Sert II Test Is Subject At Meeting

The six month orbital SERT II test of ion engines in space will be one of the topics featured in papers by Lewis scientists at the AIAA's Electric Propulsion and Plasmadynamics Specialist Conference at Colorado Springs September 11-13.

The development conducted at Lewis to make the system flight worthy will be described in a paper by William R. Kerstake, David C. Eyers and John F. Stagg. This development resulted in many increases in performance and knowledge of the major components.

Robert T. Bechel's paper, "Discharge Chamber Optimization of the SERT II Thrustor," tells about the configuration providing propellant utilization efficiencies in excess of 90 per cent for some operating conditions.

The largest scale Kaufman thrustor to date, 1.5 meters in diameter, will be discussed in a paper by Shigee Nakanishi and Eugene V. Pawlik. This thrustor has attained an overall efficiency of 70 per cent with a specific impulse of 8150 seconds.

Ingenuity is recognized...

Inventions net $1200

Thirteen Lewis researchers and two former Lewis employees recently won eight awards totaling $1200 for their inventions.

The largest individual award of $200 went to Lawrence P. Ludwig, head of the Seals Section, Fluid System Components Division, for developing a low leakage shaft seal which can be used with many types of liquids, such as water, sodium, and oil. The seal has positive contact sealing under static conditions when there is no rotation or movement. A positive separation of the sealing surfaces while the shaft is operating minimizes shaft and seal wear.

A method for developing the highest strength metal known to man at temperatures above 3500 degrees Fahrenheit won a joint $400 award for three members of the Materials and Structures Division and a former Lewis employee. They are: William D. Klopp, head of the Refractory Metals Section; Peter L. Raffo and Walter R. Witzke, both metallurgists in the Refractory Metals Section; and Lester S. Rubensteii, now associated with the Atomic Energy Commission. The tungsten base alloy contains rhenium, hafium, and carbon in proportions which increases the alloy’s strength to 800 per cent of that of unalloyed tungsten.

Two members of the Nuclear Systems Division, Edward Lantz, head of the Reactor Section, and Harry W. Davison, a nuclear engineer in the Reactor Engineering Section, shared a $100 award for developing a gaseous control system for nuclear reactors.

Four members of the Materials and Structures Division shared an award of $200 for developing a refractory fiber-reinforced superalloy that is four times as strong as the strongest conventional superalloy. They are: John W. Weeton, chief of the Composite Materials Branch; Robert A. Signorelli, head of the Fiber Metallurgy Section; Donald W. Petrasek, materials engineer in the Fiber Metallurgy Section; and Gerald B. Beremand, materials engineering technician in the Fiber Metallurgy Section.

Frank E. Rom, head of the Advanced Nuclear Concepts Branch of the Nuclear Systems Division, won $50 for developing an improved gas core nuclear reactor. The invention incorporates an improved system for cooling the reactor walls so that they can withstand the thermal heat of the nuclear reaction which is at temperature levels far above the melting or boiling point of most materials.

Shigeo Nakanishi, an aerospace research engineer in the Electromagnetic Propulsion Division’s Propulsion Components Branch, shared a $100 award with former Lewis employee Paul Margosian for development of a single grid accelerator system for an ion thruster. Nakanishi split another $100 award with Bruce A. Banks, a physicist in the EPLa Division, for developing a glass coated grid for an ion thruster accelerator system. Banks also received a $50 award for developing an improved process eliminating helium bubbles in the glass coating on the ion accelerator grid.
Glass coatings for more than

The way in which research in one field often leads to developments in another totally different field which in turn leads back to advances in the first field was illustrated most recently at Lewis by the work on single grids for electron bombardment ion engines.

Ion engines, which may someday be a prime source of propulsion for interplanetary missions, have historically had two grids at the nozzle of the engine. An ion engine operates by bombarding a plasma with electrons to form ions and accelerating the ions out of the rear of the engine to provide thrust. In order to contain the plasma in the bombardment chamber, one grid was used which was positively charged. In order to attract and accelerate the ions out the rear of the engine, another grid was used which was negatively charged.

The two grids were generally separated by about 1/10th of an inch. The exact distance is determined by the other dimensions of the engine but is carefully calculated to be far enough apart to prevent electrical breakdown between the grids and close enough to be efficient in attracting the ions. In order to maintain the exact distance, extra careful handling was important, as well as protection during launch. Buckling and warping could also occur from the heat of normal operation which could result in poor ion focusing and reduced grid life.

"Since 1967," Edward A. Richley, Chief of the Ion Physics Branch, says "we have been working to develop a single composite grid which would be less complex and more durable than the double grids."

One answer appeared to be the construction of a single grid with an insulating glass coating. However, the problem was that conventional methods of fusing a glass coating on metal left small bubbles in the glass.

Robert Hartzell, aerospace engineer, discusses the environmental advantages of fused glass coatings.

Andrew Aron, apprentice mechanic, and Bruce Banks, aerospace engineer, discuss a four-quadrant glass-coated grid being prepared for a vacuum chamber test. The new geometry permits vectoring the ion beam in two directions. (Martin Brown photo)
A patent was issued this month for a "High Speed Rolling Element Bearing." William H. Anderson and Harold H. Coe suggested a method to reduce the weight of rolling elements in bearings by drilling a hole either partially or completely through the rolling element. This reduction increases the bearing life by decreasing centrifugal loading. Anderson is Chief of the Bearings Branch, Fluid Systems Components Division, and Coe is a materials engineer in the section.

A patent was issued for an "Iron Thruster Magnetic Field Control." Bruce A. Banks, an aerospace engineer in the Ion Physics Branch, Electromagnetic Propulsion Division, devised the method for controlling the magnetic field of an ion thruster for improved starting and to eliminate stray magnetic fields which might interfere with sensing devices. The invention uses high ferromagnetic Curies temperature permanent magnets as have been used in previous systems. However, these are surrounded by a low ferromagnetic Curie temperature alloy shunt. When the thruster is not operating, the magnet field lines are confined to the permanent magnets and shunt alloy. However, when the engine is operating and components are heated the shunt becomes paramagnetic and does not divert the permanent magnet fields. In effect this means the preferred alloy composition provides an ultimate tensile strength of 20,000 psi at 220°F. Freche is Chief of the Fatigue and Alloys Research Branch, Materials and Structure Division. Waters is an aerospace technologist in the branch.

Five patents issued

The Sandusky Area Industrial Management Club has honored Lewis' Plum Brook Station by citing it as their "Company of the Month" at a dinner ceremony in Sandusky November 16. Receiving the honor and speaking at the banquet was Dr. Walter T. Olson, Director of Public Affairs. Dr. Olson touched on the importance and contribution of technology in general and the NASA aerospace contributions in particular to our society. He was titled, "Space Exploration and the Quality of Life."

The dinner meeting also featured a NASA exhibit of Plum Brook's role in furthering technology for the Sandusky area. The Industrial Management Club consists of foremen and supervisors of local government and industrial firms in the Sandusky area. Chairman of the Program Committee this year is Plum Brook's James A. Freyberg of the Facilities Service Division.

What's up?........Volleyball

Plum Brook is honored

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Publicly Speaking

The Speakers Bureau announces that the following employees are scheduled to speak during the next two weeks.

On Nov. 20 James H. Diedrich will give a presentation to the Warner & Swasey Company Supervisor's Club and on Nov. 22 Thomas A. Fox will talk to the Fairview Park Garden Club.

Oliver W. Reese will address members of the Department of Surgery at Lake Erie Hospital of University Hospital.

The next event will be on Nov. 30 at the varsity boys game. The game will be held at 7:30 p.m.

On Dec. 1 Harrison Allen will participate in the Alpha Eta Rho Fraternity Aeropace Banquet at Kent State University.

Oden will speak to the Lorain County Health Department Public Health Nurses on Dec. 3.

Notes of appreciation

"Thanks to all of my friends and co-workers who gave me the splendid sendoff and the very much appreciated gifts, cards, and flowers. My sincerest thanks and best wishes to all of you at Lewis."

Ethel L. Walker

"I would like to express my thanks for the wonderful party and gifts that were given upon my retirement. I sure appreciate it. A special thanks to my co-workers and friends in the Fabrication Division who I know spent time and effort to make it possible." Arthur D. Smith

"I want to express my appreciation for the many gracious expressions of sympathy following the recent death of my brother." Betty E. Price

"I would like to express my thanks to all my friends for the cards and well wishes during my recent stay in the hospital and home."

Raymond E. Schuerger

"My wife and I would like to express our thanks to our friends at Lewis who sent the many cards of congratulations and flowers on the occasion of the birth of our son, David Scott, Oct. 17." Ronald F. Kiesling

"I want to thank all my friends and co-workers for the splendid retirement party and the much appreciated gifts. Best wishes to all of you at Lewis." Harold E. Quay

"I would like to thank my fellow employees and friends on behalf of my family and myself for the condolences received at the time of my mother's death." W. Charles Nee

"I wish to thank my friends and fellow employees for the condolences received at the time of my mother's death." George E. Turner

Charles Taylor, James E. Williams and Johnnie L. Poole were among the 21 men who completed their apprenticeship requirements and became journeymen in cere- monies held here November 4. Taylor works as an experi- mental facilities electrician in the Test Installations Division and Williams and Poole are experimental met- al modellers in the Fabrication Division. These men's names were inadvertently left out of the apprentice graduation story in the November 5 issue of the Lewis News.

THE LEWIS NEWS is the Lewis Research Center's monthly newsletter. Information and its purpose is its progress. Published on alternate Fridays, the News is produced by the Public Information Office, Lewis Research Center, National Aeronautics and Space Administration, 21000 Brookpark Road, Cleveland, Ohio 44135.

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Editor Charles Mitchell
Lewis authors write
for tech conferences

Lewis scientists and engineers are presenting technical papers at several conferences being held this month.

For the American Institute of Aeronautics and Astronautics' (AIAA) Seventh Thermophysics Conference, held in San Antonio, Texas April 10-12 Ralph D. Sommers, Charles A. Raquet and John F. Casady, co-authored "Optical Properties of Thermal Control Coatings Contaminated by MMH/N2O4 Five-pound Thruster in a Vacuum Environment with solar simulation."

The combined AIAA, ASME, and SAE 15th Structures, Structural Dynamics and Materials Conference, and NASA Space Shuttle Technology Conference held 10-14 at San Antonio, Texas feature two Lewis engineers. They are, Hubert B. Probst, "Reusable Surface Insulation Material Research and Development" and James R. Faddoul, "Application of Composite Materials to Space Shuttle Tankage."

The AIAA Ninth Electric Propulsion Conference April 17-19 at Bethesda, Maryland has scheduled co-authors Nelson L. Milder and James S. Sovey, "Optical Radiation from Regions Downstream of Mercury Bombardment Thrusters"; Walter C. Latham, "Grid-Translation Beam Deflection Systems for 5-cm and 30-cm Diameter Kaufman Thrusters"; Vincent K. Rawlin, Bruce A. Banks, and David C. Byers, "Design Fabrication and Operation of Dished Acceleratore Grids on a 30-cm Ion Thrust"; and Robert T. Bechtel, "Ae 30-cm Diameter Thruster with a Variable Magnetic Baffle."
Lewis inventors:

Jacob D. Broder, an aerospace technologist in the Solar cell Branch, Energy Conversion & Materials Sciences Division, devised a method of binding cover glasses to solar cells. A thin film of a transparent plastic material is used as a binding material. This film is placed between the cover glass and the solar cell to form a laminate when heat and pressure are applied.

Bruce A. Banks, an aerospace engineer in the Ion Physics Branch, Spacecraft Technology Division, invented an electromagnetic flow rate meter. The speed of a flowing liquid metal is measured by passing it through a magnetic field and measuring the resulting eddy currents with an ammeter. The current induced in the liquid metal by passing it through the magnetic field is directly related to the flow rate.

Richard J. Parker has developed a method for building improved bearings using low mass rolling elements which have high fatigue strength. Parker's bearings would use either hollow core rolling elements or solid but lightweight cores and be iron plated. An advantage of these bearings is the lighter weight of the balls and the longer life due to the lower centrifugal force on the outer race of the bearing. Parker is a materials engineer in the Bearings and Mechanical Power Transfer Branch, Fluid System Components Division.

Aerospace technologist James A. Burkhardt developed a method for improving the performance of a magneto-plasma-dynamic (MPD) arc thruster in the 600 to 2100 seconds specific impulse range by mounting a hollow cathode in the exhaust beam. This type of thruster is potentially useful for satellite station keeping and altitude control missions. Burkhardt is a member of the Advanced Concepts Branch, Nuclear Systems Division.

A supersonic combustion rocket engine has been invented by Richard J. Weber, Chief of the Mission Analysis Branch, Wind Tunnel and Flight Division, and Leo C. Francis, an aerospace engineer in that branch. The engine eliminates the heavy turbomachinery presently used for liquid rocket engines. Weber and Francis used the exhaust of similar rocket motors to create a pressure differential between the fuel and oxidizer tanks and a mixing chamber to "pump" the propellants. The exhaust gases from the smaller rocket motor are also used to carry along the fuel oxidizer mixture and speed it up to supersonic speed. Two important advantages to the system, according to the inventors, was the significant reduction in weight gain from removing the turbopumps and increased specific impulse resulting from igniting the propellants flowing at supersonic speeds.

A method for fabricating hollow balls and rollers for rolling element bearings has been developed. Using this method, preformed components are diffusion welded by heating in a vacuum furnace under a light pressure. With this process, no microdeformation is involved in the welding process, and no foreign material is introduced into the joints. Thomas J. Moore, a materials engineer in the Materials Applications Branch, Materials & Structures Division, developed the method.

Dr. Tito Serafini and Peter Delvigs, two members of the Structural Mechanics & Polymers Branch, Materials & Structures Division, received an award for their "Preparation of Polymides from Mixtures of Monomeric Diamines and Esters of Polycarboxylic Acids." High molecular weight polyimides are prepared by mixing a diester of an aromatic tetracarboxylic acid, an aromatic diamine, and a monoester of a dicarboxylic acid in an organic solvent. The mixture is then polymerized after which it is cured at a temperature of from about 275°C to 350°C. Dr. Serafini is Head of the Polymer Matrix Composite Section and Delvigs is an aerospace technologist.
Inventors to be honored

The first "Lewis Invention Awards Luncheon" is scheduled for April 13 in the Main Cafeteria.

The luncheon is being held to honor all Lewis inventors. They will be represented by patentees who received patents in 1975. These patentees will receive plaques with an embossed replica of the first page of their patents from Center Director Dr. Bruce T. Lundin. According to Norman T. Murial, Lewis Patent Counsel, the luncheon is a "first" for NASA and will serve as a forerunner for a NASA-wide luncheon to be held next year to coincide with National Inventors Day.

Through aerospace technology

Center seeks better dental supports

Engineers at Lewis are using materials technology developed for aerospace purposes to improve the life of implantable false teeth supports.

Dental implants are devices attached to the jawbone which protrude through the gum tissue and serve as supports for dentures which remain permanently in the mouth.

The object of the Lewis Center research effort, conducted as part of the Ion Beam Applications Research program, is to attempt to simulate the texture and surface structure of natural teeth root by using ion beam sputtering techniques.

The titanium material samples are exposed to bombardment by kilo-electron-volt titanium ions. The ions are discharged from a thruster similar to ones developed for space satellites.

"Once a desirable surface treatment is attained, the titanium implants will be placed in dogs at a Cleveland-area hospital and the performance of the implants will be evaluated over a long period of time," explains Project Engineer Jack Weigand.

He added, "Researchers believe that tooth implants modified by ion sputtering techniques may result in long-lasting permanent dentures closely resembling the natural teeth they replace."

According to Bruce A. Banks, Head of the Small Thruster Section, titanium material is preferred for implantation because of its mechanical characteristics and compatibility with body fluids.

Surface sputtering by ion beam has demonstrated that the microscopic structure it creates closely resembles natural tooth root surface. Dental researchers feel that the duplication of this structure could result in improved performance and disease resistance of the implantable denture supports.
Inventors awards ceremony

Although Lewis is generally known for several "firsts" in space engineering programs, a "first" in the field of patents was achieved earlier this month when all Lewis inventors were honored for their contributions to NASA's patent program.

The inventors were represented by Lewis employees who had been issued patents in 1975. Center Director Dr. Bruce T. Lundin, who delivered the keynote speech at the address, also awarded plaques showing an embossed replica of the first page of their patents to the 1975 inventors.

In his talk, Dr. Lundin cited the advantages of issuing patents to the Government on inventions made by Government employees. He pointed out that Government-owned patents are valuable if and when the inventions have to be defended against lawsuits.

Another value, Dr. Lundin said, was the view expressed by President Ford that patents are a valuable natural resource and positive steps should be undertaken to have Government-owned patents used for the general public need.

Turning again to NASA inventors, he said that the NASA Patent Licensing Program has the power to grant exclusive licenses to small businesses and minority firms in areas of surplus labor in order for them to survive and compete in the marketplace.

Introductory and closing remarks were made by Lewis Patent Counsel Norman T. Musial. He stated that efforts were underway here to interest other NASA Centers in similar Inventors Day Awards Luncheons. "The overall objective is to have a NASA-wide inventors day ceremony next year and select some NASA inventors to participate in the annual National Inventors Day ceremony."
NASA Inventors’ Award is Musial’s brainchild

The second annual NASA Inventor of the Year awards were presented at an Inventor’s Day Exposition in Washington, D.C. last month. This is a program conceived by Lewis Patent Counsel Norman T. Musial.

Names of this year’s winners will be announced in the next issue of the Lewis News. The winning patents, selected by a blue ribbon panel at NASA Headquarters, were also entered in the prestigious award competition of the Association of Invention and Innovation.

Dr. James Blue was one of the 1976 finalists considered by the Headquarters panel. Dr. Blue received a patent on a method of producing Iodine 123. Persons finally selected as NASA Inventors of the Year for 1976 were Dr. Robert Tolones of Ames for his “Oblique-Wing Supersonic Aircraft” patent and Dr. Richard T. Whitcomb for his “Airfoil Shape for Flight at Subsonic Speeds.”

Locally, Lewis inventors will again be honored by a “Lewis Inventors Day Awards Luncheon” on March 29 in the Main Cafeteria small dining room. The Lewis inventors will be represented by patentees who received patents in 1976. These patentees will receive plaques showing an embossed replica of the first page of their patents from Center Director Dr. Bruce T. Lundin.

Lewis patentees of 1976 gathered at a luncheon on March 29 to recognize the Center’s contribution to NASA's patent program.

Norman T. Musial, Patent Counsel, touched on the fact that the Inventors Day Luncheon is part of an overall NASA program to provide proper recognition and incentive to inventors of the agency.

He further cited Dr. James W. Blue as one of the finalists considered for the NASA Inventor of the Year award.

Center Director Dr. Bruce T. Lundin, in his keynote address, reminded the audience, which included supervisors of the patentees, the importance of government-owned patents because of the billion dollar level of infringement claims lodged against the government.

Dr. Lundin went on to emphasize that patents obtained by the government can be used very effectively to stimulate and promote the economy.

Following his address, Dr. Lundin presented plaques to 17 patentees. The plaques have an embossed replica of the first page of the patentee's patent and serve as an appreciation from the Center for such efforts.

"With last year's objective to have a NASA Inventor of the Year ceremony now a reality, the Center looks forward to 1978 and beyond with renewed interest in NASA's patent program," Musial commented.

"Invention, strictly speaking, is little more than a new combination of those images which have been previously gathered and deposited in the memory."

—Sir J. Reynolds

"Invention, strictly speaking, is little more than a new combination of those images which have been previously gathered and deposited in the memory."

—Sir J. Reynolds

"Where we cannot invent, we may at least improve."

—Colton
"Invention, strictly speaking, is little more than a new combination of those images which have been previously gathered and deposited in the memory."

—Sir J. Reynolds

Third Annual Inventors Award Ceremony

Dr. Seymour C. Himmel addresses Lewis inventors. (Martin Brown photo)

Lewis inventors, represented by patentees of 1977, were recognized on April 18 at a luncheon given in their honor. The Inventors Day luncheon originated at Lewis two years ago. It will be duplicated at Langley for the Langley inventors in May.

Norman T. Musial, Lewis Patent Counsel, touched on the endorsement by NASA Headquarters of the Inventor of the Year Award which also was established two years ago. This year the Award was given to Clarence Cone, Jr. of Langley for his 1977 patent on controlling biological cell division which may be of great value in the search for a cancer cure.

Robert Kempf, NASA’s Assistant General Counsel for Patents, spoke of the importance of recognition as being an important incentive to inventors.

Associate Director Dr. Seymour Himmel, in his keynote address, emphasized the close partnership with the Department of Energy in the fields of gas turbines, Stirling engine, solar and wind energy and the importance of patents from these activities.

Dr. Himmel pointed out that the patents will be important in protecting the government against infringement claims, which are at a current level of a billion dollars and climbing. He went on to say that patents can be used to create businesses and aid in stimulating the economy.

Following his address, Dr. Himmel presented plaques to 32 patentees. The plaques have an embossed replica of the first page of the patentee’s patent and serve as an appreciation from the Center for such efforts.

"With the annual luncheon for NASA inventors a reality at Lewis and Langley, we look to 1979 and beyond to establish similar recognition luncheons at other Centers," Musial commented.
Take a bow

Letters of appreciation for jobs well done reach Lewis personnel through channels, with the result that only a few persons share the kudos and congratulations. Oftentimes, those who deserve the most credit spend the least amount of time seeking it. Well, the Lewis News and the Awareness Committee feel that those who truly deserve to take a bow should be recognized! Consequently, the Lewis News from time-to-time will reprint excerpts from recent letters of commendation to Lewis employees and groups from institutions or individuals. Here are some recent ones...

Spotlight on....Bruce Banks
A private citizen, Roger F. Walsh, wrote on behalf of Bruce and his work in bio-engineering, and specifically Bruce's involvement in the developing improved shunts used for hydrocephalic children. Part of his letter: "NASA does have these projects in bio-engineering areas, but this is the first time I have seen that the proper funding of these ventures is made available. Being the father of a hydrocephalic boy, I have seen him vomiting repeatedly and then lapse into semiconsciousness until he would be relieved by a surgical procedure. Mr. Banks feels that current space engineering technology can be applied to the improvement of the shunt." Note: Bruce is in the process of developing a hydrocephalic shunt project with neurosurgeons and a medical specialties company.

Spotlight on.....retiree Robert Seegert
Cleveland radio station WGAR made Bob a celebrity and saluted him with a special day in his name. Every hour on the half-hour, the station proclaimed "This is 1220/WGAR - Bob Seegert Station." Robert Sr., Gary D. Sagerman and Carl O. Ollick. Missing from the list was his brother Robert D. Reuter, but that's understandable, he is the station owner. The duo's exhibit was entitled "Protective Scales on NiCr Al Alloys" and it was awarded a first place in the Transmission Electron Micrographs Class. F.F. Simms, chairman of this year's Ceramographic Exhibit, wrote, "I wish to thank you for your participation in the exhibit and ask your continued support in the future." (Don Huebler photo)

Bandits steal crown
The Bandits are the champions of the NASA Softball League, having defeated the Hawks two out of three games in the championship playoffs. The top four teams in the league vied for the championship and finished the regular season in this order: Jets, 17-3; Polite Maintenance, 16-4; Bandits, 14-6; Hawks, 8-16. The Hawks and Bandits finished with identical 14-6 records. The champion Bandits are, front row (left to right): Carl Weegmann, Thom A. Coney, Kenneth O. Smith, Judith L. Smialek and Bruno C. Buzek. Back row (left to right): Carl Reinmann, Walt Graebner, Francis Rooker, Wilhelm Benz and Harold Sample.

Second relay set
In the Second 100-Year Relay, which will be run on Wednesday, October 18, at 5:30 pm, there will be a trophy awarded to the Most Improved team. To be eligible for this trophy, the team must consist of the same four persons who ran in the First 100-Year Relay. This trophy will be in addition to the perpetual trophy awarded to the winning Division team entry. The current holder of the perpetual trophy is the Fluid Systems Components Division which was represented by Bernie Hamrock, Lonnie Reid, Jack Reinmann and Bob Stubbs.

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Spotlight on.....James L. Smaiale and Bruno C. Buzek
The American Ceramic Society thought enough of Jim and Bruno's exhibit to include it in their Traveling and Permanent Exhibition. The duo's exhibit was entitled "Protective Al2O3 Scales on NiCr Al Alloys" and it was awarded a first place in the Transmission Electron Micrographs Class. F.F. Simms, chairman of this year's Ceramographic Exhibit, wrote, "I wish to thank you for your participation in the exhibit and ask your continued support in the future." (Don Huebler photo)

Spotlight on.....Tom Riley, Edwin Graebner, Francis Rooker, Wilhelm Benz and Harold Sample.
Johnson Space Center Director Christopher C. Crabb extolled as outstanding the "effort put forth by Lewis in the parylene coating of the remote power controllers for the Shuttle Orbiter 102. As a result of this fine effort, the Orbiter was able to successfully meet the power and testing requirements." He went on, "It is through efforts of men like these that NASA has been able to achieve its goals."

Phone never stops ringing for jobs card time person
Almost as soon as Lorene (Lori) Albergottie joined the staff about three months ago, she was handed an assignment that would directly involve every Lewis employee—permanent, temporary and those attached to the Army Propulsion Laboratory.

She is the Center's new time card coordinator and it is her responsibility to see that every employee knows enough about the long list of procedures to fill in the vital information on the cards correctly.

Lori, who has wide ranging accounting experience and education, performs other duties in the Financial Management Division, but her major responsibility now is to coordinate the job time card effort.

The new requirement for all employees to submit a job time card is aimed at identifying the different tasks at Lewis and providing management with a more accurate and complete reflection of time needed for them. A Lewis management instruction states that direct labor charges have a significant impact on the allocation of program funds.

Prior to Lewis, Lori worked at the Navy Finance Center where her duties closely paralleled the work she is doing now—working with figures.

"I went from a part-time employee working on income tax returns to full time with the government," says the mother of three with the ready smile. She had just finished eight grueling sessions helping to explain the program to time and attendance clerks and supervisors.

"The job time card program is not new. What is new is that it is now mandatory. I would urge everyone to keep their job time cards in a place where the time and attendance clerk can find them even when employees are on leave," Lori said.

Questions about the time card program, and initially there will probably be many, should be directed to Lori at PAX 8461 or PBX 5563.

BPW sponsors forum
The NASA Lewis Business and Professional Women's Club will sponsor a forum on "The Dilemma Facing the Ohio Public School System." It will feature participants from the state legislature and school boards of several western suburbs.

The admission-free forum is scheduled for October 18 at 7:30 p.m. in the Administration Building Auditorium.

Forum participants will be State Senator Jerome Stano and school board members Audrey Schmitt, Berea; Mary Ann Cavicchi, Rocky River; Richard Woollett, Strongsville; and Patricia Bahas, North Olmsted.

Senator Stano will speak on state aid for the various school systems and the tax revenues which support the school systems. School board members will give an overview of their respective school systems, including the teacher situation and school levies.

There will be a question and answer period following the discussions. Refreshments will be served following the Q&A period. Lewis employees, relatives and friends are welcome to attend. Get your free tickets now from Loretta Shaw, PAX 8356; Susan Krosel, PAX 8517; or Monica Prbish, PAX 5161.
ALERT schedules speakers through May

A newly formed ALERT Committee has announced plans to present three visiting speakers in the coming months. ALERT, meaning Alerting Lewis Employees on Relevant Topics, is a continuation of a highly successful series of lectures which ran during 1971-1976. Harold Wharton serves as chairman.

Scheduled for Thursday, March 15, is Dr. Donald F. Gibbons, Professor of Biomedical Engineering at Case Western Reserve University. His topic will be “Synthetic Human Implants – The Bio-Material Problem.”

On Wednesday, April 11, former staffer Robert “Skip” Nunamaker will return to Lewis to tell us about the results of the Pioneer-Venus program. Nunamaker is now Chief of the Space Projects Division at Ames.

Finally, on Wednesday, May 9, retired AF Colonel Walter Flint, Curator-Astronautics of the National Air and Space Museum of the Smithsonian Institute, will join us to talk about the development and operation of the museum.

Further details on each of these programs will be appearing in upcoming issues of the Lewis News.
36 scientists, engineers earn Tech Brief awards

Thirty-six Lewis scientists and engineers were recently honored for technical innovations which may find their way into the marketplace.

The recipients were presented cash awards for their technical breakthroughs which are regularly published as Tech Briefs. These circulate continuously to business and industry for possible commercial application.

Awards were presented last month in the Administration Building by Dr. Walter T. Otson, head of Technology Utilization for Lewis. Names of innovators and titles of their Tech Briefs are as follows:

Staffers vie for school board vacancies

While many Lewis employees are serving their communities as volunteer firemen, on city commissions, and in other capacities, others are running for school board vacancies in their respective communities.

Robert P. Allen, Chief, Manpower Program Branch, Personnel Division, is up for re-election to the Avon Board of Education. He has served for 13 years on the Avon school board in a variety of positions, including vice president.

How is he conducting a campaign against the seven candidates who are vying for the three openings? “I don’t have a committee to help me. I am relying on persons who know me and my reputation as a longtime member of the school board to get re-elected,” Allen said. He also plans to attend Candidates Night and certain other functions.

Leroy McCarey, personnel staffing specialist, Personnel Division, is the other known Lewis employee who is running as an incumbent.

He is campaigning to retain his seat on the Berea Board of Education. McCarey and his committee are actively campaigning in Berea, Middleburg Heights and Brook Park, the cities comprising the Berea School District, against two opponents.

McCarey was appointed to the school board last July (Continued on page 3)
Help conserve energy... turn out unnecessary lights!

In memoriam

Clifford G. Poole passed away at Southwest General Hospital of injuries suffered while working at Lewis. He was 54.

He worked as an aerospace mechanic in the Facilities Operations and Maintenance Division and had been employed at Lewis since 1962. He was a veteran of World War II, serving in the U.S. Navy from July 1943 to December 1945. He served as a deacon in his church and was active in the Masonic Order.

Mr. Poole is survived by his widow, Harriet, and son, Gary, of Brunswick, and by three brothers and five sisters.

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William J. Waters—10–3—Walsh College, Canton, Ohio

Dr. Robert T. Olson—10–4—Lakehead College, Rocky River, Ohio

Dr. Walter T. Olson—10–5—Lakehead College, Rocky River, Ohio

Dr. Neel D. Fauber—10–6—Teacher In-Service Program, Brunswick City School District, Brunswick, Ohio

Robert Friedman—10–7—Canton Regional Society of Professional Engineers, Canton, Ohio

Dr. John F. McCarthy, Jr.—10–8—Strongsville Public Library, Strongsville, Ohio

Dr. Wojciech Rostafinski—10–9—Voice of America, Washington, D.C.

Marshall W. Dietrich—10–10—Society of Automotive Engineers, Cleveland, Ohio

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Jesse L. Strickland—10–13—Cuyahoga Falls Shrine Club, Cuyahoga Falls, Ohio

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Jeffrey A. Wagner—10–12—Lake County Firefighters Association, Madison, Ohio

Annie J. Easley—10–13—Chemistry Club, University of Detroit, Detroit, Michigan

Louis R. Revnak—10–14—Trinity Marymount Alumni Association, Garfield Heights, Ohio

Oliver W. Reese—10–15—Berea Shrine Club, Berea, Ohio

Jesse L. Strickland—10–16—Cuyahoga Falls Shamrock, Cuyahoga Falls, Ohio

Oliver W. Reese—10–17—Masonic Senior Citizens Club, Lyndhurst, Ohio

June C. Szucs—10–18—Shaker Heights Senior Social Group, Shaker Heights, Ohio

Jamean L. (Jerry) Kennard—10–19—American Association of University Women, Medina, Ohio

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Letters of appreciation for jobs well done reach Lewis personnel through channels, with the result that only a few persons share the kudos and congratulations. Oftentimes, those who deserve the most credit spend the least amount of time seeking it. Well, the Lewis News and the Awareness Committee feel that those who truly deserve to take a bow should be recognized! Consequently, the Lewis News from time-to-time will reprint excerpts from recent letters of commendation to Lewis employees and groups from institutions or individuals. Here are some recent ones.

Take a bow. . . . Harold Zager and Raymond Sotos

K. Shiraiishi, project manager, Second Engineering Department of Mitsubishi Aircraft Inc., of San Angelo, Texas, was a pleased man indeed for the assistance Zager and Sotos gave during the company’s tests on the MU-300 aircraft in the Icing Research Tunnel. Wrote Shiraiishi: “We are very appreciative of the extra time you allotted us so that we could complete the tests. You and your staff worked very hard on our behalf and we thank you.”

Spotlight on. . . . Bob Walker, Sandy Kocsis, Linda Zemanek, Basil Kluchnik, Charles Noe and the entire staff of the Equipment and Supply Division.

Charles L. Wagner, Director of Supply and Equipment Management, NASA Headquarters, wrote glowing praise “for the outstanding job the division did as host of the 12th Annual Supply and Equipment Management Conference. My staff and I rank this conference as one of the most stimulating and successful ever.”

Take a bow again, Harold Zager.

Another company, Key Industries, of San Antonio, Texas, also added its thanks to Harold for the assistance and cooperation given that company during the MU-300 aircraft tests. Kenneth E. Yeoman, President, wrote: “The guidance you gave us based on your experience was invaluable and was a significant factor leading to tests of the shielded horn configuration.”

Spotlight on. . . . Bruce Banks and Albert Weigand

After Michael W. Ferralli and James B. Koeneman of Lord Corporation, Erie, Pennsylvania, visited Lewis to learn more about ion thruster technology, they wrote: “Your frank and informal explanation of both the ion thruster technology and its biomedical impact will allow us to more realistically incorporate ion beam technology to further our own research and development efforts. In particular, your suggestion to improve the ion generation system of a radial accelerator has greatly simplified our design problems in this area.”
Lewis exhibits shown at Home, Space Odyssey shows

Having fun at the Space Odyssey Show held recently at CCC's Metro Campus are Dr. John F. McCarthy's daughter and astronaut Shannon Lucid. Boy at dexterity machine is unidentified.

Sue Johnson got almost as much attention at the Home and Flower Show as the general aviation aircraft blade.

The Center's research in communications technology is explained to Home and Flower Show attendees.

The electric car got lots of notice at the Home and Flower Show.

Bruce Banks and Kathy Zona man blood pressure exhibit at Home and Flower Show.

If you did not attend either the Home and Flower Show or the Space Odyssey held in Cleveland recently, you missed some very fine exhibits extolling Lewis and the NASA agency. For those who did not attend, here are some pictures from both events. Photos by Don Huebler and Dan Laity.
Banks among 10 throughout government receiving award

Bruce A. Banks, head of the In-Space Research and Technology Section, has been selected to receive the 1980 Arthur S. Fleming Award which honors outstanding young men and women in the federal service. Banks is one of ten persons in federal service selected for the award. Five awards are given in the scientific and technical fields and five in the executive administrative fields.

The Lewis research scientist was chosen "for his outstanding achievement in developing a program applying NASA space technology for the direct benefit of mankind in biomedical devices."

Working with medical researchers, Banks produced unique micro-textured surfaces on a variety of materials used in prostheses and surgical implants.

He demonstrated that materials whose surfaces were modified by exposure to the beam of an ion thruster, originally developed for spacecraft propulsion, produced markedly different and more favorable response when implanted in body tissues.

Banks began at Lewis in 1966 in the Centaur Project Office. Later he was assigned to the Ion Physics Branch where he began research on ion thruster components for electric propulsion systems.

From 1977 to 1980, Banks' research was aimed at identifying, evaluating, developing and transferring non-propulsive applications of ion thruster technology to users. The programs he directed demonstrated that surfaces exposed to an ion thruster beam markedly improves material performance in such diverse applications as cold-welding, fluoropolymer bonding and biomedical devices.

Banks has authored or co-authored 26 publications and has 10 patents to his credit.

He earned a bachelor's degree in physics from Case Western Reserve University and a master's degree, also in physics, from the University of Missouri.

He lives in Olmsted Township with his wife, Judith, and their four children.
Lewis inventors who received patents in 1983 were honored and presented plaques at the annual Inventors Awards luncheon Apr. 30 in the dining room of the main cafeteria.

Dr. John Klineberg, deputy director of Lewis, was guest speaker and made presentations at the ceremony.

Names of patents and last names of inventors are:

"Advanced Inorganic Separators for Alkaline Batteries and Method of Making the Same"; Sheibley
"Heat Pipes Containing Alkali Metal Working Fluid" and "Thermionic Energy Converters"; Morris
"Silicon-Slurry/Aluminide Coating"; Deadmore and Young
"High Voltage V-Groove Solar Cell"; Evans, Chai and Goradia
"Ion Beam Sputter-Etched Ventricular Catheter for Hydrocephalus Shunt"; Banis
"Laser Surface Fusion of Plasma Sprayed Ceramic Turbine Seals"; Wisander and Bill
"Zirconium Carbide as an Electrocatayst for the Chromous/ Chromic"; Gahn, Reid and Yang
"Curved Film Cooling Admission Tube"; Graham and Papell
"Magnetic Heat Pumping"; Brown
"Method of Forming Oxide Coatings"; McDonald
"Piezoelectric Composite Materials"; Kiraly
"Covering Solid, Film Cooled Surfaces with a Duplex Thermal Barrier Coating"; Liebert
"Ion Sputter Textured Graphite Electrode Plates"; Curren, Forman, Sovey and Wintucky
"Additive for Zinc Electrodes"; Soltis, Sheibley and Nagle
"Lapar Supported Ring Bar Circuit" and "Gyrotron Transmitting Tube"; Kosmahl.

Lewis Patent Counsel Norman Musial was master of ceremonies and explained the Inventor of the Year Award, an agencywide program. Annually each NASA center submits one patent from that year to NASA Headquarters where one is selected for consideration in the national Inventor of the Year competition.

For 1983 a patent issued to Gerald V. Brown for Magnetic Heat Pumping was the Lewis candidate. This year, not for the first time, Lewis has one woman inventor, Margaret A. Reid, who is coinventor with Randall F. Gahn and C.Y Yang of "Zirconium Carbide as an Electrocatayst for the Chromous/ Chromic." Musial announced that the national inventor of the year is Robert Fishchell at Johns Hopkins Universities Applied Physics Laboratory.

Emphasizing the importance of obtaining patents on new devices, Dr. Klineberg said the Government often is sued for damages if we or any of our contractors infringe a patent. Nineteen Lewis employees who received patents in 1983 and inventor plaques at the luncheon are: Dean W. Sheibley, Daniel L. Deadmore, An-Ti Chai, Bruce A. Banks, Robert C. Bill, Randall F. Gahn, Margaret A. Reid, Robert W. Graham, Gerald V. Brown, Glen E. McDonald, Henry G. Kosmahl, Louis J. Kiraly, Curtis Liebert, Arthur N. Curren, Ralph Forman, James S. Sovey, Edwin G. Wintucky, S. G. Young, Ralph Forman, James S. Sovey, Edwin G. Wintucky, Daniel Soltis and William S. Nagel.


Thirteen contractor employees also were granted patents and will receive their plaques sent to them. ☐
Inventor Awards

At a Lewis Awareness Inventors Day Ceremony Program held last month, 32 Lewis inventors/patent holders who have had patents issued in 1984 were honored. Among the honorees was Lynn M. Anderson, who received the Inventor of the Year Award.

In his ceremony remarks, Center Director Andrew Stofan discussed the necessity of securing patent protections. Stofan pointed out that the defensive aspects of Government-owned patents are important because private and public corporations are working on some of the same concepts in which NASA/Lewis is interested. "If we do not secure patent protection, and someone else does, we can be sued for infringement. I am told that current infringement claims against the Government total in excess of a billion dollars."

The Center director also focused on the recent change in viewpoint from the one held years ago that espoused the use of Government-owned patents primarily for defensive purposes. But today, exemplified by the President's pronouncement of the Government Patent Policy in 1971, such patents now also constitute a valuable national resource and should be utilized positively for the general public needs.

In addition, the licensing program of NASA enables Lewis to grant exclusive licenses to small business firms, minority firms and firms in an area of surplus labor so as to provide these firms with a monopoly to aid them to survive and compete in our private enterprise system. To further this concept, Congress passed legislation effective July '81 permitting small businesses to claim first rights in inventions made under Government contracts.

"Although there have been many articles written about the patent system, both pro and con," said Stofan, "history has shown us that other than by patenting, no other satisfactory method of protecting inventions has been found.

"It is interesting to note that although NASA was formed in 1958—13 years before the President's pronouncement in '71—the sponsors of the NASA legislation recognized that valuable inventions would result from the Space Program as almost one-fourth of the NASA Space Act is devoted to patent provisions and related subject matter," Stofan said.

(Photos Continued on Page 4)
At recent Inventors Day Luncheon program award ceremonies coordinated by the Lewis Awareness Office, 32 Lab inventors who have had patents issued in 1985 were honored on behalf of all the Center inventors, including three Lewis Inventors of the Year—Randall F. Gahn and Norman H. Hagedorn of the Power Technology Division (who share a patent), and Leonard J. Westfall of the Materials Division. At the April 17 event, Chief Counsel William H. Brahms presented the inventors and Center Deputy Director John M. Klineberg offered congratulations and the award plaques and also discussed the importance of patents in providing a valuable national resource.

Pictured here are the attending Inventors Day awarded patentees.

Bruce A. Banks
James D. Cawley
Donald L. Chubb
Robert E. Cunningham
Ben T. Ebihara
David P. Fleming
Randall F. Gahn
Norman H. Hagedorn
Li Chen Hsu
Richard W. Lauver
Michael J. Mirtich
Ruth H. Pater
Warren H. Philipp
George C. Rybicki
Olga D. Gonzalez-Sanabria
Dean W. Shelbey
James L. Smialek
James S. Sovey
Stephan Stecura
Edward L. Warren
Leonard J. Westfall
Eighteen Researchers Honored At Inventors Day Awards Ceremony

Eighteen Lewis scientists and engineers, whose projects were patented in 1986, were honored at the 12th Annual Inventors’ Day Award Ceremony April 10. Acting Director Dr. John Klineberg and Chief Counsel William Brahms presented each inventor with a plaque featuring an embossed replica of the first page of his or her patent. Three of the Lewis inventors had more than one patent granted in 1986. The awards ceremony, coordinated by the Lewis Awareness Office, followed a luncheon in the small dining room.

The eighteenth researchers honored, their divisions, and the titles of their inventions are:

- **Bruce Banks**, chief, Electro-Physics Office, Power Technology Division, “Apparatus for Producing Diamondlike Carbon Flakes,” “Apparatus for Producing Oxidation Protection Coatings for Polymers,” and “Ion Beam Spotter Etching”;

- **Charles Barrett**, Materials Division, “Nickel Base Coating Alloy”;

- **Dr. Henry Brandhorst, Jr.**, chief, Power Technology Division, “Lithium Counteredoped Silicon Solar Cells”;

- **Arthur Curren**, Space Communications Division, “Textured Carbon Surfaces on Copper by Sputtering”;

- **Eliseo DiRusso**, Structures Division, “Variable Friction Secondary Seal for Face Seals”;

- **Randall Gahn**, Power Technology Division, “Method and Apparatus for Balancing a Redox Flow Cell System”;

- **Kenneth Jensen**, Test Installations Division, “Textured Carbon Surfaces on Copper by Sputtering”;

- **Dr. Henry Kosmahl**, Analytical, “Linearized Traveling Wave Amplifier with Hard Limiter Characteristics”;

- **Carl Lowell**, deputy chief, Materials Division, “Nickel Base Coating Alloy”;

- **Charalampos Marinos**, FLRT, “Heat Exchanger for Electrochemical Devices”;

- **Michael J. Mirtich, Jr.**, Power Technology Division, “Apparatus for Producing Oxidation Protection Coatings for Polymers,” “Heat Exchanger for Electrochemical Devices”; and

- **Paul Penko**, Space Propulsion Technology Division, “Heat Exchanger for Electrothermal Devices.”

In ceremonies at Headquarters in March, NASA Administrator Dr. James Fletcher presented Dr. Henry Kosmahl with a plaque, certificate, and monetary award for being NASA’s nominee for the National Inventor of the Year award sponsored by the Intellectual Property Owners, Inc. Dr. Kosmahl also received a plaque during the Lewis Inventors Day Awards ceremony.

In Appreciation...

Thank you, Lewis employees and retirees, for the extravaganza retirement party for me April 5. During my 25 years there, the “buddy system” meant so much to all of us, and was especially evident at the gala event.

All of the gifts are unique and treasures to me. They always will be. The money collected will be spent on a ring I have been admiring for years and never felt I could afford. Now I can, thanks to your generosity.

My heartfelt appreciation to all of you who made my retirement farewell such a success. The fellowship of friends, gifts, food, and beautiful decorations were very gratifying. I’ll always remember you folks and this special day. I’m proud to have been part of the NASA/NASA team.

-Jean Bily

In appreciation of the thoughtful presentation of symphony concerts by the New York Philharmonic, conducted by Maestro James Levine, at the gala event.

My special thanks to everyone at LeKC for their thoughtfulness, kindness, and concern during my recent illness. It has certainly helped me recover and feel much better.

-Sally Weiland

Many thanks for the flowers, cards, calls and visits during my hospital stay and recuperation at home. The thoughtfulness is greatly appreciated.

-Don Groesbeck

My family and I wish to thank friends and co-workers for their kind expressions of sympathy at the death of Mildred C. Hunter.

-Louise Tupper

For all my friends at Lewis, my wife Frieda and I extend our heartfelt thanks for all the gifts and the memorable retirement party.

-Jerry Weir
Newly Patented Thin-Film Coating Will Help Protect Space Station

A lightweight, flexible, thin film coating designed to protect polymers from oxidation is the most recent Lewis invention to be patented. A patent for "Oxidation Protection Coatings For Polymers" was granted May 12.

The coating was invented by Bruce Banks, chief, and Michael Mirtich, also of the Electro-Physics Office, and James Sovey, of the Space Propulsion Technology Division.

The new coating enables polymers used as thermal and structural blankets in spacecraft to retain their properties during long periods of exposure to the atomic oxygen in low-Earth orbit. The coated polymers will help ensure the durability of the Space Station.

For example, one type of polymer, polyimide, is typically used as a blanket material in solar arrays. Without protection, over years of exposure, the polymer would become so thin that it would cause the Space Station's power system to fail.

The protective coating is a molecular mixture of metal oxide and polymeric material deposited by ion beam sputtering on a clean polymer surface. The metal oxide in the coating protects the polymer by providing an already oxidized surface. The polymeric material in the coating makes the thin film flexible and resistant to cracking. The coating can be a mix of one or more metal oxides and/or polymers in a variety of ratios.

The advantage of this oxidation protection technique is that it does not substantially change the mechanical, optical, electrical, thermal, and bonding properties that make Kapton® polyimide more desirable in spacecraft design than silicon rubber or other materials.

Exchange Council Plans Improvements To Picnic Grounds

Modifications that will enable the Picnic Grounds to be used from early spring through late fall will be the first capital improvements funded by the Exchange Council with nonappropriated funds generated by the Exchange store, cafeterias, and vending machines.

Proposed modifications include a new covered picnic shelter with fireplace, a new bar and storage area, 30 gas grills, and an ice machine. The modifications are estimated to cost a total of $178,000.

Plans for the improvements to the Picnic Grounds have been developed by the Supervisors Club and were presented by Club Chairman Al Dalgleish at the May 19 meeting of the Exchange Council.

The Picnic Grounds modifications represent one part of a master plan developed by the Exchange Council's Master Plan Committee (ECMPC) in response to an ECMPC memo asking for comments on the proposed projects and additional suggestions.

"The Exchange Council Master Plan Committee did not develop the master plan based solely on the number of positive comments received about any of the recommendations," said Dr. Earls. "Funds available were critical factors in determining recommended projects."

In addition to Chairman Julian Earls, the Exchange Council Master Plan Committee included: Jerald Kennemuth, Office of Chief Counsel; Robert Fails, chief, Institutional and Program Support Office, Resources Analysis and Management Office; Dallas Lauterdale, Facilities Engineering Division; William Neff, vice-president, AFGE Local 2182; and Coulson Schoenermann, secretary, IFPTE Local 28.

The Picnic Grounds will be used from May 19 through late fall.

Exchange Council members not pictured: Julian Earls, chief, Health, Safety, and Security Division; John Gibb, manager, Facilities and Experiments Division; William Brahma, chief counsel; Paul Panasik, IFPTE Local 2182; and Coulson Schoenermann, secretary, IFPTE Local 28.
Power Technology Division employees are evaluating the performance of supervisors

The August issue of Working Smarter described how wage grade employees in the Test Installations Division are using a questionnaire to evaluate the performance of their supervisors.

Since then, researchers, secretaries, and administrative support personnel in the Power Technology Division have also been given the opportunity to evaluate their supervisors. While there are many similarities between these two subordinate appraisal programs, there are also many differences.

Initiated At Closing The Loop

The subordinate appraisal of supervisors within the Power Technology Division was first suggested last year when the Division participated in a management training session in October 1986.

In December, a committee was formed to propose such a system. The objective was to provide a mechanism that would give supervisors feedback from their employees in order to increase management effectiveness and overall Division productivity.

The committee was chaired by Bruce Banks, chief, Electro-Physics Division, and included Dr. Sheila Bailey, Dr. Patricia O'Donnell, Marla Perez-Davis, and Dr. Joseph Singer.

Before establishing basic appraisal guidelines, the committee studied literature about the concept and consulted a widely recognized expert, Dr. H. J. Berardin, a management professor at Florida Atlantic University. The committee also consulted with the Training and Development Branch, the Office of Chief Counsel, and the Computer Services Division.

Protecting Anonymity

To make sure the feedback to the branch chiefs and their deputies would be genuine and unreserved, the committee felt strongly that the forms should be submitted anonymously and tabulated by a neutral, external third party.

The committee also opted not to include open-ended questions as a means of preserving anonymity. Since branch chiefs and deputies are generally familiar with the writing styles of each employee, it's possible that a respondent could be identified by how his or her comments were phrased.

In addition, the committee recommended developing two separate appraisal forms: one for use by researchers and one for use by secretaries and other administrative support personnel.

To protect the anonymity of respondents (because there is only one per branch), the committee decided to aggregate the responses from the secretaries and other support staff.

The committee also recommended using frequency responses (i.e., Always, Usually, Sometimes, Seldom, Never) instead of a 1 to 5 scale because different numbers can mean different things to different people. A "Not Applicable" space was also included.

Developing Questions

A great deal of time, effort, and employee input went into developing the specific questions and determining how many questions should be included.

As a first step, the committee selected a list of 18 Dimensions of Managerial Performance to define the areas in which supervisors should be appraised. The list included responsibilities such as: planning, guiding subordinates, technical proficiency, persistence in reaching goals, handling crises, maintaining good working relationships, representing the organization to the public, and monitoring and controlling expenses.

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The committee felt strongly that the forms should be developed and tabulated by a neutral, external third party. Since branch chiefs and deputies are generally familiar with the writing styles of each employee, it's possible that a respondent could be identified by how his or her comments were phrased.

To protect the anonymity of respondents (because there is only one per branch), the committee decided to aggregate the responses from the secretaries and other support staff.

The committee also recommended using frequency responses (i.e., Always, Usually, Sometimes, Seldom, Never) instead of a 1 to 5 scale because different numbers can mean different things to different people. A "Not Applicable" space was also included.

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Aerospace Technology Directorate Uses PIQE Planning To Improve Organizational Effectiveness

Based on widespread employee input, four PIQE thrusts have been recommended

Bruce Banks, chief, Electro-Physics Office, Power Technology Division. Other members were: Charles Lawrence, Structures Division; Charles Raquet, Space Electronics Division; John Schubert, Space Propulsion Technology Division; and Carl Starna, chief, Environmental Durability Branch, Materials Division.

Employee Input

To gather suggestions from employees, the Aerospace Technology PIFQE Planning Committee first developed a one-page “Solicitation of Input for Productivity Improvement and Quality Enhancement Ideas.” The form asked employees to list any productivity problems or quality-related needs that could be resolved or improved by actions within the Center’s authority. Division chiefs within the Directorate sent the forms to all employees within their Divisions. The forms were then returned to the Branch chief for evaluation.

In addition to compiling all the suggestions, each Branch chief was asked to:

- Propose PIQE thrusts that Branch would be willing to support or initiate;
- Document Branch activities already being undertaken to improve productivity and quality;
- Identify Branch activities that could either be eliminated or performed by another organization to allow a more productive use of available time.

Prioritizing Thrusts

The committee then narrowed down the dozens of suggested PIQE thrusts into a more workable number. Potential PIQE thrusts were considered to be either new activities that could be undertaken, but also activities that could be eliminated or transferred.

Each committee member scored each proposed PIQE thrust on a range from 0 (“counter-productive”) to 4 (“extremely worthwhile”). The scores were tabulated to determine which ones were considered to be most worthwhile. To make sure that the priorities established by the PIQE committee accurately represented the views of a majority of Directorate employees, feedback on the highest-ranking thrusts was solicited from scientists and engineers throughout the Directorate.

The committee then re-scored the proposed thrusts—not just on the value of the proposed ideas but also on the feasibility of its implementation.

“Priorities changed considerably during this phase,” said Banks. “Some ideas that had a great deal of merit were found to be too broad and vague to quantifiably develop steps for implementation. On the other hand, some ideas that were initially viewed as of moderate value were found to be easily workable.”

PIQE Thrusts

The committee recommended four PIQE thrusts for Directorate-wide implementation. One thrust proposes providing a “safe reserve” fund that can be used during the second half of the fiscal year for purchases under $10,000. Currently, the Directorate commits all funds early in the fiscal year; consequently, researchers are told that funds aren’t available for small purchases they needed to overcome unanticipated research problems later in the year. This proposed thrust was selected because this aggravating and disruptive problem which affects a number of employees can probably be easily resolved.

Another thrust calls for rewarding those who implement and accomplish projects as well as those who “sell” them. The Aerospace Technology Directorate PIQE Planning Committee found that there is a widespread feeling within the Directorate that recognition and rewards for actually accomplishing the work should receive greater emphasis.

The PIQE Planning Committee presented its proposed thrusts to the Directorate Management Council in October. All four proposals were accepted. At this stage, the PIQE Planning Committee has completed its work.

“The Division chiefs and I have taken full personal responsibility for the follow up,” says Dr. Fordyce. “We are now developing action plans to address the selected thrusts.”

Banks is proud of the PIQE Plan that was developed: “The process involved widespread input and objective evaluations of the ideas. The end result is not a mandate from above, but an expression of changes our employees would like to see made.”
Twelve Inventors Honored At Luncheon

Twelve current or retired Lewis employees whose inventions were patented in 1987 were honored at the 13th Annual Inventors’ Day Award Ceremony, April 19 in the small dining room.

Center Director Dr. John Klineberg and Acting Chief Counsel Joseph Saggio presented each inventor with a plaque featuring a replica of the first page of his patent. The titles of the inventions and the names of the inventors honored are listed below.

- "Precision Tunable Resonant Microwave Cavity"—Shigeo Nakashima, retired; Frank Calco, Structural Systems Division; and August Scarpelli, Fabrication Support Division.
- "Oxidation Protection Coatings for Polymers"—James Sovey, Space Propulsion Technology Division; Bruce Banks, chief, and Michael Mirich, Electro-Physics Office, Power Technology Division.
- "Heat Treatment for Superalloys"—Fredric Harf, Technical Disciplines Division; and August Scarpelli, Space Experiments Division.
- "Method of Preparing Fiber Reinforced Ceramic Matrix"—Ramakrishna Bhatt, Propulsion Directorate, U.S. Army Aviation Research and Technology Activity.
- "Ion-Beam Nitriding of Steels"—Joshua Salik, retired; and Theodore Hubbell, Test Installations Division.
- "Apparatus for Mounding a Field Emission Cathode"—Ben Eltihara, Space Electronics Division; and Ralph Forman, retired.

At the Inventors’ Day ceremony, Dr. Klineberg emphasized how important it is for Lewis researchers to apply for patents. If other organizations patent technology similar to that developed here, NASA must pay for the rights to use that technology.

Eight Inventors To Share Royalties

As a result of amendments to the Technology Innovation Act, Lewis inventors have an excellent incentive to submit invention disclosures. If a patented invention is licensed for commercial use, the inventors or co-inventors may receive up to $100,000 a year in royalties for each year of the license.

NASA’s policy for distribution of royalties to inventors is included in a NASA Management Instruction issued last October that covers “Inventions Made By Employees Under NASA Administrative Jurisdiction” (NMD 3450.2B). Some of the key points of the policy are summarized below:

- For each fiscal year under each license, the inventor will receive the first $2,000 accumulated. If more than one inventor is listed on the patent, the co-inventors will share the first $2,000.
- In addition, each inventor or co-inventor will receive 20 percent of the royalties or other income in excess of the first $2,000. If there are more than five co-inventors, the amount in excess of the first $2,000 will be distributed on an equal share basis.
- The distribution of royalties or other income to any one inventor shall not exceed $100,000 per year, unless the President approves a larger amount.
- The distribution of royalties to inventors will continue regardless of any change in the inventor’s employment status.

Technical Disciplines

Suppose a project you are working on requires an expert in the design of high-speed rotating equipment. Where would you turn for help?

There are several ways you could seek such expertise, but perhaps the fastest would be to call the Technology Assessment Office. The Office has compiled a “Technical Discipline Data Base” that identifies the specific areas of expertise of 856 scientists and engineers at Lewis. Experienced in 77 technical disciplines, these scientists and engineers have listed expertise in more than 1,000 specific areas. Loretta Shaw, who coordinated the development of the data base, explains why it was initiated: “The Technology Assessment Office was formed in 1984, during a period of major reorganization at the Center. At that time, the Office determined that a method of identifying and locating the expertise at Lewis was needed.”

As a result, a questionnaire was developed and was reviewed by LESS (Lewis Engineers and Scientists Association) and the Office of Chief Counsel. The questionnaire has been sent to the Center’s 1,100 scientists and engineers twice in the past three years.

Voluntary and Confidential

In addition to asking about experience in technical disciplines and specific areas of expertise, the questionnaire asks respondents to indicate: college degrees earned, majors, and colleges or universities attended; technical society affiliations and participation on technical committees; and interest in teaching or sabbatical opportunities.

We emphasize that completing the questionnaire is strictly voluntary, and that the data will be treated confidentially, says Shaw. “The data will not be used for any type of personnel action.”

Benefits

The data base benefits not only the Center, but also the scientists and engineers who participate. “We’ve been able to notify interested staff members about sabbatical opportunities in their fields,” says Shaw. And, the Office used the data base to help the Case Western Reserve University invite physicists at Lewis to Michelson-Morley celebration activities.

The data base has also been used to provide consultants for the Space Station and can be used to select Source Evaluation Boards. To keep the data base current, a new questionnaire will be sent out early this summer.

“We are pleased that 75% of the scientists and engineers have already contributed to the data base and encourage those who haven’t to consider doing so,” says Bob Graham, chief, Technology Assessment Office.

"By keeping an up-to-date list of your specific area of expertise, we can easily let you know about some valuable professional opportunities that may be available." If you have questions about the Technical Discipline Data Base and how it can be used, call the Technology Assessment Office (3-5828).
Banks, Shaltens Win Tech Transfer Awards

Bruce Banks, chief of the Electro-Physics Office, and Richard Shaltens, a project manager in the Stirling Technology Branch, were among 30 Federal employees nationwide selected to receive Awards for Excellence in Technology Transfer from the Federal Laboratory Consortium (FLC).

The Federal Laboratory Consortium is a network of more than 300 federal laboratories that was formed in 1974 to help transfer federally developed technology to the public and private sectors. Each laboratory that belongs to the FLC may nominate two employees each year to compete for the 30 awards. Banks and Shaltens were nominated by the Center's FLC representative, the Technology Utilization Office, and received the awards May 17 in Washington, DC.

Banks won the award for his work in promoting the use of intercalated graphite composites by industry. Graphite fiber composites are used in a variety of products from aircraft components to sports gear. Intercalation, a process that inserts “foreign” molecules into the graphite crystal structure, can improve the electrical conductivity of those fibers.

Banks led a team of scientists in solving technical problems associated with intercalation and addressed such commercial issues as scaling up production quantities, identifying new and existing products that could be improved through the application of this new technology, and building and testing prototype products.

Shaltens was recognized for his efforts to transfer NASA-DOE Stirling engine technology to the automotive industry. Since the late 1970s, NASA has been interested in Stirling technology for space power applications. DOE-funded research into automotive Stirling technology has meshed well with NASA’s long-range space power objectives. The overall goal of the automotive program is to develop a cost-competitive, multifuel power plant with reduced emissions (without a catalytic converter), and improved fuel economy without a decrease in performance.

To respond to skeptics who say the performance data gathered under ideal laboratory conditions doesn’t reflect the real world, Shaltens planned a demonstration program in which Stirling-powered commercial vehicles are being driven by non-technical personnel. For example, a Stirling-powered pick-up truck has been in operation in regular service at various Air Force bases throughout the United States. And, a Stirling-powered postal van is being prepared for daily operation on a postal route in the northern Virginia area.
Curiosity led to invention of better trap

By JOHN FRESH

People often talk about the better mousetrap, but few actually build one.

Bruce Banks, chief of electro-physiology at NASA's Lewis Research Center, was intrigued by those who actually do build traps. He decided to avoid the snare, Banks left a standard trap. But the device to an overhead wooden frame that held a ball faces of materials. The process may be used to protect

"I had to come up with a new way to skin a cat, so to speak."

— Bruce Banks

Bruce Banks and his better mousetrap. "I'm not smarter than anyone else, but I'm a lot more determined," says the Olmsted Township inventor, who has 24 patents under his name for his inventions.

What U.S.-Japan agreement says

■ MORE BEEF FOR JAPAN: Japanese market for imported beef will have been raised from 2% of total beef sales per year, to 7%, in 1996.

■ LESS INTERFERENCE: Japanese's livestock industry protection, which competes with beef imports, will end its role in beef imports by 1991.

■ LOWER 1.5% SUBSIDIES: Beef expenditures will remain near their current level of 32% until 1990, but then, Japan will sell a temporary tariff on American beef of 2-3% in 1991-95, In 1996, the tariff will be reduced to 1.5%.

■ MORE ORANGES FOR JAPAN: Market access for fresh oranges will be expanded by Japan by 1990, and increased by 1995. This import of fresh —

- Bed quantities, at current tariff rates, will be reduced to 5% in 1990, and 10% in 1991-95. In 1996, the tariff will be reduced to 1.5%.

■ MORE CASHEW NUTS FOR JAPAN: Market access for fresh cashews will be expanded by Japan by 1990, and increased by 1995. This import of fresh cashews will be permitted at current tariff rates of 15% to 30%.

■ MORE O.J. FOR JAPAN: Market access for orange juice concentrates will be included in the agreement, from 0.25% in 1997 to 0.25% in 1991-95. Imports of orange juice will be permitted at current tariff rates of 25% to 30%.

■ LOWER SUBCHARGES: For other foods, reductions in the current 5% surcharge on beef will be included in the agreement.

■ More of America's concerns: beef, wheat, rice, meat, dairy products, and processed foods, such as vinegar and wine, will be reduced to 15% by 1995. The process would be used to protect the space shuttle's solar power cells from the damage
Silicon shunts for the brain

Bruce Banks has patented a shunt, tube, used to drain excess fluid in the brains of persons with hydrocephalus.

Dura mater... Pia mater... Arachnoid space... Subarachnoid space

A cross-section of facial tube, 1/4 inch in diameter, is planned by even smaller spouts, into the walls of which four strands of hair. With thousands of such tubes in each shunt, there is less danger of clogging than with previous designs.

Invent

**FROM 19-0**

For the third quarter of 1986, Silicon Shunt Inc. reported a 7% rise in earnings to $1 million, or 77 cents per share, on revenue of $13 million. The company produces a shunt for treating patients with hydrocephalus. The shunts are inserted into the brain and drain excess fluid.

**50%**

For the calendar year 1986, Silicon Shunt Inc. reported a 50% increase in earnings to $1 million on revenue of $6 million. The company plans to expand its production facilities to meet demand.

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**SHORT-TERM T-BILL INTEREST RATES RISE** (AP/GT)

The Federal Reserve Department said that interest rates on short-term Treasury securities rose for the fifth consecutive week.

The Treasury Department said that interest rates on short-term Treasury securities rose for the fifth consecutive week. The three-month bill rate rose to 6.82%, up from 6.80% the previous week. The one-month bill rate rose to 6.80%, up from 6.78%.

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Write a letter to the bank that says you will make the payment on time.

The rate for the conventional loan, which many banks use to ensure that customers will make their payments on time, is 9.5% for the first year and 10% for the second year. The rate for the conventional loan is 9.5% for the first year and 10% for the second year.

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Chief Of Electro-Physics Office Receives Award For Excellence

Bruce Banks, chief of the electro-physics office, has received the Award for Excellence in Technology Transfer from the Federal Laboratory Consortium. He was honored "for his efforts to transfer intercalated graphite fiber technology to private industry and develop new commercial products using this material."

Banks led a team of scientists that solved technical problems associated with intercalation and investigated commercial issues such as scaling up production quantities, identifying new and existing products that could be improved through the application of this new technology, and building and testing prototype products.

The electro-physics office studies space power materials, surfaces, and coatings.
Researchers in the Power Technology Division watched the STS-32 mission of Columbia with great interest and excitement. In addition to having three experiments aboard the Long Duration Exposure Facility (LDEF) retrieved by the Columbia crew (see page 4), the Power Technology Division also had an experiment flown aboard the orbiter, which was launched Jan. 9.

Bruce Banks, chief of the Electro-Physics Branch, said Lewis was invited in September to submit samples for exposure to the space environment. He jumped at the chance and assembled a team that prepared the experiment within a two-week deadline. The team included Sharon Rutledge, Kim de Groh, and Curtis Stidham, with the support of students from Cleveland State University. For de Groh and Stidham, it was their first experiment to be flown aboard the shuttle.

The experiment tested 10 specimens, including state-of-the-art atomic oxygen protective coatings. The coatings are designed to protect solar arrays and solar concentrator surfaces on Space Station Freedom from degradation by the space environment. The specimens were flown in a sample holder in Columbia’s cargo bay and were exposed to the space environment while the cargo bay was opened to be cleaned by the environmental atomic oxygen before the LDEF was retrieved. The results of the experiment will: 1) help determine the effects of the space environment on the most recently developed protective coatings; and 2) help verify the accuracy of ground-based studies of the durability of solar array blankets considered for use on Space Station Freedom.
Lewis Experimenters Eagerly Await Return Of LDEF

One of the highlights of the STS-32 mission was the successful recovery of the Long Duration Exposure Facility (LDEF). Placed in orbit in April 1984, the LDEF is a critically important spacecraft designed to test the performance of spacecraft materials, components, and systems that have been exposed to the space environment for a long time. The unprecedented data gathered by the LDEF will be invaluable in the design of future spacecraft, including Space Station Freedom.

When the LDEF is returned to Kennedy Space Center (KSC) in February, several Lewis researchers will be eagerly waiting to examine it. Michael Mirtich and Bruce Banks, of the Power Technology Division, are responsible for the Ion-Beam-Textured and Coated Surfaces Experiment. Their experiment, which has since been assigned to Dr. David Brinker of the Power Technology Division, was primarily designed to evaluate the performance of 136 different designs of advanced and conventional solar cells.

Another Lewis-originated LDEF experiment is The Advanced Photovoltaic Experiment, initiated by Dr. Henry Brandhorst and America "Moe" Forestieri. The experiment, which has been exposed to the space environment for a long period of time and return the experiments to Earth, was delivered to its orbit April 7, 1984 by Space Shuttle Challenger (above). Roughly the size of a small schoolbus, the LDEF was retrieved Jan. 12 by the crew of STS-32 aboard Columbia.

Lewis researchers played key roles in three of the 57 experiments carried aboard the LDEF. One of the Lewis experiments, The Advanced Photovoltaic Experiment, appears as the dark, solid black panel in the center of the top row of the LDEF. Another Lewis-designed thermal coatings and performance of 36 Lewis-designed thermal coatings and materials, including coatings used on solar array blankets for Space Station Freedom.

Mirtich notes that because of the orientation of the LDEF and strategic placement of each experiment aboard the spacecraft, researchers will, for the first time, be able to study the directionality of the micrometeoroids, space debris, atomic oxygen, and other elements of the space environment. When the LDEF is returned this year and be destroyed. To preserve the extremely valuable data gathered by the LDEF, NASA jiggled the shuttle flight schedule to retrieve the LDEF as soon as possible.

In February, the Lewis experimenters will examine their experiment trays before they are removed from the LDEF and shipped back to Lewis. As members of LDEF special investigating groups, Banks and Mirtich had briefed the Columbia astronauts about what effects to look for during their in-space inspection of the LDEF. The LDEF is one of NASA's most important space experiments," says Mirtich. "The synergism of all the elements of the space environment is virtually impossible to duplicate on Earth."
Lewis Employees Named OAI Adjunct Faculty

Sixty-one Lewis scientists and engineers have been appointed adjunct faculty members of the Ohio Aerospace Institute (OAI). In this role, they may be asked to mentor graduate students, serve on graduate thesis committees, and contribute to OAI's academic offerings.

And, 200 instructors from the nine Ohio universities that belong to the OAI consortium have been named collateral faculty. In addition to mentoring students and teaching, they will write proposals for research.

The selection of faculty represents a major milestone in the development of the OAI which was incorporated in 1989 to provide new opportunities for graduate and continuing education, collaborative aerospace research, and technology transfer. The OAI is operated by consortium that includes Lewis, the Air Force Wright Research and Development Center, regional aerospace and high-technology industries, and nine universities. The universities are: Case Western Reserve, Cleveland State, Ohio, Ohio State, and Wright State Universities and the Universities of Dayton, Akron, Cincinnati, and Toledo.

Special Assistant to the Director Bill Brainard, who laid much of the groundwork for the OAI, said, “We are pleased that so many outstanding Lewis scientists and engineers will be assisting the OAI. They will do a tremendous job in helping graduate students receive the very finest education possible in the aerospace field.”

Get On The “Bond” Wagon!

The 1990 U.S. Savings Bond Campaign Ends June 1

Good news! All employees who increase their current Bond allotments or initiate new Savings Bond allotments during the U.S. Savings Bond campaign May 21 through June 1 will be eligible for a special drawing in June. Four $100 bonds will be awarded as well as five pairs of Cleveland Indians tickets.

According to Savings Bond Campaign Manager Linda Little, the drawing provides an extra incentive to help the Center increase its participation rate of 21 percent. NASA Administrator Richard Truly has set a challenging NASA-wide goal of 45 percent participation rate for the 1990 U.S. Savings Bond campaign.

U.S. Savings Bonds are convenient, safe, and offer competitive market-based rates. An added benefit of this year’s campaign is the tax-free savings bond that may be used for higher education.

Contact your Division or area bond representative now and sign up for payroll deduction plan. It’s an easy way to build a more secure future for you and for America.

U.S. Savings Bonds
“The Main Street Of The American Dream”
Dr. Klineberg To Lead Goddard

Center Director Dr. John Klineberg has announced that he will leave Lewis to become Director of Goddard Space Flight Center (GSFC) on July 1. NASA Administrator Richard Truly has asked Dr. Klineberg to succeed current GSFC Director Dr. John Townsend who is retiring June 30.

Dr. Klineberg has been named to succeed Dr. Klineberg as Lewis Center Director. In announcing the appointments, Truly said, "We are fortunate to have a man of Dr. Klineberg's experience and ability to take on this challenging assignment." GSFC, which is roughly twice as large as Lewis, is at the heart of many of NASA's science programs, including the Hubble Space Telescope, Cosmic Background Explorer (COBE), Gamma Ray Observatory, Upper Atmosphere Research Satellite, and NASA's new Earth Observing System.

Truly also praised Ross, saying his deep management experience at Lewis will help him meet the exciting challenges ahead.

In a brief message broadcast on the LINK system April 9, Dr. Klineberg said, "I leave with much sadness because I am so fond of the many wonderful people I work with here. But I leave you in good hands and with a strong Center. And I leave with a sense of pride that others have recognized what we have accomplished!"

At a press conference later that day, Dr. Klineberg noted the Center's outstanding management team, employees, programs, and involvement in the community. He cited the Ohio Aerospace Institute and outreach programs to area schools as examples of how Lewis is actively transferring technology and preparing more students for careers in science.

Precious Cargo: After nearly six years in space, the Advanced Photovoltaic Experiment was returned to Lewis March 14. The experiment was one of two Lewis-led experiments carried aboard the Long Duration Exposure Facility that was deployed by the orbiter Challenger in April 1984 and retrieved by the orbiter Columbia in January of this year. Shown here (left to right) Roy Coe of the Aircraft Maintenance Branch, Jeff Cook of MSI, and Principal Investigator David Brinker of the Power Technology Division prepare to unload the crate containing the experiment package from NASA 5. The plane arrived from Kennedy Space Center where Dr. Brinker and Dennis Flood, chief of the Photovoltaic Branch, had inspected the experiment before it was prepared for shipping.

The other experiment led by Lewis investigators, the Ion-Beam Textured and Coated Surfaces Experiment, was also returned to the Center in March. That experiment was conducted by Bruce Banks, chief of the Electro-Physics Branch, and Michael Mirtich, Power Technology Division.

Three Events Planned For Secretaries Week

The Annual Secretarial/Clerical Awards Breakfast, sponsored by the S3, will be held at 8:30 a.m., Fri., April 27 in the main cafeteria. Louise Hunt, Dr. Klineberg's executive assistant, will be the guest speaker. The ten winners of the Secretarial/Clerical Awards will be announced at this event.

Tickets for the awards Breakfast cost $3.00 per person and may be purchased April 17 and 18 in the DEB, ERB, and main cafeterias between 11 a.m. and 1 p.m. Tickets are limited and will be sold on a first-come, first-served basis.

-Nancy Horansky
Lewis Honor Awards Recognize Excellence

The Honor Awards are NASA's highest medals for excellence in science, engineering, service, and leadership. Fifty-three Lewis employees were presented medals during the June 9 ceremony. Richard H. Petersen, associate administrator for Aeronautics and Space Technology, was the guest speaker.

Dr. David J. Pofel, director of Technical Services: For progressive leadership of a large, diverse directorate that provides outstanding support services to meet the continuing evolution of research and institutional needs of the Center.

James F. DePauw, chief, Photovoltaic Division, Space Station Freedom Freedom electrical power system.

Bruce A. Banks, chief, Electro-Physics Branch, Power Technology Division: For outstanding contributions to the development of durable materials for space power systems and exceptional leadership in transferring this technology for use in terrestrial applications.

Noel B. Sargent, electrical engineer. Electronic and Control Systems Division: For improving the safety of aircraft and NASA space flight through exceptional engineering contributions to the field of Electromagnetic Interference/Electromagnetic Compatibility.

Exceptional Scientific Achievement Medal

James A. DiCarlo, deputy chief, Ceramics Branch, Materials Division: For outstanding scientific and technical leadership of efforts to evaluate, understand, and improve the deformation, fracture, and reliability of high-temperature ceramic fibers and structural composites.

Nathan S. Jacobson, research engineer, Materials Division: For key contributions toward understanding the environmental durability of ceramic and ceramic matrix composites.

Exceptional Engineering Achievement Medal

Dr. Meng-Sing Liou, senior scientist, Interna- tional Fluid Dynamic Division: For internationally recognized achievements in the development of advanced numerical techniques in computational fluid dynamics.

John Johnson, spacecraft engineer/ EEO counselor, Inter- disciplinary Technology Office: For outstanding contribu- tions as the lead Equal Employment Opportunity Counselor at Lewis.

Thomas W. Bologas, electrician, Test installations Division: For outstanding technical contributions and personal dedication in the design and installation of electrical systems for research facilities.

James R. Coy, research laboratory mechanic, Test Installations Division: For exceptional service in the installation of the Short Take-Off/Vertical Landing (STOVL) model for hot gas ingestion studies in the 9X15 wind tunnel.

William G. Darby, research laboratory mechanic, Test Installations Division: For innovative contributions to the assembly, installation, and modification of the Large-Scale, Low-Speed Centrifugal Compressor.

Group Achievement Award

Area Safety Committee Chairpersons Space Shuttle Main Engine Durability Team

40-Year Service Recognition

Gordon Allen, Richard Burley, Robert Collins, Arthur Curren, Americo DePauw, Jon Jacob, James R. Coy, George Seasholtz, and Andrew Seasholtz.

50-Year Service Recognition

Helen Monroe (45) 
W. Charles Noe (50)

Exceptional Achievement Medal

Thomas W. Bologas, electrician, Test Installations Division: For outstanding technical contributions and personal dedication in the design and installation of electrical systems for research facilities.

James R. Coy, research laboratory mechanic, Test Installations Division: For exceptional service in the installation of the Short Take-Off/Vertical Landing (STOVL) model for hot gas ingestion studies in the 9X15 wind tunnel.

William G. Darby, research laboratory mechanic, Test Installations Division: For innovative contributions to the assembly, installation, and modification of the Large-Scale, Low-Speed Centrifugal Compressor.

45-And 50-Year Service Recognition

W. Charles Noe (50)

Don’t Recycle The Lewis News

Although we previously en- couraged the recycling of the Lewis News, we have been in- formed that our Center’s recy- cling program does not include the glossy paper on which the Lewis News is printed. Please discontinue putting issues in recycling bins.

Development Program Workshop: A development program workshop will be held June 23 at 1 p.m. in the Ad. Building Auditorium. Representatives from the training branch and a panel of past participants will be available to answer your questions regarding Agency-wide Development Programs. This workshop is sponsored by the Women’s Advisory Group.

For more information, please contact Catherine Peddie at 3-6545.

Savings Bond Winners: Marvin Jacobs, Janet Sortor, and Ron Zurawski are the three recipi- ents of a $100 Savings Bond picked at random from correctly completed Savings Bond Puzzle entries at the Savings Bond Open House on May 11. Re- member, your ability to begin purchasing Savings Bonds through payroll deduction never ends.

Lewis Little Folks Fund-raiser: Mark your calendars now for the Lewis Little Folks Annual Fund-raiser Luncheon to be held Tues., Aug. 18, 1992, from 11 a.m. to 1 p.m. More details to come soon.

Lewis Disinguished Publication Award

Dr. Richard Seasholtz, Instrumenta- tion and Control Technology Division; Dr. Steven Schneider, Space Propulsion Technology Division; and Frank Zupanc, Space Propulsion Technology Division, were recently named as recipients of the 1991 Lewis Distinguised Publication Award in velocity based on the scattering of laser light from mol- ecules. These mea- surements are used to verify the accuracy of computer codes used to predict the performance of new rocket designs.

News Notes

Dr. Richard G. Seasholtz, senior research engineer, Instrumentation and Control Technology Division. For pioneering research and development of advanced optical measurement systems for use in aeropropulsion research.

Dr. James Van Fossen, Jr., Inter- nal Fluid Mechanics Division: For combining creative research and outstanding engineering problem-solving skills to overcome key technical challenges in propulsion heat transfer.

Raymond D. Vannucci, senior materials engineer, Polymers Branch. For significant achievements in the development of high-temperature polymer matrix composites.

Jerry R. Wood, deputy chief, Turbomachinery Flow Physics Branch: For internationally recog- nized engineering achievements in the adaptation of advanced computational fluid dynamics computer codes to the design and analysis of turbomachinery.

Dr. Steven Schneider, Space Propulsion Technology Division; and Frank Zupanc, Space Propulsion Technology Division, were recently named as recipients of the 1991 Lewis Distinguised Publication Award in velocity based on the scattering of laser light from mol- ecules. These mea- surements are used to verify the accuracy of computer codes used to predict the performance of new rocket designs.
STs-46 Focus:
High-Tech Material

Exotic high-tech materials that may one day find use on tomorrow’s spacecraft will be flying aboard the Space Shuttle Atlantis (STS-46), a six-day mission scheduled for late July. Lewis engineers will be testing 200 different materials designed to withstand the rigors of ultraviolet radiation and the atomic oxygen environment of low-Earth orbit, 300 miles above the Earth.

Dubbed the “Evaluation of Oxygen Interactions With Material (EOIM-III) Experiment,” the purpose of the experiment is to enable engineers to make long-range predictions for Space Station Freedom’s performance and to evaluate materials for use in the SP-100 Program, a developing space nuclear reactor power system.

According to Bruce Banks, chief of the Electro-Physics Branch at Lewis, “Earlier materials experiments we have flown on shuttle missions have shown that many materials degrade substantially in a xreactive atomic oxygen atmosphere. Some materials, in time, actually vanish, while others become brittle, tarnish, or oxidize.” Small samples of materials will be carried in Atlantis’ cargo bay and exposed to 48 to 72 hours of the space environment. Sample materials include metals, metal oxides, polymers, composites, and even diamond, which are thought to be atomic-oxygen resistant. When the shuttle returns to Earth, the samples will be evaluated and analyzed.

In addition to NASA, the European, Canadian, and Japanese space agencies are participating in EOIM-III, which is managed by Johnson Space Center in Houston, TX.

Engineers are also providing a special protective coating, developed and patented by Lewis. The coating is an integral part of the retrieval system for the European Space Agency’s Eureka Spacecraft (EUREKA-A-1), which will be deployed from STS-46 and later retrieved. The EUREKA-1 mission focuses on research in the field of material and life sciences and radiobiology.

Continued on page four
Employees recognized for special achievement

July-September 1992

AST RECOGNITION AWARDS
(FRA)

0100 Multy, Mary Anne
1130 Cosari, Antonio
1340 Schwartz, Melva
1510 Horton, Nancy K.
1520 Lisy, Robert P.
1570 Rogers, Jean
1570 Spicer, Thomas
1580 Medzi, Doreen
1580 Pehotsky, Dennis D.
1590 Schultz, Jon C.
2630 Poinnett, Philip E.
2630 Hippensteele, Steven A.
2710 McDermott, Marie
2740 Carboni, Jeanne D.
2740 Linn, David
2750 Esker, Barbara S.
4110 Espinosa, William D.
4130 Culley, Dennis E.
4330 Petarca, David A.
5100 Getz, Jody C.
5320 Whalen, Margaret
5320 Zurasaki, R. I.
5320 Jankovsky, Robert S.
5350 Zweckler, Joseph G.
6000 Hack, Kurt J.
6710 Thompson, Robert L.
6820 Daddisloki, Leonard A.
6820 Gefert, Leon P.
6830 George, Jeffrey A.
7440 Wagner, James D.
7440 Kmieciak, Frank L.
7450 Beck, Phillip M.
7610 Krivanski, Thomas M.
7630 Krause, David L.
7650 Egbert, Lloyd G.
7650 Gandy, James F.
8620 Richter, Carl W.
8810 Kopasakis, George

SPECIAL ACT OR SERVICE AWARDS (SAS)

SAS 0351 Kacmar, Raymond
SAS 2780 Woods, Joanna M.
SAS 5100 O'Donnell, Gloria J.
SAS 5120 Cabi, Timothy P.
SAS 5170 Halloran, John T.
SAS 5230 Rohr, Douglas A.
SAS 5430 Kamkam, Mark D.
SAS 5430 Baumann, Eric D.
SAS 5480 Banks, Bruce A.
SAS 6400 Doherty, Michael P.
SAS 6400 Poescuk, Keith M.
SAS 6400 Pischel, Aurius
SAS 6510 Stoklich, Edward G.
SAS 6510 Wikler, Joseph L.
SAS 6710 Thompson, Robert L.
SAS 6720 Jacobson, Thomas P.
SAS 6720 Pline, Alexander D.
SAS 6720 Lauver, Richard W.
SAS 6780 Wald, Larry W.
SAS 6780 Szansiuk, Andrew J.
SAS 6800 Lewis, Patricia A.
SAS 6810 Carney, Michael J.
SAS 6820 Meyer, Shari L.
SAS 6840 Cataldo, Robert L.
SAS 6850 Black, Stephanie J.
SAS 7200 Robinson, Nazzetta W.
SAS 7202 Wolfe, Alan R.
SAS 7230 Cmanik, Thomas
SAS 7230 Bevacqua, Philip A.
SAS 7230 Sobolewski, Ronald J.
SAS 7230 Wniesiecki, Joseph S.
SAS 7230 Flais, Richard M.
SAS 7230 Faltott, Ralph
SAS 7230 Rapchock, John J.
SAS 7230 Nealen, Donald R.
SAS 7230 Arida, Wade T.
SAS 7230 Zaldana, Antonio R.
SAS 7230 Brusk, Kevin D.
SAS 7240 Schuerger, Jack D.
SAS 7240 Hill, Jerry W.
SAS 7250 Lilly, David R.
SAS 7250 Green, Eli
SAS 7250 Stephenson, Barry
SAS 7250 Oettleck, Carl A.
SAS 7250 Schooner, Clifford H.
SAS 7260 Frimer, Ronald C.
SAS 7260 Pennington, Charles D.
SAS 7260 Maschak, Louis
SAS 7280 Naugle, Clifford R.
SAS 7280 Nickel, James R.
SAS 7280 Rivera, Ricky N.
SAS 7290 Geil, Robert F.
SAS 7290 Chapek, Richard M.
SAS 8500 Brincker, Sandra A.

SUSTAINED SUPERIOR PERFORMANCE AWARDS (SSP)

SSP 0130 Adamczysz, John J.
SSP 2703 Bailey, M. Murray
SSP 2740 Wong, Kin
SSP 2740 Hammert, Darcie

(continued on page 6)
Lewis technology improves sunglass lens quality

(continued from page 3)

marketed under the name Diamond-Hard, have scratch-resistant lenses that are coated by a process derived from Lewis technology.

Current Lewis efforts have focused on developing improved transparency DLC films using dual beam deposition processes. If extremely clear and hard coatings can be deposited, Diamonex, Inc. would utilize the process to produce protective and anti-reflective coatings for prescription eyeglass lenses.

"The fact that Lewis DLC technology is now being used to produce a commercial product is a tribute to the unwavering commitment of people such as Mike Mirtich and the support of Mike Kussmaul," noted Bruce Banks, chief of the Electro-Physics Branch. ♦
Team recognized in Hubble telescope repair effort

TWO weeks after the December 1993 servicing mission that corrected the Hubble Space Telescope's mechanical and electronic problems, a team of Lewis employees were recognized for their contribution to this successful mission.

The team was challenged with the task of evaluating various protective coatings as well as unprotected surfaces to be used in the repair of the telescope’s vibration prone solar panels.

In December 1992, Goddard and the European Space Agency (ESA) approached Lewis' Electro-Physics Branch for help in the evaluation of various thermal shield materials to be used on the telescope. Confidently accepting this task, Bruce Banks, chief of the Electro-Physics Branch, brought together five branch employees with expertise in thermal shield materials. Working under an intense six-month schedule, the Thermal Shield Durability Evaluation Team was challenged with the task of evaluating various protective coatings as well as unprotected surfaces for use with the solar array bistem to be installed on the telescope during the December servicing mission.

(continued on page 4)
Lewis contributes to success of Hubble repair mission

(continued from page 3)
Extremely careful sample handling and environmental simulation control was necessary to properly evaluate the low Earth orbital durability of the candidate thermal shield materials. According to Banks, the evaluation required a special fixturing to be designed and installed in the Electro-Physics Branch steady-state vacuum ultraviolet (VUV) and atomic oxygen/VUV exposure facilities.

"The team included personnel from the TID, Photo Lab, and Cleveland State University.

As a direct result of the team’s intensive efforts, coating failures were observed, which had not been seen by the European Space Agency or Goddard, that would have caused significant risk to the performance of the Hubble Space Telescope after installation of the thermal shields. At the conclusion of the evaluation, an uncoated thermal shield proved to be the most reliable and durable and was adopted for the Hubble Space Telescope servicing mission.

"The team demonstrated a high level of teamwork with outstanding efforts to provide the customer with the information they needed in a timely and responsible manner," Banks explained. "The team also interacted successfully with the customer, developing a relationship that brought a high level of respect for the caliber and commitment of Lewis personnel."
Educational outreach encourages tomorrow's engineers

(continued from page 3)

... engineers who volunteered to visit schools.

"The number of local schools visited, as well as the number of participating Lewis engineers, has grown significantly in the past two years," said Nyerges. "In 1991, we visited 8 schools; in 1992, 97; in 1993, 107; in 1994, more than 130, at all levels from elementary to high school."

In January, Nyerges and Budd sponsor on-site workshops tailored toward NEW classroom speakers. The workshops introduce speakers to the array of educational material available from the national NEW as well as local NASA Lewis resources, and finalize logistics in assigned schools.

A banquet culminates the week-long celebration and brings together Cleveland area engineers and their families, students, and educational personnel for an awards program honoring winners of the NEW events (e.g., college egg drop contest), as well as outstanding engineers of the year in several categories. Lewis was recognized for its NEW contributions.

Ken Bowersox, astronaut and shuttle pilot for STS-61, the December '93 mission that repaired the Hubble Space Telescope, served as this year's banquet speaker.

"We believe the contributions and presence of Lewis in this community and educational event have bolstered the activity's growing popularity in the Cleveland area," said Nyerges. "Continued development of Lewis involvement is expected in coming years as it is an important educational and professional outreach program that also demonstrates the Lewis mission and story."

Added Budd, "We're grateful for the outstanding support of this effort by our Lewis engineering and science classroom speakers. They provide the personal 'spark' of interest."
Lewis NEWS

Lewis develops technique for state-of-the-art restorations

By Kristin K. Wilson

LEWIS, in concert with the Cleveland Museum of Art, has developed a varnish (lacquer) removal technique that will enable museums and art collectors to more safely restore paintings. This non-contact method is less harsh than traditional methods, which not only remove varnish but often remove paint pigments and cause paint to swell.

Lewis’ Technology Utilization Office began investigating varnish removal techniques after discussing conservation needs with the Cleveland Museum of Art. Over the years, the museum’s conservation department encountered numerous varnishes that could not be safely removed using traditional solvents and was eager to investigate new alternatives.

“Most artists before the Impressionists intentionally varnished their paintings to protect them and make the colors appear richer,” explained Cleveland Museum of Art’s Chief Conservator Bruce Christman. “As varnish ages it tends to yellow, causing the painting to lose its perception of depth. Restoration typically involves removing the varnish with organic solvents, which may cause swelling or leaching of the paint layers. We began working with Lewis to develop a new method of restoration to use on varnishes that cannot be removed using conventional methods.”

A Lewis team experimented with a thermal energy atomic oxygen plasma, originally developed to simulate the space environment in low Earth orbit, and discovered that it easily removed organic materials from paint and painted canvas samples.

“The oxygen atoms and ions in the thermal energy plasma chemically react with the surface and remove any organic material present,” explained Sharon Rutledge, Electro-Physics Branch. “Atomic oxygen will not react with oxides, so most paint pigments won’t be affected by the reaction.” For paintings containing organic pigments, the exposure can be carefully timed to stop the removal short of the pigment.

According to Rutledge, tests of the atomic oxygen method on a painted canvas test sample and color samples from the museum show great promise. “The lacquer was easily removed from all the samples and no noticeable change in appearance was observed after the fresh lacquer was applied,” she said. “Most importantly, there was no removal or disturbance of the paint pigment on the surface.”

The atomic oxygen varnish removal technique is less harsh than traditional methods, which not only remove varnish but often remove paint pigments and cause paint to swell.

With the development of the atomic oxygen technique, Lewis is discussing collaborative activities with the conservation department at New York University’s Institute of Fine Arts to restore a Monet painting damaged in a fire in the 1950s. Lewis is also pursuing partnerships with the Smithsonian Institute Analytical Laboratory and Buffalo State College’s Conservation Department to restore other paintings damaged by smoke and fire.

“This is another good example of how technology developed for space applications can have great potential for applications in areas that are often seemingly unrelated to aerospace technology,” commented Bruce Banks, chief of the Electro-Physics Branch. “Such unique applications serve as a reminder to us that we should always keep our eyes open to diverse opportunities for utilizing technology, which may on the surface appear only relevant to space applications.”

Portions of this article were written by Maria Thomas, GLTeC.
Recognizing outstanding achievement

Lewis employees receive 1996 Honor Awards

On June 12, Center Director Donald Campell and NASA Acting Deputy Administrator General John Dailey presented plaques and medals to 275 Lewis employees for their outstanding contributions.

Forty-Year Service Awards

Presented to Charles A. Barrett, Environmental Durability Branch; Charles W. Slaughter, Fabrication Support Division; Victor G. Weizer, Photovoltaic Branch; and Harold D. Wharton, Office of the Comptroller.

Distinguished Publication Award

Presented to G. James Van Fossen, Jr., Robert J. Simoneau, and Chan Y. Ching in recognition of the excellence and value of their publication titled, "Influence of Turbulence Parameters, Reynolds Number, and Body Shape on Stagnation-Region Heat Transfer."

Abe Silverstein Medal for Outstanding Research Leading to Practical Applications

Presented to David J. Larkin for his contribution and leadership in crystal growth for NASA Lewis' high temperature electronics and integrated sensors program.

Steven V. Szabo Award for Engineering Excellence

Presented to John P. Gyekenyesi, Lesley A. Janosi, Noel N. Nemeth, and Lynn M. Powers for exceptional engineering achievement that provides an innovative and cost-effective approach to brittle material component design and optimization.

Presented to William O. Hughes, Everett B. Hurst, and Anne M. McNelis for exceptional engineering achievement in the design, testing, and implementation of an improved acoustic treatment for the Titan IV/Cassini mission that eliminated the need for a costly requalification of the Cassini spacecraft's power source.

Presidential Rank Awards

Meritorious Executive—Presented to Gerald J. Barna and Donald J. Campbell for sustained superior accomplishment in management of programs of the United States Government, and for noteworthy achievement of quality and efficiency in the public service.

Exceptional Achievement Medal

Presented to Michael J. Blotzer for excellence in management of industrial hygiene and health physics functions at NASA Lewis.

Presented to Robert M. Brej for exceptional accomplishments in support of the Advanced Communications Technology Satellite (ACTS) and the Telemedicine Space Bridge projects.

Presented to Thomas O. Cressman for exceptional engineering and leadership in the successful completion of two missions for the Spread Across Liquids Sounding Rocket Combustion Experiment.

Presented to Walter S. Kim for outstanding leadership of NASA Lewis' Small Business Innovative Research Program and in the area of technology transfer and commercialization.

Presented to Anita D. Liang for outstanding contributions and dedicated leadership in planning, guiding, and directing the Earth-to-Orbit Technology Program at NASA Lewis.

Presented to George C. Madzsar for exceptional engineering contributions to the field of self-diagnosing sensors.

Presented to Terrian V. Nowdew for exceptional achievement in the fabrication and development of instrument research components.

Presented to Wayne A. Whyte, Jr. for exceptional contributions to NASA's Commercial Communications Program and the satellite industry it supports.

Presented to Edward A. Winsa for exceptional achievement resulting from outstanding leadership in the development and implementation of the Isothermal Dendritic Growth Experiment.

Exceptional Service Medal

Presented to Sandra A. App for providing exceptional initiative and administrative service to the Aeronautics Directorate and the Center.

Presented to Bruce A. Banks for exceptional engineering contributions in the transfer of NASA technology to U.S. consumer-product and biomedical industries.

Presented to Richard T. Barrett for unique and outstanding contributions to the understanding, compilation, and dissemination of expert criteria on the selection and use of fasteners.

Presented to James C. DeRaimo for outstanding engineering contributions and leadership in establishing and sustaining a proactive Pressure Vessel Recertification Program for all pressurized systems at NASA Lewis.

Presented to Linda D. Dukes-Campbell for exceptional service in expanding public awareness of NASA Lewis programs and activities, ensuring a NASA Lewis presence in appropriate community events.

Presented to Susan F. Gott for exceptional performance of secretarial and administrative skills, which have significantly contributed to the efficiency and effectiveness of the Engineering Directorate.

Presented to Kenneth W. Guinta for consistently outstanding efforts in the design, fabrication, and development of research related hardware.

Presented to Virginia T. Indovina for outstanding performance of Secretarial/Administrative duties associated with the Chief Scientist's Office and notable contributions to the Senior Secretarial Staff activities.
Mir environment examined

Unique experiment measures material contamination

By S. Jenise Veris

EMBERS of NASA Lewis' Electro-Physics Branch recently applied their expertise to a groundbreaking experiment now onboard the Russian Space Station Mir, called the Optical Properties Monitor (OPM). An active experiment the size of a suitcase, OPM will provide a unique, comprehensive space research capability to study the effects of the space environment—both natural and induced—on optical, thermal, and other properties of spacecraft materials.

"We wanted to participate because it was an ideal opportunity to fly various materials and observe their performance—an endeavor that normally would be cost prohibitive," said Bruce Banks, chief of the Electro-Physics Branch. "Not only do we have the opportunity to test those items, but we also get a snapshot of what types of contaminants exist in the Mir environment."

OPM launched onboard Space Shuttle Atlantis in January and was mounted outside the Mir docking module where it will collect data about the space station's environment for one year. The results of the data are predicted to impact all future long-term spacecraft and particularly the development and operation of the International Space Station (ISS).

The OPM flight experiment was developed by AZ Technology, Inc., Huntsville, AL, under the Office of Aeronautics and Space Technology In-Space Technology Experiment Program and the ISS Phase I Risk Mitigation Experiment Program.

Banks was invited to serve as a member of the advisory committee to assess samples for OPM, at the request of OPM Principal Investigator Don Wilkes of AZ Technology, Inc. The committee received a total of 228 sample proposals from 17 U.S. organizations and two foreign ISS partners, all vying for the 110 sample slots contained on OPM. Six of those slots were awarded to NASA Lewis' Electro-Physics Branch. Don Jaworske coordinated the effort of assembling samples submitted by the branch.

All 110 samples are arranged on half of a carousel in four concentric rows. The carousel moves the samples under instruments that measure various properties once a day. The third row of samples, where the majority of NASA Lewis samples are located, is measured by the Total Integrated Scatter (TIS) instrument. In this instrument, light from a laser beam is scattered by surface irregularities. This provides a charting of surface quality over a period of time to determine rate of degradation of materials in the Mir environment.

Contamination is an issue of general concern that can affect the performance of power systems on spacecraft. The most common contaminants in the space environment are silicones and hydrocarbons. In low Earth orbit, silicon is oxidized and forms glass-like deposits, which become discolored. These deposits often cover the surface of various materials and absorb light, causing spacecraft to become hotter.

A sample of an aluminum coated surface mirror, submitted by Kim de Groh, will provide insight into how contaminants affect the reflectance of a mirrored surface. This information will be valuable in understanding the efficiency of solar dynamic concentrators.

Sharon Rutledge has two samples on OPM: an ISS solar array blanket fact sheet and a purposely defective thin film of aluminum on Kapton H. Kapton H is an amber-colored, high-temperature polymer used in the manufacture of solar array blankets and requires an atomic oxygen protective coating. Once the protective coating on Kapton becomes compromised, the underlying Kapton can fall prey to atomic oxygen that erodes the Kapton and causes undercutting.

Levelized aluminum is being considered as the reflector for solar dynamic concentrators. Jaworske prepared the first surface aluminum-coated, levelized mirror sample for exposure and concurrent TIS measurement on OPM. The sample will be used to measure the extent and rate of the undercutting phenomena on an as-manufactured sample, and the information gained will be important in determining the performance and lifetime of solar dynamic concentrators in low Earth orbit.

The OPM will also provide in-space, time-dependent flight data for a Monte Carlo computational module developed by Banks. "The data will fine tune predictions on a pattern of behavior for material exposed to the space environment," Banks explained.

OPM will provide information useful in designing an environmentally durable ISS. ♦
Lewis contractor receives Weatherhead 100 award
Mid-America Consulting Group, Inc. of Beachwood, OH—a NASA Lewis contractor responsible for aerospace systems integration and management consulting—was recently honored as one of the 1997 Weatherhead 100 fastest and most consistently growing companies in Northeast Ohio. Mid-America’s support of NASA Lewis over the past 7 years has entailed operation of the Visitor Center and test support at Plum Brook Station, including the recent live firing tests of The Boeing Company’s new cryogenic upper stage for the Delta 3 rocket (see Lewis News, April 1998). Nomination for the award was based on revenue over a 5-year period, 1992-1996, with starting sales of more than $100,000, continued growth of more than $1 million in 1996, and a staff of 15 or more full-time employees. The event at which Mid-America was recognized marked the 10th anniversary of the Weatherhead 100 awards, which are sponsored by Bank One, Arter & Hadden, Ameritech, Case Western Reserve University Weatherhead School of Management, and Enterprise Development, Inc.

Business and Professional Women’s Organization honors two employees
Sharon McTigue, project manager for Omni Corporation, and Dr. Margaret Tuma, an electronics engineer in the Optical Instrumentation Technology Branch, were recently recognized by the Business and Professional Women’s (BPW) Organization at its Young Careerist and Individual Development statewide Speak-Off competition held March 14 in Columbus, OH.

McTigue was selected as the 1997–1998 Individual Development Winner representing Region 4. She is president of that region and has been a member of the NASA Lewis BPW since 1991. McTigue’s involvement in BPW on the local and regional level is quite diverse, having chaired or served on many committees and programs involving scholarships, bylaws, long-range planning, legislation, the Young Careerist competition, and nominations. McTigue has worked for Omni since 1991 and oversees the clerical and administrative services contract.

Tuma was selected as the 1997–1998 Young Careerist Runnerup representing Region 4. She has worked with BPW over the past 3 years as Chair and Vice-Chair of the NASA Lewis Women’s Advisory Group. Tuma has been a researcher at NASA Lewis since 1990. Her current research areas include integrated optic and photonic sensors, optical measurements, and spectroscopic ellipsometry.

Fitness Center wins Presidential Sports Award
For the second year in a row, the NASA Lewis Fitness Center won the prestigious Exercise for the Health of It Presidential Sports Award in Category 2 (civil servant population greater than 2000). The award was presented to the Center for having the largest percentage of documented participation in Presidential Sports Award activities. NASA Lewis has the distinction of having the highest number of participants in the Agency, with approximately 450 employees who participated in the program. Congratulations to Fitness Center employees Wendy Large, Tony Hyott, Carmella Cotterill, and Carrie Cappolo.

Celebrating women throughout history
The NASA Lewis Women’s Advisory Group sponsored the return of the Women In History Troupe to celebrate Women’s History Month and the 150th anniversary of the Women’s Rights Movement. Actors Charlene Connor and Sherrie Tolliver performed poignant vignettes of the lives of Susan B. Anthony, a leader in the women’s suffrage movement, and Bessie Coleman, the first American of any race or gender to earn an international pilot’s license, respectively. The presentations served as timely reminders of the risks and sacrifices endured by women throughout history that opened new and well-deserved opportunities for women of this generation. Following the vignettes, the Women’s Advisory Group presented 1998 Federal Women’s Program awards to Bruce Banks, chief of the Electrophysics Branch, and June Szucs, Community and Media Relations Office, in recognition of their contributions to the advancement of women at NASA Lewis.

(Left) Sherrie Tolliver of the Women in History Troupe recreated the heroics of Bessie Coleman, the first African American woman to earn a pilot’s license.

(Lefl) Sherrie Tolliver of the Women in History Troupe recreated the heroics of Bessie Coleman, the first African American woman to earn a pilot’s license.
Lewis Technology Transfer

A boost for the biomedical industry

By S. Jenise Veris

The following article is part one of two articles addressing NASA Lewis' opportunities for partnerships in the emerging biomedical technology industry.

NASA Lewis is poised to provide the tools for biomedical innovation in what the Northeast Ohio Regional Economic Development Strategies Initiatives identified as an emerging industry that will be key to the future growth and prosperity of the Cleveland/Akron Metropolitan Area.

The initiative is supported through the partnership of the Akron Regional Development Board, Cleveland Tomorrow, and the Greater Cleveland Growth Association to identify the dominant industries driving the regional economy and to create strategies to position Northeast Ohio for future economic prosperity.

"The successful use of space technology to boost biomedical innovation is why NASA Lewis has become involved in several long-term collaborations with local medical and research institutions including the Cleveland Clinic Foundation, Case Western Reserve University and Cleveland State University," said Larry Viterna, chief of Lewis' Commercial Technology Office. "In fact, the latest issue of Popular Science magazine's focus on the Top Ten greatest medical inventions of the millennium is indicative of the interest stirring in this area."

Working in collaboration with the Cleveland Clinic, NASA Lewis applied its turbomachinery expertise in the design of the Innovative Ventricular Assist System Heart Pump. Convincing local developers to create buildings with lab space and high-tech capabilities for fledgling biotech companies was until recently a major stumbling block to developing such partnerships. The success of Gliatech, a 10-year old biomedical firm; the opening of a joint Cleveland State University (CSU) Cleveland Clinic Foundation (CCF) Mass Spectrometry Facility; and the construction of a new CCF microelectronic/mechanical systems (MEMS) laboratory provides evidence of growth in the biomedical market and a reason for developers to begin hatching plans of their own.

Competitive industries that have close buy-sell relationships, utilize common technologies, and/or share a labor pool, are partnering to achieve a competitive advantage in this growing market.

Dr. Fred Cornhill, chairman of the Clinic's biomedical engineering department, said that Northeast Ohio holds the potential to become a leading biomedical MEMS capitol because of its solid base of medical institutions, its manufacturing capabilities, and the prominent MEMS research program at Case Western Reserve University.

With more than 1,200 biomedical experts attending the annual meeting for Cleveland's Biomedical Engineering Society last fall came enthusiasm and inquiry about the region's biomedical research and education.

EXPLORING THE POSSIBILITIES

NASA Lewis' Commercial Technology Office (CTO) is exploring new approaches for partnering and expanding the application of Lewis technologies in the field of biomedical research and new product development. The CTO recently partnered with the Great Lakes Industrial Technology Center (GLITeC) to host a workshop to bring together Cleveland area biomedical companies and Lewis researchers from selected technology areas to identify new product development ideas/needs and potential partnerships.

"Our strategy is to engage the regional biomedical community through a variety of forums and networking opportunities and to leverage our efforts by working with organizations such as the Edison Biotechnology Center and the Greater Cleveland Growth Association," said CTO's Matt Moran. "By tapping into the existing biomedical infrastructure we can better understand the needs of this industry sector and identify Lewis technologies that can satisfy those needs."

Considered a prime source for much of the nation's new technology since its inception, NASA has and continues to be a valuable resource for many start-up efforts including biomedical technology through its technology transfer and commercialization efforts. Indeed, NASA Lewis has an impressive portfolio of biomedical technology applied to innovative medical products, devices, and methods to better diagnose and treat illnesses.

FROM PROPULSION TO PROSTHETICS

A NASA Lewis Ion Beam Applications Research Program established in 1975 led to a number of nonpropulsive...
biomedical applications of ion thruster technology. The same ion thruster technology that is propelling Deep Space 1 is used for ion beam interaction with materials for sputter etching, deposition, and texturing.

Bruce Banks, chief of Electro-Physics Branch, and Sharon Rutledge, a senior member of his staff, have patented a number of exciting biomedical innovations using the technology to resolve problems associated with soft tissue and bone implants, an area that still presents a major challenge among researchers.

Notable among their efforts is the technology patented and used to identify surface textures suitable for improved tissue response in breast prostheses, which was developed in collaboration with Case Western Reserve University Department of Biomedical Engineering and transferred to the local start-up of Applied Medical Technologies, Inc. The same ion beam sputtering technology was applied in a patent to etch tiny holes in material for a hydrocephalus shunt, which makes possible a direct route for drainage of cerebral spinal fluid to replicate the normal flow process without the need for a valve.

"Over the past 18 years we have been particularly successful in the process of texturing materials using a variety of space spin-off technologies," Banks said. "More recently we have applied atomic oxygen technology, which can be damaging to materials in space but has a number of useful applications on Earth."

"By tapping into the existing biomedical infrastructure we can better understand the needs of this industry sector and identify Lewis technologies that can satisfy those needs."

—Matt Moran, NASA Lewis

A Centerwide Bioengineering Initiative begun in 1994 to identify NASA Lewis technologies with potential biomedical applications in the Greater Cleveland community laid a foundation for current biomedical outreach efforts. Bioengineering projects identified in such areas as fluids, materials, communications and electronics, and computer modeling have met with great success.

NASA Lewis' CARES software program enables industries to understand the strengths and weaknesses of brittle materials with a wide range of applications including ceramic hip joints and dental crowns. It was the Software of the Year winner in 1994 and co-recipient of a 1995 R&D 100 award as one of the top 100 developments.

PARTNERING FOR THE BENEFIT OF ALL

The joint development of a texture technique for titanium biomedical implants; an artificial heart pump; and computer-assisted minimally invasive surgery is a result of a NASA Lewis and CCF Space Act Agreement signed in 1997. Turbomachinery technology, the area for which Lewis is now designated lead for the entire Agency, played a key role in the successful design of the Innovative Ventricular Assist System Heart Pump.

NASA sponsored research in the areas of protein crystal growth, three-dimensional tissue culturing, and noninvasive diagnostic technology is making possible improved treatments for diabetes through a Space Act Agreement between NASA's Office of Life and Microgravity Sciences and Applications and the Juvenile Diabetes Foundation.

An example of noninvasive diagnostic technology that was transferred through the partnership is a portable laser light-scattering instrument applied from technology originally developed by NASA Lewis' Dr. Rafat Ansari to conduct fluid physics experiments on board the space shuttle. Used during regularly scheduled examinations, the device can help with the early detection of diabetes-related optical problems like retinopathy or retina disease, the leading cause of adult blindness in North America.

The Edison BioTechnology Center, Inc., a subsidiary of the Battelle Memorial Institute, is bringing information about these and other biomedical technologies to the public through its monthly breakfast series programming. On Mar. 16 Moran will participate in a panel discussion titled "Technology Development Through Federal Partnerships: Tips From Successful Grantees."

A in-depth look at creative partnering for product development and investigation of potential biomedical applications for such technologies as microgravity processing, structural analysis, satellite networks & architectures, MEMS, polymers, embedded web, electrophysics, digital image processing, and semiconductors will be the focus of the next article.
This is part two of a series of articles about NASA Glenn's role in fostering the development of biomedical products with local companies and research institutions to help strengthen a growing business cluster considered key to the future economy of Northeast Ohio.

BY S. JENISE VERIS

A laser light-scattering probe that removes cataracts, an artificial heart-pump, orthopedic and soft-tissue implants, and computer-assisted surgery—all things once considered improbable—now are possible as a result of space technology advances and the skill of NASA Glenn scientists and engineers.

While biomedical/biotechnology is not directly a part of NASA Glenn's mission, technology transfer is a major mission for the entire Agency. Therefore, biomedical spinoffs from NASA Glenn technology advances are not only strongly encouraged but also have become quite prevalent.

"It's important to remember that small businesses are responsible for a significant amount of the commercialization in the biomedical arena," said Walter Kim, NASA Glenn's Small Business Innovation Research (SBIR) program manager. "They may be directly funded by a NASA SBIR, the Ohio Department of Development, or receive some other state or Federal assistance. The novelty of a SBIR, however, is that it is a low risk way to develop innovative products and processes that can then be commercially marketed," he added.

AI Ware, Inc. of Cleveland enjoyed tremendous success with the assistance of a NASA Glenn SBIR. The company developed a computer program that uses artificial intelligence technology developed by NASA Glenn to enhance experimental designs in the scientific and research communities. Originally developed for the Center's Structural Analysis program, the technology is now used by a diverse customer base in the area of composites, pharmaceuticals, and medicine that includes Eli Lilly and Company, S. C. Johnson Wax, B. F. Goodrich, Dow Chemical, and The Glidden Paint Company.

Two NASA Glenn biomedical proposals for possible SBIR funding have been accepted under the subtopic of microgravity research since none exist specifically for biomedicine. However, these contracts and NASA's recent award of $33 million in grants to 48 researchers across the country to conduct microgravity biotechnology research may be the sign of an evolution in biomedical/biotechnology development.

"NASA is charged with transferring its technology to the public for the improvement of life on Earth. Our visionary researchers, scientists, entrepreneurs, and clinicians have made giant leaps in technology application. Who would have dreamed that we could map human tissue by mapping the distant stars," NASA Administrator Daniel Goldin said in his message on NASA's role in women's health.

According to Bruce Banks, chief of NASA Glenn's Electro-Physics Branch, his group represents less than 1 percent at the lab, but is responsible for 70 percent of the tech transfer conducted through the Great Lakes Industrial Technology Center (GLITeC), NASA’s Regional Technology Transfer Center operated by Battelle, Inc. About one-eighth of their effort is devoted to biomedical research. Banks and Sharon Rutledge have been the researchers and technical consultants for many biomedical spinoffs such as hydrocephalus shunts, soft-tissue implants, and more recently, percutaneous connectors that penetrate the skin without causing bleeding or infection.

"It's a small fraction of the request for our assistance with the greatest potential for good," Banks said. "Some things we do for space—maybe it will fly or maybe not—but with the spinoffs that are successful there's a bigger chance that it will get used and a greater chance that it will touch every American instead of a select few." "It makes you feel good to know you improved the quality of life for somebody," Rutledge added.

Sandra Reehorst, a senior executive service candidate, recently completed one of three program assignments at the Cleveland Clinic Foundation (CCF). One of her goals was to establish a better partnership between the

Sharon Rutledge and Bruce Banks, both of the Electro-Physics Branch, discuss texturing techniques for a biomedical implant.
Agency and the biomedical industry, in general, and specifically between NASA Glenn and the CCF. She also provided managerial assistance at the request of the newly formed Medical Device Innovation Group of the Department of Biomedical Engineering at the Clinic.

During her assignment she discovered that more than $1 billion is spent annually on medical research between the three major medical research institutions in Cleveland—CCF, University Hospitals, and MetroHealth Systems.

"NASA and biomedical research institutions are providing cutting edge technologies that frequently cross paths," Reehorst said. "As NASA Glenn assists biomedical development, our aerospace development efforts could benefit financially from additional leveraged funding; technically from having our staff making additional scientific contributions and politically as an example of outreach and partnering with our neighbors in the private sector."

Reehorst teamed with Matthew Moran, Commercial Technology Office (CTO) biomedical project manager, and GLITEC’s David Salay, Alyssa Frank, and Bonita Frank to host an Ideation Workshop that brought together representatives of leading biomedical companies and NASA Glenn technologists to identify new product development ideas and areas with the greatest potential for partnership. Attendees said they found the sessions relevant and would like to be a part of future workshops.

"I was looking for a partner to pursue an alternative approach for treating nystagmus, an involuntary movement of the eyeball, or an alternate treatment for cystic fibrosis using MEMS [microelectromechanical systems] technology," said Thomas Glasgow, a technical consultant in the Materials Division. "The applications for MEMS technology are so vast that it could be attached to a lens to direct eye movement, or fitted in a special vest combined with computer intervention to simulate the therapy necessary for cystic fibrosis patients without the pain."

Joseph Poryy, a member of the NASA Glenn team that created Tempest—the Agency’s 1998 Software of the Year—promoted the Embedded Web Technology program as an enabling technology for telemedicine applications using the Internet to eliminate the need for specialized equipment.

NASA Glenn is a part of a concerted and well-coordinated effort to attract and provide resources for this and other new technologies in Ohio. Based on its funding, knowledge and physical technologies, facilities, and business incubator, NASA Glenn is poised to be a major player in Northeast Ohio.

The most frequently used mechanisms to establish partnerships with industry, foundations, universities, and other non-government organizations are Space Act Agreements (SAA). They are designed to help put technology in the hands of companies through full or partial reimbursable and non-reimbursable contracts.

An SAA recently signed between NASA Glenn and Micro Medical Devices provides technical assistance from Mary Vickerman and the Computer Services Division’s visualization team. They are helping the company to apply software used for the Hubble Space Telescope to improve image quality of a fiber optic instrument to perform minimally invasive surgery. Another SAA nearing approval partners NASA Glenn’s Mario Castro and Case Western Reserve University’s Dr. Russell Wang to develop a low melting point titanium alloy that could replace gold and other materials for dental work such as fillings, crowns, and implants.

GLITEC enhances NASA Glenn’s profile by bringing together a network of experts under an umbrella SAA that allows quick turnover in the negotiation of short-term technical assistance, long-term collaboration, or partnerships with companies throughout the six-state Great Lakes region.

This relationship with GLITEC, combined with Enterprise Development, Inc.’s expertise in client management, makes the Lewis Incubator for Technology (LIFT), a Glenn-funded incubator, an important link to launching a number of biomedical ventures. LIFT also plans to open a software, electronics, and communications incubator next month.

Educating NASA Glenn engineers to respond to the future needs of the biomedical industry is the next step in creating new businesses for a stronger biomedical cluster. NASA Glenn Director Donald Campbell and CTO Chief Dr. Larry Viterna recently accepted an invitation to be a part of a steering committee to establish a joint-Doctoral Degree Program between Cleveland State University and the Biomedical Engineering Department at the Cleveland Clinic.

"The program would afford a number of NASA Glenn employees the opportunity to train with Clinic doctors in an cooperative agreement at Cleveland State University free of charge, which would then put biomedically-trained researchers within NASA to further facilitate biotechnology transfer," Viterna said.

In the meantime, CTO’s Moran is working with the Cleveland Clinic to build on the success of Reehorst’s tour of duty through a continual exchange of knowledge.

Reehorst said this is a positive step in building a strong partnership with the Clinic and is an avenue that should be investigated with other members of the Northeast Ohio biomedical cluster.

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THE MEDICAL DEVICE MARKET IS BIG BUSINESS. WITH SALES REACHING APPROXIMATELY $150 BILLION WORLDWIDE IN 1998.

Source: Battelle, Inc.
Glenn tests material to secure Hubble blankets

GLENN researchers have added their knowledge and experience of space-exposed materials to provide a more durable insulating skin for the Hubble Space Telescope.

The last two of the four space walks as part of the STS-103 mission, astronauts planned to repair the telescope’s multilayer insulation (MLI) blankets. With launch delays, the last space walk has been postponed for the next servicing mission. The MLI blankets, which are made up of 17 thin layers of metallized plastic, protect equipment from temperature extremes as the telescope moves into and out of Earth’s shadow.

Samples of the blankets brought back after the two Hubble servicing missions (1993/1997) were cracked and brittle. Shortly after, Glenn researchers, Kim de Groh, Joyce Dever, and Bruce Banks, Electro-Physics Branch, became part of the Goddard Space Flight Center-led Hubble MLI review board. The board worked to help determine the damage mechanism and identify a replacement material.

“Ironically, our team chose the same material as before but modified it with a scrim, or fabric, bonded to the backside,” de Groh said.

De Groh explained that Teflon FEP’s ability to reflect light and radiate heat are significantly better than other materials considered. The fabric-like strands in the scrim will retard crack growth and help keep the outer layer in place even when it becomes brittle. The new outer layer that astronauts will apply should last the life of the telescope—until 2010.

National Aeronautics and Space Administration

John H. Glenn Research Center
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A test of time and space

BY S. JENISE VERSA

MATERIAL for a sun shield to protect next generation telescopes may be among 700 samples tested in the Materials International Space Station Experiment (MISSE), a flight experiment designed to measure the stability and durability of materials and devices in the space environment.

The first set of two suitcases carrying the samples is scheduled to launch August 2001 and be mounted outside the space station for a duration of 1 year. A second set of two suitcases, with a launch date to be determined, will be exposed to the space environment for 3 years.

Bruce Banks, chief of the Electro-Physics Branch and Glenn's MISSE project scientist, said that Glenn would be responsible for 158 MISSE samples.

"We'll compare the rate of erosion on various materials tested in ground-based facilities with in-space erosion with the goal of improving the prediction of the materials flight durability based on simulations produced by computer codes," Banks explained. "Pre- and post-flight data will be compared to determine the effects of atomic oxygen and solar radiation (ultraviolet and x-ray radiation) on different polymers and thin film coatings. Careful analysis of atomic oxygen undercutting will also be done to understand degradation processes and improve durability prediction accuracy."

Banks, along with Sharon Miller, Aaron Snyder, Kim de Groh, Joyce Dever, and Don Jaworske (principal investigators for the various Glenn samples) will be assisted by guest investigators from OAI, Cleveland State University, University of Toronto, Triton Systems, Inc., QSS Group, Inc., and Hathaway Brown School in Shaker Hts., Ohio.

Students from Hathaway Brown were invited to participate in MISSE by de Groh as an extension of an earlier collaboration between the school and Glenn's Electro-Physics Branch called the Polymer Erosion And Contamination Experiment (PEACE), a space shuttle Get Away Special canister experiment. The same 41 materials used in PEACE will be used on MISSE so that both short-term and long-term exposure tests will be available for those materials.

MISSE is a cooperative effort sponsored by the Air Force Research Laboratory (Materials Lab) and NASA.
people on the move

space act award

Glenn researchers merited a $40,000 NASA Space Act Award, one of the largest ever, for their development and transfer of coating technology that prolongs the life of space solar array blankets. The coatings are now protecting the solar array blankets on the International Space Station and were used on Russia’s Mir Space Station solar arrays.

The award recognizes the inventive, problem-solving work of Bruce Banks, chief, and Sharon Miller of the Electro Physics Branch, along with James Sovey, On-Board Propulsion Branch, and Michael Mirtich, Jr., NASA retiree and Analect consultant. The team developed the coating that protects blankets from the ravages of atomic oxygen, which causes unprotected blankets to deteriorate within a year.

recognition

The American Institute of Aeronautics and Astronautics’ Survey Paper Citation of 2000 was awarded to Glenn’s Dr. Mark Wernet, Optical Instrumentation Technology Branch, and Ohio State University professor Mohammad Saminy for their paper, Review of Planar Multiple-Component Velocimetry in High-Speed Flows. The paper describes recent advances in laser-based measurements systems for Reynolds number flows applied in support of Glenn’s Integrated Instrumentation and Testing Systems project.

Richard Olinek (not pictured), safety and quality manager for Call Henry, Inc., has become a Certified Safety Professional (CSP). Certification includes meeting stringent academic and professional standards and passing two 5-plus hour exams. The exams cover safety, applied sciences, legal and regulatory matters, and professional affairs and ethics, as well as other safety-related topics that will aid the CSP in managing programs established to protect workers, the public, property, and environment from any hazards.

Dr. Woodrow Whitlow, director of Research and Technology, said that the cost savings to NASA in terms of repair and replacement missions is significant—in the millions of dollars.

appointments

Rafael Sanabria has been named chief of the Computational Environments Branch of the Computer Services Division. Sanabria brings to the position a well-rounded background that includes a degree in chemical engineering from the Massachusetts Institute of Technology and a combined 21 years of experience in engineering design, launch vehicles, and Information Technology. Performing as the deputy chief of the branch for the past 6 years, as well as managing the Expert Center for Basic Interoperability and Unix, has allowed him to demonstrate his leadership and technological skills to assume his new position.

Dr. Chan Kim, Telecommunications and Networking Branch, have begun a 1-year career-enhancing opportunity at NASA Headquarters as Glenn’s 2001 PDP (Professional Development Program) participants. They were identified as individuals who have demonstrated the potential to assume greater responsibility within the Agency based on nominations and submission of their 5-year Individual Development Plan.

Griebel is assigned to the Office of Aerospace Technology, Research and Technology Division, where she will assist in the development of cost estimates and budget submissions, and participate in the planning, development, and evaluation of candidate Aerospace Technology Programs. Kim expects to gain a better understanding of Information Technology (IT) policy, capital, and strategic planning from an assignment in the Office of the Chief Information Officer (CIO) where he will perform IT activities directed by the CIO office as well as attend the Federal CIO University.
Two Glenn innovations named 2002 most significant products

Glenn news release

Art restoration and computer simulation are not the kind of work readily associated with aerospace research, but at Glenn, such work is changing peoples’ perceptions. This year, Glenn is the recipient of two prestigious R&D 100 awards, which are presented annually by R&D Magazine for the year’s 100 most technologically significant new products.

Atomic oxygen applied in art restoration and the Numerical Propulsion System Simulation (NPSS), a propulsion system simulation software program, are the Glenn winners for 2002. This brings Glenn’s total to 85 since the award’s inception.

NPSS, a world-class propulsion system simulation tool emerging as the U.S. standard for aerospace simulation, was built and maintained with the full interaction of every major U.S. aircraft engine manufacturer.

NPSS provides NASA and the U.S. aerospace industry with ease of use and a revolutionary engineering capability that will reduce cost and risk associated with advanced propulsion system development, translating into increased safety for aeronautics and the human exploration of space.

Cynthia Gutierrez Naiman, Glenn’s NPSS team lead, worked with a team of 39, Glenn engineers and other organizations, including Analex, Cleveland; Arnold Engineering Development Center, Arnold Engineering Development Center, AFB, TN; The Boeing Company, Seattle, WA; General Electric Aircraft Engines, Cincinnati; Honeywell, Phoenix, AZ; Integral Systems Inc., Cleveland; Modern Technologies Corp., Middleburg Hts.; Pratt & Whitney, East Hartford, CT; Rolls Royce Co., Indianapolis, IN; RS Information Systems Inc., Cleveland; Teledyne Continental Motors Turbine Engines, Toledo; Williams International, Walled Lake, MI; Wright-Patterson Air Force Base, Dayton; and ZIN Technologies, Cleveland.

Removal of organic and carbon contaminants from the surfaces of paintings and other art objects by means of low-energy atomic oxygen is the second award-winning technology. This technology, developed to simulate the low-Earth-orbital space environment, has made it possible to etch as well as alter the surface chemistry and texture of many materials through atomic oxygen interaction processes. Commercial applications of this technology include medical and industrial and air restoration.

"We haven’t even begun to realize all the potential applications for this technology," said Bruce Banks, Glenn’s Electro-Physics Branch chief, who co-developed the technique with Sharon Miller, a researcher in the same branch.

The 2002 R&D 100 awards will be presented on October 16 during a banquet at Chicago’s Navy Pier Convention Center.

Tank 5: tops in electrical propulsion testing

Glenn-developed 50-kW Hall thruster test program is underway in the Electric Propulsion Laboratory’s Vacuum Facility-5 (VF5/Tank 5), and all systems are operating as expected. The facility’s unique size and pumping speed allow researchers to validate hardware and technologies quickly simulated in the vacuum of space that may be key components in the Agency’s future missions to Earth orbit and beyond.

Significant ground test programs will be required to develop these thrusters operating at power levels exceeding 20 kW—an order of magnitude above the state of the art. Recent testing of the high-power NASA 457M Hall thruster achieved three times the power of any previous level in excess of 70 kW.

Located in Building 301, Tank 5 includes a number of isolated ports (up to 6 m in diameter) that allow multiple tests to be conducted without the need to cycle the entire facility to atmosphere. With over 100 kW of installed power for thruster testing, integral propellant feed systems, thrust stands, and plume diagnostics, Tank 5 provides the world’s most-capable facility for high-power electric thruster and system testing.

Tank 5 was used to acceptance test ion engines and power processors (PPU) including the spacecraft engine and PPU that have successfully flown on the Deep Space 1 mission.
Glenn technology garners Space Act awards

Three Glenn-developed technologies were recently selected for Space Act Awards. Each honoree received a signed certificate from the NASA Administrator and a proportionate share of the $144,500 awarded to Glenn for FY02. The awards cover four areas, which include software release, publication and NASA Tech Briefs, Patent applications, and Board Action awards.

Hydroformed Ion Optics and Spall-Resistant Woven Screen Surfaces for Ion Thrusters technology developed by Bruce Banks, chief of the Electro-Physics Branch, prevents the formation of large flakes of metal generated by internal parts that could inhibit high-performance operation or shorten the life of a thruster.

A team from Glenn’s Microgravity Environment and Telescience Branch developed the Microgravity Analysis Software System (MASS), which assures accurate and timely measurement of vibrations that might affect or threaten the outcome of microgravity research conducted on the space station. MASS was the runnerup for NASA Software of the Year. MASS team members include Kevin McPherson and Dr. Ted Wright (NASA), and Ken Hrovat, Eric Kelly, Gene Liberman, Nissim Lugasy, and Tim Reckart (ZINT).

Rafat Ansari, Microgravity Fluid Physics Branch, was recognized for his non-invasive diagnostic tool that can detect early changes in the eye associated with infection, allergic reactions, autoimmune diseases, glaucoma, cataracts, age-related macular degeneration, and diabetic retinopathy.

More information on NASA’s Space Act Award Program is available at http://icb.nasa.gov.
R&D honor

Bruce Banks and Sharon Miller, Electro-Physics Branch, have received the R&D 100 Editor's award for the Most Innovative New Product in 2002. This is an added acknowledgment of their research in Atomic Oxygen System Art Restoration, which earned an R&D 100 award in 2002.
Awards & Honors

The Northeast Ohio Technology Coalition (NorTech), in conjunction with JumpStart, Inc., and their sponsors presented a 2004 NorTech Innovation Award to Glenn for the development of a technology that brings works of art back to life. Originally developed to simulate the low-Earth orbital space environment, this technology has made it possible to etch as well as alter the surface chemistry and texture of many materials with atomic oxygen, a low-energy beam of oxygen atoms. Bruce Banks, chief, Electro-Physics Branch, and Sharon Miller, senior research engineer in the Electro-Physics Branch, codeveloped a technique that applies this technology to successfully restore fire-damaged and defaced paintings that were previously considered beyond repair.

The Glenn chapter of the Business and Professional Women's (BPW) organization awarded its 2004 scholarships to the following Center employees who are currently enrolled in an accredited program or course of study:

Josephine Franks, secretary with the Aeropropulsion Research Program Office, received $400 towards a degree in business management from the Cuyahoga Community College; Chrystal Brooks, an InDyne word processor II supporting the Project Management and Quality Assurance Branch, received $400 towards a business degree from Lorain County Community College; and Michelle Conley, a heavy truck driver supporting warehousing of hold storage, Plum Brook Operations Support Group, received $200 towards a degree in industrial electronics at Terra Community College in Fremont. To learn more about BPW, visit http://www.grc.nasa.gov/WWW/Clubs/NASA BPW/.

Dr. Sunil Dutta, Office of the Director, was one of three Northeast Ohioans honored with a "Keeping the Dream Alive" award presented by the Ohio Civil Rights Commission. Dutta was recognized for his efforts on behalf of Cleveland's Asian Indian community and as program manager of Glenn's Historically Black Colleges and Other Minority Universities Research Program as well as for Small and Disadvantaged Businesses.

◆
One of the hottest topics of conversation this past year at the Conservation Center has revolved around the fire-damaged Waterlilies by Claude Monet that has resided in various storage areas of the Center for the past forty years.

This large, 79 x 71 inch canvas was donated to the Center in 1961. It was burnt in a fire at the Museum of Modern Art in 1958, and ever since it has been waiting for the development of a treatment that could revive its darkened and blistered surface. Meanwhile, it served as a study object for numerous students looking for pigment samples, cross sections, or trying out various cleaning tests. Now, at last, it has the potential to see better days in terms of its preservation — with the help of none other than NASA technology.

In the spring of 2000, Bruce Banks and Sharon Miller of NASA's Glenn Research Center in Cleveland, Ohio, visited the Conservation Center to give a presentation on a new process that could be used to remove soot and burnt materials, such as varnish and binding medium, from painted surfaces. They had initially presented this new treatment, which uses highly reactive atmospheric oxygen, at the 1998 AIC conference in Arlington, Virginia. I attended this talk and was quite excited about the possibilities this treatment offered, but had no idea that two years later I would be actively involved in applying this process to a Monet painting. After Sharon and Bruce explained the process and how it worked to our paintings class, we all proceeded upstairs to show them the Monet and determine whether there was any chance of success with the proposed oxygen treatment. The previous treatments they had performed had been on paintings that had heavy soot deposits that were impossible to remove with traditional methods. The Monet presented slightly different problems. Instead of removing loosely bound hydrocarbon soot, we were striving to remove the burnt varnish and medium from the upper surface of the paint layers. After the initial shock of the painting's present condition wore off, the scientists agreed the treatment had potential, and they were given three small samples of paint to run their tests on.

The treatment process involves placing the painting in a low-pressure chamber and exposing it to gaseous atomic oxygen. The individual oxygen atoms are highly reactive, combining easily with unattached or weakly bound atoms, such as those found in the hydrocarbon-containing layers of varnish and medium as well as surface grime and excess glue. Theoretically, as the carbon from these layers combines with the oxygen to form pigments particles will be unaffected. After monitoring the surface using a spectra-analyzer to determine the change in diffuse spectral radiance, the process would be stopped when the change in color no longer improves over time. The surface would be very fragile since the pigment particles would only be very loosely bound from behind, and a new binder would then be reintroduced.


dedicated to the ongoing work of the Conservation Center.

Winnie is using slight heat and pressure to relax the cleaving and lifting ground back into place while consolidating the surface.

Hopefully, there will be a great change in the appearance of the painted surface, and other paintings once thought to be lost forever might finally be treated. At the end of September, Bruce and Sharon returned to present the results of their tests. They determined that after 200-250 hours of exposure to the atmospheric oxygen there was a substantial change in reflected color. Their presentation gave us great hope this would work for the Monet, and so it was decided we would move forward with this process. Of course, we do have many questions that need to be researched, but we expect to use this opportunity to test many things. So the past two semesters, I have taken on the Waterlilies as an independent project, preparing it for this treatment. I have spent many hours removing the facing tissues and consolidating the paint, and will soon finish stabilizing the canvas with mends and inserts for transportation. We hope we can schedule the treatment for early fall, with the treatment continuing over the next year or so with other paintings students. We are still in the early stage of this project, but we are eager to move forward with this experiment. Further updates will appear in Conservation Center Newsletter #12.
NASA BREATHES NEW LIFE INTO DAMAGED WORKS OF ART

Tuesday, November 19, 2002
NEWS - SCIENCE 06A

By Jane Hawes
For The Columbus Dispatch

CLEVELAND -- Bruce Banks doesn't strike you as an art buff.

The walls in his NASA office, for instance, are not adorned with pictures, prints or posters. Not even a museum calendar.

But propped on a stack of papers atop a filing cabinet near his desk is an oil painting.

Though the name of the woman in the painting has been lost to time, her weary face has been saved, thanks to space-age technology.

The 500-year-old artwork isn't worth much, but Banks can't seem to muster the will to throw it away. It serves as a reminder of a technology he helped develop that has proved a beautiful blend of art and science.

About eight years ago, Banks and fellow NASA research engineer Sharon Miller developed a procedure to mimic orbital conditions to test space-bound materials in the lab. The process, they later learned, can clean soot and other pollutants off oil paintings.

Like Tang, duct tape and other discoveries made in the name of the space program, this technology transcended the boundaries of science into the world of everyday applications.

Last month, Banks and Miller not only scored a coveted Research Development Magazine award for one of the top 100 new inventions of the year, but they also took home the prize for "Most Innovative New Product." In an award program widely regarded as the Academy Awards of the invention industry, the duo's honor was the equivalent of snatching the statue for Best Picture.

"It was a nice surprise," said Banks, who directs the electro-physics branch of the National Aeronautics and Space Administration Glenn Research Center near Cleveland.

But Banks is more eager to talk about what has become known as the patented "atomic-oxygen art restoration" process itself than the accolades he has received for its development.

"It's really a spinoff of the original technology," Banks said. "And it's only been in the last 20-some years that we've developed it."
It all started with space travel to low-Earth orbit, or "LEO."

LEO is an atmospheric band about 100 miles to 400 miles above Earth, Banks said, where satellites and space stations orbit.

In order to test the materials that would be used for such travel, NASA scientists needed to simulate an environment in which oxygen is sparsely distributed and in single-atom form.

The air we breathe is laced with dual-atom molecules.

Along the way, Banks said, he and Miller saw that single-atom, or atomic, oxygen, is effective at removing "all forms of hydrocarbon, even ones that are real stubborn, like polyurethane" from the surfaces of inorganic materials.

It happens when single oxygen atoms latch onto carbon atoms, then float away in the form of carbon monoxide or carbon dioxide. If hydrogen is present, water vapor forms and also floats away.

Though simple in theory, the process to clean paintings, depending on the size of an artwork and the damage it received, requires either a $70,000 vacuum chamber or a $20,000 beam generator.

Still, no one thought about nonaerospace applications for atomic-oxygen until a couple of painting conservators from the Cleveland Museum of Art approached NASA.

The museum had some smoke-damaged, soot-coated paintings that resisted traditional restoration techniques, including the most common, cleaning solvents.

Museum officials ran out of ideas and called NASA Lewis, asking if it had anything that would help.

"I think they came to us out of desperation," Miller said.

"One (painting) was a very, very sorry 19th-century copy of an Italian Renaissance painting that had been damaged in a church fire," said conservator Kenneth Be.

The Madonna of the Chair, an oil painting from St. Albans Church in Cleveland, was almost completely blackened with soot, and some of the paint underneath had smeared when solvents were used.

NASA Glenn officials eventually decided to try atomic oxygen.

"We try to spin off our technology to outside companies, basically to garner more support for NASA," said NASA spokeswoman Katherine Martin. "So many people say, 'Well, why are we wasting money on just space?'

"But it's not just for space."

Banks and Miller developed two atomic-oxygen machines to clean paintings. One is a large vacuum chamber for flat items up to 4 feet by 6 feet. Inside, the process can take as long as 350 hours. The other is a small beam generator used for spot-cleaning. Results are almost instantaneous.

NASA used the vacuum chamber on St. Albans' Madonna and the results were stunning.

http://libpub.dispatch.com/cgi-bin/documentv1?DBLIST=cd02&DOCNUM=50951&TER... 11/19/2002
"The beauty of their technique is that it's a noncontact approach," Be said. "But it's so different, not being able to see it as (the cleaning occurs). It was a little unsettling."

The Andy Warhol Museum in Pittsburgh called after a visitor kissed a painting and left a lipstick smudge on the canvas. Because the artist hadn't protected the surface with varnish, solvents would cause the lipstick to soak further into the canvas.

A slow treatment with atomic oxygen, however, removed all traces of the kiss.

There are other applications.

For example, a St. Louis police officer is optimistic about using atomic oxygen to determine whether bank checks have been altered.

Officer Lynda Taylor-Hartwick read about atomic oxygen in a science publication last year and contacted Banks.

"There's not a smooth, continuous flow of ink when a document's been altered," Taylor-Hartwick explained. "With this atomic-oxygen apparatus, you can tell where the newer ink has been added."

Banks said he's learned a lot about forgery: "When a (numeral) 1 has been changed to a 9, then there's a double thickness where the new ink crosses the 1's vertical line. The atomic oxygen etches away that top layer (of ink) so you can see that it was a double layer."

The NASA duo also have used atomic oxygen to build a better petri dish, etching the dish's plastic interior to create a surface that allows fluids to spread out better. The same surface-etching capabilities have been used to improve the material that expands tissue during plastic and reconstructive surgery.

"When the surface is rough, that means it has certain desirable properties with regard to tissue," Banks said. "It's less likely to reject them."

He and Miller also are finding they can sterilize surgical implants, such as artificial joints, better because exposing the materials to atomic oxygen lifts away contaminating cell residue better than traditional radiation.

Just about the only application that hasn't worked is using atomic oxygen to create better mailing labels. Although etching the paper does create a surface that accepts ink better, "it's just not cost-effective," Miller said.

Banks estimated that NASA charges anywhere from "a few hundred dollars to about $20,000" per job, depending on the complexity.

"It's easy to make things better," Banks said, "but it's not as easy to make things better and cost-effective."

The painting Banks keeps in his office, the one of the old woman he calls "Grandma," actually is one of his failures.

Her smoke-damaged surface couldn't be cleaned to museum-quality standards, so the private collector who owned the painting told Banks he could toss the 16th-century portrait into the trash.
"I didn't have the heart to throw it out," Banks said with a smile.

JaneEHawes@cs.com

Caption: (1) GRAPHIC
(2) PHOTO
(3) The serene beauty of
St. Albans Church's painting
Mary Magdalene, covered with years
of soot and grime, shines through at right after being cleaned using the atomic-oxygen process
developed at the NASA Glenn Research Center.
(4) ERIC ALBRECHT | DISPATCH
NASA research engineers Sharon Miller, left, and Bruce Banks use a 500-year-old oil painting to show
the before and after effects of cleaning by the atomic-oxygen process.
Big business in small tech

WINN L. ROBCH
Special to The Plain Dealer

Nanotechnology is a key technology that makes downsizing possible, in part because it is downsizing taken to the extreme.

Dealing with things measured in billionths of a meter — nanotechnology — reduces bulk materials to mere clusters of atoms. Add nanotechnological materials to today’s plastics, for example, and they become both lighter and stronger.

Ron Clark is president of the trade group Ohio Polymer Enterprise Development in Akron, one of several groups in the state hoping to help businesses here capitalize on the new technology.

He knows such small stuff can be big business. Ohio’s economy stands to gain billions from exploiting nanotechnology. It may be the key to the state’s industrial future, at least if it moves from laboratory to business.

And for some, that’s the rub. Although Ohio is a hot spot in the development of nanotechnology, the climate here for bringing it to market is so cold it’s putting the freeze on business development.

Promising as it is, nanotechnology often takes a back seat to MEMS, Micro Electro-Mechanical Systems, in popular imagination. MEMS means stuff that’s smaller still, a thousandfold smaller, pushing the scale down so far that the moon would shrink to the size of a pea. At that scale, the world changes dramatically. Ordinary materials act strangely.

If you get things small enough, they melt at different temperatures — usually lower — have different optical effects, electrical effects and magnetic effects, said William W. Gerberich, professor of chemical engineering and materials science at the Institute of Technology of the University of Minnesota.

Some materials become harder — nanoparticles of silicon become nearly as hard as diamonds. Catalysts become more active. Electrical circuits develop strange behaviors.

Nanotechnology exploits these effects to create new materials and products. For example, adding nanoparticles of clay to some plastics raises their melting temperatures enough to make possible plastic intake manifolds for automobile engines. Nanothin coatings dramatically alter the performance of optics.

“My business is to take inexpensive things, coat them with something you cannot see and make them valuable,” explained Scott Rickert, president and CEO of Nanofil, which layers optics with coatings one molecule thick at a time.

Nanotechnology found four major application areas in industry — in electronics, basic materials, medical applications and tools.

Of these, nanoscale particles embedded in polymers hold promise of the most immediate economic benefits for Ohio businesses, tying into industries where the state is already strong. Ohio ranks among the top five in the plastic/polymer industry and is No. 1 in some areas.

“The total market for just mixing stuff — that is, taking a resin from Dow or DuPont and mixing in color or other components — is almost $9 billion in the U.S., and Ohio has the biggest chunk of that, about a quarter,” said Robert Monter, senior technology specialist for the Wright Technology Network in Dayton.

Nanomaterials have already found their way into commercial polymer products. “A number of different materials are starting to be used by the plastics industry,” Monter continued. “Compounders and those who manufacture plastic parts are incorporating nanomaterials for a variety of reasons — to improve the temperature at which plastics can be used, to

“Incorporating nanotechnology in new products is key to maintaining our position in the economy.”

Ron Clark, president of the Ohio Polymer Enterprise Development
add flame retardancy, to improve physical properties such as tensile strength and modulus, even to increase the oxidation resistance of the material."

To stay competitive in today's tough international market, the Ohio polymer industry must aggressively embrace nanotechnology, Clark believes.

"Incorporating nanotechnology in new products is key to maintaining our position in the economy," he said. "Commodity plastics are moving overseas fast. To replace that we've got to move into more advanced materials to produce composites they cannot."

On a more practical level, polymer companies need to take advantage of nanotechnology to satisfy the needs of their customers.

"Ohio's plastics companies are very much entwined with the auto industry," Monter said. Because the auto industry continues to substitute plastic for metal to reduce weight and improve fuel efficiencies, the industry continues to look for improvement in the performance of plastic materials.

Other applications for nanotechnology and nanomaterials that involve other Ohio industries loom.

For example, adding a tiny percentage of carbon nanotubes to a plastic can make it conductive, an effect the Air Force is studying for use in battery electrodes.

Nanoparticles also hold promise for the petroleum industry. You can put them in fuels to make them burn cleaner and more efficiently, Monter said.

Nanomaterials are also key to making fuel cells practical, Clark said.

Ohio is a major player in developing these technologies. Several universities in the state have research programs in nanotechnology (as well as MEMS). These include Case Western Reserve University, Kent State University, Ohio State University, the University of Akron and the University of Cincinnati.

In addition, Ohio hosts two large federal research facilities actively working on nanotechnology - NASA's Glenn Research Center, where Dr. Bruce Banks is testing a nano-texture surface treatment that could help spacecraft get rid of excess heat. Also, there's the Air Force Research Laboratory at Wright-Patterson Air Force Base in Dayton.

Exploiting this research is another matter entirely. Commercializing any new product or technology requires investment capital, and that's where the nanotechnology community sees Ohio failing.

"The venture capital market in Ohio is not good, and that holds business back from being able to progress rapidly in what is a highly competitive area," observed Jim Mazzella, CEO of Five Star Technologies Inc. in Cleveland.

"The attitude of local venture capitalists seems to be once burned, forever shy," said Dave Lupyan, director of business development for Nanofilm, who believes that investors haven't recovered from the technology industry crash.

Government money has helped. Many nanotechnology companies depend on the Small Business Innovation Research program run by the Department of Defense. But for some, that's not enough.

"There hasn't been enough government money going into it for commercialization to have a significant impact," Mazzella said. "While the state has done good work in supporting the technology, those things don't take the place of the much larger venture dollars needed to commercialize technologies in a big way."

"There's more at stake than a few new products, however. Nanotechnology, many believe, will be the next big thing. It holds the potential for changing, if not the world, all of modern industry."

"Nanotechnology is going to be an amazing revolution in everything," Rickert said. "Whenever you have a change in material science, it has far more impact than a change in a device. Plastics and silicon wafer fabrication fundamentally changed material science. I just think that it is a guarantee of what will happen with nanotechnology."

Rosch is a Shaker Heights free-lance writer.
Dr. Bruce Banks of the NASA Glenn Research Center holds, at left, a nano-textured surface he created. In his other hand is the graphite surface before treatment. The textured surface could help spacecraft lose excess heat. Behind Banks is an atomic oxygen beam facility that simulates the atmosphere of low earth orbit.
The Security Management and Safeguards Office (SMSO) recently presented Bruce Banks, chief of Glenn’s Electro-Physics Branch, with the first NASA Counterintelligence (CI) Program award. The award recognizes sustained commitment to protecting the security interests of NASA and the United States.

This award recognizes an individual the SMSO feels consistently supports the CI objectives and missions, reports potential foreign technology collection, and integrates counterintelligence principals into their daily work effort. A plaque, which accompanies the award, will be rotated throughout the Center every 6 months.

"It is through the involvement and efforts of employees like Bruce Banks that help ensure the protection of essential U.S. technologies," said Charles Scales, Director of Center Operations.

The NASA CI Program was officially ratified February 27, 2002, with the signing of NPD 1660.1, NASA Counterintelligence Policy. The program was designed for the propose of detecting, deterring, and neutralizing threats to NASA personnel, facilities, programs and projects by Foreign Intelligence Services, other foreign entities, and domestic or international terrorists.

The SMSO oversees the CI program at each NASA center with the objective of creating awareness and interacting with NASA programs and their representatives to recognize and report suspected foreign intelligence collection activities.

"CI integration strengthens the overall security program by promoting early identification and referral of cases involving possible espionage," explained David Malcom, SMSO special agent/counterintelligence at Glenn. "CI involvement also enhances security applications in terms of targeting and methods of operation. The success of a center’s CI Program heavily depends on the involvement and reporting by its employees."

Glenn has integrated counterintelligence principles and the use of classified foreign-collection threat information to improve the activities within programs to include risk management, threat awareness, illegal technology transfers, and preventing espionage. Based on Glenn employees reporting of suspicious activity, the SMSO is able to build upon previously observed trends of collection interest and activity by foreign companies and governments against the Agency.

In the last year the SMSO has made a concerted effort to facilitate employee reporting and involvement. Employees can now report suspicious activity by using the following e-mail address safeguards@grc.nasa.gov.

Center Director Julian Earls congratulates Banks on receiving the first CI Program award.
In recent months, Plum Brook Station's Reactor Facility Decommissioning Project might be compared to an archeological dig, as tons of fixed equipment were removed from below ground level. In May, workers finished fixed equipment removal (FER) in the containment vessel, the largest concrete structure formerly home to the reactor, and to quadrants and canals once filled with water and drained when the Reactor Facility was shut down in 1973. They also removed electrical and plumbing systems in another containment vessel area, the annulus, which extends from ground level to 25 feet below grade. The annulus contained many of the control systems once used in the reactor experiments.

In June, FER was completed in the hot retention area, which consisted of an earthen berm atop a concrete vault containing eight steel tanks located 90 percent underground to a depth of 25 feet. When the reactor was operational, the tanks held contaminated water until radiation levels had been sufficiently reduced and it could be pumped into the cold retention area (CRA). NASA will soon begin work in the CRA, where according to Senior Project Engineer Keith Peecook, groundwater was found and sampled to assure it was clean. The groundwater will be pumped into a clean area of the Pentolite Ditch in accordance with discharge limits set by the Ohio Environmental Protection Agency. Once the groundwater is removed, NASA will analyze the concrete to determine what can remain in place, since most of the CRA is located 3 feet below grade. The remaining removal work should be completed by the summer's end. To date, NASA has sent 8 million pounds of low-level radioactive waste (mostly FER) to the Envirocare-licensed disposal facility in Utah. Peecook noted that finishing this task is "a major step forward in completing the decommission project."

NASA is proceeding with decommissioning the closed Reactor Facility at Plum Brook Station. With public safety as its number one priority, NASA has selected the safest and most thorough approach to reduce residual radiation levels so that the Reactor Facility site will be safe enough to use for any purpose in the future.

Reactor Facility decommissioning update

For further information on the decommissioning project, visit http://www.grc.nasa.gov/WWW/pbrf/

Glenn earns 10 Space Act Awards

Ten Glenn-developed technologies were recently selected to receive 2005 NASA Space Act Awards by the NASA Inventions and Contributions Board. Space Act Awards are monetary awards for outstanding scientific or technical contributions sponsored, adopted, supported, or used by NASA that are significant to aeronautics and space activities.

Engine airframe structural system analysis tools
Dr. Charles Lawrence and Dr. Kelly Carney, Structures Division

Fully suspended five axis three-magnetic bearing dynamic spin rig with forced excitation
Carlos Morrison, Andrew Provenza, Dr. Anatole Kurkov, Gerald Montague (U.S. Army), Dr. Kirsten Duffy (UNIT), Oral Mehmed, Dr. Dexter Johnson, and Ralph Jansen (UNIT), Structures Division

COBRA-AHS rolling element bearing design software

Developing a method of hydroforming dish grids and making spall-resistant anodes for ion thrusters
Bruce Banks, Power and Electrical Propulsion Division

Turbomachinery analysis software
Dr. Roderick Chima and Dr. Meng-Sing Liou, Propulsion Systems Division

Time-Accurate QuiaS-One Dimensional Reactive Code for Design and Analysis of Gasdynamic-Based Propulsion Systems
Dr. Daniel Paxson, Instrumentation and Controls Division

Software for system controlling a magnetically levitated rotor
Carlos Morrison, Structures Division

Thermal barrier and solid rocket motor joint design
Dr. Bruce Steinetz and Pat Dunlap, Structures Division

Spreadsheet for tracking an evaporating droplet for multiple fuels
Dr. Cecil John Marek, Propulsion Systems Division, and Dr. Ka Heng Liew, Egel Urip, and Song-Lin Yang, Michigan Technological University

Antenna near-field probe station scanner
Dr. Felix Miranda, Dr. Afroz Zaman, Dr. Richard Lee, Philip Barr, and Kevin Lambert (ANLX), Communications Division; and William Darby, Research Testing Division ◆
iTA helps remove any doubt

BY S. JENISE VERIS

NASA has taken a significant step toward ensuring safe and reliable operation of future shuttle missions by establishing a position within the Agency known as the Independent Technical Authority (iTA). The iTA is structured so that those who have responsibility for the operations of high-risk technologies have an equal voice in the process of determining technical and safety readiness.

As the iTA, NASA’s Chief Engineer Rex Geveden leads the Agency’s challenge of renewing a technical conscience independent of program schedules or costs. Last year, former Administrator Sean O’Keefe implemented the iTA as part of the Agency’s Transformation following the recommendations of the Columbia Accident Investigation Board and the Presidential Commission on Implementation of U.S. Space Exploration Policy.

Geveden has sole waiver-granting authority for establishing, approving, and maintaining technical standards across the Agency. He has developed a technical warrant system to execute a robust iTA formal process that delegates technical authority to competent individuals at NASA field centers. Forty-two technical warrant holders across the Agency conduct and oversee high-risk technical work on a daily basis in order to ensure safe and reliable operations and missions. A warrant holder can be either assigned for a technical discipline or for the system integration of a total vehicle or program system.

Following a visit to Glenn in March, Geveden chose three technical warrant holders: Robert Jankovsky, Electric Propulsion Branch chief, holds a discipline warrant for electric propulsion; Dennis Rohn, Systems Engineering and Integration Branch, holds a systems warrant for Fluids and Combustion; and Richard Shaltens, Thermal Energy Conversion Branch chief, holds a discipline warrant for Nuclear Systems and Power Generation. More recently, Bruce Banks, Electro-Physics Branch chief, was selected a discipline warrant holder for Induced Environments—Chemical.

In order for warrant holders to fulfill their daily responsibilities, Center Director Dr. Julian Earls has authorized Glenn’s Chief Engineer Jose Vega to manage the negotiations and documentation of iTA requirements by procuring trusted agents (TAs) who will provide support to Agency warrant holders. TAs act as the "eyes and ears" of a warrant holder. By suggesting technical assignments and training programs to ensure the technical skills of staff in the warrant holders’ area remain current, TAs assist, when requested, in discharging a warrant’s responsibilities. To date, 15 Glenn employees have been appointed TAs—half of which support warrant holders at other centers. They include:

- TAs for Glenn: Mike Patterson, Dave Manzela, George Soulas, Luis Pinero, Lee Mason, Mike Barrett, Jeff Schreiber, and Rick Wiedenmannott
- TAs for Langley: Dr. Damodar Ambur, Dr. John Gyetkenyesi, Dr. Pappu Murthy, and Dr. Timothy Gabb
- TA for Johnson: James Yuko
- TA for Marshall: William Schoren
- TA for Stennis: James Zakany

"The iTA represents a cultural transformation in technical decisionmaking across the Agency," Vega said. "Identifying the technical warrant holders and TAs makes the technical community more aware that there is a process in place that will elevate an unresolved technical concern, exhausting normal channels, so that it reaches the highest level."

Vega plans to conduct dialogue sessions with all technical organizations at Glenn to increase employee awareness of the iTA process. Look for updates about iTA in NASA’s ASK Magazine as well as training modules and workshops for technical warrant holders and TAs on Today@Glenn.
Forty-Year Service Awards

Bruce A. Banks, Electro-Physics Branch
William K. Coho, Diagnostic and Data Systems Branch
James L. Dolce, Advanced Electrical Systems Branch
Dr. Julian M. Earls (Retired 01/02/06), Office of the Director
Dr. David P. Fleming, Systems Management Branch
Ernest R. Flower, Jr., Operations Management Branch
Robert J. Freedman, Facility Management and Planning Office
John B. Haggard, Jr., Mission Operations and Integration Projects Office
Pamela Kotlenz, CIO Policy and Planning Office
Hugh M. McLaughlin, Logistics and Technical Information Division
John A. Mihevic, Systems Management Branch
Dr. Stephen V. Pepper, Tribology and Surface Science Branch
John P. Riehl, Space Propulsion and Mission Analysis Office
Richard C. Spangle, Aviation Environments Technical Branch
Vincent J. Scullin, Experimental Data Software Branch
Charles M. Spuckler, Ceramics Branch
Adele C. Szuhai, Space Systems and Grants Branch
Sherrill K. White, Security Management and Safeguards Office

Editor's Note: Recipients of other awards recognized at the ceremony were published previously in the AeroSpace Frontiers. They include Senior Executive Service Appointment, Presidential Rank Awards and Procurement Supervisor of the Year Award.
International Space Station materials return to Earth

Glenn researchers and students recently received an important package that they have been anxiously awaiting for more than 4 years.

On November 14, members of the Electro-Physics Branch and students from Hathaway Brown School opened the Polymer Erosion and Contamination Experiment (PEACE).

Part of the Materials International Space Station Experiment (MISSE), PEACE was attached to the outside of the International Space Station after launching aboard STS-105 in August 2001. Originally planned to be retrieved in 2003 after 1 ½ years of exposure, the experiment was retrieved during the STS-114 Return to Flight mission after 4 years of space exposure.

Now that the polymer samples are back, Glenn researchers will analyze them to determine how well they withstood the harsh environment of space. So far, PEACE principal investigator Kim de Groh is happy with what she has seen.

"The samples look very interesting," she said. "A few were completely eroded away, many are degraded in varying degrees, and several still have a pristine appearance. So we have a wide range of degradation results to analyze."

In 2001, four Hathaway Brown high school students helped de Groh prepare the samples for flight. Those students have since graduated and passed the torch to a younger team. They will assist de Groh and co-investigator Bruce Banks by conducting numerous analyses of the samples.

Polymers are long-chain molecular materials often used for spacecraft applications because of their light weight and flexibility. Data from this long-duration space experiment is quite unique, according to de Groh, and will provide valuable information for spacecraft design purposes.◆

This article was written by Jan Wittry, SGTI/Community and Media Relations.
Honor Awards
Continued from page 1

Kevin P. Coleman
For exceptional service in records, forms and history program development and management.

Joyce A. Dever
For exceptional service in providing technical excellence and fostering effective collaborations vital to mission success.

Gene Fujikawa
For outstanding technical and management leadership in digital communications for advancing space missions.

Frank J. Greco
For sustained leadership in advancing the Agency’s safety and mission assurance engineering discipline.

Michael A. Heryak
For exceptional contributions and success in developing customer-focused networking and communications services for NASA.

Dale A. Hopkins
For exemplary leadership in providing breakthrough technologies for jet engine fan cases/containment systems and engine "blade-out" failure event simulation.

Avis V. Hudson
For knowledge, dedication and outstanding leadership skills that have significantly contributed to GRC’s visibility in local, regional, and national outreach efforts.

James E. Hunter
For significant and sustained impact to many important NASA programs.

Dr. Felix A. Miranda
For outstanding technical and managerial leadership in Antenna and Microwave Technologies for Space Communication.

Dr. Elizabeth J. Opila
For outstanding accomplishments in the area of high-temperature degradation and durability of advanced ceramic material and its successful impact on aeronautics and space efforts.

Timothy C. Pierce
For dedicated service, technical skills and judgment in providing excellent procurement services to NASA programs and the Glenn Research Center.

David A. Sagerser
For significant and sustained performance within NASA’s Advanced Aircraft Program and exceptional ingenuity in building successful collaborative relationships with the Department of Defense.

Kathleen E. Schubert
For exceptional abilities and accomplishments in integrating flight project activities at Glenn Research Center.

Tony D. Shook
For sustained engineering excellence and exceptional contributions to GRC’s in-house turbine engine noise-reduction projects.

Dr. David L. Urban
For outstanding technical and managerial leadership that has enabled significant enhancements to combustion science and fire safety in microgravity environments.

Lynne M. Wiersma
For many years of exceptional support to the Center’s program and project organizations.

Dr. Mary V. Zeller
For outstanding technical and outreach excellence as a successful manager and steward for the Agency.

Exceptional Administrative Achievement Medals
Myrtle L. Collins
For outstanding administrative support of the Office of the Director and NASA Glenn Research Center.

Linda Smeck
For dedication and excellence in providing secretarial support to the engineers and support personnel.

Outstanding Leadership Medals
Bruce A. Banks
For outstanding leadership and exemplary service to NASA and its customers.

Mary C. Lester
For outstanding leadership in all areas of the Logistics and Technical Information Division activities and in support of the Center’s focus on safety.

Equal Employment Opportunity Medals
Dr. Jih-Fen Lei
For exemplary commitment to and support of NASA Glenn Research Center’s equal opportunity programs and goals through mentoring, coaching and advocacy.

Frank Robinson
For exemplary commitment to and support of NASA Glenn Research Center’s equal opportunity programs and goals.

Group Achievement Awards
The following awards represent the outstanding performance of team alliance uniting Glenn personnel with those from other NASA centers, government agencies, industry, and academia to develop products and

Continued on page 3
IR&D Fund Boosts Tomorrow’s Technology

Where do you go for funding if you have an unproven idea that you believe could provide high payback to a current Glenn or NASA program or might open an avenue for a new future effort?

A few years ago, a small group of Glenn researchers deduced that aerogels, an extremely fragile insulating material used in limited applications, could be made a lot stronger. They applied for modest funding under Glenn’s Independent Research and Development (IR&D) Fund. By modifying the surface chemistry of aerogels, the research team created a new family of aerogels that are, pound-for-pound, ten times stronger than steel.

This achievement was recognized for its breakthrough technology with the Nanotech Briefs magazine Nano 50 Award and NASA’s Inventions and Contributions Board Exceptional Space Act Award. This work is now supported by several projects within the Aeronautics program. Additionally, commercial applications are being developed with two industry partners through the Glenn Alliance for Technology Exchange.

Lynn Capadona, Systems Engineering Branch, with an aerogel. Credit: NASA/Michelle Murphy

Like the aerogel team, other Glenn researchers who believed their ideas could make a technological difference have utilized the IR&D Fund to bring an idea in its infancy to enough maturity to advocate for traditional sources of funding.

The IR&D Fund is currently funded at approximately 1 percent of the center’s overall budget, which is a typical funding level for this type of activity at other NASA centers and in industry. Despite this modest investment, between Fiscal Year 01 and Fiscal Year 04, research supported by the IR&D Fund accounted for 20 percent of all patents awarded to Glenn and for 10 percent of all Disclosures of Invention filed by Glenn researchers. Pretty impressive!

The IR&D funding level has fluctuated over recent years as the center continues to struggle with increasing demands on its overhead accounts. When sufficient funding is available, the Chief Scientist’s office issues a call for new IR&D proposals. IR&D efforts are typically funded for a maximum of three years, subject to an annual progress review.

Current IR&D efforts range from improving satellite measurements of rainfall (a joint effort with Goddard Spaceflight Center) to improved models of lunar dust. For more information on all current IR&D activities and past successes, I encourage you to visit the IR&D website at http://www.grc.nasa.gov/WWW/5000/IRD/.

Web Site Features NASA Medical Spinoffs

This animated human body lights up targeted body systems to highlight the space program’s contributions to medical science. Credit: NASA

Glenn’s Web Portal Team recently created a new interactive Web site titled “NASA Anatomy: How Space Technology Improves Human Health.” Developed in Flash, this online feature highlights the space program’s contributions to medical science. An animation of the human body acts as an interface to view nine short videos that describe how space technology has aided the treatment of various body systems. Topics covered include medical imaging, sorbent dialysis, robotic surgery, vision screening and much more.

NASA Anatomy was published on the agency’s Web portal in the NASA.gov Spinoffs section, as well as NASA Glenn’s Web portal multimedia section. It was also included in an agency press release announcing the American Medical Association’s endorsement of human spaceflight. The team that created the feature included Kathleen Zona, Jan Wittry and Jenniier Sapienza, Community and Media Relations Office; and Emery Adanich, Erik Mindke, William Fletcher and Gary Nolan, Imaging Technology Center.

To view NASA Anatomy and other interactive features, visit www.nasa.gov/centers/glenn/multimedia.

Retirements

Bruce Banks, Space Environmental Durability Branch, retired on August 3, 2007, with 43 years of federal service, including 41 with NASA.

Betty Jane Waszil, Logistics and Technical Information Division, retired on July 3, 2007, with 43 years of federal service, including 41 with NASA.
Banks Awarded Patent

The U.S. patent entitled "Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring," was awarded to Bruce Banks, ALPHA/Space Environmental Durability Branch. The patent focuses on a process for developing a fiber optic glucose measurement technique that measures human blood samples that can be much smaller than those examined through conventional glucose measurement. Questar Medical, Inc., Minneapolis, Minn., has been developing the instrumentation for commercializing this new technique with Glenn, through reimbursable space act agreements. The textured, fiber optic blood glucose monitoring devices for diabetic applications allow blood sampling to be taken from low-sensitivity body locations rather than the conventional pricking of finger tips.

Calendar of Events

NASA SCHOLARSHIP FUND: Applications are now being accepted for the NASA College Scholarship Fund, Inc. The Texas, nonprofit corporation, was established to award scholarships to qualified dependents of NASA and former NASA employees, agency-wide. The scholarship fund was established as the direct result of a substantial unsolicited gift offer by the noted Pulitzer Prize winning author, James A. Michener, who initiated the gift after being inspired by the achievements of the hardworking NASA employees and his desire to promote education. Up to six scholarships will be awarded in the amount of $2,500 each in this 26th year of the program (2008-2009 school year).

This renewable scholarship is for a maximum of $10,000 over 6 calendar years. Applicants must be pursuing a course of study in the science or engineering field that will lead to a recognized undergraduate degree at an accredited college or university in the United States. Applications MUST be received at JSC no later than March 20, 2008. For additional information and to access the application online visit the following URL: http://nasapeople.nasa.gov/nasascholarship/index.htm. Questions can be directed to Lynne Sammon, Glenn NCSF Point of Contact, 216-433-3952.

DONATIONS FOR JASON KOLECKI: Jason Kolecki, Jr., grandson of Joseph Kolecki, who retired from Glenn last year with more than 38 years of service, has been diagnosed with Acute Myelogenous Leukemia. He is undergoing extensive chemotherapy at Rainbow Babies and Children's Hospital. Donations to assist the family in paying medical bills can be deposited into a temporary savings account, number #95777, at the Century Federal Credit Union under Joseph Kolecki's name until an account can be set up in Jason's name.

NASA 2007 SPINOFF MAGAZINE AVAILABLE: The 2007 NASA Spinoffs magazine highlights NASA-sponsored research and technology that has been transferred to the private sector. This technology not only supports NASA, but they also enhance the quality of life in hospitals, homes and community. Log on to http://www.sti.nasa.gov/tto/Spinoff2007/index.html

FEBRUARY THIRD SATURDAY EVENT: On Saturday, February 16, the Visitor Center will present "NASA in Cleveland." Join us for a discussion about NASA Glenn Research Center's origins in Cleveland, and find out how the research center continues to be an integral part of Northeast Ohio. For more information, contact the Visitor Center at 216-433-9653 or log on to http://www.nasa.gov/centers/glenn/events/vc_February.html

2008 THIRD SATURDAY EVENTS SET: Glenn's Visitor Center will provide opportunities to learn first-hand about some of the exciting work being done by the nation's aeronautics and space agency at the Third Saturday Events scheduled for 2008. To view the listing, visit http://visit.grc.nasa.gov.

RETIRED WOMEN'S LUNCHEON: The next NASA Retired Women's Luncheon will be Thursday, February 21 at noon at Italian Village, 1605 Pearl Road in Strongsville. Contact Gerry Ziemba at 330-273-4850 or gto64gerry@yahoo.com for information.

AFGE MEETING: AFGE Local 2182 will hold its next monthly membership meeting on Wednesday, March 5 at 5 p.m. at Denny's Restaurant, 25912 Lorain Road, North Olmsted.

LESA MEETING: LESNIFPTE, Local 28, will hold its next monthly membership meeting on Wednesday, March 12, at noon in the Employee Center.

WOMEN'S HISTORY MONTH OBSERVANCE: You are invited to attend the Women's History Month event featuring Cynthia Crane, author and speaker, on March 12 from 9-11 a.m. (location to be determined). Crane will talk about media representations of men and women. Refreshments will be served.

GIVE THE GIFT OF LIFE: The Bloodmobile will be set up in the Administration Building Auditorium from 8:30 a.m. to 3:30 p.m. on March 10 and 11.

MARCH THIRD SATURDAY EVENT: On Saturday, March 15, the Visitor Center will present "Space Communications." Learn how NASA uses the latest technology to communicate with robotic missions throughout the solar system, and how the agency will communicate with astronauts on future missions to the moon. For more information, contact the Visitor Center at 216-433-9653.
Seven Glenn employees were selected as Space Flight Awareness (SFA) honorees and invited to attend STS-119 launch festivities at NASA Kennedy Space Center as reward for their contributions to NASA’s Human Space Flight Programs. The STS-119/Discovery mission duration was March 15 to March 28.

The SFA Award, coordinated by NASA Johnson’s Office of Space Flight, is one of the most prestigious awards available to employees of NASA, industry, space shuttle and International Space Station teams. The following Glenn employees’ contributions were recognized:

David Carek, Systems Engineering & Analysis Division, for dedicated support as Glenn’s Lead Systems Engineer of the Extravehicular Activity (EVA) Power, Avionics and Software team, and for requirements definition and early exposure of Constellation Program software risks.

Trudy Kortes, Service Module Project Office, for leadership in the vehicle development process and in critical areas supporting the fundamental elements of safe and successful spaceflight as the Project Orion Service Module Test and Verification manager.

Sharon Miller and NASA retiree Bruce Banks, Alphaport/Space Processes and Experiments Division, for predicting the durability of the multilayer insulation blanket on the Hubble Space Telescope (HST). They used a combination of advanced space flight- and ground-based testing and analysis to reduce physical risk to astronauts as well as significant costs by eliminating a difficult EVA from a HST servicing mission.

Monica Palivoda and Lynne Wiersma, executive support assistants for the Space Flight Systems Directorate, for commitment, enthusiasm and excellence in managing the Space Flight Awareness Program at NASA Glenn.
Glenn Earns Eleven Space Acts

Continued from page 1

• Atomic Oxygen Textured Surfaces for Blood Glucose Monitoring Relating to Control of Diabetes. Bruce Banks (ALPH), Space Environment & Experiments Branch, is the recipient of an ICB Exceptional Award for the second year in a row.

• Optical Actuation Technology developed by Dr. Grigory Adamovsky, Communications, Instrumentation and Controls Division, Sergey Sarkisov, SS Optical; and Michael Curley, Alabama A&M University.

• Cellular Reflect Array Antenna developed by Dr. Robert Romanofsky, Communications, Instrumentation and Controls Division

To learn more about these innovations or to apply for Space Act Awards, contact Laurie Stauber, Glenn's awards liaison officer, Technology Transfer & Partnership Office, at 216-433-2820.

—BY S. JENISE VERIS and LAURIE STAUBER
B r u c e  B a n k s  (A L P H ), Sharon Miller and Debo-rah Waters (ASRC) in the Space Environment & Experiments Branch are the recipients of the 2009 Federal Laboratory Consortium (FLC) Award of Excellence in Technology Transfer, which was presented at the FLC National Meeting, May 7. The award honors laboratory employees (and their commercial partners) for outstanding achievement in advancing the mission of transferring federally developed technology to the marketplace. The Glenn team is honored for their work in Atomic Oxygen-Textured Surfaces for Blood Glucose Monitoring. For nominations to the FLC and other NASA technology awards and incentives, contact Laurie Stauber, Technology Transfer & Partnership Office.
Polymers Experiments Yield Valuable Data

This past November, members of the Space Environment and Experiments Branch and local students received a special delivery from the International Space Station (ISS).

The package was Glenn's Stressed Polymer Erosion and Contamination Experiment (PEACE) Polymers experiment, flown as part of the Materials International Space Station Experiment 6 (MISSE 6). MISSE is a series of flight experiments that are mounted on the exterior of the ISS, exposing thousands of material samples and devices to the space environment. MISSE 6 included both active and passive experiments. When retrieved from space, researchers test the samples, such as the passive samples in Stressed PEACE Polymers experiment, for their long-term durability in the harsh environment of space.

PEACE is a collaboration between students at Hathaway Brown School for girls in Shaker Heights and Glenn researchers that began in 1998 and has continued through the years. Through the collaboration, students have been able to perform research in a professional environment, attend international conferences and co-author technical papers. In addition, the students have entered their NASA research in prestigious national and international science fairs and have won scholarships and awards. Students will now analyze the latest retrieved samples to determine how well they withstood the space environment.

Data derived from the Glenn-Hathaway Brown collaboration has proven to be a valuable resource in the field of spacecraft materials in and outside of NASA.

—BY DOREEN B. ZUDELL
Awards, Honors and Promotions

Employees Rewarded for Making Safety a Priority

Tom Hartline, Safety and Mission Assurance director, presented the following employees NASA’s Quality and Safety Achievement Recognition (QASAR) award for their roles to ensure the overall quality and safety at NASA Glenn.

Laurel Gaab, an Alphaport (ALPH) employee in the NASA Safety Center Mishap Investigation Support Office, for Gaab, center, with ALPH supervisor Kristen Easton and Safety Director Hartline. outstanding skills applied to create new mathematical formulas for analyzing safety data from mishap investigations in new ways that increase data quality to better serve the NASA community at large and help achieve mission success.

Donald Gurney, a Sierra Lobo, Inc. employee supporting the Plum Brook Management Office as the Test Facilities, Operations, Maintenance and Engineering (TFOME) training coordinator, for demonstrating outstanding conviction to ensure NASA’s critical lift safety standards are being fully met.

Peter Klein, deputy chief of the Space Combustion and Materials Branch, for his leadership and example in demonstrating the value of safety training among his staff to ensure what they learn is implemented for a safe workplace environment.

To learn more about the QASAR award or nominate fellow civil servant or support service contract employees, visit http://smad-ext.grc.nasa.gov/smad/gov/qasar_award.shtml.

Photos by Eli Abumeri Gurney, left, with Plum Brook Director David Stringer. Klein, center, with Facilities and Test Director Dr. Rickey Shyne and Safety Director Hartline.

FLC Salutes Excellence

The Federal Laboratory Consortium (FLC)/Midwest Region presented its 2011 Excellence in Technology Transfer Award to the team of Michael Piszczor, Photovoltaics and Power Technologies Branch, and Mark O’Neill, Entech Solar, Inc., for “The Stretched Lens Array (SLA): Ultra-Light, Affordable Green Energy Technology.” SLA is a high-performance, ultra-light solar concentrator technology applicable for both ground and space that was developed with federal grants and transferred to the marketplace. SLA was tested and optimized through NASA’s Deep Space 1 mission and is now being used for the launch of Entech Solar’s new terrestrial product, the SolarVolt™ module.

Laurie Stauber, Innovation Project Office, received the “Midwest Regional Coordinator’s Excellence Award—FLC Laboratory Representative of the Year.” She was recognized for developing innovative ways to establish partnerships via conferences, forums and advertising. Stauber also helped raise the visibility of Glenn research through trade magazine articles and overseeing Banks

Professional Honors Presented

The SAE International Association presented the 2010 Clarence “Kelly” Johnson Aerospace Vehicle Design and Development Award, in October, to Bruce Banks, a NASA retiree and current Alphaport senior physicist who supports the Space Processes and Experiments Division. Named for Johnson, the founder of Lockheed’s Skunk Works, the award honors significant contributions to the innovative design and development of advanced aircraft and/or spacecraft. Banks was selected for development of atomic oxygen durable solar array blankets used for the International Space Station estimated to have saved $15 billion in repairs, and the hydroformed ion optics and spall-resistant surfaces that enabled ion thrusters to operate on the Deep Space One and Dawn missions.

The Society of Women Engineers (SWE) presented the Judith Resnik Challenger Medal to Kim de Groh, a senior materials research engineer in Glenn’s Space Processes and Experiments Division, in October. Named for SWE member and astronaut, Dr. Resnik, the award is reserved for specific engineering breakthrough or achievement that has expanded the horizons of space exploration. deGroh was selected for exceptional materials performance expertise and for playing a crucial role in the success of the Hubble Space Telescope mission.