AMMO WG Teleconference Minutes – 3 October 2018

On 3 October 2018, the Additive Manufacturing Maintenance Operations (AMMO) working group conducted a teleconference with over 60 participants. A summary follows:

**Joint Additive Manufacturing Working Group Update (JAMWG)**: Kelly Visconti, OSD(MIBP), provided an update on the JAMWG/ JAM Steering Group (JAMSG), which were formally established a little over a year ago. The JAMWG community is touching all aspects in all of the Services through R&D and sustainment, and major agencies like DLA. The steering group is more senior-focused, SES-level folks to provide even higher-level guidance.

The purpose of these groups is to (1) Develop a DoD AM Vision; (2) Disseminate information on DoD AM Efforts; (3) Provide recommendations for a joint AM investment strategy, (4) Identify and share AM best practices; and (5) Encourage joint approaches to accelerate AM qualification and certification.

Over the last few months, the group has rallied around a few common themes and engaging subject matter experts in discussion on specific topics in the Stakeholder Councils: (1) Digital thread, (2) Qualification/Certification, (3) Business Practices; and (4) Education and Workforce Development.

JAMWG is currently working on plans for FY19 as well as how to have the group engage with industry and the broader community to help facilitate solutions to challenges. JAMWG working sessions have been very productive and they plan to share more information as they move forward. A few themes that came out of the meeting are still in the draft stage of development but include, the need for improved sharing of best practices/tips/technical manuals, identify issues for AM and cybersecurity, continue to push EWD in joint approach, need for standard data schemas, impact of AM into the supply chain (e.g. cataloguing parts). Anyone interested in getting involved can contact Kelly.Visconti@promanstrategies.com

**PCRT For Additive Manufacturing:** Patricia Knighten, Vibrant Corporation, briefed the group on Vibrant Corporation’s Process Compensated Resonance Testing (PCRT), which delivers game-changing reliability improvements and impressive economic opportunities to its users in the aerospace, power generation and automotive industries, as well as materials laboratories serving many industries. PCRT has been identified as a leading inspection technology for AM by the America Makes consortium. PCRT is a an innovative and advanced, non-destructive evaluation and testing technology that enables a full-body means of evaluating structural integrity and micro-structural variations in metallic, ceramic, and some composite parts. PCRT is a fast, accurate, 100% inspection method that produces a pass/fail result requiring no operator interpretation. Further, it is the only non-destructive technology (NDT) technology capable of tracking the accumulation of fatigue and damage in a part over time, with a digital historical record, enabling progressive and innovative life management, condition-based maintenance, and life extension approaches. Vibrant’s innovative resonance solutions and applications range from quality assurance and process capability assessment for original equipment manufacturers to in-service structural assessment and life monitoring for maintenance, repair, and overhaul organizations.

PCRT Current work in Additive Manufacturing

1. Commercial NDE and Process Monitoring projects
	* New make AM Components
	* AM Repair of in-service components
2. DoD Funded AM Development Projects
* America Makes Maturation of Advanced Manufacturing for Low Cost Sustainment (MAMLS) Phase 3 Effects of Defects
* Defense Logistics Agency SBIR Phase I for AM process monitoring
* AFRL/Space Vehicles, SBIR Phase I for qualification of AM parts

Features and Advantages of PCRT Resonance Solutions in AM:

* Resonance correlates DIRECTLY to material properties that affect fitness for use:
* Material conditions, internal and surface defects, and accumulation of damage and fatigue.
* Precise and repeatable.
* A whole body or full body inspection.
* No operator interpretation needed. Go/No Go or Pass/Fail tests.
* Fast, 100% testing vs. sampling – records and tracks resonance by serial number and over time.
* Adjustable to various part dimensions – from bearings and bolts to aircraft wheels.
* Scalable to operation size, even, fully automated robotic systems.
* Green and Safe. No hazardous radiation or chemicals.

Vibrant has developed systems for testing engine components, landing gears, and wheels. PCRT received FAA approval for the testing of a jet engine turbine blade in 2010, and an American Society for Testing and Materials (ASTM) Standard Practice for PCRT was published in 2010.

**REACT Cell:** Jason Mann, Tinker AFB, briefed the group on REACT (Reverse Engineering and Critical Tooling), which provides in-house, organic support for reverse engineering, rapid prototyping, and additive manufacturing to resolve sustainment needs with quick turn-around times. REACT is located at Tinker Air Force Base in the 76th Commodities Maintenance Group within the Air Force Sustainment Center. REACT is a direct labor organization with a staff of 20, mostly comprised of engineers. REACT can accept funding of various forms from any DoD entity.

REACT has been reverse engineering utilizing various types of 3D scanning and metrology for many years. Currently, the lab has five different types of scanners as well as a CMM. This equipment and experience is used to provide customers with more robust technical data and to aid in the development and application of additive manufacturing. REACT has been applying AM heavily since 2015 for tooling such as sheet metal form blocks, tac weld fixtures, and drill jigs to name a few. In addition, direct part replacement for non-structural polymer parts has been a recent focus for items such as interior panels, switches, and covers.

REACT currently operates four types of AM equipment: binder jetting, fused deposition modeling, selective laser sintering, and direct metal laser melting. REACT is also adding a sand printer in FY19 to apply toward casting issues. The newest AM technology in REACT is direct metal laser melting with an EOS M290. This technology has been employed since late May and is currently being used for several tooling applications and one potential large paid job for TF33 trailer brackets. A majority of the time spent has been solving logistics and downstream processes that are affected with being the first entity to deploy this technology in the depot.

**America Makes AM Mx and Sustainment Advisory Group:** Marilyn Gaska, Lockheed Martin, provided the following update:

1. 20 September 2018 Agenda Highlights:
* Additive Manufacturing for Operational Level Maintenance (MAMLS Phase III), Senior Master Sgt (SMSgt) Michael F. Birmingham, QA Superintendent, 910th
* M&S Parts Classification for AM Working Group Update– Susan Moehring highlighted last month plus reason for families vs. qualification/certification.
* Next Monthly Teleconference moved to Nov. 1 during MMX Face to Face,

8AM–Noon EST

1. Upcoming America Makes Events:
* **Air Force Additive Manufacturing Technology Interchange Meeting**, Sept. 26-28, 2018, UDRI
* America Makes will have 2 display tables at 9/26 Poster Session
* America Makes will present on 9/27 – America Makes and MAMLS Overview, Towards AM qualification.
* **Members Meeting & Exchange** (MMX), Oct. 30-31, 2018, Youngstown, OH, \***Open to the public**
* Please consider having your organization be a sponsor of MMX; go to [www.americamakes.us/mmx](http://www.americamakes.us/mmx) for more information on registration /sponsorship.
* **Maintenance & Sustainment Working Group - Face-to-Face Meeting**, Nov. 1, 0800-1200, America Makes, Youngstown, OH
* **Defense Manufacturing Conference** (DMC), Dec. 3-6, 2018, Nashville, TN

**Next Meeting:** - The next AMMO WG call is scheduled for 10:30-12:00 am (Eastern Time) on Wednesday, 7 November 2018.

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