**JUICE SPACECRAFT FULLY INTEGRATED AND READY FOR NEXT TESTING**

ESA’s Juice mission has entered its final phase of development, with the spacecraft moving to an Airbus Defence & Space facility in Toulouse, France, for the next round of testing. The spacecraft has been fully integrated, and these tests will be done in full flight configuration, as Juice is scheduled for launch from Europe’s Spaceport in Kourou, French Guiana, in April 2023”The Juice mission is a perfect example of collaboration between several national space agencies and European industry. Its objective is to explore the gas giant Jupiter, its environment, and three of its moons: Europa, Callisto and Ganymede. By studying this planetary system, ESA hopes to learn more about the icy worlds around Jupiter and the origins and possibility of life in our Universe.

This report includes interviews with:

* Manuela Baroni, Juice Assembly , Integration & Test Engineer, ESA
* Cyril Cavel, Juice Project Manager, Airbus Defence & Space

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| Image | Text |
| 10:00:00:00 | **TITLE: JUICE SPACECRAFT FULLY INTEGRATED AND READY FOR NEXT TESTING** |
| 10:00:08:00   * Juice in cleanroom, Airbus Defence & space, Toulouse France – April 2022 [credit: ESA] * Juice in cleanroom, Airbus Defence & space, Friedrichshafen, Germany – Oktober 2020 [credit: ESA/lightcurve films]3 shots * Juice in cleanroom, Airbus Defence & space, Toulouse France – April 2022 [credit: ESA] | **The beginning of April also brought about the beginning of a whole new phase for ESA’s Jupiter Icy Moons Explorer mission, Juice. After years of development the spacecraft has now been fully integrated and sent to an Airbus Defence & Space facility in Toulouse, France, for the next round of testing – an important milestone in the spacecraft’s development, leading it towards launch one year from now.** |
| 10:00:33:03   * Soundbites: Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA - April 2022 - Airbus Defence & Space, Toulouse, France [credit: ESA] | **Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA**  This milestone is very important because here we have the spacecraft, it is integrated, is ready. We have all the 10 instruments are delivered, are there or the platform units are there, the antennas is all in place. So the spacecraft is ready for the test campaign to verify, finally, that everything works as expected within the performances they are expecting and this is one year from launch. |
| 10:00:58:08   * JUICE Spacecraft rotation and Medium Gain Antenna deployment, 13 May 2021 - ESA/ESTEC, Netherlands [credits ESA] * Time lapse footage of JUICE inside the Large Space Simulator, May 2021, ESTEC, Netherlands [credits ESA] * Juice installation of magneto boom arm - Friedrichshafen, Germany, Feb 2021 [credit: Airbus Defence & space/lightcurve films] * JUICE Spacecraft rotation and Medium Gain Antenna deployment, 13 May 2021 - ESA/ESTEC, Netherlands [credits ESA] 2shots * Juice antenna vibration testing, Thales Alenia Space, Italy (TAS-I) [credits: Thales Alenia Space / Lightcurve Films] * Juice installation of magneto boom arm - Friedrichshafen, Germany, Feb 2021 [credit: Airbus Defence & space/lightcurve films] * Juice in cleanroom, Airbus Defence & space, Toulouse France – April 2022 [credit: ESA]2shots * JUICE Spacecraft rotation and Medium Gain Antenna deployment, 13 May 2021 - ESA/ESTEC, Netherlands [credits ESA] | **Although there are contributions from the American space agency, NASA, and the Japanese agency, JAXA, Juice is primarily a European mission and many of the ten instruments were developed by the national space agencies within ESA’s Member States such as Italy, Germany, France, the United Kingdom, Sweden and many others.  With ten different instruments onboard Juice will carry the most powerful scientific payload ever flown to the outer Solar System. And so for European industry in general, and prime contractor Airbus Defence & Space in particular, the complexity and scope of the mission proved to be a worthy challenge. Now with the testing of the spacecraft in flight configuration going well, it seems their hard work has paid off: an important achievement for European industry.** |
| 10:01:49:16   * Soundbites: Cyril Cavel, Juice Project Manager, Airbus Defence & Space - April 2022 - Airbus Defence & Space, Toulouse, France [credit: ESA] * Animation: Jupiters magnetic environment [credits ESA/ATG Medialab] * Soundbites: Cyril Cavel, Juice Project Manager, Airbus Defence & Space - April 2022 - Airbus Defence & Space, Toulouse, France [credit: ESA] | **Cyril Cavel, Juice Project Manager, Airbus Defence & Space** In fact on Juice we collect a number of design and performance requirements, for which it is not taken individually the first time that we face them on a spacecraft, but we have all of them at the same time on this mission and it's a bit particular. But we have to face all these design requirements at the same time. And in addition to that, we have also some requirements coming from the environment itself of Jupiter, like temperature and radiation. Jupiter is a very aggressive radiation environment // that is making the whole //design of the spacecraft even more complex. |
| 10:02:22:01   * Animation: Juice’s flyby of Ganymede [credit: ESA/lightcurve films] * Animation: Juice’s flyby of Europa [credit: ESA/lightcurve films] * Animation: Juice’s flyby of Callisto [credit: ESA/lightcurve films] * Animation: Juice’s in orbit around Ganymede [credit: ESA/lightcurve films] * Animaton: Inside the Galilean moons, Ganymede [credits ESA/ATG Medialab] * Animation: Jupiters magnetic environment [credits ESA/ATG Medialab] * Cosmic images and animations: Hubble nebula image [credit: ESA/NASA] * Exoplanet animations [credit: ESA/NASA] | **Juice will fly to Jupiter to study the massive gas giant and three of its planet-sized moons: Europa, Ganymede and Callisto. The spacecraft will do several fly-bys of Europa and Callisto before going into orbit around Ganymede, for a more in-depth analysis. It will be the first time a spacecraft will orbit an outer Solar System moon and it will teach us much about the frozen worlds of Jupiter’s moons.**  **By studying the Jupiter system as an archetype for gas giants across the Universe scientists hope to address two core themes of ESA’s Cosmic Vision programme: ‘How does a Solar System work?’ and ‘What are the conditions for planet formation and the emergence of life?’ – tantalising questions humanity has struggled with for centuries.** |
| 10:03:10:11   * Soundbites: Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA - April 2022 - Airbus Defence & Space, Toulouse, France [credit: ESA] | **Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA**  The scientific objectives of Juice are multiple. So, first of all, // humanity always poses itself a question: 'Are we alone in the Universe? Is there life outside Earth?" To respond to this question? First, we need to answer another question: "Are there environments where life can be sustained before going in search for life?" And this is one of the main objectives for Juice: to search if on the environment, on the ocean worlds of Europa and Ganymede, there are the conditions to sustain life. // The other objective of Juice is to study the Jupiter system in its integrity, as seen as a miniaturized Solar System, if you want. |
| 10:03:53:06   * Juice in cleanroom, Airbus Defence & space, Toulouse France – April 2022 [credit: ESA] 2 shots * Animation of Juice launch [credit: ESA] 2 shots * Animation: Juice journey to jupiter [credit: ESA/lightcurve films] * Animation of Juice launch [credit: ESA] * Animation: Juice’s flyby of Callisto [credit: ESA/lightcurve films] * Animated fly-through based on a real Hubble deep field image [credit: ESA/NASA] | **The expectations rise as the countdown to Juice’s launch in April 2023 has started. Now, the satellite will be further tested in the following 9 months before it is shipped to Europe’s Spaceport in Kourou for its launch on top of an Ariane 5.  After launch the spacecraft will need an 8-year journey, performing a few slingshot manoeuvres along the way, to reach the Jovian system. Then it is estimated to perform its explorations over a nominal 4-year period. With Juice, we will learn much about the Universe and Solar System we inhabit and perhaps even shine a brighter light on the question: Is there other life out there or are we alone?** |
| **10:04:36:15** | **B-ROLL** |
| **10:04:36:15** | **Soundbites: Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA**  **April 2022 - Airbus Defence & Space, Toulouse, France**   * **English** |
|  | JUICE is the Jupiter icy moon explorer. So is the first large mission of the Cosmic Vision programme of European Space Agency and has the objective to study the Jupiter system and three of the Galilean moons, three icy moons, which are Europa, Ganymede and Callisto. |
|  | So, JUICE has been developed by a huge industrial consortium to build the spacecraft itself, and which is made 95 percent by European companies. It's about over a hundred companies from Europe and about the five percent of contribution from United States. JUICE embarks 10 scientific payloads, and the payloads are the contribution from leading funding agencies, which are the space agencies. So in particular, we have CNES, there is the Italian space agency, DLR, German Space Agency, there is the UK Space Agency, the Swedish space agency. We have also contribution in instruments and other contributions from NASA, as well as from JAXA and also from the Israeli space agency. And each of these scientific consortiums is built by other institutions from all over Europe. So we have a small contribution from Austria, from Belgium, from euhm.. it is a European wide consortium. |
|  | So in particular, we have Airbus France, which is the main contractor to build the spacecraft. The contribution of France goes also beyond the prime contractor ship of the spacecraft. We have also some navigation units which are contributed from France. And as I was mentioning, there is also one of the instruments and other and other units from the Italian space agency. We have several units, for example, the high gain antenna is from Italy. The RIME spacecraft is made under the leadership of of Italy, for example for the Italian space agency. There are many other units. We have a great contribution, for example, also from Spain with, for example, with the Medium gain antenna. We have also the extensible boom, which hosts the magnetic sensors. There are other contributions from Germany who was part of the core team that is building the spacecraft. They did also the integration before the spacecraft was arriving in Toulouse. And basically, we I mean, we can go into the details of the Europe of the consortium, but basically all the nations have provided a contribution to JUICE. |
|  | The scientific objectives of JUICE are multiple. So, first of all, we have humanity always poses itself a question:'Are we alone in the universe? Is there life outside Earth." To respond to this question? First, we need to answer to another question: "are there environments where life can be sustained before going in search for life?" And this is one of the main objective for JUICE to search if on the environment, on the ocean world of Europa and Ganymede, there are the conditions to sustain life. Now, from the past missions, we know that some of these conditions are fulfilled and we are going to and want to go with JUICE to investigate even deeper and to make sure that these conditions are are there. And this condition, is, for example, there is water, there is liquid water. There is a source of energy inside the planet. So there is energy. There are the chemical compounds which are needed to sustain life. The life, as we know so based on carbon and is a protected, it is a stable environment because is under the crust of the moons. So once these four elements are fulfilled, there is the probability that life would be sustained outside Earth is very high. The other objective of JUICe is to study the Jupiter system in its integrity, as seen as a miniaturised solar system, if you want. We have a gas giant with the bodies that go around the around this body. And studying, the interaction of the of the gas giant with these bodies, we can understand better, for example, the development of our solar system, how it was born, how it works, and etc.. |
|  | The Cosmic Vision programme has the objective of studying also other worlds, so it would be complementary to future missions, to a mission currently in development like plato, like Ariel, like SMILE and be complimentary with a future mission which we envision for the study of Venus with Athena, for example, for the study of the Year of the Universe, with Lisa for the study of the gravitational waves. So it will be complementary to have a full and round information on the astronomy and planetary science, and it will be also part of the inspiration that the Cosmic Vision programme wants to transmit to the scientific community and to the public. |
|  | We have 10 instruments on board of JUICE, and all of them are extremely important to provide the full investigation of the Jupiter system, so we have instruments that can cover the full range of frequency from direct current up to the ultraviolet. We have a laser altimeter to perform all the altimetry, the detailed altimertry of the moons. There are partical package measurements. There ar, there is the sounder, which is this long deployed antenna, you can see, that will investigate this subsurface structure of the moons. So there are radiation monitors, so there is a full package for an analysis of of the Jupiter system and the three icy moons. |
|  | JUICE will be launched next year in 2023. In April, the beginning of April, the launch window with open on the 5th of April, and will open for about three weeks because of celestial mechanics. And then the spacecraft before being injected into the transfer orbit to Jupiter will have to acquire more speed, and we will need to do a certain amount of gravity assists to the inner planets of the Solar System. We do a gravity assist, which will be a first, which will be a Moon Earth gravity assist. Then there will be a Venus gravity assist, other two flybys of of Earth, and then will be projected to the assertion orbit orbital Jupiter for either two years. Overall, if we take about 8 years to get to Jupiter. |
|  | At the moment, the nominal science is forseen to last four years. In this four years jupiter will make all the investigation. It will make some flybys of Europa, flybys of Callisto. And then we'll go into the details of the analysis of Ganymede. We stay around in orbit around Ganymede for a good part of the Jupiter tour. |
|  | In the past, there were other missions that passed, analysed the Jupiter system, like Galileo, for example, has given us important information to build the JUICE mission. There is also Cassini that passed by, that we gather a lot of data also from it and also from observation from Earth. Also, some observation from Hubble, for example, has provided us loads of data which are precious to to build JUICE and to be build alos the profile of the mission to know what we are going to to study. |
|  | JUICE will leave a legacy for the future, because once we have investigated whether life can be sustained in the icy moons in Europa or Ganymede, then there could be other missions that will go to analyse more in depth if life is really there. Maybe with penetrators, with rovers, with sample return missions. And one of the of the objective also of cosmic visoin is to be an insipirator for future missions. Also for a sample return, for example, why not on the icy moons of Jupiter. |
|  | This milestone is very important because here we have the spacecraft, it is integrated, is ready. We have all the 10 instruments are delivered, are there or the platform units are there, the antennas is all in place. So the spacecraft is ready for the test campaign to verify, finally, that everything works as expected within the performances they are expecting and this is one year from launch. So this is a very important milestone for the spacecraft, integrated is there are we can carry on with the test phase. |
| **10:14:45:23** | **Soundbites: Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA**  **April 2022 - Airbus Defence & Space, Toulouse, France**  **Italian**  **-** What is JUICE and what is the mission objective?  - Instruments of JUICE  - Italian contribution to JUICE  - more on the Italian contributions to JUICE |
| **10:18:49:02** | **Soundbites: Cyril Cavel, JUICE Project Manager, Airbus Defence & Space**  **April 2022 - Airbus Defence & Space, Toulouse, France**  **English** |
|  | So Airbus is the prime contractor for the JUICE mission, meaning that's in contract for ESA, European Space Agency, we are in charge of coordinating the overall industrial consortium to design, develop, manufacture and test of the spacecraft, which is just over there. |
|  | This mission is of particular importance for the European industry because this is the first time that Europe is going to Jupiter. So we are supporting the European Space Agency and beyond the European scientific community in their endeavour to go to Jupiter and explore Jupiter and their moons. |
|  | We have just completed let's say the assembly of a spacecraft in a full flight configuration recently, and we are now starting the test campaign of the spacecraft in order to verify that it is good for flight. Let's say. So we are exactly a year to launch as of today, and over the next 12 months, we will run a certain number of tests, starting with electromagnetic compatibility test in order to verify that the spacecraft is good for flight, ready for shipment to the launch site. |
|  | So we start first with electromagnetic compatibility tests. The goal is to verify that the spacecraft has sufficiently low level of electromagnetic perturbations because a number of instruments of JUICE will sense electric and magnetic fields at Jupiter, and we do not want the spacecraft to be a source of perturbation for that. After that, we will do a number of mechanical tests. It will be done over summer. Here the goal is to verify that the spacecraft can survive the launch environment that will be imposed by Ariane 5 when we launch to Jupiter. After that, we will also test the propulsion system in order to be sure that it is leak tight and fully operational when placed into a flight configuration. We will do a second thermal-vacuum test in a chamber very close to this facility in October in order to verify in pressure and temperature conditions and full flight configuration that the spacecraft is behaving nominally in all functions. And finally, after having tested the spacecraft in all its variant environments, we will verify your last time that from a functional perspective, a spacecraft behaves nominally and is ready for shipment to the launch site. |
|  | We have in total 10 scientific instruments on JUICE and basically, we will we will observe Jupiter and its moons in all possible wavelengths and type of observations, that we can do so. We have a number of telescopes in all wavelengths visible, infrared, ultraviolet. We have radiometer to sense the atmosphere, the structure of winds of Jupiter and their moons, and we have electric and magnetic sensors. Some of them will be deployed at the tip of a magnetometer boom that we will deploy in space. And we have also some particle package that will analyse the composition of a plasma environment of Jupiter and Europa, Ganymede and Calisto. |
|  | In fact on JUICE we collect a number of design and performance requirements, for which it is not taken individually the first time, that we face them on a spacecraft, but we have all of them at the same time on this mission and it's a bit particular. But we have to face all these design requirements at the same time. And in addition to that, we have also some requirements coming from the environment itself of Jupiter, like temperature and radiation. Jupiter is a very aggressive radiation environment, that is doing, what is making the whole design spacecraft, the design of the spacecraft even more complex. |
|  | So RIME is this big antenna that you see there, deployed just behind us. It is radar antenna that is working at a very low wavelength, nine megahertz. So for that to happen, you need a very long piece of antenna that will be able to sound very deep below the surface of the internal structure of the moons, in particular, Europa, Callisto and Ganymede. The objective is to try and locate the liquid water ocean that is underneath the icy crust of these moons. As of today, we are still not sure how deep we have to, we have to dig, let's say, to find this ocean and this antenna will help us figure out at which depth we can find this ocean. |
|  | For so far, we were in a bit of a hybrid mode where we were testing and assembling the spacecraft. We have also been in the phase where we had to remove a number of instruments or platform equipments because there was an anomaly or an error. We had to repair them and install them again on the spacecraft. This phase is now hopefully behind us. We are in full test mode now and this is the moment of truth for us, this is a moment where we will discover if, let's say, whether our years of work in the design, engineering and manufacturing phase has paid off and if the spacecraft behaves as specified, and as expected, let's say so, which is why we will be testing very intensively the spacecrafts in order to verify this. |
| **10:24:17:01** | **GV’s Cyril Cavel, JUICE Project Manager, Airbus Defence & Space**  **5 April 2022 - Airbus Defence & Space, Toulouse, France**  **Credits: ESA** |
| **10:25:38:04** | **GV Manuela Baroni, Juice Assembly, Integration & Test Engineer, ESA**  **5 April 2022 - Airbus Defence & Space, Toulouse, France**  **Credits: ESA** |
| **10:25:48:20** | **GV’s JUICE fully integrated, Airbus Defence & Space cleanroom**  **5 April 2022 - Airbus Defence & Space, Toulouse, France**  **Credits** |
| **10:28:21:13** | **OUTRO** |
| **10:28:35:15** | **End of programme** |