



Top Story

CCM-TPI Partnership contributes to successful All Composite Military Vehicle

CCM's longstanding partnerships with the U.S. Army and industry have led to another success story: TPI Composites' recent announcement that the company's All Composite Military Vehicle (ACMV) had passed its durability and road tests.

*Successfully completed accelerated durability and road testing –
TPI Press Release Jan 19, 2010*

Constructed from lightweight composite materials and yielding a structural chassis and body containing no metal, the prototype vehicle is designed to traverse treacherous terrain while transporting troops and cargo, provide enhanced protection for soldiers, add payload capacity, reduce corrosion and maintenance expenses, and improve fuel efficiency.

CCM and TPI have partnered for many years in developing lightweight, high-performance structures for the military. Their joint projects have focused on managing the integration of composites into systems as well as demonstrating the advantages of advanced composites.



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“We are really excited about TPI’s accomplishments in developing and implementing advanced composite materials technology into the ACMV,” says CCM Director Jack Gillespie. “This is a full validation demonstrating that composites can meet or even exceed mission requirements for light tactical vehicles while also reducing weight, enhancing performance, increasing durability and reducing life-cycle costs.”

“The foundation for the success story starts with our longstanding collaboration with the Army Research Laboratory via the ARL Materials Center of Excellence and Composites Applied Research and Technology projects,” Gillespie continues, “as well as our Office of Naval Research Advanced Materials Intelligent Processing Center, which establishes new materials, processes and modeling and simulation capabilities. That research foundation has proven invaluable in increasing the overall technology readiness level to enable advanced composite technologies to be transitioned to projects like the ACMV program.”

“Equally important to success is our contract with the U.S. Army Tank Automotive Research, Development and Engineering Center, which funded the ACMV advanced technology demonstrator and our relationship with TPI as a valued member of our Industrial Consortium for nearly a decade. The project has spanned the entire path from research to development to transition into applications through a university-industry-government collaboration.”

Scottsdale, Arizona-based TPI is currently conducting blast testing of the vehicle. “We are very pleased with the performance of the All Composite Military Vehicle,” said company CEO Steve Lockard. “Not only will this vehicle give our troops increased mobility, but its lighter, high-strength composition will allow for significant fuel efficiency and potentially enable the addition of enhanced armor or greater payload. This is a huge step forward in military vehicle engineering.”

“Our collaboration with TPI has yielded some very exciting results and provided significant new technologies to the Army’s tactical wheeled vehicle fleet,” says CCM Assistant Director Steve Andersen. The list includes high-performance, three- dimensionally reinforced HMMWV hoods, MRAP hoods based on the original HMMWV hood material and processing approach, and a lightweight all-composite armor-ready cab for the Heavy Expanded Mobility Tactical Truck (HEMTT).



*ACMV #3 – Driver’s door
is the ballistically tested
UD-CCM composite
armor door*

In addition, CCM's work in soldier protection research fed into the Center's construction of armored doors that were mounted on the ACMV vehicle during testing, validating the durability of lightweight composite armor for vehicle applications.

"These demonstration and insertion successes are having a very positive impact on the future viability of composite materials for military vehicle applications," says Andersen. "The results showcase the value of the Army's investment into the development and application of these lightweight composite materials technologies, where 40-50 percent weight savings over aluminum solutions have been achieved."

Article by Diane Kukich

CCM once again takes cutting-edge science from lab to market

Researchers at the Center for Composite Materials will soon begin work on the technology of energy-efficient light-emitting diode (LED) light fixtures with support from a \$1.5 million grant from the U.S. Department of Energy.

CCM scientists will begin working in conjunction with WhiteOptics in Newark, and the Crowell Corp. in Newport, both of which will partner in developing, manufacturing and distributing the new technology. The partnership, scheduled to begin early this spring, will create new employment opportunities at the two Delaware-based companies, while the group at CCM will be headed up by Suresh Advani, George W. Laird Professor of Mechanical Engineering and Dr. Joseph Deitzel, Associate Scientist.

"Partnerships with industry--with companies like WhiteOptics and Crowell--are essential for taking cutting-edge science from lab to market, for making sure research doesn't languish on a shelf but is instead put to work," said UD President Patrick Harker at a press conference to announce the grant, held on Jan. 22 and also attended by Sen. Tom Carper (D-Del.) and Gov. Jack Markell.

"And this science will work," he added, "putting people into jobs, advancing important conservation and sustainability goals, and solidifying Delaware's growing prominence in energy technology research and development."

Suresh Advani and Joe Deitzel will soon begin working in conjunction with WhiteOptics in Newark, and the Crowell Corp. in Newport



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(Continued)

Advani, who also serves as CCM Associate Director, explained that CCM's primary role will be to improve on the concept of the light-emitting diode, a semiconductor light source used in many forms of lighting.

"The folks at WhiteOptics have developed a highly reflective plastic material providing greater than 97% reflectance," Advani said. "The goal of the research is to develop and characterize this material into a highly diffuse, low-cost coating that can increase reflectivity of the light-emitting diode to 97-98 percent, thus providing equivalent brightness of current fixtures by using less power. Our job is to combine the current microfiber reflector technology with a novel fiber composite processing technique to create a well dispersed fiber suspension that can be coated effectively into the geometries and surfaces for LED light fixtures."

Advani said that the Center's background in modeling of composites is why CCM was chosen to partake in the research portion of the partnership. WhiteOptics has shown that it is possible to get the level of reflectivity, but CCM will further help to understand the science behind making the multi-dimensional film, Advani said.

Deitzel is an expert in rheology characterization and will develop techniques to measure flow properties of the composite suspension. He described LED technology and the research partnership as a "high profile, green project" that will further increase the visibility of CCM and the University of Delaware in the local economy and job market.

"Obviously it's a high-profile project that is just another example of what we're doing at the Center that will benefit the local community," Deitzel said. "But it's also pleasing to see that it's something that takes some pretty esoteric stuff, as far as how the filler works, and relates it to a very practical and tangible application everyone can get their head around and eventually use on a daily basis."

Advani said he felt "really good" when the proposal was submitted to DOE because it had a mix of all the ingredients, from materials and science to technology and application, and the partners chosen had the right and complementary expertise to convert the invention into a science in the laboratory and transfer it into a technology ready for use in the marketplace.

By Rob Kalesse



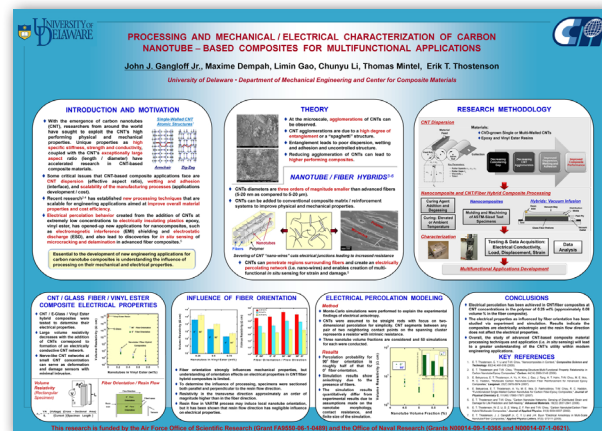
the crowell corporation

OTHER NEWS

CCM Grad Student takes 1st Place in Poster Competition

John J. Gangloff Jr., a CCM Graduate Student with the Department of Mechanical Engineering, and Vice-President of SAMPE UD-Student Chapter, won first place in the SAMPE B/W Student Night Poster Competition held on February 24, 2010.

John is now preparing for the SAMPE Graduate/Senior Student Award and Symposium Competition at the **SAMPE 2010 Conference** to be held in Seattle, WA in May 2010. [Click here to view winning poster.](#)



Gangloff's winning poster is entitled: "Processing and Mechanical/Electrical Characterization of Carbon Nanotube-Based Composites for Multifunctional Applications"



The Spring 2010 CCM Research Review series comprises weekly overviews of the Center's research focus areas. Each session consists of four brief presentations on specific topics within the designated theme area, followed by discussion/Q&A. The Research Reviews, which are free and open to the public, are scheduled Wednesdays at 11:30 in 106 CMSL unless otherwise noted. Lunch follows the session. Speakers include graduate students, post-docs, research associates, and visiting interns. Spring Research Reviews are hosted by CCM and the **SAMPE-UD Student Chapter.**

Upcoming Seminar:

You are cordially invited to attend the Jack R. Vinson lecture sponsored by the Department of Mechanical Engineering:

Dr. Subra Suresh,
Massachusetts Institute of Technology

"Engineering the Future of Human Health"

Friday, April 9, 2010 at 10 a.m.

Rm 106 Composites Manufacturing Science Laboratory

This lecture will provide recent research results at the intersections of engineering, materials science, nanotechnology, genetics, life sciences, medicine and public health. Particular attention will be devoted to the role research at the intersections of these different fields plays in advancing the boundaries of human disease diagnostics, therapeutics and drug efficacy assays, through experiments, computations, and clinical studies. Specific examples will include research results for infectious diseases, human cancer, blood disorders and traumatic brain injury.

MEMBER NEWS



We would like to thank Kubota Research, Hockessin, DE and The Boeing Company, Berkeley, MO, for the recent renewal of their memberships, and for continuing to participate in consortium 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.

This is a newsletter publication of the University of Delaware Center for Composite Materials
Please visit us on the web at <http://www.ccm.udel.edu>

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