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CONCEPT OF A REFUELLING STATION FOR WATER-BASED PROPELLANTS IN
GEOSTATIONARY ORBIT**Abstract**

In-orbit servicing is attracting more and more interest from the satellite designers and their clients to extend satellites lifespan via refuelling, inspection and maintenance. However, many issues have arisen on the way to provide in-orbit servicing. One way to answer this question is proposed within the scope of a project: an eco-system including a shuttle going back and forth between geostationary Earth orbit and the lunar ground to provide water coming from the Moon to a GEO station. This station will be responsible for transforming and providing water-based propellants to satellites willing to perform refuelling and servicing. This paper focuses on the different solutions such as: refuelling in micro-gravity different clients with water and cryogenic LH₂/LO₂ propellant produced in-situ via electrolysis on the station, sizing the power system producing the 400 kW of power needed to provide enough energy to the station, storing a package weighing up to 500 kg, providing an universal docking system to refuel any client, assembling in GEO a complex station in several launches with a robotic arm. This concept leads to the preliminary design of a spacecraft able to receive and store 20 tons of water under a liquid phase coming from a lunar shuttle, to transform part this water into cryogenic LH₂ and LO₂ propellants and to store a parcel. Finally, with the help of its robotic arm, the station will be able to inspect and assemble itself and the shuttle, as well as other client satellites.