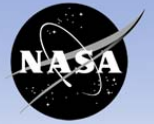


National Aeronautics and Space Administration



LAGNIAPPE

John C. Stennis Space Center

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WE TEST THE
FUTURE

NASA John C. Stennis Space Center
We are GO for Green Run!

For the latest on NASA/Stennis Space Center status, please refer to:

<https://sscsos.com/>

<https://nasapeople.nasa.gov/coronavirus/coronavirus.htm>

In 1961, Jerrie Cobb was a woman in search of a ride. She was not looking for a ride in the same way I was when my beloved '63 green Plymouth convertible hit the Grand Canyon of potholes and blew out both driver side tires one rainy night. I would have been happy to have on overgrown armadillo to ride back to town that evening. Ark!

Cobb was not on the side of the road in the rain, but she still was stranded in a way. As the unofficial first woman astronaut, she was looking for a ride to space.

Many people have never heard of Cobb. She was not officially a U.S. astronaut, and NASA did not officially begin accepting women in the program until 1978. However, in 1961, she was part of a group of women who underwent the same training as the famed Mercury 7 astronauts so heralded in book and film.

They were part of a privately funded effort to see how women might adapt to space travel. An experienced aviator, Cobb was the first woman to complete the training (that is her undergoing an inertia exercise below). She even ranked in the top 2 percent of all candidates (male or female) who went through the regimen.

Not one to give up easily, Cobb and others petitioned Congress to allow her to fly, both in 1961 and in 1999, as NASA prepared to return Mercury astronaut John Glenn to space to study aging. Permission was not granted. Cobb remained Earthbound.

However, she did live to see women in space. She witnessed Sally Ride as the first U.S. woman in space in 1983 and Eileen Collins as the first woman to serve as space shuttle commander in 1999. She saw Susan Helms complete the longest single spacewalk on record in 2001 and saw Peggy Whitson become the first woman to command the International Space Station in 2008 and set records as the oldest woman in space and oldest woman spacewalker. She even saw Whitson retire in 2018 as the nation's most experienced astronaut, having spent almost 666 total days in space.

Cobb passed away last March, which also is the month of the annual national Women's History Month observation. March is a good time to remember women such as Cobb, Ride, Collins, Whitson and so many other who have contributed in some way to the American space program. Some, like Cobb, may not have actually flown, but they certainly all soared.



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NASA's MOON to MARS MISSION



GO...
GO...
GO!

Why test at Stennis Space Center?

One day in the sooner-rather-than-later future, people across the nation will rearrange daily schedules to witness a long-anticipated event – the maiden launch of NASA's new Space Launch System (SLS) rocket.

A pair of solid rocket boosters and four RS-25 engines will fire at a south Florida launchpad to generate more than 8 million pounds of thrust, lifting the 321-foot SLS rocket into the sky on its way to the Moon and back.

The launch will herald the beginning of a new great era of space exploration, one set on establishing a sustainable presence on the Moon and placing human footprints on Mars.

In no small part, success of the new era rests on hard work provided by Stennis Space Center, which is testing the rocket engines and SLS core stage that will power the new rocket to unprecedented destinations.

Lagniappe is featuring a series of articles under the "Go ... Go ... Go!" heading that detail aspects of NASA's next step into deep space and Stennis' role in making such missions possible. The following represents the latest installment.

When NASA decided several years ago that the core stage of the new Space Launch System rocket would be tested at Stennis Space Center, not many people could have been surprised.

The south Mississippi site has been front-and-center for large propulsion system testing for more than 50 years. It was a logical decision to turn to the site once more as America prepares to return humans deep space exploration missions.

Why does Stennis play such a central – and special – role in powering the nation's space program? There are four primary contributing factors.

Stennis history

Stennis has a unique and storied history in powering the U.S. space exploration program. It was built in the 1960s to test Saturn V first and second stages that carried the very first humans to the Moon. The site conducted its first-ever propulsion test on April 23, 1966, a 15-second firing of a Saturn V second stage prototype (S-II-C). It went on to test the Saturn V first and second stages that powered the Apollo missions that carried astronauts to the surface of the Moon.

Following the end of the Apollo Program, the site began testing main engines for the new space shuttle vehicle. It also tested the integrated shuttle propulsion system, which involved configuring and simultaneously firing three main engines on the B-2 Test Stand to prove the system was ready to fly.

The site went on to test every main engine that powered 135 space shuttle missions from 1981 to 2011. These missions enabled such work as the launch of the Hubble Space Telescope and the construction of the International Space Station. Every modification or configuration of space shuttle main engines also was tested and proven flightworthy at Stennis before being used on a mission.

Stennis facilities

Stennis has unique and amazingly durable test facilities, overall valued at more than \$2 billion. The facilities include four large test stands – A-1, A-2, A-3 and B-1/B-2 (SLS core stage testing will be conducted on the newly modified B-2 facility). The smaller and versatile three-stand E Test Complex at Stennis includes seven separate cells capable of various test activities.

Test support facilities at Stennis are just as remarkable. The High-Pressure Water Facility, complete with a 66-million-gallon reservoir, provides all of the water and electricity needed for propulsion testing. The High-Pressure Gas Facility supplies four gases – nitrogen, hydrogen, helium and high-pressure air – critical to propulsion testing and to maintaining test facilities. Its role is so important that gas facility operations have not ceased at any time since it first went operational in the 1960s.

Stennis also features seven-and-a-half miles of canal waterways, which include a lock system that allows transport of large rocket stages and cryogenic barges from the Gulf of Mexico to onsite locations via the Pearl River. Finally, the site is surrounded by a 125,000-acre acoustical buffer zone, an area in which no habitable structures can be built. Without this area to shield communities, the site could not test large rocket engines and stages.

In April 2008, the American Institute of Aeronautics and Astronautics recognized the uniqueness and value of Stennis facilities, designating the center as a historic aerospace site.

Stennis expertise

One would be hard-pressed to find a more experienced and capable group of propulsion test personnel than those located at Stennis.

The work performed at the site is the very definition of rocket science. Propulsion testing is an incredibly complex operation. It involves handling super-cold propellants, such as liquid oxygen and liquid hydrogen. It requires flowing up 200,000 to 300,000 gallons of water a minute, depending on the test. Since the goal is to test a propulsion engine/article in the same manner it will fly, test operators basically follow the same procedures involved with a rocket launch.

Such work is conducted by highly specialized teams. Stennis engineers conducted 43 test firings during the Apollo Program years, accumulating a total of 2,475 man-years of rocket engine test team expertise. From 1975 to 2009, site personnel then conducted more than 2,300 space shuttle main engine tests. They also have tested other large engines, including the J-2X and RS-68, as well as various engine components.

In 2019, after Stennis operators conducted an unprecedented 10 large engine tests in 10 days, one observer succinctly characterized them as “a national asset.”

Stennis record

When it comes to propulsion testing, Stennis has an unmatched record. All 27 Saturn V rocket stages tested at the site performed on missions without a single failure. No space shuttle mission ever failed due to an engine malfunction or failure. The site also provided critical Return to Flight testing for the shuttle program following the Challenger and Columbia tragedies. And it is home to the NASA Rocket Propulsion Test Program Office, which manages and coordinates propulsion testing across the agency.

As the U.S. prepared to go to the Moon in the 1960s and NASA worked to design the rocket to fly those missions, rocket scientist Wernher von Braun pointed to the test site under construction in south Mississippi and said, “I don't know yet what method we will use to get to the Moon, but I do know that we have to go through Mississippi to get there!”

More than five decades later, nothing has changed.



Supermoon appears above nation's capital

A March 9 image shows a supermoon rising behind the U.S. Capitol. A supermoon occurs when the Moon's orbit is closest (perigee) to Earth.

NASA in the News

NASA selects 4 cosmic missions

NASA has selected proposals for four missions that would study cosmic explosions and the debris they leave behind, as well as monitor how nearby stellar flares may affect the atmospheres of orbiting planets. Following detailed evaluations, the agency intends to select two proposals in 2021 to be the next astrophysics missions under the Explorers Program. The selected missions will be targeted for launch in 2025. Selected proposals are: the Extreme-ultraviolet Stellar Characterization for Atmospheric Physics and Evolution mission, which would study nearby stars, watching for rapid, strong ultraviolet flares; the Compton Spectrometer and Imager mission, which would scan the Milky Way galaxy to map the recent history of star death and element production; the Gravitational-wave Ultraviolet Counterpart Imager mission, which would scan the sky to identify such objects as merging neutron stars and exploding stars; the Large Area burst Polarimeter, which would study energetic jets launched during the explosive death of a massive star or merger of compact objects. For more on the Explorers Program visit: <https://explorers.gsfc.nasa.gov/index.html>.

NASA offers popular e-book downloads

Earth: A photo-essay book from NASA's Earth Science Division provides a satellite view of Earth. Download at: <https://go.usa.gov/xdeHA>.

Hubble Focus: Galaxies Through Space and Time: A look at Hubble's recent discoveries about galaxies from the Milky Way to the most distant galaxies ever seen. Download at: <https://go.usa.gov/xdeHe>.

Earth at Night: Book looks at how humans and natural phenomena light up the darkness, and how scientists have observed Earth's nightlights for more than four decades. Download at: <https://go.usa.gov/xdeHJ>.

Beyond Earth, A Chronicle of Deep Space Exploration: Book discusses attempts to send robotic travelers beyond Earth orbit and, ultimately, beyond the solar system. Download at: <https://go.usa.gov/xde6q>.

The Saturn System Through the Eyes of Cassini: Book features some of the 450,000 images of the Cassini mission within the Saturn system, providing new views of the "lord of the rings" and a plethora of iconic images. Download at: <https://go.usa.gov/xde64>.

Stennis hosts NASA Day at the Capitol activities



Stennis Space Center leaders visited Jackson on Feb. 19-20 to conduct annual Stennis Day at the Capitol activities. Astronaut Doug Wheelock participated in the event, visiting individual legislators and addressing members of the state Senate as well (top left photo). Wheelock was joined in the Senate chambers by community and legislative leaders, as well as Stennis Director Rick Gilbrech (second from right) and NASA Shared Services Center Executive Director Anita Harrell (far right). Mississippi Lieutenant Gov. Delbert Hosemann presided. Wheelock also had a chance to greet a group of visiting children (bottom center photo) during Feb. 20 activities. Among other visits (top right photo), Gilbrech and Wheelock spent time with Senate President Pro Tempore Dean Kirby of Pearl, Miss. Legislators and Capitol visitors also had a chance to enjoy Stennis exhibits and learn about the range of work conducted at the nation's largest propulsion test site.



NASA, congressional groups visit Stennis Space Center, tour test complex facilities



A trio of groups visited Stennis Space Center in late February and early March, learning about ongoing work at the site and touring test complex facilities. The groups had an opportunity to tour the Aerojet Rocketdyne Engine Assembly Facility, where RS-25 engines for NASA's new Space Launch System (SLS) rocket are assembled and maintained. The visiting groups included NASA's Flight Pressure Systems Working Group (top photo), shown at the B-2 Test Stand, which houses the SLS core stage currently undergoing Green Run testing prior to its launch on a maiden mission; the NASA Software Working Group (center photo), shown standing in the A-2 Test Stand flame deflector; and legislative staff and interns from the office of U.S. Rep. Garrett Graves of Louisiana (far right photo), shown at the B-2 Test Stand.

Stennis highlights Black history

(Left photo) Jasper Cook, an electrical design engineer in the Stennis Space Center Engineering and Test Directorate, speaks to employees during the site's Black History Month program Feb. 27. Cook was joined on the "Stennis Hidden Figures of Artemis" panel by Dawn Davis, chief of the Electrical Design Branch in the Stennis Engineering and Test Directorate; and Barry Robinson, manager of the B-2 Test Stand Space Launch System Core Stage Green Run Test Project. All are supporting NASA's Artemis program effort to return humans to the Moon in preparation for eventual travel to Mars. In addition to the panel discussion, the annual program featured a Stennis choir (right photo). Black History Month, also known as National African American History Month, is observed every February to celebrate achievements by African Americans and to recognize their contributions to American history, society and culture.



Engineer has enjoyed varied test career at Stennis

Skip Roberts has worked as an engineer at Stennis Space Center for 20 years, which means he has been involved with numerous propulsion test projects.

That makes it understandably hard for him to point to a particular project or achievement as his proudest. “Each program comes with its own unique challenges to overcome,” said Roberts, a native of Thomasville, Georgia, and resident of Gautier, Mississippi.

Upon reflection, though, Roberts is able to settle on an answer. “It is the first time we light a new test article,” he said. “The expressions on people’s faces are priceless, knowing all of the hard work has finally paid off.”

Roberts has seen a lot of priceless expressions in his 20 years at Stennis. He arrived on site through a co-op program with the University of South Alabama. In 2000, he was hired as a test engineer, which enabled him to work on numerous projects. These included testing of both engine components and full-scale engines, from low-thrust engines to those powerful enough to launch space shuttle missions.

In 2010, Roberts began a two-year stint as test director on the A-2 Test Stand. During that time, he oversaw testing of the new J-2X engine, planned to provide upper stage propulsion for travel to deep space. Roberts even served as test conductor for the first J-2X engine hot fire.

He then served four years as test director for the E-1 Test Stand, where he shepherded several test projects. These included a series of tests on the AJ26 engines that initially powered commercial cargo missions to the International Space Station.

In 2016, Roberts was named a senior project engineer, which means he now provides technical assistance to managers of various test projects at Stennis. “During the test campaign, I monitor test results to ensure that the facility is performing as expected,” he said. “I also assist the New Business Office with testing concepts and configurations for companies coming to Stennis.”

Roberts recently has been involved with testing for NASA’s Artemis program to send the first woman and next man to the Moon by 2024. He assisted with installation of the first flight core stage of NASA’s new Space Launch System rocket on the B-2 Test Stand. Following a series of Green Run tests at Stennis, the stage will power the first Artemis I test mission.

Roberts is working with the core stage project engineer to address any issues that arise during integration of the stage on the stand. He also will assist with the core stage cold flow and hot fire tests. The latter will mark the culmination of the Green Run series and feature the simultaneous firing of the stage’s four RS-25 engines.

Roberts enjoys the ever-changing nature of the work. “It is always different,” he said. “I work with small startup companies and large rocket engine companies alike to help them develop their new hardware or improve their existing hardware.”

He also appreciates the workplace culture of Stennis. “The best way I can describe it is family,” he said “Stennis has a very friendly atmosphere and people who believe in their job.”

For someone who grew up in the age of Star Wars and space shuttle missions, Roberts is understandably excited about the future of deep space exploration. He is proud to be a part of the team testing engines and propulsion systems that will power missions to the Moon and, eventually, Mars. This includes testing of 3D-printed engine components that look to revolutionize the production of deep-space engines and propulsion systems.

Roberts has been recognized for his work and contributions, having received a NASA Silver Snoopy honor for flight safety and mission success, as well as a NASA Exceptional Achievement Award for his leadership of the J-2X test project.

Away from Stennis, Roberts enjoys spending time with his “awesome” wife and two “amazing” daughters, and pursuing his scuba diving and spear fishing hobbies.



Engineer Skip Roberts has been involved with numerous test projects during his NASA career.

1970 – Apollo 13 crew completes dramatic mission



Note: NASA's John C. Stennis Space Center has played a pivotal role in the nation's space program. The following offers a glimpse into the history of the space program and the rocket engine test center.

On April 11, 1970, the Apollo 13 mission lifted off on the third scheduled mission to land on and explore the Moon.

Apollo 11 and 12 had proven that could perform precision landings on the Moon, so Apollo 13 had a heavier science approach, focusing on geology. The Apollo 13 crew included Jim Lovell, mission commander; Jack Swigert, command module pilot; and Fred Haise, native Mississippian and lunar module pilot.

The mission began as planned. Two days into the flight, on April 13, shortly before 9 p.m., the astronauts ended a television broadcast in which they had given a tour of the space craft.

Approximately six minutes after the end of the broadcast, Apollo 13 was 210,000 miles from earth, Haise was completing shutdown of the lunar module, Lovell was stowing the TV camera, and Swigert was following instructions to change the altitude of the craft to get photographs of the Comet Bennett.

Sensors in one of the service module's oxygen tanks

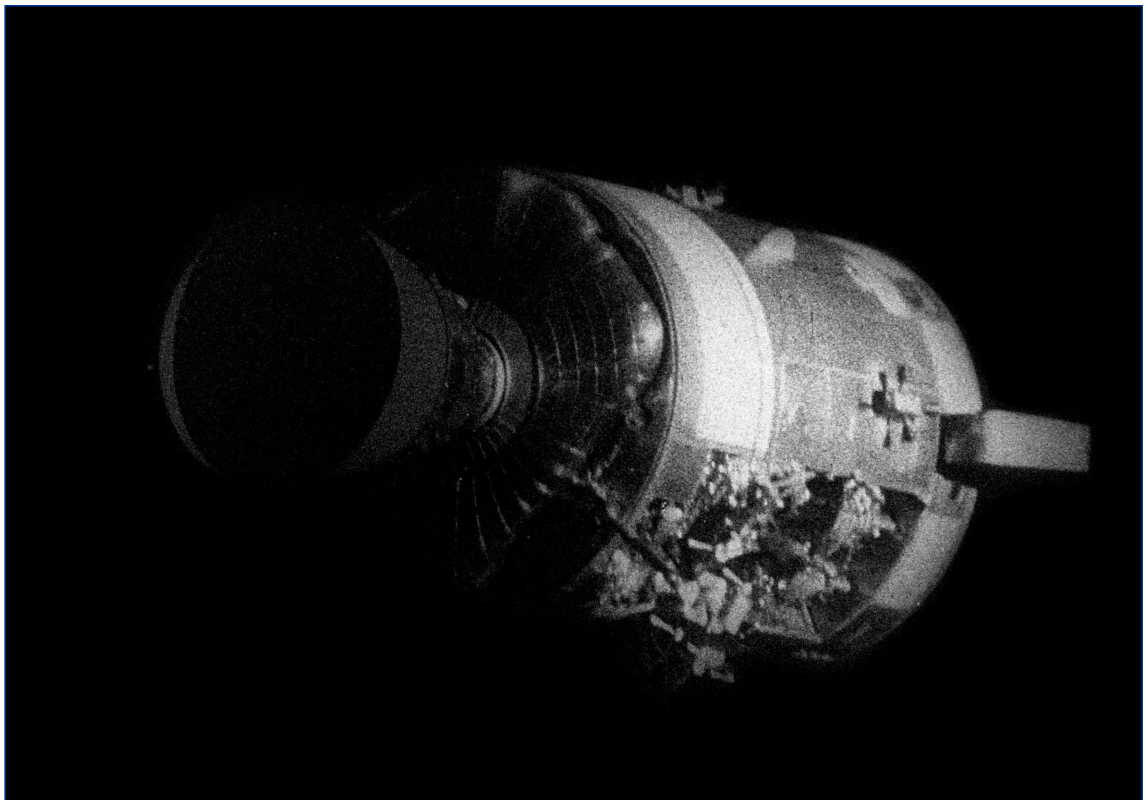
had been malfunctioning, so instructions were given to Swigert to activate the stirring fans to make the pressure readings more accurate. About a minute and a half after activating the fans, the crew heard a “pretty large bang.” Oxygen tank No. 2 had exploded, causing the No. 1 tank to fail as well. The command module's supply of electricity, light and water was lost.

To survive, the crew was forced to abandon the command module and take refuge in the lunar module. They reduced their water intake to 6 oz per person per day. Sleep was near impossible because of the cold. They ate hot dogs and other wet packed food when they ate at all.

Carbon dioxide was a huge issue as well. The lunar module, where the crew had to survive their time in space, only could support two men for two days, and now it had three men for up to four days. NASA mission control devised a way – rivaling the ingenuity shown on the former MacGyver show – to attach spare command module canisters to the lunar module system – using plastic bags, cardboard and tape – to help support the extra load.

The crew had to use the lunar module systems to navigate back to Earth. Using the sun as a navigation star, the crew did a series of engine burns to get the trajectory right. Once they were going to re-enter the atmosphere, the crew transferred from the lunar module back to the command module and made a successful splashdown on April 17, 1970 in the Pacific Ocean, just southeast of American Samoa.

A photo taken from the Apollo 13 command/lunar module shows the severely damaged service module following an oxygen tank explosion. An entire panel on the module was blown away by the explosion just two days into the lunar mission. Following the incident, the Apollo 13 astronauts had to take refuge in the lunar module and complete a perilous trip around the Moon and back to Earth. The astronaut crew included Fred Haise, a native of Biloxi, Mississippi, and the missions lunar module pilot.



Office of Diversity and Equal Opportunity

Federal program focuses on women rights, needs

National Women’s History Month is celebrated each year in March to honor the struggles and achievements of American women throughout United States history. The establishment of the Federal Women’s Program is a part of women’s history and important to the advancement of equal employment opportunity for women.

In 1963, President John F. Kennedy established the Status of Women Commission and appointed Eleanor Roosevelt as chair. Based on recommendations of the commission, the Federal Women’s Program (FWP) was formed as a vehicle to provide opportunities for recruitment, selection, training and advancement of women in the federal government.

In 1967, President Lyndon B. Johnson signed Executive Order 11375, adding sex to other prohibited forms of discrimination such as race, color, religion, and national origin. In response to this, the Office of Personnel Management formally established the FWP. In 1969, Executive Order 11478 integrated the FWP into the Equal Employment Opportunity (EEO) Program and placed the FWP under the direction of EEO in each federal agency.

The primary focus of the FWP is to address employment needs of women, such as recruitment, training/education, retention, upward mobility, career counseling, mentoring, promotion and equity in pay. It also address barriers for women as they relate to federal employment policies, practices and initiatives, including sex discrimination, sexual harassment and hostile work environments. The program provides management officials with information on workforce trends and is an integral part of the overall Civil Rights/Equal Opportunity Program.

The Federal Women’s Program Manager (FWPM) position was established to ensure that agencies meet the requirements of the U.S. Equal Employment Opportunity Commission. The FWPM acts as the agency’s contact point, source of information, and advisor to the leadership in matters involving the employment and career advancement of women.

Managers also advocate for all women within their organization, regardless of grade level or occupational category. The FWPM also assists in the recruitment, development, training, and advancement of women in their respective workforces.

FWP managers also monitor and evaluate policies, practices and procedures to determine the existence of barriers and recommend corrective action to appropriate officials; participate in studies and systemic analyses to identify barriers to equal employment opportunity; educate supervisors, managers and employees on the goals and objectives of the FWP; assist in identification of training needs and recruitment sources for women; serve as a representative to various organizations with common goals; coordinate and/or partner in educational programs including seminars, workshops and FWP observances; and participate in the planning and implementation of proactive prevention measures for women in the workforce.

The Federal Women’s Program Manager for NASA Shared Services Center and NASA Stennis Space Center is Linh Lam. Federal employees interested in the FWP at Stennis may contact her for further information.

Information in this article from nasa.gov and feo.org websites.

Immigrant-turned-citizen has found her place at Stennis

Linh Lam understands firsthand how it feels to be in a minority and have to work to find a place to belong. Her life has been an ongoing story of facing – and overcoming – obstacles to find a place with NASA at Stennis Space Center.

Lam considers Chauvin, Louisiana, her hometown. However, she only reached the Bayou State after her family fled as refugees from their Vietnam homeland in 1989. The move brought the predictable challenges any immigrant to a new country and culture faces.

Lam overcame those, eventually arriving on the Mississippi Gulf Coast, where she earned accounting degrees from Mississippi Gulf Coast Community College and the University of Southern Mississippi and a Master of Business Administration degree from William Carey University. Twenty years after arriving in the country, Lam became a U.S. citizen.

“I realized this accomplishment would open doors that could change the trajectory of my life,” said Lam, who works as a reimbursable accountant in the NASA Office of the Chief Financial Officer at Stennis and also serves as the site’s Special Emphasis Programs manager for women. “Looking back, becoming an American citizen greatly increased my qualifications and opportunities to be hired by the federal government.”

The opportunity was not immediate, even though she lived in the shadow of Stennis. Lam had not grown up exposed to NASA. “Working for NASA wasn’t even a thought,” she said. “I was just hoping I could have a job to support myself and, hopefully, also help my family.”

In 2012, though, Lam had a chance to work as a student trainee at the NASA Shared Services Center (NSSC) located at Stennis. She soon advanced to serve as an internal controls and travel accountant. In 2017, she moved to the Stennis team. “It was a challenging decision,” she said. “I began my career as an intern at the NSSC and that’s all I knew.”

Two serendipitous factors came into play. Former NASA Administrator Charles Bolden visited Stennis as his agency tenure was ending. During the visit, Bolden urged employees to take pride in their work at Stennis. “Anytime anybody gives an opportunity to talk about what you do,

take it, ...” he said, “Tell them you’re responsible for getting people into space, because that’s what you do everyday.”

Lam was inspired by the message and also in watching the recently released movie *Hidden Figures*, which recounts the previously untold story of African American women who provided critical input and support to NASA during the early days of space exploration.

“I took those two things as the universe telling me to jump at this opportunity to expose myself to a new environment so I could continue to grow in my career,” she said. “And the universe was right.”

Lam’s current work with reimbursable customers directly supports NASA’s space exploration efforts, including the Artemis program effort to send the first woman and next man to the Moon by 2024.

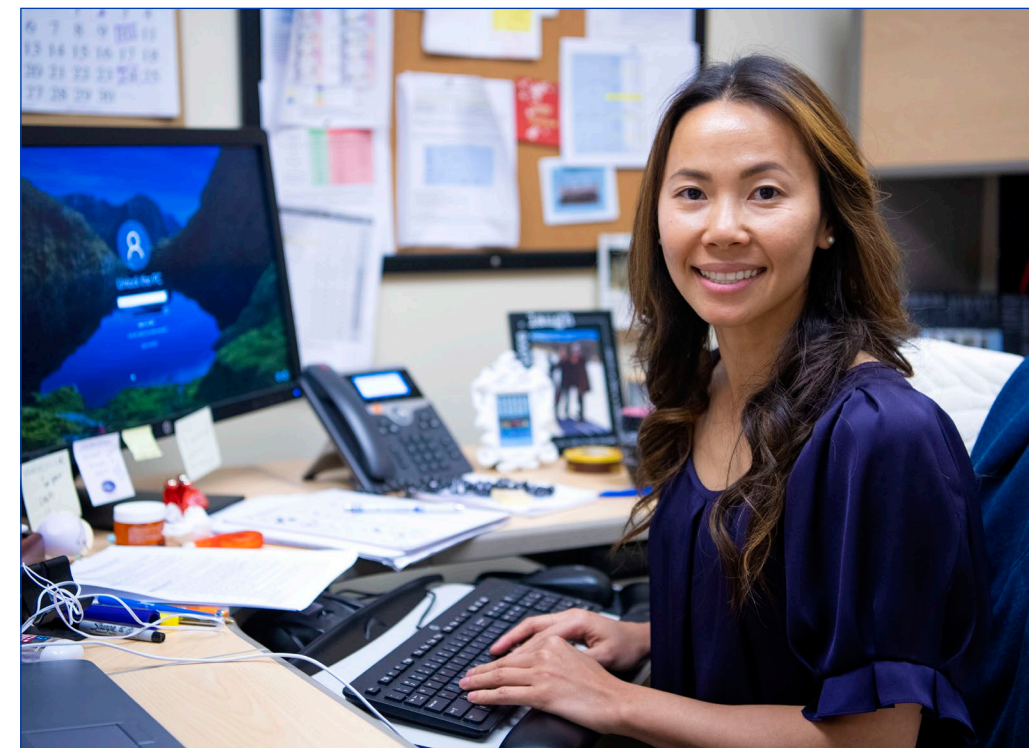
A year ago, Lam also was chosen to serve in her Special Emphasis Program role. Special Emphasis Programs were established more than 40 years ago to focus on groups that have been historically absent or underrepresented in specific occupational categories or grade levels in the federal workplace. Several managers work on site to highlight affected groups.

Lam clearly understands the challenges that various groups, including women, can face and the importance of embracing diversity. She praises

the Stennis culture. “The best thing about working at Stennis is truly the people,” she said. “And what is there to say about diversity at Stennis? They hired me – a female who was born in Vietnam and grew up in Chauvin, Louisiana, with a degree that is not in engineering.”

As a special emphasis manager, Lam is focused on ensuring that culture flourishes. “My goal is to help counter past and present disparities that can still impact equal opportunities at Stennis in the future.”

She also is focused on what lies ahead as Stennis tests the rocket engines and stages that will power the next great era of space exploration, including the Artemis lunar missions and future missions to Mars. “I’m so excited about being part of the Artemis generation,” said Lam, the immigrant citizen-turned diversity champion who has blazed her own trail since arriving in the country as a child. “We are making history.”



Linh Lam overcame various challenges to find a place to belong with NASA at Stennis Space Center.

Hail & Farewell

NASA welcomes the following:

Elizabeth Beech	Information Technology Specialist	Center Operations Directorate
Brian Everett	Aerospace Technologist, Quality Assurance	Safety and Mission Assurance Directorate
Cecile Lewis	Equal Employment Specialist	Office of Diversity and Equal Opportunity

NASA bids farewell to the following:

Rena Perwien	Chief Financial Officer	Office of the Chief Financial Officer
Jody Woods	Aerospace Technologist, Technical Management	Engineering and Test Directorate