MOMENTUM

FALL 2023

ENGINEERING FOR ENGINEERS

Mueller

Universities are spearheading the development of cutting-edge buildings to nurture our future engineers. Interdisciplinary programming is at the forefront of this trend, with advanced labs, state-of-the-art simulators, creative studios, and modern lecture halls, all designed to enhance the educational experience.

Designed to create the next generation of Northern Virginia's technology workforce, the $250 million Fuse at Mason Square is Mueller's largest academic project to date.

GEORGE MASON UNIVERSITY

Supporting Industry Partnerships

George Mason University to Open Two New Buildings

George Mason University continues to demonstrate its commitment to engineering education, innovative partnerships, and breakthrough research with two prominent new buildings on its Northern Virginia campuses. Long known for its collaborations with business and industry partners, Mason is expanding its graduate-level programs in the rapidly growing fields of computing, artificial intelligence, and the life sciences.

Fuse at Mason Square

Fuse at Mason Square will be the newest addition to Mason's Arlington campus. The 430,000-square-foot, 11-story building will be home to the university's Institute for Digital InnovAtion (IDIA) and the new School of Computing. The building will support graduate-level education and research in artificial intelligence, data analytics, cybersecurity, cyber-physical systems, and computer science and engineering programs. Spaces include entrepreneurial incubators and labs that support data visualization and media studies, robotics, and human subject research.

Each floor promotes teamwork and enables industry partners to interact directly with students. "It's really taking this ecosystem of innovation and putting it into practice architecturally," stated **Rob McClure** of **Page**, the leading architecture firm, in an interview for the university.

Mueller is providing electrical engineering and plumbing design for the building, which is anticipated to be net-zero-ready and exceed LEED® Platinum standards. "One important decision we made early during design was to use plug-in busways to distribute power throughout the building," says **Pathros Cardenas, PE**, chief electrical engineer for Mueller. "We were able to reduce the cross-section of all the feeder groups by about 50% by using busway, as compared to using conduit and wire. Our electrical rooms have plenty of electrical capacity and wall space despite being tightly constrained by the project's space requirements. This shows the importance of making the right decisions at the right time."

Set to open in 2024, Fuse at Mason Square is managed by the public-private partnership team of Edgemoor as developer and investor, Page as the design architect, OTJ as the interior design consultant, and Clark Construction as the general contractor.

Life Sciences and Engineering Building

Mason is also constructing a new Life Sciences and Engineering Building on its Prince William (SciTech) Campus. The 132,000-square-foot building will support a graduate-level curriculum focused on STEM-H programs, including science, technology, engineering, and health. Specialized laboratories will encompass wet, dry, instructional computer, virtual reality, and human performance.

Above and Beyond

The electrical engineering for Fuse at Mason Square will surpass energy codes and meet LEED Platinum requirements with:

- **Segregated power distribution and metering**
- **Daylight-responsive lighting controls**
- **Occupancy-controlled receptacles**
- **Electric vehicle charging stations**
- **A photovoltaic system**

roof, the increased ductwork and piping made the distribution challenging through the fourth floor."

Mueller incorporated custom solutions to address the building's various needs and space requirements. "The design includes specialized exhaust systems to support welding and machining in the Fabrication Lab, as well as training Nursing and Forensic Science students in the Cadaver Suite," adds Mechanical Project Engineer **Keirstin Hughes, PE**. "Another unique element of this project will be the custom air handling units located on the roof of the building. These units were designed with custom service corridors that act as small mechanical rooms so all maintenance can be performed from an indoor and conditioned environment."

Mueller has provided mechanical, electrical, plumbing, and fire protection engineering for the four-story building, again working with **Page**. Now under construction, the building is set for completion in late 2024. "A unique challenge that faced the design team was the addition of a fourth floor after the preliminary design had been completed for a three-story building," says **Daniel Carmine, PE, LEED AP**, associate and senior project manager for Mueller. "In addition to the extra 33,000 square feet, the team was asked to repurpose and reconfigure other floors to meet a variety of new requirements for added graduate programs. Since most of the building's mechanical equipment was located on the building's

Mason's new Life Sciences and Engineering Building will be integral to the university's Innovation Town Center on the SciTech Campus.

Customized MEP solutions meet the needs of the specialized spaces in Mason's Life Sciences and Engineering Building:

- **Wind Tunnel**
- **Advanced Manufacturing**
- **Biomechanics & Motion Capture**
- **Metal Shop, Woodshop, & Concrete Prototype Bay**
- **Robotics & Autonomous Vehicles**
- **Fluids & Thermodynamics**
- **Sustainable Energy**
- **Material Characterization**
- **Cadaver & Morgue Suite**
- **Emergency Care & Physical Therapy**
- **Physiological Assessment & Dexa Scan Room**
- **Microbiology & Tissue Engineering**
- **Forensic Science & Chemistry**
- **DNA Lab & DNA Sequencing**

VIRGINIA TECH™

Meeting the Mission

New Engineering Building Underway at Virginia Tech

Ranked as one of the top engineering programs in the nation, Virginia Tech currently accommodates many of its College of Engineering programs in a building that dates to 1952. To advance the university's "Beyond Boundaries" academic and research missions, the university will replace the existing building set in the North Academic District with **Mitchell Hall**, a new and expanded facility that will add 70% more space within the same footprint.

Designed by **Perkins&Will**, the 284,000-square-foot building will promote research and experiential learning, with classrooms, instructional and research laboratories, offices, and maker spaces for teaming and collaboration. Virginia Tech's existing Stability Wind Tunnel, one of the largest university-owned wind tunnels in the country, will remain and be enclosed within the new facility.

"Mitchell Hall will have five levels plus a mechanical penthouse," says Mueller Vice President **Tom Syvertsen, PE, LEED AP**. "This building will be filled with equipment-heavy labs that generate a lot of heat, so this is an environment that lends itself well to using chilled beam technology that provides cooling hydronically.

"It's more efficient in terms of both energy and physical space to move heating and cooling energy through a building using water rather than air," Syvertsen continues, "so heating and cooling through chilled beams is a great application for spaces that are not driven by ventilation or make-up air requirements."

When complete in 2027, the building will connect to the campus chilled water supply with two dedicated heat recovery chillers (DHRCs) that will also provide chilled water to other campus buildings that require winter cooling, offloading that demand from the central campus chillers. "Generating heat for the building electrically, using compressors instead of burning fossil fuels, is a means of decarbonization that aligns with Virginia Tech's Climate Action Committee goals," says Syvertsen. "We can generate a substantial portion of our required heat at a higher Coefficient of Performance (COP) using these chillers and gain the benefit of minimizing energy consumption at the central cooling plant since our chilled water byproduct is needed elsewhere."

Syvertsen adds, "One challenge to designing an engineering building that needs to remain effective for decades is providing adequate adaptability for future program changes. For example, electrical power and exhaust air systems have been designed to meet the requirements of the initial users but also provide flexibility for new processes and technology. Spare capacity has been built in for future chemical fume hoods, point exhaust including articulating fume arms, and to power new equipment, as the education and research programs evolve."

The new Mitchell Hall will serve as a centralized hub for several engineering departments on the Virginia Tech campus. A 1940s-era stability wind tunnel created by NASA will be enclosed in the new building.

The UMES Engineering, Aviation, Computer and Mathematical Sciences Building contains numerous spaces for simulations and practical learning.

UNIVERSITY OF MARYLAND EASTERN SHORE

Design It, Build It

Hands-On Learning Featured in UMES Engineering Building

The University of Maryland Eastern Shore's (UMES) **Engineering, Aviation, Computer and Mathematical Sciences Building** is the first complex built in the university's Research Quad. The 166,000-square-foot, LEED Gold building includes numerous engineering-focused spaces for instruction and hands-on activities, including a nanotechnology lab with a clean room that enables students to design and build their projects.

Hord Coplan Macht and **Perkins&Will** designed the building. Mueller's eco-friendly mechanical/electrical design included the installation of 220 geothermal wells for heating and cooling. "UMES had the advantage of available land, and with this building positioned on the edge of campus, we were able to design a network of geothermal wells," says Mueller Senior Mechanical Project Engineer **Scott Huber, PE**. "Buildings tend to require more cooling with heat rejection throughout the year, and with this geothermal well field, the heat is dispersed into the earth through long vertical pipes, which can then be used for heating in cold seasons. This was a challenging but rewarding accomplishment that minimizes the use of fossil fuels for heating."

Integrated Research

University of Delaware Engages Students in Advanced Labs

The University of Delaware's **Patrick T. Harker Interdisciplinary Sciences and Engineering Laboratory** was designed to engage students with side-by-side classrooms and labs, allowing for small-group collaboration and solutions testing. The 194,000-square-foot facility offers a microscopy and imaging suite, a nanofabrication lab, a synthesis lab, an advanced materials characterization lab, a 9,000-square-foot clean room, and a Learning Community Center.

The Harker Lab has become a hub of teaching and research on campus, bringing students and faculty from numerous teaching, learning, and research disciplines. Working with architect **Ayers Saint Gross**, Mueller designed the building's flexible and redundant HVAC, plumbing, power, and lighting systems, carefully customized to support the specialized labs.

"The future is focused on students experiencing education in action. This building is an investment in them…in this incredible community of people, everyone who has signed on to change the world with us."

Patrick Harker
Former President, University of Delaware

The University of Delaware's Harker Lab earned multiple design awards.

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