

Recycler Improves Sustainability on the International Space Station

Made In Space, Inc. (MIS) and Braskem sent the first commercially developed plastic recycling facility to the International Space Station (ISS) on Northrop Grumman's 12th commercial resupply mission (NG-12).

The facility, named Braskem Recycler, aims to improve the sustainability of manufacturing capabilities on the ISS. Recycler is designed to convert plastic waste and 3D printed objects into feedstock that can be used by additive manufacturing facilities (AM) currently on the ISS. Onboard the space station, plastic waste and materials will be loaded into the facility and then reduced into smaller pieces. The reduced pieces are then heated, extruded and spooled into feedstock that is compatible with the MIS Additive Manufacturing Facility. Aside from material loading, the recycling process is automated and requires minimal crew intervention.

MIS pioneered manufacturing capabilities in space with its first- and second-generation 3D printers, with on-orbit operations dating back to 2014. The addition of Recycler to the suite of manufacturing capabilities currently on ISS could create a near-closed loop manufacturing system that would reduce reliance on feedstock to be continuously resupplied from Earth. This could yield important benefits for future space exploration by improving reusability and sustainability of manufacturing processes in space. NG-12 launched from NASA's Wallops Flight Facility on Wallops Island, VA, USA on November 2.

As a part of Braskem's ongoing efforts to promote the circular economy, Recycler will demonstrate its recycling capabilities with a specific polyethylene, developed by Braskem, called I'm green™ biobased PE. Green PE is sourced from sugar cane, a renewable raw material. MIS and Braskem have previously collaborated to demonstrate additive manufacturing with I'm green biobased PE on-orbit in 2016.

"Local manufacturing resources are a crucial capability for space exploration," said MIS Chief Engineer Michael Snyder. "Demonstrating and validating recycling capabilities on the ISS is an important step toward

developing sustainable manufacturing systems that will enable us to venture deeper into the solar system."

Braskem CEO, Fernando Musa affirmed, "We believe that innovation helps improve people's lives, whether here on Earth or in space. On Earth, we are committed to a joint effort, involving our customers, value chain partners and society at large, to find more sustainable solutions through the use of plastics. One of them is the I'm green bio-based polyethylene, the world's first polyethylene made from a 100 percent renewable source, which contributes to the reduction of CO₂ emissions, a greenhouse gas impacting global climate change. In space, by supporting Made In Space, we have the opportunity to contribute to reducing mission costs and optimizing the transported weight."

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