

# PROGRESS TOWARDS EXPEDITIONARY PRODUCTION OF AM-GRADE METALLIC POWDER

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## BACKGROUND

The potential of metal additive manufacturing (AM) on the future battlefield holds many promises, as well as numerous challenges. This technology would most likely provide the warfighter with an agile means of repairing battle damage as well as the ability to manufacture spare parts at the point-of-need, thereby reducing reliance on the traditional supply chain (especially in logistics-contested domains), while improving operational readiness. One of the many challenges of expeditionary metal AM, would be the logistics of shipping sometimes volatile metal powders to the point-of-need. The capability of producing AM-grade metallic powder in-theater from recycled and reclaimed battlefield scrap would overcome that challenge, and help to reduce the military logistics tail. Technical challenges of producing AM-grade metal powder in-theater from scrap and recycled metals also exist that need to be overcome to fully achieve this capability in the future. For instance, scrap sorting, powder chemistry, powder quality, and the logistics of operating an “atomization unit in a shipping container” must all be taken into account. This paper will discuss these and other challenges in more detail, and will outline the progress of this on-going effort at the U.S. Army Research Laboratory. This work showed the technical feasibility of recycling scrap into suitable powder for additive manufacturing - case studies with these actual metallic powders will also be presented.

## IMPACT

The transportation of Army materiel to and from theatre is costly not only in terms of the logistic burden, but the time delays associated with replacing, repairing, and upgrading mission critical equipment, systems, and vehicle platforms. Many components on aging weapons systems have very lead long times in terms of replacement, and some of the components are no longer attainable, as companies that once served the DoD are no longer in business. The ability to