



GSDO
GROUND SYSTEMS
DEVELOPMENT & OPERATIONS

EXPLORATION BEGINS HERE



PROGRAM HIGHLIGHTS • JUNE 2016

At NASA's Kennedy Space Center in Florida, the Ground Systems Development and Operations (GSDO) Program Office is leading the center's transformation from a historically government-only launch complex to a spaceport bustling with activity involving government and commercial vehicles alike. GSDO is tasked with developing and using the complex equipment required to safely handle a variety of rockets and spacecraft during assembly, transport and launch. For more information about GSDO accomplishments happening around the center, visit <http://www.nasa.gov/groundsystems>.

NASA's Ground Systems Team Puts Students 'FIRST'

NASA's Ground Systems Development and Operations (GSDO) Program focuses primarily on preparing Kennedy Space Center in Florida to support future launches on the journey to Mars. But investing in that future extends beyond facilities and hardware; it also means reaching out to help students gain hands-on experience in robotics.

Funding provided by the GSDO Robotics Grant Program supports teams across Florida's Space Coast. This financial assistance allows new teams to form and helps existing teams cover the costs of registration, equipment, competitions, and travel when teams could not otherwise afford to move on in the competition season.

The program funds 29 FIRST Lego League teams (ages 9-14), 12 Florida Tech Challenge Teams (grades 7-12) and four FIRST Robotics Competition Teams. FIRST, meaning "For Inspiration and Recognition of Science and Technology," was founded in 1989 to encourage students' interest and participation in these fields.

The program's main objective in offering the grant is to motivate, educate and inform students of the importance and application of science, technology, engineering and mathematics. It also is GSDO's goal to inspire students, teachers, and the general public about NASA, the program itself, and how the world benefits from U.S. space exploration activities.

Team Manatee Law from Riviera Elementary School in Palm Bay, Florida, is exactly the sort of team GSDO sought to help when it created the grant program in 2014.

Manatee Law struggled to continue as their Title 1 School funding couldn't afford them a new robotics kit, and ultimately the team robot died during a competition and was irreparable.



Team Manatee Law pauses for a group photo during the 2016 qualifying tournament. Image Credit: Riviera Elementary/Team Manatee Law

The next year, Coach Lynette Rivera was granted a GSDO Rookie Team Grant to fund purchase of a brand new EV3 Robotics kit, a field setup and a laptop to allow the team to program their robot.

"What they did with that funding was nothing short of phenomenal," said Jennifer Levitt, GSDO grant program coordinator.

To read the complete story, visit <http://go.nasa.gov/2a3Gtgt>.

Ground Systems Team Spotlight

Teresa Parrish is the export administrator with Jacobs on the Test and Operations Support Contract (TOSC) at Kennedy Space Center. She performs export control on behalf of NASA in support of the International Space Station Program, Exploration Systems Development teams, and NASA's Orion European Service Module team.



Her export duties include processing Department of State and Department of Commerce export licenses, NASA Government Exception Authorizations, and U.S. Department of Agriculture permits, fish and wildlife permits and U.S. Customs duty-free letters.

To support the Ground Systems Development and Operations Program (GSDO), Parrish obtained export licenses in support of the Orion European Service Module (ESM) structural test article, EM-1 flight activities, and reviewed the ground processing export requirements with the Orion ESM. She also categorizes all of the new TOSC GSDO designs and upgrades under the export regulations.

Parrish has worked at Kennedy for 28 years. She started at the NASA Shuttle Logistics Depot with Rockwell International supporting subcontract administrators with their contract agreements between shuttle vendors for parts, spares and repairs. She transferred to Security, where she administered Department of Defense security clearances, security background paperwork and badging. In 1986, Rockwell transitioned to United Space Alliance, and so did Parrish, where she started her endeavor with export compliance in 1999. She worked in security and then legal, where she worked on export licenses to share technology with each international partner to fly modules on the space shuttle to the International Space Station.

In February, she received a KSC Certificate

of Appreciation from Kennedy Center Director Bob Cabana for exceptional logistics (exporting) support to the International Space Station Program. Previously, she received a Space Flight Awareness Award for outstanding support with obtaining export licenses in support of the Alpha Magnetic Spectrometer payload that launched aboard space shuttle Endeavour on the STS-134 mission to the space station.

Parrish is originally from Springfield, Tennessee, and moved to Florida in 1985. She has a Bachelor of Science from Barry University and also has a postsecondary vocational certificate as an international business specialist.

Parrish has been married 27 years to her husband Craig. They have two children, a daughter who works in NASA Human Resources at Kennedy and a son in the U.S. Navy, stationed in Virginia Beach. They have a three-year-old grandson and a granddaughter due in September.

Her first car was a 1980 tan Toyota Celica with a hatchback.

Her hobbies include bike riding, walks on the beach and traveling on mission trips with her church to places like Montana, West Virginia and the Amazonas River in Brazil.

"I hope the U.S. will protect our new critical export-controlled technology that we develop on the new programs, and still discover spinoff technologies to share with businesses, and also make discoveries that will inspire Americans," Parrish said. "Maybe we'll find a cure for some medical disease or a cheaper way to fuel the world."

Spiros Bourtis is a mechanical engineer with SGT Inc. on the Engineering Services Contract (ESC) at Kennedy Space Center. He has worked at the center for seven years.

His main responsibility supporting the Ground Systems Development and Operations Program is serving as the lead design engineer for the Interim Cryogenic Propulsion Stage Umbilical (ICPSU) subsystem on the mobile launcher for the Space Launch System (SLS).

The ICPSU will provide liquid hydrogen and liquid oxygen, among other commodities, to fuel the second stage of the SLS Block 1 vehicle.

Bourtis says the coolest part of his job is working with the wonderful and supportive team at Kennedy, designing part of the new mobile launcher for the next generation of space exploration rockets, leading a team of engineers for the design and analysis of the ICPSU, and being able to develop ideas from concept to fabrication and testing.

"It was amazing to watch as the ICPSU arm was delivered to Kennedy and lifted

by crane up on the Launch Equipment Test Facility tower," Bourtis said. "I felt proud to have all of the years and long hours of design work from the ESC and NASA team come to fruition."

In 2014, Bourtis received a NASA Space Flight Awareness award for his efforts on the ICPSU. "I was very humbled to be recognized by my management and peers for my dedication to the project," Bourtis said.

Bourtis first became interested in space when he was four years old, during a family vacation to Florida and Kennedy Space Center. "I thought it was incredible to be able to explore and learn about our universe, so from that point on I made all my school projects about outer space," Bourtis said.

He earned three degrees from the Florida Institute of Technology in Melbourne: a Bachelor of Science in aerospace engineering, and Masters of Science in engineering management and systems engineering.

What are his hopes for NASA's space program and exploring beyond low-Earth orbit?

"I think that human exploration of our solar system is incredible and I hope to see



crewed rocket exploration increase exponentially throughout our solar system within my lifetime," Bourtis said.

Bourtis' first car was a 1994 red Pontiac Sunbird he owned during college days. He had written on the back of the car, "No really, I am a rocket scientist."

He is married to his wife, Carla, and they have one son, Stavros, who turned one on July 4th. They have a dog named Chloe, who is a rescued mixed breed.

Bourtis' hobbies include soccer, lacrosse, surfing, scuba diving, sailing and traveling.

Industry Spotlight - Precision Fabrication Cleaning

Precision Fabrication & Cleaning (PFC) was founded in 1964 by co-owners Jack Shye and Russell Gray in Cocoa, Florida. The Precision group also includes Precision Mechanical Inc. and Precision Enterprises Inc. The company has satellite operations in Colorado and Virginia (supporting launch operations at Wallops Island).

Current owners are Robert Kelly, president; Todd Gray, vice president of operations; and Jason Shye, chief financial officer.

All three Precision companies have provided direct support to NASA since they were founded more than 50 years ago. PFC offers fabrication, chemical pretreatment, precision cleaning, testing and painting of panel frames, processing skids and ground support equipment to its customers. They also provide mobile and field cleaning capabilities, welding, corrosion control,

and extensive fabrication and assembly operations.

“Our fabrication, testing and installation projects include strict quality control, close interface and design troubleshooting with NASA,” said Deb Ehlers, Precision technical support.

Precision performs a myriad of support services to NASA and the Orion and SLS programs.

About 200 employees work at job sites in Florida, Virginia and Colorado facilities. They perform refurbishment of existing NASA hardware, vehicle hardware, and ground support equipment to meet Orion and Space Launch System (SLS) configuration requirements.

PFC currently is providing support to the Ground Systems Development and Operations Program and Engineering Directorate at Kennedy Space Center for the two Tail Service Mast Umbilicals (TSMUs).

At the Cocoa location, workers inspected, cleaned and assembled the TSMU components that will connect from the zero-level deck on the mobile launcher to the SLS rocket core stage aft section. The umbilicals will be prepared for transportation to Kennedy for testing at the Launch Equipment Test Facility.

PFC capabilities include a comprehensive machine shop with unique and high-tolerance tooling, cleaning and passivating operations to Kennedy standards.

“Precision will continue to provide fabrication, cleaning, testing and installation services for new projects as they are developed,” Kelly said. “We have a strong commercial project base and are uniquely positioned to continue growing, improving, and supporting government projects as they fluctuate during development phases.”



A crane lowers a segment of one of the Tail Service Mast Umbilicals to its other segment at Precision Fabrication & Cleaning in Cocoa, Florida. Photo credit: NASA/Bill White

Several connections, called launch umbilicals, will connect from the mobile launcher tower and provide power, communications, coolant and fuel to NASA's Space Launch System (SLS) rocket and Orion spacecraft for their first integrated mission. Among them are two umbilicals called tail service mast umbilicals (TSMUs). They are being cleaned and assembled at Precision Fabrication & Cleaning (PFC) in Cocoa, Florida, before they are transported to the agency's Kennedy Space Center in Florida for testing.

Technicians at PFC are cleaning the two segments of each umbilical to remove any dirt or debris that may hinder their functionality, checking them for any defects, and then assembling the parts to form two complete umbilicals. They will be transported to Kennedy's Launch Equipment Test Facility where they will undergo testing to ensure their readiness to support operations leading up to launch.

The umbilicals will connect from the zero-level deck on the base of the mobile launcher to the SLS rocket core stage aft section. The 33-foot-tall structures will provide liquid oxygen and liquid hydrogen fluid lines and electrical cable connections to the SLS core stage engine section to support propellant handling during prelaunch operations.

At the LETF, engineers and technicians will use liquid nitrogen to simulate the liquid oxygen for the TSMU that will provide liquid oxygen. They will test the umbilical's arm performance across the full range of SLS core stage motions and simulate a vehicle launch using the Vehicle Motion Simulator test fixture. The same series of tests will be performed with the second TSMU that will provide liquid hydrogen, using the actual liquid hydrogen commodity.

Before launch, both TSMUs will tilt back to ensure a safe and reliable disconnect and retract of all umbilical hardware away from the rocket during liftoff.

Kennedy's Engineering Directorate, along with the Ground Systems Development and Operations Program, are supporting processing activities of the umbilicals for missions to deep space including NASA's journey to Mars.

Employee Spotlight - Joy Mosdell

Joy Mosdell is the schedule analyst lead with Millennium Engineering and Integration for the Ground Systems Development and Operations Program (GSDO) at Kennedy Space Center.

Her primary responsibility is leading the schedule team and all of the schedule analysts that support all of the divisions of GSDO. She directly supports the mission manager and the program manager in all things schedule-related. She works directly with the Space Launch System and Orion Programs and the Exploration Systems Division.

Mosdell worked a combination of 15 years at Kennedy and Cape Canaveral Air Force Station. She worked on the Boeing Delta IV and Delta II Programs, at the NASA Applied Technologies Laboratories, and supported the U.S. Air Force for Atlas V.

“The coolest part of my job is being able to interact with almost everyone on the GSDO Program,” Mosdell said. “I also have the opportunity to work with the other programs as well.”

Mosdell became interested in space in 1997 while she was in the Air Force. She was a missile launch control officer stationed in Minot, North Dakota. She knew about the space shuttle but didn't really have a great concept of what else was launched from Florida. She received an assignment to work on the Delta II Program.

“When I came to the Space Coast, I was exposed to all of the different rocket programs and saw my first space shuttle launch,” Mosdell said.

“That's when I decided that I wanted to stay here. I realized this is where I needed to be – in aerospace.”

Mosdell's hometown is Cleveland, Ohio. She moved to Florida in February 2001.

She earned a Bachelor of Arts in political science from Miami University in Ohio and a Master of Science in public administration from Central Michigan University in Mount Pleasant.

Mosdell is looking forward to the launch of NASA's Space Launch System rocket and Orion spacecraft in a couple of years.

“We've come so far in the past four years, from early designs to actually fabricating and testing. It would be great if NASA has a rocket that can do something that no one else has done. It's very exciting, and we're almost there,” Mosdell said.

Her first car was an early 1990s Ford Escort.

She has been married to her husband, Brian, for nearly seven years. They have a four-year-old son, Jack.

Mosdell's hobbies include running in marathons. She loves to run and participates at least once a year. Her most recent marathon, in April, was in Paris, France. An upcoming marathon, in October, will be in Dublin, Ireland.



A heavy load transport truck from Tillet Heavy Haul Inc., in Titusville, Florida, carrying the second half of the D-level work platforms, D North, for NASA's Space Launch System (SLS) rocket, arrives at the Vehicle Assembly Building (VAB) at Kennedy Space Center on June 27, 2016. The platform was delivered to the VAB staging area in the west parking lot. Photo credit: NASA/Bill White