AEROSPACE

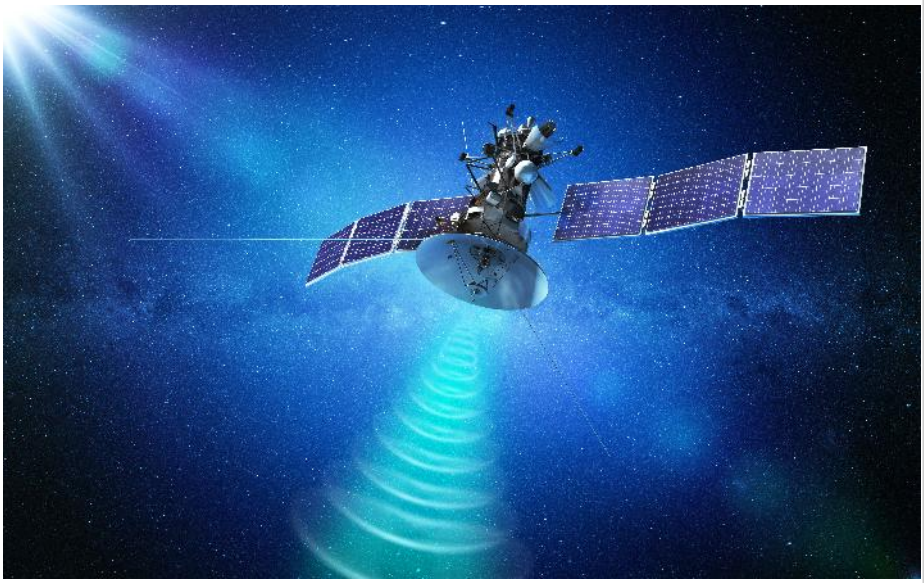
ORBITER NEWS

News, announcements, and more.

TWTs and 3D Printing: How Aerospace Put a New Twist to an Old Classic

August 31, 2020

Have you ever wondered how deep space missions are able to send images from the edge of the solar system back to Earth? These long-distance transmissions are made possible by a highly specialized type of vacuum tube known as traveling wave tubes (TWT). For higher-powered needs, such as for satellite transponders, a TWT amplifier (TWTA) is used to provide critical communication functions by converting weak input signals into high-powered ones.



Traveling wave tubes (TWT) and TWT amplifiers (TWTA) enable satellites to provide critical communication functions by converting weak input signals into high-powered ones.

Aerospace recently helped identify and resolve a technical challenge involving a customer's TWT, while also providing an innovative approach to remediation, which allowed the customer's project to proceed without significant delays or cost overruns. Individual units can cost as much as $1,000,000 to produce and can require more than a year to build or qualify using current protocols.

TWTs are structurally complex and therefore reliant upon high manufacturing standards which, if not attained, can lead to potentially catastrophic design flaws and system failures.

“Aerospace has a lot of resources because we study manufacturing techniques and we look at different ways of manufacturing parts for space applications, so we have a lot of resources in that area, in addition to the diagnostic capabilities and a lot of multidisciplinary expertise leveraged in this investigation,” said Michael Muha, Senior Engineering Specialist at Aerospace and an esteemed expert in traveling wave tube technology with 30 years of experience in the field.

Aerospace engineers were tasked with providing a comprehensive assessment of a high-voltage connection failure on a TWTA, which occurred during a final thermal vacuum test, resulting in electricity “jumping” to a nearby grounded object (a phenomenon known as electrical arcing). While TWT high-voltage connections are typically encapsulated with a polymer material to prevent this from occurring, an accidental void in the polymer led to an electrical arcing incident, which rendered the TWT inoperative.

The assessment by the engineers included an optimal rework scenario complicated by the risk of damage to the TWT during rework. TWTs are typically mounted permanently to a base plate that is not designed to be taken apart once assembled. As per Samuel S. Osofsky, Director of Aerospace’s Communications Electronics Department, “If you have to take (a TWT) off its base plate it breaks up the configuration, and every configuration that you break, you have to re-test.” The inherent risk was not limited to a broken flight interface, but total loss of the TWT itself. Manufacturing of a new unit could take up to 60 weeks.

Hence, the race was on to find a means of repairing the TWT without separating it from its base plate. The deceptively simple solution bore all the hallmarks of Aerospace ingenuity, involving the creation of a new encapsulation mold that could be placed on the damaged TWT in situ, with the help of additive manufacturing, more commonly known as 3D printing.

Muha enlisted the help of fellow Aerospace engineers Oliver Ambrosia in Digital Communication Implementation, and Tait D. McLouth and David Witkin in the Materials Science Department.

*Read the **full story on Aerospace.org** to learn how the team collaborated in supporting the customer to overcome this challenge and ensure mission success.*

Aerospace Technical Fellows: Distinguished Experts Across the Space Enterprise

August 26, 2020

To solve the hardest problems in space, the world's foremost experts in science and technology must be able to operate across multiple technical disciplines of the space enterprise for the government and commercial sector. As the nation's trusted partner and the leading FFRDC for space, The Aerospace Corporation is relied upon to support and lead in critical situations where this combination of depth and breadth of technical understanding is paramount.

To ensure that its experts are best positioned for the task, the Aerospace Technical Fellows program aims to fosters such expertise by empowering its technical leaders with the ability to collaborate across the corporation's many capabilities, harnessing its most forward-looking innovation and unparalleled repository of space-systems knowledge.

Technical Fellows' early contributions laid the groundwork for much of modern space activity. One of the many examples is how nascent research in atomic clock physics at Aerospace helped set the standard for positioning, navigation and timing critical to today's GPS system.

Another example is the decades of industry-leading work Aerospace has done in analyzing orbital debris, collision avoidance and reentry break-up, which plays an ever-increasing role in space traffic management in an era of proliferated orbit.

The Technical Fellows serve as principal authorities that enable Aerospace to continue to impact and innovate across a wide range of technical fields, from materials science to remote sensing. Here are just a few of many examples:

- Dr. John Hackwell is designing infrared sensing for wake patterns of maritime vessels as a more effective addition to radar and sonar monitoring for national security at sea
- Dr. Allyson Yarbrough partners with manufacturers and academic institutions to assess and validate commercial off-the-shelf parts that could lower costs and help scale satellite production
- Dr. William Ailor was the first director of the Center for Orbital and Reentry Debris Studies, and continues developing new tools to analyze potential orbital collisions and assess the risks of debris entering the atmosphere
- Dr. James Camparo continues Aerospace's legacy of precision time-keeping research through chip-sized atomic clocks that will enable interaction among swarms of small satellites

At Aerospace, the Technical Fellows lead multidisciplinary projects while promoting technical cross-pollination and can serve as an emergency response team of sorts for the most critical projects when called upon. They also provide their high-level expertise and technological insight to support enterprise-wide decision-making, such as for internal research and development investments and top-level architectural planning for Aerospace customers.

"The Technical Fellows are essential to the health of Aerospace," said Dr. David Miller, Chief Technology Officer for Aerospace. "Not only does the program recognize the fundamental role that science and technology play in Aerospace's mission, but it also provides a promotion path for those thought leaders that Aerospace needs to maintain its technical excellence."

The Technical Fellows also provide a force multiplier of technical knowledge for Aerospace's workforce, enabling teams to leverage their expertise in complex projects.

Administered by Aerospace's Office of the Chief Technology Officer, the program represents a leadership career path for scientists and engineers as an alternative to traditional line management roles.

2020 Aerospace Technical Fellows

Ric Agardy, SSG	Dr. Renny Fields, ETG	Dr. Michael Meshishnek, ETG
Dr. William Ailor, ETG	Dr. Peter Fuqua, ETG	Dr. Inki Min, ETG
James Anderson, SSG	Dr. Sergio Guarro, ETG	Jay Penn, SSG
Dr. James Barrie, ETG	Dr. John Hackwell, OCTO	Dr. Merri Sanchez, OCTO

Nat Bhaskar, DSG	Ranwa Haddad, SSG	Enold Pierre-Louis, ETG
Bob Bitten, CSG	Lawrence Harzstark, ETG	Dr. John Scarpulla, ETG
Dr. James Camparo, ETG	Bernardo Higuera, NSG	Matthew Smith, ETG
Peter Carian, ETG	Dr. Felix Hoots, ETG	Gary Stupian, ETG
Willard Downs, ETG	Dr. Ronald Hopkins, ETG	Susan Vogel, NSG
Robert Dybdal, ETG	Eric Johnson, ETG	Dr. Allyson Yarbrough, ETG
Dr. Renny Fields, ETG	Dr. Mark Maier, ETG	Dr. Albert Zimmerman, ETG

“The Tech Fellows add another layer to the strategic direction of the company,” said Hackwell, who helps manage the program. “They bring a different view of the world into where Aerospace should be going.”

Many Tech Fellows hold patents and publish non-classified work in top scientific journals. They serve on government and commercial advisory boards, bringing their expertise to bear on industry-wide issues.

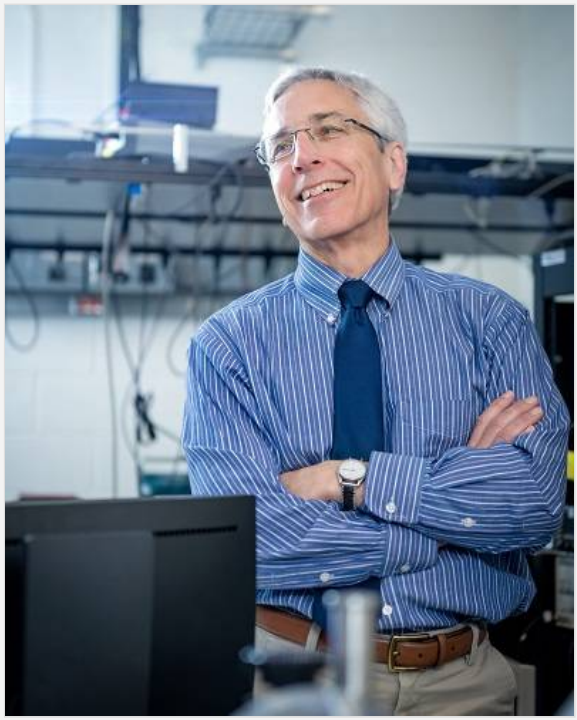
In conjunction with major professional bodies, Tech Fellows have led international conferences and workshops. Through these activities, they strive to involve others from Aerospace in broader scientific community.

The Tech Fellows leverage their extensive industry networks to partner with research labs, academic institutions and other FFRDCs – consistent with the corporation’s collaborative ethos.

This co-creation process brings outside knowledge to bear, yielding more innovative solutions to the challenges of Aerospace customers.

A Technical Fellow is recognized as having achieved and sustained an unparalleled level of technical excellence in his or her field, and the role is the pinnacle of the technical career path at Aerospace. Currently, there are 33 Tech Fellows spanning every major technical group in the corporation.

Given the Tech Fellows' accomplishments and stature in their fields, they are also uniquely suited to serve as valuable mentors for the younger professionals at Aerospace, ensuring the retention of corporate values and technical expertise into the future.



In fact, mentorship lies at the core of the program. Both formally and informally, the Tech Fellows play an active role in developing emerging talent and future technical leaders at Aerospace.

"Mentorship is natural to the Tech Fellows," Hackwell said. "Many of them have done it before they were in the program, so they continue with it and expand their reach."

Beyond individual mentoring, Tech Fellows facilitate corporate-wide continuing education and support university recruiting to engage diverse, early career talent.

Ultimately, the Tech Fellows contribute unmatched expertise in a range of disciplines for the benefit of the Aerospace and the broader space enterprise.

This article was originally published on Aerospace.org.

Aerospace Honors Three Employees with Woman of the Year Awards

August 25, 2020

The Aerospace Corporation honored three employees with Woman of the Year awards on Monday, recognizing their outstanding professional achievements and contributions to the company.

The ceremony was hosted by the Aerospace Women's Committee as part of Women's Week, which began over the weekend with a virtual "Run or Walk #TowardEquality" event and continues throughout this week, including a keynote speech from Gen. (Ret.) Ellen Pawlikowski on Thursday.

This year's Women's Week theme is "100th Anniversary of the Women's Right to Vote," in recognition of the passage of the 19th amendment.

Monday's ceremony featured remarks from Aerospace President and CEO Steve Isakowitz, who congratulated this year's award winners and spoke of the long role women have played fighting for equal rights and societal change throughout our country's history.

"Women have been on the frontlines of fighting for change throughout our history and that proud legacy continues today," Isakowitz said. "For more than 40 years, the Aerospace Women's Committee has been a powerful force for good at our company. It plays a crucial role in supporting and furthering the professional and personal ambitions of our female colleagues. Just as importantly, it's a place to recognize and celebrate the achievements of the many talented women who work at Aerospace."

The Woman of the Year award recognizes outstanding job performance, involvement with company activities, community involvement, professional and academic achievement, and leadership and mentorship roles.

Here's more about this year's recipients:

Darlene Covington joined Aerospace in 1988 as a temporary secretary in the Engineering and Technology Group, became a permanent hire the following year and now works as a project administration specialist in the Corporate Chief Engineers Office. During her 32 years at Aerospace, she's consistently been recognized for her exceptional contributions as a key member of independent review teams and failure review boards.

Covington has been a life-long learner, taking Aerospace corporate courses and trainings to build her project management and support skills, obtaining a degree in Business Administration Information Systems in 2008, and continuing to take classes at a local community college to stay on top of changing technologies and trends.

Covington is a frequent mentor to Aerospace colleagues, and participates in the Aerospace Black Caucus and Aerospace Women's Committee, serving as the volunteer webmaster for both organizations. She is also active in STEM and community outreach.

"At Aerospace, my core journey has been on-demand learning. As tasks, projects, and programs have changed, my skills have changed to meet each of these challenges. This is what motivates me to continue learning," Covington said in her acceptance speech. " Aerospace is the kind of place to work for that gives you access to continual learning to improve your skills and capabilities. I'm thankful to be here for the last 32 years."

Dr. Seema Sud joined Aerospace in 2011 as a senior engineering specialist and is now a distinguished scientist and engineer in ETG. Throughout her time at the company, she's found innovative solutions for difficult customer problems and is frequently sought out by customers to share her expertise in satellite communications.

Her work at Aerospace has included leading a team developing algorithms to obtain sub-millimeter resolution using a device with six GPS receivers, a problem that was unsolved for more than a decade. Her work on advanced signal processing methods has led to about 20 publications, six patents and follow-on customer funded efforts.

Sud is an active educator and mentor both inside and outside Aerospace, including at George Mason University, where she's taught for more than 10 years. She's received a Masters of Science from George Mason University and a Ph.D from Virginia Tech University.

"I'm so thankful for all the opportunities that Aerospace has given me. Working here has allowed me to pursue my two greatest professional passions: performing research to develop innovative solutions to difficult signal processing problems, and teaching," Sud said Monday.

Dr. Dewanne Phillips joined Aerospace in 2014 as a senior project leader and is now a principal director in ETG where she oversees a team of more than 100 staff and managers. Phillips is an established systems engineering and software engineering expert, who provides trusted technical and management advice to the government and other partners.

Throughout her career, Phillips has contributed to improving technological advancement by capturing innovative improvement practices, documenting best practices, and providing lessons learned along with recommendation to address shortfalls in reports and presentations to high-level customers.

Phillips is an active mentor to Aerospace colleagues at all levels, holding an informal monthly round-table women's group, volunteering with various associations to advance women in STEM and the corporate world and serving on the boards of several organizations related to education and philanthropy.

She received an undergraduate degree in mathematics with a minor in computer science from Marymount College, a Master of Science degree from Carnegie Mellon University and a Ph.D from George Washington University.

"Providing technical guidance as well as mentoring is very important in our field. Working at Aerospace has also enabled me the opportunity to mentor many employees and to help them advance and grow their careers," Phillips said Monday. "Just as mentors have helped me with my career in the past, I feel it's important to give back by mentoring others. I want to keep it going."

Aerospace and GEM: Increasing Diversity in Engineering for Over 40 Years

August 17, 2020

Campuses may have been closed but that didn't stop Aerospace mentors and interns around the country from connecting in ways that will diversify the future of the aerospace industry. It's part of an Aerospace tradition that dates back over 40 years.

Since 1978, Aerospace has participated in the Consortium for Graduate Degrees for Minority Engineers (GEM), a national program which aims to support underrepresented groups (African Americans, American Indians, and Hispanic Americans) at the Master's and Doctoral levels in engineering and science.

Since 1978, Aerospace has participated in the Consortium for Graduate Degrees for Minority Engineers (GEM), a national program which aims to support underrepresented groups (African Americans, American Indians, and Hispanic Americans) at the Master's and Doctoral levels in engineering and science. Currently nearly 40 employers and over 100 universities participate in GEM.

"GEM and Aerospace represents a 40-year partnership to attract diverse scientists and engineers to achieve advance degrees and impact this industry," said Todd Nygren, Senior Vice President of the Engineering and Technology group and Executive Sponsor of Aerospace's GEM program. "We have an incredible GEM alumni group that mentors and leads this fantastic group of scholars"

Aerospace's legacy with the GEM program has been a powerful asset for increasing the diversity at the master's and doctoral levels in engineering and science.

"GEM recruits high-quality underrepresented students looking to pursue Master's and Doctoral degrees in applied science and engineering, and matches their specific skills to the specific technical needs of GEM employer members," said Angela Couture, Director of University Relations and Recruiting. "The GEM program has been a valuable pipeline of top diverse graduate level talent for Aerospace since 1978."

Since its founding, the GEM program has graduated over 4,000 researchers, professors, entrepreneurs, inventors, and business leaders who go on to encourage and mentor the next generation of GEM members. Aerospace currently employees over 20 GEM fellows.

One of those is Enold Pierre-Louis, a Technical Fellow in the Structural Mechanics Subdivision at Aerospace.

"After applying during my junior session at Penn State, I became a GEM MS Fellow with sponsorship from Aerospace in 1981," said Pierre-Louis. "I enjoyed internships at Aerospace for three summers. I graduated from Penn State with a B.S. in Aerospace Engineering in 1982 and completed the GEM MS program at UCLA in 1984 with an M.S. in Mechanical Engineering. I accepted a fulltime MTS position in 1984 and have stayed at Aerospace for my entire career. I am a member of the GEM Alumni Association and have supported the Aerospace GEM Alumni mentorship program during my time here."

This year, Aerospace sponsored five GEM fellows to participate in a 100-percent virtual program due to COVID conditions. Participants receive engineering guidance and career advice from mentors like Pierre-

Louis, who encourages GEM fellows to “find a field and go for jobs that you have a passion for and always try to exceed the expectations of your customers and supervisors. Seek assistance and be grateful to all those who help you move forward with your career.”

More importantly, Pierre-Louis hopes GEM fellows will provide the same guidance to the next generation.

“Do all you can to help the GEM program meet its goals of helping individuals like you fulfill their dreams. GEM continues to grow by using the strong GEM Alumni force to help our nation improve racial harmony by breaking barriers that are limiting forward mobility.”

Aerospace Impacts Orion's Heatshield Program: Protecting NASA's Next-Generation Capsule

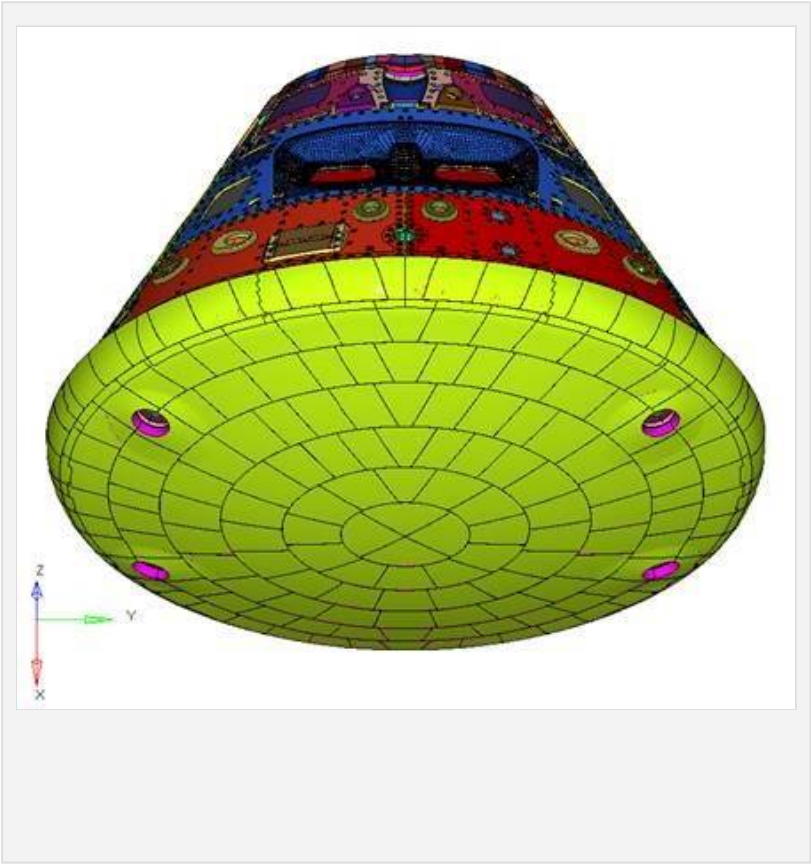
August 12, 2020

The Orion capsule is protected from the extreme re-entry conditions by a system of blocks which are bonded to the capsule and designed to slowly burn away to manage cabin temperatures.

Imagine yourself as an astronaut. Now think of which aspects of the astronaut experience would be the scariest. After liftoff and launch, reentry back into the Earth's atmosphere feels like a close second. NASA is currently planning to ferry their next round of astronauts through deep space on the Orion space capsule, the Apollo-like living quarters that connects to a service module trunk and sits atop the Space Launch System (SLS) rocket.

Unlike the space capsules of recent memory, Orion must be capable of servicing a variety of mission needs, including to the moon, and ultimately to Mars. The mission names fall under the "Artemis" moniker, with Artemis-1 being an uncrewed test flight and Artemis-2 being fully crewed for a lunar flyby. The nature of the expanded mission profile presents unique challenges for engineers designing the capsule, especially the thermal protection system, or "heatshield," which must endure significantly more intense reentry heating environments than for missions ferrying only into low Earth orbit.

Aerospace was awarded a contract in 2015 by the NASA Engineering and Safety Center (NESC), a branch of NASA, which serves to independently assess and support programs across the whole administration, to ensure 100% structural integrity of the Orion thermal protection system. Over the past five years, Aerospace has leveraged its unique expertise to impact multiple aspects of the Orion heatshield program, including overall verification methodology, testing, analysis, inspections and risk assessment.



The Orion heatshield consists of ablative tiles bonded to a composite backing structure. The tiles “ablate,” or partially burn away, during reentry due to the atmospheric heating and are designed to control the temperatures inside the astronaut cabin.

A biproduct of the design is that the tiles must function structurally and withstand thermo-mechanical loading without structural failure, otherwise the tiles wouldn’t remain intact to achieve their primary function of ablation and thermal management.

The combination of unique geometric construction, the large number of tiles, and complexity of the thermal protection materials have made it challenging to assess the integrity of the tile bonding during reentry conditions.

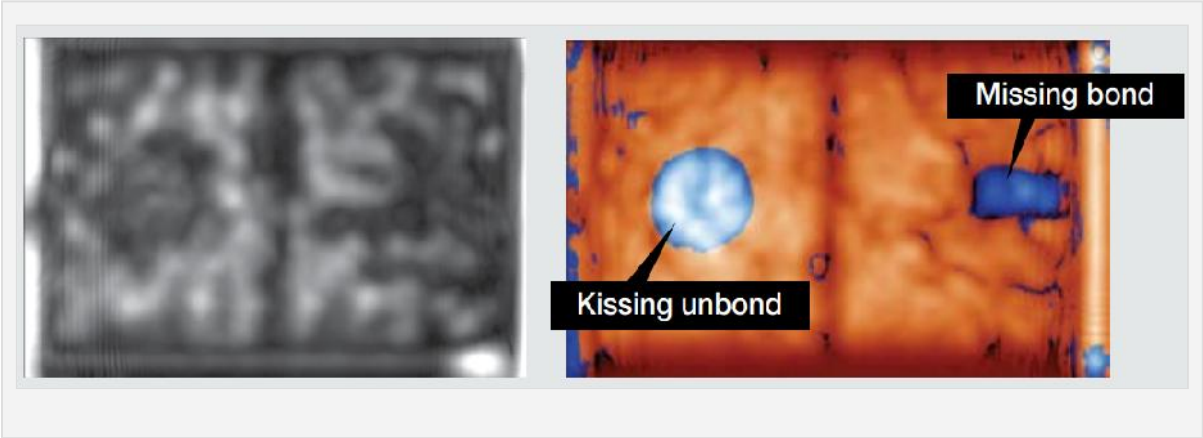
Due to challenges with inspection access from the cabin-side of the structure, the contractor initially decided not to fully inspect the bonds between the heatshield tiles and the backbone structure.

“Flaws in the bondline often arise organically due to manufacturing errors, contamination, or issues with the parent materials,” said Dr. Stephanie Svetlik-Haley, an Aerospace expert in adhesive systems involved early in the program. “Without strong predictable bonds, there is limited confidence in the tiles’ ability to act as a robust thermal protection system.”

Partnering with the NESC and the prime contractor Lockheed Martin, Aerospace provided the program with a robust methodology for certifying the heatshield design.

Mr. Daniel Friedman, a key Aerospace structural analyst, developed state-of-the-art thermo-structural models, which predicted that a bondline flaw could lead to tile detachment and failure during re-entry. These models required that the team invent a novel test coupon to measure fracture capability of the heatshield material. Aerospace's analyses guided acceptance test conditions intended to exercise the integrity of the bonds, but the test could not fully achieve target levels due to infrastructure limitations.

In light of inspection limitations, test limitations and Aerospace's analysis findings, NASA was faced with the potential that a hidden flaw could compromise the integrity of the heatshield, since the loss of even a single tile could cause catastrophic failure during reentry. Led by Aerospace, the NESC team convinced the program to take these conclusions seriously, which resulted in the program requesting Aerospace to develop new inspection techniques capable of achieving 100% inspection coverage of the heatshield bondline, a significant improvement from their initial goal.



Aerospace experts, Dr. Toby Case and Dr. Shant Kenderian, developed an innovative non-destructive technique (NDT) that enabled detection of flaws with high precision and manufactured a portable unit, which was used in the inspection of the heatshields assigned to Artemis-1. Then, the Aerospace's Structures team aided the NASA program in the acceptance of the heatshield by using independent models to disposition bondline defects found by the novel NDT methods developed by Aerospace.

While analysis and inspections play a key role in any certification, ablative heatshield systems must show their true capability by test. Historically, early programs such as Apollo performed many more tests to verify design capability compared to Orion, despite Orion having a more complex heatshield design. Sufficiently testing the Orion heatshield required Aerospace to work with the program to develop and conduct innovative testing with flight-like thermal profiles to ensure high confidence in the design to protect our nation's astronauts.

An advanced "Radiant Test" facility at Johnson Space Center was retrofitted to conduct testing with key inputs provided by Aerospace. Currently, multiple rounds of testing are scheduled for the updated facility that will further establish confidence in the design. There is no substitute for actual flight data, but high-quality ground testing is the next best thing and Aerospace has been able to add significant value in this domain for several years now.

Aerospace's contributions to the Orion program have not gone unrecognized by the NASA community. Both the new fracture test and the new inspection technique were featured in the NASA *NESC Technical Update*. Aerospace led the NESC sub-team's assessment and disposition of the Artemis-1 manufacturing defects and the acceptance test screening, both of which fed directly into the NESC's official risk assessment. Further, the NASA program and Lockheed Martin both adopted Aerospace's models to study the heatshield.

"Aerospace provided excellent technical support in the areas of analysis, test, and nondestructive evaluation that was crucial in assuring the structural integrity of the critical bondline of NASA's Orion spacecraft heatshield," said Dr. William Prosser, NESC program lead.

In recognition of these key contributions throughout the past five years, Aerospace has received four NASA NESC Individual Achievement awards (Babuska in 2019, Snow in 2018, Goyal in 2016, and Kenderian in 2016) and one NASA NESC Team Achievement award, and has garnered respect from the Orion program.

Once Artemis missions are finally underway, there is no doubt that the astronauts and entire aerospace community at large will be nervous, excited, hopeful, and many other emotions all rolled into one. After all, Artemis is designed for territory uncharted by humans for nearly 50 years.

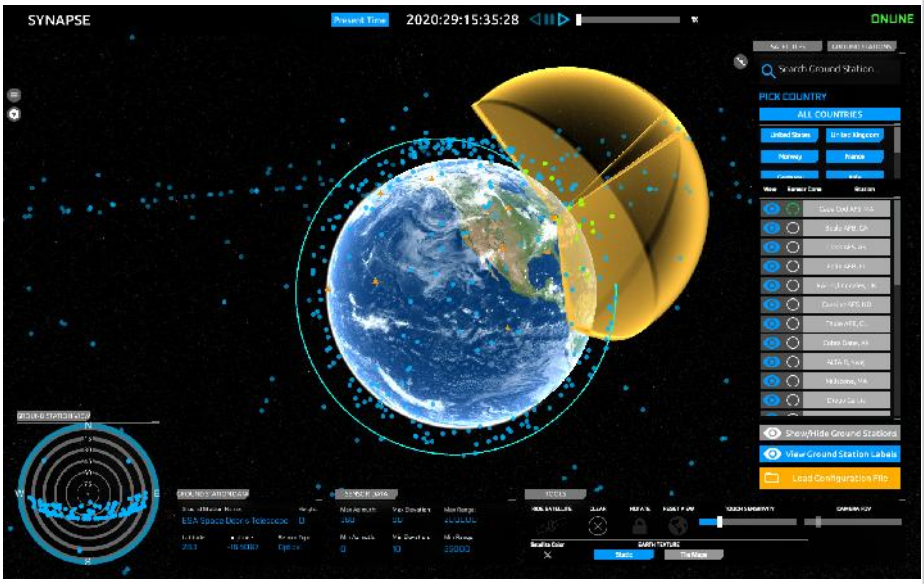
They will, however, be able to rest assured that, upon their reentry into Earth's atmosphere, the protective heatshield has been thoroughly vetted by a comprehensive team of industry experts across the administration and industry as a whole, with Aerospace playing a centralized role in the verification activities to achieve a flight-worthy design.

Aerospace's ongoing partnership with NASA continues to help the administration achieve their missions of exploring the cosmos and fulfilling their humanitarian duty in the words of their own motto, "For the Benefit of All."

Prairie: A Platform for Next-Gen Space Operators

August 05,
2020

The rapid growth of the space enterprise, from commercial interests in space exploration to a potentially adversarial domain, has created a demand for faster, more agile tools for space operations. The ability to simulate multiple scenarios and test models with pinpoint accuracy and rich interactive data visualization can serve as an invaluable advantage for operators to maintain space domain awareness.



Game-based UX: Prairie leverages commercial and open-source gaming technologies. This reduces development time while providing the best-in-class interfaces and game play for simulating space missions.

Aerospace is developing a next-generation platform that allows for these capabilities. Known as Prairie, the platform combines Aerospace's unrivaled technical and historical space operation data with the most innovative gaming engines available in the commercial market, and is presented to the user with stunning visual graphics. Prairie will give users the ability to train for space engagement by fusing architecture, technology and space operations together in a unique, open-source package.

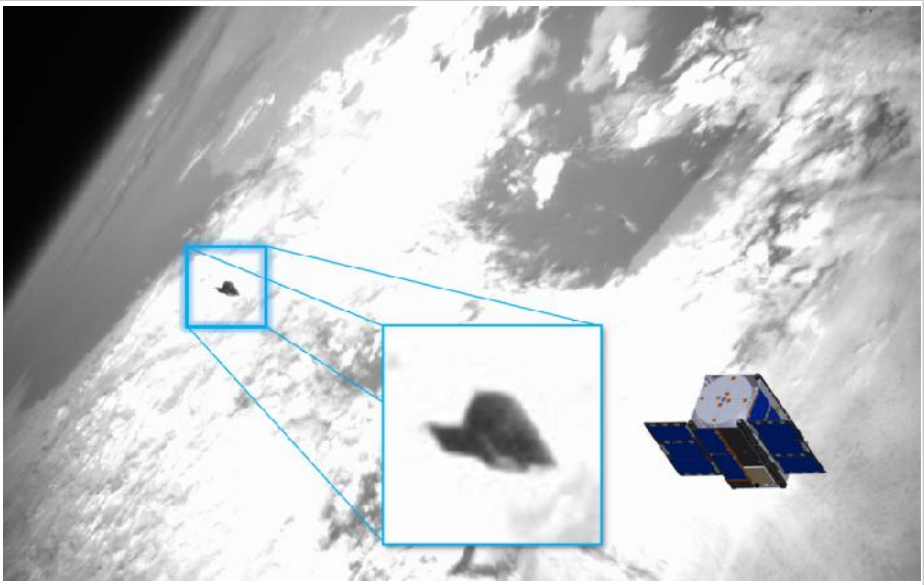
"The future of space belongs to those who are more aware, can make decisions faster, and routinely execute seemingly impossible operations," said Randy Villahermosa, General Manager of Aerospace's iLab. "Prairie is a gaming platform for experimenting how we can achieve these aims."

Prairie will marry decades of Aerospace domain expertise with commercial technologies to deliver an ecosystem of advanced tools with intuitive, streamlined interfaces. It will also provide the ability to quickly create operational scenarios—using low-fidelity calculations for rapid exploration, then switching to high-fidelity modeling and simulation to determine requirements.

*Read the **full article about Prairie on Aerospace.og**, and to learn more about the features of the platform, check out the **Prairie fact sheet here**.*

Cubesats Get Close: Proximity Operation With Interesting Implications

August 04,
2020

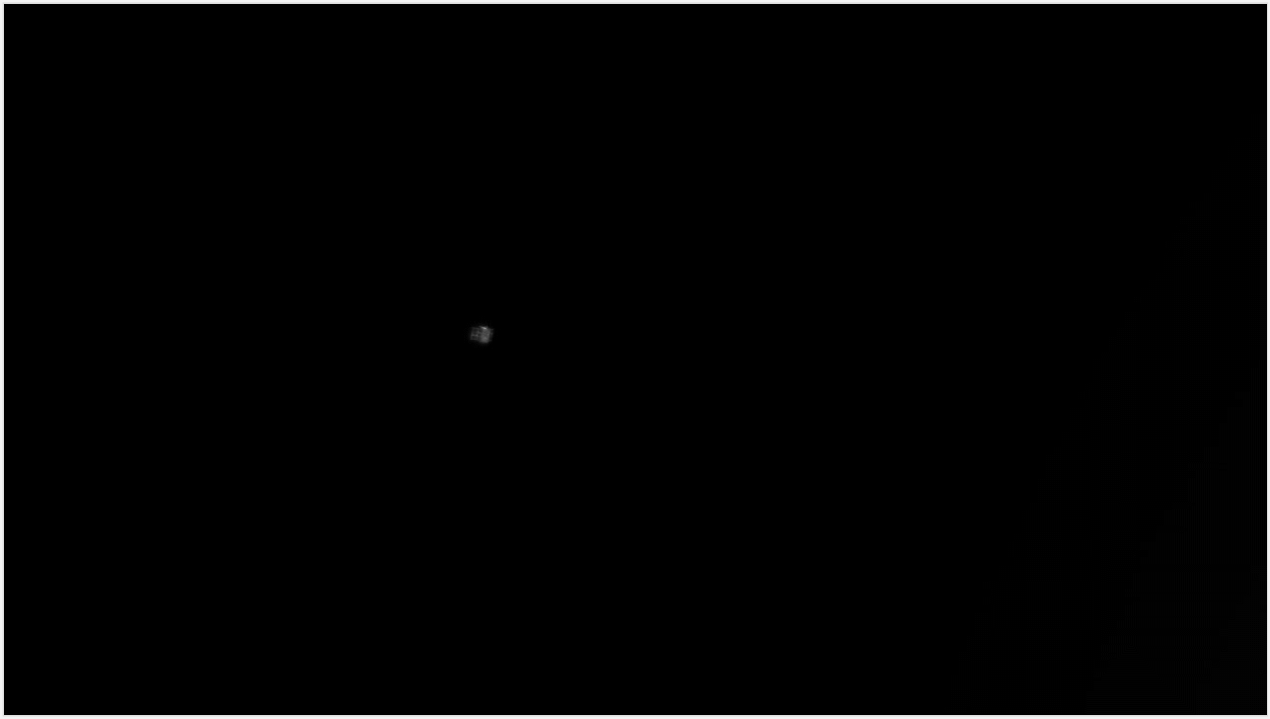


AeroCube-10A (which is only 10 x 10 x 15 cm itself) photographed from 26 meters away.

With some technical panache, one of Aerospace's CubeSats maneuvered itself within 22 meters of its sibling CubeSat and snapped a series of photos while orbiting at 17,000 miles per hour.

This incredibly difficult technology demonstration, performed by a satellite the size of a tissue box, paves the way for future inspection or servicing missions.

"AeroCube-10 is by far the smallest spacecraft to have accomplished a rendezvous and proximity operation so close," said Catherine Venturini, an Aerospace Senior Project Leader and team lead for the AeroCube-10 mission. "This operation has successfully demonstrated that the future is open for very small and cost-effective spacecraft to perform on-orbit inspection (and potentially servicing) missions, to participate in science missions that require close proximity, and ultimately to advance to docking scenarios so that nanosatellites can join in the struggle to remove space debris from orbit."



Precise proximity operations are necessary for some of AeroCube-10's science missions, which require spatial separation between the two CubeSats. AeroCube-10's missions include advancing the maturity of nanosatellite-scale technologies and capabilities, studying the Earth's atmosphere via the release of small probes, and studying the radiation environment of the Earth's ionosphere.

Beyond its current tasks, however, AeroCube-10 demonstrates a cost-effective capability that could be used in potential future missions.

As Joseph Gangestad, Systems Director and experiment lead, put it, "The miniaturized technologies and sophisticated processes used to accomplish this proximity operation can be applied to other spacecraft and missions, so that future projects — such as free-flying inspector satellites for the International Space Station — can be accomplished in a small form factor and lower cost."

Read the full article and watch the video about AeroCube-10's proximity operation on Aerospace.org. You can read more about AC-10's mission here.

August 2020 Obituaries

August 01, 2020

Sincere sympathy is extended to the families of:

- **Dana Aras,** office of technical support, hired Jan. 30, 1990, retired Sept. 1, 1995, died May 12, 2020
- **David Aviv,** member of technical staff, hired Sept. 6, 1966, retired Jan. 1, 1994, died May 1, 2020
- **Mary Binns,** office of technical support, hired Aug. 28, 1967, retired Jan. 1, 2007, died May 3, 2020
- **Paul Covello,** member of technical staff, hired Nov. 20, 2006, died July 16, 2020
- **Harold Culver,** member of technical staff, hired June 15, 1992, retired Sept. 1, 2007, died June 5, 2020
- **Herbert Hecht,** member of technical staff, hired July 2, 1962, retired Dec. 1, 1977, died April 10, 2020
- **Betty Incorvia,** office of technical support, hired March 16, 1981, retired Aug. 1, 1986, died May 30, 2020
- **Harriett Smith,** office of technical support, hired Sept. 19, 1966, retired July 1, 1998, died July 5, 2020
- **Hideyo Takimoto,** member of technical staff, hired Jan. 10, 1961, retired Oct. 1, 1993, died July 25, 2020
- **Ethel Watts,** member of technical staff, hired June 28 ,1971, retired Feb. 1, 1991, died June 11, 2020
- **Ronald Williams,** member of technical staff, hired Aug. 27, 1962, retired Feb. 1, 1994, died June 27, 2020
- **Norma Workman,** office of technical support, hired Aug. 10, 1964, retired April 1, 1988, died June 16, 2020
- **Ting-Pin Yang,** member of technical staff, hired June 22, 1981, retired Oct. 1, 2011, died April 22, 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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