

7-11/11/2022

Deadline 07/09/2022

On-Orbit Servicing initiative in EUROPE: the EROSS projects suite

Access to space is becoming less and less expensive, thanks to new technologies and New Space actors, allowing disruptive missions and services to the benefit of end-users. However, the subsequent increased use of space (especially with mega-constellations) also highlights the need of a more sustainable vision for the future infrastructures. It is not possible anymore to design and launch disposable spacecraft without considering the consequences, and **On-Orbit Servicing (OOS) is a first step towards a change of paradigm**: the same technologies, typically autonomous rendezvous, refuelling, Orbital Replaceable Unit (ORU) exchange, repair and waste management with robotic tools, will be used in future smart, flexible and modular spacecraft.

The growing demand for satellite life extension from commercial customers is an opportunity to support the development of robotic technologies and solutions, via the OOS market: OOS is **an emerging market** that is evaluated at a cumulative worldwide \$5.15 billion over 2020-2030 (source: Northern Sky Research 2021).

In the longer term, new business models can be fostered with modular, upgradable and scalable spacecraft in the image of the first pioneering, designed-for- OOS mission, Hubble, in 1990: fuel station networks around the Earth, the Moon and beyond, reusable vehicles for orbit transfer, second life offer (upgrade, change of mission, even re-living) or space data centres. All of those models would also benefit from a general logistics and servicing support.

Thales Alenia Space in France has led in the last 6 years a series of projects funded by the European Commission within the H2020 Strategic Research Cluster (SRC) on space Robotics technologies. The first phase was I3DS (Integrated 3D Sensors) in 2016, which aimed to develop a suite of sensors for robotic missions involving a rendezvous in space with another vehicle or object. The second phase was EROSS in 2019, which has validated on ground all the technologies required for On-Orbit Servicing operations. Thales Alenia Space has won the *Etoiles de l'Europe* award for both these projects. The third and last phase of the SRC is on-going since 2021: the EROSS+ project is entailing preparations for the in-orbit demonstration, through the preliminary design stage and maturation of the key building blocks. In 2022, the €ROSS IOD project submitted by a 17 members consortium, that builds on the past experience and is a step closer to the real in-orbit demonstration, has been positively evaluated by the European Commission in the framework of Horizon Europe Space calls ; it is expected to start early in 2023.

This paper will hence expose the vision driving Thales Alenia Space to develop On-Orbit Servicing infrastructure, the steps implemented to that aim, and more precisely the next steps towards an in-orbit demonstration of European On-Orbit Servicing capabilities.