

A close-up photograph of a 3D printer's nozzle, which is black and has a red tip, printing a white, textured part on a metal plate. The background is blurred, showing other parts of the printer and the printed object.

DEFAUS 18

# 3D RAPID PROTOTYPING

PITCHER

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# ABSTRACT

With the CAs futures statement for an Army in Motion, Accelerated Warfare thinking will determine Army's way forward to combat future threats. We are at a time where the adoption of technological advances in prototyping and fabrication of components in differing materiel's, such as 3D printing, is being utilised at a phenomenal rate due to the process becoming less cost prohibitive and access to open source information. SOCOMD must leverage this emerging technology to its advantage to support the war fighter when they are required to rapidly responding to ever evolving threats, both domestic and internationally in differing operating environments.

The ability to 3D print almost anything is enabling everyone from big business down to individuals to take advantage of this technology and produce items with huge time and cost savings. This technology is already being adopted by several of our coalition partners and it is highly probable that it is seen by non-state actors and even individuals as an asymmetric means to cause disruption. In order for SOCOMD to continue to strive toward and maintain superiority in support of its current and future equipment it must embrace this technology. For the prototyping then production of repair parts and components to enable equipment to stay in the fight within a contested environment without the need to rely on an extended supply chain that is becoming more vulnerable to disruption, ultimately causing mission failure.

The possible solution to counter this threat is the Mobile Manufacture of Mission Critical Components (M3C2) Box. Although the term 'Box' is used here and a containerised version will be the basis of the presentation, this reflects the maximum capacity, in some instances all that maybe required is a member with a hardened



# PROPOSAL AND OUTCOMES

case (such as a Pelican/Trim cast case) carrying a 3D printer and laptop. The fundamental aspect is having the capability to perform the M3C2 with the container sized option providing the most capability.

The container sized version would consist of multiple 3D printers capable of printing basic plastic through to composite materials and metals, all of which are currently commercially available and in use within industry and coalition partners. Some examples of this include: US Army's Armament Research, Development and Engineering Centre (ARDEC) printing a M203A1 functioning grenade launcher (including the 3D printing of the ammunition used). The 1st Marine Logistics Group produced a 3D metal printed impeller that removes debris from the air filter for the M1A1 Abrams. This component has an extensive lead time with an associated cost of \$1500 whereas the 3D printed component is less than 10% of this figure and is manufactured immediately and in location.

Any M3C2 system, no matter the size, would be a complete self-contained system not only carrying the equipment to complete the job but having all the consumables required to maintain, service and complete a variety of tasks to help ensure mission success. The M3C2 container would allow for an individual or team of CAD trained personnel to deploy at short notice in support of SOCOMD operations with the ability to design, print test prototype exemplars within hours to ensure compatibility before printing the component complete. A time measured in days instead of weeks or months. Currently, at unit and formation (SOLS RFC) level, 3D printing is already supporting the design and development of components for use within SOCOMD, and in parts FORCOMD.