



# 2007 Award Recipient

## U.S. Army Armament Research, Development and Engineering Center (ARDEC)

From the cannonballs fashioned for George Washington's Continental Army to the laser-guided artillery currently being used in combat, Warfighters defending and protecting the United States from its enemies rely on having the best weaponry and ammunition available. The U.S. Army Armament Research, Development and Engineering Center (ARDEC)—one of the specialized research, development, and engineering centers within the U.S. Army Materiel Command—has been responsible for meeting this critical demand. ARDEC develops 90 percent of the Army's armaments and ammunition including warheads, explosives, all sizes of firearms, battlefield sensors, and advanced weaponry based on high-power microwaves, high-energy lasers, and nanotechnology.

The Center's annual net revenue is in excess of \$1 billion. Of its nearly 3,000 employees, more than two-thirds are scientists and engineers. The ARDEC headquarters in Picatinny Arsenal, N.J., is home to 2,500 staff with the other employees located at ARDEC satellite offices and facilities in Illinois, Maryland, and New York.

## Excelling in a Challenging World

Dramatic changes in the types of adversaries and technologies that U.S. Warfighters face, the ongoing transformation of the military services, and increasing competition for funding combine to make the delivery of innovative technologies to the U.S. Army more important than ever. In this demanding environment, ARDEC not only has maintained its position as provider of choice to its Army customers but has also expanded its market. Since 2001, ARDEC's customer base has shifted from virtually 100

### What is the Malcolm Baldrige National Quality Award?

Named after the 26th Secretary of Commerce, the Malcolm Baldrige National Quality Award was established by Congress in 1987 to promote excellence in organizational performance, recognize the achievements and results of U.S. organizations, and publicize successful performance strategies. For more information, see <http://baldrige.nist.gov>.

### Baldrige 20th Anniversary Highlight: The Baldrige Award Crystal

The Malcolm Baldrige National Quality Award, composed of two solid Steuben Glass crystal prismatic forms, stands 14 inches tall. The crystal is held in a base of black anodized aluminum with the Award recipient's name engraved on the base. A 22-karat gold-plated medallion is captured in the front section of the crystal. The medal bears the inscriptions "Malcolm Baldrige National Quality Award" and "The Quest for Excellence" on one side and the Presidential Seal on the other.

The President of the United States traditionally presents the Award at a special ceremony in Washington, D.C.

percent Army customers to approximately 83 percent Army and 17 percent non-Army, including organizations such as the U.S. Special Operations Command and the Department of Homeland Security.

ARDEC applies a team approach to all project and strategic planning activities, and the teams often include Department of Defense (DoD) organizations, defense contractors, and other government agencies. Such collaborations and partnerships allow ARDEC to leverage its own capabilities and accelerate the development of crucial innovations. This multifaceted quest for excellence has had a significant impact on ARDEC's bottom line:

- Overall revenue increased from \$640 million in fiscal year (FY) 2001 to over \$1 billion in FY 2007, and in the same period, revenue from non-Army customers grew from \$60 million to \$140 million.
- Between FY 2004 and FY 2007, the number of Cooperative Research and Development Agreements (CRADAs) with ARDEC as a partner grew from 99 to more than 140—representing 79 percent of the cash-in value for CRADAs signed by the Army's Research, Development and Engineering Command (RDECOM) laboratories. The increase in CRADA money that ARDEC could leverage during the three-year period increased from \$10.2 million to \$29.4 million.



## Performance for the Ultimate Customer

ARDEC's end-users are, of course, U.S. Warfighters whose lives depend on the products provided. To steadily improve itself and its products on behalf of those customers, ARDEC has been applying the Baldrige Criteria to its operations since the 1990s. In 2004, ARDEC reorganized itself around a capability- and competency-based structure, and followed this in 2005 with the adoption of Enterprise Excellence—a strategy built around a Baldrige framework and integrating best practices such as Balanced Scorecard, Lean/Six Sigma, Capability Maturity Model Integration, and ISO.

As a result of this quality journey, ARDEC has:

- Achieved overall Lean/Six Sigma improvements in quality (91 percent), cost (70 percent), schedule (67 percent) and risk (84 percent) with an overall cost avoidance of \$3.22 billion since 2001;
- Received the Army's *Large R&D Laboratory of the Year* award for four of the last eight years and 13 of the Army's *10 Greatest Invention of the Year* awards in the past five years;
- Been recognized for the technological innovation of its SWORDS robot that was named one of the "most amazing inventions of 2004" by *Time*;
- Been named the Army's benchmark for technology transition by the Army Audit Agency; and
- Been honored with the Army's 2005 Collaboration Team of the Year award and two Collaboration Team awards in 2006.

ARDEC's overall customer satisfaction ratings increased from 3.48 (on a 4-point scale) in FY 2000 to 3.75 in FY 2007, exceeding both government and industry benchmarks. During 2004-2007, satisfaction among Army customers remained fairly consistent at 3.62, while satisfaction among non-Army customers increased from 3.82 to 3.92. This success has grown largely out of ARDEC's Voice of the Customer (VOC) program. Web-based customer satisfaction surveys provide 1,500 data points and over 60 pages of comments each quarter, with the results available to everyone in the ARDEC workforce.

ARDEC also has developed a number of tools to help it react quickly and effectively to customer needs. For example:

- In FY 2005, the Center formalized a Web-based tool for collecting and tracking customer requests with the objective to close all requests within 72 hours. ARDEC has met that goal in five of six quarters since FY 2006.
- ARDEC has adopted world-class modeling, simulation, and prototyping design tools to shorten development cycles and reduce costs. This has enabled a more than 50 percent increase in the volume of armament releases to the field.
- ARDEC's Knowledge Management Office makes great use of its Armaments Knowledge Base, a repository of technical information and best practices throughout the armaments industry that has grown from 450 documents in FY 2001 to more than 4,000 in FY 2007.

## Growing a Specialized Workforce

The skills and expertise that ARDEC requires in its workforce are not taught in universities or readily obtainable through previous work experience. Therefore, the Center created an internal Armament University to provide its staff with specialized training. Staff also has access to continuing education, including advanced degree programs and Lean/Six Sigma training, to support continuous improvement and innovation. More than \$3 million was spent in tuition assistance for ARDEC employees in 2006.

In addition to these enrichment opportunities, the Center devotes significant time, resources, and funding to keeping ARDEC staff "fully engaged and satisfied," a goal that survey results show is being met. For example:

- Levels for workforce engagement (empowerment, communication, motivation, training, and recognition) are consistently ranked above 80 percent by employees and are higher than comparable best-in-class benchmarks.
- Job satisfaction increased from 85 percent in FY 2004 to 90 percent in FY 2007, exceeding American Productivity and Quality Center (APQC) and best-in-class benchmarks.
- The attrition rate for engineers and scientists since FY 2004 has been consistently lower than competing RDECOM laboratories and other benchmarked best-in-class industry organizations.

ARDEC's strong attention to its workforce has not gone unnoticed. In 2005, the Under Secretary of Defense for Acquisition, Technology, and Logistics recognized ARDEC with a Gold-Level Workforce Development Award, and in 2007, ARDEC received an American Society for Training and Development (ASTD) BEST Award for Workplace Learning and Performance, ranking sixth in a field of more than 100 organizations.

## Good Citizen, Good Neighbor

ARDEC strives to be a good neighbor to the communities surrounding its facilities and an ardent supporter of the greater Army community. For example:

- Headquarters contributions to the Combined Federal Campaign far exceed those of the next "best-in-class" federal agencies in the state of New Jersey, both in per capita giving and percentage of participation.
- The number of volunteer hours donated to ARDEC's neighbors increased from 10,600 to more than 20,000 between FY 2003 and FY 2006.
- During the same period, annual donations to the Army Emergency Relief Fund increased from just over \$7,000 to almost \$16,000, and leave donations rose from just under 5,000 hours to 6,500 hours.

For more information:

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