2023 Clean Space Industry Days

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ESTEC
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Markers Supporting Navigation Development and Qualification

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Speaker

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Description

ADMATIS LTD. joined to ESA Clean Space initiative in 2018 in PEMSUN project to perform feasibility study of passive navigation aids capable to function in VNIR and TIR spectra. Based on the first promising results continuation projects included the full development and manufacturing of Markers Supporting Navigation (MSN project) in 50 to 5m and 5 to 0m ranges, respectively. Markers are developed to withstand long term (>12 years) LEO environment. The objective is to equip satellites with passive navigation aids that are still detectable long after the satellite itself is non- operational. Detectability is ensured using combinations of various thermo-optical coatings to maximise contrast in VNIR and TIR against representative backgrounds. Spatial geometry also helps visual navigation processes. The evaluation of detectability is tested using VNIR and TIR cameras under controlled lab conditions in open-air.
Two types of markers have been developed; the “2D Marker” aimed to support navigation from 50m to 5m, while the “3D Marker” is aimed to support navigation from 5m down to capture. Coating of the markers have been qualified to long term (>12 years) Copernicus LEO environment in the MSN and MSN-FD projects.
2D markers are equipped with an ADM-developed laser retroreflector. These LRRs are typically used to perform orbit determination by laser ranging from ground. Using these LRRs it is possible to determine the spin-rate of tumbling objects of defunct (client) satellites to prepare the capture by the servicer. During the qualification activities performed in the MSN-FD project, these LRRs have also been tested long term (>12 years) Copernicus LEO environment to reach TRL6, while the markers as equipment have been tested to reach TRL7 in the MSN-Q project. Results will be shown during the event.

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Presentation materials

MSN.PRE.ADM.125.pdf