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National Academies Press, United States, 2014. Paperback. Condition: New. Language: English . Brand New Book. Additive manufacturing has the potential to positively affect human spaceflight operations by enabling the in-orbit manufacture of replacement parts and tools, which could reduce existing logistics requirements for the International Space Station and future long-duration human space missions. The benefits of in-space additive manufacturing for robotic spacecraft are far less clear, although this rapidly advancing technology can also potentially enable space-based construction of large structures and, perhaps someday, substantially in the future, entire spacecraft. Additive manufacturing can also help to reimagine a new space architecture that is not constrained by the design and manufacturing confines of gravity, current manufacturing processes, and launch-related structural stresses. The specific benefits and potential scope of additive manufacturing remain undetermined. The realities of what can be accomplished today, using this technology on the ground, demonstrate the substantial gaps between the vision for additive manufacturing in space and the limitations of the technology and the progress that has to be made to develop it for space use. 3D Printing in Space evaluates the prospects of in-space additive manufacturing. This report examines the various technologies available and currently in development, and considers the possible impacts for crewed space operations and robotic spacecraft operations. Ground-based additive manufacturing is being rapidly developed by industry, and 3D Printing in Space discusses government-industry investments in technology development. According to this report, the International Space Station provides an excellent opportunity for both civilian and military research on additive manufacturing technology. Additive manufacturing presents potential opportunities, both as a tool in a broad toolkit of options for space-based activities and as a potential paradigm-changing approach to designing hardware for in-space activities. This report makes recommendations for future research, suggests objectives for an additive manufacturing roadmap, and envisions opportunities...

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