

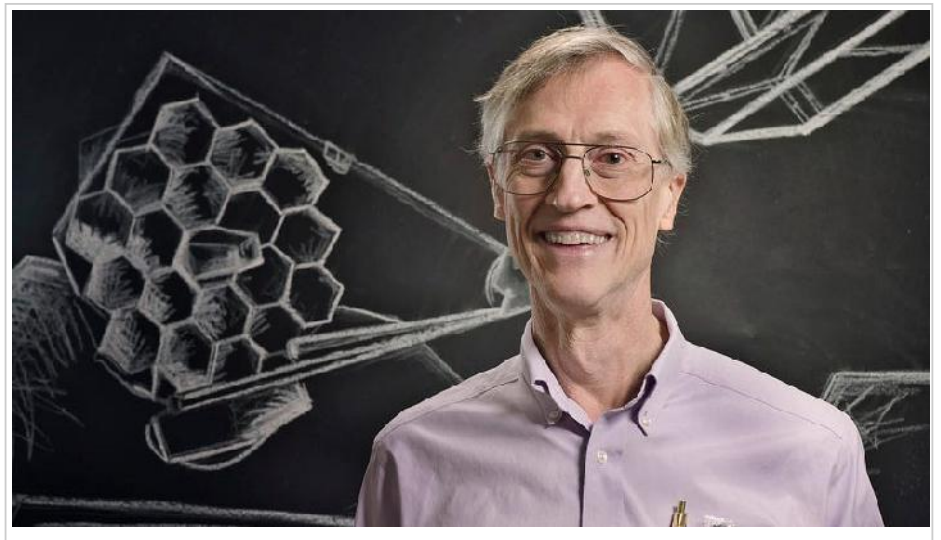
ORBITER NEWS

News, announcements, and more.

Nobel Prize Winner Dr. John Mather Talks Future of Space Exploration

April 28, 2021

Four centuries since Galileo first pointed a telescope into the stars, the technical capabilities and scientific discoveries for space exploration continues to grow exponentially today. Fueled by the accelerating pace of innovation and advancements in technology, new possibilities in astronomy to further our understanding of space are still rapidly emerging.



Recently, the Aerospace Distinguished Speaker Series invited Nobel Prize winner Dr. John C. Mather to give a talk about New Technologies for New Astronomy, highlighting some of the most exciting programs for space and their underlying technologies. Sponsored by the Aerospace Technical Fellows, the series features external presenters who are thought and technical leaders in their fields.

Mather is currently a senior astrophysicist in the Observational Cosmology Lab at NASA's Goddard Space Flight Center, and the Senior Project Scientist on the James Webb Space Telescope.

Along with George Smoot, Mather was awarded the 2006 Nobel Prize in Physics for his work on NASA's Cosmic Background Explorer (COBE) and the discovery "of the blackbody form and anisotropy of the cosmic microwave background radiation." In essence, they were able to precisely measure and map the oldest light in the universe with a precision of 0.005%, thereby confirming the validity of the Big Bang Theory.

"We were able to make a differential instrument that compared the spectrum of the cosmic microwave background radiation with an ideal blackbody calibrator. The prediction of the Big Bang Theory is that spectrum must be blackbody, and we confirmed that it is to 50 parts per million," Mather said. "We also discovered with this mission that there were hot and cold spots in this cosmic background radiation and you make a map of the entire sky and it was sufficiently important discovery that it was part of the Nobel recognition."

NASA describes the COBE project as having "revolutionized our understanding of the early cosmos."

"The accomplishment is we know the parameters of the expanding universe to a percent accuracy, if we did it right," Mather said. "Of course, that's always subject to doubt because nature has a way of fooling us, or maybe I should say, we have our ways of fooling ourselves."

Mather also discussed some of the contributing factors for why space innovation continues to accelerate. Exponential growth is happening all around us, as observed through Moore's Law, Wright's Law, and the modern pace of rocket launches, to name just a few. The combination of increasing performance and lowering costs in exponential terms, along with new inventions and breakthroughs—such as in small and nano satellites, adaptive optics and new detectors—has had a significant impact on what space programs are able to accomplish.

"Exponential growth is pretty darn fast," said Mather, who shared his experience working on the Webb telescope as an example how technology has advanced exponentially.

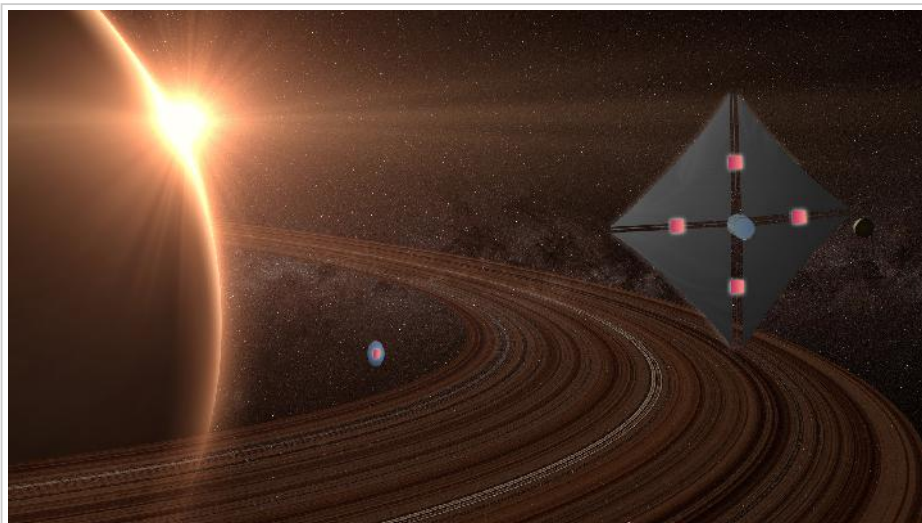
"When we started work on it in 1995, we needed 10 new technologies, and we made a plan to get them all ready. The most difficult were the mirrors, which must be much larger and much lighter than the mirror for the Hubble Space Telescope, and the detectors, which had to be much bigger and better than those we flew on the Spitzer Space Telescope," he said. "I just want you to have some appreciation that once in a while you set out on a project that seems laughably difficult, and then you do it."

As part of his presentation, Mather provided a "quick tour" of some of the most fascinating programs in the field of astronomy, including the Event Horizon Telescope (EHT), which produced the first ever image of a black hole; the Dragonfly Telephoto Array, which discovered a galaxy with 99.9% of its mass composed of dark matter; and even more ambitious concepts on the horizon.

Press Release: Aerospace Concept for Deep-Space Travel Selected for NASA Innovation Award

April 22, 2021

EL SEGUNDO, Calif., April 22, 2021 – The Aerospace Corporation's (Aerospace) Atomic Planar Power for Lightweight Exploration (APPLE) concept, which could expand human exploration of the deepest parts of the solar system faster than ever before, received a 2021 NASA Innovative Advanced Concepts (NIAC) Phase I grant worth up to \$125,000.



The APPLE concept is a new type of spacecraft power system that will open previously inaccessible parts of the solar system to human exploration and make a range of rapid transit missions possible. (Aerospace illustration)

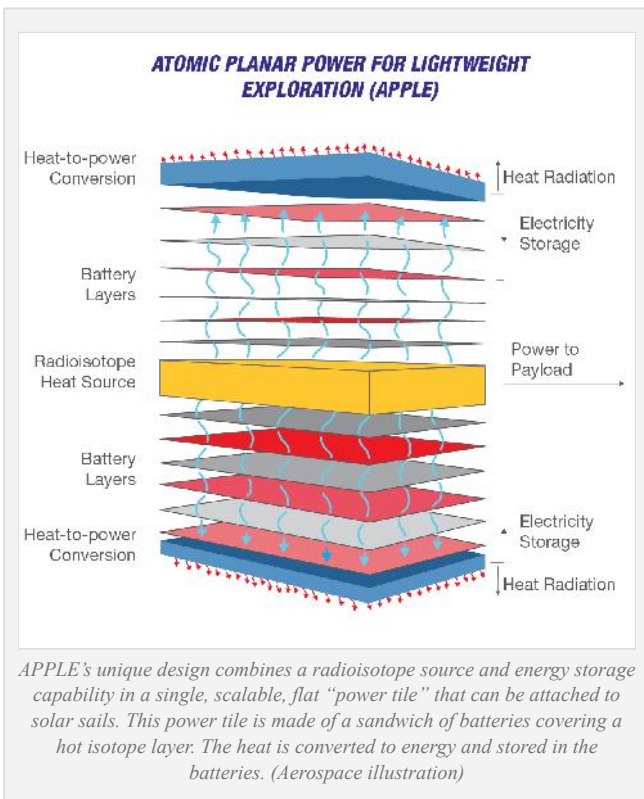
The APPLE concept is a new type of spacecraft power system that will be much lighter—and thus faster and cheaper—than existing spacecraft power systems, thanks to the combination of a radioisotope source and energy storage in a single, scalable, flat “power tile” that can be attached to solar sails. APPLE’s use of a structural battery and recycled waste heat mean it is also long-lived and rechargeable.

“The real value of APPLE is that it enables fast transit,” said E. Joseph Nemanick, a research scientist in Aerospace’s Energy Technology Department. “The ultimate achievement would be to build a spacecraft that can rapidly deliver a science payload to the deepest parts of the solar system in the order of years, not decades.”

During the next nine months, the team will build a power system and radiation models that assess the power needs of deep space missions like a Kuiper belt object flyby and a mission to the solar gravity focal point. The radiation testing will be completed by the Oak Ridge National Laboratory (ORNL) while the Aerospace team leads system and mission modeling.

“This is an exciting approach to reimagining the architecture of batteries to enable greater functionality and survivability in the harsh conditions of space,” added ORNL’s Gabriel Veith, who is partnering with the Aerospace team on this project.

Aerospace teams have previously been awarded Phases I and II NIAC grants for the Brane Craft concept and Phases I, II, and III NIAC grants for the Solar Gravity Lens concept. NIAC targets transformational ideas



for future NASA missions to drive radically improved space technology.

Leading the APPLE project is Nemanick and his Aerospace teammates Henry Helvajian and Kristine Ferrone, in conjunction with Veith.

This year, NASA's Space Technology Mission Directorate selected 16 NIAC Phase I proposals, each worth up to \$125,000 in NASA grant funding. After the nine-month period of performance, Phase I recipients may apply for Phase II awards.

About The Aerospace Corporation

The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center and has more than 4,000 employees. With major locations in El Segundo, California; Albuquerque, New Mexico; Colorado Springs, Colorado; and the Washington, D.C., region, as well as a wholly owned subsidiary in the United Kingdom, Aerospace addresses complex problems across the space enterprise and other areas of national and international significance through agility, innovation, and objective technical leadership. For more information, visit www.aerospace.org. Follow us on Twitter: [@AerospaceCorp](https://twitter.com/AerospaceCorp).

About Oak Ridge National Laboratory

Oak Ridge National Laboratory is the largest US Department of Energy science and energy laboratory, conducting basic and applied research to deliver transformative solutions to compelling problems in energy and security. UT-Battelle, LLC, manages ORNL for the Department of Energy's Office of Science. For more information, please visit ornl.gov.

Earth Day: How Our Work at Aerospace Helps Protect the Planet

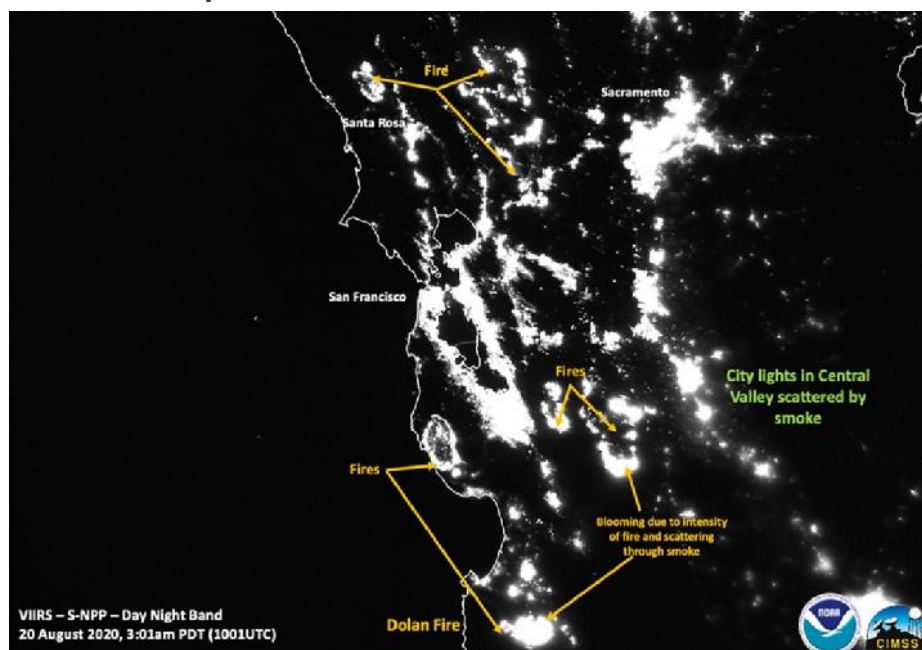
April 21, 2021

It turns out one of the best ways to study Planet Earth is to leave it. As human access to space has sped up, scientists increasingly rely on everything from satellites to the International Space Station to study our planet and changes to our climate. New tools on the ISS provide data on Earth's airglow and carbon dioxide levels while satellites track wildfires, Arctic warming and hurricanes.



In honor of Earth Day, we used our new Medium page to highlight eight ways that Aerospace scientists and engineers are using space to study and protect Earth.

How Satellites Predict Wildfire Spread



A single spark in remote wilderness can ignite massive fires that devastate surrounding communities, destroying homes and taking lives. Emergency personnel and the public rely on satellites high above the Earth to detect these fires early and track their spread.

How Much is Carbon Dioxide Affecting Our Planet? NASA's New Space Instrument Aims to Find Out.



Increases in atmospheric carbon dioxide are responsible for about two-thirds of the total energy imbalance that is causing Earth's temperature to rise. [NASA's Orbiting Carbon Observatory](#), installed on the International Space Station, will study carbon dioxide in oceans and terrestrial ecosystems.

A New Generation of Small Satellites Capture Hurricane Sally from Space



When Hurricane Sally hit the Gulf Coast region of the United States, a pair of tiny AeroCubes shot the eye of the storm. These small satellites [sent compelling imagery of the hurricane to Earth](#) via laser communications, demonstrating how small satellites can deliver large amounts of data for weather and other research.

[Read more at the Aerospace page on Medium.](#)

Press Release: Aerospace Selects James Myers as Vice President of Civil Systems Operations

April 14, 2021

EL SEGUNDO, Calif., Apr. 14, 2021 – The Aerospace Corporation (Aerospace) announced today the selection of aerospace and defense industry veteran James (Jim) Myers as vice president of Civil Systems Operations. Myers brings 30 years of global security and information systems industry expertise to Aerospace at a dynamic time for the national space enterprise.



“Jim’s vast leadership experience, understanding of mission integration, and strong commercial partnerships will play a key role in our efforts to integrate the space enterprise,” said Steve Isakowitz, Aerospace president and CEO.

Prior to joining Aerospace, Myers served as vice president of Programs for Northrop Grumman Corporation’s Mission Systems sector, leading the program management and execution of a \$12 billion business. Previous to this position, he was vice president of Northrop’s Enterprise Initiatives, partnering with industry in the commercial applications of the company’s technologies. Earlier in his career, he served as sector vice president of Northrop Grumman’s Global Operations as well as sector vice president and general manager for three of Northrop Grumman’s divisions – Cyber Solutions, Civil Systems, and Navigation Systems.

Before joining Northrop Grumman, Myers held several senior leadership positions at Loral Space and Communications, United Technologies Corporation, and Microsoft Corporation.



James (Jim) Myers, Vice President of Civil Systems Operations.

Myers earned a bachelor’s degree in mechanical engineering and a master’s degree in aeronautical and astronautical engineering from Stanford University as well as a master’s in business administration with an

emphasis on finance and strategic planning from UCLA's Anderson School of Management.

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Supporting Perseverance: How Aerospace Contributed to the Mars 2020 Mission

April 12, 2021

February 18, 2021 will stand as a major milestone in one of the most exciting eras in the history of space exploration.

On that date, the Mars 2020 Perseverance Rover finally touched down in the Jezero Crater on Mars, completing a 292.5-million-mile journey that started seven months prior on an Atlas V rocket launched from Cape Canaveral, Florida. Perseverance's flight featured six maneuvers and an impressive autonomous entry, descent, and landing (EDL) upon arrival at the Red Planet, where it is now searching for signs of past life.

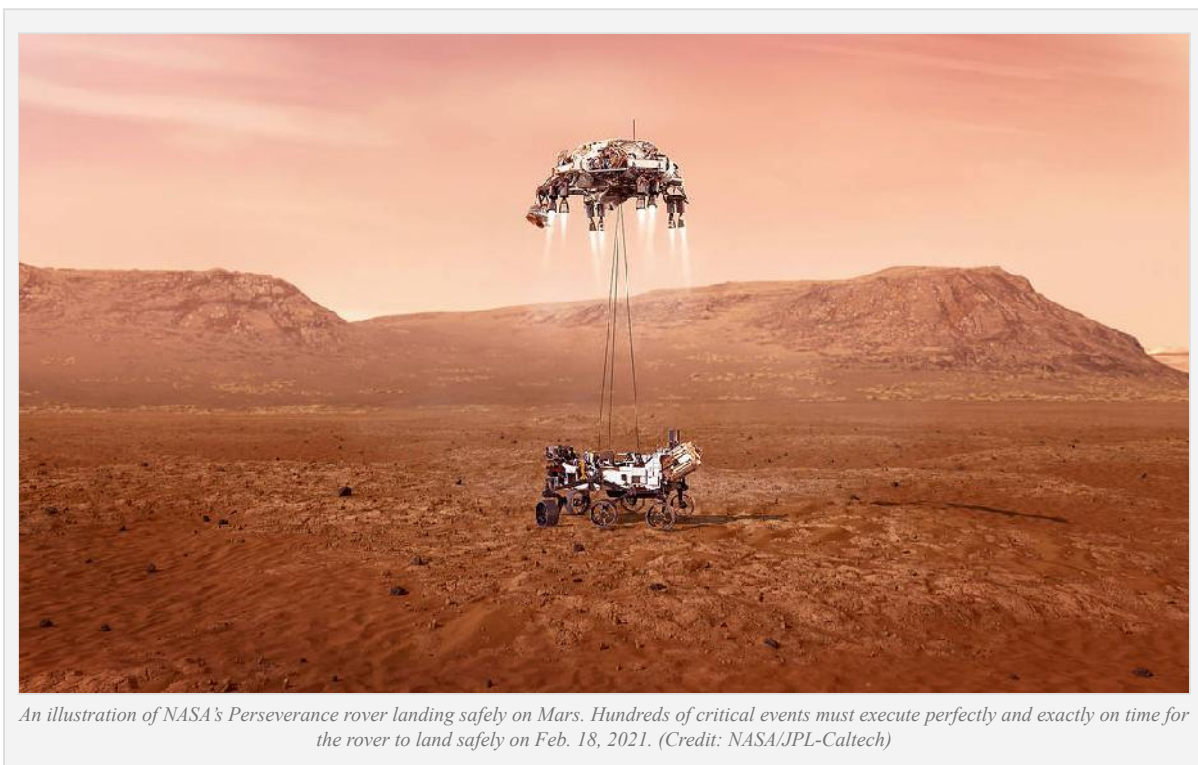
Aerospace is proud to have contributed to this unprecedented achievement and congratulates its entire team that supported this historic feat.

"On behalf of all of us at Aerospace, I heartily congratulate our entire Perseverance mission team, which played a critical role in enabling our customers' mission success and represented us extremely well at a definitive moment in humanity's history in space," said Ed Swallow, Senior Vice President of Civil Systems Group.

Throughout Perseverance's development life cycle, Aerospace provided direct support to NASA's Jet Propulsion Laboratory (JPL) and NASA's Launch Services Program (LSP), and programmatic support to NASA Headquarters (HQ), including project verification and validation, launch support, vehicle separation simulations, reliability predictions, resiliency testing, and several other key activities.

Starting with the Mission Concept Review in 2013 and continuing through formulation to confirmation after the Preliminary Design Review in 2016, Aerospace provided numerous parametric cost and schedule estimates of the maturing mission that helped NASA HQ's Science Mission Directorate (SMD) ensure the mission scope was within the cost cap set for the mission by the National Academies.

"Throughout implementation all the way to launch, Aerospace performed monthly and milestone assessments based on project performance that provided insight to SMD as to whether the Mars 2020 project would meet the budget and launch date set at confirmation," said Eric Mahr, Senior Project Leader in Aerospace's Strategic Assessments and Studies Division. "Overall, the Aerospace programmatic assessments enabled SMD to better manage the entire planetary science portfolio."



An illustration of NASA's Perseverance rover landing safely on Mars. Hundreds of critical events must execute perfectly and exactly on time for the rover to land safely on Feb. 18, 2021. (Credit: NASA/JPL-Caltech)

The entire world watched Aerospace's contributions play out during Perseverance's impressive EDL sequence in February. "The parachute dynamic model and the entry and powered descent vehicle separation models developed at Aerospace were successfully used for this mission, and they supported the JPL structural and mechanical design of the Perseverance Rover during this phase," said Marco Bacaloni, Senior Project Leader in Missile Systems Design and Assurance, Strategic Deterrence & Defense Division.

While drawing upon significant heritage from the Mars Curiosity mission, which has been operating on Mars since 2012, the Perseverance mission will make new scientific discoveries and serve as the first in a series of missions comprising the Mars Sample Return (MSR) campaign. Furthermore, Perseverance will demonstrate a new technology by performing the first powered flight on Mars with Ingenuity, a small helicopter designed to provide aerial surveillance of Perseverance's landing site.

The Perseverance mission has already taken critical steps toward returning Martian rock and soil samples to earth for future analysis. "Aerospace teams provided support to the specific group that was developing the Sample and Caching System (SCS) which will eventually prepare samples for the return of regolith from the Mars surface," said Dr. Meg Abraham, Senior Project Leader in Systems Formulation and Implementation. "It was a wonderful experience."

"Getting samples back from Mars is one of the 'Holy Grail' missions of space exploration that has not yet been performed," Mahr said.

Perseverance proved an apt name for a mission that sustained activity and progress throughout the COVID-19 pandemic, having to perform integration and test activities, launch, and cruise operations en route to Mars, all of which culminated with a successful landing. This included addressing a technical challenge with dry lubricants used on the SCS that was identified roughly six months prior to launch.

“JPL discovered that the friction-reducing properties of the dry lubricants had degraded to the point where the SCS mechanisms might completely jam up, thus preventing Perseverance from achieving one of its key science objectives,” said Dr. James Kaufman, a Senior Project Engineer supporting the Civil Space Programs Operations Division. “JPL formed a Tiger Team to investigate and understand the root cause of the anomaly and determine potential recovery paths. Because of Aerospace’s expertise in the field of tribology, which is the study of friction, we were invited to participate in the Tiger Team. Aerospace’s support gave the project confidence that the SCS would perform properly, thus allowing the mission to launch on time – avoiding added cost and a 26-month delay to the next Mars launch opportunity.”

Aerospace’s tribology team performed a critical lubrication evaluation in early 2020 using unique laboratory equipment to simulate harsh Martian conditions, with multiple Aerospace teams contributing.

“The Physical Science Labs have state-of-the-art instruments used to perform physical analysis of spacecraft components,” said Dr. Gary Stupian, Technical Fellow, Electronics and Photonics Laboratory. “We were able to bring considerable expertise to bear to successfully resolve the issue and allow the launch schedule to be met.”

While Dr. Andrew Clough, Senior Member of the Technical Staff, performed tribology measurements alone in Aerospace labs due to COVID-19 protocols, the full support and contributions of his team enabled his success.

“Everyone was singularly focused on the current problem at hand,” he said. “I knew that the team had my back, and we were able to evaluate the lubricant performance and give JPL the assurance they needed to launch the [sample collection] tubes to Mars. And I can’t wait to see those samples returned to Earth.”

With more groundbreaking milestones on the horizon for Perseverance, Aerospace stands ready to continue supporting our customers throughout this unprecedented Mars mission.

“It was an incredible opportunity to get to work on something that is now on another planet, and it wouldn’t have been possible without the contributions from the entire Aerospace team behind this effort,” said Dr. Aimee Hubble, Project Leader in Aerospace’s Research and Technology Collaboration Office who contributed to Perseverance while she was a research scientist within Aerospace’s Propulsion Science Department.

Aerospace Video Production Center Team Earns National Recognition for Excellence

April 08, 2021

Across Aerospace's nationwide campuses, our people work on some of the most complex and innovative technical programs to solve the hardest problems in space. Many times, explaining that work requires engaging and compelling videos that effectively tell the bigger story. Whether it's a short sizzle reel to capture imagination or a long-form discussion to explore issues at greater depth, video storytelling has been a powerful tool for Aerospace, and even more so during the past year of teleworking.



From left: Lester Chung, David Garlick, Bryan Tsunoda, David Newman and James Liggins preparing to film an Aerospace news segment in December 2018.

Behind these videos is the team at the Aerospace Video Production Center (AVPC) in Corporate Communications, which partners with groups across the company to create over 300 engaging, high-quality videos per year—often on tight deadlines—about the great work Aerospace does. Interestingly, their great work has been steadily gaining recognition, garnering industry awards against very tough competition.

AVPC recently took home the grand prize for Video Team of the Year at the prestigious Ragan Communication's 2020 Video, Visual & Virtual Awards, beating out a wide field of competitors, which included global heavyweights like Ford, Microsoft, ESPN, and the FBI. In addition, AVPC team won an honorable mention in the Grand Prize category of Virtual Event of the Year for the 2020 Corporate Awards.



Aerospace President and CEO Steve Isakowitz recording an All Hands presentation with James Liggins and Dean McDonnell.

"The Ragan Video, Visual & Virtual Awards celebrate the most successful campaigns, initiatives and teams in the communication, PR and marketing industries," said Lester M. Chung, Video Production Manager for

AVPC. “The *Video Team of the Year* award is especially significant to us, not only for the recognition it represents, but also as a testament to our ability to quickly respond to production challenges imposed by COVID-19. We had to reinvent how we do things.”

As Aerospace introduces and engages new customers and potential recruits, video has been a differentiator in helping the corporation “punch above its weight” in a very competitive marketplace. For example, in a recent Aerospace external digital campaign, video was the most engaged with format, attracting over 2.65 million views and a 71% completion rate. The results indicate that well-produced videos—which can attract 10 times the engagement versus other formats—are essential in helping Aerospace expand awareness to new audiences and external channels.



David Newman and Dean McDonnell filming Delilah Nunez for an Aerospace video.

Internal and external to Aerospace, the shift to working in remote environments due to COVID-19 also translated to a significant increase in demand for video products. As a result, the team delivered at record levels in terms of quantity while still making gains on quality. Going forward, the team intends to dial back on the number of projects it takes on while focusing on enhancing the impact and value of the videos they produce.

AVPC’s creative process typically begins with a brainstorming session with the requestor and subject matter experts to determine goals and expectations for content, messaging and communication, followed by production scheduling. When the global pandemic

upended normal operations and precluded the use of their studio, AVPC responded by adapting with alternate production methods and producing content from home.

In those instances when filming on campus was required, the team ensured adherence to Aerospace’s COVID-19 safety protocols by social distancing, reducing crew on site, conducting interviews outdoors, and devising new ways of integrating content derived from Zoom and Teams calls.

The AVPC team is comprised of video production experts, each bringing unique skills and specializations to complement each other. This enables the team to deliver in all aspects of video production across a wide range of subjects, including for corporate and executive communications, creative development, high quality HD production, training, electronic news gathering and multi-camera studio production.

Pandemic notwithstanding, AVPC remains committed to producing consistently effectual, high-quality content while leveraging collective know-how to fine tune corporate messaging.

“In the past year, we’ve changed the scope of the videos we produce. We’re trying to create videos with more value to the corporation, that can change the perception of the corporation and tell the story of Aerospace,” said Chung. “With the help of CorpComm’s Strategic Communication Partners, who have a better understanding of the communication needs of their customer organizations, we can produce videos

that are far more targeted and effective. The industry recognition we're now receiving bears this out."

Congratulations to the AVPC team's Lester Chung, Jennifer Langone, James Liggins, David Garlick, Dean McDonnell, Brian Dionisi, David Newman, John Gasca and Erick Yablon.



Dean McDonnell and David Garlick on location filming Technical Specialist Jonathan Taylor about the FIRESTORM mission.

Press Release: Aerospace UK Ltd Awarded £500k Contract by UK Ministry of Defence Space Directorate

April 07, 2021

EL SEGUNDO, Calif., April 7, 2021 – The Aerospace Corporation (Aerospace) announced today that its wholly owned U.K. subsidiary, The Aerospace Corporation UK Ltd (Aerospace UK), has secured a one-year contract for £500,000 to advise the U.K. Ministry of Defence (MoD) Space Directorate on a decision-making framework for space capabilities.



“Space is critical to securing operational advantage and enabling multi-domain integration: It is the responsibility of my team to deliver space coherency across defense and ensure we are aligned with other Whitehall Departments,” said Air Vice Marshal (AVM) Harv Smyth, Director of Space at the MoD. “Whilst we are the single touch point for space in defense, this is a team effort, and we are delighted to be working with The Aerospace Corporation UK Ltd, whose expertise over many years spans the entire space enterprise.”

Aerospace UK will bring Aerospace’s 60 years of technical expertise and insight to help address the MoD Space Directorate’s challenges, in parallel with U.S. Space Force Chief of Space Operations Gen. John W. “Jay” Raymond’s Planning Guidance objective to strengthen the space capabilities of U.S. allies.

“Working with our allies directly, and through common mission partners, we strengthen our mutual ability to rapidly deliver war-winning capabilities,” said Lt. Gen. John Thompson, Space and Missile Systems Center commander. “As the United Kingdom stands up their new Space Command and embarks on their first national space strategy this year, we are excited to work alongside our longest ally to deepen these ties. Through U.K.-U.S. efforts like International Space Pitch Days and collaborative exploration of how to integrate our complementary space systems together, our mission partners help us collectively deliver coalition capabilities that will outpace the threat.”

In its March 16 Integrated Review of Security, Defence, Development and Foreign Policy, the U.K. established that it views space as fundamental to the delivery of military capability and to the functioning of wider society. As access to space is increasingly congested and contested, the MoD is developing space capabilities and infrastructure that will enable the U.K. to continue to operate effectively in a degraded or

denied space environment. Effective strategic planning underpins the MoD's response to the evolving space security environment.

"Space is a complex and expensive environment, and we understand the dedication and collaboration required to achieve success," said Gina Galasso, Aerospace U.K.'s managing director. "We are excited to be working with AVM Smyth and his team to help them develop and deliver space capabilities necessary for their protect-and-defend mission."

ABOUT THE AEROSPACE CORPORATION UK LTD

The Aerospace Corporation UK Ltd is the wholly owned U.K. subsidiary of The Aerospace Corporation. Headquartered in Salisbury, Wiltshire, this small-to-medium enterprise is focused on supporting a number of different government organizations in the U.K. space economy. The company has been established to support U.K. efforts in a variety of space areas, including launch, space situational awareness, systems acquisition, and program management. For more information, visit www.aerospace.org/uk.

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April 2021 Obituaries

April 01, 2021

Sincere sympathy is extended to the families of:

- **Allen Arnold**, member of technical staff, hired Oct. 8, 1981, retired April 1, 1989, died Feb. 19, 2021
- **Edward Asato**, member of administrative staff, hired April 21, 1968, retired Oct. 1, 1993, died Feb. 11, 2021
- **Stephanie Brown**, member of administrative staff, hired Jan. 16, 1978, retired June 1, 2012, died Feb. 22, 2021
- **Phil Dahl**, member of technical staff, hired Sept. 3, 1960, retired Nov. 1, 1991, died Jan. 25, 2021
- **Georgine Foster**, office of technical support, hired April 2, 1962, retired Jan. 1, 1990, died March 8, 2021
- **Mildred Linnetz**, office of technical support, hired Aug. 21, 1978, retired Dec. 1, 1987, died March 1, 2021
- **Charley Roberts**, member of administrative staff, hired April 16, 1963, retired Oct. 1, 1988, died March 5, 2021
- **John Stubstad**, member of technical staff, hired Feb. 2, 1987, retired April 1, 2017, died March 2, 2021
- **Mason Watson**, member of technical staff, hired July 16, 1962, retired April 1, 1990, died March 1, 2021

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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