



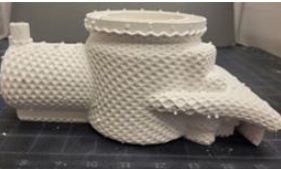








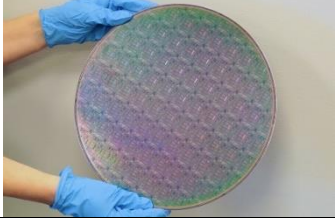

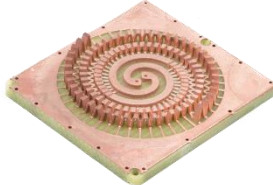



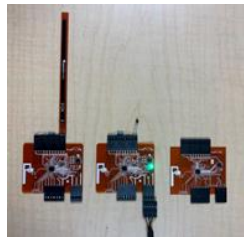




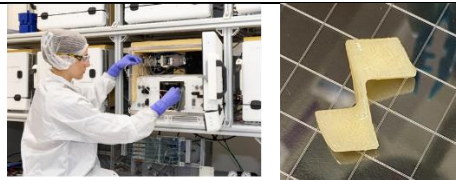
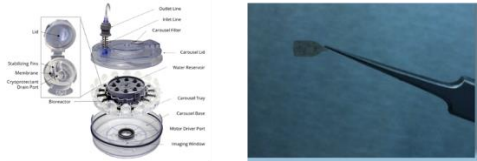


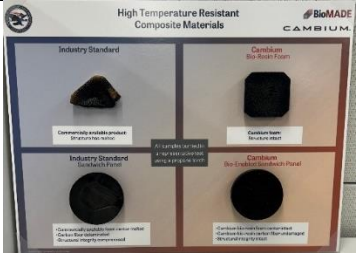

**Department of Defense Manufacturing Innovation Institutes
Pentagon 2nd Floor Apex 9-10**




Institute	Technology Title	Technology Description	Photo
America Makes	Hybrid Manufacturing for Rapid Tooling and Repair	Additive manufacturing to repair military equipment using hybrid techniques: America Makes developed an additive manufacturing process to repair worn forging tools, significantly reducing sustainment costs and downtime for military manufacturing equipment. This innovative process also tests combined repair techniques, improving and streamlining maintenance for the warfighter.	
America Makes	Airman Multi-Tools from Additive in Steel 2025 Challenge	Student-designed airman multi-tools: America Makes' "Additive in Steel" challenge tasked 75 university students from nine schools with designing innovative Air Force multi-tools using metal 3D printing. This initiative inspired future additive manufacturing experts to develop technologies that enhance warfighter effectiveness and efficiency.	
America Makes	Rapid Casting Demonstration	Faster, tool-free process for casting DoD parts: America Makes developed a faster, simpler casting method called Additive Manufacturing Evaporative Casting. By eliminating tooling, data requirements, and qualification hurdles, this process delivers parts and equipment to the warfighter more quickly while improving readiness.	
America Makes	One-Piece Wing Structure & Skin	Interwoven parts using 3D printing: America Makes' continuous fiber 3D printing technique weaves together the outer skin and internal structure of parts in a single process. This simplifies design, integrates with industry software, and ultimately leads to stronger, lighter, and more readily produced components for military equipment, enhancing warfighter performance and survivability.	
America Makes	Rapid Investment Casting with Ceramic 3D Printed Shell	High-quality parts castings for aircraft: Leveraging additive manufacturing, America Makes produced high-quality castings that meet the standards of leading sustainment centers like Tinker Air Force Base's 76th Commodity Maintenance Group. This capability fills supply chain gaps, enables on-demand manufacturing, and reduces both lead times and costs, ultimately improving warfighter readiness and paving the way for a future digital aerospace foundry.	
America Makes	Additive Manufacturing of Rocket Engine Components	Additively manufactured rocket engines: By overcoming production and qualification challenges, America Makes' advancements in additive manufacturing for the Hadley rocket engine's copper chamber increase production rates up to sevenfold and reduce qualification timelines by 50%. This accelerated delivery of critical technology strengthens national security by enabling faster deployment of advanced propulsion systems.	
MxD	Melt Pour Sensor Kit	Using the digital twin to mix TNT: In partnership with Picatinny Arsenal, MxD is using digital twin technology to optimize the TNT explosive mixing process – creating safer, more reliable, and more effective munitions for the warfighter. This technology ensures precise formulas, reduces errors, and minimizes waste.	

LIFT	Additively Manufactured Hypersonics Ramjet (section)	Improved manufacturing of hypersonics ramjet engine: LIFT used laser powder bed fusion to create a hypersonic ramjet engine component and analyzed the process data to improve quality control. By identifying potential defects, this ensures higher quality, more reliable hypersonic components for enhanced warfighter performance and mission success.	
LIFT	BiPolar Separator Plate	Metallic power plates used for power source within hydrogen fuel cells for small-unit power: LIFT and the Manufacturing Science and Technology Program partnered to rapidly establish a pilot production line for hydrogen fuel cell bipolar separator plates, reshoring this capability from China and ensuring a consistent supply while minimizing production delays. Domestic production of these critical hydrogen fuel cell components strengthens the supply chain and ensures timely access to this efficient power source for warfighter applications like unmanned systems, vehicles, and forward operating bases. <i>(This technology is also on display in the MSTP exhibit in Apex 1-2.)</i>	
LIFT	Steel Powder, Rods and Wire samples	Critical materials from LIFT's Advanced Metallics Production & Processing Center: LIFT's new Advanced Metallics Production & Processing Center in Detroit produces novel metal materials (powders, wires, rods, etc.), addressing a critical gap in the U.S. defense industrial base. This facility is accelerating the development and adoption of these materials to enable cutting-edge equipment for the warfighter.	
LIFT	Handheld Virtual Welder and Cobot	Virtual welding and collaborative robot trainer: LIFT's Learning Labs use tools like a digital virtual welding trainer and a collaborative robot (cobot) trainer to engage students and inspire them to pursue advanced manufacturing careers. By incorporating engaging and gamified learning methods, LIFT is inspiring the next generation of American manufacturers ready to advance the future of digital and smart manufacturing.	
AIM Photonics	Modular Optical Aperture Building Blocks (MOABB) LiDAR Prototype	An innovative U.S.-made LiDAR system for defense and commercial use: This technology revolutionizes LiDAR by integrating lasers, detectors, and electronics into a single, compact system using Photonic Integrated Circuits (PICs) manufactured in the U.S. by AIM Photonics. Originating from a DARPA project led by an AIM Photonics member, this hardware is poised to impact intelligence, surveillance, and reconnaissance (ISR), autonomous navigation, optical communication systems, automated manufacturing, and robotics.	
AIM Photonics	SiPhox Home	A portable blood diagnostic platform: AIM Photonics' technical expertise and fabrication capabilities enabled the development of SiPhox Home, a portable, low-cost blood diagnostic platform that is 100 times smaller and cheaper than traditional diagnostic machines. This technology will improve warfighter readiness by providing rapid, lab-quality health assessments of key biomarkers.	






AIM Photonics	Hands-on Photonic Education (HOPE) Kit	A silicon photonics training and education platform: AIM Photonics' Hands-on Photonics Education (HOPE) Kits provide students with integrated photonics circuits and a corresponding training curriculum. To date, these kits have been distributed to 28 institutions across 10 states, equipping educators with practical training tools and strengthening the photonics workforce pipeline.	
AIM Photonics	300 mm Silicon Integrated Photonics Wafer	The world's first 300mm multi-project wafer: AIM Photonics offers the U.S.'s first recurring integrated silicon photonic multi-project wafer (MPW) capability and the world's first 300mm MPW. These advancements ensure U.S. production of advanced Photonic Integrated Circuits, leading to better and more affordable military technologies like improved communication, sensors, and imaging.	
NextFlex	Shield Heat Sensor for Worker Safety	Wearable health monitor for warfighter safety: NextFlex's proven manufacturing capabilities enabled development of Shield™, a compact wearable device, monitors vital signs and environmental conditions to prevent heatstroke in warfighters, improving safety and reducing costs in challenging environments. It is currently undergoing military-grade testing and has already proven effective in field deployments.	
NextFlex	RF Antenna	Radio frequency antenna for unmanned aerial vehicles: NextFlex industrial partners developed and validated a new antenna technology, reducing size and weight by over 30% while improving performance. This upgrade is transitioning to a current military weapon system, offering crucial enhancements for aviation and small unmanned aerial vehicle platforms.	
NextFlex	Wearable Confined Space Monitor for Worker Safety	Wearable health monitor for workers in confined spaces: NextFlex and the Air Force Research Laboratory helped small business Aptima create a safer, more efficient wearable device for hazardous workplaces like aircraft fuel tanks. This Federal Information Processing Standards certified device digitizes hazard detection, reduces staffing needs, and can save up to \$2 million per facility annually.	
NextFlex	Asset & Facility Monitoring for the Organic Industrial Base	Legacy equipment monitor for predictive maintenance: NextFlex's hybrid manufacturing enabled IRONPIPE - a Bluetooth sensor tag using artificial intelligence/machine learning to monitor the health of legacy DoD equipment. By tracking equipment vibrations, acoustics, and temperature, this technology helps predict maintenance, reduce downtime and costs, and improving operational readiness of critical DoD equipment.	
NextFlex	Quantum Electrochemical Spectroscopy Test Vial	Innovative biomedical sensor to detect disease: NextFlex successfully scaled production of a novel biomedical sensor for rapid pathogen and biomarker detection. With over 75,000 high-quality units already delivered, this sensor is now transitioning to mass production for widespread military and civilian healthcare applications. This rapid diagnostic capability will provide faster identification of health threats, enabling quicker treatment and improved outcomes for warfighters in the field.	



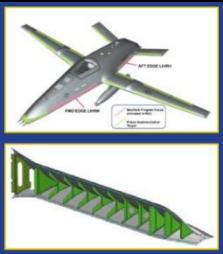

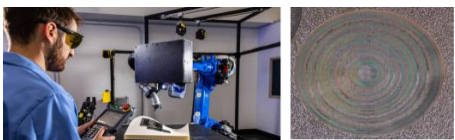

NextFlex	Additively Manufactured Microcontroller Circuit	Additively manufactured microcontroller circuits for DoD applications: NextFlex partnered with Air Force ManTech to successfully develop and scale a compact, lightweight microcontroller for hybrid electronics, now in high-volume production. This versatile technology enhances warfighter systems by improving functionality, reducing weight and power consumption, and strengthening supply chain resilience for critical defense applications. Its uses range from safety monitors to wearable electronics. <i>(This technology is also on display in the Air Force ManTech exhibit in Apex 1-2.)</i>	
BioFabUSA	Forward-Deployable Saline Production System	Portable, automated sterile saline production system: BioFabUSA member DEKA's Caspian system enables sterile saline intravenous fluid production in the field. Through a portable, automated unit, warfighters in remote locations will have faster, easier access to essential medical supplies for treating dehydration, shock, and administering medications.	
BioFabUSA	Cryopreservation Technology for Battlefield Cell Therapies	Advanced cryopreservation solutions for cell therapies: BioFabUSA member X-Therma has advanced new cryopreservation solutions such as XT-Thrive and XT-ViVo to enable secure transport and long-term storage of regenerative medicine, potentially lifesaving treatments for the warfighter. These solutions preserve cell viability and stability even in remote locations.	
BioFabUSA	AI-Driven Robotic Platform for Biofabrication	Video demonstration of the robotics biomanufacturing platform: BioFabUSA member Advanced Solutions Life Sciences (ASLS) developed the BioAssemblyBot, which uses AI and robotics to automate production of regenerative tissues such as skin, cartilage, and blood vessels. This scalable, consistent, and cost-effective platform supports personalized battlefield care and accelerates treatment development.	
BioFabUSA	Portable Bioreactor for Red Blood Cell Production in Austere Environments	Portable red blood cell bioreactor: BioFabUSA members Safi Biotherapeutics and Sciperio co-developed a portable bioreactor system for on-demand red blood cell production, even in austere environments. This system reduces dependence on traditional blood supplies and has the potential to significantly improve survival rates for soldiers with traumatic blood loss.	
BioFabUSA	Automated Manufacturing of Patient-Specific Bone Grafts	Manufactured, patient-specific bone graft: BioFabUSA member Epibone is developing an automated system to produce sterile, patient-specific bone grafts for combat-related skeletal injuries. This technology improves healing outcomes, reduces complications, and may shorten recovery times for injured warfighters.	
BioFabUSA	Automated Manufacturing System for Implantable Retinal Patches	Implantable retinal patches for restoring vision (Developed by Regenerative Patch Technologies): BioFabUSA member Regenerative Patch Technologies (RPT) is developing an automated system to manufacture implantable retinal patches to restore vision lost due to trauma. This scalable, cost-effective solution offers a potential treatment pathway for soldiers with ocular injuries, improving recovery times and visual outcomes.	

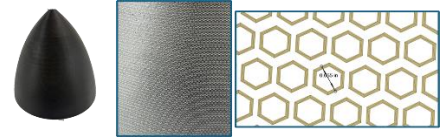
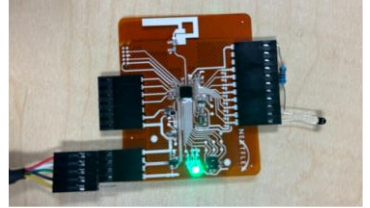




BioFabUSA	Tissue Foundry Diorama for Military Use Case	Diorama of deployable tissue foundry: BioFabUSA is developing a deployable Tissue Foundry for military settings like combat ships or field hospitals. This technology will enable on-demand tissue engineering in austere environments.	
The ARM Institute	Autonomous Drone for Navy Ship Inspections	An autonomous drone inspection system to scan Navy ships for surface defects: The ARM Institute partnered with the Joint Robotics Organization for Building Organic Technologies (JROBOT) to develop an unmanned system that uses aerial imaging to spot defects in hard-to-reach areas on Navy ships. This project lowers sustainment costs, speeds up inspections, and improves the safety of DoD maintenance crews.	
BioMADE	Enhanced Survivability Drone Wing	Resilient bio-based coating for drone wings: BioMADE helped develop bio-based, heat-resistant coatings for drone wings. These tested coatings enable the wings to withstand fifty bursts of intense heat (1800°C for 3-6 seconds), offering warfighters increased mission assurance and platform resilience.	
BioMADE	Biodegradable Shotgun Wads and Ammo Links	Better, lighter shotgun wads and ammunition links: A BioMADE member matured biodegradable shotgun wads and lighter (up to 18%) machine gun ammo links. These U.S.-made, biodegradable components offer tactical and environmental advantages by allowing them to be left behind without compromising warfighter positions.	
BioMADE	High-temperature Composite Materials	Lighter, fire-resistant composite material made from biomaterials: BioMADE made possible lighter, flame-retardant, high-temperature composites for applications like fire-resistant battery housings, high-speed weapons, aircraft, and mortar tubes. These U.S.-made materials improve warfighter safety and enable advanced capabilities.	
BioMADE	Compostable Earplugs	Bio-based earplugs for warfighter safety: A BioMADE member advanced compostable, mycelium-based earplugs offering superior sound dampening, clarity, and comfort compared to traditional foam options. This technology improves warfighter hearing protection and reduces traceability in the field.	

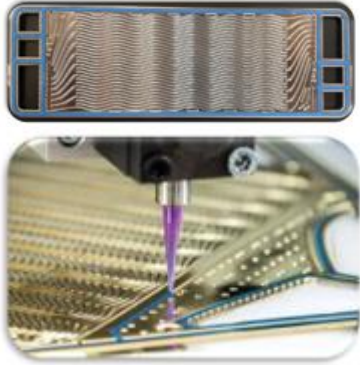



BioMADE	Laser-Protective Eyewear	Bio-based film for laser-protection: BioMADE helped progress a bio-based, easily applied film that protects fighter pilots and other personnel from laser attacks. This military-grade protection can be applied to glasses, sensors, and other lenses in various scenarios.	
BioMADE	Procell Fiber Sweater	Bio-based fibers for improved warfighter protection and comfort: BioMADE helped develop a durable, water-repellent, and burn-resistant sweater made from Procell fiber (derived from spent yeast biomass) to enhance warfighter protection and comfort in harsh environments.	
BioMADE	Virtual Walkthrough of BioMADE Facility	Digital rendering of new bioindustrial pilot facility: BioMADE's virtual walkthrough showcases its new 122,000-square-foot Minnesota facility, featuring demonstration-scale biomanufacturing equipment like two 25,000-liter fermenters. This facility enables domestic scale-up of biomanufacturing, reducing reliance on overseas facilities and protecting intellectual property.	

**Department of Defense Manufacturing Technology Program
Pentagon 2nd Floor Apex 1-2**

Service	Technology Title	Technology Description	Photo
Army	Durable Dual-Band Optical Coatings	Optical coating for enhanced warfighter visibility: Army ManTech is giving Soldiers a clearer view of the battlefield through a new, more durable optical lens coating. This technology improves next-generation multi-band optical systems performance, boosts manufacturing yield to over 90%, and reduces component costs by 33%.	
Army	Scalable Manufacturing of Engineered Fabrics	Smart fabrics for warfighter safety: Army ManTech is advancing smart uniforms that seamlessly integrate sensors and electronics into standard combat uniforms. Using flexible electronics and conductive yarns, this Multi-Domain Operations Flexible Integrated Sensor Network (FISN), transmits real-time soldier health and environmental data to commanders while allowing soldiers to control small UAVs without added weight, bulk, or discomfort. The manufacturing process is scalable and adaptable for other DoD applications.	
Army	Novel Ultra-Strong Low-Cost Film Manufacturing Technology for Superior Warfighter Protection	Innovative, lightweight helmet for enhanced warfighter protection: Army ManTech enabled the Next Generation Integrated Head Protection System - a new, lighter helmet that uses special material to provide the warfighter with enhanced protection against bullets and fragments while weighing 40% less. The helmet is now in full production.	
Army	Electrochemical Machining for Armament Manufacturing	Innovative cannon barrel manufacturing: Army ManTech has innovated the large-caliber cannon barrel manufacturing process. Using next-generation electrochemical machining – a high-precision, non-traditional material removal process – artillery can be made faster, cheaper, stronger, and more accurate.	
Navy	Virginia Class Submarine Seawater-System Large Diameter Ball Valve Improvements	Ceramic coating to improve lifecycle of submarine valve balls: A new ceramic coating system and application process developed by Navy ManTech's Institute for Manufacturing and Sustainment Technologies extends the life of submarine valve balls - critical components controlling seawater flow throughout the submarine. By preventing corrosion and wear, this technology will save an estimated \$100 million in lifecycle costs for Virginia and Columbia class submarines.	

Navy	Augmented Reality Application for Virtual Loadout at Shipyards	Augmented reality for shipbuilders: A new augmented application from Navy ManTech's Naval Shipbuilding and Advanced Manufacturing Center helps shipyard workers visualize 3D equipment layouts, reducing costly rework. Projected savings for DDG 51 destroyers, Virginia and Columbia class submarines exceed \$5.2 million over five years.	
Navy	Robotic Blending of Large Diameter Internal Piping in Submarines	Pipe crawling robot for submarines construction: Navy ManTech's Center for Naval Metalworking developed a small robot that provides submarines construction by sizing to fit inside submarine pipes and navigating inside to smooth out welds. This robot prevents costly repairs and speeds up construction, saving an estimated \$10.6 million over five years for Virginia and Columbia class submarines.	
Navy	Thermoplastic Composite Welded Assemblies	New welding process for thermoplastic composite aircraft part: Navy ManTech's Composites Manufacturing Technology Center developed a new induction welding process for curved thermoplastic composite aircraft parts. This creates stronger, lighter components, eliminates fasteners, and speeds up production.	
Navy	Fastpack Demolition Explosive	Safer, cheaper demolition putty: Navy ManTech's Energetics Manufacturing Technology Center developed manufacturing processes for the Fastpack Demolition Explosive, a new putty-like demolition material that's safer and more versatile than C-4. Projected to save \$39.5 million, FPEX performs in all weather extremes and is slated for implementation at Naval Surface Warfare Center Indian Head in FY 2026 to produce the explosive that meets warfighter explosive ordnance disposal requirements.	
Air Force	Laser Machined Composite Plates	Examples of automated laser machining for carbon fiber repairs: Air Force ManTech Program is using lasers to streamline carbon fiber repairs, returning planes and critical equipment to service faster. Automated laser machining replaces the slow, manual method, saving time and money while also reducing the need for highly skilled labor.	
Air Force	Laser Ablated Composite Plates	Examples of automated laser machining for composite repairs: Air Force ManTech developed a laser-based technology using ultra-short pulses to replace hand-sanding when preparing composite plates for bonding and decontamination. This automated process significantly improves aircraft and equipment repair, offering a 30-to-1 return on investment. It's faster, more consistent, safer, and provides real-time quality and geometric data.	

Air Force	Laser Processed Nosecone Geometry	Examples of automated laser machining for aircraft nosecone production: Air Force ManTech is using advanced automation and ultrashort pulse lasers to create intricate features on complex aerospace components like nosecones and canopies. Replacing traditional methods like sanding and grit blasting, this process saves time and money with the potential to reduce canopy production time significantly and revolutionize many aspects of military manufacturing.	
Air Force	Additively Manufactured Microcontroller Circuit	Additively manufactured microcontroller circuits for DoD applications: Air Force ManTech partnered with NextFlex to use additive manufacturing to create lighter, more adaptable, and cost-effective electronic components like control circuits, antennas, and wearables. This approach reduces reliance on foreign supply chains, expands domestic manufacturing capabilities, and strengthens the U.S.'s ability to rapidly increase production on demand. <i>(This technology is also on display in the NextFlex exhibit in Apex 9-10.)</i>	
Air Force	Robotic Sheet Metal Forming	Examples of robotically formed sheet metal for aircraft: Air Force ManTech is advancing robotic sheet metal forming to rapidly create custom parts, shrinking component lead times from months to hours. Deployable anywhere, this technology uses traditional forming methods, producing parts for aircraft and other DoD systems with properties comparable to conventionally manufactured components. This technology streamlines manufacturing and sustainment across the DoD.	
Defense Logistics Agency	Advanced Battery Manufacturing	Small cell batteries for more efficient and effective power sources: The Defense Logistics Agency is enhancing military power sources with innovative cell manufacturing technologies for 1) nickel-zinc batteries that offer twice the energy density of lead-acid batteries for Joint applications 2) lithium vanadium oxide batteries for directed energy, arctic environments, and aviation; and 3) high energy, dual use batteries using cost-effective, rapid synthesis of lithium cobalt oxide cathodes.	
Defense Logistics Agency	Advanced Microcircuit Emulation Program	Microcircuit refabrications for obsolete weapons systems parts: DLA's Advanced Microcircuit Emulation program refabricates obsolete microcircuits, ensuring the continued readiness and operation of over 560 weapons systems vital to warfighter capabilities. This U.S.-based manufacturing effort has delivered over 160,000 components and saved over \$2 billion in redesign costs.	
Defense Logistics Agency	Castings and Forgings Parts Comparison	Additive manufacturing parts comparison with traditional manufacturing methods: The Defense Logistics Agency's Castings and Forgings program leverages additive manufacturing (3D printing) to produce stronger, more affordable parts for the DoD. A 3D-printed and machined prototype has demonstrated superior performance and cost-effectiveness compared to both traditionally cast and machined parts, and reverse-engineered cast and machined prototypes.	

Manufacturing Science and Technology Program	BiPolar Separator Plates	<p>Metallic power plates used for power source within hydrogen fuel cells for small-unit power: Traditionally, these plates have been manufactured overseas or by Chinese companies. MSTP partnered with LIFT to reshore manufacturing and ensure a reliable supply of materials while offering a low-signature, efficient, and versatile power source for applications like unmanned aircraft, tactical operations, and portable power. <i>(This technology is also on display in the LIFT exhibit in Apex 9-10.)</i></p>	
Manufacturing Science and Technology Program	Hydrogen Small Unit Power	<p>A power generating unit for forward deployed Marines: MSTP developed a power generating unit designed to increase safety of forward-deployed Marines. Unlike generators and ground vehicles that have significant audible and thermal signatures that make Servicemembers vulnerable to detection, this unit operates quietly and with low or no heat detection. This technology provides power generating in forward deployed positions where it can be difficult to have fuel supplied.</p>	
Manufacturing Science and Technology Program	Laser Welded Fiber-Optic Assemblies	<p>A laser-welded fiber array for high-power laser weapon systems: MSTP is automating laser welding fiber optics to glass for high-power ($\geq 100\text{kW}$) laser weapon systems, making them stronger and more reliable. This is a major advancement towards making laser weapons a practical reality for the U.S. military.</p>	
Manufacturing Science and Technology Program	Precision Optical Wind Sense	<p>The only handheld optical device that senses down-range crosswind for long-range sniper engagements: MSTP is streamlining manufacturing to better equip the warfighter with an accurate wind measurement tool for confident long-range targeting, both for DoD snipers and autonomous weapon systems.</p>	
Manufacturing Science and Technology Program	Robotics and Automation for Munitions Production	<p>An illustrated demonstration of a robotics system used to load energetic munitions: Using robotics, MSTP is automating the production, loading, and unloading of explosives, limiting human interacting with dangerous materials and reducing the risk of injuries.</p>	<p>N/A - Poster</p>