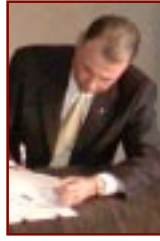




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NEWSLINK

FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER

JANUARY 2002 VOL. 18, NO. 1

FAA Develops, Encourages New Aircraft Safety Technologies

In 1988, the world was stunned when the top flew off an Aloha Airlines aircraft in flight. Caused by structural failure, this accident was the impetus for greater surveillance and research in aircraft safety at the Department of Transportation's Federal Aviation Administration (FAA) William J. Hughes Technical Center, Atlantic City, NJ. As a result, the National Aging Aircraft Research Program today is broad and comprehensive, encompassing every possible problem that may develop in older planes.

Catherine Bigelow, Ph.D., branch manager of the Airworthiness Assurance Research and Development Branch, explained its largest safety program. "In our National Aging Aircraft Research Program, we look at the effects of aging on aircraft. We develop new technologies to inspect for aging, damaged mechanisms like cracks and corrosion." FAA research also includes updating and improving inspection and maintenance procedures to ensure those types of damages are detected properly and repaired in every type of aircraft of a certain age (aircraft age is determined by years, number of flight cycles, and hours flown.)

Safety Goal by 2007

The effects of flight loads on aircraft are also checked, as are the flight regulations for each plane—are they being operated differently than 10 or 20 years ago when the aircraft was designed and certified? And most recently, since the tragic crash of TWA 800 in 1996 and the possibility that the explosion was caused in part by a wiring failure, aging electrical and mechanical systems are the subject of current research.

The FAA has sponsored research at some level since its inception. Today, under the broad umbrella of Aircraft Safety Research, the William J. Hughes Technical Center is working with NASA centers—Langley Research Center, Ames Research Center, Dryden Flight Research Center, Glenn Research Center—and universities and aircraft manufacturers to develop advanced, affordable technologies to make flying safer. The overall goal is to reduce the fatal aircraft accident rate by 80 percent by 2007 and by 90 percent by 2022. If air traffic triples as predicted over the



Using the Magneto-Optic Imager (MOI), an inspector scans the aircraft for cracks and damages.

next 20 years, even today's low rate of less than two accidents per million flights will be unacceptable. Dramatic steps, through joint FAA and NASA research, will assure unquestioned safety for air travellers. "This is all very important to the flying public," said Bigelow.

Engine Failure, Fuel Concerns

In addition to the National Aging Aircraft Program, Bigelow oversees three other programs, including the Catastrophic Failure Prevention Program, where she attempts to answer "what if" questions. For example, in the event of an engine explosion or system failure, what if fragments penetrate the

Please see FAA, p. 5

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FED LABS FLASH

*Technology transfer news, notes, and events
within the federal lab community*

FLC Praised for Assistance

The Department of Justice (DOJ) praised the FLC for its quick action in offering technical assistance to rescue and recovery efforts following the attacks of September 11.

"I am especially impressed with the [FLC's] ability to rapidly disseminate information to its membership about our need for technical assistance and the overwhelming response from member laboratories with offers to help with technology and expertise," said David Boyd, director of the National Institute of Justice's (NIJ) Office of Science and Technology in a recent letter to FLC Chair Ann Rydalch.

Boyd said he "welcome(s) the opportunity to establish a closer working relationship [with the FLC] in support of our ongoing efforts to provide technology assistance and expertise to our nation's public safety community." Further, he stated that "many of the technologies offered by FLC members will be critical to the long-term security of the United States."

Ames Database Provides Information for Diagnosing Animal Disease Outbreaks

Scientists at the U.S. Department of Energy's Ames Laboratory are preparing a new tool that could help in the battle against bioterrorism.

The project utilizes expertise at the Iowa State University (ISU) Veterinary Diagnostic Laboratory to compile an online database of existing information on the most deadly animal diseases that could damage or wipe out the livestock industry and, as in the case of anthrax, infect the human population. The database also includes a list of recognized experts for each of those agents and the diagnostic facilities currently testing for those diseases.

"It provides an invaluable resource to those on the front lines in defending against a bioterrorist threat," said Ames associate scientist Gary Osweiler, director of the Veterinary

Diagnostic Laboratory at ISU and a principal investigator on the project. "It will help veterinarians more quickly diagnose potentially deadly diseases, which in turn may help stop the spread of those agents."

For more info: Kerry Gibson,
kjgibson@ameslab.gov, 515-294-1405,
www.external.ameslab.gov

LBNL Offers Homeland Security Expertise

Researchers at the U.S. Department of Energy's (DOE) Lawrence Berkeley National Laboratory (LBNL) participated in an exhibition of more than two dozen counterterrorism technologies at DOE headquarters in Washington, D.C. Offering its expertise and program experience, LBNL presented information on three projects to Secretary of Energy Spencer Abraham and Director of Homeland Security Tom Ridge.

LBNL's demonstrations included:

- **Compact Neutron Source**—A portable device that uses neutrons to noninvasively screen the contents of baggage, air cargo, and mail.
- **Building Occupant Protection Guide**—A simple kit for use by occupants and first responders at a building site that may have been attacked using chemical and biological agents.
- **Rapid DNA Sequencing of Microbial Pathogens**—This could identify particular bacterial strains, differentiate between infectious and noninfectious bacteria, identify genes for rapid detection, and aid in forensic identification of the strain and potential source of origin.

For more info: www.lbl.gov

NEWSLINK

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Finding What You Want

Need help finding a technology or facility at a federal lab? In addition to *NewsLink*, the FLC also offers this free service to help you navigate the federal lab system.

Laboratory Locator

Our Laboratory Locator personnel will search the FLC network for the exact technology or facility you are seeking. All you have to do is submit a Technical Request Form describing what you need. To do this, go to www.federallabs.org and click on LABORATORY LOCATOR, or call 856-667-7727 and ask for Frank Koos or Sam Samuelian.

Students, Labs Bring Climate Modeling to the Rescue

For the past several months, LBNL's Earth Sciences Division and the National Energy Research Scientific Computing Center (NERSC) have played host to three young scientists from Brazil who are honing their climate modeling skills to apply to the Amazon River Basin.

Caarem Studzinski, Ricardo da Silva, and Giampaolo Pellegrino have worked with Norman Miller, lead scientist of ESD's hydroclimate and impacts research, and Chris Ding, a NERSC staff scientist specializing in computational climate projects. Miller and Ding helped Studzinski, da Silva, and Pellegrino adjust their research to various scales of effective climate modeling.

The Brazilian scientists will apply what they learned at LBNL to the development of specific applications, including technology transfer, for models varying in both physical and chronological size.

For more info: www.lbl.gov

R&D 100 Awards Recognize Hilbert Huang Transform

The Hilbert Huang Transform (HHT), developed by Norden Huang of the NASA Goddard Space Flight Center in Greenbelt, Maryland, was selected for the prestigious R&D 100 Award.

HHT allows the first analysis of nonlinear and nonstationary data. Nonlinear data for events ranging from earthquakes to heart arrhythmias have long been analyzed, but their underlying phenomena had to be frozen in time and space. HHT is the first adaptive method for measuring things that don't stay still and don't follow regular patterns. The result is a more precise definition of particular events in time-frequency space and a more meaningful interpretation of underlying dynamic processes than can be obtained with historical methods.

For more info: Evette Conwell, 301-286-0561,

Evette.Conwell@gsfc.nasa.gov

NASA Langley to Aid Analysis of American Airlines Crash

The National Transportation Safety Board (NTSB) has asked NASA's Langley Research Center to help with its investigation into the November 12 crash of American Airlines Flight 587 in Queens, N.Y.

Parts of the tail section of the Airbus A300 were shipped to the Hampton, Va. center earlier this month, officials said. The NTSB is attempting to determine why the tail section separated from the fuselage in flight.

NTSB officials said they chose Langley because of its extensive experience with composite materials and structures for civilian and military aircraft.

Hundreds Reply to DOD Request for Antiterrorism Ideas

The Department of Defense (DOD) received more than 700 submissions in response to an October 23 call for antiterrorism ideas.

The DOD sought concepts to combat terrorism and weapons of mass destruction that could be developed and deployed within 1 year to 18 months.

The Technical Support Working Group (TSWG), which is conducting an interagency program for counterterrorism, hopes that the solicitation will generate many innovative applications of technology from both individuals and existing defense contractors.

Ideas that meet qualifications and attract specific interest from the DOD could become the subject of a contract for rapid research and development.

For more info: www.bids.tswg.gov **NL**



Have some news for "Fed Labs Flash"?

Send it to:
flcnews@utrsml.com,
with "FLASH" in the
subject line.



TECHNOLOGY WATCH

Federal laboratory technologies available for technology transfer



MATERIALS

Advanced Material Finds Use in Potholes

As anyone who has been in the back seat of a taxi cab in New York City can attest, the ride can seem like a roller coaster when the street is riddled with potholes. Soon, a similar ride can be smooth sailing, thanks to a scientist at **Argonne National Laboratory (ANL)**.

Ceramicrete is a ceramic material that mixes like concrete and can be applied similarly using the same tools.

In testing, Ceramicrete patches held up for more than two years on an ANL road under 50 to 100 truck trips daily, while another pothole developed next to it. Further, road patches have remained in place without shrinking or structural cracking—no mean feat in the Midwest, where winter temperatures and weather conditions wreak havoc with road materials, specifically those used to patch potholes.

Although researchers noticed a few surface cracks upon examination, the Ceramicrete material was intact and supporting vehicular traffic.

“Ceramicrete is great for this purpose,” said developer **Arun Wagh**, “because it’s lighter and more durable than cement and binds well to all types of road material. It also is more impervious to water, which means it holds up well under freeze-thaw conditions.”

Durability isn’t the only advantage to using Ceramicrete on potholes.

“Ceramicrete is much faster to use than concrete, for two reasons,” said Wagh. “First, it cures in under two hours, even at temperatures below freezing because it has an ‘exothermic’ reaction, which means it generates heat. Second, there’s no need



Argonne's Pat O'Malley measures a circular Ceramicrete patch.

to trim the edges or clean out the pothole before patching—Ceramicrete sticks to the edges and to any rubble in the pothole.” In addition, time is saved because Ceramicrete is self-leveling, requiring at most only minimal troweling to achieve a smooth surface.

For more info: Terry Maynard, 630-252-9771, maynard@anl.gov



ASSISTIVE TECHNOLOGY

Everyday Items Improved to Assist Disabled

U.S. Army Soldier and Biological Chemical Command Volunteers for Medical Engineering (VME) recently made a unique bag specifically geared for those who use a wheelchair. The bag will allow users to carry up to three grocery bags on a fixed route bus.

“This bag will give me access to my seatbelt and enable me to carry more bags,” said **James Johnson**, a Vietnam War veteran. Johnson would often have to use the seatbelt of his wheelchair to strap down a single grocery bag.

Other recent projects include a wheelchair backpack designed to give disabled students easy access to school materials, and specially designed pot/pan fences for stove burners that allow one-handed cooking by a disabled person.

For more info: Jim Allingham, 410-436-4347



With a theme of “Moving Forward with the FLC,” this should be the biggest and best yet! Basic and advanced training is offered, focusing on tech transfer processes, offering new ways of conducting tech transfer. Includes the 2002 FLC Awards for Excellence in Technology Transfer, a formal event.

FOR MORE INFO: Sherry Nacci, 856-667-7727, www.federallabs.org; snacci@utrsmail.com

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MANUFACTURING
Multi-use Nozzle Offers a Multitude of Uses

A Federal Aviation Administration (FAA) scientist has designed a nozzle that will allow a high-pressure firefighting agent to undergo staged expansion and use the heat of vaporization to chill the liquid agent entering the device.



The adiabatic expansion nozzle

The adiabatic expansion nozzle is a device that attaches to a pressurized extinguisher cylinder. This technology is unique in that the nozzle provides the following beneficial attributes: it can be used with high vapor pressure compounds to make them behave like streaming agents; it does not have an objectionably high exit velocity; it can be used in a substantially closed compartment; and, it produces a mixed gas/solid output or low-pressure gas/liquid output.

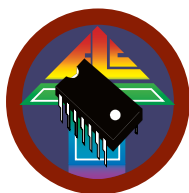
For more info: jennelle Derrickson, 609-485-5096, jennelle.derrickson@faa.dot.gov

FAA *from p. 1*

aircraft and cause additional failure in other systems? What kind of protection would be needed? How would the pilot handle the aircraft?

In the Propulsion and Fuel Systems Program, emphasis is on developing a safe, unleaded fuel with proper performance characteristics for general aircraft to ensure that there are no accidents as a result of the fuel. Researchers work with fuel manufacturers on different blends to keep the octane level high but without the lead; and, down the road they may examine the possibility of processing fuel to lower flammability. Research in this program also includes developing improved design and life management procedures for turbine engines to reduce engine failures.

As part of the FAA's Advanced Material/Structural Safety Program, Bigelow, a civil engineer who formerly worked at



SENSORS
Taller Than a Dragon's Eye...

Imagine the Marine on a reconnaissance mission who must know what's over the hill in front of him. Imagine a four-pound glider that fits in a backpack, has the radar signature of a bird, comes packed with a video eye, can be assembled and launched in less than five minutes, and comes complete with a portable control station. Now visualize that soldier launching his flyer and then watching his control station screen come alive—showing him not only the nature and general size and condition of the enemy in front of him, but their movements, their hardware, the general landscape, and the cover provided.

A new robotic airborne sensor system funded by the **Office of Naval Research** gives the soldier the means to see what he can't see from where he's standing. And, best of all, the "Dragon Eye" comes back when called. It is low-priced, hip-pocket aerial reconnaissance for troops—made with commercial off-the-shelf materials—so even if it is captured by enemy fire or other tactics, it is easily replaceable.

For more info: Gail Cleere, 703-696-4987, cleereg@onr.navy.mil; or Richard Thompson, 202-767-2541, rthomps@ccf.nrl.navy.mil



COMPUTERS
Imaging Device Ensures a Perfect Fit for Aviators

Navy and Marine Corps aviators fly the most modern, innovative, high-tech aircraft in the world. But, before they get their wings, they must measure up. Each aviation candidate is measured to the inch to ensure sufficient reach to operate controls and adequate leg room to perform emergency ejection procedures. To streamline the anthropometric screening, researchers at the **Naval Aerospace Medical Research Laboratory (NAMRL)** developed DAVID, a computer-based digital anthropometric video-imaging device.

DAVID's camera is accurate, and the software programming for the image acquisition, analysis, electronic transfer and storage is user-friendly.

The screening process begins with the candidate sitting in a chair in a standard pose. DAVID's camera takes the image and the software digitizes the image; the operator then identifies the area to be measured, and the required measurements are automatically calculated. In less than two minutes, the data are available to evaluate and determine the right "size" aircraft for the potential pilot.

For more info: www.namrl.navy.mil

NASA Langley, is also responsible for the R&D of composites, including new lighter, stronger materials with greater formability, composites made from resins with fibers that may have different damage and fatigue behavior, etc., compared to metal used today. This program develops guidelines and criteria for the use and repair of these new materials.

The FAA works closely with NASA, federal agencies, labs, universities, and large aircraft manufacturers, such as **Boeing** and **Lockheed-Martin**, on many different projects. But there are partnerships with small companies as well. Two such examples are Jentek Sensors, Inc. and PRI Research & Development Corp., both developers of innovative inspection devices that detect cracks and damages in metal with greater accuracy.

For more info: Cathy Bigelow, 609-485-6662, cathybigelow@tc.faa.gov **NL**



SPOTLIGHT ON SUCCESS

Success stories from the federal lab community

Air Force Research Accelerates into Braking System CRADA

Air Force Research Laboratory (AFRL) officials joined forces with an automotive industry leader to begin a revolutionary research and development project called "Brake by Wire."

AFRL and **Delphi Automotive Systems** officials signed a collaborative agreement by which respective experts will design, build and demonstrate a viable "brake-by-wire" system on a drivable vehicle within the next two years. "Brake by wire" is a next-generation braking system that stops vehicles by electrical signals rather than the conventional hydraulics systems used today.

AFRL's Air Vehicles, Materials and Manufacturing, and Propulsion Directorates are key players in this agreement, officials said. They bring specific technologies that will work in creating the brake-by-wire system.

AFRL experts said the Air Force has a keen interest in how this project unfolds. One of the benefits is the chance to prove that the various systems using these key technologies have viable commercial applications outside of the Air Force.

"Our interests are in validating the technology on high temperature power applications, control theory, reliable wiring, and connectors for applications on aircraft and other aerospace systems," said **George Schmitt**, chief of the Materials and Manufacturing Directorate Integration and Operations Division Chief. "We anticipate that the technologies that are applied to ground vehicles would likewise be of use for ground-based defense systems."

Another possible benefit is the reduced cost of components for Air Force systems.

"The automotive industry has a large quantity buy which will drive down the cost of more electric systems and make them more affordable," said **Joseph Weimer**, chief of the Propulsion Directorate's Electrical Technology and Plasma Physics Branch.

This technology emanated from the More Electric Aircraft (MEA) initiative, which aimed to eliminate mechanical power transmission in favor of electrical. MEA systems use fault-tolerant electrical power and power electronics to drive aircraft subsystems in lieu of less reliable hydraulic, pneumatic and mechanical power systems. Weimer has been working with this system since the early 1990s.



Bob May, executive director of AFRL, signs the CRADA as Bill Gillespie of Delphi Automotive Systems looks on.

"We've been researching the use of MEA power to do more and more functions within the weapon systems," he said. "Delphi is interested in doing the same thing for automobiles. I'm really excited about this opportunity—this is a real boost for us."

In 1999, the Miami Valley Economic Development Coalition (MVEDC) undertook an automotive and manufacturing competitiveness study as part of its automotive initiative. This study pointed to brake-by-wire systems as a critical technology for Ohio's automotive and aerospace industries.

The coalition then brought together AFRL and Delphi through the **Wright Technology Network**, the **Edison Materials Technology Center**, and **NCIC Capital Fund** to make this partnership happen.

"Currently, the motor vehicles industry is the largest employer in Ohio," said **Marty Hohenberger**, director of the automotive initiative at MVEDC. "By leveraging off of the region's core strengths in aerospace and automotive, we have an exciting opportunity to increase Ohio's economic base, lead new product development and bring a host of benefits to the consumer."

Robert May, AFRL executive director, believes these partnerships are vital to ensure affordable technologies and a strong industrial base to support defense needs.

"The Miami Valley Economic Development Coalition is to be congratulated for facilitating this arrangement that is clearly a win-win-win for the Air Force, for Delphi, and for the local community," said May.

For more info: Kristin Schario, 937-255-3428, kristenschario@wpafb.af.mil **NL**



BIOTECHNOLOGY

Stem Cell Regeneration May Help Heart Attack Victims

Myocardial infarction (MI), commonly known as a heart attack, is the leading cause of death in both men and women, with nearly 450,000 deaths each year. MI occurs when the coronary arteries that supply oxygen to the heart muscle become blocked. Obstruction of the left coronary artery can ultimately lead to loss of function in the left ventricle. If 40% or more of the left ventricle is damaged, the patient will ultimately die. The Office of Technology Transfer of the **National Institutes of Health (NIH)** may have gained ground on a solution.

In a study of myocardial repair in adult mice using adult stem cells derived from bone marrow, one protocol involved the direct injection of adult stem cells into the healthy myocardium—the middle muscular tissue of the heart wall—adjacent to the area of dead tissue. Within 7 to 11 days after the transplant, the stem cells migrated into the tissue and began to proliferate. As a result of the regeneration of these new structural components, the bone marrow stem cell-treated hearts recovered approximately 35% of their lost function.

For the first time, injured heart tissue can be significantly repaired. This demonstration of the flexibility of adult stem cells may soon allow us to use the patient's own bone marrow stem cells as a new therapeutic option in the treatment of heart failure. These findings also suggest other suitable uses for adult stem cells. Infarcts in other organs—such as kidneys, intestines and the brain—may also be amenable to treatment with adult bone marrow stem cells.

For more info: Fatima Sayyid, 301-496-7057 ext. 243, sayyidf@od.nih.gov



AGRICULTURE

Thin is In for Peach Trees

Peach trees under evaluation in experimental orchards worldwide could give homeowners an attractive, space-saving tree plus sweet and juicy, full-size peaches.

Commercial peach growers would reap even

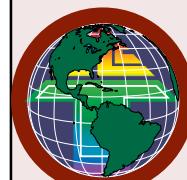
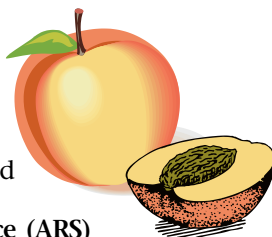
more benefits from the new tree forms—“columnar” and “upright” styles—developed by **Agricultural**

Research Service (ARS) scientists. Both trees come from conventional breeding at ARS's **Appalachian Fruit Research Station** in Kearneysville, W. Va.

A “columnar” form maintains a diameter of about 5 feet fully grown and would fit neatly into a tiny townhouse yard. In commercial orchards, these compact trees can be planted much closer together than conventional trees that branch out to 16 feet across.

This translates into many more peaches per acre, while land and production costs remain about the same. One estimate shows that grower profits could increase by 20 to 50%. Additionally, growers may get a profitable crop the second year after planting, when the pickings would be too slim in a conventional orchard to make harvesting worthwhile. For growers who may not be ready for such a radical change, an “upright” form that reaches eight to 10 feet across may be a consideration. Left unpruned, both tree forms reach a height of 12 to 15 feet after several years. Nevertheless, both tree selections produce yellow-fleshed, dessert-type peaches with smooth, melting flesh that is sweet and aromatic. They are firm-fleshed, store well, and soften when completely ripe.

For more info: www.ars.usda.gov, <http://afrsweb.usda.gov/>



ENVIRONMENT

In Situ Process Developed for Oil Field Remediation

Petroleum Environmental Technologies (PET) has developed an environmentally safe, in situ remediation process with widespread potential for the cleanup of contaminated water and soil. The process is currently being field tested at the **Rocky Mountain Oilfield Testing Center (RMOTC)**, where for the past six weeks the in situ process has been applied, monitored, and analyzed on a production pit at the Teapot Dome field. The PET treatment is a new, fast, nonhazardous sludge pit cleanup technology for oil-contaminated soil and production water.

The key to PET's in situ process is a proprietary chemical product called Ecosafe. During the field test project, Ecosafe was injected into two 500-gallon tanks containing untreated production water, beginning the decontamination process. The water was then injected into a holding pit through a series of small injection wells, and air was pumped into the wells. The cohesiveness of the oil in the water breaks down so that the contaminants separate, and the deoxidation process begins. The primary objective of the field test was to meet a minimum standard of dissolved contaminants of 10,000 parts per million (ppm). PET representatives believe they can achieve greater than 100 ppm with this field installation.

The in situ process and the use of field produced water result in a low-cost alternative to currently accepted in situ treatments. “We have also found that the technology is not weather-dependent,” said **Jose Ajjam**, PET principal and inventor of the technology. “Cold weather does inhibit some in situ treatment methods, but ours will continue to work until the water freezes.”

For more info: Neil Haugland, 888-599-2200 **NL**



COMING ATTRACTIONS

February 3-5, 2002
CyberCrime2002
Mashantucket, CT

Be on hand to receive white papers on: e-Privacy, Internet Education for Educators, Child Online Safety, Internet Gaming, Voting in the Electronic Age, and International Cyber Crime Issues. New committees formed at CyberCrime2002 will report at CyberCrime2003.

www.cybercrime2002.com,
1-800-213-4326

February 15-18, 2002
American Association for the
Advancement of Science (AAAS)
Boston, MA

Thousands of scientists, engineers, and media representatives in a single gathering learn, inspire, and inquire about the latest knowledge, technological advances, and products.

Kathleen Feehan, 202-326-6736,
www.aasmeeting.org

February 20-23, 2002
Agricultural Equipment Technology
Conference (AETC 2002)
Kansas City, MO

This year's conference will bring together engineers, managers, researchers, and other professionals in the agricultural equipment industry to exchange information, discuss opportunities, and address challenges for production agriculture.

www.asae.org/new/meetings/aetc2002

March 4-7, 2002 ★
Society of Automotive Engineers Congress
Detroit, MI

The largest OE service, parts and components exhibition in the world. Offers an in-depth technical program containing more than 1,200 individual presentations within five specialty conferences: Safety; Emissions/ Environmental Control; Electronics/ Intelligent Vehicles; Materials; and Powertrain. Each specialty conference is the largest technical event of its kind in the world.

www.sae.org/congress/

March 18-21, 2002 ★
National Design & Engineering Show
Chicago, IL

This show addresses the needs of the \$770 billion design engineering market. One thousand exhibitors feature all the latest tools, components and materials used in mechanical and electromechanical design and product development.

www.manufacturingweek.com

May 6-10, 2002 ★
FLC 2002 National Meeting
Little Rock, AR

With a theme of "Moving Forward with the FLC", this should be the biggest and best yet! Basic and advanced training is offered focusing on on tech transfer processes, offering new ways of conducting tech transfer. Includes the 2002 FLC Awards for Excellence in Technology Transfer, a formal event.

Sherry Nacci, 856-667-7727,
www.federallabs.org; snacci@utrsmail.com