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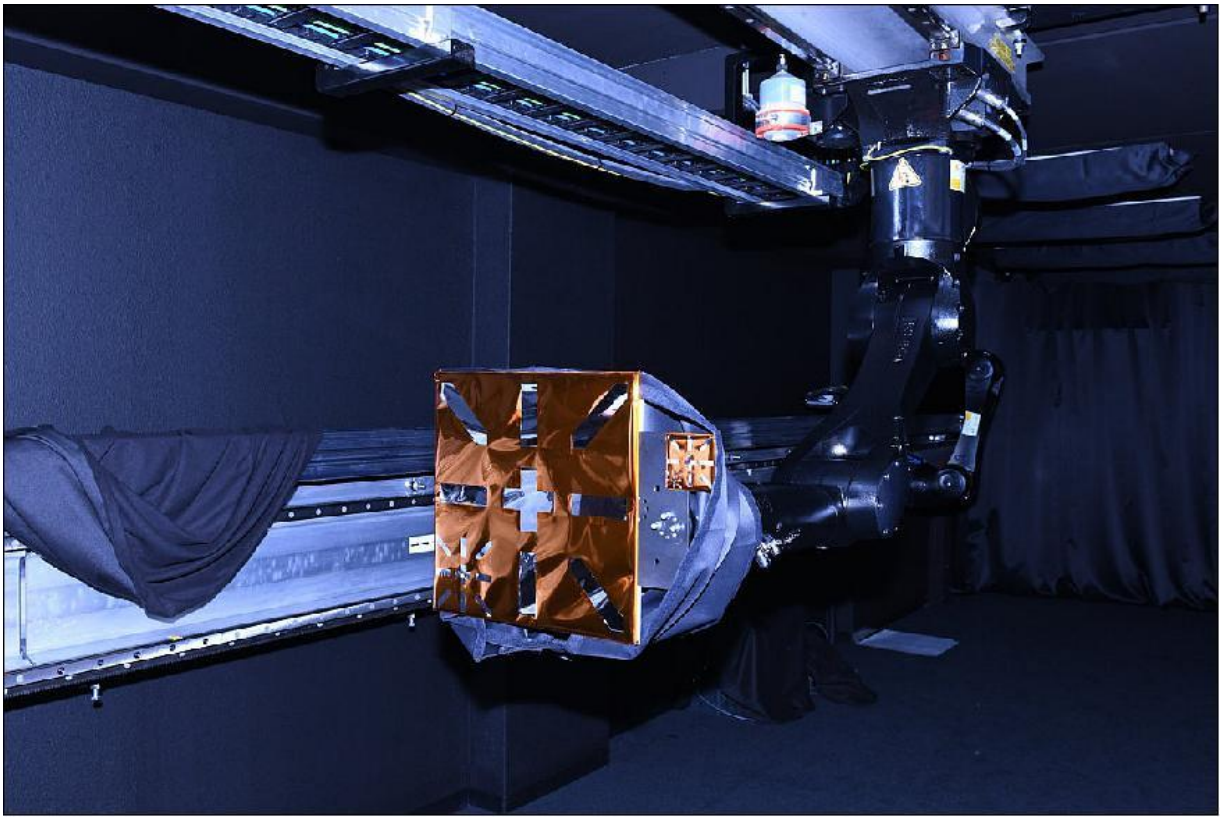
Testing satellite marker designs

24 April 2019: Akin to landing lights for aircraft, ESA is developing infrared and phosphorescent markers for satellites, to help future space servicing vehicles rendezvous and dock with their targets. [2)]

Developed by the Hungarian company Admatis (Advanced Materials in Space) as part of an ESA Clean Spaceproject, these markers would offer robotic space servicing vehicles a steady target to home in on, providing critical information on the line of sight, distance and pointing direction of their target satellite.

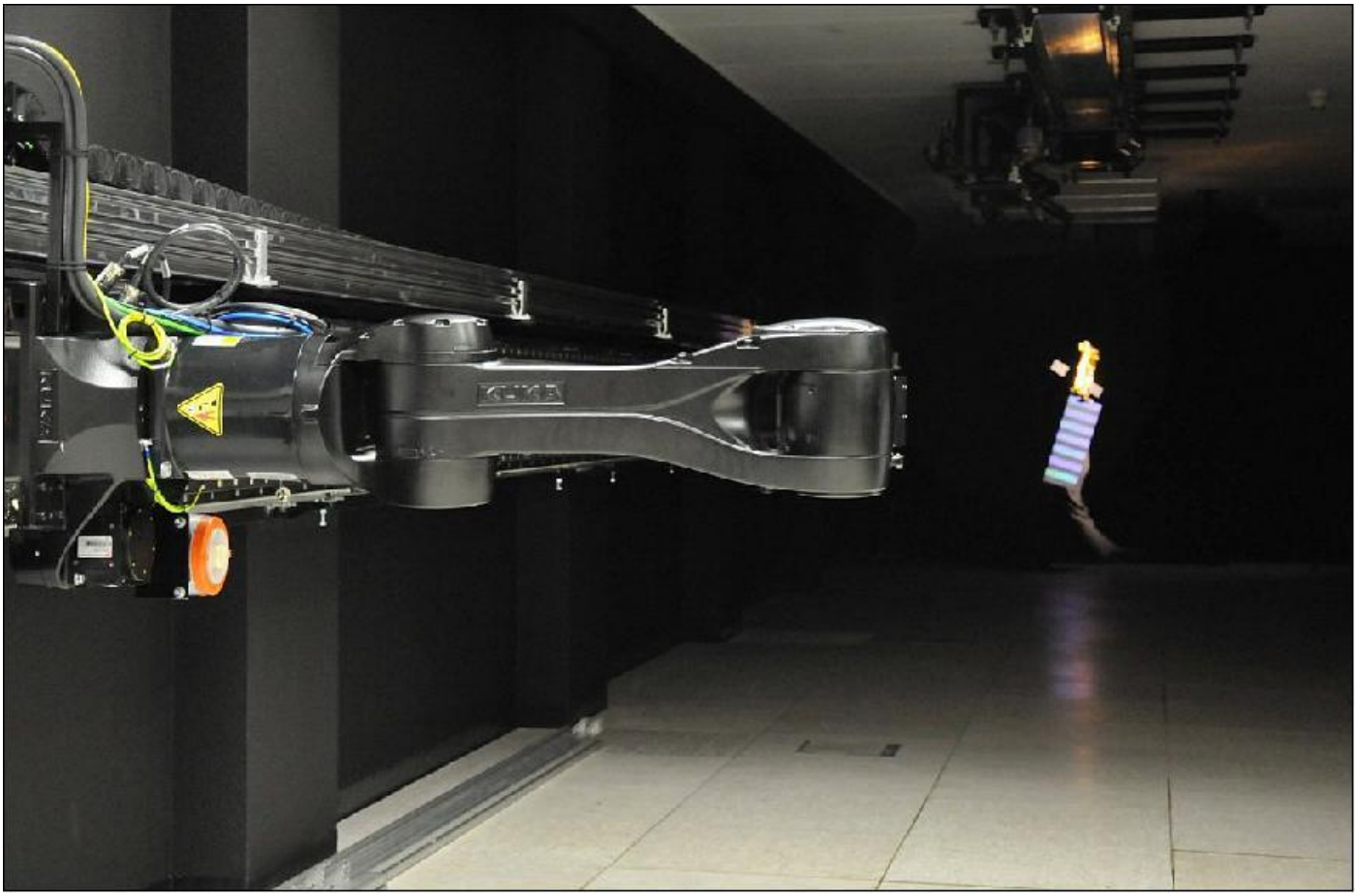


Initial testing of these 'Passive Emitting Material at end-of-life' or PEMSUN markers took place at the end of March 2019 inside ESA's GNC Rendezvous, Approach and Landing Simulator, part of the Agency's Orbital Robotics and Guidance, Navigation and Control Laboratory, at its ESTEC technical center in Noordwijk, the Netherlands (image credit: ESA)

"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," comments 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."

ESA is studying space servicing vehicles to carry out a wide range of roles in orbit, from refurbishment and refuelling to mission disposal at their end of life.



GRALS Testbed. This robotic arm, attached to a 33 m track is ESA's GRALS (GNC Rendezvous, Approach and Landing Simulator), is part of the Agency's Orbital Robotics and Guidance, Navigation and Control Laboratory. GRALS is used to simulate close approach and capture of uncooperative orbital targets, such as drifting satellites or to rendezvous with asteroids. It can also be used to test ideas for descending to surfaces, such as a lunar or martian landing (image credit: ESA, M. Grulich)

Legend to Figure 6: The moveable arm can be equipped with cameras to test vision-based software on a practical basis to close on a scale model of its target. Image-processing algorithms recognize various features on the surface of the model satellite seen here, and uses those features to calculate the satellite's tumble, allowing the chaser to safely come closer. Alternatively, the robotic arm can be fitted with a gripper, to test out actually securing a target, or with altimeters or other range sensors.

2) "Testing satellite marker designs," ESA, Technology image of the week: Infrared and phosphorescent satellite markers could help future space servicing vehicles home in on targets, 24 April 2019, URL:http://m.esa.int/spaceinimages/Images/2019/04/Testing_satellite_marker_designs