TransAstra Begins Commercialization of Orbital Logistics While Maturing Technology for Lunar Polar Power Towers and Telescopes to Prospect for Asteroidal ISRU.

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Introduction: TransAstra raised $7M in Seed funding in Q4 2022 to launch its commercial orbital logistics business line. The new laboratory "The Hive" opened in Los Angeles in Q1 2022 and will accelerate the pace of development of the Omnivore™ solar thermal rocket engine along with other innovations that will fundamentally enable space ISRU and unleash 21st century industry in space [1]. These include the Worker Bee™ Orbital Transfer Vehicle, the Sun Flower™ Lunar Tower, designed to provide utility-scale power to lunar shaded regions, and the Sutter™ telescope system, designed to identify, track, and prospect small asteroids not currently observable.

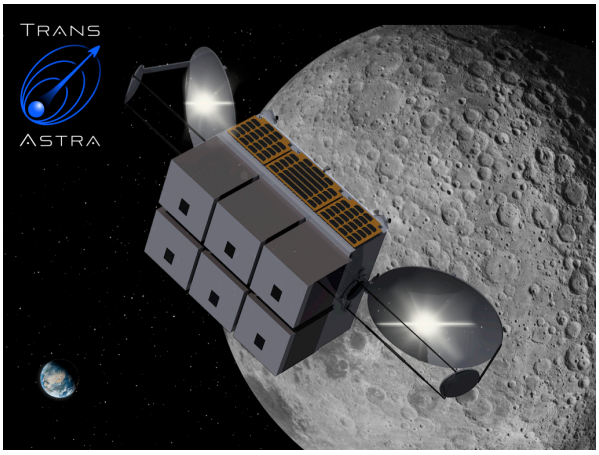

Figure 1 - Worker Bee™ delivering 6 small payloads to lunar orbit

Worker Bee Orbital Transport Vehicle (OTV) and Omnivore Solar Thermal Propulsion: Worker Bee (shown in figure 1 carrying multiple payloads to lunar orbits) is the backbone of a fleet of space logistics vehicles designed to deliver satellites, deploy constellations, and host payloads in LEO to Lunar and even Near Earth Asteroidal (NEA) orbits. Worker Bee 1 is compatible with various small, most medium, and all large launch vehicles and will carry 25 kg (e.g, to NEA) to 200 kg (e.g., in LEO) depending on the launch vehicle and destination orbit. The Omnivore™ solar thermal rocket engine, the heart of the Worker Bee, is firing in the laboratory and is planned to reach flight qualification level of maturity by Q1 2023. [A 2-min video will show *Worker Bee, including Omnivore, and Mini Bee*™]. Omnivore propels both the Worker Bee orbital transport vehicle and Mini Bee™ LEO demonstration mission. The Mini Bee is a Worker Bee equipped with Optical Mining™ equipment to extract resources from asteroids [2,3,4] and resupplies Omnivore for the return trip. Mini Bee is a miniature version of the Honey Bee and Queen Bees, the operational asteroid mining vehicles.

Sun Flower™ Lunar Power Tower: Sun Flowers (shown in Figure 2) will provide the critical levels of solar power required to energize lunar surface operations at scale by hoisting heliostats to altitudes with nearly continuous sun exposure at the lunar poles. Laboratory testing has completed on 4 m tensegrity structures and 2 m inflatable structures. Initial studies have determined that inflatable structures are capable of a higher payload mass fraction, enabling greater lifting capacity while requiring a lower total system mass. Steps are underway to test a 10 m inflatable structure which will be the core of a 10 kW power system. The 10 m scale tower will enable missions at selected polar regions by providing at least 50 percent lunar day power generation [5,6].

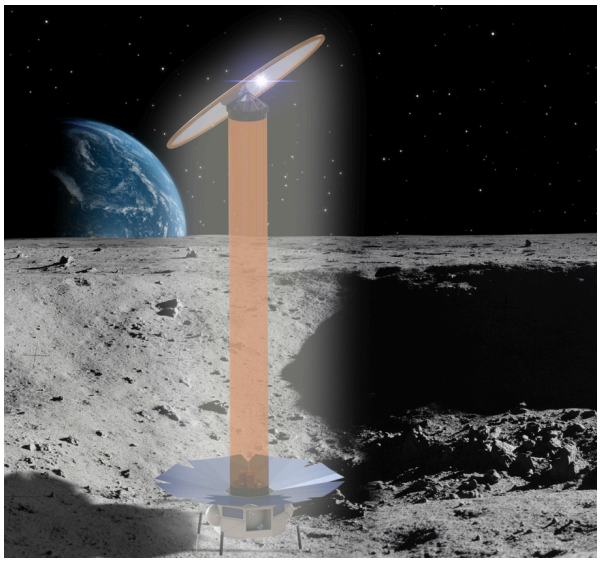

Figure 2 Sun Flower Power Tower redirects light solar arrays in shadowed lunar polar regions

Sutter™ Telescope System: Sutter is designed to answer the question of which asteroids to mine first and will increase the number of objects that can be detected by 350-fold, for orders of magnitude lower cost per object than today's methods. Matched Filter Tracking (MFT) algorithms combine with 4 other innovations (see Table 1) to formulate the computational and observational approach (illustrated in Figure 3) needed to find small, slow moving objects that are of primary interest for near term asteroid ISRU [7,8]. The

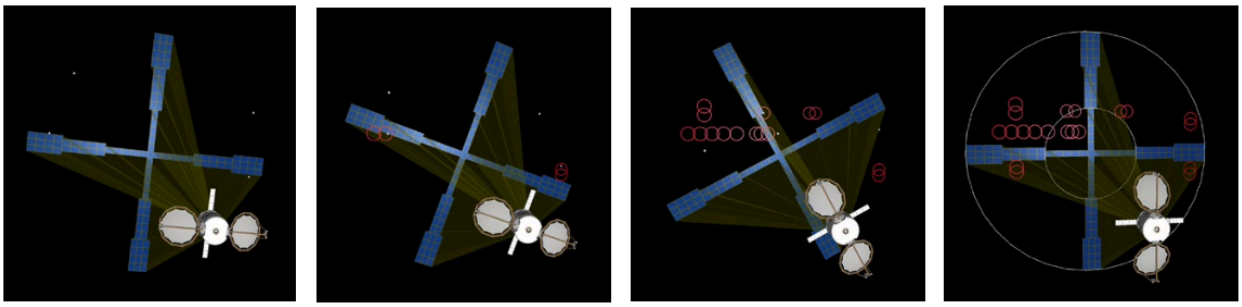

Figure 3 - Sutter's unique stop/stare/turn approach to observation, where the rotating FOV is arranged in a cross pattern, increases the likelihood of multiple detections of moving objects.

Sutter ground demonstration unit is now in testing at the Winer Observatory.

Sutter™ Ultra Telescope System Video. A short video will explain the Sutter™ telescope approach and show the progression of demonstration missions culminating Sutter Ultra™: a system of three telescopes in a novel Pseudo-GeoCentric Retrograde Orbit (PRO) which will find and prospect more small asteroids in its first year of operation than all terrestrial systems have to date.

Table 1 The Sutter system integrates 5 key innovations to achieve several orders of magnitude advantages

Combined Innovations and Cumulative Benefit on Finding & Tracking on Cost per Target		
Technology	Cost Benefit	Cumulative Advantage
Matched Filter Tracking (MFT)	100X	10^2
Compound Telescope Benefit	10X	10^3
Rotate-Stop-Rotate Observations	10X	10^4
Single Moving Part	10X	10^5
Optimal Orbit	3X	3×10^5

References:

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