



## Company Information

Orbit Fab, a venture-backed company based in Colorado, was founded in order to develop the in-space propellant supply chain. The company exclusively focuses on developing on-orbit refueling technologies with the aim to offer refueling services broadly to commercial and government satellite operators in Earth orbits, cislunar space, and beyond. In-space refueling enhances spacecraft mobility, enables new operations and business models, and increases revenue potential.

Orbit Fab has flown two missions to space thus far to advance in-space refueling technologies. The first, Furphy, flew to the International Space Station (ISS) in 2018 through an ISS National Lab (ISSNL)-funded program, and demonstrated the first steps of propellant transfer and fluid dynamics. The second, Tanker-001 Tenzing, flew in 2021 as Orbit Fab's first propellant depot. Tenzing flew Orbit Fab's Block 1 passive-side refueling interface, the Rapidly Attachable Fluid Transfer Interface (RAFTI™). Since then, Orbit Fab has developed the RAFTI Service Valve (RSV) Block 2, which is currently baselined on over 100 commercial satellites and 4 Department of Defense (DoD) satellites including Oracle (previously Cislunar Highway Patrol System).

Orbit Fab has raised over \$25M from venture capital funding and aerospace primes such as Lockheed Martin and Northrop Grumman. Orbit Fab recently won two key government on-orbit refueling contracts: one to create a refueling payload for a host DoD spacecraft by 2024 and a second to deliver 50 kg of hydrazine to GEO in 2025. These efforts will help mature critical systems to support a key commercial delivery of up to 1000 kg of hydrazine and xenon to Astroscale US's life extension spacecraft in GEO starting in 2028. Orbit Fab is also part of both ClearSpace and Astroscale UK's UK Space Agency-funded Active Debris Removal contracts, and is currently working toward a series of risk reduction and capability demonstrations under their Trailblazer program to enable the first commercial on-orbit refueling mission in 2024.

## Benefits of Refueling

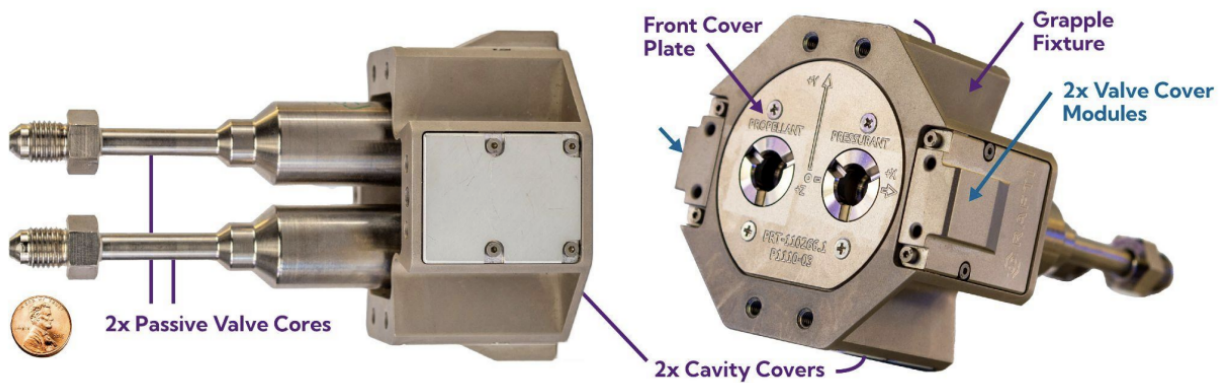
For Science missions, the benefits of refueling include, but are not limited to:

- **Life extension:** Your spacecraft is no longer life-limited by the amount of fuel you were able to carry with you from Earth. This is particularly important for interplanetary orbiters/constellations that can't be easily replaced due to cost and schedule constraints
- **Retasking/re-positioning:** Orbiters can be retasked/re-positioned at the end of their nominal life to do an entirely different mission and increase the science output.
- **Increased payload mass fraction:** With refueling in-the-loop, you can trade propellant tank mass for more science payloads or an overall lighter spacecraft.
- **Increased launch performance:** By shrinking the required spacecraft mass per launch, you can increase the effective performance of the launch vehicle enabling new ConOps.
- **Orbital insertion correction:** You no longer have to give up some operational life due to having to correct orbital insertion inaccuracies if you can refuel your spacecraft.

## RAFTI Service Valve

The RSV is a passive fluid transfer interface that also enables cooperative docking. It consists of an octagonal grapple fixture and two valve cores, as shown in the figure below. A single RSV supports the transfer of two independent fluids, for example propellant and pressurant.

The full RAFTI User Guide is available here: <https://www.orbitfab.com/rafti-icd>. It includes everything you need to make your spacecraft refuelable, details regarding RAFTI's features and supported propellants, and the Interface Control Document (ICD).



### Refueling Architecture

Orbit Fab’s refueling architecture consists of Fuel Depots and Fuel Shuttles. Our Depots are positioned in strategic orbits close to our customers, and they support a variety of propellants to enable servicing for any customer, anywhere, and at any time. Our Shuttles ferry fuel between our Depots and your spacecraft, and they are equipped with the active side of the RAFTI system known as Grappling and Resupply Interface for Products (GRIP). The Shuttles perform all the necessary rendezvous, proximity operations, and docking (RPOD) maneuvers as well as the actual refueling.

Orbit Fab is currently focused on refueling architectures around Earth and in cislunar space, but are actively working on identifying customer demand for refueling architectures beyond the Moon to service missions to Mars, Venus, and more.

## ORBIT FAB REFUELING ARCHITECTURE

Fuel Depots and Fuel Shuttles in Various Orbits

**1** Depot drifts in orbit allowing frequent refueling opportunities. RPO capable customers can refuel directly from the depot.

