Orbiter
June 2014

Smashing Satellites for Science

by Laura Johnson
June 25, 2014

Patti Sheaffer carefully gets the first target ready to be blown to smithereens. (Photo courtesy DebriSat Project)

Usually, scientists and engineers work very hard to keep spacecraft from colliding. In April, however, a team of researchers deliberately sent a projectile flying into their "spacecraft" just to see what would happen.

DebriSat, as the unfortunate object was dubbed, was part of an experiment to help researchers study what happens when objects impact each other in space.

"The test used one of the most powerful light gas guns in the world to accelerate a soup-can-sized projectile to just shy of orbital velocity to collide with the targets, including a realistic satellite mock-up," said Marlon Sorge, the technical lead for the project at Aerospace. "Nothing like this has really been done for debris in 20 years."

The study of space debris is growing in importance. As more and more objects get launched into space, there are more items that must be tracked to avoid collisions. And if collisions do occur, they create even more debris that must be tracked.

The goal of this project, started several years ago, is to understand what happens during collisions and to be able to accurately model how the debris spreads. It was an ambitious undertaking that required the expertise of a number of different organizations: The Aerospace Corporation, the Space and Missile Systems Center, the NASA Orbital Debris Program Office, the University of Florida, and the Arnold Engineering and Development Complex.

One area in which Aerospace was able to provide expertise was the design of the test satellite. The researchers wanted to approximate a real satellite as closely as possible, while not incurring the costs associated with a real satellite.

Aerospace's Engineering and Technology Group has experts in satellite subsystems who were able to help with the design of DebriSat. The final product, which had to be small enough to fit inside the testing facility, was about 56 kg and half a meter in each direction.

The projectile also needed to be realistic. An experiment like this had been done 20 years prior using a solid aluminum sphere as a projectile. However, a satellite is much more likely to be struck by another satellite or piece of debris, not a solid object.

The researchers were limited in what they could use, since the projectile must endure extreme acceleration. They chose to employ a hollow cylinder about the size of a soup can. The cylinder, made of aluminum and nylon, would break up when it collided with DebriSat.

Now, in order to make the projectile and the target collide at the appropriate speed, a proper testing facility was needed.

"There is a facility called the G-Range at the Arnold Engineering and Development Complex in Tennessee that has the only light gas gun, certainly in the United States, and probably in the world, that's capable of doing this," Sorge said.

A light gas gun uses an explosive and a piston to force a light gas, in this case hydrogen, down a barrel to propel the projectile at great speeds.

The G-Range gun would be used to fire the projectile at DebriSat, causing the mock satellite to break up and spread debris all

The projectile (Photo courtesy DebriSat Project)

over the soft catch foam the team would set up. The team could then assess what type of debris landed where.

As part of the preparation for the test, the gun needed to be fired in a pre-test. Since the gun was going to be fired anyway, the team decided to take advantage of it. Aerospace scientist Patti Sheaffer coordinated the fabrication of an object they called DebrisLV, which resembled a simplified upper stage. They used DebrisLV as a target for the pre-test two weeks before the real test.

“It ended up becoming … a really useful second target,” Sorge said.

In order to collect as much data as possible, the team employed lots of instruments for the test, such as high-speed color and black and white cameras, a high-speed infrared camera, an infrared hyperspectral system, a mass spectrometer, a nanosecond spectrometer, a borescope, and a gas collector.


Marlon Sorge and Patti Sheaffer examining the largest tank fragment from DebrisLV. The team wore gear to protect them from the dust, as well as cuts and bruises. (Photo courtesy DebriSat Project)

All the instruments were set up, the foam was placed, the gun was tested. Years of preparation culminated in a very brief moment as the gun actually fired.

“You’re standing up there, they kind of count down, you feel the building shake, you hear … the whooshing of the gun going off, and it’s done,” Sorge said.

Both the pre-test and the actual test were a success, spreading debris all over the place and generally making a big mess for the team to clean up.

“We then spent the next two days — all of the next two days — with well over a dozen people I think, working to collect all the debris,” Sorge said.

The team had to gather all the debris, keep track of where it came from, and send it off to the University of Florida, where it would be analyzed. They discovered that packing it was quite a chore, since there were fragile parts, and wires sticking all over the place. They ended up with about 20 pallets of debris from each test.

”It was a huge effort,” Sorge said.

Now that DebriSat has been turned into pieces of scrap, the next step is to analyze all the data. Given the amount of data collected, that could take some serious time.

“The next year or two is just going to be processing all this stuff,” Sorge said.

But the results should be worth the wait. As Sorge said, “the test series is the most complex and thorough one of its kind ever conducted.”

It promises to contribute valuable data to the ongoing space debris issue.

Check out the slideshow below for more pictures. All photos courtesy DebriSat Project.

Patti Sheaffer, Marlon Sorge, Paul Adams, and Gouri Radhakrishnan in front of DebriSat.

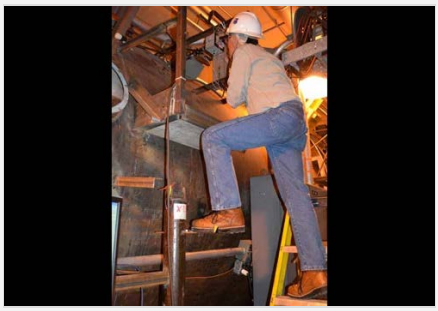
DebriSat before ...

...and after. The cables hanging from the ceiling are where DebriSat had been hanging.

Paul Adams installing sample collection disks.

Patti Sheaffer gluing soft catch foam panels into stacks.

Gouri Radhakrishnan adjusting high speed spectrometer.



Paul Adams aligning borescope.

Marlon Sorge, right, and Dr. J.-C. Liou, NASA Orbital Debris Chief Scientist, examining DebrisLV installation.

DebrisLV debris field 50 ft downrange.

Wall of Honor Acknowledges Space Pioneers

June 24, 2014

By Chantel Carter

The Schriever Wall of Honor at Los Angeles Air Force Base was unveiled Thursday, June 19, as a part of the Space and Missile Systems Center's 60th anniversary celebrations.

The ceremony drew a crowd of about 150 people who saw Lt. Gen. Samuel Greaves preside over his first public ceremony as the new commander of SMC.

The Schriever Wall of Honor was named after Gen. Bernard A. Schriever, the architect of the Air Force's ballistic missile and military space program.

At the SMC Wall of Honor ceremony on Thursday, June 19, left to right, Lt. Gen. Samuel Greaves, SMC commander; retired Maj. Gen. Thomas Taverney, chairman of the board of the Schriever chapter of the Air Force Association; and retired Col. Ed Peura, president of the Schriever chapter. (Photo: Elisa Haber)

Among the initial six honorees on the wall was Dr. Ivan Getting, the first president of The Aerospace Corporation. Getting was recognized for his contributions to the development of satellite navigation, in particular the Global Positioning System. Along with Getting, the other space pioneers honored on the wall are: Karel Jan Bossart, Brig. Gen. William King, Jr., Col. Frederic C.E. Oder, Dr. Simon Ramo, and Maj. Gen. Osmond Jay Ritland.

Lt. Gen. Samuel Greaves chats with Dr. Wanda Austin following the Wall of Honor unveiling ceremony. (Photo: Elisa Haber)

Aerospace leaders attending the wall unveiling included Dr. Wanda Austin, Dr. Wayne Goodman, former Aerospace president Dr. William Ballhaus, and former Aerospace senior vice president Don Walker.

At the ceremony, Greaves spoke highly of the six honorees, stating, "We would not be here today without these space pioneers. We owe these leaders a great deal of gratitude."

AeroCube 6 Launches Aboard Russian Rocket

by Matthew Kivel
June 23, 2014

AeroCube 6, consisting of two .5U CubeSats, was launched from Yasny Launch Base in Russia, aboard a Dnepr rocket on Thursday, June 19. The CubeSats, each measuring about 4 inches by 4 inches by 2 inches, were stored within the UniSat-6 satellite and deployed the following afternoon, Friday, June 20.

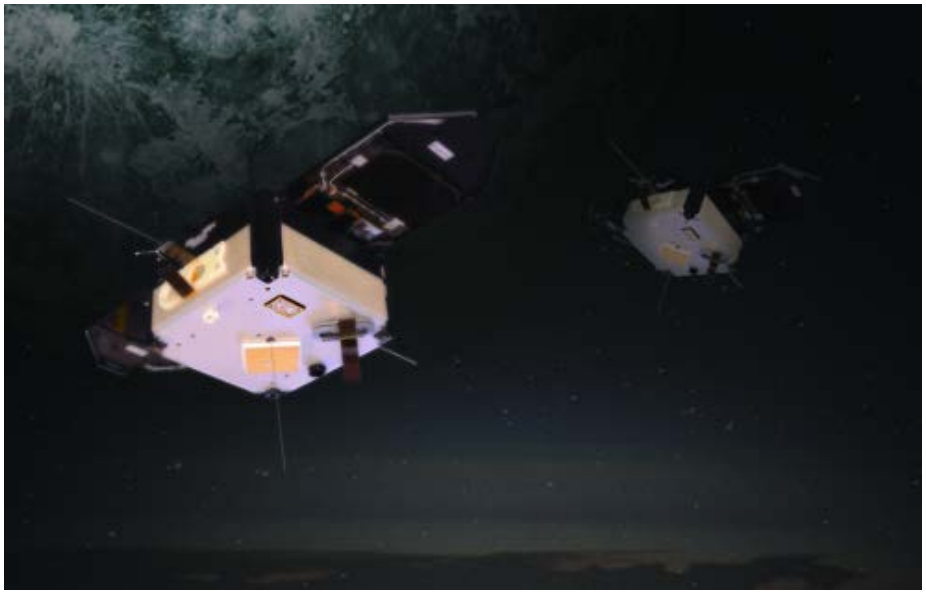
Both satellites are communicating effectively, which indicates that they successfully separated from one another after deployment. The rocket's payload contained 37 satellites, the largest quantity of individual satellites ever launched on a single

rocket.

The AeroCube 6 introduces a number of system upgrades, including a continuously operated, spin-stabilized attitude control system as well as the space-saving consolidation of the spacecraft's master flight computer, GPS system, and radio onto a single circuit board. The CubeSats are equipped with a suite of miniaturized radiation dosimeters that will take identical measurements of the radiation environment as the spacecraft travel in low Earth orbit.

Since the two satellites will measure the same radiation fields within only a few minutes – or seconds – of each other, Aerospace scientists will be able to gather significant information about time-related radiation variations in LEO. A secondary payload of novel solar cells will also be characterized while AeroCube 6 is on-orbit.

AeroCube 6 first passed over an Aerospace ground station at 8:52 PT on June 20. Initial data indicates that both vehicles are healthy and operating as expected.



AeroCube 6 consists of two half-unit CubeSat satellites. (Illustration: Jason Perez)

TAI Celebrates its 20th Anniversary in El Segundo

by Gail Kellner
June 20, 2014

The Aerospace Institute (TAI) celebrated its 20th anniversary Thursday, June 19, to honor those who have contributed to making it a valuable resource to the corporation.

Aerospace employees, including past and present senior management, filled the A3 café for the casual dessert and social event.

Marilee Wheaton, executive director of the Institute, hosted the celebration and introduced Dr. David Evans, the Institute's second executive director. He spoke briefly about remembering a similar anniversary event during his time at Aerospace and said that it was a treat for him to see so many familiar faces.

Mike Drennan, senior vice president, Operations and Support Group, said that it is vitally important for Aerospace to continually provide exemplary support to its customers, and we must keep the latest advances in the many fields of expertise we represent.

Nancy Profera, editor-in-chief of Crosslink magazine, chats with Nahum Melamed, left, who created a new Institute class, Asteriod Deflection Simulator. At right is Distinguished Engineer Dr. Bill Ailor, an expert on asteroid deflection. (Photo: Karl Jacobs)

"For the last 20 years, the Institute has been providing courses, programs, and materials to enable our employees to maintain their leadership role in Aerospace science and engineering," he said.

Marilee Wheaton, executive director of The Aerospace Institute, addresses the gathering. (Photo: Karl Jacobs)

Drennan highlighted three distinguished Aerospace leaders of the Institute: Dr. Jack Schiewe, whose long career at Aerospace culminated in his position as group vice president, Engineering and Technology Group; Dr. David Evans, who in addition to being an engineer at Aerospace, had significant experience in the field of education as the physics department chair at the United States Air Force Academy; and current TAI Executive Director Marilee Wheaton, who has extensive and varied experience in the field of aerospace engineering and education, serving as an adjunct faculty in the Viterbi Systems Architecting and Engineering Program at USC.

The Institute will also hold other contributor recognition events next week in Colorado Springs and in October in Chantilly.

June CEO's Report to Employees

by Lindsay Chaney
June 19, 2014

In her June CEO's Report to Employees, Dr. Wanda Austin reported that Aerospace supported four successful launches during the quarter and she announced the winner of the annual corporate Excellence in Diversity Award.

She also highlighted interesting work underway or being sought by the company's Civil and Commercial Operations group, including a bid to operate a second Federally Funded Research and Development Center (FFRDC), and noted that the board of trustees this quarter held a special two-day strategic planning meeting.

Following the CEO's Report and Diversity Award presentation, employees had the opportunity to say farewell and best wishes to retiring Senior Vice President Mike Drennan in a receiving line.

Howard Carver and Dr. Wanda Austin share a moment at the podium following his acceptance speech for the Excellence in Diversity Award. (Photo: Elisa Haber)

In addition to regular board business, Austin said, this quarter included a two-day strategic planning session, focusing on the continued long-term success of the corporation.

"We had a very productive discussion about the current state of Aerospace and new opportunities for delivering value," Austin said. "This was a great opportunity for the talented leadership that the members of our board of trustees represent to really engage and have discussions about our future."

During the quarter, Aerospace supported four successful launches. One of those, the DMSP-19 mission that launched on April 3 from Vandenberg Air Force Base, developed an anomaly with the deployment of the solar array boom. Austin reported Aerospace and the satellite builder, Lockheed Martin, are aggressively working to understand the root cause of the problem. However, she said, in spite of the issue, the spacecraft has sufficient power and early orbit testing is continuing for most of its sensors.

Another launch, the GPS IIF-6 satellite onboard a Delta IV on May 16, was noteworthy as it was the first time a GPS satellite had been launched in a northerly direction from Cape Canaveral Air Force Station. Aerospace engineers were responsible for determining that launching in a northeast direction instead of the traditional southeast could put the GPS satellite into the correct orbit with only two burns of the RL-10 upper stage engine instead of three. As a result, the launch vehicle had enough propellant and battery power left over to move into a higher disposal orbit after the satellite was deployed, lessening the amount of space junk in the GPS constellation area.

Two other launches during the quarter carried classified national security satellites.

Employees had a chance to extend their good wishes to retiring Senior Vice President Mike Drennan at a receiving line following the CEO's Report. (Photo: Heather Golden)

Austin reported that Aerospace support in the area of on-orbit activities included work on the Wideband Global SATCOM space vehicles, which met the Air Force criteria for "full operational capability" in May. Aerospace also provided independent evaluations for four classified on-orbit anomalies, one of which identified the root cause of a problem.

Turning to Civil and Commercial Operations work, Austin reported that for the first time in its history, The Aerospace Corporation has made a proposal to operate a second FFRDC, which she said is an indication of company efforts to use its engineering capabilities wherever they might appropriately serve the public interest.

Aerospace's proposal is to run an FFRDC that is being created by the National Institute of Standards and Technology (NIST) to promote the use of better standards in U.S. commercial industry in order to increase the effectiveness of cyber-security and lower its costs. NIST, which sought competitive proposals to operate the new FFRDC, is expected to announce the selected operator in October.

In another Civil and Commercial project, Aerospace is developing a spacecraft dynamics simulator for testing spacecraft attitude control systems. The work, as part of a multi-year contract, is for the Southwest Research Institute, which is developing the Cyclone Global Navigation Satellite System. CYGNSS will consist of eight small spacecraft in low Earth orbit, utilizing GPS signal reflections to measure ocean surface winds. This in turn will improve forecasts of hurricane intensity.

Aerospace is increasing its work for the Department of Energy's National Nuclear Security Administration with a new project to do systems engineering for development of space sensors that will be used to quickly detect and report any nuclear detonations in the Earth's atmosphere or in near space.

The company has also expanded its work with the FBI through support to the Intelligence and Investigative Applications Section. Staff to support that assignment are being identified.

Following the CEO's Report to Employees, Austin presented the 2014 Excellence in Diversity Award to Howard Carver, manager of government security in the Security and Safety Directorate. Carver was recognized for his work over the years as a champion of lesbian, gay, bisexual, and transgender causes, both inside and outside The Aerospace Corporation.

Two questions were submitted before the CEO's Report. The questions and answers, edited somewhat for space and conciseness, follow.

Question: Our local representative Henry Waxman recently voted "nay" on HR 4438 – the American Research and Competitiveness Act of 2014. The bill passed the House, and I'm wondering what Aerospace employees who worked with Rep. Waxman during his tour can do in the future to better explain the benefits of research and development in Southern California to him and his colleagues?

Answer: Because Aerospace operates an FFRDC, we are prohibited from lobbying Congress. We also do not engage in discussion of tax policy, such as HR 4438. Aerospace management works to inform members of Congress and other government leaders regarding a number of issues related to national security space. When these leaders visit Aerospace, they are briefed on the role of FFRDCs, and the importance of research and technology in providing key advantages to the United States military and intelligence communities.

Question: Now that travel parking in the structure is restricted to the roof, it has taken a toll on our cars. The dew settles on the cars overnight and the neighbor directly to the south of the El Segundo campus creates cement dust that settles on the cars and re-casts itself into crusty film that is difficult to remove.

It would be better if travel parking were allowed on level three of the structure where, in the absence of moisture on the cars,

we will not be bothered by the cement dust. Those who come to work late in the day can park on the roof and not be bothered by the dew and the dust will not stick.

Would it be possible to move travel parking to level three of the structure (i.e., covered parking)?

Answer: It is not clear that the dust being noticed is due to our neighbors to the south; the A10 construction project is ongoing and is likely generating some of this dust. You may notice a significant decrease in dust and debris when the project is completed in August. The traveler's parking area was selected to enable Security to monitor the area with the in-place camera surveillance system. That monitoring would be lost if we move the designated parking area. We will look into this situation to see what can be done.

Carver Honored With Excellence in Diversity Award

by Lindsay Chaney
June 18, 2014

Howard Carver is the winner of the 2014 Excellence in Diversity Award. (Photo: Elisa Haber)

Howard Carver, a 40-year Aerospace employee, is the recipient of the 2014 Excellence in Diversity Award.

Aerospace President and CEO Dr. Wanda Austin presented the award to Carver in a brief ceremony following the CEO's Report to Employees on Tuesday, June 17.

The Diversity Award Committee, which reviewed all nominations for the yearly corporate award, cited Carver for his "leadership and outstanding sustained support in advancing diversity and inclusiveness at The Aerospace Corporation."

Carver, who began his Aerospace employment in the library, then transferred to Security and Safety 27 years ago, is currently the manager of government security. In her introduction to Carver at the award presentation, Austin said, "Howard has consistently led by example, serving as a tireless champion of lesbian, gay, bisexual, and transgender causes for many years, both inside and outside of The Aerospace Corporation."

He has been an Aerospace Lambda Alliance (ALA) board member since the organization's inception in 2000, serving variously as its president, vice president, secretary, and treasurer. In 2007 he helped establish ALA's LGBT History Month event, where poster displays are set up to highlight LGBT icons.

Over the past two years, Carver has participated in "The Models of Pride," part of ALA's presence at the USC Youth Conference. He donates his personal time to take part in the event, speaking with young people about STEM and career opportunities at Aerospace and within the defense industry.

The Excellence in Diversity Award was created in 2004 to honor individuals whose contributions and behavior demonstrate exceptional support of Aerospace's corporate focus on diversity through teamwork, competitiveness, excellence, productivity, and quality innovation. The award is given to the person or persons who, during the past year, best demonstrated the corporation's commitment to the consistent support and celebration of diversity in the workplace.

Any regular employee below Level 6 may nominate any regular employee or team below Level 6 for the award.

The Diversity Award Committee reviews the nominations to determine whether the achievements are extraordinary and clearly exceed normal job responsibilities in the area of diversity. The committee then submits a final recommendation of nominees to the CEO for final approval.

In his acceptance speech, Carver recalled how Motown music and the rise of the African-American-owned record label influenced his support for civil rights. Many audience members became teary-eyed as he gave an a cappella rendition of "Somewhere" from West Side Story. He received a standing ovation at the conclusion of his talk.

View video of the award presentation below.

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First Aerospace Employees Move into New Chantilly Campus

by Amanda McCarty
June 16, 2014

The first group of Aerospace employees settled into their new offices in the Chantilly campus June 16.

The move was the first of five phases that will transition Chantilly employees from offices in Greens I and Penrose to the new campus through September.

“We’ve been working toward this day for many years,” said Mike Horn, Facilities manager. “The success of this initial move is a culmination of about five years of efforts of everyone involved. We planned for it, we rehearsed it, and it paid off today.”

John Tunell, Special Programs Security associate principal director, agrees that the first move was a success overall. “Everyone has been able to get back to working rather quickly with minimal obstacles. We have learned a lot from this first move and have many lessons learned to share and build upon for the next move phases.”

Elvira Wolk, left, Human Resources staffing specialist, and Regina Sadler, Human Resources senior coordinator, unpack files on the first day of their move to the new Chantilly campus on June 16.

The move phases, move dates, and groups in each move are as follows:

Phase I: June 13

Security, Human Resources, Facilities, General Services, unclassified EIS, The Aerospace Institute, and Procurement.

Phase II: July 25

Imagery Programs Division, Engineering and Technology Group (ETG), ETG Cyber, and Systems Engineering and Launch Division.

Phase III: Aug. 15

National Intelligence Operations and Ground & Communications Division.

Phase IV: Sept. 5

Classified Ex. Area, Front Office, Civil and Commercial Operations, Corporate Communications, Library, and The Aerospace Institute.

Phase V: Sept. 26

Advanced Technology Division, EIS classified, and the special handling facilities for Electronic Programs Division, National Intelligence Operations, Advanced Technology Division, Bond, General Services, and Ground & Communications Division.

The Aerospace Corporation decided to construct the Chantilly campus to allow greater access to and interaction with local customers. A modern, centralized campus on the East Coast also serves to enhance service and support while streamlining operations.

“A greater sense of community as employees are brought together under one roof engages the concept of ‘more’ – more

opportunities for collaboration, more predictable operating costs, and – most importantly – more accessibility for our customers," said Dr. Mal De Ponte, National Systems Group senior vice president. "This project is about bringing long-term benefits to both our customers and to our employees."

For more information, or to ask a question, visit the Chantilly website at http://pages.aero.org/newchantilly.

Mike Drennan: Exiting to a New Stage

June 13, 2014

Senior Vice President Mike Drennan will retire at the end of June. (Photo: Eric Hamburg)

Interviewed by Gail Kellner

Mike Drennan, senior vice president, Operations and Support Group, will retire at the end of this month. He joined the corporation in 2003 as vice president of Colorado Operations, after serving as a director at Raytheon in Aurora, Colorado. He retired from the Air Force in 2000 with the rank of brigadier general after 28 years of service.

Drennan has been a personable and warm presence at Aerospace. He has made a point of personally interacting with all of his employees and was the gracious star of many popular corporate videos, playing a pharmacist, an emergency room doctor, and a politician running for office.

In the following interview, he reflects on his career at The Aerospace Corporation.

First of all, thanks for taking the time out of your day to discuss some of your career highlights at the corporation. How did your 28-year Air Force career prepare you for your position as vice president of Operations in Colorado Springs in 2003?

In my last Air Force job as the 21st Space Wing Commander, I was reliant on space assets working correctly the first time and I was keenly aware of the role that The Aerospace Corporation played in ensuring space mission success. Therefore, I was prepared to continue to help those at Air Force Space Command understand the great capabilities of Aerospace and likewise shed some light to the Aerospace people on what the "operators" of space systems need to be successful.

In 2008, a new position was created — senior vice president, Operations and Support Group, to increase the accountability of a number of organizations all under one umbrella. When you moved to El Segundo to fill this position, what was first on your "to do" list?

My first task was to get to know the wonderful professionals in the organization and to fully understand how "support" was provided to Aerospace employees and to our many other customers. I then provided OSG with five main goals: first, to understand every person's role in accomplishing mission success; second, to develop a "support" team so that support was as seamless as possible; third, to ensure professionalism in all that we do; fourth, to be accountable and meet commitments; and finally, to have integrity, always.

You have gone out of your way to create personal interaction with your employees from visiting them in their offices and cubicles, shaking their hands before events, and even signing birthday cards for your entire organization. What inspired you to do this?

I've been privileged to be in leadership roles for many years and the first lesson that I learned is that if you treat people with respect, dignity, and a caring attitude that they will leap tall buildings for you. Beyond that I truly enjoy people and want to know about every person as individuals, their lives, their work, and how I can help them achieve even more success in their jobs. This approach has served me well in all my endeavors.

The corporation has faced many challenges recently — from implementing a layoff in 2012, facing the threat of sequestration, and sending about 60 percent of its employee base home due to the partial government shutdown last October. Your discussions with your group were very open and transparent before and after the shutdown.

How did you see your role and how did you address those issues with the leadership team?

Your comment says it all, being open and transparent is the only approach as you face difficult, and sometimes life-changing, situations. Lay out the facts, lay out the options, and make the very best decision that you can for the people and for the organization.

What are you most proud of?

I am absolutely the most proud of the many professionals in OSG and the wonderful work that they do day-in and day-out. I couldn't have asked for a more professional and dedicated group of individuals to work with.

What are you most looking forward to in retirement?

Mike Drennan chats with employees in the Pasadena office during an open house for the Aerospace 50th anniversary. (Photo: Eric Hamburg)

First, I will miss the people at Aerospace. I'll miss the daily interaction and the informal visits that I had with so many great people. However, I must admit that I am excited about the next phase of my life. The ability to travel while my wife and I have our health and spend time with children and grandchildren will provide me with memories that will last until my last day on Earth. We are both ready and excited. We wish every person at Aerospace the very best in all your future endeavors. God bless!

Employees in El Segundo will have the opportunity to say goodbye to Drennan at a receiving line following the CEO's Report to Employees on Tuesday, June 17.

Incubating Bright Ideas

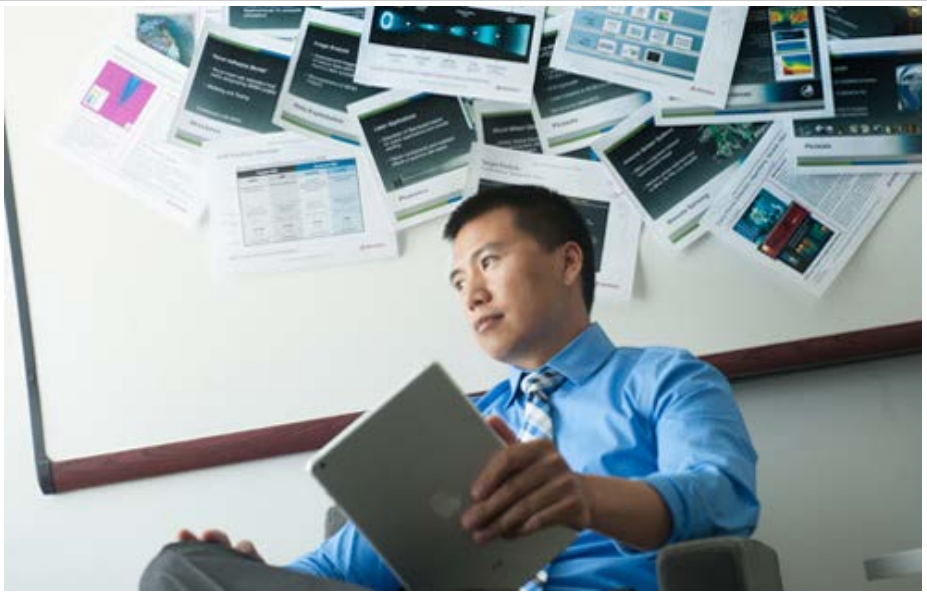
by Laura Johnson
June 11, 2014

Printing 3-D rocket motors.

A Mars lander.

Rocket plume analysis.

What do all these topics have in common? They were all supported by the Aerospace Technical Investment Program (ATIP).



From his first days at Aerospace, Randy Villahermosa has understood that innovation and technology are part of the Aerospace DNA. (Photo: Eric Hamburg)

Aerospace considers it vitally important to stay on the cutting edge of research and technology, and ATIP is one way it accomplishes that goal. ATIP is a program that allows Aerospace scientists and engineers to complete research and development on a variety of important topics that might otherwise be neglected.

"The ATIP program serves multiple objectives, from innovation to supporting a responsive technical staff," said Sherrie Zacharius, vice president of Technology and Laboratory Operations. "Leveraging technology and innovation to help our customers overcome today's and tomorrow's challenges is critical and ATIP investments play a crucial role."

Mark Goodman, principal director of Strategic Planning at Aerospace, agreed on the importance of ATIP.

“The ATIP program is important because it is a key source of innovative ideas at the company, and because it gives the technical staff the chance to work with advanced technologies in their fields,” he said.

ATIP is managed by the Research and Program Development Office (RPDO), with Principal Director Dr. Randy Villahermosa at the helm. Villahermosa, with the help of senior scientist Dr. Terence Yeoh, has the exciting, yet challenging task of sorting through competing research proposals and generally managing the ATIP budget.

“We are stewards of this precious corporate resource and see it as both a privilege and a responsibility. We’re never satisfied when it comes to finding ways to nurture and support research and development at Aerospace,” Villahermosa said.

In order for ATIP to be as effective as possible, it consists of four different programs (see sidebar). This portfolio of options allows ATIP to be both responsive and far-looking.

RPDO is currently administering about 300 different ATIP projects involving approximately 700 Aerospace employees.

Types of ATIP Projects

- Independent Research and Development (IR&D): IR&D projects are targeted research and development projects that often lead to the invention of novel technologies or new technical capabilities. IR&D projects vary in length, but are typically less than four years.
- Engineering Methods (EM): Like IR&D, EM projects are shorter-term, focused development efforts. The emphasis in this case is on the development of software and engineering tools.
- Sustained Experimentation and Research for Program Applications (SERPA): The goal of the SERPA program is to carry out research in broad technology topic areas that are continually advancing and are of critical, ongoing importance to the corporation and the national security space enterprise.
- Long-Term Capability Development (LTCD): LTCD projects focus on the development and/or maintenance of technical capabilities and tools for which there is a sustained corporate need.

One of those employees is Dr. Eugene Grayver, a senior engineering specialist who is working on an IR&D project trying to send a strong signal and receive a weak signal simultaneously on the same antenna at the same frequency.

“This is a very exciting [project] because the expected result has been considered impossible for many years,” he said. “I’ve been thinking about this problem for a few years now and it started to seem less ‘impossible’ than some sources claim.”

Grayver considers ATIP essential. “Having employees work on these ‘out-there’ projects … keeps our skill current and exposes us to the latest and greatest developments from industry and academia,” he said. “We have to be able to see novel solutions to the problems faced by our customers and the contractors.”

Dr. Allyson Yarbrough, a principal engineer, is working on an IR&D project assessing a commercial capacitor for possible use in spacecraft. She also expressed the importance of ATIP.

“Our ATIP program is an incubator for innovation,” she said. “Four of the five of the patents I have earned have been associated with an ATIP project.”

An individual ATIP project can certainly be valuable and interesting. However, ATIP is also valuable on a larger scale. An example of this is the propulsion capabilities at Aerospace. Dr. Tom Curtiss, director of the Propulsion Science Department, explained that his department has benefited greatly from ATIP.

SERPA money has been used to build up the electric propulsion, chemical propulsion, and multipaction facilities. IR&D funding is also used to look at new technologies. Most recently, ATIP has supported the development of a new Propulsion Research Facility. The propulsion labs are used to support DOD programs (e.g., AEHF and WGS), as well as civil and commercial programs. Clearly, they would not be what they are today without the contributions of ATIP.

Of course, ATIP is not the only way for employees to do research and development work at Aerospace.

“There’s actually quite a bit of R&D that happens outside of ATIP that’s directly funded by customers,” Villahermosa said.

Call for Proposals

It’s that time! RPDO has recently released its annual call for ATIP proposals and will be accepting them until June 30.

Nonetheless, ATIP plays an important role at Aerospace, supporting innovation and enhancing the company’s technical reputation. It also provides an important outlet for scientists wishing to do research.

“This isn’t just about allocating funds and reviewing proposals,” Villahermosa said. “It is about people wanting to pursue these

endeavors that mean a lot to them."

If you're interested in reading more about those endeavors, check out these articles featuring projects that had ATIP support:

Cutting Edge Sensor Flies into Earth Science
Aerospace Engineer Proves Staggered Engine Start Theory
Labs Develop New Bonding Experience
Aerospace Explores Nanotube Applications for Space
Big Boost for Small Spacecraft
Aerospace Laser Beacons Light Up U.S. Satellites Around the World
Aerospace Prints Rocket Motors in 3-D
Rocket Plume Analysis Ready for Takeoff
Aerospace Tests a Mars Lander at the Edge of Space

TAI Celebrates 20 Years of Promoting Excellence

by Gail Kellner
June 09, 2014

Left to right, David Evans, Marilee Wheaton, and Bill Ailor. (Photo: Heather Golden)

The creation of The Aerospace Institute (TAI) was announced by President and CEO Pete Aldridge in June of 1994 to provide world-class professional development for leadership in space systems planning, engineering, and technology applications.

The late Dr. Jack Schiewe, TAI's first executive director appointed by Aldridge, assembled a group of people to form an agenda and to outline what the Institute would look like. One of those individuals was Dr. Bill Ailor, currently principal engineer, Vehicle Systems Division. Schiewe asked him to develop the overview and transition plan, including the vision and goals for the Institute and its programs.

Ailor explained that he worked on the corporate strategic plan during that time and Aerospace was talking a lot about its space systems architecture and engineering capabilities. According to Ailor, the question arose, "How many of our engineers actually had training in these new disciplines and how could we expand our capabilities?

"With the input of many internal organizations, TAI was formed to be a focal point for all of our training and staff development activities and to recognize individuals who successfully complete training in critical areas by providing certification programs," he said. "One of the first to be offered was in systems engineering."

After Aerospace President and CEO Eberhardt Rechtin retired and joined the University of Southern California, he initiated a systems engineering masters program at USC that the Institute incorporated in its offerings. Several Aerospace employees were enrolled in this two-year program and received masters of science degrees. Some of those graduates later contributed to building the Institute's technical courses, according to Ailor.

Dr. David Evans, retiree casual, The Aerospace Institute, became involved with initial TAI activities when he was on staff to Schiewe in the Engineering and Technology Group before Schiewe became the executive director. Evans helped with the curriculum development by using his previous experience as a faculty member of the Air Force Academy. Evans was appointed executive director in late 1995, when Schiewe retired, and served as the second executive director for 14 years.

The board of trustees took an active interest in the direction for TAI, especially in the technical curriculum in space systems engineering, according to Evans. The board established an advisory committee to review the program, which was very valuable in helping Evans set priorities.

“The biggest challenge was to make TAI a valued resource for the corporation and its employees,” Evans said. “Since there had never been an institute, many employees, especially our very bright technical staff, questioned why an institute was needed and how it would use crucial corporate resources. I think we were successful in enlisting the support of executive management and many of our very best technical staff in developing programs and services that met corporate needs,” he said.

Evans added that he thinks they were especially successful in developing a culture of ongoing learning for the corporation, indicating that employees recognized that they needed to incorporate continuing learning into their job. He said they were also successful in integrating learning and knowledge resources such as classes, the library, and The Aerospace Press under a single umbrella organization.

Marilee Wheaton became the third executive director of TAI late in 2009 after serving as general manager of the Systems Engineering Division.

In this photo from 1994, Dr. Jack Schiewe, executive director of the Aerospace Institute (front, on steps), is joined by Institute staff and those who helped develop the Institute’s agenda. From left, Dr. Bill Ailor, principal director, Network Systems and Services Subdivision; Mary Neudorffer, principal director, Milstar Space Segment; Susan Crowe, head, Library Services; Herb Wintroub, principal engineer, Communication Systems Subdivision; Schiewe; Dr. David Evans, principal director, Office of Engineering and Technology Applications; and Marianne Matheis, head, Institute Training and Development Department. (Photo: Bryan Trebelcock)

Her first priority in her new post was to further increase the value of the Institute to Aerospace employees and to be a key enabler of the Aerospace corporate strategic plan. She explained that she was asked to provide training and services to a widely distributed employee population, both demographically and geographically, in a cost-efficient and effective way, which included the use of more online and digital resources.

“I am most proud of being able to successfully advocate for and implement a corporate learning management system, the Talent and Learning Center (TLC),” she said. “The organization had needed one for over five years, but wasn’t able to procure one. With the TLC, we are better able to offer programs online via e-learning, and to streamline training processes to be more effective.”

Wheaton said that she is also pleased with the corporate leadership programs such as Aerospace Leadership Today. Partnering with Human Resources, she feels that they have raised the bar on workforce development. In fact, the Institute was recently recognized as a Silver Learning Elite organization by Chief Learning Officer magazine.

So what does the future hold for the Institute?

Wheaton said that she is working very closely with Human Resources and Enterprise Information Services to further improve knowledge management and collaboration at the corporation. TAI is partnered with EIS for the Microsoft 365 effort, and it is making plans to repurpose the library building in El Segundo to better serve the future collaboration needs of the corporation.

“Our 20th Anniversary theme is “Promoting Employee Excellence,” she said. “As a key part of the celebration, it’s the contributions across the company that we are recognizing for their service to promoting excellence.”

Team Pulls All-Nighters in Hawaii to Calibrate Satellites

by Laura Johnson
June 03, 2014

From a cramped portable trailer near the beach in Hawaii, a team of Aerospace engineers recently spent three weeks collecting data using sophisticated laser sensors. The data they collected was then used to help calibrate equipment on board the latest Defense Meterological Satellite Program (DMSP) satellite (F-19), launched in April.

The DMSP satellites provide important weather data in support of U.S. armed forces, and in order to collect accurate data, the satellites must be calibrated properly. Aerospace has unique lidar capabilities that make it perfect to aid in this task.

“What we’re trying to do is get the best data from the ground possible to compare to data that’s being collected from sensors on weather satellites and lidar is an integral part of that,” said Andrew Mollner, a senior member of the technical staff. “It has several advantages over other techniques that you could use.”

A reflective bunch: The team stares into the mirror on the lidar system they use to prepare for the trips to Hawaii. From left: Michael Williams, Stephen LaLumondiere, Petras Karuza, Andrew Mollner, and Paul Belden. (Photo: Elisa Haber)

Lidar, which is similar to radar, involves sending a laser beam into the atmosphere where it bounces off molecules. By analyzing the light that comes back, the scientists can determine atmospheric pressure, temperature, and water vapor.

This data can be compared to the data collected by the satellite, and then the satellite can be calibrated as necessary.

The more common way to calibrate sensors is by using balloons carrying radiosondes, or weather sensors. One of the problems with this is that is takes a long time for the balloon to ascend, during which time it may drift. Also, the balloon pops at a certain height, whereas lidar can be used to collect data at higher altitudes.

The Aerospace team actually uses both lidar and radiosondes to get the best data set.

“You have two completely separate ways of measuring the same thing, and if they agree that gives you a lot of confidence,” Mollner said.

In order to collect the data for DMSP, the team uses a portable trailer which is parked on a Navy base on Kauai, Hawaii. It’s a good spot because it’s near a warm ocean with a lot of water vapor. It’s also at sea level so they can take data in the lower portions of the atmosphere, which is important for weather satellites.

On this particular trip, Mollner was joined by Paul Belden, Petras Karuza, Stephen LaLumondiere, and Michael Williams.

The trailer itself is rather small, and various members of the team spent a lot of time in there during the three-week period. The DMSP satellite would pass by every 12 hours and the team would collect lidar data for an hour before and an hour after. They also launched a balloon each time.

They obtained 18 data collects for the recently launched DMSP satellite (F-19). They also collected data for the previous DMSP satellite (F-18) when it was coincident with F-19 (eight times) to help facilitate cross-calibration.

Aerospace is also collecting data for a new NASA/NOAA satellite, the Suomi National Polar-orbiting Partnership (NPP), which launched in 2011. Suomi NPP has new sensors that haven’t flown before, and the data-processing algorithms are still being worked on. Aerospace has been providing data to NOAA for three years to help with the algorithm development.

During this recent trip, the team collected data for Suomi NPP 24 times. Suomi NPP passed by every 12 hours, but it is offset

from the DMSP satellite by 6 hours. Just to make things more hectic, the team also collected some data for a European satellite as well, which passed by at a different time from either DMSP or Suomi NPP.

“It was a very busy trip,” Mollner said.

Fortunately, the trailer contained a few bunks in case anyone got too worn out.

Despite the crazy schedule, the team was able to collect some good data for the satellites. This data is important to making sure the satellites can perform as desired.

An artist’s rendition of a DMSP satellite. (Image courtesy U.S. Air Force)

“Your weather forecasting is only as good as the input data to the models, and most of that input data is coming from these weather satellites,” Mollner said.

Mollner and his team are doing their part to make sure that input data is as good as it can be.

June 2014 Obituaries

by Carolyn Weyant
June 01, 2014

Sincere sympathy is extended to the families of:

Bruce Bohi, project engineer, hired May 21, 1965, retired Nov. 1, 1991, died May 14.
Rena Brincat, administrative secretary, hired Jan. 10, 1963, retired July 1, 1985, died May 15.
Alvia Dial, executive secretary, hired Oct. 28, 1961, retired Aug. 1, 1989, died April 25.
Andrew Quintero, member of the technical staff, hired Dec. 28, 1992, died May 4.
Harry Thoben, member of the technical staff, hired Feb. 13, 1961, retired Dec. 1, 1978, died May 3.
Barbara Wardwell, member of the administrative staff, hired Sept. 12, 1960, retired Jan. 1, 1988, died April 19.

To notify Aerospace of a death and have it included in the Orbiter, please contact Cynthia Johnson in Human Resources at 310-336-5806.

June Notes

by Carolyn Weyant
June 01, 2014

Notes of appreciation to fellow employees and Aerospace for thoughtfulness and sympathy have been received from:

Gary and Kathy Nilges, for the recent passing of their father and father-in-law, William Nilges, Sr., and their brother and brother-in-law, William Nilges, Jr.

To submit a note of appreciation to Aerospace, please contact Valerie Jackson in Human Resources at 310-336-0891.

June 2014 Anniversaries

by Carolyn Weyant
June 01, 2014

APRIL 2014

5 YEARS

Engineering and Technology Group: Ethan Barbour, Samuel Tai

National Systems Group: Stephen Hill

Operations and Support Group: Lindsay Chaney, Lisa Neufeld

JUNE 2014

50 YEARS

Engineering and Technology Group: Jerry Michaelson

40 YEARS

Engineering and Technology Group: Vivian Flores

35 YEARS

Engineering and Technology Group: Veronica Billingsley, Alvar Kabe, Kenneth Luey, Henry Montes, Michael Villa, Richard Walterscheid

National Systems Group: Rita Wiltberger

Operations and Support Group: Karen White

Systems Planning, Engineering and Quality: Eugene Hunt

30 YEARS

Engineering and Technology Group: Camille Keely

Operations and Support Group: Charletha Washington

Space Systems Group: Robby Rustin

25 YEARS

Engineering and Technology Group: Mark Barrera, Thomas Eng, Samuel Gasster, Sergio Guarro, Jeffrey Kern

National Systems Group: Theresa Montoya

Operations and Support Group: Caesar Capolupo, Jacqueline Dorsey

Space Systems Group: Frederic Agardy, Michael Mcquaig, Carl Sunshine, Albert Yu

Systems Planning, Engineering and Quality: Michael Stallard

15 YEARS

Engineering and Technology Group: Lamont Cooper, Jerome Cox, Suzanne Dawes, Patrick Johnson, Eric Mahr, Michael Martino, Michael Moore, Christopher Paul, Joseph Pham, Karen Richardson, Jasen Ross, Michael Tanzillo

National Systems Group: Leslie Newcastle

Operations and Support Group: Joy Caldwell, James Liggins, Jaswinder Sandhu

Space Systems Group: Nkiru Ogamba

Systems Planning, Engineering and Quality: Paul Cheng, James Farmin

10 YEARS

Engineering and Technology Group: Daniel Bartz, Rebecca Bishop, Jennie Fujisaki, Michael Huang, Johnny Lam, Viet Hung Le, Christopher Panetta, Geoffrey Reber, Deborah Salvaggio, Michael Willhoff

National Systems Group: Rebecca Kramer

Operations and Support Group: Stephanie Gonzales, Christopher Voegtli

Space Systems Group: Mahan Hajianpour, Scott Hendrickson, Rauby Page

Systems Planning, Engineering and Quality: John Ashlock, Douglas Harris, Marcus Lobbia

5 YEARS

Engineering and Technology Group: Juliett Davitian, Gordon Rollins, Daniel Thai, Nathan Wells, Yuliya Yefimenko

Operations and Support Group: Jason Reetz

Systems Planning, Engineering and Quality: James Cashin, Brenda Taylor