

National Aeronautics and  
Space Administration

## Space Technology Mission Directorate Game Changing Development Program

# Additive Construction with Mobile Emplacement (ACME)

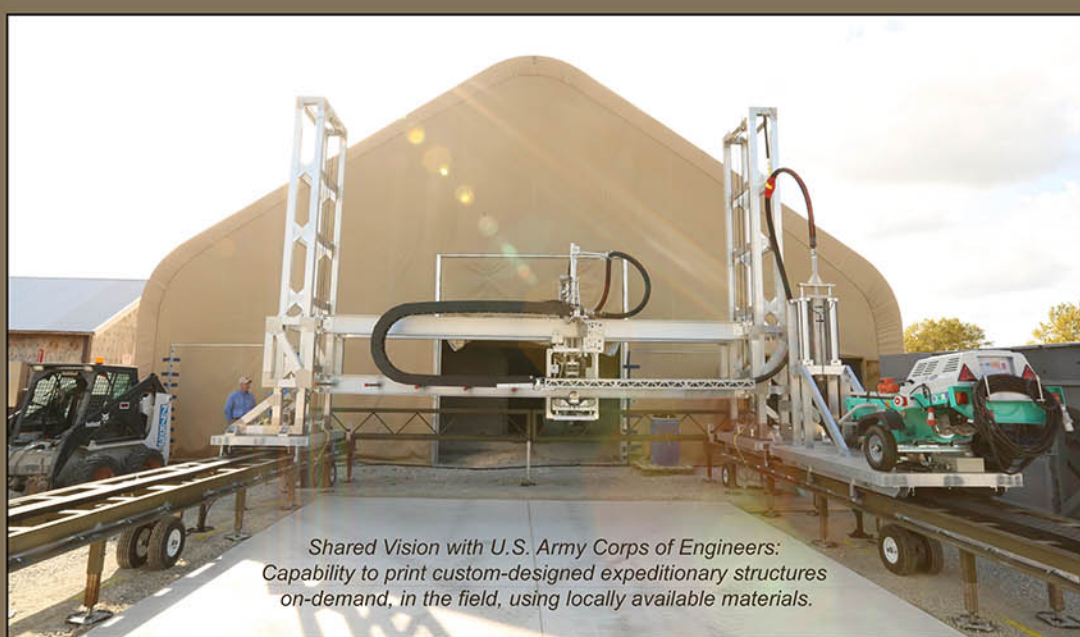
*An Automated Technology to Impact Deep Space Architecture and Improve Life On Earth*

### TECHNICAL APPROACH

ACME focused on advancing additive construction technologies by developing subsystems that process, mix, and continuously feed material through a nozzle mounted on a gantry-style mobility system. Along with advancing the additive construction process, material research and development was performed to characterize materials, develop new binders from planetary analogs, and understand different mixture compositions that could be compatible with additive construction.

Materials testing included hypervelocity impact tests, compression strength tests, and simulated environment curing tests. Research included incorporating Lunar and Martian regolith simulant into recipes and characterizing its effects as an aggregate.

The project successfully demonstrated additive construction using planetary analog materials at a small scale which provides the first step towards evolving additive construction for use on lunar and deep space missions.



*Shared Vision with U.S. Army Corps of Engineers:  
Capability to print custom-designed expeditionary structures  
on-demand, in the field, using locally available materials.*



### SUMMARY

The vision of ACME is to enable science and human exploration by utilizing in-situ resources that feed additive construction technologies to efficiently build needed infrastructure. For space missions, by using in-situ materials the mass launched from Earth to a destination could be reduced somewhere between 60 to 90 percent. Additive construction can be used to build both terrestrial and extraterrestrial structures, reduce the time and cost required to transport materials by using in-situ resources, and reduce waste as compared to traditional construction techniques.