technology base program and have repeatedly proven their abilities by demonstrating affordable solutions to overcome critical technical barriers in customer programs. AMRDEC applies leading-edge expertise to weapon system prob-

lems to rapidly develop and transition technology into fielded weapon systems to provide the soldier with the survivability and lethality needed to enable swift, decisive victory while still providing best-value solutions. The center's number one goal is to "exceed the greatest expectation of its customers," and AMRDEC employees are committed to technical excellence and unsurpassed services to provide the best possible weapon systems to their ultimate customer—the U.S. soldier.

A recent major technical accomplishment that illustrates the widening scope of AMRDEC's goal is the integration of a HELLFIRE laser-guided missile with an Air Force Predator unmanned aerial vehicle (UAV). AMRDEC's improvements and modifications give the Predator the capability not only to identify targets of opportunity on the battlefield, but also to engage and destroy these targets in real time. This capability to loiter over a battle area for extended periods of time, allowing man-in-the-loop identification, recognition, and weapon engagement of targets, has given the Predator a new, expanded role, the importance of which has become increasingly evident since the events of September 11, 2001. The nature of the conflict in Afghanistan dictates the need for 24-hour-a-day surveillance and the capability to immediately engage a target of opportunity as it appears with a weapon offering excellent lethality against both hard and soft point targets. The weaponized Predator has proven to be invaluable in

achieving destruction of high-value targets while minimizing losses to friendly forces. AMRDEC's Predator/HELLFIRE weaponization program, in partnership with the Program Executive Office, Tactical Missiles, and U.S. Air Force Air Combat Command, has been a model in demonstrating that a fast-track, urgently needed program such as weaponized Predator can be designed, developed, and fielded in less than 5 months after approval.

Continuing critical efforts in unmanned systems development, AMRDEC successfully executed a demonstration with soldier operators of remote "plug and fight" capabilities from an eXperimental Unmanned Ground Vehicle at the Redstone Technical Test Center, Redstone Arsenal, AL; MacGregor Test Range, Fort Bliss, TX; and Fort Knox, KY. The demonstration included remote firings of a suite of light assault weapons, interchanged with the Javelin missile, in conjunction with the operation of a remotely launched UAV. All commands were provided externally. All hardware performed flawlessly, including first round kills against an armored target for the Javelin. Battle damage assessment was provided by the remotely launched and controlled UAV that sent back imagery to the operator stations located in fixed facilities on the range. This demonstration provided key information on the importance of the cooperativeness of unmanned ground vehicles and UAVs and the increased benefits of a lethal payload. This system-of-systems solution concept is a mainstay in the new RDECOM.

Speed of transition from laboratory to field is another goal of RDECOM and AMRDEC's quick development of critical technologies for the modification of the HELLFIRE AGM-114K missile (MOD-K) to meet an urgent operational need for fragmentation lethality against a broad range of targets is an excellent example. The primary urgency was related to global military operations involving the United States. The MOD-K is

an excellent example of AMRDEC transitioning advanced technology to deployment in a very short time at minimal cost. The MOD-K effort, including simulation, design, fabrication, test, and deployment, provided a joint service capability in less than 8 weeks.

The Army identified a requirement for an Advanced Precision Kill Weapon System (APKWS) to fill the weapon gap between the current unguided 2.75-inch rocket system and the HELLFIRE anti-armor missile. AMRDEC's Low Cost Precision Kill (LCPK) 2.75-inch Guided Rocket Advanced Technology Demonstration program has shown key technologies and performance requirements in support of the APKWS by developing and flight testing a low cost, accurate 2.75-inch guided rocket that provides a standoff range surgical strike capability against specified soft point targets. The LCPK guided rocket uses an existing rocket motor that integrates with proven laser and precision guidance technology. The LCPK guided rocket is compatible with existing fielded HELLFIRE laser designators and has demonstrated HELLFIRE-like accuracy in recent flight testing. AMRDEC formally transitioned the LCPK technology and prototype designs to the APKWS program on Dec. 20, 2002, with a successful Milestone B decision to proceed to System Development and Demonstration.

AMRDEC, the only full life-cycle software engineering center in the Army and one of four organizations in the federal government to achieve a Level 4 or greater rating in an assessment of its software engineering processes, joins an elite group of software development organizations worldwide. A Level 4 rating means that the organization's software development process and products are measured and understood quan-



AMRDEC weaponized the Predator UAV in less than 5 months.

tatively. Significant quality and productivity improvements have resulted from the utilization of a defined development process. AMRDEC provides software support to most of the Army's major weapon systems in the Army's only facility designed for tactical battlefield automated systems support. The center is an internationally recognized leader in software technology, software development, and software verification and validation.

AMRDEC has DOD's best Value Engineering (VE) program with \$3 billion in documented cost savings and consistently achieves 70 percent of the Army Materiel Command's total savings and 30 percent of DOD's total savings. AMRDEC's Service Life Prediction Program has achieved over \$8 billion in cost avoidance. AMRDEC's Prototype Integration Facility (PIF) is a Government Owned, Government Operated (GOGO) facility/concept concentrated on meeting the rapid response needs of the Research, Development and Engineering Command, DOD, and ultimately the warfighter. Customers buy solutions, not technology; therefore, the GOGO PIF concept focuses on assembling and integrating the necessary government and industry expertise to render a true rapid response.

AMRDEC personnel are among the world's premier aviation and missile technologists who have proven their abilities by repeatedly demonstrating affordable solutions to overcome technical barriers in customer

programs. Personnel are continually recognized for their achievements. Recent individual awards include the Missile Systems Management Award, the Paul A. Siple Medallion for Scientific Achievement, the Technology Transfer Excellence Award, several Presidential Rank Meritorious Executive Award Winners, the Tibbetts Award, and numerous Research and Development Awards. In the past 13 years, AMRDEC has received 9 DOD VE Best Field Command Awards, 8 DOD VE Professional Awards, and 5 DOD Best Individual/Team Awards. AMRDEC personnel and programs continue to enjoy the commendation and recognition from elite groups and societies worldwide.

The greatest change in the Army's posture since the end of the Cold War is the transition from a heavily forward-based force to a primarily CONUS-based force with many notable exceptions (e.g., Bosnia). This transition places a high premium on deployability in a logistically-challenged legacy Army which, because of decades of facing a well-defined threat, is strongly oriented toward heavy forces. AMRDEC employees are focused on making the pre-eminent warfighting force in the world even more lethal, survivable, flexible, deployable, and affordable while reducing its logistical footprint in response to the Army vision.

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