

# Power Couple

By Jill Becker

**Martine LaBerge and Paul Joseph** met and fell in love over a broken leg.

It was 1991, and Joseph, an assistant professor of mechanical engineering in Clemson's College of Engineering and Science (CES), had been asked to consult on a court case involving a motorcyclist who was suing his doctor after a rod used to repair his fractured leg had severed. Needing to learn more about the tribology and function of the device, Joseph was directed to LaBerge, then an assistant professor in the bioengineering department.

"Yes, that's how we met," remembers LaBerge. "Paul was a newly appointed faculty member, and I explained what he was looking at in relation to the biomechanics of the problem."

LaBerge's specialty just happens to involve the biomechanics of such medical devices.

Obviously, it turned out to be a match made in heaven. But, was it love at first sight? Both say no, claiming their relationship was all business at first.

Both also claim to be fuzzy on the exact details of how their relationship blossomed from there. "I don't remember. I'm getting old," LaBerge jokes — but both clearly relish the end result, as well as the benefits of being able to work together at a place like Clemson.

"It's difficult for spouses in academia to work at the same university," says Joseph. "But Clemson is a nurturing place for couples and supports dual employment."

LaBerge concurs. "Clemson has served as a catalyst for our marriage — and for others," she says, referring to the handful of other dual-career CES couples, including Dan and Agneta Simionescu, Xuejun Wen and Ning Zhang, Brian and Delphine Dean, and Ken Webb and Jeoung Soo Lee.

"You're very lucky if you're a person in this job and your spouse understands your work," says Joseph, explaining why, when so many workplaces frown upon married co-workers, happy unions seem to thrive at Clemson. "We have a very large department. Between the teaching, working with grad students, committee work and all the unexpected things that come up, this job is demanding and takes a lot of time and energy. And to have your spouse appreciate that and understand that it's hard not to think about work all the time is invaluable. Luckily, Martine gets it. She understands the job better than anyone."

"We have quite a few professional couples in our department," notes LaBerge, who as chair of the bioengineering department actively assists couples interested in dual careers at Clemson. "Clemson is very supportive of initiatives like this. As long as it fits the University's mission, we encourage it and help out as much as we can. Personally, working together with Paul has made my life and our relationship easier. It relieves the pressure because we know what the other is going through. Without Paul's support and understanding, I couldn't do this."

But factoring in working together, sneaking off for the occasional lunch out, and even commuting to and from work together from their home in Seneca, is it too much of a good thing? "No," says Joseph. "At the workplace, Martine plays the role of my colleague, not my wife. And we try hard not to take our work home with us. Although she is admittedly better at that than I am."

**Paul F. Joseph** joined the mechanical engineering department in 1990. His research expertise is in analytical and computational approaches in fracture mechanics, contact mechanics and visco-elasticity.

His current research includes fracture mechanics with contact and friction; combined analytical and numerical approaches in fracture, contact and lubrication; precision glass lens molding; glass fiber extrusion; sand-tire interaction and tire mechanics — with a particular interest in the Michelin Tweel™. These projects range from mathematical evaluation of interface fracture parameters, to predicting how a molded glass lens changes shape upon cooling, to the design of wheels for the next lunar rover.

He has served as the department's Honors coordinator for 10 years. He has also received teaching awards and a Best Paper Award from the ASME *Journal of Electronic Packaging*.



Joseph explains the advantages of a new composite material used in Michelin's Tweel™ Project to a colleague.



# News and notes

**Martine LaBerge's** research expertise is focused on the tribological evaluation and characterization of natural and artificial surfaces used in the design of implants for orthopaedic and vascular applications. Her research addresses the fundamental lubrication and wear problems encountered with artificial tribological models. Boundary and elastohydrodynamic lubrication are especially targeted through the design of alternative bearing surfaces.

Current research projects include investigating the wear performance of total knee joint replacements, total knee joint design and dynamic contact mechanics, the effect of phospholipidic boundary lubrication on the subsurface failure of natural and artificial materials, the use of elastomeric composites as alternative bearing surfaces, the effect of artificial lubricant rheology on the wear of tested materials, the tribology of vascular implants and their effect on restenosis and smooth-muscle-cell biochemical response, and surface design for lubrication improvement.



In fact, getting to work together with her future spouse was a major factor in LaBerge's decision to turn down an opportunity to join the Canadian astronaut program (she originally hails from Canada). "Having Paul here kept me at Clemson," she admits, "because I feel like if you have a supportive husband, you have a successful career."

Indeed, both Joseph and LaBerge maintain that being at the same school ultimately enhances both their work performance. "I know Paul's strengths and weaknesses, and he knows mine," says LaBerge. "Working together helps us be better team members and collaborators."

And that connection extends to their home life as well, where, along with their nine-year-old son, William, they bond over activities like cooking, fishing, working in the garden and trips to the beach.

"Working with Paul," LaBerge says with a smile, "I really have the best of both worlds." \*

LaBerge discusses the knee joint developed in her lab with research scholar Michele Spinelli.

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—Paul Joseph

## Clemson lands funding to develop next-generation wind turbines

The next-generation wind turbines and drive trains will be tested by Clemson's College of Engineering and Science (CES) and the Clemson University Restoration Institute in a move that is expected to create hundreds of jobs and place one of the most important sites for wind energy research and development in South Carolina.

A \$45 million grant from the U.S. Department of Energy — combined with \$53 million of matching funds — will build and operate a large-scale wind turbine drive train testing facility at the institute's research campus on the former Navy base in North Charleston, S.C.

The award is the largest single grant ever received in the University's history and represents an enormous economic development opportunity for the region.

The University's partners are the Charleston Naval Complex Redevelopment Authority, the S.C. Department of Commerce, the state of South Carolina, S.C. Public Railways, the S.C. State Ports Authority, RENK AG, Tony Bakker and James Meadors.

Planning and construction of the facility will begin in the first quarter of 2010 with a targeted operational date in the third quarter of 2012. The Department of Energy estimates that South Carolina could gain 10,000 to 20,000 new jobs related to the wind power industry during the next 20 years.

## Researchers receive EPA grant to study carbon emission storage

Clemson University researchers **Ron Falta** and **Larry Murdoch** have received \$891,000 through an Environmental Protection Agency grant to study the safe storage of carbon dioxide in geological formations located deep below the earth's surface.

With carbon dioxide emissions from burning fossil fuels believed to be the leading cause of global warming, geologic storage of the gas is one of the most promising alternatives for reducing emissions using current technology.

Falta and Murdoch will focus on the behavior of carbon dioxide dissolved in saltwater at high pressure and methods to keep it safely away from shallow drinking water aquifers.

## Professor named American Chemistry Society Fellow

Clemson University Alumni Distinguished Professor of Chemistry **Melanie Cooper** has been named to the inaugural class of American Chemical Society Fellows. Cooper was among 162 honorees who were chosen for excellence in their contributions and distinctive service to the society and to the broader world of chemistry.

Cooper's research has focused on the development of effective ways for students to learn science. One of the outcomes of her research is the development and assessment of evidence-driven, research-validated curricula. "Chemistry, Life, the Universe and Everything" (CLUE) is a new general-chemistry curriculum that uses the emergence and evolution of life as the scaffold to teach chemical principles. Cooper was awarded an NSF grant of \$500,000 for a three-year project to develop CLUE. She says many students do not have a deep understanding of fundamental chemistry principles, and this does not prepare them for further study in chemistry or other areas like biological sciences.

Her research focuses on how students learn and develop the cognitive skills that will allow them to develop an understanding of chemistry concepts and problem-solving rather than relying on memorization and algorithms that are not transferrable to new situations. Her research has looked at problem-solving in a wide variety of areas, including laboratories and large-enrollment lectures.

## Researcher teams up internationally with Marie Curie Fellowship

Chemical engineering professor **Mark C. Thies** has received a Marie Curie Fellowship to develop molecular models for advanced-carbon materials that have the potential to be used in strong, yet lightweight transportation vehicles, wind turbines and more energy-efficient aircraft.

The award has enabled Thies to work with Doros Theodorou of the National Technical University of Athens in Greece. It will support the team's collaboration for the next two years.

## Safety expert honored by American Psychological Association

**Scott Shappell**, a professor of industrial engineering, has been elected Fellow of the American Psychological Association (APA). The title is bestowed upon APA members who have shown evidence of outstanding contributions and significant impact in the field of psychology on a national and international level.

Shappell is known for his research in the areas of human error, human factors safety-management systems and fatigue effects on performance. He is the co-developer of the Human Factors Analysis and Classification System and Human Factors Intervention Matrix, groundbreaking tools used to identify and prevent human causal factors associated with accidents in high-risk industries such as aviation, mining and medicine.

## Researcher regenerates brain tissue in traumatic injuries

An injectable biomaterial gel may help brain tissue grow at the site of a traumatic brain injury, according to findings by a Clemson University bioengineer.

Research by assistant professor of bioengineering **Ning Zhang** shows that the biomaterial gel made up of both synthetic and natural sources has the potential to spur the growth of a patient's own neural stem cells in the body, structurally repairing the brain injury site. In previous lab studies, Zhang has demonstrated the reconstruction of a complete vascular network at the injury site as an initial step toward brain tissue regeneration.

The researcher says current approaches to traumatic brain injury have been focused on managing the primary injury using hypothermia or neuroprotection with pharmacological agents, all with limited success. With this new procedure, the hydrogel is injected into the lesion site to direct the response of neural stem cells in the brain to regenerate normal brain tissue. The current research is supported by a \$220,000 grant from the U.S. Department of Defense.