Engine problems delay launch of NASA's Artemis I mission to the Moon

Bryan Dyne
29 August 2022

The launch of NASA's new Artemis I spacecraft, designed to once again land astronauts on the Moon, was scrubbed on Monday at 8:34 a.m. Eastern Time after launch controllers at the Kennedy Space Center were unable to resolve an engine issue that emerged during the pre-launch countdown sequence. The space agency reported that the rocket is safe and stable as engineers continue to gather and process further data.

The next two possible launch dates for Artemis I are on Friday, September 2, and Monday, September 5.

Several other technical difficulties and delays occurred before the launch was officially delayed. Storms in the Atlantic Ocean pushed the launch back an hour, and a leak occurred as technicians began to fill the rocket's liquid hydrogen tanks, forcing them to fuel the rocket at a slower pace. There was also ice build-up that was spotted and an 11-minute communications lag between the spacecraft and ground control, which would have made controlling the mission during launch and after impossible.

The problem with Engine 3 of the rocket's four engines, however, proved insurmountable during the launch window for the mission. Each of the engines must be cooled by venting small amounts of liquid hydrogen through them before launch so that the temperature difference between the super-cooled fuel and the engine itself does not cause potentially catastrophic problems as the engines fire. The venting problem was thought to have been resolved in June, according to NASA officials.

The ice build-up also initially greatly alarmed launch control, no doubt reminding many of the frozen O-ring which was the technical fault that caused the explosion of the Space Shuttle Challenger in 1983. It was determined, however, that the ice was only freezing along a crack in the foam between the liquid hydrogen and liquid oxygen fuel tanks and deemed not hazardous to the launch.

The further delay of the Artemis I launch highlights the immense complexity and daunting nature of spaceflight, even more so when the vessels involved are rated for humans. While Artemis I will be uncrewed, instead carrying a variety of instruments to gauge the hazards of human travel to the Moon in this particular spacecraft, the ultimate goal is for Artemis II to have a crew which will orbit the Moon and for Artemis III to safely land astronauts on the Moon, using a separate landing vehicle similar to that of Apollo, where they will perform moonwalks, conduct experiments and return to the orbiting Orion and finally to Earth.

The missions will each take several weeks. When Artemis I launches, it will be propelled above the atmosphere by the Space Launch System (SLS), a combination of the Apollo-era Saturn V rocket and four RS-25 engines taken from decommissioned space shuttles, aided by two newly designed solid rocket boosters to provide greater lift capacity for the system. The second part of the mission consists of Orion, a partially reusable spacecraft which can support a crew of six for up to 21 days in orbit. Orion will be set on a trajectory to orbit the Moon six times before coming back to Earth and splashing down in the Pacific Ocean. The entire mission is expected to take 42 days and will be used to test all Artemis systems before a crewed mission is sent to the Moon.

A great deal has been made of the Artemis mission by NASA and the Biden administration: Astronauts will be returning to the Moon for the first time in five decades; the orbits around the Moon will take them further from Earth than Apollo; the missions will last longer than Apollo and pave the way for a permanent human presence on the Moon; and the missions will act as a jumping off point for even more distant missions to Mars and possibly beyond.

These are worthy goals if viewed in a social and political vacuum. The development of human-capable space vessels is a scientific and technical achievement, one that provides another victory for the materialist outlook of history, that human beings can understand nature and thus themselves and the society within which they live. Under capitalism, such aspirations are marred by religious obscurantism and increasingly belligerent militarism.

In the lead-up to the launch, NASA Administrator Bill Nelson, a former Democratic senator from Florida, proclaimed the Kennedy Space Center one of the country's "sacred sites." Kamala Harris attended the aborted launch as Vice President and head of the National Space Council, a body established under the Trump administration and at which the fascistic former president announced the creation of the new Space Force branch of the US military.

There is also a strong component of identity politics around

© World Socialist Web Site

the mission: The crews will include the first woman and the first person of color to land on the Moon, and the Artemis I launch is being overseen by the first female flight director. Even the name of the program has been contrasted as shifting from the Greek god of the Sun to the goddess of the Moon.

Such cultural and geopolitical limitations are also manifest in the design of the spacecraft itself. The entire mission concept is largely a rehash of the Apollo missions without any fundamentally new engineering. The Orion two modules are larger versions of the old Command and Service Modules; the Space Launch System is still a large tank fuel of highly explosive propellant aimed upwards. In many ways, the design is a step backward from the Space Shuttle, which for all its limitations was a mostly reusable spacecraft that allowed astronauts to perform a variety of experiments and types of labor in space.

The Artemis program, which formally began in 2017, is not the first post-Apollo project to return to the Moon and then on to Mars attempted by the American government. The first such proposal came from George H.W. Bush in 1989, when he proposed the Space Exploration Initiative on the 20th anniversary of the Apollo 11 landing. It was estimated to cost $500 billion, however, and was never funded by Congress.

A similar program was established by George W. Bush in 2005, named Constellation. It was slated to cost only $230 billion and received initial funding from Congress. Constellation proceeded to develop initial designs for the Ares I (the crewed spacecraft), the Ares V (the cargo vehicle), both of which were similar in design to the SLS. The current Orion spacecraft also began development during this period.

Constellation was canceled by the Obama administration in 2010, citing numerous delays and cost overruns. That administration then announced the SLS, which continued development of Orion and shifted work away from the Ares designs to the SLS. Work continued for seven years before again being renamed, this time under the auspices of the fascistic President Trump, to Artemis.

In addition to using previously developed spacecraft and parts for Artemis, NASA has also contracted out the actual lunar lander, the Human Landing System, to SpaceX, in a further privatization of spaceflight. Elon Musk, the owner of SpaceX and currently the world's wealthiest person, claims that his lander will be launched by SpaceX's still incomplete Starship.

It is unclear whether or not the lander will actually be functional given that it is not designed to ferry astronauts to the surface of the Moon after they have transferred from Orion to the currently nonexistent Lunar Gateway, a Moon-orbiting space station announced by the Trump administration in 2018. The Human Landing System is also still incomplete even as NASA has given billions of dollars to SpaceX. There is also a very real danger of the vessel exploding, given how many times Starship itself has suffered minor, major or catastrophic explosions while being tested.

The Artemis program is also deeply tied to the militarization of space. The Space Force is already designing spy satellites and other military-intelligence infrastructure for the Moon to watch potential Chinese landers or future bases. The sixth branch of the US military is also being used to forecast the weather for the Artemis I launch, a task which previously was the purview of the National Oceanic and Atmospheric Administration (NOAA).

Even the international nature of the mission is marred by the fact that all the countries that have contributed are under the Artemis Accords, essentially a pledge by 20 other countries closely aligned with the US to support American dominance in space.

And when the aforementioned Lunar Gateway was announced, Trump at the time declared that the space lanes between Earth and the Moon are "a matter of national security" and that the US should not have "China and Russia and other countries leading us." This outlook has been maintained by the Biden administration, which has sharply increased tensions with China over Taiwan and has threatened to unleash a nuclear World War III with the US/NATO-provoked war in Ukraine.

There is also no clear conception of the actual scientific goals of orbiting and landing on the Moon. During the Apollo era, which was ultimately defined by the conflict between the Unites States and Soviet Union, each successive step in getting to the Moon was a scientific and engineering feat in itself, one which involved more than 500,000 people. Artemis, in contrast, is essentially wholly defined by the tensions between the US, Russia and China, with no true pioneering technical work taking place.

It is also worth noting that the planned crewed launches in Artemis are slated to take place at an inopportune time for space flight in general. The Sun has a roughly 11-year cycle during which its energy output waxes and wanes, known as solar cycles. Solar Cycle 25 (based on solar activity records going back to 1755) started in 2019 and is slated to be at its peak in 2024 or 2025, when crewed missions to the lunar surface are expected to take place. During this peak, solar energy output can spike in the form of solar flares and coronal mass ejections, both of which can deliver potentially lethal doses of radiation to astronauts. Such an event almost killed the astronauts of Apollo 16 and 17.

That the Artemis missions are being carried out during the Sun's maximum energy output, rather than its minimum, further speaks to the fact that Artemis is driven more by domestic and international political considerations than genuinely scientific ones.

To contact the WSWS and the Socialist Equality Party visit:

wsws.org/contact

© World Socialist Web Site