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ADR SPACECRAFT FOR DEBRIS REUSE AND REPURPOSING

Abstract

Using a proprietary, machine vision, real-time tumble characterization software system (TumblEye) with an exclusive, multi-element, mechanically articulated, non-destructive, and selectively releasable end effector (REACCH), Kall Morris Inc (KMI) is developing a spacecraft for efficient active debris removal (ADR). Utilizing TumblEye for determining unrecognized objects and REACCH for capturing unprepared surfaces, the KMI craft can perform multiple ADR missions in it's lifetime, opening the opportunity for debris destinations beyond re-entry. As this research will demonstrate, there are multiple opportunities for near-term reuse, repurpose, and recycling of space debris. This includes repairing faulty or damaged components within a satellite, utilizing still-function components into a new construction, or reducing materials to raw stock for new construction in orbit. With technical and economic partners, the mission extensions, new mission potentials, and overall efficiencies are shown to work with On-Orbit Servicing, Assembly, and Manufacturing (OSAM) while also providing a significant business case for ADR. These conclusions, taken with the considerations of this research, should provide a guide to organizations, agencies, and enterprise concerned with the future of space, whether related to OSAM and ADR or merely adjacent to these. There exists further specifics to properly determine, additional questions and proofs to be examined, yet fundamental acceptances for the potential opportunities such collaborative efforts can enable.