

Front Line

NEWS, TRENDS & TACTICS

Green tea good for hard drives, too

BIODEGRADABLE COMPOUND OFFERS EFFICIENCY AND ENVIRONMENTAL BENEFITS



Erica von Koerber, Evon Photography

John Lombardi's environmentally friendly machining fluid is made from a combination of synthetic proteins and compounds extracted from plants.

Derived in part from green tea, a new biodegradable machining compound for computer hard drive manufacturing is three to four times more effective than toxic counterparts. In an industry where more than 161 million hard drives leave assembly lines each year, the new compound could significantly improve manufacturing efficiency and minimize environmental risks.

Engineered by John Lombardi, Ph.D., of Ventana Research Corp. in Tucson, Ariz., as part of a National Science Foundation Small Business Innovation Research grant, the chemical is contained in a slurry that polishes the ceramics used in computer hard drives.

"If confirmed in industrial settings, the three- to four-fold increase in efficiency could mean substantial reductions in hard-drive manufacturing costs and all with a product that is less corrosive and more environmentally sound," said James Rudd, the NSF program officer who oversees Ventana's award.

The new compound is part of a family of machining fluids that bind to polishing debris and rapidly remove tiny particles from the polishing surface. The fluids are critical because imperfections in the read-write heads of hard drives must be less than 10 angstroms high. Larger defects can cause the head to crash into the disk, resulting in data loss.

Ventana formulates its fluid using a combination of synthetic proteins derived from common commercial chemicals and compounds extracted from green tea and other plants. Compared to many natural machining fluid compounds, which are often rare and expensive, the plant chemicals in the Ventana fluid are abundant and easily extractable.

According to Lombardi, the fluid's possible biocompatibility and high affinity for ceramics and metals may lead to applications in wastewater treatment, where the compound could remove heavy metal contaminants from water, and medicine, to help deliver certain cancer treatments.

POPULAR HERB

Camellia sinensis is the world's most widely used herb. From it, both black and green teas are derived.

Source: Celestial Seasonings

SITE TO SEE

Small business scores

Now celebrating its 40th anniversary, the nonprofit SCORE Association is a source of free and confidential small business advice for entrepreneurs. Its extensive network of more than 10,000 volunteers provides business counseling and advice as a public service to all types of businesses in all stages of development.

A resource partner with the U.S. Small Business Administration, SCORE delivers help through an e-mail service as well as face-to-face at nearly 400 chapter offices.

Go to www.score.org to get no-cost help as well as a list of low-cost business workshops and seminars that offer training on a variety of topics.



BOOK OF THE MONTH

Demystifying project management

Project managers rely on a host of techniques encompassing dozens of project management practices to see them through daily operations as well as chaotic flare-ups. Tom Kendrick's *The Project Management Tool Kit: 100 Tips and Techniques for Getting the Job Done Right* delivers the most effective project management methods in an easy-to-apply format.

Written for project managers who practice in



any industry and at all levels of experience, the book provides step-by-step explanations, concise summaries, thorough checklists, and other tools.

Kendrick is a program manager with Hewlett-Packard and boasts nearly 30 years of project management experience.

The Project Management Tool Kit is published by AMACOM (\$19.95).

Vision insight could improve machines

PROVIDING CONTEXT IS THE KEY

MIT scientists are reporting new insights into how the human brain recognizes objects, especially faces, in work that could lead to improved machine vision systems.

Pawan Sinha, an assistant professor in the department of brain and cognitive sciences, and his colleagues have shown that a specific brain region known to be activated by clear images of faces is also strongly activated by very blurred images if surrounding contextual cues (such as a body) are present.

Computer recognition systems work reasonably well when images are clear, but they break down catastrophically when images are degraded.

“A human’s ability is so far beyond what the computer can do,” Technical Assistant Ethan Meyers explained. “The new work could aid the development of better systems by changing our concept of the kind of image information useful for determining what an object is.”

UNCOMMON IE

Mars or bust

It's not surprising that Kerry McGuire would eventually find her way to NASA. A graduate of NASA's Space Camp, Space Academy I and II, and Aviation Challenge programs, she was intimately acquainted with the space program before the age of 18. Experiences in these programs inspired her to obtain her open water diving certificate and her private pilot's license before graduating from high school.

Despite her keen interest in NASA, McGuire thought it unlikely that she would ever work for the organization. While pursuing an industrial engineering degree at Clemson University, she wrote a paper about her love for flying and her experiences with NASA's youth programs. Upon reading the paper, her professor, Delbert Kimbler, Ph.D., offered to introduce McGuire to industrial engineer and former astronaut Nancy Currie, Ph.D. McGuire was ecstatic.

"He [asked me], 'Would you mind if I gave her your e-mail address?' And I said, 'Would I mind? Would I mind if an astronaut e-mailed me? Of course not!'"

Currie quickly determined that McGuire would be an excellent candidate for NASA's cooperative study program and used her connections to get McGuire's résumé into the right hands for McGuire to land the position.

During her first co-op tour at the Johnson Space Center, McGuire worked with the Astronaut and Space Flight Training division. Though she was surrounded by aerospace engineers and says she felt a little out of place initially, the friendly staff and stacks of manuals quickly got her up to speed. She even found a way to apply her industrial engineering skills, compiling a user-friendly index of the complex acronyms used in astronaut training materials. In her free time she managed to pick up a working knowledge of Russian at NASA's language center.

Indeed, McGuire seems intent on taking advantage of every avenue for knowledge available to her. She will complete her last



KERRY MCGUIRE

Clemson University Senior
Clemson, S.C.

Kerry McGuire hopes to convert her lifelong interests in NASA and medicine into a stellar career.

semester of academic study in France, satisfying the requirements for a minor in international science and engineering. Before she graduates, she'll undertake another co-op semester with NASA. This time she'll be working in human factors and habitability, areas that more closely reflect her career interests.

Ultimately, McGuire would like to combine her love of space-flight and engineering with her affinity for medicine. She began college studying biomedical engineering at Vanderbilt University before transferring to Clemson to pursue IE. Ergonomics and prosthetics interest her, as does the prospect of teaching. But in talking to McGuire, one gets the definite sense that she is destined for space.

"I would love to work with NASA. It's just a really big family experience. It was my first job and I was kind of iffy because I'd never worked with a government agency. People said, 'Oh it's a lot of paperwork.' I wasn't sure. I thought, 'Oh, these people are going to be so smart and I don't know if I'll fit in.' But it was great. Everyone is willing to help you. I love working for them."

— Steven Averett

<<< QUOTE, UNQUOTE >>>

RESUSCITATING THE SYSTEM

"Saving lives requires a system. The problem is not that our health care system is broken and we need to fix it. The problem is we've never had a system. And complexity requires systems — industrial engineering techniques, project management, continuous improvement, all of the stuff that's done in every other industry in this country."

— Mayo Clinic President and CEO Denis Cortese, *Fast Company*, April 2004

Productivity loss due to present workers

THE COST OF ILL STAFFERS WHO WORK IS HIGHER THAN THAT OF PEOPLE WHO STAY HOME

It may not be the employees who are absent due to illness that cause the greatest productivity losses, but the employees who suffer from medical complaints and come to work anyway.

Economists have coined a new word to describe the problem of productivity loss due to on-the-job slowdowns from a variety of medical conditions such as hypertension and arthritis. It's the flip-side of absenteeism: "presenteeism."

Researchers at the Cornell University Institute for Health and Productivity Studies and the health information firm Medstat estimate that companies' on-the-job productivity losses from presenteeism may be as high as 60 percent of the total cost of worker illness — exceeding the costs of absenteeism and medical and disability benefits.

Adding such conditions as allergies and headaches, on-the-job productivity losses could account for more than 80 percent of employers' total illness costs.

the cost of good medical care against the potential for on-the-job productivity losses, which we see are substantial in many cases."

He observed that the expense of on-

the-job productivity losses is in most cases higher than medical costs. "Yet this very large category of expenses has not been adequately considered by employers," Goetzel noted.

HIGH COST

Hypertension is the costliest condition in terms of productivity loss. It costs employers \$392 per employee annually.

"In this day and age where employers are hesitant to hire because of skyrocketing medical care costs, it's important to broaden the view of health costs beyond the cost of patient care," said Ron Goetzel, director of IHPS. "If a company's health plan is poor, for example, disorders may not be well managed. Workers will come to work and not be as productive. Employers need to weigh

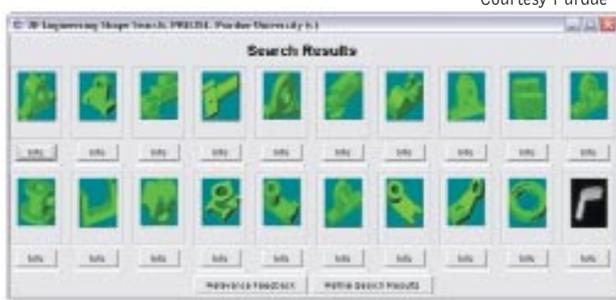
Improving design productivity

SEARCH ENGINE RETRIEVES 3-D CAD DRAWINGS FOR REUSE

A parts search engine developed at Purdue University could save industry millions of dollars annually by making it easier for companies to reuse previous CAD-generated designs.

“Designers spend about 60 percent of their time searching for the right information, which is rated as the most frustrating of engineers’ activities,” said Karthik Ramani, Purdue professor of mechanical engineering and director of Purdue’s Center for Information Systems in Engineering. “The whole power of computers is lost if you are not able to retrieve and reuse what you have created in the past.”

The system enables people to select an inventoried drawing that resembles the desired part and retrieve a cluster of like items. Users also can sketch a desired part from memory or choose one that looks similar from the company’s catalog and sketch modifications to it. The system then assists in finding the desired part.



Courtesy Purdue

Purdue engineers have developed a search engine that retrieves CAD drawings.

“Let’s say there are 1.3 million parts in your inventory,” said Ramani. “If you are trying to design a part and you can find something similar that was produced in the past, that has a lot of value.”

He estimates that design engineers spend about six weeks per year searching for information on parts. The shape-search system would cut that by as much as 80 percent, he said.

Joint membership with SHS and HIMSS



Thanks to a recent agreement between IIE’s Society for Health Systems (SHS) and the Healthcare Information and Management Systems Society (HIMSS), both organizations now offer increased value to members. The new collaboration agreement will benefit management engineers and performance improvement professionals in the areas of membership, education, and publications.

From dual membership to joint education, IIE/SHS and HIMSS are working together for you.

To discuss their eligibility for dual membership, current SHS members can contact IIE / SHS Member and Customer Support at (800) 494-0460, (770) 449-0460, or cs@iienet.org.

<http://shs.iienet.org>



Tool marks fight crime

IDENTIFICATION SYSTEM RECOGNIZES MANUFACTURING PROCESSES

Law enforcement has a new investigational weapon thanks to research that allows more precise identification of tools by the way they were manufactured.

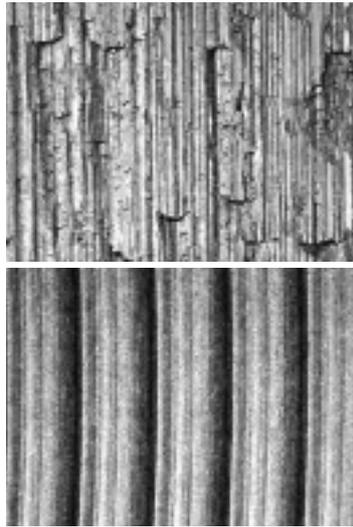
Manufacturing processes leave imperfections and patterns embedded in tool surfaces. Because the patterns appear to be unique for each tool, when criminals use tools to perpetrate crimes — such as jimmying a door with a screwdriver — patterns on tools can be transferred to the crime scene.

Research at the U.S. Department of Energy's Ames Laboratory involved building a database of tool mark images using a forensic comparison microscope and then developing software to analyze the image

data. Algorithms were then developed and used for comparing various tool marks by Max Morris, Ames associate and Iowa State University professor of statistics and industrial engineering, along with graduate student Zhigang Zhou.

Another research project is taking tool mark analysis to a three-dimensional level. Ames metallurgist and ISU professor Scott Chumbley is using a profilometer, a scanning tool that measures the height or depth of tool marks, to develop contour maps.

Manufacturing leaves telltale marks that can be used in criminal investigations. At top is an example of marks left by broaching. At bottom, marks left by milling.



Courtesy Ames Laboratory

EVENTS

> JUNE

JUNE 9-10
Quality Expo Detroit, Novi, Mich.; (800) 840-5688 or (203) 840-5680; www.qualitydetroit.com

JUNE 10-11
Smart Healthcare USA conference, San Francisco; www.smarthealthcareusa.com

JUNE 20-23
Automated Materials Handling Association Conference, Long Island, N.Y.; (877) 557-2538; www.asrs.org

> AUGUST

AUG. 23-25
*Six Sigma Green Belt, Norcross, Ga.

AUG. 26-29
*P.E. Exam Review for Industrial Engineers, Norcross, Ga.

> SEPTEMBER

SEPT. 8-15
International Manufacturing Trade Show, Chicago; (800) 828-7469 or (703) 893-2900; www.imsnet.org

SEPT. 12-16
*Lean Management Solutions Conference, Los Angeles; (800) 494-0460 or (770) 449-0460; www.leanmanagement.org

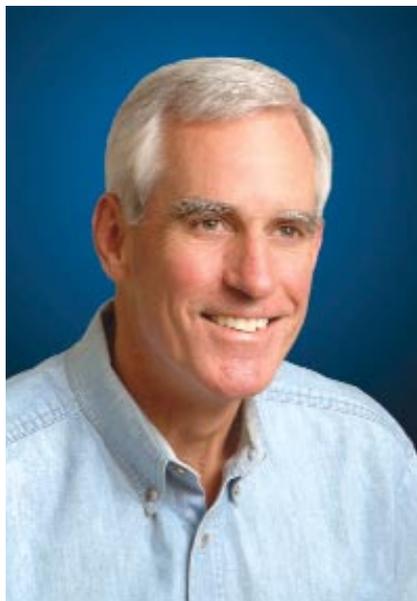
SEPT. 13
*Lean Enterprise: An Introduction, Norcross, Ga.

SEPT. 14-16
*Lean Enterprise I seminar, Norcross, Ga.

SEPT. 20
*Introduction to Supply Chain Improvement seminar, Norcross, Ga.

* Conducted or co-sponsored by IIE. Call (800) 494-0460 or (770) 449-0461 or go to www.iienet.org/events for information.

Beer magnate joins political race



Republican Pete Coors, chairman and CEO of the Coors Brewing Co., has announced his candidacy for the U.S. Senate, saying "I owe my country a debt of gratitude and I want to serve my country."

Coors, who earned an industrial engineering bachelor's degree from Cornell and an M.B.A. from the University of Denver, is the great-grandson of Adolph Coors, who founded the brewery in 1873. His campaign is driven by a promise of more jobs and a stronger economy.

Coors will face former Rep. Bob Schaffer in an Aug. 10 primary.

Pete Coors put his IE degree to use in the company his great-grandfather founded.

Plane dreams



Courtesy The Boeing Co.

In April, The Boeing Co. received its first order for the company's newest airplane — the 7E7 Dreamliner. Japan-based All Nippon Airways agreed to buy 50 of the next-generation commercial plane. The 7E7, Boeing's first new plane since 1990, is designed to use 20 percent less fuel than current planes of comparable size as well as provide up to 60 percent more cargo revenue capacity. Passenger innovations include wider seats and aisles and larger windows. The first planes will be delivered to ANA in 2008.

Manufacturing looks up

INDUSTRY BAROMETER REFLECTS INCREASED OPTIMISM

U.S. industrial manufacturers expect to reduce their work force by 1.9 percent in the next 12 months, according to PricewaterhouseCoopers' first quarter 2004 Manufacturing Barometer. At the same time, the survey shows that more manufacturers plan to add to their work force than reduce it (36 percent versus 23 percent).

Despite these mixed signals, the survey points out that executives are increasingly optimistic about the economy and expect growth for the year.

"Job growth is a concern as manufacturers desire to remain lean, doing more with less. These results show that manufacturers who plan to add to their work force will do so cautiously, while those who plan to reduce it will do so more aggressively," said Dean Simone, U.S. leader of PricewaterhouseCoopers' industrial products practice. "However, there are several positive indicators that point to improved prospects for

U.S. manufacturers. The pricing environment appears to be firming, and manufacturers expect to benefit from the growing economy."

Over the past 12 months, 65 percent of industrial manufacturers reported positive revenue growth. Looking ahead, 83 percent expect positive growth in the next 12 months.

MANUFACTURING EXECUTIVE INSIGHT

Believe domestic economy is growing	90%
Optimistic about U.S. economy in next 12 months	79%
Optimistic about world economy	65%
Planning major new investments in next 12 months	46%
Planning to add workers in next 12 months	36%

Source: 2004 Manufacturing Barometer, PricewaterhouseCoopers

APPLIED ERGONOMICS CONFERENCE

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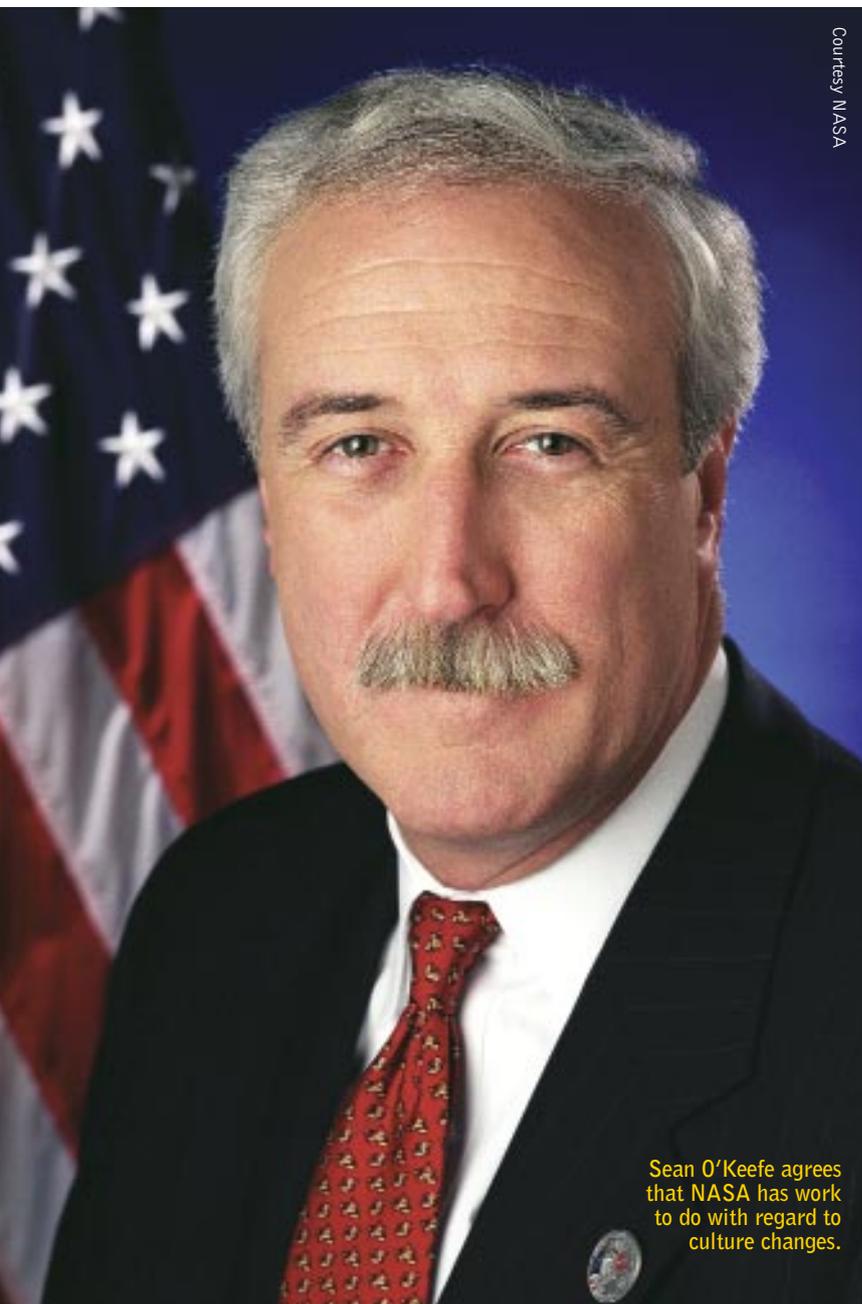
The Institute of
Industrial Engineers



CEUs
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The next frontier: Earthly communication

NASA ASSESSMENT SHOWS CULTURAL PROBLEMS REMAIN



Courtesy NASA

Sean O'Keefe agrees that NASA has work to do with regard to culture changes.

Despite NASA's well publicized objective of transforming its organizational and safety culture following the February 2003 Space Shuttle Columbia tragedy, the space agency still has a distance to go.

A report commissioned by NASA shows the agency has not overcome communications problems that were cited as a factor in the Columbia accident that took the lives of seven crew members.

"We have got a lot of work to do," admitted NASA Administrator Sean O'Keefe in an April news conference following publication of the report.

According to the report, which was conducted by Behavioral Science Technology Inc., "NASA has not yet created a culture that is fully supportive of safety. Open communication is not yet the norm, and people do not feel fully comfortable raising safety concerns to management."

O'Keefe expressed his commitment to making changes, noting the necessity of a climate in which open communication is not only accepted but actively engaged. "The leadership has got to take it on, starting with me," he said. O'Keefe said he and other top managers would begin sessions with management counselors that week.

One thing NASA will watch for is that employees who exhibit technical excellence are advanced and rewarded without pressing them into service as managers, explained James L. Jennings, NASA's associate deputy administrator for management issues.

"You are really minimizing the total capability of the organization by not getting the best from everybody, and that is the kind of environment we want to create," said Jennings.

BST recommended a three-year plan to transform NASA's organizational culture, beginning with a startup period of five months.

AHA!

NASA accounted for 7.9 percent of worldwide scientific discoveries in 2003.

Source: 2003 Scientific News Metric