2016 DoD Maintenance Innovation Challenge (MIC)

Abstract Form	
Innovation Title:	Additive Manufacturing for Agile Depot Operations
Submitter:	Jason Mann
Organization:	USAF 76 CMXG/ENB
Phone:	405-622-7607
Email:	jason.mann.6@us.af.mil

Abstract: (300-500 words)

Sustainment of aging aircraft presents a unique challenge due to lack of complete tech data, poor condition of legacy tooling, and rapid response required on unanticipated repair items. To meet the needs of the depot and return aircraft to service as soon as possible CMXG has leveraged 3D laser scanning, additive manufacturing, and castable materials to create solutions for maintenance problems where traditional manufacturing is either not possible or too slow. CMXG has had great success augmenting organic manufacturing by providing tech data packages for parts and equipment, prototype parts for aircraft, and end use dies and fixtures created either by 3D printing or resin casting into printed molds. Specific innovative solutions include printed Ultem weld fixtures containing internal flow cavities for argon cooling, allowing polymers to be used without melting. Fixtures like this save cost over traditional machining but more importantly allow greatly reduced turn- around times, typically 3- 6 months faster, including delivering parts currently unable to be sourced. CMXG has also helped the B1 maintenance save time and cost by scanning cracked sections and making prototype “bath tub” fittings using a binder jet printer. Creation of a section model allows for greatly reduced fitting design time and easy modification and prototyping has reduced time spent machining with an overall average time savings of 3 weeks per fitting. Printing or resin casting of sheet metal form blocks has also proven to be an extremely cost and time effective route to supporting organic manufacturing. CMXG has shown that fully dense printed ABS, PLA, and ASA form blocks can withstand 10,000 psi from the rubber and fluid cell presses with an average cost savings of $2500 for small to medium form blocks and elimination of nearly 2 months in lead time. Printing molds and casting form blocks from ceramic filled epoxy has also been demonstrated as a major cost and time saving technique with $3500 average cost savings per block and similar production time to printing, however these blocks are brittle and have more limitations than dense printed blocks. To date utilization of these techniques for die block manufacture have saved over $100,000 and a combined total of 284 flow days.