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Author: Mrs. Irma Moran
Orbital, United States, irma@orbitalcomposites.com

ORBITAL'S ASTROBOT: A NOVEL APPROACH TO MANUFACTURING LARGE ANTENNAS IN
SPACE

Abstract

Orbital Composites, Inc. (Orbital) is driven by a vision to revolutionize space manufacturing through the realization of In-Space Servicing Assembly and Manufacturing (ISAM). This vision is embedded in our company's name "Orbital", reflecting our commitment to leveraging advanced technologies to unlock the potential of in-space manufacturing. Drawing upon our expertise in robotics and advanced materials, Orbital has already developed the tools to integrate industrial 6-axis arms for additive manufacturing. These tools serve as the cornerstone of our approach to large antenna construction in space, enabling precise and efficient manufacturing processes in the microgravity environment. Building upon our foundation, Orbital has achieved significant milestones in space manufacturing. Our 6-axis arms work in concert, employing advanced additive manufacturing techniques to achieve faster print speeds and intricate designs. Orbital has successfully completed extremely large prints, with one robot holding and rotating the print while another robot prints continuous fiber continuous out-of-plane. Large antennas play a critical role in various space exploration missions, enabling communication, navigation, and scientific observations. Orbital's ISAM technology revolutionizes the construction of these antennas, offering unparalleled speed, quality, and complexity in manufacturing. The integration of industrial 6-axis arms and the introduction of autonomous robotic units "AstroBots" – represent a fundamental transformation in space manufacturing. Like members of a symphony orchestra, each AstroBot contributes its unique expertise and skill set to the manufacturing process under the guidance of astronauts, who assume the role of conductors in the cosmic symphony. Through augmented reality interfaces, astronauts direct and coordinate the actions of AstroBots, ensuring precision and harmony in the manufacturing endeavor. The result is a harmonious collaboration where speed, quality, and complexity converge seamlessly, propelling humanity towards new frontiers in space. Moreover, the versatility of AstroBots extends beyond manufacturing, as they could potentially be deployed for the repair and servicing of space assets like the James Webb Telescope, currently unserviceable due to its location. AstroBots offers a promising solution for future maintenance missions. By emphasizing the construction of large antennas, Orbital's ISAM technology takes center stage, showcasing its potential to revolutionize communication technology and pave the way for future space missions. As the cosmic symphony unfolds, Orbital's innovative approach promises to redefine the possibilities of in-space manufacturing and propel humanity toward a future among the stars. Keywords: In-Space Manufacturing, In-Space Servicing Assembly, Robotics, Additive Manufacturing, Antenna Construction, Human-Robot Collaboration, Augmented Reality.