National Aeronautics and
Space Administration

KENNEDY SPACE CENTER

2020 Annual Report

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Vision, Mission, and Core Competencies

KSC Vision

KSC is the world's preeminent launch complex for government and commercial space access, enabling the world to explore and work in space.

KSC Mission

KSC safely manages, develops, integrates, and sustains space systems through partnerships that enable innovative, diverse access to space and inspire the nation's future explorers.

KSC Core Competencies

Acquisition and management of launch services and commercial crew development

Launch vehicle and spacecraft processing, launch, landing, recovery, operations, and sustaining

Payload and flight science experiment processing, integration, and testing

Designing, developing, operating, and sustaining flight and ground systems and supporting infrastructure

Development, test, and demonstration of advanced flight systems and transformational technologies to advance exploration and space systems

The recently repainted American flag and NASA logo are illuminated on the walls of Kennedy Space Center's iconic Vehicle Assembly Building at sunrise on July 25, 2020.

Director's Message

Director
ROBERT D. CABANA

We have experienced a year like no other at the Kennedy Space Center. The milestones we've achieved while adjusting to a new work posture in the face of a global pandemic have been truly inspiring, and I am honored to be part of such a dedicated team.

It is easy to see how vibrant and diverse our space activities have become. We have solidified our transformation to a multi-user spaceport and are now focusing on how we can best support the next 50 years of spaceflight.

This fiscal year provided many firsts as we enabled the first launches of human-rated, American-made spacecraft from the Space Coast in nearly a decade – initially with the test flight of Boeing's CST-100 Starliner, and then with the safe launch and landing of the NASA/SpaceX Demo-2 certification mission to the International Space Station through our Commercial Crew Program. Based primarily at Kennedy, our two commercial partners, Boeing and SpaceX, are developing safe, reliable, and cost-effective access to and from low-Earth orbit with American-built spacecraft systems.

Our Exploration Ground Systems program has moved out of the development phase and into the operations phase as we continue to march toward the first launch for the Artemis program in 2021. In fiscal year 2020, we received the first components of NASA's Space Launch System rocket for processing and began stacking the solid rocket booster segments onto the mobile launcher that will ultimately usher the SLS rocket to the pad for its inaugural flight.

The Launch Services Program (LSP) celebrated the launch of its Ionospheric Connection Explorer spacecraft to study the Earth's ionosphere, as well as the international collaborative Solar Orbiter mission to study the Sun. In July, LSP launched the Mars 2020 Perseverance rover on its quest to search for evidence of past life on Mars.

Through Exploration Research and Technology (ER&T) programs in place at Kennedy, we are supporting and conducting a variety of experiments and investigations that will help us prepare for long-duration missions to the Moon and Mars. When we arrive at these far-off destinations, learning how to live off the land will be key. The Gaseous Lunar Oxygen from Regolith Electrolysis (GaLORE) project aims to turn lunar regolith into oxygen for sustainable human lunar exploration. ER&T also has continued work on the Mass Spectrometer Observing Lunar Observations (MSolo) instrument, slated to begin analyzing the chemical makeup of landing sites on the lunar surface in 2021.

And while all this work was happening, a series of events in our nation highlighted the need for unity and started conversations to bring about tangible changes in our country. In July 2020, NASA Administrator Jim Bridenstine added a fifth core value – inclusion – to those embraced by the agency. With this action, NASA has taken a positive step toward the goal of creating a more inclusive work environment free from bias. Working together, we will be better positioned to accomplish the ambitious missions for which NASA and Kennedy Space Center are famous.

Kennedy has played, and will continue to play, an integral role in launching our nation forward, and I eagerly await what the future has in store as we charge ahead to the Moon and Mars. For now, I invite you to review many of the significant achievements in fiscal year 2020.

NASA's core values are shown in the Central Campus lobby at Kennedy Space Center following the installation of the agency's fifth core value – inclusion – on Sept. 1, 2020. On July 23, NASA Administrator Jim Bridenstine announced the addition of this fifth core value to the existing values embraced by the agency: safety, integrity, teamwork, and excellence.

Top 20 Significant Events

October 2019
NASA's Ionospheric Connection Explorer (ICON) spacecraft launched on a mission to study Earth's ionosphere aboard a Northrop Grumman Pegasus XL rocket carried aloft by the company's Stargazer aircraft. The agency's Launch Services Program (LSP) managed the launch service.

November 2019
Kennedy received the national honor of being named a Purple Heart Entity by the Military Order of the Purple Heart in recognition for the spaceport's support of veterans through employment opportunities and services.

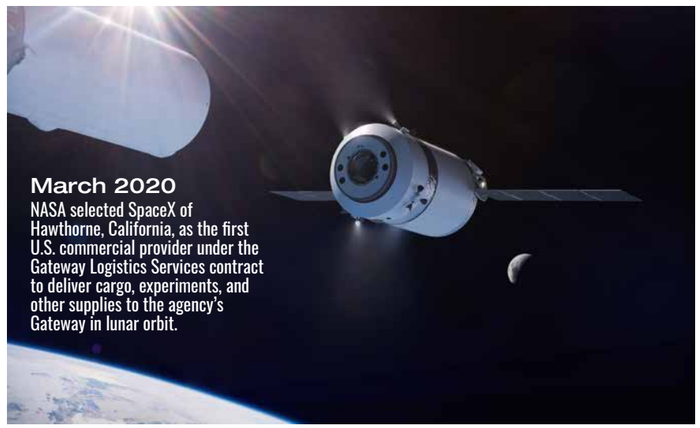
January 2020
NASA and SpaceX completed the In-Flight Abort Test, a launch escape demonstration of the company's Crew Dragon spacecraft and Falcon 9 rocket.

February 2020
Solar Orbiter, a new collaborative mission between the European Space Agency and NASA to study the Sun, launched aboard a United Launch Alliance Atlas V rocket from Cape Canaveral Air Force Station's Space Launch Complex 41.

December 2019
SpaceX launched a Falcon 9 rocket and Dragon cargo spacecraft on the company's 19th Commercial Resupply Services (CRS) mission to the International Space Station.

December 2019
Boeing's CST-100 Starliner spacecraft launched on a United Launch Alliance Atlas V rocket from Cape Canaveral Air Force Station's Space Launch Complex 41 on the uncrewed Orbital Flight Test. The mission was shortened due to an unstable orbit and the spacecraft successfully completed the U.S.'s first land touchdown of a human-rated capsule two days later at New Mexico's White Sands Space Harbor.

January 2020
Kennedy's Vehicle Assembly Building (VAB) is recognized as a National Historic Civil Engineering Landmark by the Florida Section American Society of Civil Engineers during a ceremony in front of the facility.



March 2020
NASA selected SpaceX of Hawthorne, California, as the first U.S. commercial provider under the Gateway Logistics Services contract to deliver cargo, experiments, and other supplies to the agency's Gateway in lunar orbit.

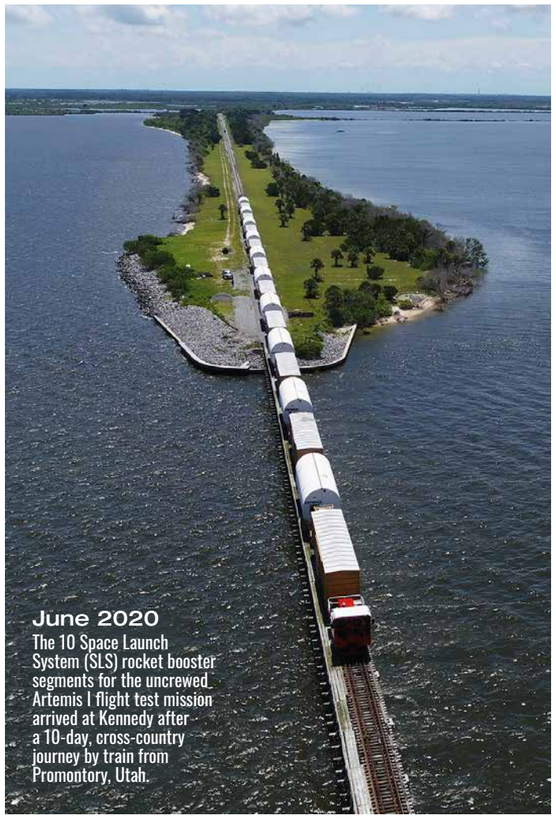
Top 20 Significant Events

March 2020
SpaceX launched a Falcon 9 rocket and Dragon cargo spacecraft on the company's 20th CRS mission to the space station.

April 2020
NASA held the RASSOR Bucket Drum Challenge, a competition for participants to design an improved bucket drum for RASSOR, a robotic platform designed to dig on the Moon.

April 2020
The launch abort motor was integrated with the jettison motor for Orion's launch abort system for Artemis II inside Kennedy's Launch Abort System Facility.

May 2020
NASA astronauts Robert Behnken and Douglas Hurley launched aboard a SpaceX Crew Dragon spacecraft carried atop the company's Falcon 9 rocket on NASA's SpaceX Demo-2 mission to the space station. Named "Endeavour" by its crew, Crew Dragon docked to the orbiting laboratory the day after launch.



June 2020
The 10 Space Launch System (SLS) rocket booster segments for the uncrewed Artemis I flight test mission arrived at Kennedy after a 10-day, cross-country journey by train from Promontory, Utah.

June 2020
NASA announced the new Suborbital Crew (SubC) office within the agency's Commercial Crew Program, laying the groundwork for flying NASA personnel on commercial suborbital space transportation systems.

July 2020
NASA's Pegasus barge arrived at Kennedy from the agency's Marshall Space Flight Center in Huntsville, Alabama, carrying the launch vehicle stage adapter for the agency's SLS rocket.

July 2020
A United Launch Alliance Atlas V 541 rocket launched from Cape Canaveral Air Force Station's Space Launch Complex 41 carrying NASA's Mars Perseverance rover and Ingenuity helicopter. LSP managed the launch service.

Top 20 Significant Events

August 2020

NASA astronauts Robert Behnken and Douglas Hurley splashed down safely off the coast of Pensacola, Florida, aboard the SpaceX Crew Dragon "Endeavour," capping the two-month, 27.1-million-mile Demo-2 mission.

August 2020

The attitude control motor, the last of three motors required to assemble the Launch Abort System for NASA's Artemis II mission, arrived at Kennedy by truck from Northrop Grumman's manufacturing facility in Maryland.

September 2020

Kennedy took delivery of two new Airbus H135 (T3) helicopters; a third is expected to arrive in early 2021. The H135s will replace the Bell Huey 2 security aircraft currently utilized by Kennedy's Flight Operations team.

September 2020

The Sentinel-6 Michael Freilich satellite arrived at California's Vandenberg Air Force Base aboard an Antonov cargo aircraft in preparation for its upcoming launch aboard a SpaceX Falcon 9 rocket. LSP managed the launch service.

The American flag and NASA "meatball" logo on the south-facing side of Kennedy's 525-foot-tall Vehicle Assembly Building received fresh coats of paint in fiscal year 2020. The facility was last repainted in 2007 following hurricane damage. HM2 and H.I.S. Painting of Titusville, Florida, performed the work, which required more than 500 gallons of paint to refresh the 209-by-110-foot flag and the 110-by-132-foot meatball.

Center Planning and Development

Kennedy Space Center's Master Plan is being updated, as it is a crucial element to continuing Kennedy's evolution as a multi-user spaceport. This Master Plan update began with the development of the center's Vision Plan that involved input and collaboration from a variety of NASA-Kennedy, local, and commercial stakeholders. The goals, themes, and strategies outlined in the Vision Plan will serve as the basis for Kennedy's future Master Plan that will chart a path for how the spaceport can most effectively support NASA and commercial space operations over the next 20 years. With NASA's campaign to put boots on the Moon in 2024, these updates are crucial steps in supporting this effort to secure Kennedy's place as humankind's door to the universe.

Sample of Active Agreements in Fiscal Year 2020

SpaceX: Commercial Space Launch Act agreement continuing to enable multi-user spaceport commercial operations and launch activities from Launch Complex 39A

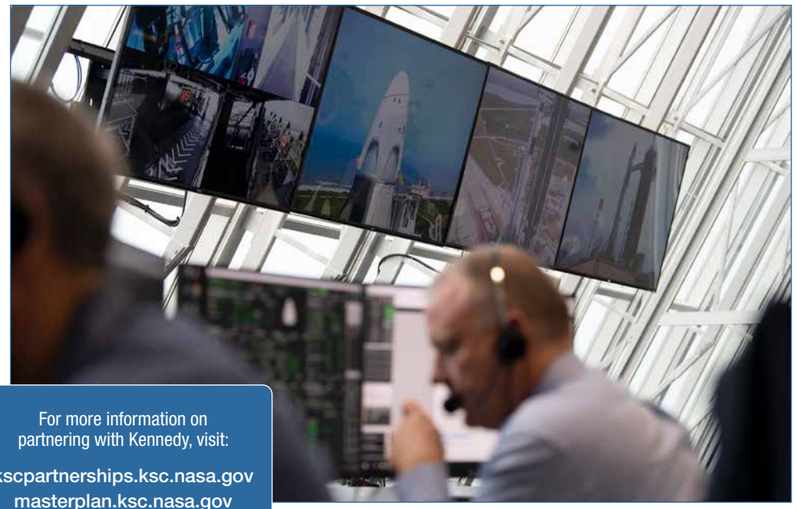
KT Engineering: Reimbursable Space Act agreement for Universal Propellant Servicing System and Ground Systems support

Space Perspective: Reimbursable Space Act agreement for historical weather data research and analysis

U.S. Department of Agriculture: Interagency agreement for plant propagation and microgreens research optimizing plant growth and nutritional value

SpaceX: Reimbursable Space Act agreement for use of Launch Control Center Firing Room 4 in support of NASA's Commercial Crew Program

Kirkland Air Force Base: Interagency agreement with Department of Defense for Vibration Testing Services in support of the Space Test Program



NASA and SpaceX managers monitor the SpaceX Demo-2 launch countdown from Firing Room 4 inside Kennedy's Launch Control Center on May 30, 2020. A Reimbursable Space Act Agreement between NASA-Kennedy and SpaceX enables the company's use of Firing Room 4 in support of the agency's Commercial Crew Program.

For more information on partnering with Kennedy, visit:

kscpartnerships.ksc.nasa.gov
masterplan.ksc.nasa.gov

A SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft lifts off from Kennedy's historic Launch Complex 39A on May 30, 2020, carrying NASA astronauts Robert Behnken and Douglas Hurley to the International Space Station for the agency's SpaceX Demo-2 mission. Part of NASA's Commercial Crew Program, this final flight test paved the way for the agency to certify the SpaceX crew transportation system for regular, crewed flights to the station.

After the space shuttle was retired in 2011, NASA began the process to transform Kennedy from a historically government-only launch facility into a multi-user spaceport for both government and commercial use. The Demo-2 launch represented a major milestone in that transformation by returning human spaceflight capability to the Space Coast. Kennedy's ongoing, robust launch cadence is proof that this is America's premier multi-user spaceport.

Center Planning and Development 10th Anniversary

America's Premier Multi-User

SPACEPORT

90 ACTIVE PARTNERS WITH 227 AGREEMENTS AND COUNTING

NOTICE OF AVAILABILITY 2020

Kennedy Space Center released a **Notice of Availability (NOA)** for undeveloped land identified in the Master Plan to support activities in launch operations, assembly, testing and processing, renewable energy, research and development, support services, and vertical launch. The announcement is part of Kennedy's multi-user spaceport objectives and is based on effectively utilizing land suitable for new development. This NOA has been extended from 2020 to 2022. Interested parties can respond to the NOA anytime during the open period.

FPL SOLAR POWER EXPANSION

Florida Power & Light (FPL) leased 476 acres to expand the Solar Panel Project. This development is underway and will provide an additional 74.5 megawatts of power.

MORE MANUFACTURING

Blue Origin signed an Enhanced Use Lease (EUL) for approximately 90 acres to expand their orbital vehicle manufacturing complex. The company started construction on its phase 2 facility located south of their existing facility in Exploration Park.

LAUNCH COMPLEX 48

Kennedy completed construction of Launch Complex 48, a multi-user launch pad enabling growth of the small-class launch vehicle and small satellite industry. The clean pad offers flexibility to meet various ground processing layouts and small-class launch vehicle configurations.

SPACEX OPERATIONS FACILITY

SpaceX signed an Enhanced Use Lease (EUL) for the use of 67 acres of undeveloped land to utilize a centralized campus and booster/fairing production/storage facility.

KENNEDY VISION PLAN

Kennedy's 2020 Vision Plan provides the forward path for the continued evolution of the center's dynamic multi-user spaceport over the next 20 years. The Vision Plan and associated programmatic Environmental Assessment were successfully completed in September 2020. The centerwide effort was the first step in the 2014 Master Plan update, ensuring Kennedy will continue to enable success of government and commercial partners, and serve as humanity's gateway to the universe.

PARTNERSHIP LAND/ASSETS

GOVERNMENT USE LAND/ASSETS

TITUSVILLE

SR 406

SR 3

SR 402

Merritt Island National Wildlife Refuge Visitor Information Center

National Park Service Playalinda Beach

Gate 4

Launch and Landing Facility

SPACE FLORIDA

LC 39B

SLS & CLEAN PAD

VAB

SPACEX

LC 39A

BOEING

LC 48

LAUNCH CONTROL CENTER

ULA

LC 41

KENNEDY SPACE CENTER

SR 407

SR 405

Indian River Bridge

FLORIDA POWER & LIGHT

SPACEX

KSC Industrial Area

Kennedy Space Center VISITOR COMPLEX

Gate 3

Banana River Bridge

INTERSTATE 95

ONEWEB

SPACE LIFE SCIENCES LAB

FIREFLY

BLUE ORIGIN

Gate 2

FLORIDA POWER & LIGHT

US 1

SR 3

Indian River

MERRITT ISLAND

Banana River

CCAFS

North

Commercial Crew Program

NASA's Commercial Crew Program is delivering on its goal to provide safe, reliable, and cost-effective human space transportation to and from low-Earth orbit and the International Space Station. Together with commercial partners Boeing and SpaceX, NASA completed a series of flight tests that will help return regular human launches to the space station from the United States on American rockets and spacecraft.

On May 30, 2020, NASA's SpaceX Demo-2 test flight launched with NASA astronauts Robert Behnken and Douglas Hurley aboard the Crew Dragon spacecraft on a Falcon 9 rocket from the agency's Kennedy Space Center– the first launch with humans to the space station since the retirement of the space shuttle in 2011. The astronaut duo completed a 62-day stay aboard the orbital laboratory before a successful splashdown on Aug. 2 in the Gulf of Mexico off the coast of Florida.

Demo-2 was SpaceX's final test flight to validate all aspects of the company's crew transportation system. Scheduled for late 2020, NASA's SpaceX Crew-1 mission will be the first in a series of regular, rotational flights with astronauts to the station. NASA astronauts Michael Hopkins, Victor Glover, and Shannon Walker and Japan Aerospace Exploration Agency astronaut Soichi Noguchi were assigned to the six-month mission.

Prior to Demo-2, SpaceX conducted a successful In-Flight Abort Test to demonstrate Crew Dragon's ability to safely escape the Falcon 9 rocket in the event of a failure during launch. During the test, a launch escape was

A United Launch Alliance Atlas V rocket with Boeing's CST-100 Starliner spacecraft onboard launches from Space Launch Complex 41 on Dec. 20, 2019, at Cape Canaveral Air Force Station.

A SpaceX Falcon 9 rocket and Crew Dragon spacecraft lift off from Launch Complex 39A at NASA's Kennedy Space Center in Florida on May 30, 2020, carrying NASA astronauts Robert Behnken and Douglas Hurley to the International Space Station for the agency's SpaceX Demo-2 mission.

NASA astronauts Robert Behnken, left, and Douglas Hurley, wearing SpaceX spacesuits, walk through the Crew Access Arm connecting the launch tower to the SpaceX Crew Dragon spacecraft during a Demo-2 dress rehearsal at Kennedy Space Center on Jan. 17, 2020. Photo credit: SpaceX

intentionally triggered, prompting a sequence of events that deliberately led to Falcon 9 aerodynamically breaking up offshore over the Atlantic Ocean.

Boeing successfully performed a Pad Abort Test as part of the path to certification of the company's CST-100 Starliner spacecraft. The demonstration, which occurred in November 2019 at White Sands Space Harbor in New Mexico, proved Starliner's systems can carry astronauts safely away from the launch pad in an emergency prior to liftoff.

The abort test was followed by the launch of Boeing's Orbital Flight Test, a mission designed to validate the new crew-capable system's end-to-end capabilities. On Dec. 20, 2019, the uncrewed Starliner spacecraft launched atop the first human-rated United Launch Alliance Atlas V rocket. Although the flight test did not dock with the International Space Station as intended, Boeing completed a number of flight test objectives during the two-day mission, which concluded with Starliner's bullseye landing at White Sands Space Harbor. This was the first land touchdown of a human-rated capsule in U.S. history.

In April, Boeing announced its decision to refly the uncrewed flight test with Orbital Flight Test-2 to prove Starliner meets NASA's requirements, including docking to the space station. The company also conducted supplemental parachute tests to further validate the system's capabilities under adverse environmental factors. Boeing's Crew Flight Test, its first test flight with crew, is scheduled to launch NASA astronauts Barry "Butch" Wilmore, Mike Fincke, and Nicole Mann no earlier than summer 2021. Wilmore is taking the place of Boeing astronaut Chris Ferguson, previously slated for the flight test, following Ferguson's decision not to fly for personal reasons.

Teams from NASA, Boeing, SpaceX, and the Department of Defense continued to rehearse launch and mission operations in both normal and emergency scenarios. In addition, astronauts participated in mission-specific training to prepare for life in orbit, including the work they'll perform after joining the Expedition crew awaiting them on the station.

Furthermore, Commercial Crew announced the new Suborbital Crew (SubC) office. SubC is an effort to enable NASA research payloads to fly on future commercial suborbital spaceflights for short periods of microgravity time. The office's goal is to perform a system qualification, or safety assessment, to enable NASA astronauts, principal investigators, and other agency researchers to take advantage of these unique capabilities. Following system qualification, the NASA plan would be to purchase seats on commercial suborbital space transportation systems for agency use.

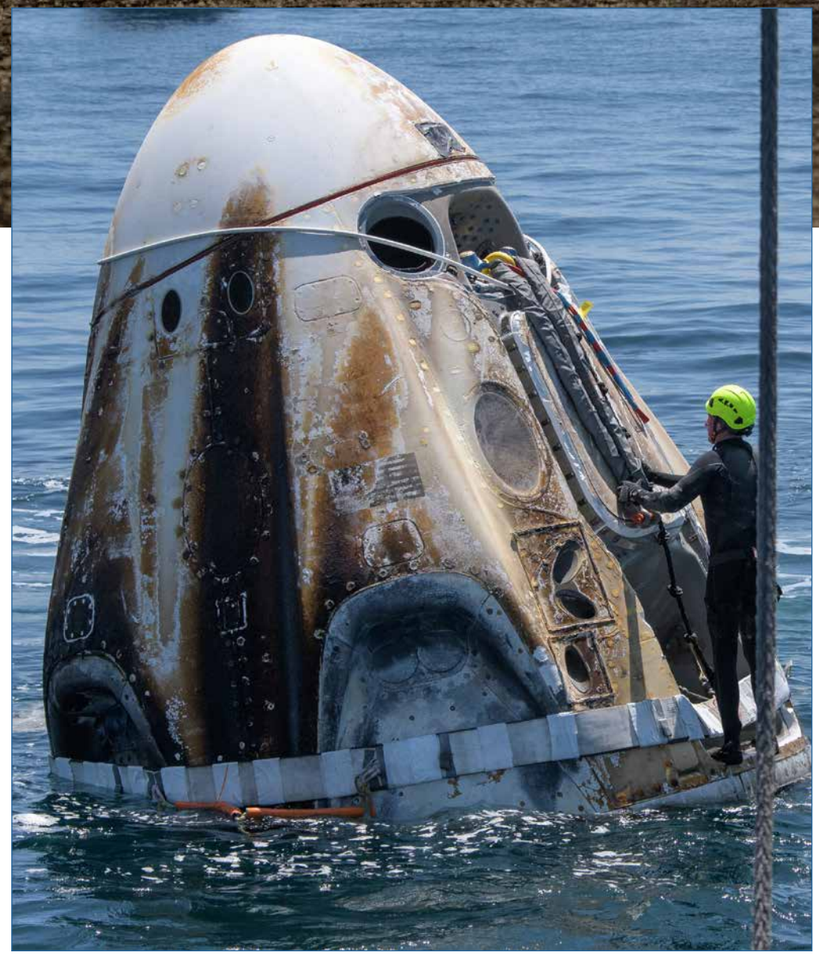
From left to right, NASA astronauts Butch Wilmore and Mike Fincke, Boeing astronaut Chris Ferguson, and NASA astronaut Nicole Mann pause in front of Boeing's crew transport vehicle during a crew transportation test at Kennedy's Neil Armstrong Operations and Checkout Building, Feb. 24, 2020. Photo credit: Boeing

Left: The uncrewed SpaceX Crew Dragon capsule separates from the company's Falcon 9 rocket during an in-flight abort test following liftoff from Kennedy Space Center's Launch Complex 39A on Jan. 19, 2020. Photo credit: SpaceX

Below: The Boeing CST-100 Starliner's four launch abort engines and several orbital maneuvering and attitude control thrusters ignite in the company's uncrewed Pad Abort Test on Nov. 4, 2019, from Launch Complex 32 on White Sands Missile Range in New Mexico.

Right: The SpaceX Crew Dragon trunk was secured to the spacecraft April 30, 2020, at Cape Canaveral Air Force Station, in preparation for NASA's SpaceX Demo-2 launch mission to the International Space Station. Photo credit: SpaceX

Below: The Boeing CST-100 Starliner spacecraft is guided into position above a United Launch Alliance Atlas V rocket at the Vertical Integration Facility at Cape Canaveral Air Force Station's Space Launch Complex 41 on Nov. 21, 2019. Starliner was later secured atop the rocket for Boeing's uncrewed Orbital Flight Test.



Above: The Boeing CST-100 Starliner spacecraft is seen after it landed in White Sands, New Mexico, Dec. 22, 2019. The landing completed an abbreviated flight of the uncrewed Orbital Flight Test.

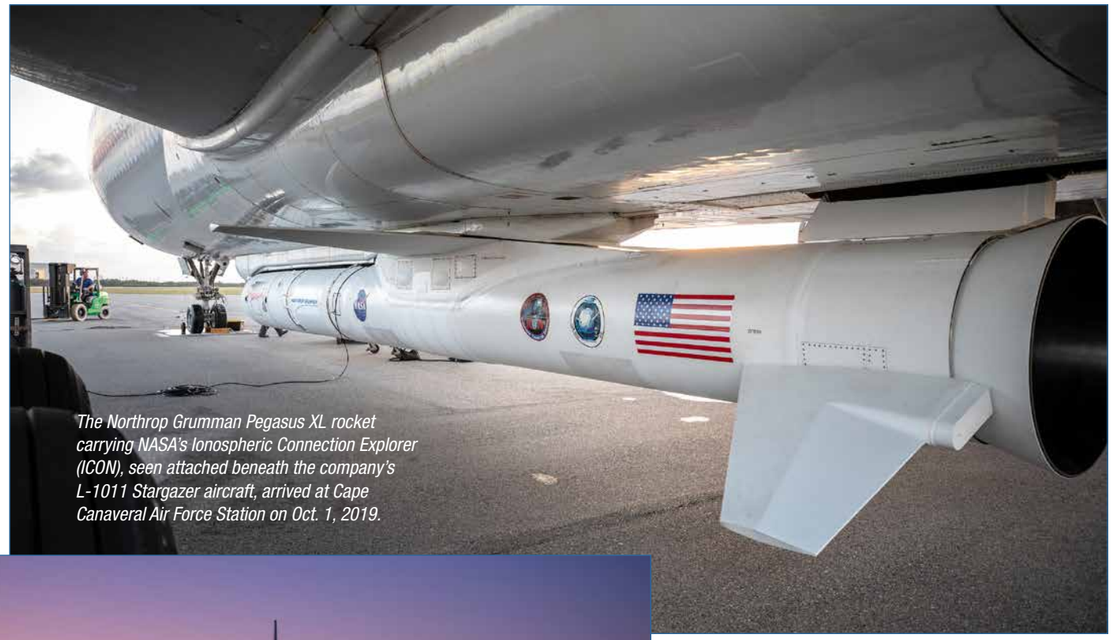
Left: Support teams arrive at the SpaceX Crew Dragon Endeavour, with NASA astronauts Robert Behnken and Douglas Hurley onboard, shortly after the spacecraft splashed down in the Gulf of Mexico on Aug. 2, 2020, concluding NASA's SpaceX Demo-2 mission.

Launch Services Program

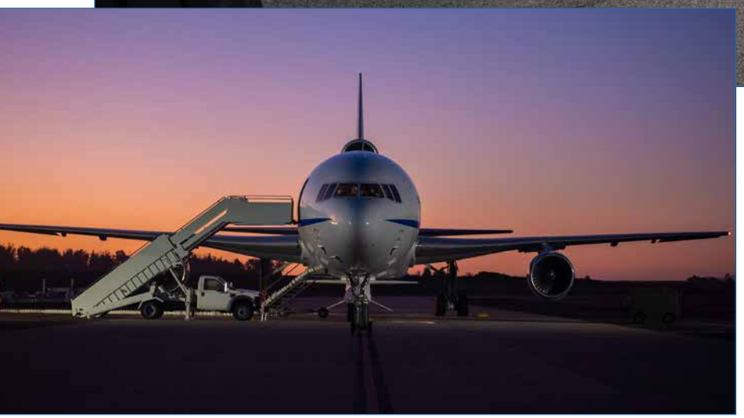
NASA's Launch Services Program (LSP) is skilled at connecting payload entities with launch vehicle providers. LSP works to provide reliable, competitive, and user-friendly launch services in the commercial arena to satisfy agencywide space transportation requirements and maximize the opportunities for mission success.

Launch Services Program supports NASA's return to the Moon. For NASA's Artemis architecture, LSP is serving in a major consulting role for the Gateway Logistics Element, the Human Landing System, the Habitation and Logistics Outpost, and the Power and Propulsion Element; as well as providing mission management to deliver the Canadian Deep Space Exploration Robotic System to the Gateway. The team also is leveraging its expertise in the Venture Class Launch Services for precursor lunar CubeSat missions to reduce technical risk in advance of crewed Artemis campaigns.

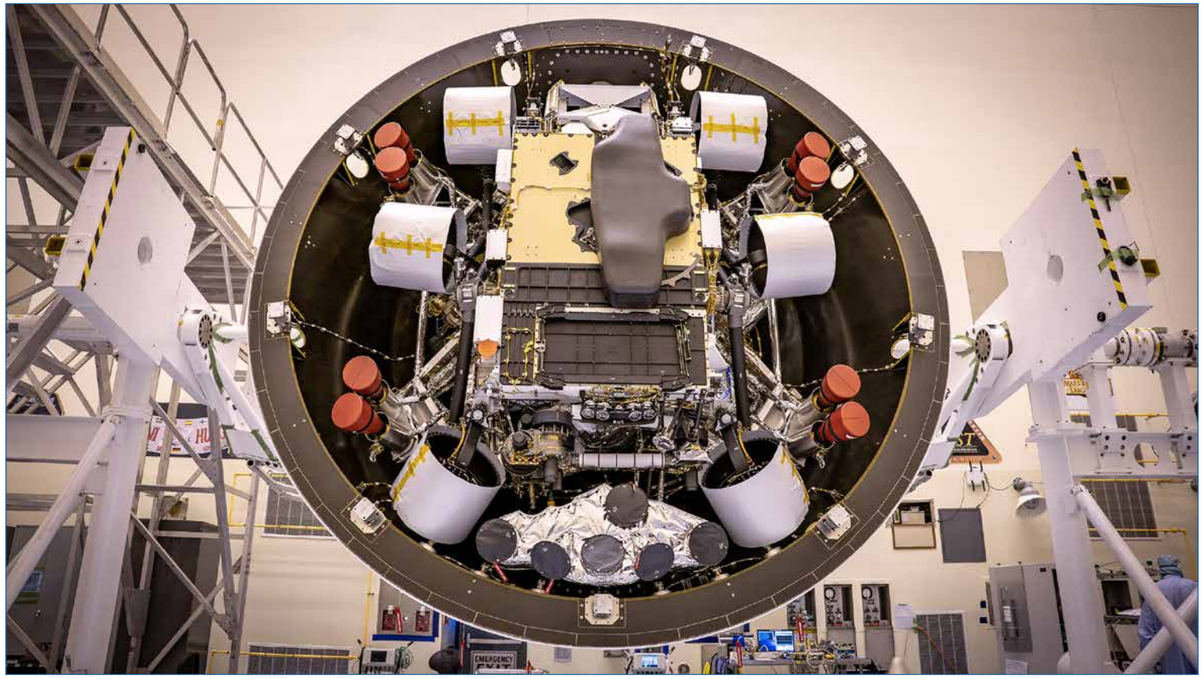
LSP launched three missions in fiscal year 2020: Ionospheric Connection Explorer (ICON), which studies the charged particle layer where Earth's weather meets space weather, launched Oct. 10, 2019, on a Northrop Grumman Pegasus XL rocket from Cape Canaveral Air Force Station (CCAFS); Solar Orbiter, an international cooperative mission between the European Space Agency and NASA to study the Sun, launched Feb. 9, 2020, on a United Launch Alliance (ULA) Atlas V rocket from CCAFS; and Mars 2020, NASA's Perseverance Mars rover, launched July 30, 2020, on a ULA Atlas V rocket from CCAFS.



The Northrop Grumman Pegasus XL rocket carrying NASA's Ionospheric Connection Explorer (ICON), seen attached beneath the company's L-1011 Stargazer aircraft, arrived at Cape Canaveral Air Force Station on Oct. 1, 2019.



Backdropped by a twilight sky, Northrop Grumman's L-1011 Stargazer undergoes final preparations prior to its takeoff from Vandenberg Air Force Base in California on Oct. 1, 2019. The company's Pegasus XL rocket, containing NASA's ICON spacecraft, is seen attached beneath the aircraft. Photo credit: U.S. Air Force 30th Space Communications Squadron



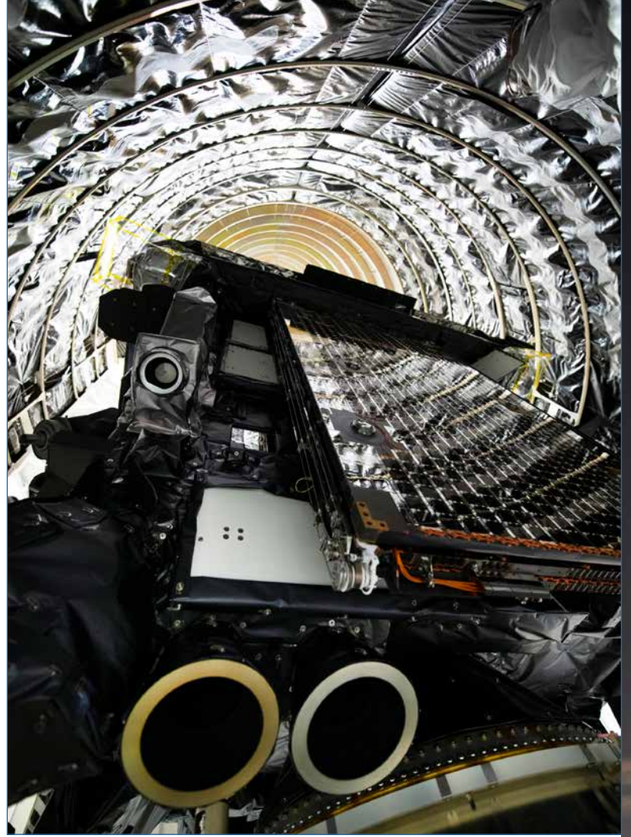
Inside Kennedy's Payload Hazardous Servicing Facility, the Backshell-Powered Descent Vehicle and Entry Vehicle assemblies are prepared to be attached to the Mars Perseverance rover on May 4, 2020.

NASA awarded three missions during the fiscal year: Geostationary Operational Environmental Satellite-T (GOES-T), which will provide advanced imagery and atmospheric measurements of Earth's weather, oceans and environment, real-time mapping of total lightning activity, and improved monitoring of solar activity and space weather, is targeted to launch in December 2021 aboard a ULA Atlas V 541 rocket; the Psyche mission, which will journey to a unique metal-rich asteroid, also named Psyche, orbiting the Sun between Mars and Jupiter, is targeted to launch in July 2022 on a SpaceX Falcon Heavy rocket; and the Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission, which will provide global ocean color, cloud, and aerosol data about Earth's changing climate, is targeted to launch in December 2022 on a SpaceX Falcon 9 Full Thrust rocket. LSP will manage the launch services for all three missions launching from Florida.

The program supports the agency's CubeSat Launch Initiative (CSLI) by providing dispenser hardware and mission integration services to CubeSat development teams from educational institutions, non-profit organizations, and NASA centers. LSP also manages Educational Launch of Nanosatellites (ELaNa) missions, launching complements of small satellites, known as CubeSats, selected for flight by CSLI. In fiscal year 2020, 16 CubeSats were launched during four missions: ELaNa 25A in November 2019, ELaNa 25B and 28 in December 2019, ELaNa 30 in February 2020, and ELaNa 31 in September 2020.

LSP's Hangar AE, located at CCAFS, supported a total of 21 launches. These included launches for NASA's Commercial Resupply Services, which replenish the International Space Station; NASA's Commercial Crew Program's SpaceX Demo-2, which was the first crewed test flight of the Crew Dragon spacecraft; the Department of Defense; and commercial companies. Hangar AE also supports the Commercial Crew Program and Space Launch System teams by documenting communication and telemetry requirements.

A United Launch Alliance Atlas V rocket lifts off from Cape Canaveral Air Force Station's Space Launch Complex 41 on July 30, 2020, carrying NASA's Mars Perseverance rover and Ingenuity helicopter.



This is a view inside the United Launch Alliance payload fairing as it is secured around the Solar Orbiter spacecraft on Jan. 20, 2020, inside the Astrotech Space Operations facility in Titusville, Florida. Photo credit: European Space Agency/Airbus

The United Launch Alliance Atlas V rocket carrying the Solar Orbiter spacecraft arrives at the launch pad at Cape Canaveral Air Force Station's Space Launch Complex 41 on Feb. 8, 2020.

Workers watch from the Atlas Space Operations Center as the United Launch Alliance Atlas V rocket with the Solar Orbiter spacecraft climbs upward after liftoff from Space Launch Complex 41 on Cape Canaveral Air Force Station on Feb. 9, 2020.

ARTEMIS PROGRAM:
Accelerating Toward a 2024 Moon Landing

NASA is charged with the extraordinary mission of putting the first woman and next man on the Moon by 2024. In the past year, Kennedy Space Center has been a hub of critical activity progressing toward that monumental mission. The dedicated, mission-focused members of the Exploration Ground Systems, Orion, and Space Launch System (SLS) programs, along with the Gateway Deep Space Logistics team, accomplished significant milestones during fiscal year 2020 that included spacecraft assembly, preparing the ground support systems, priming the launch team, receiving rocket segments, and building the deep space commercial supply chain that will support the astronauts in their arrival and landing on the Moon and venture beyond to Mars.

NOV 2019

Orion crew and service modules for Artemis I are transported to NASA's Plum Brook Station in Sandusky, Ohio, for environmental testing to certify they are ready for flight

DEC 2019

Validation and verification are completed on the mobile launcher swing arm, Pad 39B xenon lights, and the fire suppression system

JAN 2020

SLS pathfinder booster segment lifting practice

Gateway Deep Space Logistics provides the keynote address at the Air Cargo Conference

FEB 2020

Firing room simulations and cryogenic fueling countdown are completed

MAR 2020

SpaceX announced as first awardee under the Gateway Logistics Services contract

Landing and Recovery Team validates Orion recovery procedures during Underway Recovery Test-8

Orion spacecraft returns to Kennedy aboard NASA's Super Guppy aircraft and is transported back to the Neil Armstrong Operations and Checkout Building high bay for final production processing for Artemis I

APR 2020

Artemis II Launch Abort System jettison motor arrives

MAY 2020

Launch Pad 39B ready for Artemis I

JUNE 2020

Artemis II Orion crew module and crew module adapter assembly progresses

SLS booster segments and aft skirts arrive

JULY 2020

Artemis II heatshield progresses

SLS rocket launch vehicle stage adapter arrives

AUG 2020

Artemis I spacecraft adapter cone installation

SEP 2020

Artemis I solar array wing deployment and inspection

'NASA Worm' installation on flight hardware

- Exploration Ground Systems
- Orion Production Operations
- Space Launch System
- Gateway Deep Space Logistics

ARTEMIS COMPONENTS:
Exploration Ground Systems

Exploration Ground Systems (EGS) has moved from the planning and development phase into operations for the Artemis I mission. Much of the hardware for the first flight has arrived and is in processing to prepare for launch in 2021. EGS has only yet to receive the core stage of the Space Launch System (SLS) rocket and the official handover of the Orion spacecraft. Stacking will take place in the next fiscal year, starting with the booster rockets on the mobile launcher in High Bay 4 of the Vehicle Assembly Building (VAB).

Validation and verification completion

- The mobile launcher – the 380-foot-tall ground structure that will be used to assemble, process, and launch SLS – completed integrated testing inside the VAB and at newly renovated Launch Pad 39B, validating it can communicate effectively with the facility systems and ground systems to perform appropriately during launch.
- These tests included a swing arm test of the umbilicals, aiming of Xenon lighting, and a demonstration of the fire suppression and cryogenic fueling systems.

The cross-country line through which liquid oxygen will flow stretches from the storage tank to the mobile launcher at Launch Pad 39B on Nov. 8, 2019. Exploration Ground Systems oversaw testing of the pad's cryogenic systems in preparation for the launch of SLS and Orion spacecraft for the uncrewed Artemis I mission.

SLS pathfinder booster segment practice

- The EGS team, including engineers, technicians, and crane operators with contractor Jacobs, practiced lifting and stacking operations with pathfinder segments of Northrop Grumman's solid rocket boosters.
- These sections of the SLS rocket will be stacked in High Bay 4 of the VAB.
- Stacking rehearsals prepare the team by using pathfinder segments – inert, full-scale replicas of the actual solid rocket boosters, with the same weight (300,000 pounds) and center of gravity.

In High Bay 4 of Kennedy's Vehicle Assembly Building, a team of engineers with Exploration Ground Systems and contractor Jacobs participate in Space Launch System (SLS) solid rocket booster pathfinder stacking during a training exercise on Jan. 8, 2020.

Members of NASA's Landing and Recovery Team, along with Navy sailors from the USS John P. Murtha and divers from EOD Mobile Unit 3, MDS Company 3-1, attach tending lines to a test version of Orion during Underway Recovery Test-8 off the coast of California, March 13, 2020.

Underway Recovery Test-8

- NASA, the U.S. Air Force's 45th Space Wing Human Space Flight Support Office, the U.S. Navy, and Orion prime contractor Lockheed Martin conducted the Underway Recovery Test-8 (URT-8) in March 2020.
- The combined team has been conducting a series of tests off the coast of California to practice recovery with a mockup of the Orion spacecraft.
- For URT-8, the team performed an end-to-end mission simulation and validation of operational timelines.

Artemis I Launch Director Charlie Blackwell-Thompson (left) stands at the launch console inside the Launch Control Center's Firing Room I at the Kennedy Space Center in Florida during a countdown simulation, Feb. 3, 2020. Next to her are Jessica Parsons, former technical assistant to the launch director, and Jeremy Graeber, NASA's Test, Launch and Recovery Operations branch chief, who also serves as the assistant launch director.

Firing room simulations and cryogenic fueling countdown

- The Artemis I launch team continues to prepare for launch with a series of simulations. In February 2020, the team conducted a realistic run-through of the terminal count – the final stretch of the countdown that ends with booster ignition.
- In late summer, the team focused on loading fuel into the SLS rocket with a cryogenic simulation.
- During a simulation, a small group of masterminds introduces anomalies and other unexpected situations that controllers and launch managers must solve in real time.

Launch Pad 39B ready for Artemis I

- In May 2020, Launch Pad 39B was declared ready for Artemis I.
- Throughout the past few years, EGS has modified and upgraded Launch Complex 39B for the SLS rocket and Orion spacecraft.
- New fiber cable and a water tower for the upgraded sound suppression system passed integration testing. Refurbishments were completed on the pad's three lightning towers, and a new flame deflector was installed.

In this aerial view of Launch Complex 39B, Exploration Ground Systems' mobile launcher for the Artemis I mission is in place on the pad. In May 2020, Launch Pad 39B was declared ready for Artemis I.

Inside Kennedy's Rotation, Processing and Surge Facility, Exploration Ground Systems and Jacobs TOSC workers completed painting of NASA's "worm" logo on the Artemis I Space Launch System twin solid rocket boosters on Sept. 23, 2020.

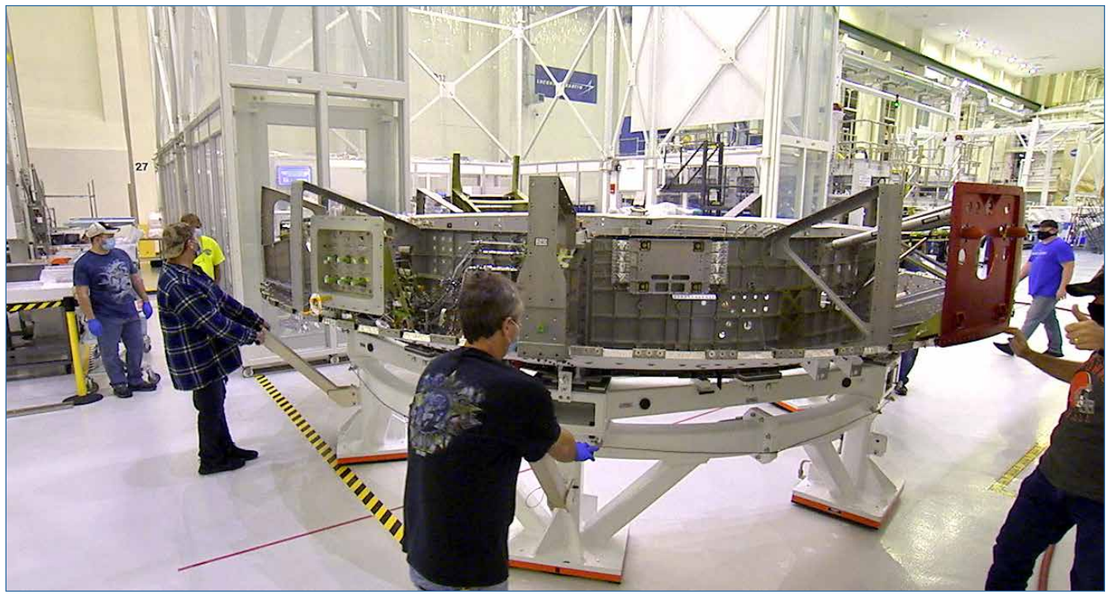
ARTEMIS COMPONENTS:
Orion Production Operations

Fiscal year 2020 proved to be a dynamic time for the Orion production team of engineers and technicians at Kennedy Space Center. The march toward final preparations for the uncrewed and crewed flight tests atop the agency's Space Launch System (SLS) rocket on Artemis I and II missions included several milestone achievements that spanned across facilities, including the Neil Armstrong Operations and Checkout Building (O&C) high bay and the Launch Abort System Facility.

Artemis I crew and service module (CSM) environmental testing and return to Kennedy

- Successful environmental testing at NASA's Plum Brook Station in Ohio verified NASA's Orion spacecraft can handle the extreme conditions of a deep-space environment. The spacecraft returned to the Florida spaceport for final testing and assembly and is certified for Artemis missions.
- Orion demonstrated it could handle the extreme temperatures of space during thermal vacuum testing, simulating sunlight and shadow the spacecraft will encounter during flight. During this test, the spacecraft was exposed to temperatures ranging from -250 to around 200 degrees Fahrenheit.
- Electromagnetic interference and compatibility testing verified all of Orion's electronics work correctly when operating simultaneously and in the electromagnetic environments it will encounter during its mission.
- Sealed in a protective shipping container, the Artemis I CSM returned to Kennedy in March 2020, arriving at Kennedy's Launch and Landing Facility aboard the agency's Super Guppy aircraft. The spacecraft then was transported to the O&C.
- Orion will go through a final round of testing and assembly, including end-to-end performance verification of the vehicle's subsystems, checking for leaks in the spacecraft's propulsion systems, installing its solar array wings, performing spacecraft closeouts, and pressurizing a subset of its tanks in preparation for flight.

NASA's Orion spacecraft, protected in its shipping container, is removed from the agency's Super Guppy aircraft at Kennedy's Launch and Landing Facility runway on March 25, 2020, after returning from testing at the agency's Plum Brook Station in Ohio.



The Artemis II crew module adapter is relocated from the clean room to the Proof Pressure Cell inside the Neil Armstrong Operations and Checkout Building at Kennedy.

Artemis II crew module and crew module adapter processing

- The crew module moved between workstation and clean room in June 2020 to perform tube welds of the propulsion system and the Environmental Control and Life Support Systems.
- The crew module adapter moved between clean room and Pressure Proof Cell for additional maintenance and testing.

Inside Kennedy's Neil Armstrong Operations and Checkout Building high bay, the Artemis II crew module is relocated into a clean room on June 10, 2020.

The launch abort motor is integrated with the jettison motor for Orion's launch abort system for Artemis II inside Kennedy's Launch Abort System Facility on April 15, 2020. Photo credit: Lockheed Martin

Artemis II Launch Abort System (LAS) mating with jettison motor

- Kennedy received a critical piece of hardware in support of the Artemis II crewed mission, the LAS motor, in April 2020.
- The launch abort motor was integrated with the jettison motor for Orion's LAS for Artemis II in April 2020 inside Kennedy's Launch Abort System Facility.
- The launch abort motor is one of three motors on the LAS and is capable of producing about 400,000 pounds of thrust to steer and pull the crew module away from the rocket. The attitude control motor and the jettison motor complete the trio of motors responsible for controlling the LAS.

Artemis II heat shield progress

- Technicians at Kennedy finished meticulously applying more than 180 blocks of ablative material to the heat shield for the Orion spacecraft set to carry astronauts around the Moon on Artemis II.
- Ablative material called AVCOAT was produced at the agency's Michoud Assembly Facility in New Orleans. It was then shipped to Kennedy and machined into 186 unique smaller blocks before being applied by the technicians onto the heat shield's underlying titanium skeleton and carbon fiber skin.
- Engineers conducted non-destructive evaluations to look for voids in the bond lines, as well as measure the steps and gaps between the blocks. The gaps will be filled with adhesive material and then reassessed. The heat shield will then undergo a thermal test after which it will be sealed, painted, and then taped to help weather in-orbit thermal conditions. Once all testing has been completed, the heat shield will be installed and bolted to the crew module later this year.

Technicians with ASRC Federal inspect AVCOAT block bonding on the Artemis II heat shield inside Kennedy's Neil Armstrong Operations and Checkout Building on July 2, 2020.

Artemis I spacecraft adapter cone installation

- The spacecraft adapter cone was attached to the bottom of the spacecraft's service module in August 2020.
- This piece connects to the bottom of Orion's service module and will later join another adapter connected to the top of the rocket's interim cryogenic propulsion stage (ICPS).
- The Orion spacecraft was lifted out of the Final Assembly and Systems Testing (FAST) cell and placed into the Super Station support fixture, then returned to the FAST cell following installation.

The Artemis I Orion spacecraft, with its spacecraft adapter cone attached, is moved by crane along the high bay inside Kennedy's Neil Armstrong Operations and Checkout Building on Aug. 20, 2020.

Artemis I solar array wing deployment and inspection

- Teams from NASA, Lockheed Martin, the European Space Agency (ESA), Airbus Defence, and Airbus Netherlands completed the installation of Orion's four solar array wings on the European-built service module in September 2020.
- Prior to installation, the ESA/Airbus teams unfurled each array and performed an inspection to confirm proper extension and to ensure all the mechanisms functioned as expected.
- The solar array wings will provide energy to the service module, which in turn will power and propel the spacecraft.

(Right) The final of four solar array wings is shown being installed prior to receiving its protective covering on the Orion spacecraft for Artemis I, Sept. 30, 2020.

(Below) NASA's "worm" logo and European Space Agency (ESA) are visible on the aft wall of Orion's crew module adapter, Sept. 24, 2020.

'NASA Worm' installation on flight hardware

- Teams at Kennedy applied the historic "worm" logo in bright red on visible parts of the Artemis I spacecraft and rocket. The sleek design was first added to the SLS twin solid rocket boosters in August 2020; in September, the logo was added to the aft wall of Orion's crew module adapter.
- Originally created by the firm of Danne & Blackburn, the "worm" logo was officially introduced in 1975. It was retired in 1992 but has made a comeback in 2020 as the agency ushers in a new, modern era of human spaceflight.

ARTEMIS COMPONENTS:
Space Launch System

Kennedy Space Center ramped up production of NASA's Space Launch System (SLS) rocket during fiscal 2020. Throughout the year, Exploration Ground Systems (EGS) received SLS rocket hardware and commenced ground processing for Artemis I.

SLS booster segments and aft skirts arrival

- In June 2020, EGS received the two, five-segment solid rocket motor assemblies of the SLS rocket for Artemis I.
- The motor assemblies arrived by train from a Northrop Grumman manufacturing facility in Promontory, Utah, and were taken to Kennedy's Rotation, Processing and Surge Facility (RPSF) for inspection, processing, and storage until stacking operations.
- The aft skirts also were delivered from the Booster Fabrication Facility to the RPSF for mating with the aft segments in preparation for stacking.

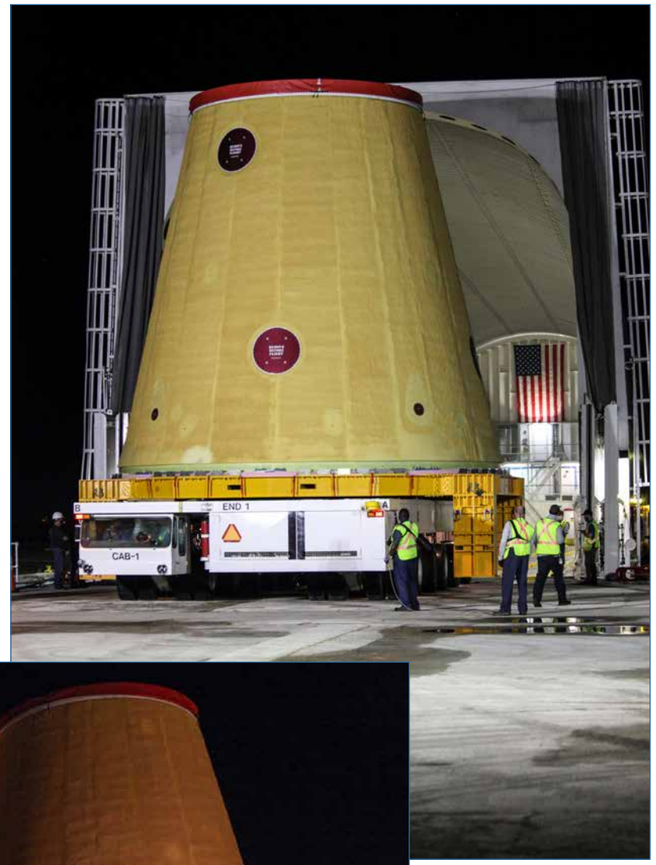
Left: Technicians lift the right aft motor segment – one of five segments that make up one of two solid rocket boosters for the agency's Space Launch System – onto an inspection stand inside Kennedy's Rotation, Processing and Surge Facility on June 23, 2020.

Twin rocket boosters for NASA's Space Launch System that will power Artemis missions to the Moon arrive at Kennedy on June 15, 2020. The two motor segments, each comprising five segments, arrived by train from a Northrop Grumman manufacturing facility in Promontory, Utah.

SLS launch vehicle stage adapter arrival

- The second-to-last piece of hardware for Artemis I arrived at Kennedy in July 2020 aboard NASA's Pegasus barge. The launch vehicle stage adapter (LVSA) connects the SLS core stage to the upper stage, called the Interim Cryogenic Propulsion Stage.
- The cone-shaped connector also helps protect the RL10 engine housed in the upper stage, which will provide the power necessary to leave Earth's orbit and send the Orion spacecraft on its journey to the Moon.

Right: Technicians with NASA's Exploration Ground Systems move the launch vehicle stage adapter for the agency's Space Launch System rocket off of the Pegasus barge for transportation to Kennedy's Vehicle Assembly Building on July 30, 2020.



Left: Technicians with NASA's Exploration Ground Systems move the launch vehicle stage adapter for the agency's Space Launch System rocket from Kennedy's Launch Complex 39 turn basin to the Vehicle Assembly Building on July 30, 2020.

ARTEMIS COMPONENTS:
Gateway Deep Space Logistics

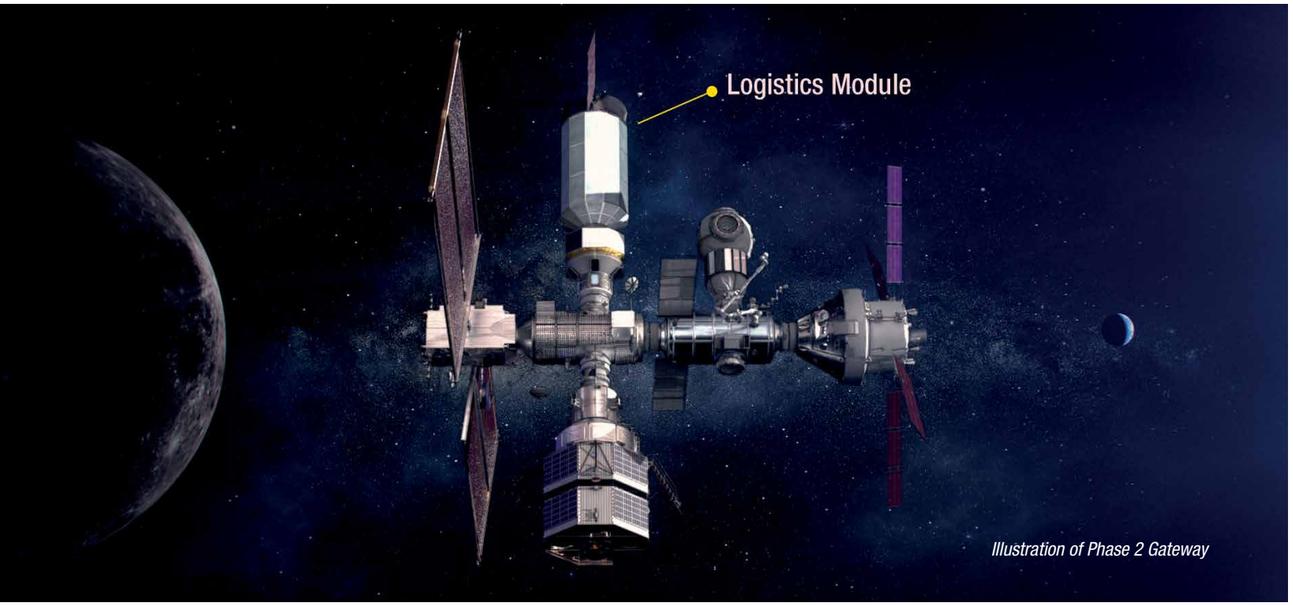


Illustration of Phase 2 Gateway

The Gateway will be an outpost orbiting the Moon that provides vital support for a sustainable, long-term human return to the lunar surface, as well as a staging point for deep space exploration. It is a critical component of NASA's Artemis program. The Gateway is a destination for astronaut expeditions and science investigations, as well as a port for deep space transportation such as landers en route to the lunar surface or spacecraft embarking to destinations beyond the Moon.

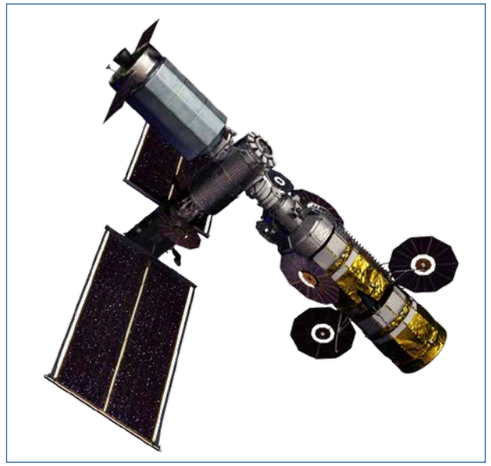
While the Gateway Program is led out of the agency's Johnson Space Center in Houston, Deep Space Logistics (DSL) is the Gateway Project office at Kennedy Space Center responsible for leading the commercial supply chain in deep space by procuring services for transporting cargo, equipment, and consumables to enable exploration of the Moon and Mars.

Kennedy's Deep Space Logistics office is the focal point for all Gateway activities conducted at the spaceport, including:

- Commercial acquisition and contract management
- End-to-end commercial service mission management, insight, and approval
- Spaceport host for commercial, deep space logistics, payload processing, and delivery services

Initial commercial partner announcement

- In March 2020, SpaceX was announced as the first awardee under the Gateway Logistics Services contract; a result of an expedited procurement cycle of less than 12 months from Request For Proposal to award announcement.



NASA's Phase 1 Gateway includes a Power and Propulsion Element combined with a Habitation and Logistics Outpost and logistic supply.

Illustration of the SpaceX Dragon XL logistics module. Image credit: SpaceX

Investing in industry relationships

- DSL focused intensely on outreach with cargo, supply and logistics industry media and stakeholders in 2020, resulting in four magazine cover stories among more than 100 major articles, TV, radio, and podcast interviews for a combined total of 600 million audience views.
- In-person outreach played a significant role in this initiative. Mark Wiese, DSL manager, keynoted the January AirCargo 2020 Conference for 800 people in Nashville, Tennessee.
- Leveraging the opportunity further, the DSL team also visited HBCU Tennessee State University's campus to speak with students interested in NASA internships and careers.

Mark Wiese, Deep Space Logistics manager, speaks at the AirCargo 2020 Conference in Nashville, Tennessee, in January. Wiese served as the event's keynote speaker.

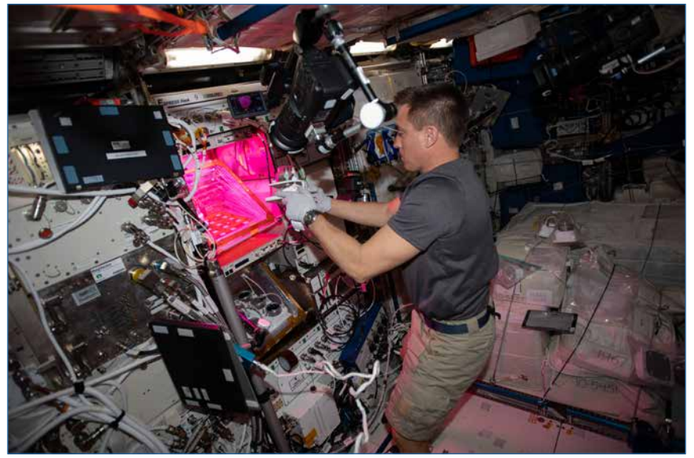
Exploration Research and Technology

The Exploration Research and Technology (ER&T) programs supported the agency in fiscal year 2020 with a research and technology portfolio aligned to center roles at Kennedy Space Center and designed to meet the needs of existing and future missions. ER&T worked on more than 90 projects during the fiscal year, significantly contributing to the agency's human space exploration efforts, including the Artemis program and space technology development. Through a combination of hands-on research at Kennedy plus collaborations with academic institutions, commercial organizations, government agencies, and international partners, ER&T advanced NASA's vision of discovering and expanding knowledge for the benefit of humanity.

Throughout fiscal year 2020, ER&T supported twenty years of continuous human presence on the International Space Station by providing operations, maintenance, logistics, payload processing storage, and other services to enable science research done on the station.

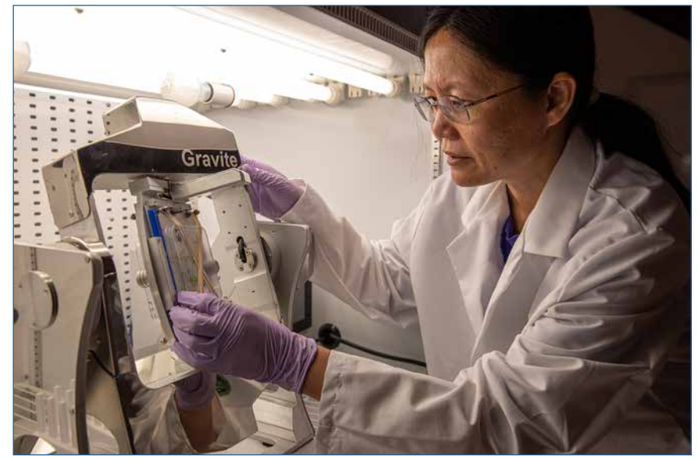
Support for the space station included sending Nitrogen/Oxygen Recharge System (NORS) tanks to the orbiting lab. ER&T technicians unpacked and inspected a NORS tank inside the Space Station Processing Facility high bay on July 16, 2020, before sending them to Wallops Flight Facility in Virginia.

Working with international partners from Airbus Defense and Space to unpack the Bartolomeo platform in the Space Station Processing Facility high bay on Jan. 30, 2020, ER&T enabled sending Bartolomeo to the International Space Station aboard SpaceX's 20th Commercial Resupply Services (CRS-20) mission. Bartolomeo provided the station with new payload-hosting capabilities.



ER&T supported Human Exploration and Space Operations in fiscal year 2020 by conducting plant research and production in space. This required working closely with crew on the International Space Station, including NASA astronaut and Expedition 63 Commander Chris Cassidy, who serviced the Veggie Passive Orbital Nutrient Delivery System (PONDS) experiment on April 22, 2020.

ER&T also carried out biological research at Kennedy facilities, including the Microgravity Simulation Support Facility (MSSF) inside the Neil Armstrong Operations and Checkout building. Shown here is Ye Zhang, a project scientist, adjusting a Gravite 3d clinostat on Feb. 11, 2020.



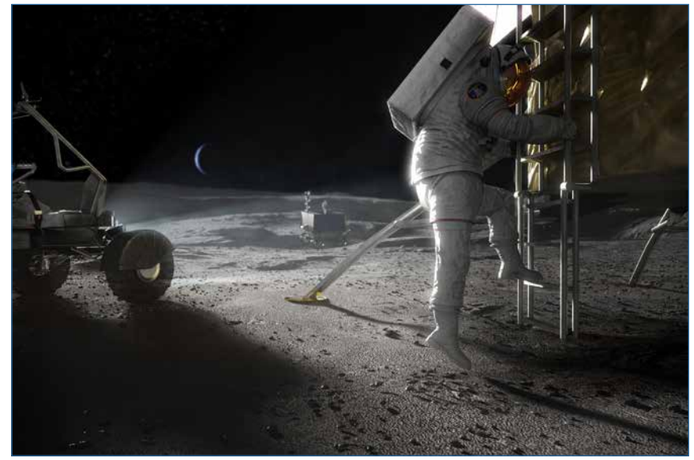
ER&T also worked on instruments to explore the Moon, including the Mass Spectrometer observing lunar operations (MSolo), a mass spectrometer slated to fly to the Moon as part of NASA's Commercial Lunar Payload Services (CLPS), and the Polar Resources Ice Mining Experiment (PRIME-1), a drill combined with a mass spectrometer.

Nearly 50 exhibitors gathered to demonstrate new technologies and innovations during the center's Innovation Days – one of several events sponsored by ER&T focused on fostering and encouraging an innovative culture at Kennedy. Showcase participants included individuals from multiple directorates, programs, and organizations throughout Kennedy.

ER&T supported the agency's Space Systems Development and Operations efforts through dust mitigation work. This included preparing for dust testing of various seals for the wheel motors on NASA's Volatiles Investigating Polar Exploration Rover, or VIPER, on March 17, 2020. VIPER is slated to explore the Moon in 2023.

ER&T also supported the agency with logistics reduction technologies, such as NASA's Orbital Syngas Commodity Augmentation Reactor, or OSCAR, which functions by processing small pieces of trash in a high-temperature reactor. On Dec. 11, 2019, OSCAR was a payload on Blue Origin's New Shepard suborbital rocket.

NASA selected three U.S. companies to design and develop human landing systems (HLS) for the agency's Artemis program on April 30, 2020. ER&T has provided support to HLS through lander ground operations functions.



ER&T supported In-Situ Resource Utilization efforts, including the Gaseous Lunar Oxygen from Regolith Electrolysis (GaLORE) project, which is investigating turning lunar regolith into oxygen. Seen here, Kevin Grossman, project lead for GaLORE, inspected a piece of hardware inside a laboratory on July 21, 2020.

ENGINEERING

VISION

To be the first choice to engineer the exploration of space

CORE VALUES

Safety, Integrity, Teamwork, Excellence, Inclusion

TENETS

- We are empowered to lead at every level.
- We meet our commitments.
- We instill confidence with our customers.
- We are always learning.

MISSION

To provide engineering excellence in the design, development, and operations of launch vehicles, spacecraft, payloads, ground systems, and facilities necessary to cultivate a multi-user spaceport while advancing transformational space technologies to meet NASA exploration goals.

PROGRAMS WE SUPPORT

Artemis Program, Commercial Crew Program, Launch Services Program, Exploration Research and Technology Programs, International Space Station, and Safety, Security, and Mission Services

MARS 2020

Mars 2020 Launch

Since 2015, Engineering has provided support to the Mars 2020 mission during requirements development, design, modification, build, test, verification, and launch. Despite COVID-19, the team was on site every step of the way for integration and testing of the spacecraft with the launch vehicle.

MILESTONES:

April 2020: Lower Environmental Control System installed
June 2020: Mars 2020 mate to the payload adapter
June 2020: 90% controls software and graphics approved
July 2020: Payload fairing encapsulation of Mars 2020

LIQUID HYDROGEN TANK

Liquid Hydrogen Tank (LH2) Installation at Pad 39B

Project increases LH2 storage capacity by adding new 1.25 M gallon (usable) sphere into existing system. Project installs new associated vaporizers, flare stack, fill manifold, piping, valves, support systems, etc.

MILESTONES:

Aug 2018: Construction contract awarded
Nov 2018: Unrestricted notice to proceed issued
Sep 2019: New electrical equipment bldg installed
Nov 2020: Sphere structural portion complete (required for Artemis missions)

DEMO-2 LANDING

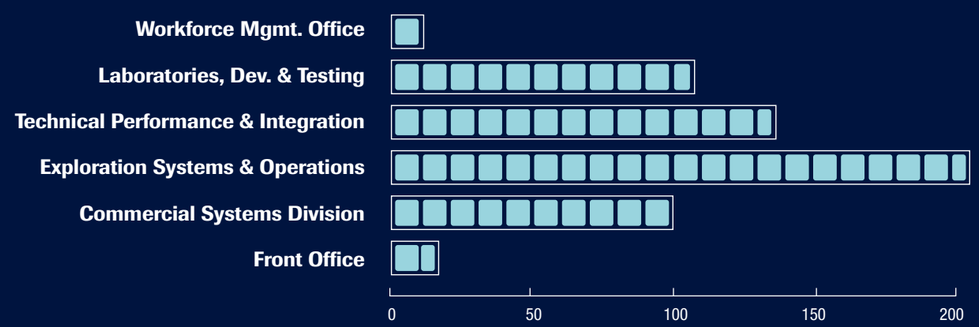
Support of SpaceX Demo-2

Assessed the readiness of ground systems used for tracking and recovering the spacecraft once it landed. Deeply immersed in the initial testing of parachutes, as well as understanding the environments every mechanical, electrical, software, and propulsion subsystem would be subjected to during flight and landing.

MILESTONES:

- Reviewed launch vehicle and spacecraft testing documents
- Flight certification process for all systems
- Flight Readiness Reviews of SpaceX Demo-2
- Prelaunch countdown and flight simulations

WORKFORCE AT A GLANCE



Spaceport Integration and Services

Running America's Premier Multi-User Spaceport

25 LAUNCHES

25

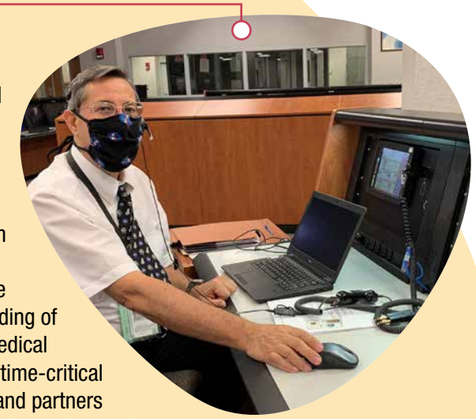
Spaceport Integration and Services (SI) supports all Federal Aviation Administration (FAA)-licensed launches from Kennedy Space Center and Cape Canaveral Air Force Station - a total of **25** in fiscal year 2020. These included missions under NASA's Commercial Crew and Launch Services Programs, as well as commercial launches licensed by the FAA and others for the U.S. Department of Defense.

LOOKING AHEAD

The formulation of the future spaceport has been a top focus for SI. A detailed study was completed to identify infrastructure limitations, which are being addressed for correction in order to improve throughput and support an increased flight rate. Additionally, the operational concept for the recently completed Launch Complex 48 small-class launch facility was developed to pave the way for future customers.

COUNTERING COVID-19

NASA's mission-critical work continued without impact, and essential work was only minimally interrupted due to Kennedy's COVID response. The spaceport's pandemic plan guided the initial response, and an integrated team was created to manage that response and develop a robust framework for the Return-to-Site Plan, an eventual unwinding of precautionary measures. A Kennedy medical team tracked cases and performed time-critical contact tracing. The workforce and partners were kept informed with the latest data and plans throughout the process.



SUPPORTING HUMAN SPACEFLIGHT

SI provided critical support for NASA's SpaceX Demonstration Mission-2, including emergency and medical triage forces, Biomedical Console operations, Astronaut Crew Quarters and Health Stabilization Program, local hospital education and coordination, and VIP visitor medical coverage. COVID-19-related support included temperature checking at three facilities and medical screenings for those departing Kennedy on and after launch day.

PROTECTING THE SPACEPORT

40

The Protective Services Office Emergency Management team activated the Emergency Operation Center **40** times for launches and visits by the president and vice president of the United States.

THE BUSINESS OF THE SPACEPORT

- **Electrical Maintenance Facility:** Designed and installed 125kW photovoltaic system
- **Space Station Processing Facility:** Replaced legacy fire alarm panels; removed old pyrotronics panels; upgraded fire alarm control panel parts and peripherals; upgraded high bay fire detection; and engineered and installed utilities to support added growth chambers
- **Vehicle Assembly Building (VAB):** Provided lighting on Tower A level 25/40 and Tower F 5th floor; completed power pedestal modifications in High Bay 4; and installed new LED lighting in transfer aisle low bay and high bay
- **Hurricane Fencing:** Repaired hurricane damage at VAB north gate, VAB south gate, and Paint and Oil Locker Logistics gate
- **Booster Fabrication Facility:** Upgraded fire alarm panels
- **For NASA's Exploration Ground Systems:** Replaced heating, ventilation and air conditioning (HVAC) components in Launch Control Center, OSF Lab No. 1, Multi-Purpose Processing Facility rooftop, and VAB penthouse; replaced VAB 8 Variable Air Volume boxes; and replaced condensate and floor drains in VAB High Bay 3 F-Tower
- **For NASA's Launch Services Program:** Upgraded HVAC in Payload Hazardous Servicing Facility fuel transfer building
- **For Center-Managed Operations:** Replaced Press Site Air Handling Unit No. 1

SOUND SUPPRESSION

Exploration Ground Systems and SI completed a Multi-Element Verification and Validation test series on the Launch Complex 39B Ignition Overpressure Protection and Sound Suppression (IOP/SS) system. The IOP/SS is a gravity-induced, high-volume water deluge system that will protect the Space Launch System rocket from high energy generated during launch by the solid rocket boosters and core stage main engines.

The system's final test, conducted Oct. 12, 2019, included the activation of the igniters that burn off any free hydrogen that potentially collects at the aft of the rocket just before liftoff. IOP/SS also successfully passed the Design Certification Review milestone in spring 2020.

SHORING UP THE KENNEDY COASTLINE

Efforts to restore Kennedy's Atlantic shoreline are nearing completion. The project protects valuable inland launch and support infrastructure, as well as critical wildlife habitat from storm surge events and inundation.

BIOMEDICAL ENGINEERING AND RESEARCH LABORATORY

The Biomedical Engineering and Research Laboratory (BERL) continues its efforts to improve the state-of-the-art of liquid air-based life-support technology. EGS has funded the development of several technologies to improve the safety and sustainability of the current fleet of environmental control unit packs.

- ✧ Refining and manufacturing a 3D-printed Venturi tube to replace the existing tubes, reducing pack weight and costs while improving sustainability
- ✧ Improving the current design of the Attitude Independent Pickup (AIP), which allows the pack to operate in all physical orientations within 90 degrees of upright
- ✧ Designing a new liquid air dewar for the packs to replace the existing ones that are no longer commercially available; the new design will accommodate the new AIP and improve the sustainability of the existing pack by providing replacement parts
- ✧ Developing a liquid level sensor that would allow a direct measurement of the amount of remaining air, rather than the existing indirect, time-based method of operation

LANDMARK HONOR

The American Society of Civil Engineers (ASCE) recognized the iconic VAB as a National Historic Civil Engineering Landmark during a dedication ceremony organized by SI. The directorate worked with Kennedy's Communications and Public Engagement Directorate and the ASCE. The event featured multiple speakers, including Florida Department of Transportation Secretary Tribault and Center Director Bob Cabana. The dedication plaque is mounted on the VAB wall by the entrance, where it will inform all who enter of the building's important legacy to the nation.

MATERIAL MANAGEMENT

All contractors managing Kennedy's installation-accountable government property were added to the Supply Management System in February 2020. The system identifies and accounts for NASA-owned supplies and materials, providing the data necessary to properly account for and identify items in inventory. An ongoing effort is underway to locate, record, and track items currently stored in various locations around the spaceport, resulting in better accountability of supplies and materials.

Kennedy's Property Management Office Team implemented a new agency inventory requirement for the spaceport's Administratively Controlled Equipment (ACE). ACE is subject to annual inventory by random sampling to ensure property accountability and prevent fraud, waste, and misuse.

$3.1 Million

added to the center's budget
via reutilization of excess property

$162,000

in proceeds from surplus sales

PROTECTION FOR THE FUTURE

Kennedy's Protective Services purchased several new vehicles to ensure the spaceport is operationally prepared for the future.

- Bearcat armored personnel carrier
- Sutphen Ladder Truck
- Mobile Command Vehicle
- Sutphen Quint Fire Engine

Safety and Mission Assurance

The Safety and Mission Assurance Directorate is an independent branch of NASA that identifies and mitigates risks to mission success and ensures the safety of astronauts, the spaceport's unique workforce and property, and the public during all Kennedy Space Center activities. The directorate's mission is to enable safe and successful access to space by focusing on three core values: helpfulness, relationships, and knowing what matters.

World-Class Safety and Health Culture

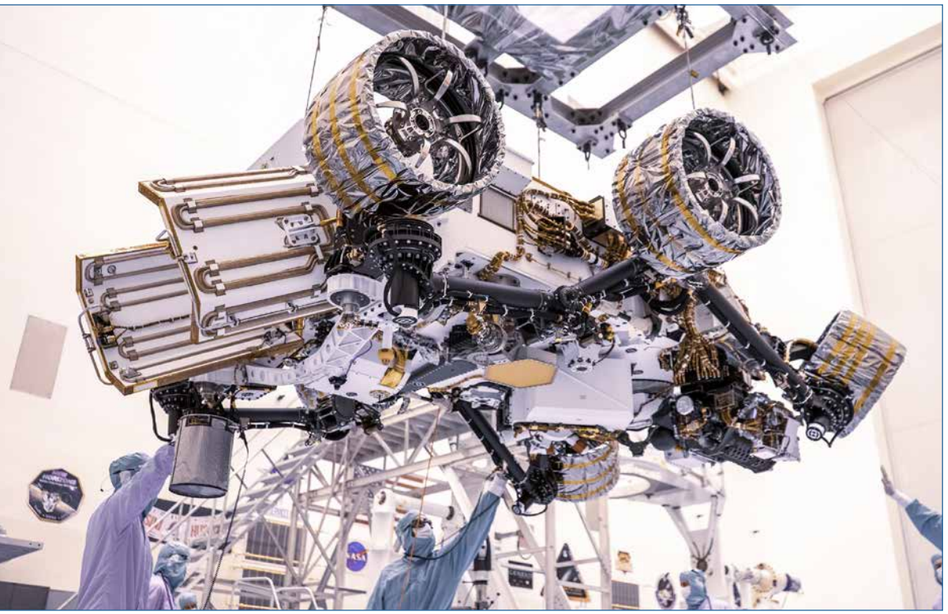
Safety and Mission Assurance cultivates and maintains Kennedy Space Center's strong safety culture across our missions, research, and day-to-day activities. Despite challenges introduced by the coronavirus, the safety culture instilled in our community remains strong, allowing us to continue pushing boundaries and completing our missions.

Program/Project Support

Safety and Mission Assurance supports all programs and projects across the multi-user spaceport. The Safety and Mission Assurance Commercial Crew team collaborated with Commercial Crew Program Engineering, the Spacecraft System Office, and NASA's commercial partners to support the development and operation of a new generation of spacecraft and launch systems capable of carrying crews to low-Earth orbit and the International Space Station. This team performed surveillance activities for SpaceX's Demo-2 and Boeing's Orbital Flight Test, including documentation reviews, observing procedures, and reviewing test results, and performed audits to ensure compliance with safety requirements, while identifying and mitigating hazards. The team also reviewed expected and emergency operation plans at the launch site to ensure the safe ingress and egress of astronauts and ground crews.

The directorate's Launch Services team contributed to the processing and launch of the Ionospheric Connection Explorer (ICON), Solar Orbiter, and Mars 2020 missions by providing independent assessment of risks to mission success and verifying launch vehicle systems and the integrated vehicles met NASA requirements. The team also protected Kennedy personnel and facilities by providing quality insight and independent assessments into the launch vehicle providers, ensuring the payload and launch vehicle were processed safely.

The Safety and Mission Assurance Exploration Ground Systems (EGS) team provided onsite quality assurance by ensuring vendors met contract requirements while fabricating the Exploration Upper Stage Umbilical, the vehicle support posts for the new Mobile Launcher 2, and the crew access arm hinge access platforms for Mobile Launcher 1, to name a few.



Engineers perform mass properties testing on NASA's Mars Perseverance rover inside Kennedy Space Center's Payload Hazardous Servicing Facility on April 7, 2020.

EGS verification and validation testing identified and mitigated hazards and will continue to do so as Artemis I flight hardware processing begins. The EGS team also developed the Orion Quality Assurance Surveillance Plan to document NASA Quality's insight into Orion activities prior to turnover of flight hardware from Lockheed Martin, and oversaw the completion of major Orion Crew Module assembly operations and integration with the European Service Module for Artemis I.

The directorate's Exploration Research and Technology (ER&T) team performed safety reviews to ensure safe and successful ground processing of more than 30 International Space Station payloads, including Bartolomeo, CLARREO Pathfinder, and Astro Gardener. The ER&T team prepared safety analyses for multiple research and technology projects, conducted lab safety walkdowns and safety insight of payload processing operations, and provided quality assurance for On-orbit Servicing, Assembly, and Manufacturing (OSAM), MSolo, rodent research, power/data testing for station utilization payloads, and space station Orbital Replacement Unit processing. The team also contributed to formulation and planning for Gateway's Deep Space Logistics project and supported planning for Human Landing System Program ground and lunar surface operations.

The Institutional team continued to make significant progress toward flight safety analysis for advancing the Range Safety capability.The team formed a cross-agency collaboration with the 45th Space Wing and the Federal Aviation Authority to standardize analysis products, and built a training plan to develop risk analysis capabilities for current and future range safety officers. Range and flight safety engineers provided the capability for assessment, creation, and implementation of risk analyses for flight safety operations. As the multi-user spaceport grows, including more commercial launch partners and continuing NASA operations, the Institutional team also ensured construction safety by performing safety surveillances for over 150 construction projects across the center in fiscal year 2020.

The continued hard work and dedication of the Safety and Mission Assurance team has been vital to maintaining the versatile spaceport the center is today.

Safety and Health Week

Each year, Kennedy Space Center observes Safety and Health Days to show our commitment to the well-being of our workforce. This year's theme was "Know What Matters," which applied to life at home and at work. During the week, more than 2,500 employees attended nine special presentations featuring favorites such as astronaut Dr. Stan Love, former astronaut Jim Wetherbee, and integrative nutrition health coach and chef Carly Paige.

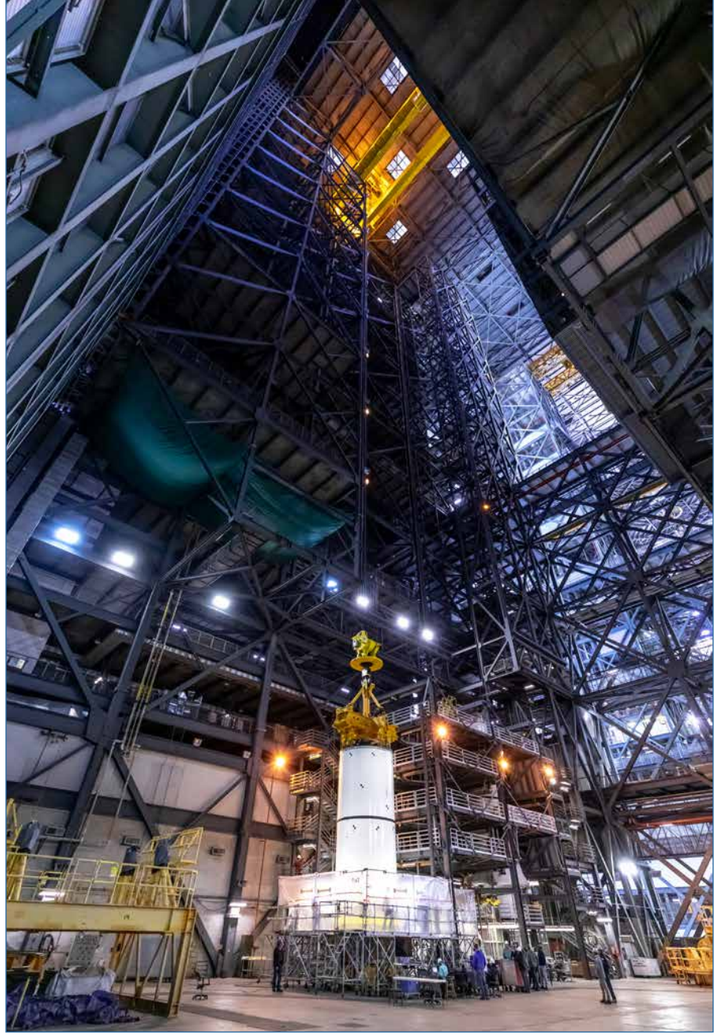
A United Launch Alliance Atlas V rocket carrying Boeing's CST-100 Starliner spacecraft rolls out of the Vertical Integration Facility to the launch pad at Cape Canaveral Air Force Station's Space Launch Complex 41 on Dec. 18, 2019, ahead of the Orbital Flight Test.

Leading the Charge on Risk-Based Decision Making

Risk is an inherent part of NASA's mission, and maintaining a balance between risk and benefit while keeping safety in the forefront is the responsibility of every Safety and Mission Assurance team member. Safety and Mission Assurance uses risk-informed decision making as part of the directorate's "Yes, if" strategy, allowing teams to embrace flexibility through alternative solutions while maintaining safety and actively managing the risks associated with them.

Building on Safety and Mission Assurance's desire to maintain a strong safety culture and encourage continuous improvement, the directorate created a video series explaining and demonstrating its risk approach.

Above: A SpaceX Falcon 9 rocket with the company's Crew Dragon spacecraft onboard is seen as it is raised into a vertical position at Kennedy Space Center's Launch Complex 39A on May 21, 2020, as preparations continued for NASA's SpaceX Demo-2 mission.



Above: In High Bay 4 of the Vehicle Assembly Building at NASA's Kennedy Space Center in Florida, pathfinders, or full-scale replicas of Space Launch System solid rocket booster segments, are stacked during a training exercise on Jan. 8, 2020.

Above: The Orion spacecraft is moved to the Final Assembly and Systems Test cell at Kennedy Space Center on March 30, 2020. Photo credit: Lockheed Martin

Right: Airbus workers inspect the Bartolomeo platform after it was unpacked from its shipping container in Kennedy Space Center's Space Station Processing Facility high bay on Jan. 30, 2020. Manufactured by Airbus Defence and Space, Bartolomeo was delivered to the International Space Station aboard SpaceX's 20th Commercial Resupply Services (CRS-20) mission for the agency.

Communication and Public Engagement

NASA Socials

Five in-person NASA Socials took place, which brought in almost 200 participants to observe a launch, experience Kennedy Space Center, and connect with other like-minded individuals to create a unique community.

Additionally, the first-ever global, virtual NASA Social for the #LaunchAmerica mission was created due to COVID-19 concerns. The event was held through a Facebook group and hosted more than 20,000 participants from all over the world. On the days leading up to launch, the NASA Social team presented 15 live shows to take guests around Kennedy Space Center, virtually, just like an in-person NASA Social. The online audience was able to ask questions live to subject matter experts throughout the segment. This new format continued with the #CountdownToMars and Crew-1 NASA Social.

A very similar format was executed for the Mars 2020 mission, highlighting Kennedy's role in launching the mission as part of the #CountdownToMars.

Joshua Santora with NASA Communications moderates a NASA Social Facebook Live briefing inside the Press Site auditorium on May 26, 2020, ahead of the agency's SpaceX Demo-2 launch. Seated from left are NASA Administrator Jim Bridenstine, NASA astrona uts Nicole Mann and Kjell Lindgren, and Kennedy Space Center Director Bob Cabana.

NASA Social Quick Stats

#LaunchAmerica	#CountdownToMars
Total participants: 20,670 • 98% were active in the Facebook group 15 total live shows • More than 52,000 views combined in YouTube and Facebook • Average video retention rate: 20% • Average length of live shows: 28 minutes	Total participants: 16,000 • 93% were active in the Facebook group Six total live shows • More than 25,000 views combined in YouTube and Facebook • Average video retention rate: 20.2% • Average length of live shows: 26 minutes

Social Media Components

	2019	2020	Increase
Followers across accounts	3.34 million	3.75 million	12%
Engagement across accounts	895,500	16,833,000	88%
New followers across accounts	177,000	432,200	144%
Facebook engagement	306,000	439,700	43.7%
Twitter engagement	284,500	534,600	87.9%
Instagram engagement	305,000	709,000	132%
Facebook new account followers	16,000	50,100	213%
Twitter new account followers	101,000	232,100	130%
Instagram new account followers	60,000	150,000	151%

Social Media Featured Posts

Twitter (left):
193,000+ views

Instagram (center):
1.2 million last slide impressions

Facebook (right):
2,500 shares, 17,000 responses

Rocket Ranch Podcast

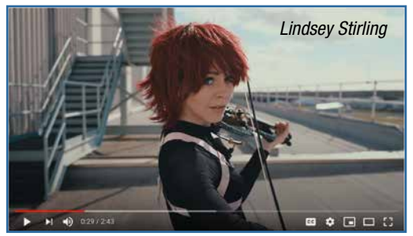
Released episodes: **15 through 23**
Views of Rocket Ranch pages: **15,600**
Plays of new episodes across platforms: **10,000+**

Celebrity Engagement

Throughout the year, nine groups of high-profile guests toured Kennedy Space Center. This included Lindsey Stirling, who filmed a video on top of the Launch Control Center for her song "Artemis." This video garnered close to two million views and was picked up by multiple sources, including PEOPLE.com. Other guests include X Ambassadors and David Harbour, and conduits such as Amway, Walt Disney World, and iHeartMedia.

With this new project, the team successfully launched Countdown Minute – a 60-second video in which the guest is asked multiple space-related questions. This venture is housed on the NASA Kennedy Instagram account.

- Total special guest groups: **nine**
- Platforms utilized: **Facebook, Instagram, YouTube, Twitter**
- Total engagement on all posts: **2.25 million**



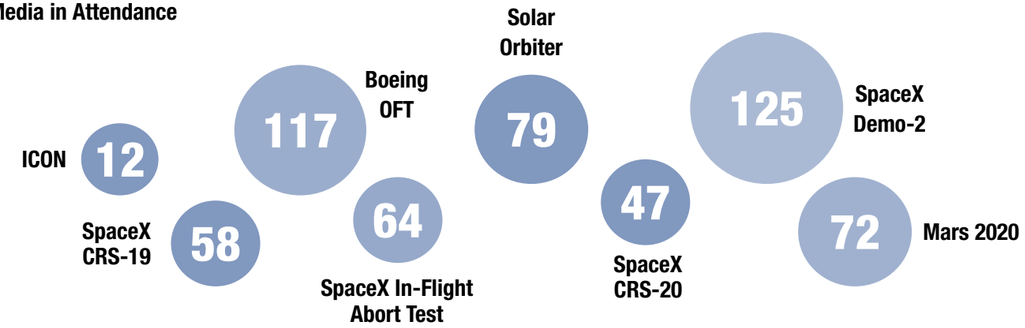
Media Events* (Media in Attendance):

- Exploration Ground Systems (EGS) Wet Flow (14)
- Core Stage Pathfinder/Pegasus Barge (18)
- Kennedy Veterans Day Event (3)
- Sierra Nevada Media Day (25)
- Boeing Starliner Rollout (25)
- Solar Orbiter Media Day (20)

*14 total projects, including Matter of Fact with Soledad O'Brien, NFLPA Josh Dobbs Project, NEW filming for EGS, and BBC Hubble documentary

Kennedy Space Center Launches:

Media in Attendance



Throughout one of the most challenging years in modern history, and one of the busiest for NASA, the world's premiere spaceport has pushed forward to more vividly tell the NASA story, bringing to life the experiences of the next generation of human and robotic explorers. These technical upgrades and investments have positioned Kennedy to be ready for broadcasts in UHD, in more compelling locations, and be more collaborative in the process.

- Permanent fiber-optic and camera infrastructure throughout Kennedy and Cape Canaveral Air Force Station facilities for live coverage needs
- A mobile broadcast unit to allow for more flexible, on-location live content, including the chase vehicle used to capture the Demo-2 crew on their way to the launch pad
- New UHD cameras to replace and add to Kennedy's existing camera suite
- Scripting/TV programming software to allow for real-time collaboration for the entire TV team, both behind the scenes and on camera
- A new suite of hardware and software for Kennedy directors/producers to more adequately meet the demands of modern television practices and capabilities
- A secondary studio space to allow for increased flexibility with regard to additional capacity, inclement weather, and diverse broadcast demands

Kennedy's communication team is continually exploring new ways to engage and inform a broader audience through one-of-a-kind visuals. With access restricted due to the pandemic, Public Affairs helped lead a consortium of Orlando TV stations and major IP video streaming companies to transmit live images around the world of the Falcon 9 rocket awaiting launch on the SpaceX Demo-2 mission from Launch Complex 39A. The images were broadcast for 24 hours a day, four days before launch, allowing worldwide television networks and media companies to use live pictures of the pad as they shared the story of the return of American astronauts to space from American soil. The effort included the installation of a temporary web camera and a rack of six IP video transmitters from three different companies in the Kennedy News Annex building at no cost to taxpayers. Instead, the stations and video companies paid for the equipment and internet access to make the live view possible. LiveU, Dejero, and TVU all reported that at the time, the Demo-2 live stream was the most popular stream ever made available on their platforms.

IMPACT by the NUMBERS

Kennedy hosted 140 OSTEM interns, including 70 interns who participated in the first all-virtual internship session.

EPSCoR released three cooperative agreement notices.

More than 1 million visits to the NASA STEM@Home engagement website.

60 awards totaling $12.2M were made to 28 colleges and universities.

NASA Days events reached 3,000 students at Minority-Serving Institutions.

Workforce Overview

Kennedy Space Center is the nation's premier, multi-user spaceport. It is an integral part of the local economy, providing more than 10,000 jobs for civil servants, contractors, tenants, and construction crews.

The workforce includes people with many skills who are dedicated to supporting the nation's space program and NASA's future exploration to destinations including the Moon and Mars. To accomplish the agency's various missions, these individuals fulfill a multitude of tasks.

At the end of each year, the center takes a snapshot of its workforce. This picture includes all federal and contractor employees chartered to work for Kennedy. Other organizations may have roles here but are not reflected in these numbers.

The civil servant skill mix includes those in science, technology, engineering, and mathematics positions, as well as those in professional administrative and clerical positions.

KENNEDY SPACE CENTER WORKFORCE PROFILE

(through 9/30/20)

Civil Servants	2,021
NASA Pathways Interns	65
Total Civil Servants * includes 1 NEX, 38 full-time term employees, and 10 part-time perm employees, all 'Active' duty status personnel.	2,086
Civil Servants Skill Mix	
Scientific, Technology, Engineering and Mathematics	69%
Clerical and Professional Administrative	31%
On-site Contractor Employees	4,884
Off-site/Near-site Contractor Employees (Excludes construction workers)	314
Total Contractor Employees	5,198
Total Construction Workers	428
Total Tenants	2,767
TOTAL KSC POPULATION	10,479

NASA Office of Diversity and Equal Opportunity (ODEO) Kennedy Space Center

At NASA, we make Air and Space available for everyone.

DID YOU KNOW?

8 in 10 NASA (KSC) Employees Believe*:

- Diversity is promoted in the workplace (86%)
- Prohibited personnel practices are not tolerated (88%)
- Managers and supervisors are committed to a workforce representative of all segments of society (89%)
- They can disclose a suspected violation of any law, rule, or regulation without fear of reprisal (87%)
- My talents are used well in the workplace (80%)
- They are encouraged to come up with new and better ways of doing things (85%)

*Source: 2019 Federal Employee Viewpoint Survey

Kennedy won **3rd** best place to work in the federal government for diversity support.

50% of the center senior leadership is female.

MINORITIES IN ENGINEERING in the last 20 years:

The employment of **Native American** engineers averaged 1%

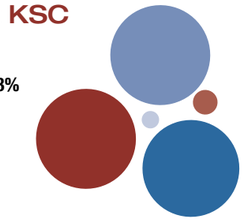
The employment of **Hispanic engineers** averaged 14%

The employment of **African American** engineers averaged 10%

The employment of **Asian Pacific Islander** engineers averaged 6%

AGE DEMOGRAPHICS at KSC

- **Silents** (born prior to 1945) **<1%**
- **Boomers** (born between 1946 and 1964) **33%**
- **Gen X** (born 1965 – 1979) **33%**
- **Millennials** (born 1980 – 1996) **31%**
- **Gen Z** (born 1997 – 2012) **2%**

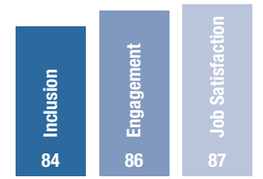


- Average Age: **46** years
- Most junior employee: **19** years
- Most senior employee: **80** years

Correlation between inclusion, job satisfaction, and engagement

Inclusion Quotient Index comprises five aspects of culture:

Fair, Open, Cooperative, Supported, Empowered.



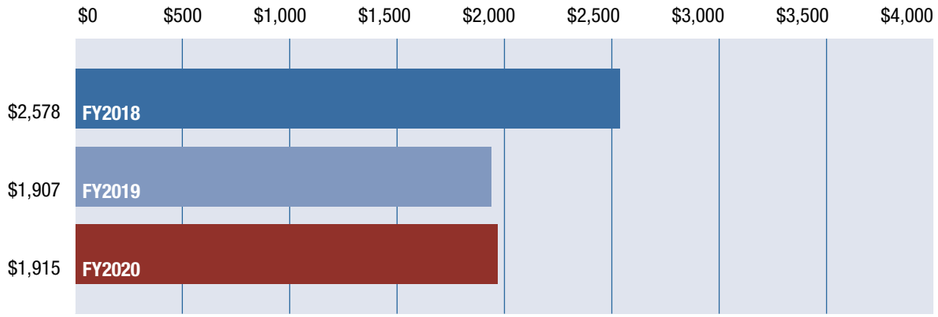
IQ Overall at Kennedy was 84% positive compared to Engagement (86% pos.) and Job Satisfaction (87% pos.) in 2019.

NASA centers' ODEO continually provide training on topics such as disability awareness, conflict management, and diversity and inclusion.

Kennedy Space Center
FY 2020 Budget Authority ($ in Millions)

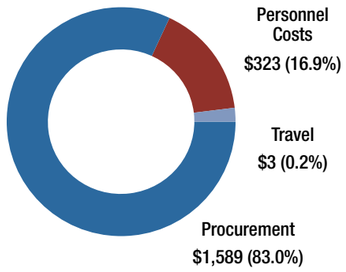
Commercial Crew Program	$344
Launch Services/Science	$432
Exploration Ground Systems	$553
Space Station	$50
Center Management & Operations	$329
Other	$207
Total KSC	$1,915

NASA/KSC Budget Authority Summary
FY 2018 through FY 2020 ($ in Millions)



FY 2020 KSC Budget by Element ($ in Millions)

Total $1,915



Procurement Report

INDUSTRY PARTNERS AT A GLANCE

The companies listed below were some of Kennedy Space Center's top support or launch services contractors in terms of dollars obligated in fiscal year 2020. Following is a brief description of their work for the agency.

Jacobs Technology Inc.

Jacobs Technology Inc., prime contractor for the Test and Operations Support Contract (TOSC), was responsible for the overall management and implementation of ground systems capabilities, flight hardware processing, and launch operations at Kennedy. Specific services provided by Jacobs Technology under TOSC include launch vehicle, spacecraft, and payload integration and processing; operations and development of associated processes for ground systems to support integration, processing and launch; servicing and testing of flight hardware; and launch of development and operational flights at Kennedy.

United Launch Services LLC

United Launch Services (ULS) is a subsidiary of United Launch Alliance, a joint venture between Boeing and Lockheed Martin Commercial Launch Services. ULS provided commercial launch services to NASA using the Delta and Atlas launch vehicles under the NASA Launch Services (NLS) II multiple-award, indefinite delivery, indefinite quantity task order contract. The principal location for the Delta and Atlas vehicle assembly was Decatur, Alabama. Both vehicles launch from Cape Canaveral Air Force Station in Florida and Vandenberg Air Force Base in California.

Space Exploration Technologies Corp.

Space Exploration Technologies Corporation (SpaceX) participated in NASA's goal of developing orbital commercial Crew Transportation Systems. Under the Commercial Crew Transportation Capability (CCtCap) contract for NASA's Launch America initiative, SpaceX was tasked with developing safe, reliable, and cost-effective crew transportation to and from the International Space Station on American spacecraft launched from the United States. SpaceX also participated via a Space Act agreement supporting the agency's Commercial Crew Integrated Capability (CCiCap) initiative.

PAE-SGT Partners LLC

PAE-SGT Partners LLC (PSP) performed institutional support services at Kennedy and NASA facilities at its neighboring Cape Canaveral Air Force Station under the Base Operations, Spaceport Services (BOSS) Contract. PSP provided mission-focused institutional support, including operations, maintenance, and engineering of assigned facilities, systems, equipment and utilities; work management and spaceport integration functions; mission support and launch readiness management; project management and design engineering services; construction support services; and institutional logistics.

ASRC Federal Data Solutions LLC

ASRC Federal Data Solutions performed infrastructure and application services, communication services, and multimedia support services at Kennedy, NASA facilities at Cape Canaveral Air Force Station, Vandenberg Air Force Base, and other locations, under the Kennedy Infrastructure, Applications and Communication (KIAC) contract. ASRC Federal Data Solutions delivered products and services to both NASA and the Department of Defense, and provided benefit to other government agencies, contractors, academia, news media organizations, and various space-related industry entities. ASRC Federal Data Solutions provided products and services including application operations and software development; data center operations; voice, imaging and data communications; multimedia services support; documentation and reproduction; and research and library management.

Bechtel National Inc.

Bechtel National Inc. was the prime contractor for the design and construction services for Exploration Ground Systems' Mobile Launcher 2 (ML2). Bechtel was responsible for the design, construction, testing, and commissioning of the ML2. The ML2 is necessary to meet NASA's goal of returning men and landing the first female astronaut on the Moon by 2024.

AECOM Management Services Inc.

AECOM provided laboratory support services and operations for Kennedy. AECOM was responsible for the operation, maintenance, and engineering for a diverse set of laboratories, developmental shops, and test facilities. AECOM also was responsible for program management, laboratory maintenance and support, operational laboratory services, and professional and technical support for scientific research, engineering analysis, test, and evaluation in laboratory environments.

YOUR PROCUREMENT DOLLARS AT WORK
GEOGRAPHICAL DISTRIBUTION BY STATE
(Fiscal Year 2020 Obligations)

STATE	TOTAL DOLLARS
ALABAMA	10,657,254
ARIZONA	(29,832)
CALIFORNIA	300,028,774
COLORADO	275,901,146
CONNECTICUT	4,524,824
DISTRICT OF COLUMBIA	926,380
FLORIDA	93,791,313
GEORGIA	4,198,071
HAWAII	269,796
IDAHO	10,177,613
INDIANA	2,860,393
LOUISIANA	3,964,095
MARYLAND	139,021,800
MICHIGAN	615,687
MISSOURI	1,278,978
MONTANA	(2,800)

STATE	TOTAL DOLLARS
NEVADA	104,415
NEW HAMPSHIRE	2,495,656
NEW JERSEY	4,034,484
NEW MEXICO	14,181,544
NEW YORK	6,006,079
NORTH CAROLINA	3,647,549
OHIO	4,336,144
OKLAHOMA	2,424,000
PENNSYLVANIA	32,766,559
SOUTH DAKOTA	2,717,857
TENNESSEE	341,531,790
TEXAS	63,114,290
VIRGINIA	174,012,443
WASHINGTON	110,000
TOTAL STATE OBLIGATIONS	**$**1,499,666,302

TOP 25 KSC BUSINESS CONTRACTORS FOR FY 2020

Contractor	Dollars
JACOBS TECHNOLOGY INC.	340,102,864
UNITED LAUNCH SERVICES, LLC	275,796,019
SPACE EXPLORATION TECHNOLOGIES CORP.	251,772,516
PAE-SGT PARTNERS LLC	80,160,041
ASRC FEDERAL DATA SOLUTIONS, LLC	51,900,987
BECHTEL NATIONAL, INC.	46,625,813
AECOM MANAGEMENT SERVICES, INC.	45,777,523
AI SOLUTIONS, INC.	39,225,825
AIR LIQUIDE LARGE INDUSTRIES U.S. LP	32,229,631
CHENEGA INFINITY, LLC	32,109,334
BOEING COMPANY, THE	30,893,749
AIR PRODUCTS AND CHEMICALS, INC.	22,139,023
ARES TECHNICAL SERVICES CORPORATION	15,835,523
APACHE-LOGICAL JV	13,654,608
SAUER INCORPORATED	12,448,895
INTEGRATED MISSION SUPPORT SERVICES LLC	11,917,314
TETRA TECH, INC.	10,608,550
FLORIDA POWER & LIGHT COMPANY INC.	10,346,302
NORTH WIND CONSTRUCTION SERVICES, LLC	10,177,613
NEW DIRECTIONS TECHNOLOGIES, INC.	9,935,637
ROCKET LAB USA, INC.	9,493,990
ASTROTECH SPACE OPERATIONS LLC	9,063,129
A-P-T RESEARCH, INC.	8,476,567
PRECISION MECHANICAL, INC.	7,662,841
BREVARD ACHIEVEMENT CENTER, INC.	6,176,422
TOTAL	**1,384,530,716**

National Aeronautics and Space Administration

John F. Kennedy Space Center
Kennedy Space Center, FL 32899
Public Affairs Directorate

www.nasa.gov

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