

Press Release: Aerospace Opens UK Subsidiary to Support Key U.S. Ally in Space, Boost UK Space Role

January 25, 2021

EL SEGUNDO, Calif., Jan. 25, 2021 – <u>The Aerospace Corporation</u> (Aerospace) announced its opening of The Aerospace Corporation UK Ltd (Aerospace UK), a wholly owned, UKbased subsidiary.

As an extension of Aerospace's role as an objective technical advisor for the space enterprise, <u>Aerospace UK</u> will support a key U.S. ally under contract with the UK Ministry of Defence (MoD). Aerospace UK will provide technical support as the UK



develops a new set of space policies and initiatives. For 60 years, Aerospace has operated a federally funded research and development center (FFRDC) dedicated to solving the hardest problems for the U.S. space enterprise and its allies.

"Establishing Aerospace UK demonstrates Aerospace's commitment to advancing the global space community and stronger, deeper partnerships with U.S. allies," said <u>Steve Isakowitz</u>, Aerospace president and CEO. "We are pleased to provide the technical expertise and strategic insights that have made us a trusted partner to the U.S. space enterprise to support the UK in shaping its future in space."

The UK is emphasizing space in planning for future defense, security and national prosperity, with specific focus on developing domestic launch facilities, a new position, navigation and timing system and a major new satellite communications capability.

Aerospace UK draws on 60 years of independent technical expertise and insight that Aerospace—as a nonprofit corporation that operates a federally funded research and development center (FFRDC)— provides to the U.S. military, government space leaders and U.S. allies to help them make technically informed space policy decisions. Aerospace UK will function in a similar independent role, providing access to Aerospace experts while also deploying local technical specialists.

Gina Galasso will serve as the managing director of Aerospace UK. She has spent over 35 years helping Aerospace customers navigate the complex issues of space, including 15 directly supporting allied governments.

"The UK is poised to take its place as one of the world's most important sovereign space nations," said Galasso. "The Aerospace Corporation UK Ltd will facilitate a truly UK approach that will strengthen our allies' space capabilities."

ABOUT THE AEROSPACE CORPORATION

The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center and has approximately 4,000 employees nationwide. With major locations in El Segundo, Calif.; Albuquerque, N.M.; Colorado Springs, Colo.; and Washington, D.C., Aerospace addresses complex problems with agility, innovation, and objective technical leadership across the space enterprise and other areas of national significance. For more information, visit <u>www.aerospace.org</u>. Follow us on Twitter: <u>@AerospaceCorp</u>.

Aerospace Employees Discuss Launching the Next Generation of Engineers and Scientists

January 20, 2021

Employees at Aerospace recently had the opportunity to virtually engage with college students interested in career opportunities in the science, technology, engineering and math (STEM) fields. Partnering with the organization STEM Advantage, Aerospace co-hosted the "Launch Your STEM Career" professional development session, which featured participation from senior leaders and young professionals at the company who spoke about their own life experiences, professional inspirations and career aspirations.



Aerospace Director Sonia Henry (center) with STEM Advantage Scholars Antonella Pinola (left) and Rubi Mora (right) in 2016.

Aerospace has a long-standing relationship with STEM Advantage, which was recently spotlighted on the Orbiter. The nonprofit organization helps to mentor, prepare and inspire women and underserved communities to pursue career opportunities in STEM through internships, mentorships, scholarships and professional and community development for students. STEM Advantage currently offers its program in six schools within the California State University system, which is the largest and most diverse public university system in the nation, with more than 50 percent of the student body comprised of people of color.

Aerospace also invited students from other partner schools and organizations to attend the event, which featured keynote speaker Dr. Malina Hills, Senior VP Space Systems Group, as well as speeches from Aerospace STEM Advantage Scholar Alumni and professional development breakout sessions led by members of Aerospace's Employee Resource Groups (ERGs) and University Relations and Recruiting. "Work somewhere with people who really appreciate you and value your work," said Hills, who shared her personal journey into STEM, and her experiences at Yale, CalTech and Aerospace. "At technology companies like Aerospace, our people are our greatest asset because we need scientists and engineers to solve hard problems. Students like you are very important because you represent the next generation of engineers and scientists. It's the best and most satisfying job I could have, because science and engineering are, in a weird way, kind of like a painting a poem in that it helps you understand the physical world around you and really appreciate it. I work hard, I enjoy it and I encourage you to continue your STEM education, study hard, collaborate, compete, take some reasonable risks and network because there are a lot of opportunities out there for you to shine."

The breakout sessions allowed attendees to hear from Aerospace employees and focused on pertinent topics that resonate with many students ready to launch their careers, including advancing their opportunities, overcoming adversity and finding resources. The Aerospace Black Caucus presented on "Navigating to the Top," Aerospace Latino Members Association discussed "First Generation College Students and College Success: Breaking Down the Barriers," the Aerospace Women's Committee talked about "Building Confidence and Managing Imposter Syndrome," and Aerospace University Relations & Recruiting shared "Tips to Connect with Employers and Help Get Hired."

For Aerospace, Senior Vice President Chuck Gustafson serves on the STEM Advantage Advisory Board, and Senior Project Engineer Dr. Sylvia Kohn-Rich also serves as a STEM Advantage mentor. Sonia Henry, Director in the Systems Engineering Division, is also a mentor for the program and served as the event's master of ceremonies.

"Before I decided to be an engineer, I thought I wanted to be a doctor. Aerospace and programs like STEM Advantage really helped me to jumpstart my interest in STEM, but also really helped me jumpstart my STEM career as well," Henry said. "Programs on campus, the Minority Engineering Program (MEP), National Society of Black Engineers (NSBE) and others that I had the privilege to be involved in really helped me to find internships and scholarships to pay for most of my schooling so that there was very little debt when I finished. Aerospace allowed me to work and be mentored from the summer after my sophomore year at Cal State Long Beach all the way to today. I am still learning and growing."

Paying it forward, Henry has been a mentor to multiple STEM Advantage Scholars, including current Aerospace employee Antonella Pinola.

"I had the opportunity to be a STEM Scholar and STEM Advantage gave me the opportunity to intern at The Aerospace Corporation," said Pinola, who became an Aerospace employee as a direct result from her internship. "I'm very thankful for STEM Advantage because without them I would not be where I am today. That internship gave me a chance to experience working in industry and taught me how to collaborate with multiple people and get the job done."

Aerospace Sensors Shed Light on Environmental Impact of U.S. Wildfires

January 12, 2021



As the world's climate heats up, many states in the western United States are experiencing increasingly larger and more devastating wildfires, along with a corresponding increase in dangerous air quality from wildfire smoke. A team of engineers at The Aerospace Corporation recently took to the skies to capture valuable data related to the environmental and atmospheric effects of these wildfires and the smoke they generate.

Conducted in late September, the FIRESTORM 2020 mission involved the flight of a Twin Otter Aircraft at altitudes of 12,500 – 17,500 ft above the Creek Fire burning east of Fresno, Calif. now recognized as the largest fire in the state's history. Aerospace's renowned Mid-infrared Airborne Hyperspectral Imager (MAHI) and Mako sensors were on board the craft, providing infrared hyperspectral imaging capabilities to detect and identify gases resulting from widespread wildfires, and analyze the movement and effects of these gases on the environment.

"There are a lot of fires this year. A lot more in California than in previous years, and larger fires," said Dr. Eric Keim, Associate Director of Aerospace's Imaging Spectroscopy Department. "We're trying to help characterize the emissions from these fires that are of interest to scientists about the impacts of these fires on humans."



Onboard the Twin Otter, Aerospace's Mako instrument provides superior sensing capabilities.

It should be noted that airborne infrared hyperspectral imaging is a technology used to support national security and intelligence community applications, typically involving a sensor being flown over an area to collect data on the thermal infrared radiation (i.e., heat) that is emitted by the land and atmosphere below. While the Department of Defense routinely uses this capability to spot ground-based vehicles, Aerospace was instrumental in expanding airborne infrared hyperspectral imaging capabilities into Earth science applications, such as mineral mapping, global warming studies, and crop health analysis.

How Infrared Hyperspectral Imaging Works

The MAHI/Mako sensors share similar functionality with digital cameras, in that they capture images comprised of rows of pixels, however, their similarity to consumer-level digital cameras ends there. While digital camera pixels can only register colors (i.e., "channels") of red, green and blue, Mako sensor pixels can capture spectral information on the order of 128 channels, while MAHI sensor pixels can capture 640. Given that different chemical compounds absorb different wavelengths of light, the two sensors can provide infrared information that can reveal variations in color intensity that provide the visual signatures unique to specific gases.

"Where most hyperspectral sensors are visible, near-infrared, we're in portions of the chromatic spectrum that most people do not sense in," says Pat Johnson, Senior Engineer of Aerospace's Imaging Products Department. "So (MAHI/Mako) are state-of-the-art, as far as instruments go."



A plume of smoke rises as the plane goes by. Aerospace's onboard sensors can detect harmful gases resulting from the fires.

Last summer, Aerospace engineers initiated a hardware redesign for both sensors, which included a redesign of the lens enclosure and sensor cooling mechanism. In addition, the mount used to attach the sensors to the aircraft was updated to allow for three-axis stabilization (i.e., roll, yaw and pitch) allowing for the capture of smoother, crisper images that are unaffected by flight turbulence. Electronics were also updated, to increase reliability and reduce the likelihood of optical artifacts.

"Right now, nothing approaches (MAHI/Mako's) combination of sensitivity and area coverage that anyone else is flying," Keim said. "Aerospace has instruments that nobody else has, in terms of the capability for large areas, survey and the sensitivity for the gases that we're trying to detect."

FIRESTORM Mission Leveraged Evolved Sensor and Data Analysis

Likewise, data collection and analysis tools were similarly updated and tailored to meet the needs of the mission, which now presented an exceptionally large area of coverage due to the unprecedented severity and range of the wildfires. While carbon monoxide and nitrous oxide were readily observed during the mission, the FIRESTORM 2020 mission also identified preliminary "exotic" materials in the hyperspectral data, such as formaldehyde, acetaldehyde, benzaldehyde and acrolein, among others.



The team prepares to takes the sensors airborne, flying over fire-affected regions to collect hyperspectral imaging data.

"Chemicals that we measure, some of them are dangerous to humans, and some of them are precursors to other chemicals that impact human health," said Dr. Katherine M. Saad, Senior Member of the Technical Staff for Aerospace's Data Analytics Department. "What we are able to provide are quantities that can be used by regulatory folks or scientists that are concerned with exposure."

Recent and increasingly frequent natural disaster events in the U.S. and the world at large have underscored the importance of Earth system science to environmental protection, public health and national security. As always, Aerospace is committed to applying its state-of-the-art resources to these objectives for the greater good. The FIRESTORM 2020 mission was a successful application of Aerospace's technology for a new purpose of quantifying fire-related toxins.

"Fires are having more and more of an impact on our environment and our living conditions," Keim said. "The more we can characterize them, the more we can understand how bad they are, and how much we need to do to mitigate them."

How Aerospace Keeps Space Missions Running Smoothly

January 06, 2021

Satellites and space vehicles are required to survive extreme environments. Scientists at The Aerospace Corporation specialize in creating and evaluating lubricants that help spacecraft withstand whatever space throws at them.

Every vehicle, from the International Space Station to interstellar probes, runs on many moving parts. Preventing wear and tear on these mechanisms is the job of tribologists, who specialize in the study of interacting surfaces and friction.





Aerospace Director Dr. Stephen Didziulis works to better understand how materials and their functional environment can impact spacecraft performance.

"There are mechanical systems in space operating at thousands of rotations per minute that have to last for 15 years without an oil change," said Dr. Stephen Didziulis, Director of Aerospace's Surface Science and Engineering Department.

Choosing the right lubricants requires deep knowledge of not only the compounds themselves, but also an understanding of the surfaces, systems and extreme environment conditions of space involved in a mission.

Liquid lubricants, oils and greases thicken like molasses in extreme cold, become too loose in heat and can evaporate too easily, requiring highly specialized space formulations. Solid lubricants are needed in very cold and contamination-sensitive systems. Examples include Teflon and molybdenum disulfide, a graphite-like substance. Unlike graphite, however, this compound doesn't require moisture in the air to function, making it ideal for the vacuum of space.

Since vehicles can't be repaired after they leave the Earth, operators must be certain that their systems will function for the full duration of their missions. Aerospace houses the world's foremost capabilities for the testing and verification of space lubricants, serving as a crucial resource for the industry's toughest tribological challenges.

Tribology in Action

In July, NASA's Jet Propulsion Laboratory tasked Aerospace with a critical lubrication evaluation for the Perseverance rover, a part of the Mars 2020 mission. The Perseverance, set to land on the Red Planet in February 2021, will look for signs of ancient life by collecting rock and soil samples for possible return to Earth in future missions.



Dr. Andrew Clough conducts rigorous testing in Aerospace's Tribology lab to analyze solid lubricants and better understand the surface chemical makeup, which impacts their performance.

To prevent the contamination of the samples, the rover's equipment must be sterilized. However, this process had an unexpected effect on the solid lubricants needed to manipulate, seal and deposit the collection tubes on the Martian surface.

JPL engaged with the Aerospace tribology team to obtain a better understanding of the impact of sterilization on the lubricant and to define a less damaging procedure to ensure that the lubricants would adequately function.

"They wanted to kill off any microbes in the equipment and wanted the samples to be free of carbon," Didziulis said. "But the team was concerned that the sanitization could destroy the lubricants." The Aerospace team proceeded to test and analyze lubricants subjected to a less damaging sterilization process and prove that they would work in the Martian environment.

Fortunately, Aerospace's lab contains one of the few instruments in existence capable of testing a lubricant under Mars conditions: carbon dioxideheavy air, blistering cold and low pressure.

Using a unique rotating stage cooled with liquid nitrogen in a vacuum chamber, the team proved that the Martian atmosphere would not harm the performance of the solid lubricants, enabling the rover to launch on schedule at the end of July.

The team's unique capabilities, combined with the corporation's breadth of space systems experience, make Aerospace a sought-after authority on lubrication issues.

"Most people don't care about the space environment when they do tribology. Most tribologists reside in fields like aviation, automotive or biomechanical engineering,"



Aerospace's technical capabilities enable our scientists and engineers to replicate the extreme temperatures and conditions of space to optimally test the potential effects on lubricants.

Didziulis said. "But it's an essential area for space, so we stay very busy."

January 2020 Obituaries

January 01, 2021

Sincere sympathy is extended to the families of:

- Floyd Anderson, office of technical support, hired Oct. 21, 2019, died Dec. 13, 2020
- Sharon Bauer, office of technical support, hired May 22, 1961, retired June 1, 2004, died Dec. 15, 2020
- **Rudolph Bova**, office of technical support, hired Oct. 22, 1964, retired June 1, 1988, died Nov. 29, 2020
- Lester Eiskant, member of administrative staff, hired Jan. 19, 1987, retired Aug. 1, 2004, died Dec. 8, 2020
- **Timothy Fernandes**, office of technical support, hired March 31, 1980, retired April 1, 2018, died Dec. 12, 2020
- Irving Garfunkel, member of technical staff, hired July 26, 1966, retired March 1, 1988, died Dec. 15, 2020
- Kasper Graff, member of technical staff, hired Dec. 11, 1961, retired May 1, 1981, died Dec. 6, 2020
- John Guidero, member of technical staff, hired April 3, 1967, retired Feb. 1, 1986, died Oct. 2, 2020
- Richard Leslie, member of technical staff, hired June 15, 1971, retired July 1, 1994, died Dec. 13, 2020
- **Paul Marchionda**, member of technical staff, hired July 25, 1974, retired Jan. 1, 1995, died Dec. 3, 2020
- **Cecilia Noonkester,** office of technical support, hired May 15, 1967, retired April 1, 1994, died Oct. 15, 2020
- Kathleen Page, office of technical support, hired Sept. 8, 1989, retired Dec. 1, 1990, died Dec. 29, 2020
- William Paterson, member of technical staff, hired April 23, 1979, retired Nov. 1, 1993, died Dec. 17, 2020
- **Robert Postma**, member of technical staff, hired March 31, 1980, retired June 1, 2012, died Aug. 22, 2020
- Michel Rogson, member of technical staff, hired Aug. 14, 1962, retired Oct. 1, 1996, died Oct. 25, 2020
- Nathan Rosenblatt, member of technical staff, hired May 10, 1981, retired Oct. 1, 1995, died Dec. 13, 2020
- **Gwen Smith**, member of administrative staff, hired June 14, 1965, retired March 1, 1995, died Oct. 22, 2020
- Zoltan Stroll, member of technical staff, hired Feb. 2, 2009, retired Jan. 1, 2013, died Oct. 24, 2020
- **Phyllis Whobrey**, member of administrative staff, hired Dec. 31, 1960, retired Jan. 1, 1989, died Dec. 25, 2020
- William Wilcox, member of technical staff, hired July 23, 1962, retired Feb. 1, 2000, died Dec. 17, 2020
- Leaman Wilkes, member of technical staff, hired May 19, 1975, retired Feb. 1, 1994, died Oct. 6, 2020

To notify Aerospace of a death and have it included in the Orbiter, please contact People Operations at (310) 336-5107.

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