



MARSHALL STAR

Serving the Marshall Space Flight Center Community

Oct. 9, 2003

NASA research propels development of new glass

by Tracy McMahan

There's a new glass in town. The glass, developed with the help of a unique NASA levitator facility at the Marshall Center, is available for numerous commercial applications including lasers and optical communications.

"We have patented a family of new glasses and have established processes for making and using them in practical applications," said Dr. Richard "Rick" Weber, director of the Glass Products Division of Containerless Research Inc., the small company that invented and produces the glass in Evanston, Ill. "We're already making commercial quantities of glass rods and plates for use in lasers," he said.

REAL Glass™ — made from Rare Earth oxides, Aluminum oxide and small amounts of silicon dioxide — has unique properties that were identified using both the company's containerless processing techniques and a NASA ground-based

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Safeguarding the Marshall Center's Administratively Controlled Information

from the Protective Services Department

An important part of our responsibilities as government employees and contractors is our stewardship of NASA's Administratively Controlled Information — data we use as we do our jobs.

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NASA'S International Space Station Science Control Center updates information technology while cutting costs

by Tracy McMahan

The National Aeronautics and Space Administration's control center for all science experiments on board the International Space Station is modernizing its information technology while saving the Agency millions of

dollars.

From the Payload Operations Center at the Marshall Center, scientists and engineers operate all the U.S. experiments located 240 miles above Earth on the Space Station. For more than two years, they have used complex computer systems and

software to communicate with experiments and other equipment — 24 hours a day, seven days a week.

The Ground Systems Department — part of the Flight Projects Directorate at the Marshall Center - is replacing outdated

See Space Station on page 4

Marshall Center co-sponsors Alabama Hispanic Youth Conference

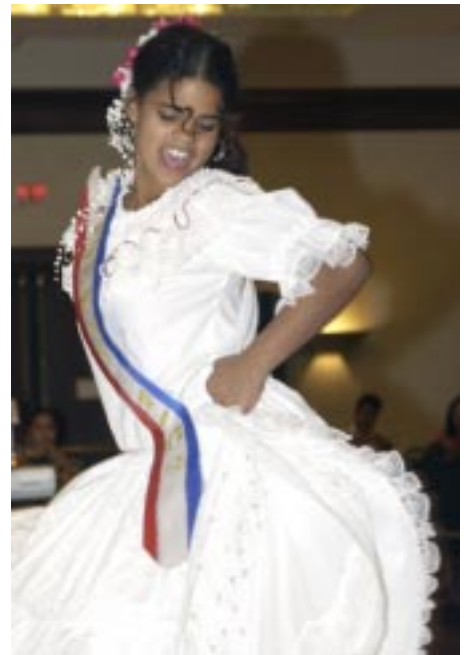
by Grant Thompson

Nearly 200 high school students from across Alabama came to Huntsville to participate in the "Mi Futuro" ("My Future") Latin American Youth Conference last week at the U.S. Space & Rocket Center.

The event was co-sponsored by the Marshall Center, and the Alabama Latin American Association and Stillman College, both of Tuscaloosa.

Conference organizers hoped to motivate Hispanic students to continue their education.

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Annette Mayor, of the Daughters of America dance troupe from Ozark, performs during the Mia Futuro opening ceremony last Friday.

Photo by Emmett Given, NASA/Marshall Center

Glass

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research facility.

As part of a NASA research grant for a proposed International Space Station flight experiment, Weber conducted research in the Electrostatic Levitator at the Marshall Center. The levitator, where molten spheres of glowing material float with no visible means of support or containment, is one of the nation's few facilities where scientists can process materials without using contaminating containers.

"Precise determination of materials properties is difficult when they are tested in a container," said Dr. Jan Rogers, a materials scientist who helped Containerless Research characterize the glass during at the Marshall Center. "Anything that touches a molten sample can alter the results and observations by interacting with the material physically or chemically."

Inside the levitator, it's almost like magic when molten, glowing glass floats in mid-air with no visible means of support. Actually, the sample is suspended inside a chamber by static electricity generated by six electrodes. A laser beam heats the sample until it melts. Scientists, like Weber, measure the sample's physical properties without interference of a container that would contaminate it.

Since 1997, the Electrostatic Levitator facility at the Marshall Center has been used to study the characteristics of new metals, ceramics and glass compounds - both in their hot molten states and as they are cooled to form solid materials. Materials created as a result of the tests include new optical materials, new metal alloys, special metallic glasses and spacecraft components.

"This shows how basic NASA research

can lead to innovative materials and new products that can benefit everybody," said Dr. Michael Wargo, Enterprise Scientist for materials science in NASA's Office of Biological and Physical Research in Washington.

Containerless Research's development of applications and new products for lasers, optical communications, and surgical lasers is supported by grants from the National Science Foundation and the Air Force Office of Scientific Research.

"The development of REAL Glass™



Dr. Jan Rogers, right, discusses the role played by the Electrostatic Levitator at the Marshall Center in helping a company invent a new type of glass. With Rogers is Huntsville Times reporter Shelby Spires, left, and Huntsville Times photographer Robin Conn, center.

Photo by Emmett Given, NASA/Marshall Center

shows how the Small Business Innovation Research program works by building on good ideas that come from basic research and helping small businesses grow into commercial manufacturers of innovative products," said Dr. Winslow Sargeant, who directs the National Science Foundation Small Business Innovation Research Commercialization Program for devices. "We are working with Containerless Research Inc. by supporting product research and development that can help them grow the business and continue to create new products and new jobs."

REAL Glass™ has qualities useful for creating materials for demanding optical applications.

"We've taken many of the best qualities of the current materials and created a new glass that can be produced inexpensively," Weber said.

One of the most promising uses of the glass is for lasers. Whether it is a power laser for cutting metal for car bodies or a medical laser used for surgery, the "heart" of lasers is the gain medium, which is where REAL Glass™ can be used. This critical component increases or amplifies light, resulting in an intense, highly concentrated beam capable of precisely

cutting metal parts or surgically removing or repairing human tissue.

"Most surgical lasers now use expensive single crystals, which limit the range of operating wavelength to very narrow bands," Weber said. "REAL Glass™ will provide tunability, which can give more control over surgical procedures, an important factor in different types of surgery and for different skin types. Our glass can provide efficient power lasers and expand coverage to new wavelengths."

REAL Glass™ also provides a medium for next-generation optical communications devices that need to be small, low-cost and powerful to provide fiber for home connections for broadband Internet. The company can customize the glass composition for these uses. The family of REAL Glass™ materials is patented under U.S. Patent No. 6,482,758 issued Nov. 19, 2002, and is only available from Containerless Research Inc., or under license.

The writer, an employee of ASRI, supports the Media Relations Department.

Information

Continued from page 1

NASA holds significant expertise in space launch vehicles, satellites, and other advanced technologies.

“Unfortunately, technology losses have dramatically increased over the last several years, and concerns have been heightened at the Marshall Center and NASA,” said Owen Johnson, director of Protective Services. “Reversing this trend will require the help of every employee at Marshall. We have a legal obligation to safeguard sensitive information pertaining to individuals, private enterprises, and certain government endeavors.”

Marshall Center personnel will be required to take mandatory awareness training that reinforces awareness of the need to safeguard NASA’s Administratively Controlled Information. The scope

of the training addresses the release of information or data to external parties, control of sensitive data, and our responsibility for identifying information subject to administrative controls.

Marshall team members can make a major difference by following simple safeguarding practices:

- Limit the number of sensitive hard copies
- Limit access to only personnel with a “need to know”
- Store data under lock and key when unattended
- Store data on a secure server with appropriate markings
- Transmit data via a secure FAX/encrypted e-mail transmissions
- Destroy data by shredding, burning and removing from IT systems

- Utilize ACI cover sheet (NF 1686).

The mandatory Web-based training is available via SOLAR through Nov. 14. The training site can be found on Inside Marshall at: <https://solar.msfc.nasa.gov/solar/delivery/public/html/newindex.htm>.

For personnel who do not have access to a computer, live training sessions will be Oct. 16 from 1-2 p.m. in Bldg. 4200, Room 409; Oct. 22 from 10-11 a.m. in Bldg. 4705, Room B-206; Oct. 28 from 3-4 p.m. in Bldg. 4200, Room P-110; and Nov. 6 from 7-8 a.m. in Bldg. 4663, Room A-164.

Please remember to notify the Marshall Center’s Protective Services Department immediately if you suspect any data has been compromised. The Protective Services Department point of contact is Polly Edwards at 544-4536.

Participation in Facilitated Mentoring Process encouraged at Marshall

from the Customer and Employee Relations Directorate

The Marshall Center is continuing its effort to enhance and encourage mentoring at Marshall with another group of mentors/mentees in the Facilitated Mentoring Process.

This process will offer approximately 50 persons, in grades 13 and below, the opportunity to pair with a mentor outside their chain of command for six months with the option to extend for another six months. The mentor and mentee will agree upon the amount of time for mentoring, but it should not exceed three hours a week. It is intended that the mentors will enhance their coaching skills, and the mentees will broaden their perception of the Center and strengthen their skills and abilities through this process.

Appropriate training opportunities will be provided in conjunction with this process to include Mr. Bob Ryan’s presentation on the “Learning Organization” and coaching and mentoring skills. Perrone-Ambrose Associates, of Chicago, will provide additional training for both mentors and mentees.

To ensure the continued success of this endeavor, we are seeking volunteer mentors in grades 14 and above who have a broad range of experiences in successful careers and who

are interested in contributing to the development of others.

If you would like to participate as mentor, please complete items 1-14 of the “Mentoring Process Information Form,” MSFC Form 4308, available in the electronics forms application. The information provided will be made available to the mentees and will serve to introduce you to them.

If you are in grades 13 and below and have been at Marshall for at least three years, you are eligible to apply for participation in this process as a mentee. If selected, you will be paired with a mentor outside your chain of command from the pool of volunteer mentors described above. If you are interested in participating in this process, please complete all items of the “Mentoring Process Information Form,” MSFC Form 4308.

You are encouraged to consider being a part of this process. If you are interested in applying for participation as a mentee, volunteering as a mentor or want more information, contact CD20/Ela Washington at 544-1164. All completed forms for participation should reach CD20 by Nov. 21.

— **Tereasa H. Washington**
Director

Customer & Employee Relations Directorate

Space Station

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computer platforms, servers, networks and software with less expensive, more robust systems that incorporate the best 21st century technology. Every day these systems monitor and store several billion bits of data from the Space Station, while simultaneously handling many time-critical commands to Space Station equipment, and serving a diverse community of research scientists located around the globe.

“We are well along on a two-year series of cost-saving initiatives,” said Ann McNair, manager of the Ground Systems Department. “Our controllers, who watch over Space Station science experiments on a daily basis, don’t really see these behind-the-scenes changes, which is as it should be. But the system today is more reliable, more maintainable and more economical.”

The Ground Systems Department is making many of these changes through the Utilization and Mission Support contract with Lockheed Martin Space Operations Co. in Huntsville. According to McNair, the team is about halfway through a series of planned upgrades that include:

- Migrating server platforms from high-priced servers to inexpensive servers running an open-source operating system
 - Migrating client platforms from expensive workstations to low-price personal computers
 - Replacing a physically scattered, difficult-to-manage data storage system with a centralized Network Attached Storage/Storage Area Network approach
 - Replacing expensive 48-channel custom voice sets with Voice-over Internet Protocol, available directly from a remote user’s personal computer
 - Creating a mature, efficient software baseline through close interaction with the users and system administrators
 - Migrating from end-of-life Fiber Distributed Data Interface Local Area Networks to high-speed switched networks
 - Increasing system availability by using high availability clusters that are virtually unaffected by individual equipment failures
 - Using multiple layers of rigorous security measures, including Virtual Private Networks, for all outside users to minimize system vulnerability
 - Establishing a funding plan based on continuous technology updates rather than large, wholesale technology replacements.
- The result of these changes will be a robust, secure, high-



Courtesy photo

Marshall team visits RSRM nozzle materials test lab in Ohio

Marshall Center team members watch lab testing of Space Shuttle Reusable Solid Rocket Motor nozzle materials for quality during a visit to the LASER Hardened Materials Evaluation Lab at Wright-Patterson Air Force Base in Dayton, Ohio. Ten members of the Marshall Center’s motor team visited the facility recently, and also visited National Electrical Carbon Products in Fostoria, Ohio, as part of an on-going effort to better understand work performed and processes used at facilities that manufacture or test parts of the Reusable Solid Rocket Motor. Standing, from left, are Jody Singer, motor team project manager, Dennis Moore, Mat Bevill and Andy Schorr. While the LASER Lab tests nozzle materials for quality, the Fostoria plant manufactures carbonized rayon cloth material used as insulation on the motor’s nozzle.

performance information technology system that is fully supported by industry vendors, takes advantage of modern computing technologies, and costs a fraction of the current system. This new system will improve NASA’s ability to collect and disseminate the scientific information from the International Space Station.

The writer, employed by ASRI, supports the Media Relations Department.

Energy Tip

How cozy is a fireplace?

When you cozy up to a crackling fire on a cold winter day, you probably never consider that a fireplace is one of the most inefficient heat sources you can use. It literally sends your energy dollars up the chimney along with volumes of warm air. A roaring fire can exhaust as much as 24,000 cubic feet of air per hour to the outside. This air volume loss must be replaced by cold air coming into the house from the outside. How cozy does that sound to you now? Using an open fireplace as a heating source will consume extra energy and increase your utility bill considerably. If you have an energy or water conservation tip or question, contact: cedreck.davis@msfc.nasa.gov or juergen.haukohl@msfc.nasa.gov.

Inventors help make life better on Earth through space-age technology

by Sanda Martel

In 1970, when renowned inventor and rocket scientist Dr. Wernher von Braun said farewell to the Marshall Center, he remarked, "My friends, there was dancing here in the streets of Huntsville when our first satellite orbited the Earth. And, there was dancing again when the first Americans landed on the Moon. I'd like to ask you - don't hang up your dancing slippers."

Forty-two years and 848 patents later, the space center's inventors show no sign of hanging up their "dancing shoes."

Von Braun, Marshall Center's first director and well known for his leadership in developing rockets for space, was the inventor responsible for the first Marshall Center patent - a rocket-propelled missile - on Jan. 10, 1961.

Marshall inventors of recent years are not as well known as von Braun. However, their inventions make an important contribution to the nation's space program and to the American economy, said Jim McGroary, Marshall's patent counsel, or legal advisor.

"Engineers and scientists here have established a long history of innovation and creativity," said McGroary, who also provides professional advice to Marshall inventors. "And NASA's patent program supports the Center's inventors by giving them the recognition they deserve, as well as transferring space technology to the American economy, so everybody benefits."

Unlike the days when von Braun was issued a rocket-propelled missile patent, patented inventions today must demonstrate commercial potential.

Inventors are advised to develop their ideas, when possible, with the needs of the market in mind, said Sammy Nabors, commercial assistance team leader of the Marshall Technology Transfer Department. That's because in 1962, a few years after the space agency was created in 1958, NASA established the Technology Utilization Program to promote the transfer of aerospace technology to the private sector. As a result, life on Earth has benefited from an outpouring of space technology "spin-offs" into the fields of health, medicine, transportation, public safety, computer technology, industrial products, consumer products, and many more areas.

Some of the better-known inventions developed by the people of the Marshall Center include:

VISAR

Helping law enforcement identify criminals and solve crimes is a surprising benefit from a NASA-developed technology known as VISAR.

Short for Video Image Stabilization and Registration, this software was created by NASA scientists Dr. David Hathaway and Paul Meyer to study violent explosions on the Sun and examine hazardous weather conditions on Earth. VISAR stabilizes and enhances poor quality video, brightens dark pictures and enlarges small areas to reveal clues about crimes.

Under commercial licensing to Intergraph Corp. in Huntsville, VISAR software has been incorporated into the company's Video Analyst workstation, which has been sold to numerous law enforcement agencies.

Hathaway and Meyer have personally helped police departments nationwide, as well as the FBI, solve dozens of criminal cases using their VISAR invention.

After the recent high-profile assault case involving an 11-year-old girl in a store in West Virginia, police contacted Hathaway and Meyer for help in enhancing images of the suspect captured on store security cameras. Based on video images, a suspect has been identified, arrested and charged.

Hathaway and Meyer received NASA's 2002 Commercial Invention of the Year award for VISAR. The two were also

See *Inventors* on page 8



Photo by David Higginbotham, NASA/Marshall Center

Discussing fire safety

Mike Warnick, left, with North American Fire Equipment Co. in Decatur, discusses fire extinguisher safety with Marshall team member Bob McKemie, right, in the Bldg. 4203 lobby Tuesday. McKemie was having his home fire extinguisher inspected during Home Extinguisher Maintenance Day. The event, sponsored by the Marshall Safety & Health Action Team, was part of Fire Prevention Week.

Hispanic

Continued from page 1

“The conference is intended to be a celebration for these kids,” said Elia Ordonez, manager of the Hispanic Employment Program at the Marshall Center. “We want them to take pride in their lives, to celebrate their accomplishments in education with their families and community.”

The goal of the conference is to create mentoring opportunities and prevent students from dropping out of school.

“It’s important to foster young people’s pride in their Hispanic culture and history and encourage students to pursue higher education.”

Each participating school selected Hispanic students to attend the two-day event. Students were chosen from rural and underprivileged families that show an eagerness to learn.

During the conference, students met



Sixteen-year-old twin sisters Angelica Villalobos, left, and Alma Villalobos, right, take a lunch break during the Hispanic Youth Conference in Huntsville. They attend Austin High School in Decatur.

with Marshall Center Deputy Director Rex Geveden, NASA scientists and engineers, appointed state leaders and business professionals. Student participants also toured the U.S. Space & Rocket Center and attended workshops that focused on self-esteem, Hispanic heritage and college and job preparation skills.

Participating Alabama schools included: Albertville High School; Decatur High School and Austin High School in Decatur; Athens High School, Clements



Art Stephenson, special assistant to NASA's associate administrator for Education, tells students the importance of setting goals and staying in school.

Photos by Emmett Given, NASA/Marshall Center

High School and Tanner High School in Athens; Bob Jones High School in Madison; Butler High School in Huntsville; Clay-Chalkville High School in

Trussville; Cleveland High School; Gaston High School in Etowah County; Hoover High School; Hayes High School in Birmingham; Minor High School in Adamsville; Ozark City High School; Pelham High School; Pinson Valley High School; Rainbow Middle School in Rainbow City; St. James School in Montgomery; Sardis High School; Southside High School in Etowah County; Vestavia Hills High School;

and West End High School in Walnut Grove.

Alabama organizations teaming with the event sponsors included Hispanic Outreach Latinos Adelante of Madison and Morgan Counties; the Coalition for Hispanic Community in Russellville; the

Hispanic Interest Coalition of Central Alabama; the Hispanic Business Council in Birmingham; the Hispanic Coalition of Central West Alabama; the Montgomery Hispanic Interest Group; the Wiregrass Hispanic Coalition in Dothan; the Migrant Clinic in Baldwin and Mobile Counties; the Chandler Mountain Center in Oneonta; the Central Alabama Alliance for Latino Health; the Arbol de Vida Hispanic Interest Group in Ozark City; the Hispanic Coalition of Saint Clair County; and the Hispanic Coalition of Marshall and Dekalb Counties.

The writer, an employee of ASRI, supports the Media Relations Department.



Students at the Hispanic Youth Conference participate in a self-esteem and leadership skills program.

Lunar prospecting with Chandra

from the Smithsonian's Astrophysical Laboratory

Observations of the bright side of the Moon with NASA's Chandra X-ray Observatory have detected oxygen, magnesium, aluminum and silicon over a large area of the lunar surface.

The abundance and distribution of those elements will help to determine how the Moon was formed.

"We see X-rays from these elements directly, independent of assumptions about the mineralogy and other complications," said Jeremy Drake of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. "We have Moon samples from the six widely-spaced Apollo landing sites, but remote sensing with Chandra can cover a much wider area. It's the next best thing to being there, and it's very fast and cost-effective."

The lunar X-rays are caused by fluorescence, a process similar to the way that light is produced in fluorescent lamps. Solar X-rays bombard the surface of the Moon, knock electrons out of the inner parts of the atoms, putting them in a highly unstable state. Almost immediately, other electrons rush to fill the gaps, and in the process convert their energy into the fluorescent X-rays seen by Chandra.

According to the currently popular "giant impact" theory for the formation of the Moon, a body about the size of Mars

collided with the Earth about 4.5 billion years ago. This impact flung molten debris from the mantle of both the Earth and the impactor into orbit around the Earth. Over the course of tens of millions of years, the debris stuck together to form the Moon. By measuring the amounts of aluminum and other elements over a wide area of the Moon and comparing them to the Earth's mantle, Drake and his colleagues plan to help test the giant impact hypothesis.

"One early result," quipped Drake, "is that there is no evidence for large amounts of calcium, so cheese is not a major constituent of the Moon."

The same Chandra data have also solved a long-running mystery about X-rays from the dark side of the Moon, as reported by Brad Wargelin, also of the Center for Astrophysics. Wargelin said data from the German Roentgen satellite (ROSAT) obtained in 1990 showed a clear X-ray signal from the dark side. These puzzling "dark-Moon X-rays" were tentatively ascribed to energetic electrons streaming away from the Sun and striking the lunar surface.

However, Chandra's observations of the energies of individual X-rays, combined with simultaneous measurements of the number of particles flowing away from the Sun in the solar wind, indicate that the X-rays only appear to come from the Moon. In reality they come from much closer to home.

"Our results strongly indicate that the

so-called dark Moon X-rays do not come from the dark side of the Moon," Wargelin said. "The observed X-ray spectrum, the intensity of the X-rays, and the variation of the X-ray intensity with time, can all be explained by emission from Earth's extended outer atmosphere, through which Chandra is moving."

In the model cited by Wargelin and colleagues, collisions of heavy ions of carbon, oxygen and neon in the solar wind with atmospheric hydrogen atoms located tens of thousands of miles above the surface of Earth give rise to these X-rays. In the collisions, the solar ions capture electrons from hydrogen atoms. The solar ions then kick out X-rays as the captured electrons drop to lower energy states.

"This idea has been kicking around among a small circle of believers for several years supported by theory and a few pieces of evidence," Wargelin said. "These new results should really clinch it."

The Marshall Center manages the Chandra program for the Office of Space Science, NASA Headquarters in Washington. Northrop Grumman of Redondo Beach, Calif., formerly TRW, Inc., was the prime development contractor for the observatory. The Smithsonian Astrophysical Observatory controls science and flight operations from the Chandra X-ray Center in Cambridge, Mass.

For more information on this and other Chandra stories, visit: <http://chandra.harvard.edu/> and <http://chandra.nasa.gov/>.

CIENCIA@NASA: Worldwide outreach in Spanish

from the Science Directorate

The Marshall Center Science Directorate's outreach to Hispanics reached a milestone recently -- Science@NASA's Spanish language Web site, Ciencia@NASA completed two years of operation.

The Web site, at <http://ciencia.nasa.gov>, carries translations of the popular stories on the English site, <http://science.nasa.gov>. The Ciencia Web site receives about 140,000 visitors each month who read about NASA science from all NASA Centers and Enterprises.

Ron Koczor, associate director for Science and Technology

in the Science Directorate, said what makes this project an especially rewarding one is that the Spanish community has taken to it so completely.

"In addition to our Marshall Hispanic employees, we have volunteers from all over the Spanish-speaking world who translate and review these NASA stories," Koczor said. "Their commitment shows the level of interest worldwide in space exploration and the work that NASA is doing."

The Web site received the YAHOO! International Award as the 2001 Best Spanish Science & Technology Web site on the Internet.

Inventors

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nominated by NASA to compete for the national Inventor of the Year Award, an annual competition that recognizes outstanding American inventors whose work has been patented or made commercially available.

VISAR was inducted into the Space Technology Hall of Fame in 2001.

Aluminum alloy

Another NASA patent success story is a high-strength aluminum-silicon alloy invented by Jonathan Lee, a Marshall structural materials engineer, and PoShou Chen, a scientist with Morgan Research Corp. in Huntsville. The alloy was developed seven years ago when a major automobile manufacturer approached NASA about developing a strong, low-cost alternative to current aluminum alloy pistons that would lower engine emissions.

Seven patents have been filed on the aluminum alloy, and the technology was licensed to three companies last year. Another license has been signed with Bombardier Motor Corporation of America of Melbourne, Fla., an outboard marine engine manufacturer of Johnson and Evinrude engines. The alloy is three times stronger than conventional cast aluminum alloy at high temperatures, and will enable engine manufacturers to make engines that produce more horsepower with less weight, while emitting fewer pollutants. The alloy is also being tested for a new fighter jet design and holds promise of improving gas mileage in cars and recreational vehicles, as well as boats.

Knee brace

A team of five Marshall engineers, including principal inventor Neill Myers and co-inventors Michael Shadoan, John

Forbes, Kevin Baker and Darron Rice, invented the Selectively Lockable Knee Brace. This prosthetic device is designed to aid recovering stroke and knee injury patients.

The knee brace attaches to a person's thigh, with the lower part secured to the foot. It allows knee movement when weight is not on the heel, then locks into position when weight is placed on the heel. This allows patients to walk with a more natural, stabilized gait and promotes a quicker, less painful recuperation than with devices that lock the knee in a rigid, straight-leg position or permit free motion.

The engineer team developed brace mechanisms and materials in 1996 as an outgrowth of their work on NASA propulsion systems. The team members were named Marshall Center Inventors of the Year in 1996 and 1998. The technology was one of 15 featured at a White House observance in 2000 of the 10th anniversary of the Americans with Disabilities Act.

Another patent - for an improvement involving a device that locks the brace in place, increasing its reliability - has been applied for and is pending.

Center and inventors benefit

The Marshall Center benefits from inventor royalties, and has received more than \$60,000 in royalty fees since 1993. But as an incentive, inventors receive a percentage of royalties collected as well, said Nabors.

"Marshall scientists and engineers have an outstanding record of reporting new technologies," Nabors said. "The inventor benefits, the Center benefits, and the American public benefits."

For more information about licensing and Marshall's Technology Transfer Program, visit: http://www.nasa_solutions.com/.

The writer, an employee of ASRI, supports the Media Relations Department.

SES Candidate Development Program open until Nov. 7

The NASA Senior Executive Service Candidate Development Program is accepting applications until Nov. 7

The program is for GS-14 and GS-15 federal employees who have potential for assuming executive responsibilities. The program can be completed on a part-time basis during a 12-18 month period.

Applicants must apply on "NASA Stars." If a resume is already on file, apply through "Quick Apply." Required supplemental information can be provided in the "Other Information" section of Resume Builder. For information, call Deidra Williams at 544-5721.



Photo by Emmett Given, NASA/Marshall Center

CFC bus tour visits senior center

Seiford Schultz, left, shows a wooden caboose in the workshop at the Madison County Senior Center. Marshall team members admiring Schultz's handiwork are, from left, Wayne Tankesley, Jack Stokes and Roger Parisa, who were on a Combined Federal Campaign bus tour last week. The Marshall Center's campaign goal is \$500,000.

Enhancing networking, diversity, training for a model subcontracting program

Marshall Prime Contractor Supplier Council meets in Guntersville

by David E. Brock

The Marshall Prime Contractor Supplier Council held its third meeting in Guntersville Aug. 27-28.

Teledyne Brown Engineering, Computer Sciences Corp., The Boeing Co., Lockheed Martin Space Operations, and Jacobs Sverdrup Technology co-hosted the event.

The purpose of the council is to create a productive environment for networking among the Marshall Center's prime contractors. Its primary focus is strengthening diversity within Marshall's subcon-

tracting programs, development of training tools for small businesses interested in pursuing subcontracting opportunities, and development of a forum for exchange of information.

This ultimate goal is the creation of a model subcontracting program and best practices manual to be shared with all prime contractors supporting NASA.

The Marshall Center's Procurement Office established the council in November 2002.

During the two-day event, several prime contractor representatives conducted sessions on best practices and

lessons learned, including developing a NASA mentor-protégé relationship and how to effectively conduct small business forums at prime contractor facilities. The council agreed to pursue creation of a training module to guide small businesses in developing effective marketing tools. The module will be presented to the small business community in the near future, and on an ongoing basis as needed.

The next council meeting will be Dec. 4-5, hosted by Pratt & Whitney in West Palm Beach, Fla.

The writer is Marshall's industry assistance officer in the Small Business Office of the Procurement Office.



Courtesy photo

MARS softball Division A champions

The "Renegades," front row, from left, John Hutt, Greg Rowan, Derek Wang, Mark Walton, Rob Ray and Chris McGougan. Back row, from left, Mark Hutchison, Jon Street, Rob Milton, Doug Walton, Joel Anderson, Corey Harrell and Mike Kynard. Not pictured are Steve Knight, Russ Huffman, Louie Clayton and Shawn Selvidge.



Courtesy photo

MARS softball Division B champions

The "TBE Integrators," front row, from left, Perry Young, Donna McLamb, Scott Walter, Austen Young, Leigh Young and John Geiger. Back row, from left, Ken Hartensteiner, Rantz Berryman, Chris Ruddock, Torsten Segewitz, Beth Young, Chris Koehler, Brad Mason and Jimmy Wrape. Not pictured are Clif Jones, Boyd Evans, Nate Neveu and Lisa Martin.

Obituaries

George C. Crow, 79, of Huntsville, died Sept. 18. A memorial service was held at the Episcopal Church of the Nativity in Huntsville.

Crow was born April 12, 1924, in Muskogee, Okla., and spent his youth in Longview, Texas. He was a U.S. Marine Corps veteran of World War II. He received a bachelor's degree in electrical engineering from the University of Texas at Austin in 1953 and joined the U.S. Corps of Engineers in Marshall, Texas. In 1956, he moved to Huntsville as senior electrical engineer for the Army Ballistic Missile Agency. He joined the Marshall Center as a charter member in 1960 where he worked as a senior mechanical and structural design engineer and retired in 1984. He later worked as a consulting engineer for SRS Technologies and General Dynamics in the Space Systems Division.

Crow is survived by his wife, Marie Mitchell Crow; two daughters, Robbie Crow Shafer and Priscilla Cowing, both of Huntsville; one sister, Marie Wood of Longview, Texas; and two grandchildren.

'Spinoff 2003' highlights NASA technologies in everyday life

"Spinoff 2003" is the latest edition of the annual NASA publication showcasing the wide range of technologies and innovations from the space program to everyday use by the public.

The 143-page publication includes eight technologies connected with the Marshall Center and a special section commemorating the 100th anniversary of powered flight. To view the publication, go to <http://www.sti.nasa.gov/tto/>.

Job Announcements

MS03D0190, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0191, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0192, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Three vacancies in New Orleans. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0193, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Duty location Kennedy Space Center, Fla. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0194, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Two vacancies in Brigham City, Utah. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0195, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Two vacancies in Los Angeles. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0201, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Two vacancies at Kennedy Space Center, Fla. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0203, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03D0204, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Closes Oct. 16.

Contact: Rita Evans-McCoy at 544-7507.

MS03D0205, AST, Reliability & Quality Assurance. GS-0861-13, Safety and Mission Assurance Office, Shuttle Assurance Department. Closes Oct. 16. Contact: Rita Evans-McCoy at 544-7507.

MS03N0213, AST, Technical Management. GS-0801-12, 13, Office of the Director MSFC. Closes Oct. 9. Contact: Kevin Plank at 961-0157.

MS03D0214, Executive Assistant. GS-0301-12, 13, Office of the Director MSFC. Closes Oct. 9. Contact: Kevin Plank at 961-0157.

MS03S0215, Director, Flight Projects. Senior Executive Service ES-0801-01-06, Flight Projects Directorate. Closes Oct. 13. Contact: Diedra Williams at 544-5721.

MS03S0217, Director, Center Operations. Senior Executive Service ES-0301-01-06, Center Operations Directorate. Closes Oct. 13. Contact: Diedra Williams at 544-5721.

MS03D0223, Program Manager. GS-0340-14, Office of the Chief Financial Officer, IFMP Administrative Systems Implementation Office. Closes Oct. 14. Contact: Dana Blaine at 544-7514.

MS03D0224, Program Manager. GS-0340-14, Office of the Chief Financial Officer, IFMP Administrative Systems Implementation Office. Closes Oct. 14. Contact: Dana Blaine at 544-7514.

MS03D0226, AST, Solid Propulsion Systems. GS-0861-09, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Oct. 14. Contact: Jim Bramblett at 544-3398.

MS03D0227, AST, Solid Propulsion Systems. GS-0861-12, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Oct. 14. Contact: Jim Bramblett at 544-3398.

MS03D0228, AST, Liquid Propulsion Systems. GS-0861-13, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Oct. 14. Contact: Jim Bramblett at 544-3398.

MS04D0002, AST, Aerospace Flight Systems. GS-0861-14, Space Shuttle

Propulsion Office, Solid Rocket Booster Project. Closes Oct. 14. Contact: Edwina Bressette at 544-8115.

MS04D0003, AST, Aerospace Flight Systems. GS-0861-14, Space Shuttle Propulsion Office, Solid Rocket Booster Project. Closes Oct. 14. Contact: Edwina Bressette at 544-8115.

MS04D0004, AST, Aerospace Flight Systems. GS-0861-14, Space Shuttle Propulsion Office, Solid Rocket Booster Project. Closes Oct. 14. Contact: Edwina Bressette at 544-8115.

MS04D0005, AST, Aerospace Flight Systems. GS-0861-14, Space Shuttle Propulsion Office, Solid Rocket Booster Project. Closes Oct. 14. Contact: Edwina Bressette at 544-8115.

MS04D0006, AST, Solid Propulsion Systems. GS-0861-11, Space Transportation Directorate, Vehicle and Systems Development Department. Closes Oct. 15. Contact: Jim Bramblett at 544-3398.

MS04C0010, Management Support Assistant (OA). GS-0303-06, Office of the Chief Financial Officer. Closes Oct. 20. Contact: Dana Blaine at 544-7514.

MS03D0013, AST, Structural Materials. GS-0806-07, 09, 11, Engineering Directorate, Materials, Processes & Manufacturing Department. Closes Oct. 17. Contact: Allan Day at 544-4079.

MS03D0014, AST, Structural Materials. GS-0806-13, Engineering Directorate, Materials, Processes & Manufacturing Department. Closes Oct. 20. Contact: Debbie Longeddy at 544-2308.

MS04D0015, AST, Aerospace Materials. GS-0806-13, Engineering Directorate, Materials, Processes & Manufacturing Department. Closes Oct. 21. Contact: Debbie Longeddy at 544-2308.

MS04D0016, AST, Electronic Systems Failure Analysis. GS-0855-12, Engineering Directorate, Avionics Department. Contact: Allan Day at 544-4079.

MS04D0017, AST, Aerospace Materials. GS-0806-13, Engineering Directorate, Materials, Processes & Manufacturing Department. Closes Oct. 21. Contact: Debbie Longeddy at 544-2308.

Center Announcements

Symposium on liquid space propulsion is Oct. 27-30

The Marshall Center is hosting the Fifth International Symposium on Liquid Space Propulsion in Chattanooga, Tenn., on Oct. 27-30. The invitation-only symposium is the principal international forum for all aspects of liquid rocket propulsion. This year's theme is "Long Life Combustion Devices Technology" and will cover all aspects of analysis, modeling and design. Experts from around the world also will conduct forums. For details, go to <http://www.chattanooga.com/hotel.com/5thinternational/index.html>. To inquire about an invitation to the symposium, call Roberto Garcia at 544-4974 by Friday.

Applied Systems Engineering workshop will be Oct. 14-17

An Applied Systems Engineering workshop will run from 8 a.m.-4:30 p.m. Oct. 14-17 at the Marshall Institute in Room 711. The workshop is a review of the latest principles for systems engineering in the context of NASA and Marshall Center development cycles with realistic practice on how to apply these principles. The workshop is geared for program managers, project managers, systems engineers, technical team leaders and others who participate in defining and developing complex systems. Registration is online through AdminSTAR. For more information, call Jerry Miller at 544-7555.

SLTS design and operations workshop is Nov. 17-19

Space Launch and Transportation Systems Design and Operations workshop will be Nov. 17-19 at the Marshall Center in Bldg. 4200, Room G-13E. The course is for space professionals who produce, operate and use cost-effective space launch and transportation systems. The workshop's focus is technical risk identification and mitigation in the most cost-effective manner, while maintaining technical integrity of a vehicle and infrastructure. For more information, see "Inside Marshall."

Full Cost in Practice course available for Marshall team

Full Cost in Practice, an eight-hour course, will be offered for Marshall team members Oct. 14, 16 and 21-23 in Bldg. 4200, Room G-13. The course is sponsored by the Office of the Chief Financial Officer in conjunction with the Agency Full Cost Training Team. Registration is through AdminStar. A prerequisite for the course is the Web-based training FC 101 at <https://fullcost.hq.nasa.gov>.

New hours for allergy injections in effect at Medical Center

New hours for receiving allergy injections at the Marshall Medical Center are 9-10:30 a.m. and noon-2:45 p.m. weekdays.

Marshall conducting controlled equipment inventory

A 100 percent physical inventory of all controlled NASA bar-coded equipment is underway. All equipment, whether in file cabinets or desks, should be made available for scanning when inventory teams are in your area. All mobile controlled equipment also must be made available for scanning. The scanning schedule is at <http://inv2002.msfc.nasa.gov/inv2003/>. For more information, call Robbie Saint at 544-9618.

MARS Dance Club classes held each Monday night

The NASA MARS Dance Club has intermediate and beginner ballroom dance classes starting at 7 p.m. and 8 p.m., respectively, every Monday at St. Stephens Episcopal Church on Whitesburg Road in Huntsville. For more information, call Jerry Maxwell at 544-1954.

Discount circus tickets available for Marshall team members

Marshall team members can receive a \$3.50 discount on seats in the Box and Mezzanine sections when the

Ringling Brothers and Barnum & Bailey Circus perform Dec. 3-7 at the Von Braun Center. Tickets go on sale at the Von Braun Center on Oct. 23. Marshall team members should show their identification badges to receive the discount. For more information, see "Inside Marshall."

AIAA dinner to feature Dr. Dave Franz, former weapons inspector

Dr. Dave Franz, a three-time UNSCOM chief weapons inspector for biological weapons in Iraq and vice president of the Chemical and Biological Defense Division of the Southern Research Institute, will speak at the American Institute of Aeronautics and Astronautics dinner Tuesday. The event at the Holiday Inn, Research Park, in Huntsville, begins with a social at 6:15 p.m. followed by dinner at 7 p.m. Cost is \$25 per person. You do not have to be an AIAA member to attend. For reservations, call 544-4650.

Marshall team invited to 'State of the City' address Oct. 29

Marshall team members are invited to the "State of the City" address by Huntsville Mayor Loretta Spencer at noon Oct. 29 in the Von Braun Center's North Hall. Tickets cost \$25. Reservations and payment must be received by Rosa Kilpatrick in the Government and Community Relations Department by noon Oct. 21. Checks should be made payable to the Chamber of Commerce of Huntsville and Madison County.

Proposal production assistance available

The Center Operations Directorate's Proposal Production Team (PPT) is available for assistance in preparing proposals. The PPT can schedule coordination, guidelines, text editing, figure and table production, layout, camera-ready art and coordinate printed products. For more information, go to <http://co.msfc.nasa.gov/ad03/graphics/proposal.html> or call 544-4852, 544-4580 or 544-4741. The PPT is in Bldg. 4200, Room G-28.

Classified Ads

Miscellaneous

- ★ Two table runners, 13"x56", hand-scalloped lace, one natural, one white, \$5 each. 880-7490
- ★ 1977 Avion travel trailer, 27', for lake lot or hunting and camping, \$5,000. 931-427-2059
- ★ Kenmore refrigerator/freezer, 27 cu. ft., side-by-side, white, \$500; GE drop-in range, \$250. 881-3527
- ★ Handicap walker, \$50; handicap toilet, \$50. 233-3407
- ★ Mizuno Ti driver, graphite shaft, \$75; Remington Model 11A semi-auto shotgun, \$245. 651-1085
- ★ Two tickets to Alabama/Southern Mississippi homecoming football game, Oct. 11, \$60. 355-8589
- ★ Kenmore refrigerator, 22 cu. ft., icemaker, frost-free, side-by-side, \$165; Kenmore washer, \$90; Whirlpool dryer, \$90. 837-6649
- ★ Radio-controlled model airplane, 40 sized airplane & 4-channel radio, \$95. 828-4564
- ★ Bear Whitetail EL compound bow, 60 lb. pull, 30" draw, sights, quiver, hard case, \$190. 851-8085
- ★ Whirlpool upright freezer, frost-free, 19.6 cu. ft., \$250. 882-0947
- ★ Bumper pull two-horse trailer, older model, \$1,600. 256-685-0308
- ★ 1975 Yamaha RD350 motorcycle, \$1,350; 1982 Honda XR250R motorcycle, \$750. 883-7729
- ★ Craftsman table mount jig saw, 18" throat, cast iron, tilting table, w/motor, stand/storage, \$100. 348-5181
- ★ Fresh/salt water aquarium equipment, 55-gallon tank, 10-gallon tank, pumps, heater, etc. \$400. 564-9912
- ★ Two tickets to "Jesus Christ Superstar" at VBC, Nov. 28, Orchestra seating, \$44 each. 233-7869
- ★ Ethan Allen heavy pine round dining table w/leaf and four swivel captain's

- chairs, \$375. 881-4105
- ★ Tickets to BTL Miss Saigon, 10/26, 2 p.m., Row K, Seat 14, \$30. 881-6077
- ★ Two Valhalla crypts, eye level, Masonic Bldg., \$5,800. 860-657-1618
- ★ Farmhouse style table, 36"x60w", 6 chairs, \$250. 461-8848
- ★ Bicycle, 16-speed, chrome-moly frame, extra set of wheels, many accessories, \$100. 461-6337
- ★ Window-unit A/C. Worked last time used, about six years ago. In storage. \$60. 306-0700 Decatur
- ★ Kitchen table w/leaf, four swivel, rocking, rolling chairs w/beige fabric cushions, \$150. 880-7376
- ★ Classic 11-piece dining room suite by Bassett, \$2,900. 881-0883
- ★ 2002 Artic Cat 4-wheeler, 180 miles, 400cc, 2.4WD, low/high range, \$5,000. 883-9741
- ★ Class A, 5K pound equalizer trailer hitch w/sway control bars, fits 2" square receiver, \$150. 852-5394
- ★ Palm V accessories kit; modem, charger, wireless web, GSM upgrade, cases, face plates, \$20. 772-8489
- ★ Little Tykes items: play structure w/slide, \$60; See-Saw, \$10. 683-9364
- ★ Blue Ribbon horse saddle, stirrups, saddle cover, saddle pad & cleaner and conditioner, \$600. 882-1862
- ★ Macula degeneration seeing aid, \$1,250. 256-883-2044
- ★ Computer desk, \$60; large wooden desk, \$40; Ladies clothes, size 12, \$5; Shoes, \$5. 256-534-0939
- ★ New THULE trunk bike rack, adjusts to fit most automobiles, holds 2 bikes, \$45. 520-2656

Vehicles

- ★ 2000 Mazda 626, 4-door, 41K miles, silver w/gray interior, PS/PB/PB/PL, AM/FM/CD cassette, a/c, \$9,950. 256-230-0806
- ★ 1995 GMC Serria Z71, ext. cab, new

- tires, garage kept. 931-937-6518
- ★ 1995 Volvo 850 wagon, silver, cloth interior, new tires, \$4,600. 931-937-6148
- ★ 1995 Dodge Caravan SE, automatic, 164K miles, blue w/gray interior, V6, \$2,000. 256-880-3337
- ★ 1996 Infiniti I30, 4D, pearl white, tan interior, loaded, \$7,150. 837-6879
- ★ 1982 Cadillac Sedan Deville, \$250. 881-6040
- ★ 1987 GMC Serria pickup, SWB, all extras, 140K miles, one-owner, \$3,795. 256-776-4331
- ★ 1996 Eclipse RS, power sunroof, 5-speed, air, 88.5K miles, \$4,500. 256-603-0741
- ★ 1997 Miata, Limited, 5-speed manual, A/C, cassette/CD, blue/tan, new top, \$7,000. 227-4092
- ★ 1995 Dodge Caravan SE, automatic, 164K miles, blue exterior, gray interior, V6, \$2,000. 256-880-3337
- ★ 1997 Buick LeSabre Limited, 87K miles, \$6,500. 830-0757
- ★ 1992 Nissan Maxima, white, \$2,900; 1997 Ford Explorer, red, \$7,900. 256-721-7799
- ★ 1991 Explorer, Eddie Bauer, 4-door, 4x4, a/c, tow hitch, \$1,650. 325-6000
- ★ 1995 Ranger extended cab, 2.3L, 5-speed, AM/FM/cassette, a/c, PS, CC, 155K miles, \$2,950. 828-3887
- ★ 1999 Toyota Avalon XL, all-power, leather, sunroof, a/a wheels, CD/cassette, tan, 75K miles, \$11,500. 880-9025

Wanted

- ★ Laser Jet Printer. 883-2757
- ★ "User's Guide to Vax/Vms Operating System" by Corey Sandler, (January 1989). 922-1424
- ★ Large bird cage for parrot. 653-4240
- ★ Pair of solid wood bookcases, 45"x85". 256-351-9467

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