**Hera Asteroid Mission goes on Trial**

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| Image | Text |
| 10:00:00:00  Music: Lost Civilization ©storyblocks Asset ID: SBA-347660327  Video:   * Zooming past a large asteroid in space tumbling towards a sun in the distance ©Storyblocks Asset ID: SBV-338659792 * Dangerous asteroid approaching planet Earth ©Storyblocks Asset ID: SBV-338238628 * Meteor (Asteroid) burns in atmosphere ©Storyblocks Asset ID: SBV-334816737 * Extinction Level Event - Asteroid Impact Causing Apocalyptic Destruction © Storyblocks Asset ID: SBV-339014889   Music: Lose The Shadow ©storyblocks Asset ID: SBA-348420070  Video:   * GV’s Juice mission team at MCR, ESOC – Darmstadt, Germany – 26/01/23 ©ESA * NEO Asteroid Approaching Earth on Collision Course ©storyblocks Asset ID: SBV-346792989 * Gv’s ESA’s Flyeye Telescope at OBH Italia – Milan, Italy – 2019 ©ESA * Inserts asteroid trajectory - ESA asteroid video – 2019 ©ESA * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA (2shots) | **Somewhere in the vastness of space might well lurk an unobserved asteroid, on course for a head-on collision with our planet. Its impact could be devastating for humankind. Should we not wish to experience the fate of dinosaurs we best be prepared.  This is also the view of ESA and NASA as both agencies invest in locating these lonesome wanderers and seek to prepare a planetary defense strategy.  As ESA’s HERA spacecraft arrives at the ESTEC test center in Noordwijk, the Netherlands humankind takes another step towards a safer future for our planet and its species.** |
| 10:00:55:12   * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA | **Title HERA Qualifying for Launch** |
| 10:00:59:18   * Aerial view of ESTEC – Noordwijk, The Netherlands – 2020 ©ESA * GV’s of ESTEC test centre – Noordwijk, The Netherlands – 2017 ©ESA (6Shots) | **The test center at ESTEC is the largest and best satellite testing facility in Europe and is equipped to simulate all aspects of spaceflight, from the force and noise of a rocket take-off to the sustained vacuum and temperature extremes of deep space. This allows new spacecraft such as HERA to efficiently undergo the crucial tests needed to qualify for launch.** |
| 10:01:27:19   * Interview Ian Carnelli Hera Project Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Ian Carnelli: Hera Project Manager, ESA**  We need to make sure that the satellite works, which means the software, all the different pieces of software together, work. And it does what it's supposed to be when it's going to be alone into space. And this entails not only doing the nominal operations, but even more importantly, to be able to react in case of failures, in case things go wrong, or things go differently from what we have planned. |
| 10:01:51:01   * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA (2shots) * GV’s Hera solar wings deployed at ESTEC – Noordwijk, The Netherlands – 27/09/23 ©ESA- A. Conigli * Animation Hera launch – Oktober 2023 ©ESA (2 Shots) * Dart impact replay -2022 ©NASA (2shots) * Animation Dart impact – 2019 ©ESA (2shots) * Animation HERA Arrives at didymos – 2019 ©ESA * Animation HERA Solar wing deployment – Oktober 2023 ©ESA | **At the facility HERA will not only receive her metaphorical wings proving her worthy of flight but also its solar wings will be installed here. Finally the spacecraft will be ready to meet its tight October 2024 launch window in order to make its appointment with the binary asteroid system Didymos and Dimorphos.**  **The HERA spacecraft is part of a larger programme: only a year ago NASA’s DART-mission successfully impacted on Dimorphos shifting the celestial body’s orbit as planned. Now Hera will survey the aftermath and the asteroid up close, to help turn this grand experiment into a well understood and potentially repeatable planetary defense technique.** |
| 10:02:40:08   * Interview Ian Carnelli Hera Project Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA * Animation HERA Cubesats – 2019 ©ESA (3shots) | **Ian Carnelli: Hera Project Manager, ESA**  One of the interesting aspects of Hera is that for the first time we bring two CubeSats with us. These are very small spacecraft, similarly to drones that will go very close to the surface of the asteroid and gather complementary information to Hera. They will have a ground penetrating radar. They will have multispectral imagers, all of this. And as going closer, of course, they will take more risks. So the idea there is that we fly cheaper systems closer to the danger zone and keep Hera at the safe distance. |
| **So it is not only Hera that needs to be tested but also the CubeSats it carries with it – and how the trio of spacecraft will work together in deep space.** |
| 10:03:26:10   * Interview Paolo Martino: Hera Lead Systems Engineer – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA   Music: Wings Of Inspiration ©storyblocks Asset ID: SBA-347259551 | **Paolo Martino: Hera Lead systems engineer, ESA**  Out of all these tests which are typically performed on all the spacecraft that are launched into space. One of particular interest will be the one in the anechoic chamber when we will assess the what so called electromagnetic compatibility. In that framework, we will operate for the first time the CubeSats and the mother spacecraft communicating to each other via this inter satellite link. This is one of the primes of the Hera mission in deep space. |
| 10:03:54:20   * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA (4shots) * Animation HERA arriving – Oktober 2023 ©ESA | **Hera is a unique spacecraft and compared to its predecessor asteroid hunters like Rosetta, Hera is about 10 times smaller and cheaper. An enormous achievement for the team.  Soon HERA will leave ESTEC and be fully ready to take on the vastness of space and explore Dimorphos, teaching humankind about strategies how to defend itself against the asteroid that could end it all.** |
| **10:04:28:03** | **ESA OUTRO** |
| **10:04:42:07** | **END** |

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| **BR002**   * Interview Paolo Martino: Hera Lead Systems Engineer – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Paolo Martino**  **Hera Lead Systems Engineer, ESA – ENGLISH**  **Paolo Martino** [00:00:05] I am Paolo Martino, the lead system engineer of the Hera mission. That means I'm responsible to make sure that the design of the satellite fulfils the requirement from the scientific and planetary defence community.  **Paolo Martino** [00:00:24] [00:00:24]Having Hera here in ESTEC for ready for testing for the first time. It's been a very, very emotional moment. For some members of the team this represents the apex of a journey more than ten years long, and this is a huge achievement. Being here just three years after the signature of the development contract represents really an almost unprecedented achievement for deep space mission. In order to be here in such a short timeframe [30.5s] countless people had to work day and night for the last three years. Everybody in the industrial consortium and a ESA had to go that extra mile to make sure we could be here on time today.  **Paolo Martino** [00:01:12] The Hera mission builds on the heritage of other European Deep Space Missions and asteroid and comet chasers. The most famous is the Rosetta mission, of which we can say that Hera represents a faster, cheaper and simpler version.  **Paolo Martino** [00:01:33] [00:01:33]The Hera mission is designed to get in a couple of years close to the asteroid Dimorphos and will be capable to move around the asteroid, orbit around Dimorphos, the moon off this system, in order to characterise it and be able to assess the effects of the impact of the DART mission. The mission will also be able to deploy two CubeSat, two smaller spacecraft that are more or less the size of a cereal box. And those will carry additional instruments and will get in close proximity of the asteroid, bringing additional added value to the mission. [34.0s]  **Paolo Martino** [00:02:12] [00:02:12]Hera is operating very far away from the earth and more than 500 million kilometres. Therefore, it is not possible to have it controlled directly from ground. In order to operate safely around the asteroid. The mission and the satellite needs to have some degree of autonomy to be able onboard to understand where it is with respect to the asteroid, where it's going and whether it is on a dangerous course of collision. So the spacecraft has the capability to understand whether there is a risk of collision and autonomously put itself in a safer trajectory and call ground for help. [35.6s]  **Paolo Martino** [00:02:51] The CubeSat can be seen as smaller, independent and autonomous mission. Each has its own mission objectives. One will fully characterise the asteroid with hyperspectral imagers. The other one has a low frequency radar that will be able to characterise even the interior of the asteroid. So we will have a kind of CT-scan of the asteroid for the first time.  **Paolo Martino** [00:03:18] The Hera mission is characterised by an extremely complex development timeframe. Just today we are less than three years from contract signature. This means that we had to speed up and go at the pace much higher than a regular mission development, meaning every issue and hiccup that we had along the way had to be solved in quasi real time. My specific role in the project has been to coordinate the engineering team and make sure we could find a solution and find a way to go ahead every time we had an issue. And as you can imagine, this can happen. It happens in all the projects.  **Paolo Martino** [00:03:59] In the next months here in the ESTEC test centre Hera will undergo what is called the Environmental Test campaign, meaning it will be subject to all of the conditions in terms of mechanical load, temperature and RF environment that we see during the mission. So it's always a moment of great tension for the team because it's where we will have the certainty that the design, that the design has been done well and will work properly. Out of all these tests which are typically performed on all the spacecraft that are launched into space. One of particular interest will be the one in the anechoic chamber when we will assess the what so called electromagnetic compatibility. In that framework, we will operate for the first time the CubeSats and the mother spacecraft communicating to each other via this inter satellite link. This is one of the primes of the Hera mission in deep space.  **Paolo Martino** [00:04:59] [00:04:59]With Hera we are going to characterise the object of the impact of DART on the dimorphos asteroid. And this is fundamental in order to allow the scientists to extrapolate their scientific model and fully understand the effectiveness of the impact of DART. In this way we would be able to understand whether this technique is actually validated planetary defence technique and can be used again in the future in case an asteroid that poses a threat to Earth shows up. [31.0s]  **Paolo Martino** [00:05:33] The Hera mission will study in detail Dimorphos the object of the impact of DART last year. And this is fundamental because characterising this object will allow the scientific community to validate their models and validate therefore the kinetic impact of planetary defence technique. Meaning, after Hera, we would be fully sure that this technique can be used in case of need, when we will have to deflect a potentially dangerous asteroid.  **Paolo Martino** [00:06:05] Having today the Hera spacecraft here at the ESTEC Test Centre is a very emotional moment. The ESA team and all the industrial consortium have been working around the clock for the last three years to make sure we could have this huge achievement today. And for some members of the team, this represents the apex of a journey longer than ten years. We all know that there is still a lot of work to be done before launch next year, but being here today, after just three years from Contract Signature, represents an unprecedented achievement in the development of novel deep space platforms. |

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| **BR003**   * Interview Paolo Martino: Hera Lead Systems Engineer – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Paolo Martino**  **Hera Lead Systems Engineer, ESA – Italian** |

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|  | **B-ROLL** |
| **BR004**   * Interview Ian Carnelli Hera Project Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Ian Carnelli**  **Hera Project Manager, ESA – ENGLISH**  **Ian Carnelli** [00:00:05] So my name is Ian Carnelli, I am the project manager of the Hera mission at ESA.  **Ian Carnelli** [00:00:12] So now we're in a phase of the mission where the satellites has come home. Here in ESA in the test centre. And for us, it's a huge achievement because it means that most of the mechanical integration of the satellite is finished, all the units are on board. And it's something that only two years ago nobody would have believed. Only a year ago we were in the critical design review. So it was it's a huge accomplishment in one year to have the satellite here and ready for testing.  **Ian Carnelli** [00:00:43] For me, this is a great emotion. I feel extremely emotional because it's something I've dreamt of for 20 years. I started working on this in 2005 and having the spacecraft here now, it's an unbelievable emotion.  **Ian Carnelli** [00:01:00] So now that the satellite is integrated, what we need to do is to ensure that it works in space. So we need to put it through all the conditions of space, not only physical in terms of temperature, in terms of environment, in terms of radiations, but even more importantly in terms of functionality. We need to make sure that the satellite works, which means the software, all the different pieces of software together, work. And it does what it's supposed to be when it's going to be alone into space. And this entails not only doing the nominal operations, but even more importantly, to be able to react in case of failures, in case things go wrong, or things go differently from what we have planned.  **Ian Carnelli** [00:01:45] [00:01:45]The Hera mission is ESA's the first mission to an asteroid and a very special asteroid that was impacted by the NASA mission DART to test for the first time if we can reflect an asteroid and protect Earth from asteroids. What Hera will do is to complement the NASA mission by gathering all the information the scientists need to validate numerical impact codes, which means to be able to to design a mission in the future should an asteroid come toward us. [31.3s]  **Ian Carnelli** [00:02:20] The Hera emission for the first time will bring a radar which will allow us to get the internal structure of the asteroid and will bring a suit of instruments like a thermal camera, a multispectral camera to understand the properties of this asteroid. And this is fundamental information to complement the data from DART, in order to be able to use this technique in future asteroids.  **Ian Carnelli** [00:02:47] One of the interesting aspects of Hera is that for the first time we bring two CubeSats with us. These are very small spacecraft, similarly to drones that will go very close to the surface of the asteroid and gather complementary information to Hera. They will have a ground penetrating radar. They will have multispectral imagers, all of this. And as going closer, of course, they will take more risks. So the idea there is that we fly cheaper systems closer to the danger zone and keep Hera at the safe distance.  **Ian Carnelli** [00:03:24] [00:03:24]Hera has a number of new technologies besides the CubeSats that are the first we fly in deep space. We also have a very innovative radio communication system between Hera and the CubeSats. Hera will act as a data relay to Earth. We have a completely new guidance system Hera will be for the first time a spacecraft that these kind of intelligent it will be able to fly alone around the asteroid. So understanding its relative position, but also calculating on board the manoeuvres it needs to go to take to go to the next point. So it's a sort of autopilot system. That Hera will demonstrate in deep space. [39.9s]  **Ian Carnelli** [00:04:08] I'm personally super nervous about the tests because we work really hard, but now it's the proof, and now it's when we know whether things work or not. The tests we're going to do in the next months are really, really tough, not only for for the Hera spacecraft, but also for the software engineers, for all of the minds. There are hundreds of engineers are working on this mission. And now we will finally know whether it all works together.  **Ian Carnelli** [00:04:40] [00:04:40]So planetary defence is by definition an endeavour that needs to be done internationally and the DART and Hera together are the perfect expression of this idea, is that humanity needs to work together to defend the planet. In our case, from asteroids and with DART and Hera completed, we will finally be able to say that we have protected Earth from future asteroids. [25.4s] From a personal point of view. It's it's a dream to be able to work with scientists from all over the world. And that I think it's a good example of what humanity can achieve when we work together. |

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| **BR005**   * Interview Ian Carnelli Hera Project Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Ian Carnelli**  **Hera Project Manager, ESA – Italian** |

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| **BR006**   * Interview Heli Greus, Hera Product Assurance and Safety Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Heli Greus**  **Hera Product Assurance and Safety Manager, ESA – ENGLISH**  **Heli Greus** [00:00:05] My name is Heli Greus and Product Assurance and Safety Manager for Hera mission, which means that I'll give the final approval for anything that goes to the spacecraft, starting from the components, materials, cables, whatever, you name it, and I'll give them a final approval for it.  **Heli Greus** [00:00:22] My role is to make sure that everything works as planned and all the materials and components that are going to the spacecraft will survive the space environment.  **Heli Greus** [00:00:35] And my role is for the testing of what's happens here at ESTEC, is to make sure that if there's any issues with the testing, that we will quickly resolve them, together with our, of course, OHB team and ESA team and all the experts together.  **Heli Greus** [00:00:49] Here in ESTEC, we do an environmental test campaign. So it means that we start with the mechanical testing. Then we go to TVAC and SO and so on. So it's all a spacecraft level testing will happen here at ESTEC.  **Heli Greus** [00:01:04] We started with, the testing starts with Mechanical testing which simulates the launch environment and also when we do deployments in space. So all the first, the shock, acceleration of the spacecraft and then in space, when we deploy the solar wings, there's a shock. So that everything, all the shock levels which is seen, is covered by the testing that is done here.  **Heli Greus** [00:01:32] There's always something that could go wrong at the testing, and that's why we do the testing that we know that. Okay, did we protect the test level correctly? Did we do everything right? But of course, are all the items ready, all the equipment, structural and everything has been already tested separately. So this is the final test on the spacecraft level to make, to prove that everything survives.  **Heli Greus** [00:01:57] The Hera solar wings actually arrive today here at ESTEC. So first we, first of course, we will look, do our incoming inspection that everything is correct. There's no damage related to transportation. Then they're stowed and put to the Hera spacecraft and they will go through the mechanical testing. Then they are taking out again, so that we can then do more electrical testing. Because, one of my titles of which is safety, is that it's not safe to have the solar array wings on the spacecraft when you do electoral testing because it also takes time, but if you rotate it, you actually can damage something if you don't take care.  **Heli Greus** [00:02:40] Hera, together with DART, will find out what would be the defence mechanism in case someday there will be asteroids that will be a threat to Earth. So that we will be ready with a defence mechanism to deflect the asteroid so that it doesn't pose a big threat to earth.  **Heli Greus** [00:03:04] This is actually my first asteroid defender mission. So I have been working on Earth observation, telecommunication satellites, and also a little bit on Euclid, but I'm really interested on the science part of this mission and also the future of what we can learn about asteroids.  **Heli Greus** [00:03:25] It's really amazing to see the spacecraft here at ESTEC and ready to be tested. It means so much to the team and all the hard work that we have done during the years. It's really paying off now. And after that, the whole testing, we will be ready to be shipped to the launch site. |

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| **BR007**   * Interview Heli Greus, Hera Product Assurance and Safety Manager – ESTEC, Noordwijk, The Netherlands – 30/08/23 ©ESA | **Soundbites Heli Greus**  **Hera Product Assurance and Safety Manager, ESA – Finnish** |

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|  | **B-ROLL** |
| **BR008**   * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA | **GV’s Hera arriving at the ESTEC Test Centre**  **Closing the tranport container** |

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|  | **B-ROLL** |
| **BR009**   * GV’s Hera Arrival at ESTEC – Noordwijk, The Netherlands – 30/08/23 ©ESA | **GV’s Hera arriving at the ESTEC Test Centre**  **Hera** |

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|  | **B-ROLL** |
| **BR010**   * Animations Hera’s journey | **Hera Animations**  **October 2023**   * **Launch** * **Deployment solar wings** * **Mars flyby** * **Arrival of Hera at Didymos** |