

Senior's published research could enhance water treatment processes

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Jenna Bishop, a senior majoring in environmental systems engineering in the College of Earth and Mineral Sciences (EMS), experimented with different ways to improve the efficiency of pressure filtration. She specifically researched small-scale filtration with coal slurries, which are mixtures of coal and water. Credit: Penn State

Jenna Bishop, a senior majoring in environmental systems engineering in the College of Earth and Mineral Sciences (EMS), has taken advantage of several opportunities as an undergraduate. From serving as president of the EMS Student Council, to playing the role of captain for Relay For Life, to dancing for THON, a student run philanthropy at Penn State, Bishop has no shortage of memorable moments. However, she says one of her proudest moments was publishing research as an undergraduate.

"Ever since I started at Penn State I've had a few major goals, and one of them was to conduct research," Bishop said. "Not many students can get started so early."

In the summer before her junior year started, Bishop worked in a lab at Penn State under the guidance of Mark S. Klima, associate professor of [mineral](#) processing and geo-environmental engineering, to experiment with different ways to improve the efficiency of [pressure](#) filtration. Filtration is a process that uses external forces—in this case, high levels of pressure—to separate a solid from a fluid.

Pressure filtration is useful for dewatering various types of solid-[water](#) slurries consisting of fine and ultra-fine particles.

Bishop specifically researched small-scale filtration with coal slurries, which are mixtures of coal and water. Coal slurry is a residue leftover by coal cleaning processes, which needs to be properly disposed. Improving the filtration of coal can help to dispose of the coal residue while recycling the remaining water.

"The goal for us was to split the mixture into a dry [coal](#) cake and water," she said. "I was interested primarily in adjusting the variables in pressure filtration to extract as much water as possible."



Adjusting certain variables, such as temperature and acidity, allowed Jenna Bishop, a senior majoring in environmental systems engineering in the College of Earth and Mineral Sciences (EMS), to work toward improving the efficiency of pressure filtration. She was able to publish her research as an undergraduate. Credit: Penn State

Bishop and Klima, along with Gireesh S.S. Raman, graduate student in the John and Willie Leone Family Department of Energy and Mineral Engineering, improved the filtration's efficiency by changing certain conditions, such as temperature and acidity.

"I ran more than 100 pressure filtration tests with different conditions," Bishop said. "Each test took approximately one to two hours each."

By finding the optimal conditions under which their small-scale filtration could operate, the research results could then be applied to improving water filtration on a larger scale.

Prior to completing her research, Bishop took a [mineral processing](#) course with Klima, which she credited with preparing her for the experience.

"My course with Dr. Klima gave me a general knowledge of how the mining industry operates and how research is conducted," she said.

Bishop, Klima and Raman published their research on pressure [filtration](#) in the *International Journal of Mineral Processing*.

"I was very fortunate to have my research published, and I couldn't be more thankful for that opportunity as an undergraduate," Bishop said.

Provided by Pennsylvania State University

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