

## **Penn State ARL to lead defense manufacturing research project**

EurekaAlert!

Streamlining the design and manufacture of U.S. Department of Defense equipment, including vehicles, weapons and other complex systems, is the goal of a \$48 million contract recently awarded to Penn State's Applied Research Laboratory through the Defense Advanced Research Projects Agency's Instant Foundry Adaptive through Bits (iFAB) program, which is part of the agency's Adaptive Vehicle Make (AVM) portfolio.

"The iFAB Foundry will help revolutionize the design and building process for complex defense systems with the goal of shortening development time by a factor of five," said Mark Traband, head, Manufacturing Systems Division, ARL. "We want to move away from a capital-intensive manufacturing facility aimed at one product and move toward flexible, programmable, distributed production that can accommodate many systems and variations and reconfigure quickly."

iFAB will provide manufacturing machine computer instructions and human work instructions automatically to minimize the time it takes to begin manufacturing a product. This requires new work to enable automated manufacturing planning and execution across a distributed manufacturing organization. As part of AVM, iFAB will support another DARPA program called Fast, Adaptable, Next-Generation Ground Vehicle (FANG), by providing near-instantaneous manufacturability feedback to designers to ensure the designs can be manufactured.

FANG will run a series of design challenges related to military ground vehicle technologies, and iFAB will be an integral part of those challenges. Included in this is the requirement that iFAB supply a bid with cost and schedule seven days after receiving the winning design from the challenge. iFAB will then initiate manufacture, providing continuous updates using an information architecture that will capture the as-built design to compare it to the original design. FANG will do the operational testing on the product.

This process requires a team of manufacturing, logistics and research partners to make the vehicle, an agent-based information architecture to interconnect the team and a prestructured set of contractual agreements that allow response in days rather than months. "These steps will provide a new approach to building complex systems that can transform our country's military systems acquisition processes," said Traband.

Commercial, military and academic partners will make this project possible. Commercial partners include Demmer Corp., East Lansing, Mich., responsible for machined components, fabrication of large structural components and final assembly; Mercury Electronics, Seven Valleys, Pa., responsible for manufacture of

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cable assemblies, wire harnesses and control panels; ArmorStruxx, Lodi, Calif., responsible for manufacture of spall liners and composite armors; Standard Bent Glass Corp., Butler, Pa., responsible for manufacture of transparent armor; Lippmann-Milwaukee, Cudahy, Wis., responsible for machining and subassemblies; and TPI Composites, Warren, R.I., responsible for manufacture of composite structures. GENCO Infrastructure Solutions, Pittsburgh, will provide logistics support for the team. Military partners on this project are Rock Island Arsenal, Rock Island, Ill., where final assembly of the vehicle will take place, and Armament Research and Development Center, Picatinny, N.J.

The research capabilities of Penn State's Department of Industrial Engineering, Iowa State University, Bradley University, University of Alabama at Birmingham, University of Texas, Austin, Arizona State University, RECON Services and Palo Alto Research Center will help develop the information architecture to enhance the manufacturing state of the art.

In addition to Traband, co-investigators on the iFAB project from Penn State's Applied Research Laboratory are Michael Yukish, head, Manufacturing Product and Process Design Department; Daniel Finke, research associate and Christopher Ligetti, research and development engineer. Faculty investigators from Penn State's Department of Industrial Engineering are Soundar Kumara, Timothy Simpson, Robert Voigt, Sanjay Joshi and Christopher Saldana.

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