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ESA'S CLEAN SPACE INITIATIVE – AN OVERVIEW OF THE SPACE DEBRIS MITIGATION AND
REMEDIATION ACTIVITIES

Abstract

ESA through its Clean Space Initiative is tackling the space debris issue head on. In terms of space debris mitigation (SDM), the requirements can be grouped into four categories for which technology development is taking place. These four areas are:

1. EOL Disposal Manoeuvres: Development of passive systems such as drag sails and active systems such as SPADES (Solid Propulsion Autonomous Deorbit System); 2. Casualty Risk: Design for demise and active deorbit systems to reduce the re-entry footprint; 3. Passivation: Focusing on the release of stored energy from batteries and propulsion tanks; 4. Release of small particles: Ensuring that all particles from propulsion systems and pyrotechnics are smaller than 1mm.

Since 2013 Clean Space has been coordinating these SDM activities, however an issue was identified concerning the integration of the outputs from such activities to the space integrators in Europe. As a result several activities were run in parallel to run identical studies for different integrators, but due to the limitation on resources it was clear this method could not continue indefinitely. So a new initiative was born where these technologies could be developed in concurrently through coordination between equipment and subsystem manufacturers along with all Large Space Integrators (LSI) in Europe, namely Airbus, OHB and TAS. This initiative is known as CleanSat. Over the next few months, the first 25 technologies to be developed under the CleanSat framework will be selected and the succeeding concurrent engineering phase will begin.

Clean Space is also running the system studies for an Active Debris Removal (ADR) known as e.deorbit mission, which soon begin Phase B1. This will be the first mission of its kind and requires new and innovative technologies to be developed to support the various phases of an ADR mission. These technology developments are being coordinated by Clean Space. To support the developments of these technologies, there will be an IOD for e.deorbit known as d.deorbit. Within ESA's Concurrent Design Facility (CDF), the d.deorbit Pre-Phase A is currently being finalized.