

NEWS/RESEARCH



Better methods for clean energy

Lane Carasik, Ph.D., has received a Jeffress Trust Award, which comes with \$100,000 to accelerate the deployment of clean energy and make it more cost-effective. Carasik and his Fluids in Advanced Systems and Technology research group are designing and optimizing efficient, low-cost enhancements for equipment used in solar, nuclear and geothermal energy systems. His research group is focused on a specialty insert to be placed inside a heat exchanger's tubes, improving performance.

FROM THE CHAIR



Gary Tepper, Ph.D.

Professor and Chair
Department of Mechanical
and Nuclear Engineering

VCU's Department of Mechanical and Nuclear Engineering is a research and education leader.

Our faculty are making robust research contributions in mechanics, nuclear engineering, advanced materials and thermal fluid systems. Our commitment to meaningful student research opportunities means that undergraduate and graduate students work alongside faculty as they develop breakthrough technologies with applications for transportation, health care, manufacturing and more. Recent accomplishments include exciting new advances for additive manufacturing, clean energy, smart materials and aerosol drug delivery systems.

We offer the most comprehensive nuclear engineering program in Virginia. We also offer the United States' only hybrid doctorate in mechanical and nuclear engineering.

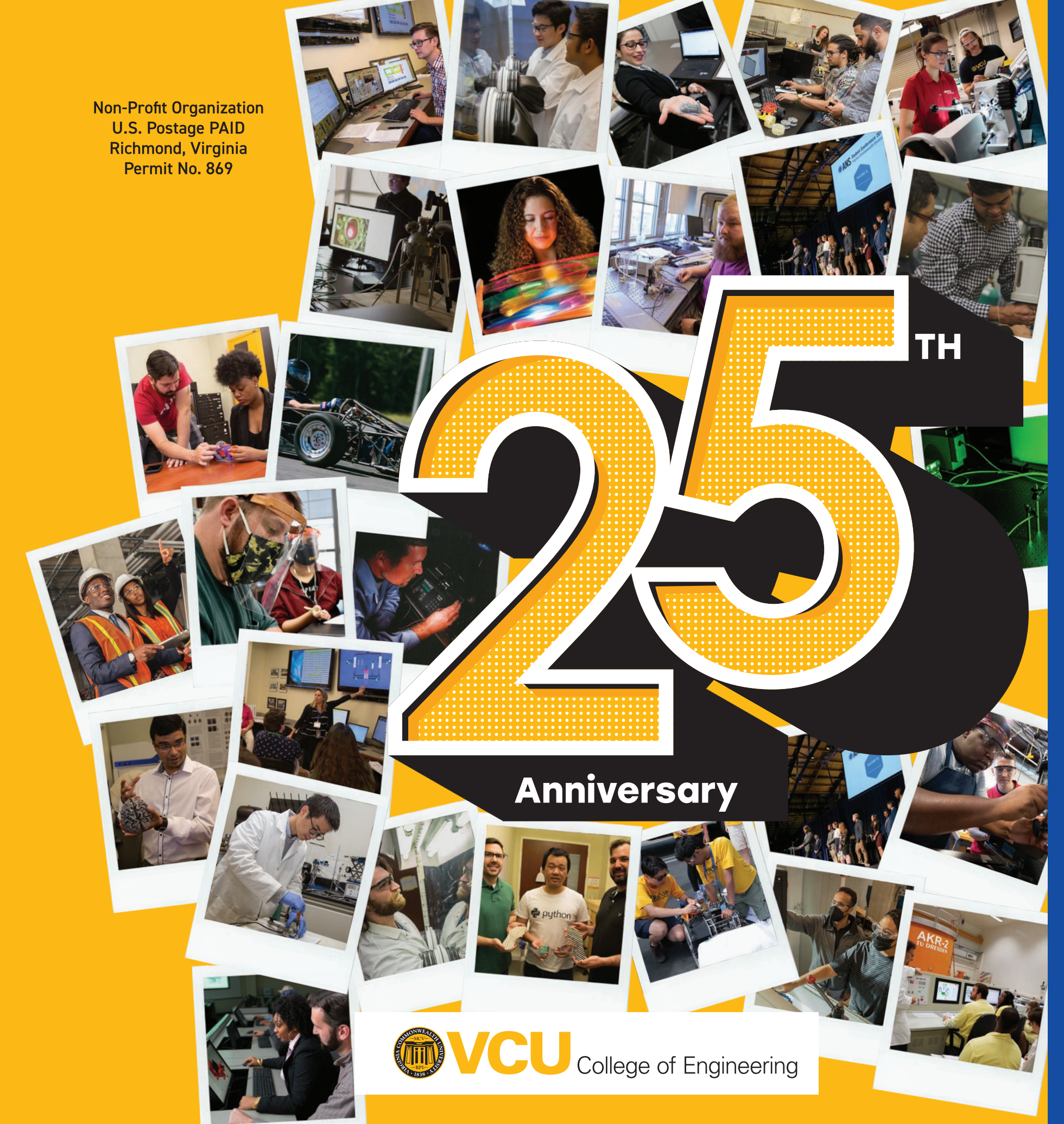
This is a great time for VCU's Department of Mechanical and Nuclear Engineering. We're proud of our accomplishments, and excited about our future.



VCU College of Engineering

601 West Main St.
Box 843068
Richmond, VA 23284-3068

Non-Profit Organization
U.S. Postage PAID
Richmond, Virginia
Permit No. 869



25TH Anniversary

VCU College of Engineering

GROWTH

NOW OPEN: the Engineering Research Building

VCU Engineering held a different kind of grand opening for its new Engineering Research Building. To comply with restrictions because of the COVID-19 pandemic, a large audience of well-wishers gathered by Zoom Feb. 3 to see university officials, architects, builders and civic leaders cut the ribbon on the 133,000-square-foot research and workforce development hub.



The building facilitates expanded public-private partnerships in VCU Engineering research. Construction of the \$93 million facility was funded by taxable bonds, which allows VCU Engineering to work closely with industry to conduct translational research. These collaborations support the college's mission to train students in real-world engineering, often alongside industry professionals. The Engineering Research Building also includes a 9,000-square-foot makerspace and a fully wired courtyard for working outdoors.

64

ACTIVE RESEARCH GRANTS

57

INVENTION DISCLOSURES IN THE LAST 5 YEARS

AREAS OF RESEARCH

- Materials
- Mechanics
- Nuclear engineering
- Thermal fluid systems

egr.vcu.edu/mne

- /VCUEngineering
- @VCUEngr
- @VCU_Eng
- egr.vcu.edu/linkedin
- VCUEngineering

Improving inhaled pediatric medicines

Laleh Golshahi, Ph.D., leads a multidisciplinary team that received a \$1.6 million contract from the U.S. Food and Drug Administration to develop physical and computer-based models to evaluate the performance of generic and brand-name nasal spray medications used by children. **Worth Longest, Ph.D.**, is principal investigator on a project to improve how infants in respiratory distress receive lifesaving surfactant. He has received \$500,000 from the Bill & Melinda Gates Foundation to conduct an in-depth analysis of noninvasive surfactant delivery programs by applying computer modeling and in vitro testing.



Castano receives CAREER award

Carlos Castano, Ph.D., has received a prestigious National Science Foundation CAREER award to investigate a new method to modify the surface of metallic powders used for additive manufacturing. Castano is developing a method to deposit thin films on materials' core powders to form a coating or shell on each individual grain. The new core-shell structures are designed to give materials more homogeneous and controlled microstructures when used as powder feedstock for sintering-based manufacturing.



Understanding behavior of materials in extreme conditions

Gennady Miloshevsky, Ph.D., is VCU's principal investigator on a grant from the U.S. Defense Threat Reduction Agency to 18 major research institutions that are working to understand the behavior of materials in extreme conditions caused by weapons of mass destruction (WMD). He is conducting computational research on the behavior of satellite materials in WMDs outside Earth's atmosphere. He is also modeling photon-material interactions to analyze what happens when materials encounter high-intensity X-ray pulses, which are associated with exo-atmospheric explosions.



Photo courtesy of Gennady Miloshevsky, Ph.D.

Tiny particles, big impact

Ibrahim Guven, Ph.D., has received funding from the U.S. Department of Defense's Office of Naval Research to model how rain, ice, sand, dust, volcanic ash, aerosols and other particles impact surfaces of hypersonic aircraft. This research is expected to lead to development of advanced materials for building vehicles traveling more than five times the speed of sound. Guven's team will develop a computational framework to streamline the analysis of how multiple dynamic fractures spread.



Photo courtesy of NASA

Students design and 3D-print cargo drone

Members of VCU's chapter of the American Society of Mechanical Engineers (ASME) designed and additively manufactured an unmanned aerial vehicle for ASME's 2021 Innovative Additive Manufacturing 3D Challenge (IAM3D™). The challenge tasked student teams with designing and additively manufacturing an unmanned cargo aircraft that navigates an obstacle course, picks up cargo and delivers a specific payload. Creating the drone was the students' pet project throughout the 2020-21 academic year. They continued to optimize the aircraft after the challenge ended, with plans to show it off during student activity days in the 2021-22 school year.



Photo courtesy of ASME at VCU

Innovation Lab prints pandemic safety solution

When the COVID-19 pandemic made face shields hard to come by, the Mechanical and Nuclear Engineering Innovation Lab came to the rescue. Using materials donated by DuPont Teijin Films, lab personnel designed and 3D-printed reusable face shields to be used with masks for an added layer of protection. The reusable face shields were available for use in all VCU Engineering labs.



A lifesaving gift

Thanks to a forgotten action years ago, doctoral student **Sarah Saunders (B.S.'17)** was called on to save a stranger's life. As an undergraduate, Saunders participated in a bone marrow registry drive, adding her DNA to the National Marrow Donor Program. She didn't remember having signed up when, in the height of the pandemic, she received word that she was the best match for a patient whose survival depended on a donation. Despite the personal risk involved, Saunders underwent the donation procedure at Georgetown University Hospital.



Photos courtesy of Sarah Saunders

Carter Opportunity Award recipient

Lisa Patton (B.S.'20) is VCU's first recipient of the E. Eugene Carter Opportunity Award, a university-wide award that provides female Hispanic students up to \$20,000 to repay student loans upon graduation from an engineering program. Patton had been working as an executive administrative assistant for several years before she enrolled at VCU Engineering to fulfill a promise she had made to her late mother. She continued to work full time during most of her time in college. Today, Patton is a process engineer with Ashland Specialty Ingredients.



Photo courtesy of Lisa Patton