



STARFIELD

MISSION BOOKLET



Mission name: Starfield
Carrier names: ION SCV009 Eclectic Elena

January 31st, 2023: Space logistics and orbital transportation company D-Orbit launched Starfield, the eight commercial mission of their proprietary orbital transfer vehicle (OTV) ION Satellite Carrier (ION), and the first one in a mid-inclination orbit.

The OTV lifted off today, January 31st, 2023, at 8:15 a.m. PT (16:15 UTC) aboard a Falcon 9 rocket from the Space Launch Complex 4 East (SLC-4E) at Vandenberg Space Force Base in California, and was successfully deployed 57 minutes later into an approximately 340km altitude and 70 degree inclination orbit.

ION is a versatile and cost-effective OTV designed to precisely deploy satellites and perform orbital demonstrations of third-party payloads hosted onboard. After the first commercial mission in September 2020, D-Orbit has completed seven more missions, including one featuring two IONs.

During the mission, ION SCV009, dubbed "Eclectic Elena", will host onboard four third-party payloads: ADEO-N3, an autonomous braking sail developed by Munich-based space company HPS, NEA® Payload Release Ring (PRR) by Ensign-Bickford Aerospace & Defense Company (EBAD), Bunny, an onboard computer developed in-house by the students of the Spacecraft Team of the Swiss Institute École Polytechnique Fédérale de Lausanne (EPFL), and SD-1, a memorial payload by New Zealand company StardustMe.

Starfield is ION's second mission in 2023. D-Orbit launched its first ION in September 2020 aboard an Arianespace VEGA launcher, then six further missions aboard SpaceX Transporter missions. With this launch, the Company will have transported to space more than 90 payloads collectively.



A note about the name of the satellite carrier

The name of the satellite carriers are "ION SCV009 Eclectic Elena", a combination of the acronym "ION", which stands for "InOrbit NOW", the acronym "SCV," which stands for "Space Carrier Vessel," and the satellite's first name. This format follows the naming conventions of naval vessels used in navies around the World. The name "Elena" was drawn at random from a bowl containing the names of all D-Orbit's employees. The company will continue to follow this procedure in the future to honor the skills, energy, passion, and commitment of its people.





Name of payload: NEA® 8" Payload
Release Ring (PRR-8)

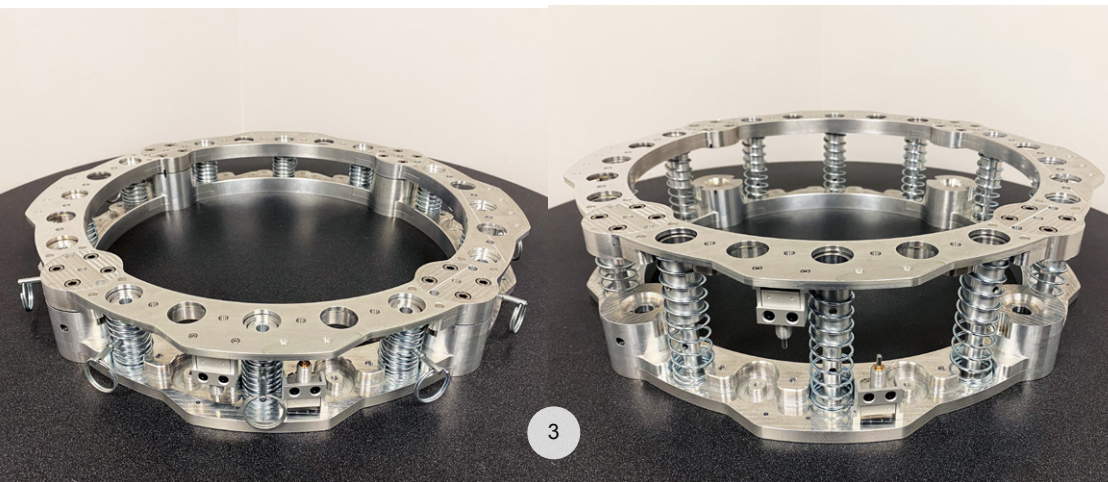
POC: Mike Ronzello
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The NEA® Payload Release Ring (PRR) utilizes the flight-proven technology of the NEA® hold down release mechanism product line to release payloads/spacecraft from a launch vehicle or Orbital Transfer Vehicle (OTV). Available in 8", 15" and 24" diameters, the NEA® Payload Release Ring consists of four (4) NEA® release mechanisms, two ring halves, and separation springs with corresponding holders. The 4 NEA's are utilized to compress the separation springs and hold the two ring halves together. The PRR is then attached to the payload. The PRR and attached payload are mounted to the launch vehicle or OTV and is electrically connected to the launch vehicle through redundant connectors. An additional connector is provided to provide communication between the launch vehicle and the payload. The payload is released when the launch vehicle or OTV applies current to the PRR connector. The connector distributes the current to the four NEA® release mechanisms, which actuate and allow the separation springs to separate the payload from the launch vehicle or OTV.

COMPANY PROFILE Website: www.ebad.com

Ensign Bickford Aerospace & Defense (EBAD) delivers mission-critical solutions for satellites (separation and dispensing), human spacecraft, missiles, and launch vehicles. EBAD's spacecraft separation systems and hold down release mechanism (HDRMs) have the broadest use in the US and European space market, having been used on over 500 platforms to date. Through our NEA® and TiNi™ product lines, EBAD has designed, qualified and delivered more HDRMs for spaceflight applications than anyone else in the world. We have 100% mission success over a twenty-year period, with over ten thousand mechanisms successfully released in space. Our devices are used in telecom, navigation, earth science, defense, and exploration platforms.

Photo credit: EBAD



High Performance Space
Structure Systems GmbH

Name of payload: ADEO

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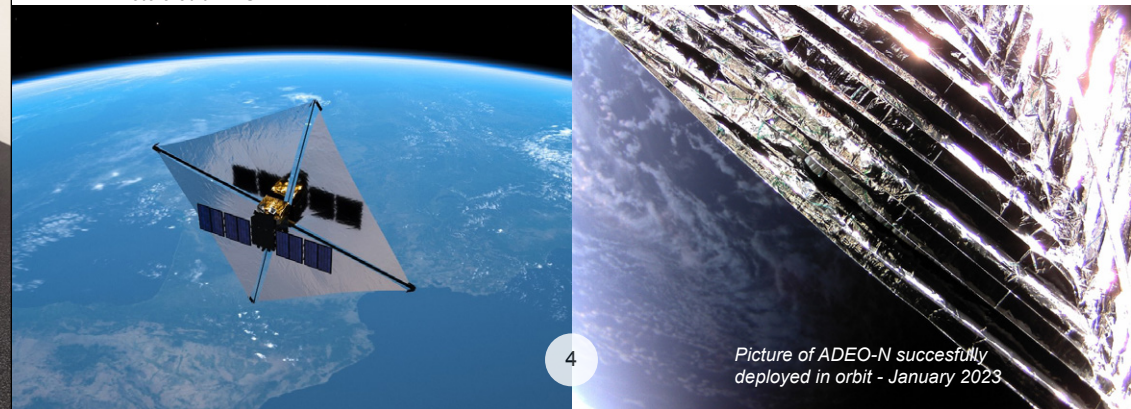
ADEO, the world's only industrial NewSpace deorbit drag sails of its kind for the multiple accelerated re-entry of retired satellites, are available from HPS in different versions tailored to the size and weight of the spacecraft. In the case of this Mission, it is one of the smallest versions (ADEO-N), weighing less than one kilogram, with dimensions of only 10 x 10 x 10 centimetres (1U) and a sail area of 5.0 square meters. The descent will be monitored intensively and correlated with the mathematical models for a better deorbit prediction for future customers.

Unique features of ADEO products are: 1) secured deorbit from LEO (< 900 km); 2) ultra-lightweight (lower mass than additional propellant for active de-orbiting); 3) scalable sail size (2 m² to > 100 m²) tailored to each spacecraft mass; 3) generic standard interfaces with adjustable interface brackets to spacecraft; 4) completely passive (no need for active control).

COMPANY PROFILE Website: www.hps-gmbh.com

HPS GmbH, Munich, Germany, was founded in 2000 and has evolved into an independent group of three sites with 70 employees. In May 2016 HPS-S.R.L. was founded in Bucharest, Romania, which also contributes the production of ADEO-modules. In 2020 HPTex was founded in Northern Bavaria for the production of RF-reflective mesh for small and large deployable satellite antennas. HPS Group is developing high end space technologies and delivering flight hardware on equipment up to subsystem-level across its business areas of Solid Reflector Antennas with focus on high frequencies like Ka-/Q/V-band (up to 2.5 m), Large Deployable Reflector Subsystems (up to 20 m), Deployable Sail Subsystems for De-orbiting (up to 100 m²), Nanosatellite-Equipment (RF, mechanical, thermal), Thermal Hardware (MLI, Radiators, on-site OSR Bonding Services, Thermal Washers, etc.), Composite & Metal Structures, Radiation Protection and Mechanical Ground Support Equipment (MGSE). HPS Group is currently onboard of more than 20 space-missions, such as EUCLID, Copernicus-CIMR, Heinrich Hertz, SENTINEL 4 and ExoMars 2016.

Photo credit: HPS



*Picture of ADEO-N successfully
deployed in orbit - January 2023*



Name of payload: Bunny

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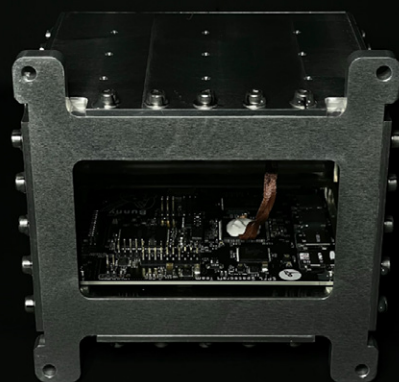
Bunny is a CubeSat onboard computer developed in-house by the EPFL Spacecraft Team. It will be tested and validated on a mid-inclination orbit as part of an in-orbit demonstration (IOD). The IOD will allow the team to evaluate the performance of the payload in actual space conditions and ensure that it can function properly in the challenging environment of space. This is an important step in the development process, as it allows the team to identify and resolve any problems that may arise.

The IOD mission is a part of the CHESSE project, which plans to launch a pair of CubeSats to study the chemical composition and changes in Earth's atmosphere over time. These satellites will be placed in an elliptical orbit with a low perigee, enabling the spacecraft to gather samples from the upper layers of the atmosphere at the perigee and the exosphere at the apogee. The project also serves as a demonstration of the feasibility of using low-cost probes to examine extraterrestrial atmospheres in future planetary missions.

COMPANY PROFILE Website: www.chessmission.ch

The EPFL Spacecraft Team is a student-led association that coordinates the CHESSE mission, whose purpose is to launch two scientific CubeSats to analyze the earth's exosphere. The team comprises almost 50 students divided into 13 poles bringing together the various engineering backgrounds from EPFL. The main goal of the EPFL Spacecraft team is to design the CubeSat platform for the CHESSE mission, all while providing the students with a hands-on experience and enabling them to live the entire life-cycle of a space project.

Photo credit: EPFL Spacecraft Team



Name of payload: StardustMe SD-1

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The SD-1 payload is a memorial payload, consisting of a number of aluminium machined capsules (called "tokens" by StardustMe), each carrying 1g of human cremated ashes, contained in an additive-manufactured frame and enclosure. This assembly is in turn mounted to the main core of the host ION vehicle.

There is no deployment or other release of StardustMe hardware or items at any point in the mission. The StardustMe hardware is permanently affixed to the ION host vehicle, and will de-orbit and re-enter the atmosphere with the host vehicle.

COMPANY PROFILE Website: www.stardustme.com

StardustMe is a new business, based in Auckland and Gisborne, New Zealand. StardustMe provides space memorial flights to celebrate life. Ashes are launched into orbit onboard SpaceX rockets to be placed amongst the stars to look back down on loved ones. These memorial flights are the perfect tribute to honouring life and provide a means to interact and honour loved ones in a novel and meaningful way.

Photo credit: StardustMe



"Every atom in your body came from a star that exploded. And, the atoms in your left hand probably came from a different star than the atoms in your right hand. It really is the most poetic thing I know about the universe: you are all stardust." - Physicist Lawrence Krauss

