The Center serves as a virtual resource encompassing all aspects of the technology, as well providing an extensive, functional network of materials, process, and analysis capabilities available to industry. In keeping with this mission, the Center operates a 6,000-square foot demonstration facility within the Applied Research Laboratory of the Pennsylvania State University. This facility serves as a training, demonstration, and development platform for DDM technology, and contains a select assortment of systems capable of producing high quality metallic components designed for critical applications. The facility also encompasses a vast array of hardware and software capabilities for component design, materials analysis, advanced sensing, and process simulation and validation.

The views expressed are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. This is in accordance with DoDI 5230.29, January 8, 2009.

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DDM encompasses novel formative processes by which materials are transformed into functional parts that are produced in an additive manner, directly from a digital representation of the part, such as a CAD file or point cloud. DDM processes for producing components and structures challenge conventional manufacturing processes, through efficient methods of consolidating metallic feed stock into highly complex shapes. These processes are applicable to on-demand production of high-value components having complex shapes, while minimizing material waste and compressing the design-to-production cycle.

Although Direct Digital Deposition offers huge potential, full exploitation of the process requires the collaboration and collective expertise of organizations involved in all aspects of the technology. Foremost, the reliability of the process and quality of the product must be capable of consistently producing components and structures that meet the intended performance dictated by the application. Standardized practices, materials, and techniques for producing high quality components must be identified and validated, and advanced sensing and control technology offers enormous potential for improving and ensuring process consistency during extended operation. As with any disruptive technologies, full exploitation of direct digital manufacturing will require education and training of managers, engineers, and technologists involved in all aspects of the design, manufacturing, and insertion processes.

The mission of the Center is to advance and deploy DDM technology for highly engineered and critical metallic systems for the Department of Defense (DoD) and U.S. industry through three primary objectives:

- Advancement and integration of enabling technologies required to exploit DDM process attributes during design and optimize DDM processing conditions for producing qualified components and structures,
- Collaboration with industry in the development and transfer of DDM technologies through process selection, demonstration, and validation as a “trusted broker”, and
- Promotion of DDM technologies through training, education and dissemination of information.

The Center for Innovative Metal Processing through Direct Digital Deposition (CIMP-3D) is involved in all facets of the development and implementation of direct digital manufacturing (DDM) technology for metallic systems. Appropriate to DDM technology, CIMP-3D functions through a cyber-enabled environment drawing upon the collective capabilities of the member organizations. This includes developers of DDM systems, institutions engaged in various aspects of innovative product design, materials suppliers and developers that realize the potential of DDM, corporations that will strategically exploit this technology, and government organizations that will benefit from the massive insertion of this technology to the U.S. industrial base. CIMP-3D also supports a state-of-the-art facility for the advancement of various DDM technologies through demonstration of innovative designs and manufacturing of metallic components and structures.