T0004-PS Printing The Space Future

Adapting Additive Manufacturing Technology for Microgravity

Problem Statement

- All current space missions depend on Earth. AM will enable in-space manufacturing of parts, spacecraft and large extended structures. Rather than transporting the final part from Earth, only printers and feedstock need to withstand launch stresses.

Future Customers:

- NASA

Technology Development Team

- Jason Dunn, Made In Space, Inc. Jason@madeinspace.us
- 3DSystems, Autodesk
- Autodesk, NASA

Proposed Flight Experiment

Experiment Readiness:

- Experimental box is flight ready.

Test Vehicles:

- Parabolic Aircraft and sRLV

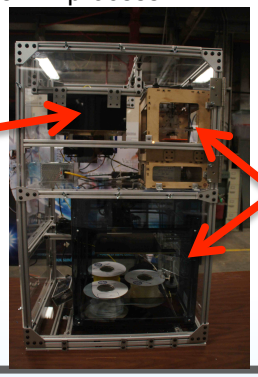
Test Environment:

- The experiment has flown on microgravity flights through the Flights Opportunities Program in the Fall of 2011.

Test Apparatus Description:

- AM "prints" parts by adding material layer by layer, causing an efficient use of material. Two OTS AM machines will build cross sections of functional parts. The ESAMM uses worm gears to provide travel in the third direction allowing for a theoretical unlimited amount of layers to be built. The worm gears ride along teeth built into the structure by the AM process.

Made In Space Custom Built 3D Printer



Modified Off-the-shelf 3D Printer

Technology Maturation

- The purpose of these flights is to demonstrate and enable 3D printing as a viable in-situ technology to be utilized as a tool for manufacturing in space and on other planets. The direct objectives of the proposed experiments are to build upon previous flight research and to raise the TRL level of extrusion based 3D printing in microgravity.

Objective of Proposed Experiment

- This experiment will serve as risk reduction for the Made In Space 3D printer that will be installed on the International Space Station. Parts will be built and printer functions will be tested in microgravity. Data gathered will be utilized to advance in-space additive manufacturing.

TA03, TA04, TA06, TA07, TA10, TA12

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