THE AMES Astrogram
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD
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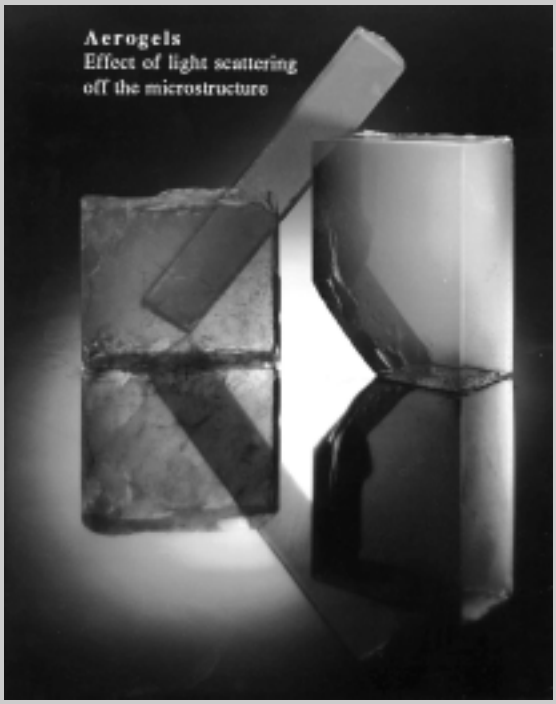
Concept for spacecraft 'solid smoke' tiles can be used on Earth



A new concept for spacecraft tiles can be used on Earth to make efficient, vacuum-like insulation for refrigerators, furnaces and automobile catalytic converters.

The new material is similar to that used for the tiles on the Space Shuttle to protect the vehicle from the heat generated during reentry into Earth's atmosphere. However, the new tiles have a layer of aerogel, or 'solid smoke,' mixed into the tile's air spaces.

"Solid smoke, or aerogel, works like a vacuum layer because it's a great insulator," said aerogel tile co-inventor Ames' Dr. Susan White. "The new aerogel tiles can insulate spacecraft from 10 to 100 times better than today's tiles."

Aerogel is made of silica, alumina and carbon, as well as other materials, and weighs very little. "The aerogel used to fill the air spaces inside the tiles is like strings of nanosized pearls all tangled up," White said. A nanometer is a billionth of a meter.

The fibers that form the tiles are mostly a mixture of silica and alumina oxides, according to co-inventor Dr. Daniel Rasky, also of Ames.

The spaces inside the untreated spacecraft tiles are less than a millimeter wide.

"The reason the aerogel-tile composite will act as a great insulator for keeping freezers cold, or automobile catalytic converters hot, is that air flow through the tile is almost completely blocked by aerogel," White said. "It is like having a chunk of solid vacuum where you need it."

"Aerogel is very brittle and can't be machined, but spacecraft insulation tiles filled with a layer of aerogel can be cut, machined, drilled and attached to a surface," White said. "Aerogel-tile insulation can be made into different shapes for many uses here on Earth."

The aerogel space-tile material could be used in commercial products that require mechanically tough super-insulation, such as catalytic converters for cars or specialty refrigeration units. In addition, the new material potentially could be used for furnaces, for liquefied gas transport trucks, or for liquid carbon dioxide, nitrogen or oxygen containers.

The new aerogel tiles could also be used to insulate future spacecraft from the heat of reentry into the atmosphere. "Not only will the aerogel tiles protect future spacecraft from very high reentry temperatures, the materials will also better protect spacecraft from ice that may be formed on the extremely cold fuel tanks when the vehicle is waiting on the pad for launch," White said.

High temperature and environmental testing of aerogel space tiles was conducted at Ames for seven years. A patent is pending for the new material.

BY JOHN BLUCK

State of the Center Address

Center Director Henry McDonald delighted the Ames community with his upbeat, good-news State of the Center briefing on April 29. He summarized the many Ames accomplishments of the past 12 months, and highlighted the Ames' activities that are "extremely relevant" to NASA's strategic plan in each of its four

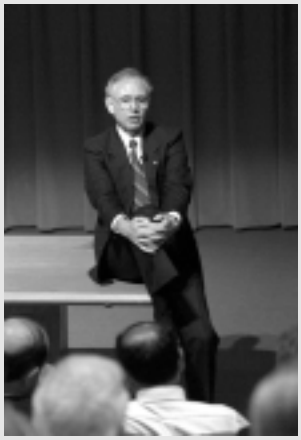


photo by Tom Trower

Dr. Henry McDonald

Enterprises: Aeronautics and Space Transportation Technology, Space Science, Human Exploration and Development of Space, and Earth Sciences. McDonald praised researcher's work in support of Ames' role as the NASA Center of Excellence for Information Technology, and the "lead center" for aviation operations systems, rotocraft technology, and the new Astrobiology Institute. He assured employees that, from his perspective, the future looks very bright for Ames and its research programs.

See related ISO photo on page 5.

Ames ISO Web-site address: http://nasarc1.arc.nasa.gov/iso9000/index1.html

Briefs

NASA remote sensing aids highway planning

The Commercial Remote Sensing Program at NASA's Stennis Space Center, MS, recently applied its comprehensive capabilities to highway routing plans for the Mississippi Department of Transportation (MDOT).

The technology was applied to connecting a route between Hernando, MS, and Collierville, TN. While the specific route is still being planned, by using remote sensing, the planning time may be significantly reduced while the quality of the route is enhanced.

Remote sensing -- the observation of the surface of the Earth from distant vantage points, usually from sensors mounted on aircraft or satellites -- provides images to make detailed maps of selected study areas.

"Urban forests" study to be conducted

Three U.S. cities will partner with NASA and the Environmental Protection Agency to study how strategically placed "urban forests" and the use of reflective surfaces may help cool cities, reduce pollution, lower energy bills, modify growth plans and help mitigate further deterioration of air quality.

Researchers from NASA's Marshall Space Flight Center, Huntsville, AL, will study bubble-like accumulations of hot air, called urban heat islands, and how these change between day and night. To better understand which surfaces contribute or drive the development of heat islands, an aircraft equipped with thermal-imaging equipment will fly over selected cities to take high resolution thermal measurements.

The study will contribute to NASA's Earth Science enterprise which is responsible for a long-term, coordinated research effort to study the total Earth system and the effects of natural and human-induced changes on the global environment.

NASA Temper Foam - a Spinoff success

On May 6, NASA Administrator Daniel S. Goldin received in the NASA Headquarters Auditorium the one millionth pillow produced by Temper-Pedic Inc.

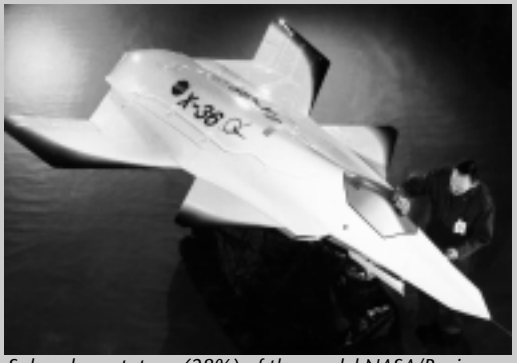
The pillow, made from a foam material, was first developed by Ames for use in Space Shuttle seating and to protect airline passengers in crashes. The Lexington, KY, company's pillows, mattresses and other products are used to treat disorders ranging from sleeplessness to pressure ulcers, commonly known as bedsores.

Temper Foam is a visco-elastic, body-temperature reactive material, which returns to its original form even after compression. The material was recently inducted into the United States Space Foundation's Space Technology Hall of Fame, Colorado Springs, CO.

X-36 team wins 1998 AIAA award

The American Institute of Aeronautics and Astronautics (AIAA) recently presented the 1998 AIAA Design Engineering Award to the NASA/Boeing X-36 Tailless Fighter Agility Research Aircraft Team.

The award recognizes design engineers who have made outstanding technical, educational or creative achievements that exemplify the quality and element of engineering design. Mark Sumich, an Ames aerospace engineer who served as the X-36 project manager, and Bruno Lohmueller of The Boeing Company accepted the award on behalf of the team during an Awards Luncheon at the 39th AIAA Structures, Structural Dynamics and Material Conference held April 21 at the Westin Long Beach Hotel, Long Beach, CA.



Subscale prototype (28%) of the model NASA/Boeing X-36 Tailless Fighter Agility Research Aircraft

"The NASA team is very gratified to be recognized for the success of the X-36 flight test program," Sumich said. "We completed 31 flights in 25 weeks without any incidents, and exceeded our project goals by a significant margin. The aircraft demonstrated exceptional fighter agility," Sumich added. "The development process used for the X-36 is an excellent example of a 'faster, better, cheaper' way to design, build and fly prototype aircraft."

The X-36 is a remotely piloted, advanced-research vehicle that represents a true breakthrough in aircraft design and manufacturing processes. The Boeing Company applied advanced design technology and new Integrated Production Definition (IPD) design processes to make the X-36 an extremely successful program. The aircraft was designed and built in just 28 months, and was rolled out on March 19, 1996 in St. Louis, MO. After an extensive ground test program, the aircraft first flew on May 17, 1997. The complete design and flight test program cost only $20 million, a fraction of the typical cost for a full-scale piloted aircraft to obtain the same flight test data.

In addition to Sumich, X-36 team members from Ames included Gary Cosentino, deputy project manager; Lloyd Corliss, flight controls specialist; and Dwight Balough, stability margin expert. Rod Bailey served as the X-36 program manager. The Boeing team was led by Gary Jennings.

The 1998 AIAA Design Engineering Award presented to the X-36 NASA/Boeing Team is inscribed: "For the implementation of new, integrated product definition design processes and advanced design technology that made the X-36 an extremely successful, low-cost program."

BY MICHAEL MEWHINNEY

May JUG meeting: data visualization using web-based Java

The May JUG meeting will be held on Thursday, May 28 from 2:00 to 3:30 p.m. in the NAS Auditorium Bldg. N-258. Glenn Deardorff from Ames will present his experiences using Java and JavaScript for data visualization on the Lunar Prospector web site.

Lunar Prospector was co-developed by Ames and Lockheed Martin, and was launched from Cape Canaveral last January. Its mission is to search for water ice and various elements in the moon's surface, map its magnetic and gravity fields, and detect tectonic activity.

Java is being used to graphically display near-real-time data from a planetary exploration mission to the global public. This has enabled tens of millions of people around the globe to monitor the spacecraft and view its datastream at the same time as mission scientists.

The presentation by Glenn Deardorff will describe these Java and JavaScript tools, and address the successes and pitfalls in using these technologies as media for sharing real-time mission data with the public.

Check out the Lunar Prospector data visualization web site at: http://lunar.arc.nasa.gov/dataviz. The May meeting will also include a demo of the Sun 'knuckle-top' Java ring and ring reader (first seen at JavaOne) by Pete Paluzzi.

BY SHARON MARCACCI