



SAMPE VOLUNTEERS HELP STIMULATE INTEREST IN SCIENCE AND ENGINEERING

Some 40 volunteers from the University of Delaware's SAMPE student chapter provided educational activities and demonstrations in science, technology, engineering, and mathematics to K-12 students at three camps on the UD campus.

University of Delaware
Center for Composite Materials

COMPOSITES

UPDATE

JULY 2011

A single course in high school—"Introduction to Engineering"—determined John Gangloff's career path, and now the University of Delaware doctoral student is doing everything he can to provide that kind of life-changing experience for other kids.

As president of UD's **Society for the Advancement of Material and Process Engineering (SAMPE)** student chapter, Gangloff has had plenty of opportunities to organize K-12 outreach activities during the past two weeks at the Center for Composite Materials (CCM).

During the second and third weeks in July, some 40 SAMPE volunteers, including both undergraduate and graduate students affiliated with CCM, participated in demonstrations, tours, tutorials, live chats, and poster sessions at three engineering-oriented summer camps: Engineering Cool Stuff, FAME/UNITE/MERIT/UD, and Delaware Aerospace Academy.



John Gangloff
UD SAMPE President



TOP STORY

(Continued)

Serving a variety of ages from elementary through high school, all three camps are designed to motivate young students to pursue science, technology, engineering, and mathematics (STEM) majors and careers:

- Sponsored by **Engineering Outreach**, Engineering Cool Stuff shows 12- to 16-year-olds how to use basic engineering principles to design and build a variety of structures including composite beams.
- **Delaware Aerospace Academy** provides hands-on training and experiences in aerospace-related activities and fields for students in grades 1–10.
- The summer residential **FAME/UNITE/MERIT/UD** program, which serves rising 11th and 12th graders, is aimed at increasing the participation of under-represented minorities in engineering and other science professions.

“All of these programs package key engineering concepts in a way that reinforces what young students are taught in the classroom and that lets them have fun while they’re learning,” Gangloff says. “The feedback we’ve received tells us that the activities we offered were effective—the kids were enthusiastic and engaged.”

For the Engineering Cool Stuff and Delaware Aerospace Academy campers, those activities included designing, building, and testing composite beams.

Engineering Cool Stuff students learning about advanced Vacuum Assisted Resin Transfer Molding (VARTM) composites processing



SAMPE students advise Delaware Aerospace Academy cadets during construction of their composite beam designs

“Learning about why their beams fail is a real ‘CSI-type’ experience for the kids,” Gangloff says. “It’s all about understanding what went wrong so you can build a better beam next time. They also learned about teamwork and deadlines—two important skills for the workplace.”

Assistant dean Kathy Werrell says that CCM has provided “amazing opportunities” for the pre-college students in the Engineering Cool Stuff camps.

“Through the hands-on activities in the composites lab, these young people understand how the math and science they’re learning in school come to life through engineering,” she says. “The SAMPE students have been wonderful role models and

TOP STORY
(Continued)*Photo compliments of UDaily*

shared their own love of engineering with our participants.”

For the FAME/UNITE program, the 20 SAMPE volunteers were joined by more than 30 CCM-affiliated student and staff researchers to give tours and demonstrations. Senior assistant dean Michael Vaughan appreciates the examples of “practical but world-changing applications” CCM shared with the FAME/UNITE students.

“This is the difference in effectively attracting young people and others to the vast opportunities within the STEM arena,” he says, “when the science is extracted from the pages of the text-book, extended through new discovery, and allowed to come alive to address the challenges and problems confronting our global society.”

With the program partially supported by the U.S. Army, it was appropriate that the half-day agenda at CCM included presentations by Army Research chemist Robert Jensen and Army Research engineer Travis Bogetti.

Jensen shared information about educational and career opportunities at the [Army Research Laboratory \(ARL\)](#), while Bogetti delivered a presentation on ballistic and high-energy impact. “The kids get excited to see things blowing up,” Bogetti says, “but the important thing is that they get the real message too—that the purpose of everything we’re doing at ARL is to save soldiers’ lives.”

The FAME/UNITE participants not only toured CCM’s many labs and watched demonstrations of various testing and processing techniques but also tapped into the wisdom of current CCM students. “I’ve heard that if you major in engineering, you have no free time,” one



ARL Research Engineer Travis Bogetti’s talk entitled “Ballistic & High Energy Impact” included several videos produced by ARL.

OTHER
NEWS

young woman said. “I want to focus, but I still want to have fun.”

Mechanical engineering major Allan Burleigh quickly eased her concern. “That’s really not true,” he said. “Here at UD, we’re encouraged to do anything we want—participate in intramural sports, choose a minor in something that interests us, or play an instrument—along with studying engineering.”

J.R. Santiago, a chemical engineering major, urged participants to take advantage of the support offered by **UD’s RISE** (Resources to Insure Successful Engineers) program as well as to join student chapters of professional organizations like SAMPE.

“I can’t say enough about the outreach efforts of our SAMPE students,” says CCM director Jack Gillespie. “These camps cover the entire K-12 range, and our volunteers represent all levels at CCM, from interns to professionals, working as a team. Through the SAMPE effort, we offered meaningful hands-on activities to these young students so they could learn what engineers actually do. The impact of these activities is tremendous—it lets the participants see that becoming an engineer is a viable option for them.”

For Gangloff, delivering presentations on the **Composite App Challenge** and the **SAMPE bridge competition** brought everything full circle.

“This is what SAMPE is all about,” he says. “With the camps, we start small and we start young, and it’s just a few years and a few steps—doing research, preparing posters, and writing papers—before they’re competing and networking at the national level. CCM, as a major research center that’s fully integrated into academic activities like these camps, provides the perfect environment to make all of this happen.”

Article by Diane Kukich



SAMPE students showcase their composite bridges to FAME/UNITE program students while explaining the design process

NEW AWARDS

UDAILY STORY: STUDENTS SWEEP SAMPE

Mechanical engineering undergrads take first, second in international competition

1:08 p.m., June 20, 2011--Two undergraduate students in mechanical engineering at the University of Delaware won high honors at the 2011 Society for the Advancement of Material and Process Engineering (SAMPE) Student Symposium International Competition held as part of the 56th International SAMPE Symposium and Exhibition in Long Beach, Calif., May 23-26.

Zachary Melrose won a first place award for his work on "Damage Sensing in Adhesively-Bonded Composite/Steel Joints Using Carbon Nanotubes." His research evaluates the ability of carbon nanotube networks to sense and distinguish different types of damage in adhesively-bonded hybrid composite-to-metal joints. Melrose demonstrated that different failure mechanisms possess a distinct resistance response, proving the ability to not only sense failure in situ, but also to distinguish the extent and nature of the damage that occurs.



Sarah Friedrich



Zachary Melrose

Sarah Friedrich earned second place for her work on the "Influence of Calendering on Carbon Nanotube/ Polymer Composites for In Situ Damage Sensing," which investigated the use of a percolating network of carbon nanotubes dispersed in a fiber-reinforced polymer composite to detect the health of a mechanically-fastened composite joint. Friedrich's results implied that resistance changes within a carbon nanotube/fiber/polymer composite correlates to the progressive damage.

Judges selected the UD students, both in the Honors Program, from a pool of over 250 entries, evaluating their work on technical content, originality and relevance to the industry.

"This is the most important composites conference of the year, so for UD students to take the two top places in the student competition is quite extraordinary. Sarah and Zach's success is a testament to their highly developed research skills and to the strong mentorship of their adviser, Erik Thostenson," remarked Anette Karlsson, chair of the Department of Mechanical Engineering.

[Click here to read full story in UDaily](#)

NEW
AWARDS

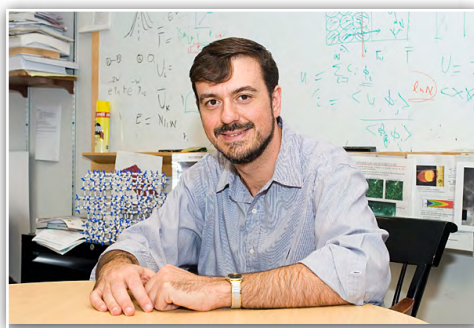
PROF WOOL RECEIVES ACS AWARD

Prof. Richard Wool, Affordable Composites from Renewable Sources (ACRES-CCM) Program Department of Chemical Engineering was awarded the ACS Award for Affordable Green Chemistry. The award was sponsored by Dow Chemical Company and endowed by Rohm&Haas during the ACS 241 National Meeting held in Anaheim California on March 28, 2011.



[Click here to view the presentation given by Prof. Wool during the event.](#)

UDAILY STORY: RAISING THE BAR



Chemical engineering faculty, student, alumnus honored for research excellence

3:36 p.m., July 13, 2011--At the University of Delaware, research excellence has many faces – among them are faculty, students and alumni. Three individuals from the Department of Chemical Engineering recently earned honors for their work.

Dion Vlachos, director of UD's Catalysis Center for Energy Innovation and Elizabeth Inez Kelley Professor of Chemical Engineering, has won the 2011 American Institute of Chemical Engineering's (AIChE) R.H. Wilhelm Award in chemical reaction engineering. Sponsored by Exxon-

Mobil Research and Engineering Company, the honor recognizes Vlachos' pioneering work on multiscale modeling and application to development, design and interpretation of catalytic reaction mechanisms, rational materials design and renewable energy.

[Click here to read full story in UDaily.](#)

PROF ZIDE NAMED NAMBE 2011 YOUNG INVESTIGATOR

On behalf of the North American Molecular Beam Epitaxy (NAMBE) Advisory Board, I would like to congratulate Professor Joshua Zide in your department for being selected to receive the NAMBE 2011 Young Investigator Award. His citation reads, "For the pioneering development of MBE-grown nanoparticle/semiconductor composites and their application to solar and thermoelectric power generation". This award recognizes individuals who have made significant contributions to the science and technology of MBE or enabled by MBE by the age of 35 and show promise of future leadership in the field.



[Click here to visit Prof Zide's home page.](#)

PUBLICATIONS JOURNALS

Koellhoffer, S., J. W. Gillespie, Jr., Travis A. Bogetti, and S. G. Advani, "Role of Friction in the Thermal Development in Ultrasonically Consolidated Aluminum Foils and Composites," Journal of Materials Processing Technology, doi:10.1016/j.jmatprotec.2011.06.011, 2011.

Nilakantan, G., M. Keefe, E. D. Wetzel, T. A. Bogetti, and J. W. Gillespie, Jr., "Computational Modeling of the Probabilistic Impact Response of Flexible Fabrics," Composite Structures, <http://dx.doi.org/10.1016/j.compstruct.2011.06.013>, 2011.

Weidner, K., J. W. Gillespie, Jr., and N. Shevchenko, "Performance of Bolted Joints in Discontinuous Ceramic Cored Sandwich Structures – Static Experimental Testing," Composite Structures, <http://dx.doi.org/10.1016/j.compstruct.2011.06.012>, 2011.

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Sargianis, J. and J. Suhr, "Noise Mitigation and Wave Number Characterization in Sandwich Structures," 161st Meeting of the Acoustical Society of America, Seattle, WA, May 23, 2011.

Chowdhury, S. C., B. Z. (Gama) Haque, D. R. Hartman, and J. W. Gillespie, Jr., "Computer Simulation of Carbon Nanotubes under Combined Loading using Molecular Dynamics Method," The 26th ASC Technical Conference (the Second Joint US-Canada Conference on Composites), Montreal, Quebec, Canada, September 26-28, 2011.

NEW CONSORTIUM



*We would like to thank **BASE-The Chemical Company,** from Florham Park, NJ, for becoming our newest consortium member.*

NEWS

CONSORTIUM

We would also like to thank **Alliant Techsystems**, Rocket Center WV, for the recent renewal of their members, as well as our many other consortium members for continuing to participate in CCM's research and development activities.

To learn more about the benefits of becoming a member, please visit us on the web at www.ccm.udel.edu/Consortium/benefits.html



CELEBRATING 35 YEARS
OF SIGNIFICANT
CONTRIBUTIONS TO
COMPOSITES SCIENCE
AND TECHNOLOGY,
THE EDUCATION OF
STUDENTS, AND THE
CREATION AND
TRANSFER OF
TECHNOLOGY TO
INDUSTRY.

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