

Pioneering Power Solutions for Space Flight Missions



Photo: Petty Officer 1st Class Ronald Gutridge





2.8 BILLION

CELL HOURS OF SUCCESSFUL SPACE OPERATION WITHOUT FAILURE

It is a record that supports the quality and reliability to ensure the success of every space flight mission. Pioneering EnerSys® ABSL™ rechargeable Lithium-ion (Li-ion) batteries were the first onboard a mission in space, the first to orbit the Earth, Mars and Venus, and have been influential in powering the National Aeronautics and Space Administration (NASA®) Parker Solar Probe in its orbit of the sun.

ABSL™

Expertise that Exceeds Requirements

Since building the first Li-ion battery to power a satellite, the ABSL™ team developed technological breakthroughs that have extended satellite and mission lifecycles. As the space industry's leading supplier of Li-ion batteries, ABSL has delivered on hundreds of projects and programs.

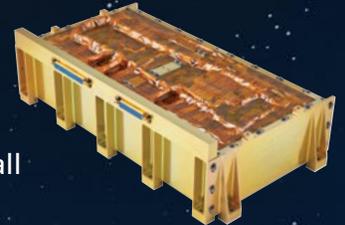
Today, ABSL batteries range from the size of a small shoebox (1.5 Ah) to a large microwave oven (448 Ah). Whatever the size, all undergo stringent design, structural and thermal analyses to help ensure mission-critical performance.

Whether your project application involves a launch, Earth orbit or interplanetary travel, the EnerSys ABSL team is ready to develop a Li-ion voltage system to meet and exceed your mission requirements.

Lithium-ion Cells in Space

Small (18650) Li-ion Cells

EnerSys® pioneered small cell Li-ion space battery designs in the 1990s with Commercial Off-the-Shelf (COTS) cells. Today, we continue the COTS battery design approach and also custom-design and manufacture small (18650) cells for high, low and hybrid voltage systems.



Large Format 72 Ah Cells

EnerSys has recently completed space qualification of large format Li-ion cells with ZeroVolt™ technology from Quallion®. Featuring long-life, low-fade chemistry, these cells are suitable for a range of satellite applications.



Meeting Human-Rated Mission Demands

ABSL battery designs comply with stringent NASA crew safety requirements. It's a major achievement and another benefit of bringing EnerSys to the project design and development table.





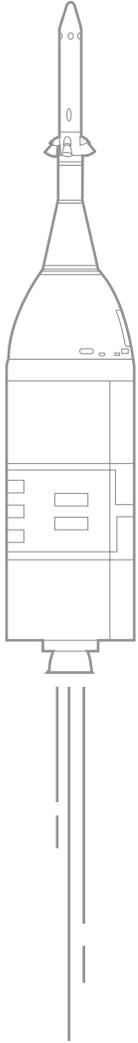
2.8 BILLION

CELL HOURS OF SUCCESSFUL SPACE OPERATION WITHOUT FAILURE

It is a record that supports the quality and reliability to ensure the success of every space flight mission. Pioneering EnerSys® ABSL™ rechargeable Lithium-ion (Li-ion) batteries were the first onboard a mission in space, the first to orbit the Earth, Mars and Venus, and have been influential in powering the National Aeronautics and Space Administration (NASA®) Parker Solar Probe in its orbit of the sun.

ABSL™





LAUNCH VEHICLES

Today's launch vehicles are pushing vibration, shock and acceleration forces to new extremes. EnerSys® is responding with innovative battery designs to meet these extreme environments.

NASA® – Space Launch System (SLS) Exploration Upper Stage (EUS)

NASA's SLS will be the most powerful rocket ever built. To power its vehicle avionics and the Electromechanical Actuator (EMA) battery system, EnerSys ABSL and Quallion® collaborated on two battery solutions.

Naro – South Korea Space Launch Vehicle (KSLV-I)

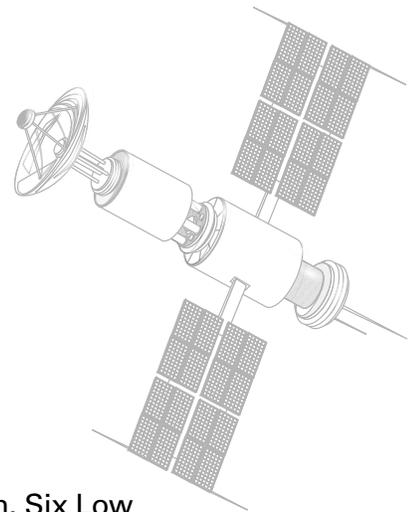
As South Korea's first space launch vehicle, KSLV-I put a satellite into low-earth orbit in 2013. As the industry's first high-voltage Li-ion battery system, ABSL batteries powered the flight termination, pyrotechnic, avionic and thrust vector control systems.

Nuri – South Korea Space Launch Vehicle (KSLV-II)

The successor to KSLV-I, KSLV-II will support South Korea's Moon mission and enter the commercial launch service market. ABSL batteries will power the flight termination, pyrotechnic, avionic and thrust vector control systems.

EARTH OBSERVATION

EnerSys ABSL™ large-format, Li-ion batteries are space-qualified to survive extreme temperatures, shocks and vibration. These unique cells deliver long-life, low-fade chemistry for Low, Mid, High and Geostationary Earth Orbits (GEO).



ESA – Copernicus

Copernicus is the European Space Agency's (ESA) Earth observation program. Six Low Earth Orbit (LEO) satellites – each fully powered by ABSL batteries – capture data for land, marine, atmosphere, climate change, emergency management response and security.

The European Data Relay System (EDRS)

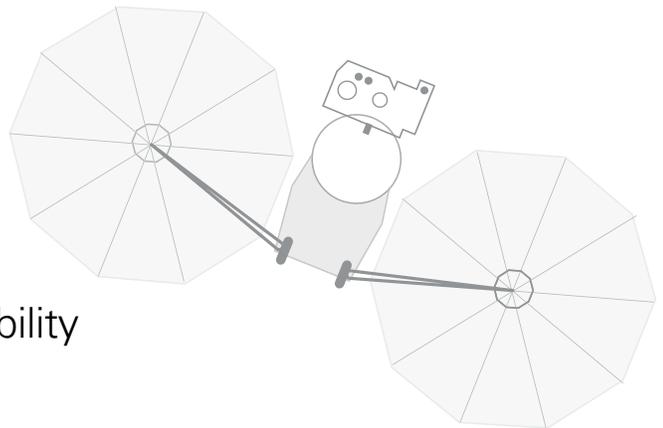
The EDRS uses innovative laser technology to reduce the time required for Earth observation. Powered by ABSL™ batteries, this GEO satellite almost constantly connects to sentinel satellites on Earth.

NASA® – Plankton, Aerosol, Cloud and ocean Ecosystem (PACE)

NASA's PACE will measure the distribution of phytoplankton to help assess ocean health. NASA's Goddard Space Flight Center selected ABSL to provide batteries for this mission.

INTERPLANETARY MISSIONS

Backed by more than 50,000+ cell years in space since their initial qualification, ABSL Li-ion batteries deliver the long life, high energy density and configuration flexibility that interplanetary missions demand.



NASA – Lucy Mission

Slated for a 2021 launch, NASA's Lucy will be the first mission to study Jupiter's Trojan asteroids. With boosts from Earth's gravity, ABSL Li-ion batteries will help the Lucy spacecraft complete its 12-year journey to eight different asteroids.

ESA – BepiColombo

BepiColombo is Europe's first mission to Mercury. Two ABSL battery-powered spacecrafts – the Mercury Planetary Orbiter and the Mercury Magnetospheric Orbiter – will endure temperatures of 662°F (350°C) as they separate and orbit Mercury in 2025.

UAE – Emirates Mars Mission (EMM)

The United Arab Emirates EMM orbiter mission reached Mars in February 2021. Enabled by ABSL Li-ion batteries, the "Hope" probe will orbit Mars and study the Martian atmosphere and its interaction with outer space and the solar wind.

Powerful Solutions for a Global Marketplace

EnerSys® , the global leader in stored energy solutions for industrial applications, manufactures and distributes energy systems solutions and motive power batteries, specialty batteries, battery chargers, power equipment, battery accessories and outdoor equipment enclosure solutions to customers worldwide. Energy Systems, which combine enclosures, power conversion, power distribution and energy storage, are used in the telecommunication, broadband and utility industries, uninterruptible power supplies and numerous applications. Motive power batteries and chargers are utilized in electric forklift trucks and other industrial electric powered vehicles requiring stored energy solutions. Specialty batteries are used in aerospace and defense applications, large over-the-road trucks, premium automotive, medical and security systems applications. EnerSys also provides aftermarket and customer support services to its customers in over 100 countries through its sales and manufacturing locations around the world. With the NorthStar acquisition, EnerSys has solidified its position as the market leader for premium Thin Plate Pure Lead batteries, which are sold across all three lines of business. More information regarding EnerSys can be found at www.enersys.com.

These batteries and associated technical data are subject to the regulations of the International Traffic in Arms Regulations (ITAR) contained in 22 C.F.R. Parts 120-130. Any export or re-export of these products require a prior written export authorization from the U.S. Department of State. It is the responsibility of the purchasing or receiving party to comply with all requirements of the ITAR, including ensuring that all required export authorizations are in place prior to exportation or re-exportation.

Caution Concerning Forward-Looking Statements

EnerSys is making this statement in order to satisfy the "Safe Harbor" provision contained in the Private Securities Litigation Reform Act of 1995. Any of the statements contained in this publication that are not statements of historical fact may include forward-looking statements that involve a number of risks and uncertainties. A forward-looking statement predicts, projects, or uses future events as expectations or possibilities. Forward-looking statements may be based on expectations concerning future events and are subject to risks and uncertainties relating to operations and the economic environment, all of which are difficult to predict and many of which are beyond our control. For a discussion of such risks and uncertainties that could cause actual results to differ materially from those matters expressed in or implied by forward-looking statements, please see our risk factors as disclosed in the "Risk Factors" section of our annual report on Form 10-K for the most recently ended fiscal year. The statements in this publication are made as of the date of publication, even if subsequently made available by EnerSys on its website or otherwise. EnerSys does not undertake any obligation to update or revise these statements to reflect events or circumstances occurring after the date of this publication.



EnerSys World Headquarters
2366 Bernville Road
Reading, PA 19605, USA
Tel: +1-610-208-1991 /
+1-800-538-3627

ABSL US Office
1751 S. Fordham Street,
Suite 100
Longmont, CO 80503
Tel: +1-303-848-8081

ABSL UK Office
Building F4, Culham Science Centre
Abingdon, England OX14 3ED
Tel: +1-44-1865-408-710 /
+1-44-7968-707-561

