



News Release

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Additive Manufacturing bring concepts to life with 3D imaging *ECBC captures the look and feel of modern engineering*

ABERDEEN PROVING GROUND, Md. – Additive Manufacturing technology has gained notoriety due to its ability to reproduce everything from critical gun parts with full functionality, to exact replicas of children’s toys. Three-dimensional (3D) printing has even made an appearance in recent pop music videos, transporting viewers through a seemingly futuristic odyssey to clone a high-tech version of will.i.am.

Rick Moore, Branch Chief of the Rapid Technologies and Inspection Branch at the U.S. Army Research, Development and Engineering Command's Edgewood Chemical and Biological Center (ECBC) notes, “more than toys or gun parts can be produced with these Additive Manufacturing technologies.”

Additive Manufacturing (also known as rapid prototyping or 3D printing) is the process of making a three-dimensional solid object of virtually any shape from a digital model. Having this capability has increased the speed at which products are brought to market, while also proving to be ideal for testing, which allows for cost-effective design changes during the preproduction cycle of a product.

Moore and his team have been utilizing these revolutionary processes and capabilities to produce items in support of the Warfighter and the Homeland, all within their Rapid Technologies lab on-campus at ECBC.

“3D-printing and 3D laser scanning are capabilities we’ve had here since the mid-1990s,” said Moore. “These capabilities help us get equipment in the hands of the Warfighter quicker, and it also provides access for other engineering and science groups to design products with the ability for many iterations or design changes before fully investing critical funds into the mass-production of that item.”

Additive Manufacturing has paved the way for several new technologies that will change the landscape of the Army, such as the Octopus-inspired suction cups developed by U.S. Army Research Laboratory (ARL) scientists with the assistance of Moore’s Rapid Technologies and Inspection Branch. These self-sealing suction cups, conceptualized by Chad Kessens of ARL during his post-graduate research in robotic manipulation, were produced with the assistance of engineering technician Brad Ruprecht from the Rapid Technologies and Inspection Branch, using the Objet Connex500 multi-material 3D-

printer.

These robotic suction cups are able to maximize suction force and the passive reaction forces that cause the cup to activate and open when the lip contacts an object, breaking the seal to initiate suction.

“Using the multiple digital material options afforded by the Connex500 allowed us to blend variations of elastomeric and rigid materials at the same time, into the same product. That otherwise would be very difficult if not nearly impossible to manufacture traditionally,” Ruprecht said.

The Rapid Technologies Branch also supported prototyping of the Anthropomorphic Control Arm (ACA), a recent project of the Advanced Design and Manufacturing Division’s in support of the Defense Threat Reduction Agency Robotics.

“The ACA is an intuitive joystick developed to control a hydraulic actuating arm and claw mounted on a military vehicle. Much like how a human arm has wrist, elbows and the ability to twist or extend, the ACA has joints that mimic these motions to manipulate the vehicle mounted arms in a fashion that requires little to no training between operators,” Ruprecht said.

The ACA project has been through multiple design iterations ranging from simple wood or cardboard models that test ergonomics to more involved designs built using polycarbonate or nylon plastic materials that support the integration of electronics and sensors that allow full functionality testing.

While the engineers of the Rapid Technologies and Inspection Branch are using their 3D equipment to make life safer for the Warfighter, they recognize its presence in popular culture as well. While the general public is concerned about those who would use the technology to bypass laws for gun production with a \$2K printer, Moore and his engineers hope that a few users won’t mar the technology and the possibilities for everyone else.

“Sure, the technology is available for home use, but we feel the higher functionality and capability we have been able to achieve has been a credit to the team I have put together, combined with our accessibility to unique projects provided by ECBC and other Department of Defense organizations,” said Moore.

For more information about ECBC, visit <http://www.ecbc.army.mil/>.

ECBC is the Army’s principal research and development center for chemical and biological defense technology, engineering and field operations. ECBC has achieved major technological advances for the warfighter and for our national defense, with a long and distinguished history of providing the Armed Forces with quality systems and outstanding customer service. ECBC is a U.S. Army Research, Development and Engineering Command laboratory located at the Edgewood Area of Aberdeen Proving Ground, Maryland. For more information about the Edgewood Chemical Biological Center, please visit our website at <http://www.ecbc.army.mil> or call (410) 436-7118.

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