

Adaptation of Metal Additive Manufacturing Processes for the International Space Station (ISS)

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The In-Space Manufacturing (ISM) project at NASA Marshall Space Flight Center, in a partnership with the company, Made in Space, has previously investigated 3D printing of polymer materials on-orbit. In recent years, the project has begun exploring the potential for metal additive manufacturing (AM) on future space missions to reduce logistics and enable point-of-use manufacturing for sparing and repair. This presentation will provide an overview of constraints for demonstrating a manufacturing process on the International Space Station (ISS) as well as trades of available metal AM processes and their potential for in-space use. There are currently two processes in development as payloads for an ISS technology demonstration: wire+arc additive manufacturing (the Vulcan payload from Made in Space, Inc.) and bound metal deposition (the Fabrication Laboratory from Techshot, Inc). An update on both of these systems, results to date, and future development efforts will be presented. Relevant modeling work to evaluate operation of certain aspects of the processes in a microgravity environment will also be summarized.