


Beyond Gravity computer controls Europe's Jupiter spacecraft

Beyond Gravity, a leading supplier to the space industry, provided key products for Europe's first mission to Jupiter. The Airbus-built Juice satellite is controlled by a computer and protected by thermal insulation from Beyond Gravity.

The European Juice spacecraft (Jupiter Icy moons Explorer) will study the largest planet in our Solar System, Jupiter. Juice will launch on April 13 aboard an Ariane 5 rocket from Europe's spaceport in Kourou. The European Space Agency (ESA) mission will investigate Jupiter and three of its largest moons. It will look for water under the ice crust of these moons, which would indicate life-compliant conditions. Beyond Gravity, a leading space supplier, delivered various key products for this mission. "Juice is humankind's next ambitious mission to the outer Solar System. As a key supplier, we have delivered a wide range of electronic, thermal and mechanical products that make Juice's exploration of the fascinating planet Jupiter and its moons possible. Together with the launcher structures we are supplying for the Ariane 5 rocket that will take Juice into space, the mission gives us the opportunity to once again showcase the diversity and unmatched reliability of our product portfolio", says André Wall, CEO Beyond Gravity. The prime contractor of the Juice spacecraft on behalf of ESA is Airbus Defence and Space.

Computer from Beyond Gravity controls Juice spacecraft

Beyond Gravity delivered the data handling subsystem of the Juice spacecraft, which controls the satellite platform (satellite bus) and collects operational data. The subsystem includes the computer, the remote interface unit, and a mass memory. "Our



high-performance onboard computer manages the spacecraft position and orbit, ensures that the spacecraft stays healthy, and communicates with the Earth,” explains Anders Linder, EVP Division Satellites at Beyond Gravity. “Yet another ESA mission trusts in our onboard computers, confirming our leading position in this field.” During operation, Juice generates a large amount of data. The mass memory of the spacecraft, developed by DSI Aerospace Technologies, provides storage for the payload and spacecraft telemetry data on-board before transmission to Earth. The remote interface unit from Beyond Gravity is a key component of the data handling subsystem. For instance, it provides a physical interface to Juice’s state-of-art propulsion system, as well as to the system responsible for the spacecraft’s orientation.

Elaborate thermal insulation protects

A new type of thermal insulation will keep the internal temperature of the Juice spacecraft stable. The thermal insulation from Beyond Gravity consists of several layers of ultra-thin special plastic films. They are separated by sophisticated nettings that achieve a highly efficient insulation in the vacuum of space comparable to a brick wall of several meters thickness on Earth. “Our thermal insulation protects Juice from temperatures ranging from plus 250 degrees Celsius during Venus flyby and minus 230 degrees Celsius at Jupiter,” says Anders Linder. The spacecraft weighs about six tons (including fuel). The total mass of the thermal insulation alone is 100 kilograms. In total, more than 500 individual parts of the thermal insulation were installed on the spacecraft, ranging from simple aluminized polyester film inside the satellite to external multilayer insulation consisting of more than 20 layers of coated high temperature capable polyimide film.

Highly radiation and heat resistant antenna

One of the antennas that Juice will use to navigate around Jupiter and communicate back and forth with Earth was built by Beyond Gravity. “The biggest technical challenges for this antenna are the high levels of radiation around Jupiter and the extreme heat at Venus and extreme cold at Jupiter,” explains Anders Linder. “Also, the enormous distance is challenging. Our antenna will send data hundreds of millions of kilometers down to Earth.”

Structural elements for Juice

Beyond Gravity also delivered a number of structural elements for the Juice satellite. These include more than 30 sandwich panels made of aluminum or carbon fibre as well as different types of carbon fibre struts. For some of the aluminum sandwich panels Beyond Gravity provided a special feature: The panels are covered with lead foils. The foils are needed to shield the equipment mounted to the inside of some areas of the spacecraft from the harsh radiative environment. The struts are used to support e.g. Juice’s solar arrays, pressure tanks or communication antennas.

Bye, bye Ariane 5: Last science flight

The Juice satellite will be launched into space on board an Ariane 5 rocket from the European spaceport in Kourou, French Guiana, South America. After more than 25 years of service, this will be the second to last flight of this European launcher rocket, which will be replaced in the future by its successor model Ariane 6. In more than 100 flights Ariane 5 exclusively relied on Beyond Gravity’s payload fairing, computer, antenna and separation system. “We are proud to contribute to one of the most reliable launchers in the world since the very first day,” says Paul Horstink, EVP Division Launchers at Beyond Gravity. The company’s fairing protects the satellite during launch and journey into space.

Once in space the Juice spacecraft is placed in orbit with the help of a separation system from Beyond Gravity. After an eight-year journey in space, the probe will arrive at Jupiter in 2031 and help provide humankind with more answers to the mysteries of the universe.

About Juice

European Space Agency's Jupiter Icy Moons Explorer, Juice, is humankind's next mission to the outer Solar System. It will make detailed observations of gas giant Jupiter and its three large ocean-bearing moons – Ganymede, Callisto and Europa. Juice will monitor Jupiter's complex magnetic, radiation and plasma environment in depth and its interplay with the moons, studying the Jupiter system as an archetype for gas giant systems across the Universe. Juice is a mission under ESA leadership with contributions from US Space Agency NASA, Japan's Space Agency JAXA and the Israeli Space Agency.

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[Image 1](#): In 2031 Juice will reach planet Jupiter. Artist's impression of Juice orbiting Jupiter. Copyright: ESA.

[Image 2](#): Juice spacecraft with its black-colored thermal insulation. Copyright: ESA/Lightcurve Films.

[Image 3](#): Gas planet Jupiter (left) and some of its moons. Copyright: © NASA/JPL/DLR.

[Image 4](#): Once in space the two halves of the Beyond Gravity payload fairing open up and are jettisoned from the launch vehicle. Copyright: ESA, ATG Medialab.

[Image 5](#): A payload adapter from Beyond Gravity (left) will deploy the Juice spacecraft in orbit and separate it from the Ariane 5 launch vehicle. Copyright: ESA, ATG Medialab.

[Video](#): Learn how Beyond Gravity is pushing boundaries of what is technically feasible for the benefit of humankind.

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This media release can also be found at www.beyondgravity.com/news

Beyond Gravity, headquartered in Zurich, Switzerland, is the first startup to combine agility, speed, and innovation with decades of experience and proven quality. Approximately 1'600 employees at 12 locations in six countries (Switzerland, Sweden, Austria, Germany, USA, and Finland) develop and manufacture products for satellites, launch vehicles and the semiconductor industry with the goal of advancing humanity and enabling exploration of the world and beyond. In 2022, the company generated revenues of approximately CHF 356 million. More information at: www.beyondgravity.com