

Ames Research Center

Testifying before the Senate Committee on Aeronautical and Space Sciences in 1972, Daniel J. Harnett, head of NASA's Office of Industry Affairs and Technology Utilization, mentioned a Denver Research Institute study that investigated NASA contributions to industrial technology and identified examples of successful technology transfer throughout the Agency. In many instances, Ames research and development (R&D) was cited as the basis for the advances, with much of it contributing to spinoff technology. The Center's contributions ranged from the exotic to the mundane, but the very assortment underlines the wealth of applications Ames research embraces as a basic R&D center.

Today, Ames' R&D focus includes advances coming from information technology, biotechnology, and nanotechnology, lending to a strong technology transfer and commercialization mission. Throughout the 1970s and 1980s, the Technology Utilization Office at Ames maintained an active program, assisting both the internal researcher and outside organizations

with technology transfer. In 1994, NASA Headquarters released the "Agenda for Change" program, announcing a new way of accomplishing technology transfer with emphasis on commercialization. Priorities shifted from providing technology assistance programs for businesses to providing outreach for licensing patented technologies. Currently, the Ames Commercial Technology Office actively supports the traditional activities of fostering NASA/industry technology development partnerships, executing licenses, and administering a **Small Business Innovation Research (SBIR)** program. In addition, it is tapping into the new NASA Research Park at Moffett Field—a growing initiative co-located with Ames. The Office has partnered with the Girvan Institute of Technology, a non-profit organization chartered to foster research, technology development, and technology commercialization for NASA. Girvan will also provide services for companies pursuing new relationships with Ames and will manage the small business incubator activities.



An artist's rendering of the new NASA Research Park at Moffett Field depicts the bold new vision proposed for Ames.

Over the last 40 years, one example of a far-reaching technology transfer story dates back to 1966 when Ames awarded Stencel Aero Engineering Corporation a contract to develop a safer seating system for commercial aircraft. This project produced temper foam—a new foam for aircraft seat cushions that would absorb great shocks. Throughout the 1970s and 1980s, the foam found additional uses from hospital beds to improving sports equipment. In the 1990s, temper foam became the basis for a new material for bed mattresses and pillows commercialized under the name “Tempur-Pedic” by the company with the same name.

In 1998, NASA’s temper foam was inducted into the U.S. Space Foundation’s Space Technology Hall of Fame. Following this event, Robert Trussell, chief executive officer of Tempur-Pedic, Inc., presented former NASA Administrator, Daniel Goldin, with the company’s one millionth pillow. Other businesses are still making temper foam-based products, such as Dynamic Systems, Inc. The company’s owner, Charles Yost, collaborated on temper foam’s final formulation and was honored as one of the original innovators. Temper foam remains a leading Ames success story, having commanded a spot in the marketplace for over 30 years.



Seats in the cockpit of the Wing Derringer twin-engine lightplane have temper foam padding to reduce pilot and passenger fatigue on long flights.

The Ground Processing Scheduling System (GPSS) software, originated at Ames, is another successful transfer from aerospace to commercial markets. Mr. Monte Zweben, a former deputy branch chief, designed and developed several planning and scheduling systems, including a software system for complex, multifaceted operations known as the Gerry scheduling engine. Since Space Shuttle flow managers at Kennedy Space Center needed a more efficient scheduling system, Kennedy brought Ames, Lockheed Space Operations Company, and Lockheed Missiles and Space Company together to transfer the technology of the Gerry scheduling engine to the Space Shuttle program. The GPSS successfully became the accepted general purpose scheduling tool for operations. The system was also adopted for scheduling Space Shuttle orbiter refurbishing, saving NASA about \$4 million annually.

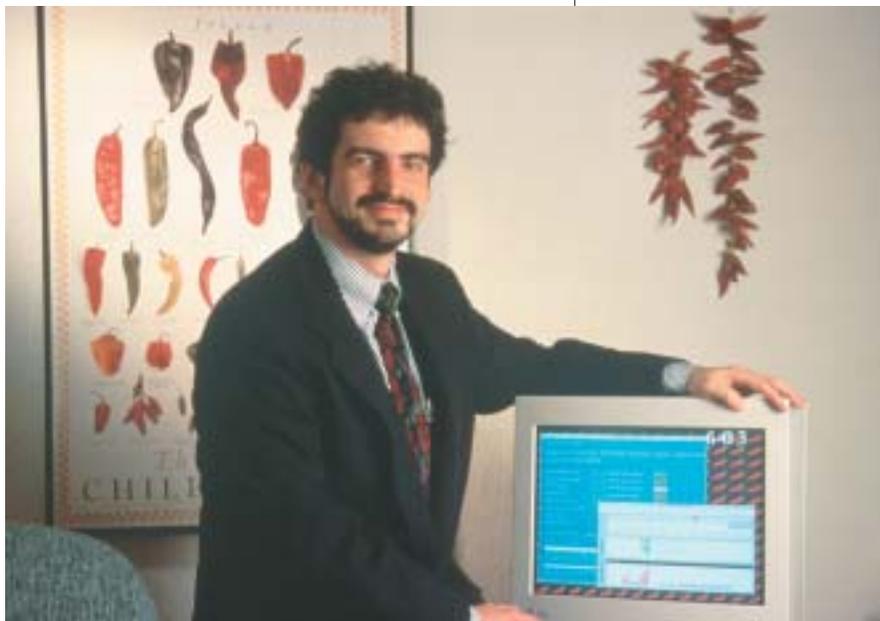
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Tempur foam’s applications have spanned from wheelchairs to sporting equipment.

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Zweben left NASA in 1993 and applied for and received the copyright license to commercialize the GPSS. He then founded Red Pepper Software Company (RPS) in 1994 with Daniel T. Doles. RPS emphasized the real-time responsiveness in the modern manufacturing environment as a primary benefit of its product. In 1995, RPS was one of five winners of *Industry Week* magazine's Technologies of the Year Award. RPS, with a rapidly growing list of customers that included Sun Microsystems, Inc., Hewlett-Packard, Coors Brewing Company, and Chesebrough-Ponds, was purchased in 1996 by PeopleSoft Inc., for \$225 million. Building RPS was only the beginning for Zweben, who started a new venture, Blue Martini Software, aimed at providing companies with software to personalize their products for customers. The story of Monte Zweben and the NASA scheduling software illustrates the positive economic impact that can result from spinning off space-based applications for industry solutions.

A look at Ames' technology transfer history would not be complete without recognizing the value remote sensing technology has brought to government entities and the business community. Remote sensing yields unique data benefiting public safety, conservation, disease prevention, and improving agricultural methods and crop yields. *Spinoff 1983* published a story on the Airborne Thematic Mapper (ATM) that Daedalus Enterprises developed for Ames for agricultural studies and data validation from the Landsat 4 Thematic Mapper. Daedalus then commercialized both systems for sale, lease, or data collection services. One data collection program, sponsored by 13 energy and mining companies, used ATM data to map exposures of clay minerals and to segregate iron oxides; such exposures are associated with deposits of gold, silver, uranium, copper, lead, and zinc.



Red Pepper Software Company, founded by former NASA employee Monte Zweben, commercialized Ames' Ground Processing Scheduling System software.



The Ames C-130 took photographs of the 1988 Yellowstone fires in a composite of visible and thermal channels.

Although remote sensing data determine the extent of disasters like fires and hurricanes, and map the spread of diseases like malaria, some of the greatest benefits are found in agriculture. In the 1980s, Ames partnered with CROPIX, Inc., to make crop acreage estimates and to calculate a field-by-field vegetative index number. In 1993, the Ames Research Center Ecosystem Science and Technology Branch collaborated with industry and university partners to use remote sensing and associated computerized technologies as a tool for vineyard managers to address the phylloxera infestation and to improve crop uniformity in the winegrape harvest. Robert Mondavi Winery produced high quality reserve wines from the studied vineyard for the first time.

In May 2002, Ames signed a Memorandum of Understanding to embark on a remote sensing project for the U.S.'s largest coffee

plantation, and to explore the establishment of an "Unmanned Aerial Vehicle (UAV) Applications Center" in the NASA Research Park. The new center's charter is to conduct collaborative R&D to enhance scientific and commercial utilization of UAVs as high-resolution imaging platforms in national airspace. The Ames-based research team is currently conducting a \$3.76 million project for NASA's UAV Science Demonstration Program.

The effort will provide the first-ever test of the commercial use of a solar-powered UAV operating in national airspace.

Looking forward, Ames' Commercial Technology Office has many exciting prospects underway. Looking to the future with anticipation, but without forgetting the past, Ames remembers its rich history of contributions to the mission of technology transfer by celebrating the successes of the past 40 years. ❖