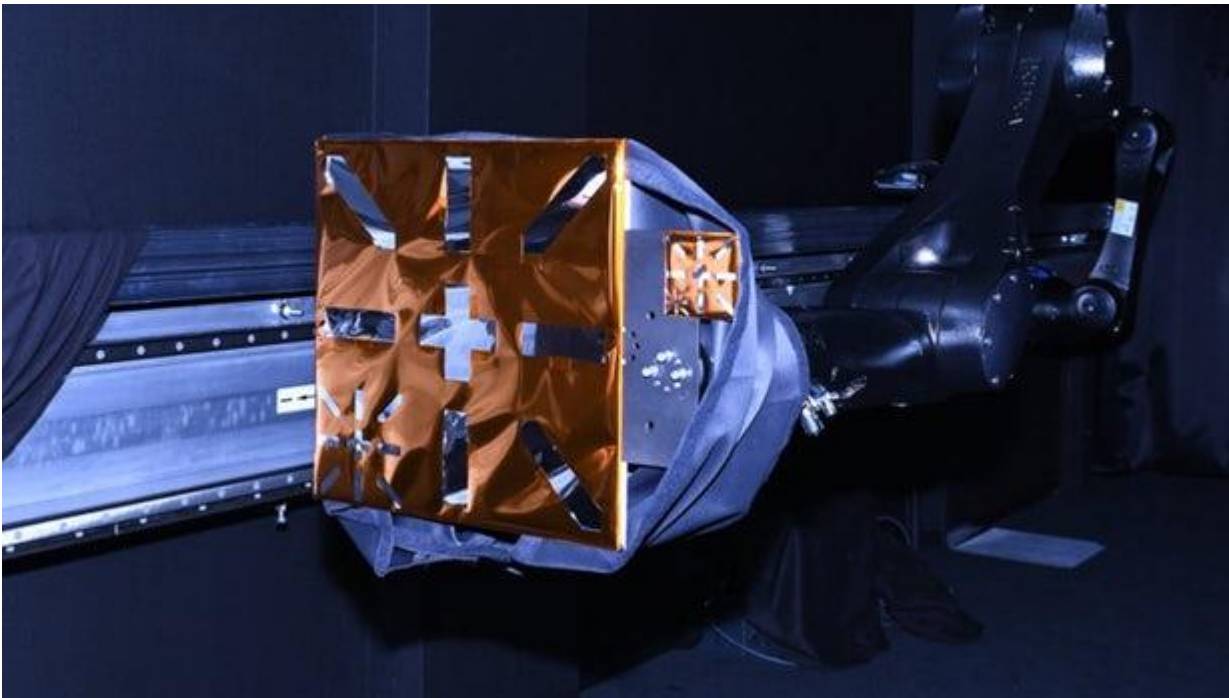


ESA developing satellite navigation markers for easier docking in space



David Szondy | April 26th, 2019



Testing "Passive Emitting Material at end-of-life," or PEMSUN, markers to enable easier docking with satellites (Credit: ESA/P. Sebirot)

ESA and Hungary-based Admatis are developing infrared and phosphorescent navigation markers for satellites. The patches that attach to the outer hull or insulation of the spacecraft are designed to help space servicing vehicles more safely approach, rendezvous, and dock with the target satellite.

One of the nice touches on the USS Enterprise in the original *Star Trek* series were the navigational lights blinking red and green on either side of the fictional starship's saucer section. Based on the lights carried on real terrestrial ships, it not only added an air of verisimilitude, it also turns out to be a prediction of things to come.

Spacecraft docking with one another is now a common occurrence, but with more manned space traffic planned, the boom of commercial spaceflight, and increasing interest in remotely servicing satellites and capturing them for disposal at the end of their lives, how to carry out such rendezvous safely and routinely becomes a major challenge.

One obvious area of interest is making satellites visible. Currently, docking spacecraft use a standardized docking target that's a bit like a 3D bullseye, and blinking rendezvous lights have been used since the Apollo program, but the ESA Clean Space project is looking at something that is cheap, passive, and more general.

The result is the "Passive Emitting Material at end-of-life" (PEMSUN) markers. Using a combination of infrared reflectors and phosphorescent patches for use in darkness, the markers not only make the spacecraft easier to see, but the distinctive patterns in which they are laid provide information about line of sight, distance, and pointing direction of the target satellite.

So far, the technology has completed initial tests in March 2019 at the space agency's GNC Rendezvous, Approach and Landing Simulator and the Orbital Robotics and Guidance, Navigation and Control Laboratory in Noordwijk, the Netherlands.

"The idea itself is not new, but this is the first time we've manufactured and tested sample patches, cut into spacecraft multi-layer insulation covering," says ESA Clean Space trainee Sébastien Perrault. "For the design we've looked into one larger pattern incorporating smaller versions for when the space servicing vehicle comes close enough that its camera's field of view is filled.

"These markers would be very useful during eclipse states for instance, when Earth obscures the Sun in low Earth orbit, to allow the chaser vehicle to stay fixed on its target, potentially in combination with radio tags."

Source: [ESA](#)