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PROPULSION OPTIONS FOR SMALL SATELLITES

Abstract

The availability and capability of small satellites has been steadily increasing over the last few years. With improved and more varied options for spacecraft buses and payloads, small satellites can begin to take on more mission sets and support a large variety of missions. To maximize the mission potential of small satellites, new propulsion solutions are required. While small satellites can do some missions without propulsion, propulsion can enable or enhance many missions. Low altitude missions are severely limited in mission duration without propulsion to overcome atmospheric drag. Satellites above a certain altitude will not deorbit within the 25 year requirement, prohibiting missions at those altitudes without propulsion. Furthermore, small satellites often are left at the mercy of the primary payload's desired position and propulsion can provide additional maneuvering into the desired orbital position. Propulsion for small satellites must be both designed for those applications and affordable. This paper will discuss a series of Modular Propulsion Systems (MPS) in development by Aerojet Rocketdyne specifically designed for small satellites. The MPS-100 line offers a complete propulsion system, including tank, fluid system valves and thrusters, in a 1U package. The MPS-200 series is sized for ESPA class satellites and is in a modular package for simplified integration into the spacecraft. Both the MPS-100 and MPS-200 series are available with several propulsion options. This paper will provide an overview of the design, performance capabilities and recent test results for both the MPS-100 and MPS-200 series. It will also provide technical details on recent green propulsion advances that have been incorporated into the MPS-100 and MPS-200 series and have specific performance advantages for volume limited spacecraft.