

Video: Engineers conduct "heart surgery" on the Webb telescope

June 1 2015, by Laura Betz

In this new NASA video, engineers from Airbus Defense and Space (DS), Ottobrunn, Germany, dressed in white protective suits and special white gloves, recently completed a delicate surgical procedure to exchange two key components from the "heart" of an instrument on the James Webb Space Telescope at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Airbus DS is associated with the European Space Agency, one of NASA's two partners on the Webb. The other is the Canadian Space Agency.

Webb has four main instruments that will detect light from distant stars and galaxies, and planets orbiting other stars. The operation required the team to open one of those four instruments, the Near Infrared Spectrograph or NIRSpec, which is a highly sensitive instrument. This was the last chance to provide upgrades before it flies on the Webb telescope in 2018.

Once in [space](#), NIRSpec will be capable of measuring the spectrum of up to one hundred objects simultaneously. With this tool, scientists will be capable of observing large samples of galaxies and stars at unprecedented depths across large swaths of the Universe and far back in time.

To make this remarkable achievement possible, Goddard scientists and engineers had to invent a new device. This so-called Micro Shutter Array

(MSA) controls whether light from an astronomical object in the telescope field of view enters the NIRSpec. The MSA consists of just under a quarter of a million individually controlled microshutters. Each shutter is approximately as wide as a human hair.

"We exchanged two very crucial subsystems, NIRSpec's Focal Plane Array and the Micro Shutter. We were working deep in the heart of the instrument," said Maurice te Plate, European Space Agency's Webb system integration and test manager working at NASA Goddard. "We used laser trackers and special camera systems to make sure that everything was accurately aligned. We've had very good support from NASA and we've had a great team from Airbus DS Germany that was super professional and dedicated."

Each morning after dressing in special garments that do not generate dust, the team began work with the lights in the big clean room switched off. They turned their specialized flashlights on and begin pouring over this vital piece looking for fibers. Any presence of fibers could weave through the micro shutters and prevent them from properly closing.

"To prepare for this operation we planned for a year," said Ralf Ehrenwinkler Airbus DS NIRSpec Post Delivery Support Manager. "We performed everything in a different environment so it's an added challenge. We needed to copy the same clean room environment as the instrument was integrated in Germany, so we needed to establish special clothes and requirements. There was a lot of coordination. The recorded data showed that the required cleanliness levels were well achieved."

Once NIRSpec received its last chance updates, it joined the three other Webb science instruments that were mounted on the ISIM.

NIRSpec weighs about 430 pounds (195 kg), about as much as an upright piano. It is one of four instruments that will fly aboard the Webb

telescope. The other instruments include the Near-Infrared Camera (NIRCam), the Mid-Infrared Instrument (MIRI) and the Fine Guidance Sensor/ Near InfraRed Imager and Slitless Spectrograph (FGS/NIRISS).

NIRSpec was provided by the European Space Agency and built by Airbus Defense and Space in Germany.

The James Webb Space Telescope is the successor to NASA's Hubble Space Telescope. It will be the most powerful [space telescope](#) ever built.

More information: For more information about the ISIM, visit: www.jwst.nasa.gov/isim.html

For more information about the Webb telescope, visit: www.jwst.nasa.gov or www.nasa.gov/webb

Provided by NASA

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