OBJECTIVE: The Defense Logistics Agency seeks to develop standardized and Additive Manufacturing (AM) production methods in a deployed environment.

DESCRIPTION: Repair and part obsolescence are ongoing supply chain challenges. Often, singular or just a few replacement parts for damaged or out of date systems are needed at a time. The cost and lead times of non-recurring expenses associated with standard manufacturing approaches can increase the cost and time to produce a “one-off” or low rate build part by orders of magnitude. Advanced manufacturing techniques (such as additive manufacturing) provide opportunities to provide on demand, zero tooling components. To realize the full capability of advanced manufacturing processes, quasi-automated manufacturing needs to be truly automated -- reducing the dependency on the user -- and rapid deployment needs to be realized, allowing functionality in all environments and theaters.

The deployable system must meet DoD and military shelter safety requirements, ISO/CSC standard intermodal transportation requirements, necessary environmental controls for typical deployed environments, power consumption on the order of that already provided by deployed DoD generator systems, and provide a level of automation capable of supporting a novice controller. An ideal advanced manufacturing machine will provide flexibility in material and footprint (modular/customizable for theater). A system capable of manufacturing with plastics, metals, composites, and/or ceramics would provide maximum use.

While software currently exists to support and automate each manufacturing step individually, expert users are still required to interpret data from the previous step and establish appropriate inputs for the next step. There is an apparent need for a single software package to manage the workflow from part identification to part certification, automatically.

PHASE I: Provide justification to bypass Phase I (Not to exceed twenty pages)

PHASE II: To qualify for the Phase II effort the proposer should possess a technology with proven feasibility. An ideal system would provide the following qualities: 1. Part Scan to Part Geometric Certification with minimal hardware and software interfacing 2. Ability to build drop-in, optimized re-design, or new design parts 3. Digital tolerance control (physical part, to digital, back to physical) of +/-0.010” 4. Effective with metals, plastics, filled, and ceramic materials 5. A minimum print bed size of 12”x12”x12” 6. Overall system size that is only nominally larger than the print bed size in a minimum of one direction, but ideally two directions, to enable efficient packaging options (e.g., containerization). For example, a columnar printing system may have a footprint the size of the print bed, but be much taller than the print bed height. a. Material storage footprint is not of immediate concern due to different environmental and human access requirements 7. Be deployable within ISO standard shipping containers (8’x8’ opening and up to 40’ long). Containerization enables rapid deployment around the world. 8. Weight and power consumption conscientious a. A target system weight would be 10% of the container payload capacity (20’ ISO container is capable to ~55,000 lbs. payload) b. Target power consumption would enable operation with standard deployable generator systems (such as MEP-805, MEP-806B or PU-805B) 9. Material and configuration modifiable without affecting the certification of the system rapidly transition chemistry and product through fused filament fabricated (FFF) 3D printed mandrels

PHASE III DUAL-USE APPLICATIONS: At this point, no specific funding is associated with Phase III. Progress made in D2P2 should result in a functional Open Source System which can transition into the Government or the commercial markets.

COMMERCIALIZATION: Expand and enable a flexible and scalable supply chain where qualified gloves and related parts may be produced in reasonable quantities and with rapid reliable delivery.

KEYWORDS: Advanced manufacturing techniques, additive manufacturing, On-demand zero tooling components