NEWSLINK

FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER JANUARY 2000 VOL. 16, NO. 1

Argonne Helps Put 21st Century Vehicles on Fast Track to Reality

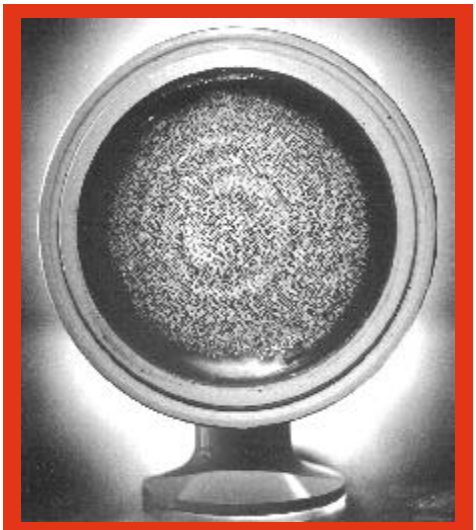
Now that the year 2000 has arrived, 21st century concept vehicles are much closer to 21st century *reality*—thanks in part to the efforts of researchers at the **Department of Energy's (DOE) Argonne National Laboratory**. Whether used on an automotive engineer's computer, inside a vehicle, or along an auto assembly line, Argonne technologies are helping pave the way to "greener" vehicles with improved fuel efficiency and reliability.

Clean Diesel Breakthrough

One Argonne advance overcomes a long-standing diesel emission reduction tradeoff by *simultaneously* reducing both nitrogen oxides (NO_x) and particulate matter. The breakthrough resulted when Argonne researchers combined three changes to engine operating conditions:

- increased oxygen content in the engine air supply
- retarded fuel injection timing
- increased fuel flow rate.

This three-way optimization reduces both particulate and NO_x emissions while actually increasing engine power and lowering fuel consumption.



Cleaner Diesel: Argonne's "chemical filter" membrane unit (shown here in cross-section) separates air into oxygen and nitrogen. The oxygen helps reduce combustion particulates, while the nitrogen helps reduce NO_x emissions.

The technology's key is a compact membrane unit that acts as a chemical filter to passively separate engine intake air into oxygen and nitrogen. The oxygen is then used to enrich the air mixture entering the cylinder. Argonne collaborated with the chemical industry to make the advanced separation membranes small and inexpensive enough for practical use by OEMs. "The NO_x breakthrough was a significant achievement, but it is only one of the many contributions we're making here at Argonne toward developing safer, cleaner, more affordable, and fuel-efficient transportation technologies," says **Larry R. Johnson**, director of **Argonne's Transportation Technology Research and Development Center (TTRDC)**.

Real-Time Sensors

Another Argonne contribution involves developing real-time sensors for intelligent control of automotive systems. Argonne scientists are researching different types of sensors that can *instantaneously* record vehicle information so that engine and drivetrain operations can be adjusted and optimized in response. These radically new sensor technologies are

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The Advanced Vehicle Program's Bold Breakthroughs

Understating its title, the Department of Transportation's Advanced Vehicle Program (DOT/AVP) is right at home in the new millennium—creating bold, new paradigms that even Arthur C. Clarke might have explored for his book and subsequent movie, *2001: A Space Odyssey*.

Rather than build incrementally on technologies for internal combustion or diesel engines as Detroit's Big Three automotive companies tend to do, AVP focuses on new, "from-the-bottom-up," electric, hybrid-electric, and auxiliary technologies and components for use in medium- and heavy-duty vehicles. And these longer term, higher risk 21st century technologies could significantly increase fuel efficiency and reduce environmental emissions.

"We're taking a radical approach," says **Dr. Fenton Carey**, AVP's Executive Director and Associate Administrator for the **DOT/RSPA Office of**

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INSIDE

This issue of *NewsLink* focuses on **AUTO** and **TRANSPORTATION** technologies. Next month will focus on manufacturing technologies.

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very fast (typically measured in milliseconds) compared to existing automotive sensor and onboard diagnostic technologies, which are much slower (two to three minutes in some cases) and usually don't provide a feedback loop for self-regulation.

In partnership with the Big Three automakers (**DaimlerChrysler, Ford**, and **General Motors**), Argonne is investigating four technologies for monitoring vehicle carbon monoxide, NO_x, and particulate emissions:

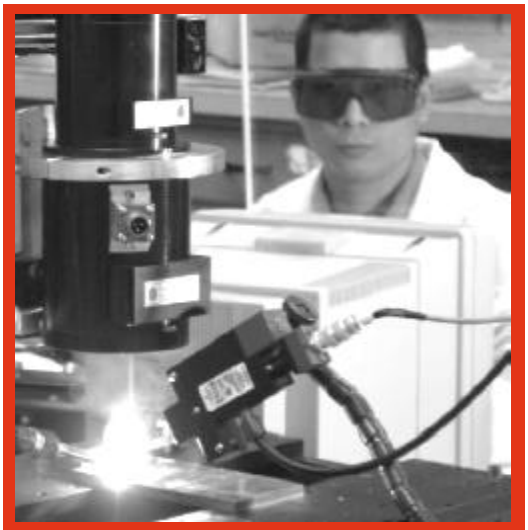
- microwave/millimeter-wave spectroscopy
- surface acoustic wave microsensors
- ion mobility sensors
- ultrasound particulate monitors.

In the near future, the project's actuator phase will bring intelligent control of automotive engines and systems closer to fruition.

Model Teamwork

TTRDC research also entails modeling vehicle underhood thermal loads—including vehicles equipped with advanced propulsion systems, such as hybrid electric vehicles (HEVs). Adding a power electronics system and a new set of complex operating conditions to an HEV's engine requires early diagnosis and remedy of potential heat load problems during the design stage to reduce time and costs. The performance and reliability of the battery pack are also influenced by thermal conditions. Therefore, Argonne scientists teamed with the **Analysis and Design Application Company** (Melville, NY) to improve the way underhood heat loads are modeled and managed.

Using STAR-CD general purpose computational fluid dynamics software, researchers plan to extend its capabilities to include HEV-specific component models, which will be experimentally validated. The 3-D fluid flow and heat transfer calculations for the entire vehicle will provide a "virtual test facility" that can assess the interdependence of underhood components, study heat load conditions, and identify critical components. Coupled with the **Partnership for a New Generation Vehicle (PNGV)** Systems Analysis Toolkit (PSAT) code for analyzing integrated HEV propulsion systems, the new software will be a valuable addition to existing HEV design and analysis tools.



Stronger Welds: This weld monitor, developed at Argonne, is now being used in DaimlerChrysler's manufacturing operations.

Assembly Line Advance

Using a new infrared laser welding monitor developed by Argonne and its industrial partners, U.S. auto manufacturers are beginning to produce better welded parts at lower costs. The easy-to-operate device, which uses a passive sensor with integrated optics to measure infrared emissions from a weld, costs only $17,000—compared to $50,000 for a conventional system. If the monitor detects welds that are not deep enough to form a strong bond, it automatically signals the welding unit to correct system parameters.

The research that led to the development of the weld monitor was conducted under two Cooperative Research and Development Agreements (CRADAs)—one between Argonne and **Delphi Energy & Engine Systems** (Flint, MI), and one between Argonne and the **Low Emissions Partnership** (which is composed of DaimlerChrysler, Ford, and General Motors). Another of Argonne's CRADA partners—**Spawr Industries** (Lake Havasu City, AZ)—offers the monitor as an off-the-shelf product. By mid-2000, Spawr will have installed 13 of the units in the DaimlerChrysler transmission plant in Kokomo, IN—where the system has decreased scrap by 10% and reduced processing time. NL

For more info: Industrial Technology Development, 800-627-2596, partners@anl.gov

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Research, Innovation and Education. "We hope to come up with some significant breakthroughs in AVP."

Faster Tech Transfer Methods

A unique collaboration of approximately 500 universities, companies, and federal and private labs, AVP "stole shamelessly" from DARPA's (the **DOD's Advanced Research Project Agency**) successful **Electric and Hybrid Vehicle (EHV) Technologies Program**, which was created by Congress in 1992 to serve our evolving national defense needs. These electric and hybrid propulsion technologies—which are cleaner and more efficient than conventional systems—have great potential to solve the performance, stealth, and fuel efficiency issues of the military. They also "translate" nicely into AVP's objectives for the transportation industry. In FY1999, AVP program management was transferred to the DOT, and the first group of project awards was made in June.

Headed by Dr. Carey, the DOT AVP team also "borrowed" DARPA's innovative partnering ideas—accelerated means to move technologies to the marketplace. Instead of the usual procurement process (*e.g.*, contracts, grants, CRADAs), AVP uses "other transactions authority"—a more flexible mechanism that brings together multiple parties to share their resources, expertise, and best practices,

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FED LABS FLASH

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

FLC Midwest Auto Initiative Publications

The FLC's **Midwest Region** is the sponsor of an Auto Initiative designed to help identify the technology needs of the auto industry and match them with the capabilities of government labs. In February 1999, a small advisory group of representatives from automotive OEMs and their suppliers met with representatives of seven Midwest labs to discuss needs and possible technology linkages. One of the outcomes of this meeting was several publications that describe auto technologies available from federal labs and contact information for Midwest labs. The technology descriptions booklet divides lab technologies into eight areas—powertrain, environment, safety, electrical/electronics, vehicle systems, comfort/convenience, manufacturing, and materials—and includes a facilities overview of Midwest labs with automotive testing and R&D capabilities.

For more info: www.federallabs.org/Midwest/start.html; Sue Leitner, 513-948-4032, leitner@iams.org

New Air Force R&D Magazine Planned

Air Force Research Laboratory (AFRL) Commander Maj. Gen. Dick Paul recently announced plans to debut a quarterly technical publication, *AFRL Technology Horizons*, in March. Patterned after *NASA Tech Briefs*, the publication will reach 200,000 government, academia, and industry subscribers. Features will include: technical articles from AFRL scientists and engineers; tech transfer material; and info on AFRL conferences, requests for proposals, broad agency announcements, and other topics. "*AFRL Technology Horizons* will offer exciting opportunities for the lab to communicate with its peers, and potential peers, in academia and industry," said Paul. Technical articles will be supplemented by web-based Technical Support Packages (TSP), which will include: official reports, white papers, previously published articles, status reports, research papers, and other related material. AFRL's TECH CONNECT hotline (800-203-6451) will also be available for readers interested in any of the magazine's articles. NL

For more info: Susan Wapelhorst, 937-255-0065, susan.wapelhorst@afrl.af.mil

ADVANCED VEHICLES *from p. 2*

as well as benefits and risks. The seven consortia around the country that manage AVP projects cost-share projects, which have equal parts federal and private funding.

Hawaii's Electric Vehicle Test Bed

This simplified tech transfer method means there is more incentive to commercialize the technologies. And with one single agreement and projects that can be awarded in just weeks, the process enables technologies to get to market faster. Members of the consortia are also encouraged to work with other organizations, such as the **National Park Service**. This way, the government helps develop more environmentally friendly technology in parks, while assisting with "smart buys" from a broader market that offers better technologies.

Rapid Recharge: A US Electricar pickup truck being recharged by an AeroVironment "Posicharge" System.

Because AVP is new, most current successes in developing and delivering products come from DARPA's EHV program funding. For example, one consortium—the **Hawaii Electric Vehicle Demonstration Project**—is attempting to make Hawaii the first EV-ready state by establishing a 24-hour accessible, high-power recharging infrastructure on the island of Oahu. This project is examining all aspects of pure electric battery technology—including a fast and reliable prediction tool for battery cycle life and a battery charge that takes less than eight minutes (compared to the usual two hours). One day, these innovative batteries could double or triple the distance traveled on a charge—and save petroleum. As part of the project, electric vehicles from various manufacturers will be supplied to fleet operators on Oahu, where operational data will be analyzed.

Consortia Contacts

Dr. Carey encourages federal labs and industry with potential electric/hybrid-electric technologies to be aware of and consider participating in the AVP program. Interested parties should seek other transactions authorities "to make doing business and partnering better, cheaper, and faster" and can also contact one of the seven consortia, which are looking for innovative ideas to improve fuel efficiency, develop zero emission vehicles, and compete successfully in the world market. NL

For more info: www.rspa.dot.gov/dra; KT Thirumalai, 202-366-0375

TECHNOLOGY WATCH

Federal laboratory technologies available for technology transfer

Oak Ridge National Lab Transportation Technologies

Here are a few examples of transportation research being conducted by the **DOE's Oak Ridge National Lab (ORNL).**

- **Cleaner Fuel.** A novel chemical-biological process being developed by researchers at ORNL and **Petro Star** could result in ultra-clean fuels with a sulfur content of less than 30 ppm.
- **More Effective Natural Gas Storage Tanks.** Taking advantage of methane's physical adsorption in microporous carbon fibers, ORNL researchers can now store compressed methane at 500 psi (down from 3,000 psi). This reduces costs, permits the use of single-stage compressors, increases safety, and results in near complete release of the gas.
- **Electric Bus of the Future.** A new motor controller with advanced soft-switching circuitry developed at ORNL promises to make electric and hybrid vehicles more practical. Currently being tested on an electric bus in Chattanooga, TN, the controller represents breakthroughs in cost, volume, weight, and reliability.

For more info: Ron Walli, 423-576-0226, wallira@ornl.gov

Modeling the Effects of Winter Conditions on Vehicle Performance

Winter surfaces can severely affect vehicle handling—with low coefficients of friction and resistance from slush and snow combining to adversely impact driving traction, braking, and turning. Researchers at the **U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory** have developed modeling and simulation tools that account for the impact of winter conditions on vehicle movement. Vehicle dynamics codes are modified and enhanced to optimize modeling of tires on low coefficient surfaces, and high fidelity finite element models simulate tire-snow interaction for performance prediction, equipment specification, and tire design.

For more info: Sally Shoop, 603-646-4321, sshoop@crrel.usace.army.mil

New Stiffer, Longer-Lasting Aluminum Composite

Scientists in the **Air Force Research Lab's Materials Directorate** and **DWA Composites Specialties** (Chatsworth, CA) have spearheaded the development of a durable metal matrix composite that has the stiffness of titanium and the weight of an ordinary aluminum alloy. Used as the ventral fins on F-16 aircraft, the material offers an operating life more than 17 times longer than ordinary aluminum alloy fins. By using a discontinuously reinforced aluminum (DRA) metal matrix alloy made up of 6092 aluminum alloy reinforced with silicon carbide particulate, researchers improved stiffness by as much as 50%. Material costs also dropped by more than 50%, and more cost savings are possible because DRA can be machined by conventional machining practices. The new composite is an excellent candidate to replace worn and failing parts made of conventional aluminum alloy in other aging aircraft—and may have applications in the auto industry as well.

For more info: Dr. Benji Maruyama, 937-255-1310

Surf and Turf: Brookhaven National Lab's Toshi Sugama has developed an environmentally friendly coating to protect metals from corrosion.

"Surf and Turf" Coating Protects Metals from Corrosion

Crab, shrimp, and lobster shells from the ocean and corn from the earth are the key ingredients of a new "surf and turf" coating invented by **Toshi Sugama** of the **DOE's Brookhaven National Lab**. The water-based coating protects aluminum and other metals from corrosion and moisture. Tests show the coating resists saltwater damage for twice as long as conventional aluminum coatings. According to Sugama, "Everything in this coating is harmless to humans and the environment." A component called chitosan is extracted from crushed crab, shrimp, or lobster shells to make the coating's base. Chitosan is then mixed in water with an electrolyte—dextrine poly-acid—found in cornstarch to help form a dense, smooth surface that adheres to metals.

For more info: Dorry Tooker, 516-344-2078, dorryt@bnl.gov

Magnetic Refrigeration in Vehicles

Researchers at the **DOE's Ames Laboratory** are investigating the feasibility of using magnetic refrigeration technology to both cool and heat vehicles. Magnetic refrigeration is based on the magnetocaloric effect—the ability of some metals to heat when magnetized and cool when removed from the magnetic field. Using these metals as refrigerant materials would provide an environmentally friendly alternative to the volatile liquid chemicals (such as CFCs and HFCs) used in traditional vapor-cycle cooling systems. An air-conditioning system based on the technology could run on electric power generated by the alternator—thereby reducing the load on the powertrain and making the car more fuel-efficient. The process can be reversed to heat the vehicle and would also be ideal for electric vehicles.

For more info: Todd Zdorkowski, 515-294-6029, toddzd@iastate.edu

TECH WATCH *continued*

Microtechnology for Automotive Fuel Cells

Researchers at the **DOE's Pacific Northwest National Lab (PNNL)** have demonstrated the technical feasibility of an ultra-compact fuel reformer that converts readily available fuel into hydrogen to power fuel cells. In lab tests, engineers demonstrated that one of the reformer's most critical components can be made at least one-tenth the size of current units without sacrificing efficiency. The heart of the reformer is a microchannel reactor and heat exchanger, which are about the width of three strands of hair. This breakthrough helps reduce the weight and costs of fuel cell technology and decreases fuel cell development start-up time.

For more info: 800-375-PNNL

Low Power Circuit for Picosecond Timing

A novel integrated circuit developed by engineers at the **DOE's Sandia National Labs** can precisely measure the time elapsed between two events with a resolution as low as 20 picoseconds. Built using a low-cost, 1-micron CMOS process, the circuit uses a patented technique that enables picosecond resolution without the need for leading-edge circuit speed or a high-speed clock. Two of the timing circuits are housed in a single 44 pin J-lead package, and total power dissipation per circuit is only 60 milliwatts. In addition to its use as a inexpensive, low-power alternative circuit in electronic time interval counters, the device could also be used in automotive, industrial monitoring, or process control systems to make the "time of flight" measurement required in pulsed ultrasonic, optical, and radar distance measurement systems.

Picosecond Timing: An integrated circuit developed at Sandia National Labs can make picosecond timing measurements without leading-edge circuit speed or high-speed clock.

For more info: Ken Condreva, 925-294-2362, kjcondr@sandia.gov

Reliable and Safe Hydrogen Storage Device

Demand for alternate energy sources is leading to the use of hydrogen as a combustible and as a fuel for fuel cells, which requires safe hydrogen storage. Current storage methods—compression and liquefaction—have major safety and handling issues. However, the **DOE's Westinghouse Savannah River Company** has developed a reliable metal hydride-based hydrogen storage device that solves many of these problems. The system can safely store and discharge hydrogen at user-defined flow rates and pressures up to 300 psi, offers a storage density equivalent to liquid hydrogen, and has an estimated minimum lifetime of 2,000 charge/discharge cycles. Possible applications include: fuel storage for combustion engines or fuel cell-powered electric motors; replacement for lead acid batteries in electric-powered vehicles; zero emission electricity source for mining equipment; and much more.

For more info: John Elliott, 803-725-4185, john.elliott@srs.gov

Noise Barrier for Use Near Highways

Researchers at the **Department of Commerce's National Oceanic and Atmospheric Administration (NOAA)** have developed a noise barrier whose specific shape controls the diffraction of noise so that quiet regions can be maintained—even near large noise sources. The primary application is acoustic noise control near highways, but the patented technique can also be applied to electromagnetic energy (*e.g.*, shielding sensitive electronic equipment from radio interference). The barrier's advantage over absorbing barriers is that it uses the same amount of material more efficiently. The main disadvantage is that the redirected noise requires a place to go. For example, highway noise would be directed upward away from houses.

For more info: Dr. Al Bedard, 303-497-6508, abedard@etl.noaa.gov

Method for Producing Biodiesel and Lubricants

A **USDA Agricultural Research Service (ARS)** invention makes auto fuels and lubricants by combining waste products (*e.g.*, animal fats, vegetable oils, rendered fats, restaurant grease) with alcohol and lipase. Solvent also helps improve the reaction process. When the reaction is complete, the alkyl ester products are separated from the residual reaction mixture by conventional methods to remove enzymes and any solvent. The lipase used depends on the desired end-product. This lipase-catalyzed method is more efficient than chemical methods and offers advantages such as minimal waste residue and low reaction temperatures.

For more info: Mary Ann Gwodz, 301-504-5345, mag@ars.usda.gov

Recycled Tires for New Products, Profits

W. Stanley Anthony, head of the **ARS Cotton Ginning Research Unit** in Stoneville, MS, has developed an improved process to recycle the 265 million+ tires discarded each year. Currently, tires are cut into smaller pieces and pulverized. Although more than 50% of the rubber is recovered from this process, the remainder is sent to landfills—and recovered rubber is valued at about $500 per ton. Anthony's two methods extract pulverized rubber and the polyester/nylon mix from tires and divide it into two separate materials—crumb (rubber) and fluff (polyester/nylon fiber), which can be used for a newly developing market. The new methods mean a company that places 12 tons per day in a landfill could potentially turn that into an additional $5,700 a day. Products such as new tires, truck bed liners, running tracks, shoes, and more can be made from the recycled rubber.

For more info: W. Stanley Anthony, 601-686-3094, anthonys@ars.usda.gov

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TECH WATCH continued from p. 5

PNNL, Delphi Partner on Low-Emission Machine

The **DOE's PNNL** and **Delphi Automotive Systems** (Troy, MI) are developing a new technology that greatly reduces emissions from lean-burn engines. The nonthermal plasma technology is durable, compact, energy-efficient, and can be used in existing exhaust systems to break apart and destroy NO_x and particulates in auto emissions. Initial tests on a diesel engine show a 55% reduction in NO_x without the need to add additional hydrocarbons to the exhaust. The technology recently won the *Financial Times* Global Automotive award.

For more info: 888-375-PNNL

Sandia's Combustion Research Facility Expands

The **Combustion Research Facility (CRF)** at the **DOE's Sandia National Labs** recently unveiled 16 new labs, including:

- a lab dedicated to detailed scientific observation of how alternative fuels (including plant-based biofuels) operate in a working engine
- a new wing that houses a Sandia-designed picosecond laser for diagnosing molecular energy transfer
- a new low-pressure flame lab
- an expanded facility with advanced tools for studying turbulent diffusion flames
- a pilot-scale furnace that will produce up to seven tons of glass each day to allow experimentation with alternative burner and furnace configurations.

Because the facility is designated for use by outside collaborators for both basic and applied research, combustion experts helped plan uses for the new labs. The new labs bring the total number of CRF labs to 36.

For more info: Bob Gallagher, 925-294-3117

Don't see what you're looking for?

Looking for a specific technology or facility at a federal lab? Submit a Technical Request to the **FLC Laboratory Locator**, who will find the answers you need—at no cost! Go to the FLC web site at *www.federallabs.org* and click on LOCATOR or call 888-388-5227.

Technology Transfer on the World Wide Web

DOT Technology Transfer
http://t2.dot.gov

Visit this site for one-stop shopping for tech transfer opportunities within the **Department of Transportation**. This site includes a facilities locator and info on outreach programs and services and highlights opportunities for S&T partnerships, CRADAs, patents, SBIRs, the Idea Program, and other agreements.

Socioeconomic Data
www.econdata.net

This web site, funded by the **Economic Development Administration,** provides a searchable database of more than 400 links to socioeconomic data resources on the web. The site is meant to be a convenient, comprehensive first stop for anyone searching the vast, disparate array of socioeconomic data sources on the Internet. Includes links by subjects (*e.g.*, demographics, industry sectors, trade/output) and provider and the 10 best sites for accessing socioeconomic data.

Fuel Cell Tutorial
http://education.lanl.gov/resources/fuelcells

Go here to access a 36-page comprehensive tutorial on fuel cells. Written for high school and college students, the publication is an excellent introduction to the topic. Developed for the **DOE Office of Advanced Automotive Technologies,** the tutorial explains a fuel cell in detail, discusses different types of cells and fuels, provides an overview of potential uses, and highlights areas where more research is needed.

NIST Tools for the Auto Industry
www.nist.gov/public_affairs/factsheet/auto2.html

This web site contains a comprehensive list of **National Institute of Standards and Technology (NIST)** projects related to the auto industry. Topics include: machine tool performance models, service life prediction of coatings, injection/compression molding of polymer composites, low-cost powder metallurgy technology for particle reinforced aluminum, hardness standards, magnetic sensors for steel processing, fuel cell research, and much more.

Have a suggestion for a tech transfer web site?
Send an e-mail with the URL to jbegley@utrsmail.com

Exhibit Passes to SAE and NDES!

If you're interested in attending the exhibits at the upcoming **Society of Automotive Engineers (SAE)** or **National Design and Engineering Show (NDES)**, let us know—we'll send you an exhibits pass.

SAE	***March 6-9***	***Detroit, MI***
NDES	***March 13-16***	***Chicago, IL***

To get your passes, send us an e-mail (jbegley@utrsmail.com) or fax (856-667-8009) with your name, mailing address, phone, and number of passes needed for each show.

SPOTLIGHT ON SUCCESS

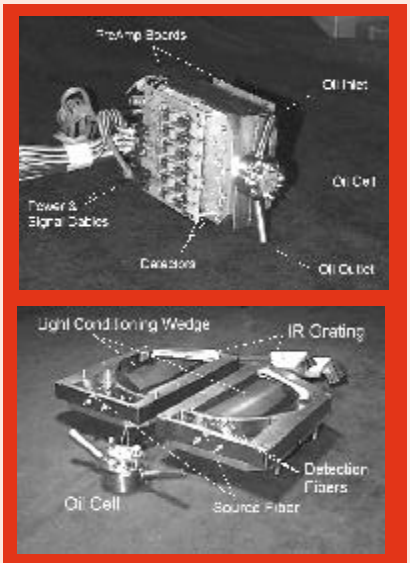
Success stories from the federal lab community

SBIR Success and Intra-Agency Technology Transfer

SBIR Program Results in Real-Time Sensor for Monitoring Oil Condition

Advanced sensor technology developed for the **Air Force Research Laboratory's (AFRL) Propulsion Directorate** is improving the health and extending the life of jet engines. A device called an on-line oil condition monitor (OCM) incorporates the sensor technology in a small, efficient package. The OCM's role is to monitor the quality of the lubricant in a jet engine—vital information because oil failure can result in loss of life, destruction of a multimillion-dollar aircraft, or both.

The OCM is the product of an SBIR project with **Foster-Miller, Inc.** (Waltham, MA) that focused on developing a device to provide real-time, analytical data on the condition of jet engine lubricants. The OCM consists of a miniature, rugged, infrared spectrometer equipped with a custom-designed flow-through cell. Attached directly to a turbine engine, the unit provides real-time analytical data indicating the condition of the oil. The prototype unit weighs only six pounds and measures approximately 6" x 3" x 2". Production units are expected to be about half this size. Testing has demonstrated the OCM's ability to identify various fluid contaminants (such as water, fuel, and glycol) in oil.



SBIR Success: This on-line oil condition monitor was developed by AFRL and Foster-Miller via the SBIR program.

Although designed for use on gas turbine engines, the OCM uses a technology that can monitor any organic fluid in the liquid or gaseous phase. Consequently, the OCM technology could find applications in the automotive, chemical processing, and polymer production industries.

For more info: Dr. Robert L. Wright, Jr., 937-255-5568, robert.wright@wpafb.af.mil; Jeffrey Pearce, 937-255-5451, pearceja@wpafb.af.mil

Moving Missile Technology to Unmanned Ground Vehicles

Note: *Although* NewsLink *often focuses on transferring technology from federal labs to industry (and vice versa), we rarely cover technology transfer that takes place* between *or* within *federal agencies. However, this is a common practice that leads to millions of dollars of cost savings each year. The following success story highlights one such "intra-agency" tech transfer effort within the* ***Department of Defense****.*

In 1990, the **U.S. Army's Unmanned Ground Vehicles/Systems Joint Project Office (UGV/S JPO)** was established at Redstone Arsenal, AL to act as the focal point for military ground robotics. The UGV/S JPO's goal is to field the first generation of Unmanned Ground Vehicles (UGVs) for use in tactical missions for the U.S. Army and **Marine Corps**.

All UGVs use datalinks for transferring imagery and command/status data between the UGV and the operator. The datalinks have always been a major problem area in UGV systems because, to be effective, UGVs must be able to operate out of the operator's line-of-sight. However, radio frequency (RF) datalinks work best in line-of-sight operations and have minimal non-line-of-sight (NLOS) capabilities due to physical constraints. To enhance the NLOS capabilities of UGVs, fiber optic technology developed for the Army's Fiber Optic Guided Missile (FOG-M) program was transferred to the UGV program—resulting in a fiber optic datalink that offers several advantages over current RF technology in certain applications.

The tech transfer effort involved extensive laboratory and field testing, the design and modification of several prototypes, and intensive research into various types of materials and equipment. The conclusion? Fiber optic systems have a very bright future for specific UGV applications—and the R&D of this tech transfer effort will become an integral part of the datalink design for future UGV systems. In fact, the success of the Army's effort led to the transfer of the technology to the **Air Force's** UGV mission, which uses an All-Purpose Remote Transport System (ARTS) to conduct unexploded ordnance and explosive ordnance disposal missions.

If you would like receive a longer article that provides details on this technology transfer effort, send an e-mail to Sherrie Burgett (burgett-sj@redstone.army.mil) or Keith Anderson (keith.anderson@redstone.army.mil).

COMING ATTRACTIONS

February 24-27, 2000
AUTM 2000 National Meeting
Atlanta, GA

Universities, non-profit research institutions, and teaching hospitals will showcase their latest technologies at this meeting of the Association of University Technology Managers (AUTM). AUTM's first Networking Fair offers corporate registrants a unique chance to scout the exhibits for potential licensing opportunities.

Penny Dalziel, 203-845-9015, autm@ix.netcom.com

March 6-9, 2000
Society of Automotive Engineers (SAE)
Detroit, MI

With a theme of "Adding Value to Life Through Technology and Advanced Mobility," this year's expo will feature the latest auto technologies from more than 900 companies and organizations from around the world, while the conference offers a wide spectrum of technical courses on all aspects of auto engineering. Be sure to visit the FLC in Booth 1765.

www.sae.org/congress/index.htm

March 13-15, 2000
Nanotribology: Critical Assessment and Research Needs
Gaithersburg, MD

This meeting sponsored by the National Institute of Standards and Technology (NIST) will critically assess the state-of-the-art of nanotribology in the context of MEMS, microsystems, nanotechnology, microsystems, and meso-manufacturing and identify research needs.

Lori Phillips Buckland, 301-975-4513, phillips@nist.gov

March 13-16, 2000
National Design Engineering Show
Chicago, IL

Are you ready for the new century? The new global economy? New manufacturing shaped by technology-driven change? How will you keep up with all the advancements in components, computers, materials, and tools used in OEM product development? Stay ahead of the curve by attending the National Design Engineering Show. Be sure to visit the FLC in Booth 479.

www.manufacturingweek.com

April 2-6, 2000
Future Car Congress
Arlington, VA

The Future Car Congress will bring together experts from industry, government, and academia to: showcase accomplishments in advanced auto technologies; highlight achievements of government-industry partnerships; and exchange ideas for educating, recruiting, and training an advanced transportation technologies workforce for the 21st century.

www.futurecarcongress.org

May 8-12, 2000
FLC National Meeting
Charleston, SC

Mark your calendars and plan to attend the FLC's 2000 National Meeting. With a theme of "Show Me the Way," the meeting will feature tech transfer training (beginner and advanced), sessions on how to use the FLC to advance your lab's tech transfer efforts, and many networking opportunities. Don't miss the first FLC meeting of the 21st century!

Sherry Nacci, 856-667-7727 x120, snacci@utrsmail.com

NEWS

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