Research Goes Viral: USU Alum’s Thesis Has 100,000 Downloads | College of Engineering

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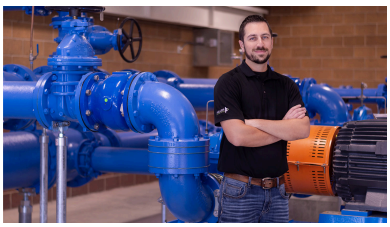
Utah State University News Release — Jan. 14, 2020 — College of Engineering alumnus Colter Hollingshead didn’t expect his thesis to turn too many heads. Civil engineers, after all, are known for publishing technical studies with unfamiliar terms and lots of math.

Even the title is intimidating: “Discharge Coefficient Performance of Venturi, Standard Concentric Orifice Plate, V-Cone, and Wedge Flow Meters at Small Reynolds Numbers.”

“It’s a mouthful,” said Hollingshead with a laugh. Despite its technical tone, the 93-page study is quite the page-turner with over 100,000 views across the globe. Today it is the most-downloaded research manuscript at Utah State University.

So what’s behind the overwhelming popularity of this otherwise unapproachable study? Hollingshead (’11 MS Civil and Environmental Engineering) says the paper looks complex, but it boils down to a straightforward research question.



Civil engineering alumnus Colter Hollingshead is the author behind USU’s most-downloaded thesis.

“Basically we wanted to know if water flow meters could be used to accurately measure viscous — meaning thick — fluids,” he said.

For years, engineers in the oil and gas industries have asked the Utah Water Research Laboratory to calibrate meters used to measure the flow of oil. The challenge is that the meters are calibrated with water, not oil. Because the two fluids have vastly different flow characteristics, it’s difficult to simulate the flow and pressure characteristics of oil.

But the requests kept coming, and Hollingshead and his graduate advisor spotted an opportunity.

Under the direction of Research Professor Michael Johnson, Hollingshead set out to determine if the meters could be calibrated to accurately measure oil flow. However, there was another hurdle.

“There’s no way they would allow hundreds of gallons of oil into the Utah Water Research Lab on the banks of the Logan River.” Said Hollingshead. “So we used computational fluid dynamics.”

Computational fluid dynamics allows engineers to model and predict fluid behavior using software instead of physical models. The findings demonstrate that flow meters can be calibrated to accurately measure oil flow. Hollingshead published the results in the Journal of Petroleum Science and Engineering in 2011.

Today, Hollingshead is a civil engineer at Keller Associates in Pocatello, Idaho where he works with five other USU alumni. He specializes in water and wastewater systems for cities and towns throughout the West. Looking back on his USU experience, he credits Johnson for his success and encourages civil engineering undergraduates to find opportunities at the Utah Water Research Lab.

“The experience you’ll gain there is invaluable,” he said. “There’s a stigma that you need to leave the state for grad school, but in my opinion USU has some of the best professors and programs in the country when it comes to water resources engineering.”

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