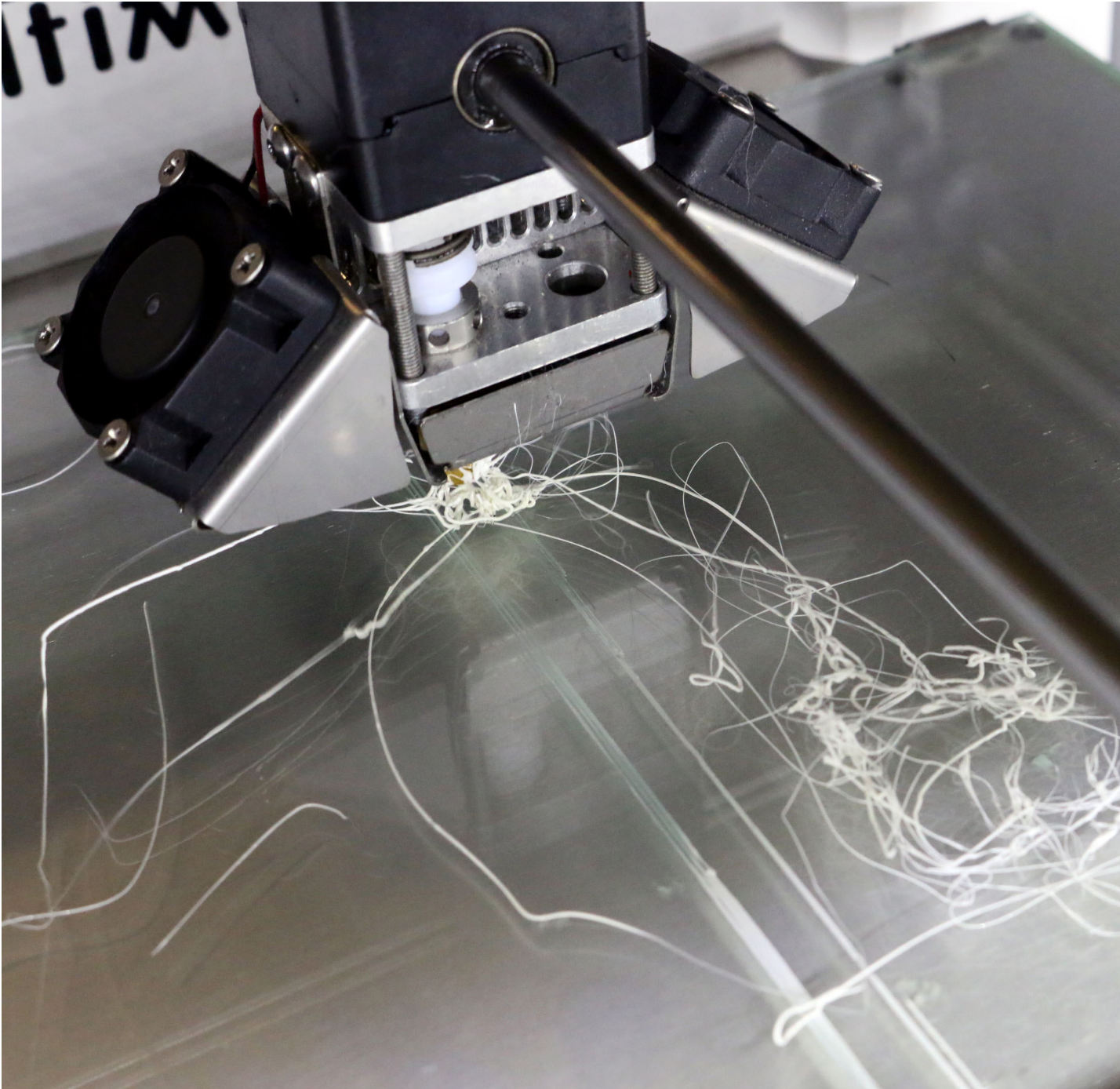
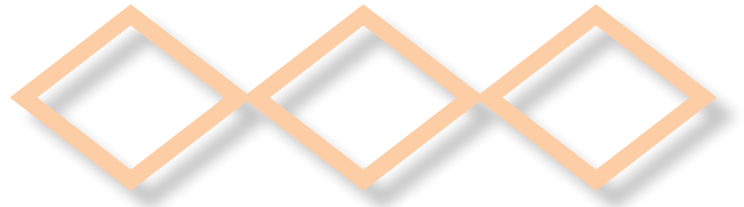


Printing in the Third Dimension



An insider look into Lehigh University's 3-D printing lab



By Carina Bonasera

Upon opening the door to Wilbur Powerhouse, an unadorned gray stone building near the bottom of Lehigh University's campus, the first sound that greets a visitor's senses is a low mechanical hum – the sound of dozens of 3-D printing machines running, simultaneously sucking up electricity from the powerhouse.


A colorful display of samples from the 3-D printers is arranged artfully at the front desk. Figurines hardly bigger than a coin; bright strands twisted together into artistic shapes; a foot-tall, rainbow-colored model of the Eiffel Tower. The variety and uniqueness of the pieces draws the visitor farther in, where closer inspection reveals their intricate compositions. Some are made up of loops of plastic and tiny links that only appear delicate, while others look solid enough to have come right out of a factory mold.

All of this is a lead-up to the main attraction: rows and rows of pristine white 3-D printers, some individuals humming softly as they spin out new creations while the rest lay dormant. And beside them, in a separate glass room like a trophy on display, is the pride and joy of Wilbur: the new Renshaw metal 3-D printer.

The first 3-D printer had already been at Lehigh for some time when graduate student and lab manager Trevor Verdonik started working here. Verdonik, who has witnessed the entire creation of Wilbur's 3-D lab, says that once the movement toward 3-D printing started, it picked up speed fast. "We said, let's try getting some of these less expensive printers and maybe we'll try putting one out for student use and see what happens. Well, the next thing we knew it was being used 24 hours around the clock and people were fighting over it," he recalls.

The popularity of the 3-D printers led Lehigh to purchase more. Over time the lab grew into an extensive collection, one which now holds celebrity status in the powerhouse. But the metal printer is the new attraction – an imposing monster of a machine, partially divided from the rest of the building by glass walls, and complete with warning signs about its potential hazards. This kind of modern technology is what has brought Lehigh's 3-D production potential to a whole new level.

"It's amazing to see how much it's really changed our capabilities as a university and the access that students and other faculty



A 3-D printer runs at Wilbur Powerhouse on Thursday, Sept. 22. Printers can take anywhere from several minutes to several hours to complete a product. (Carina Bonasera/B&W Photo)

have to making projects real,” says Brian Slocum, head manager of Wilbur design labs. He mentions the integrated project development course that is a requirement for mechanical engineers, material science and product design students. “Five years ago, before we had as many printers as we [have], it took them a long time to get to the prototyping phase of the project. Bringing in just those small consumer-grade printers has allowed them to prototype in the very first semester, where typically they don’t even start to prototype until the second semester.”

The technology also helps students prepare for real jobs in the real world, even more so than they would in a traditional classroom setting. Using the printers brings students a step closer to the resources that they could potentially use in the future. “It’s a much more reflective process of real, solid engineering, and I think the students find it much more interesting and much more real,” Verdonik says. No longer do concepts learned in class have to stay abstract; using the 3-D technology, students have the opportunity to put them to use and see the physical results of their learning.

While the presence of 3-D technology is not unique to Lehigh as a university, the undeniable impact that it has on learning is heightened by the “engineering school” stereotype that Lehigh carries. Verdonik describes some of the projects that he has seen come out of the 3-D printers; from cat-skeletons for a theater class to mounting parts in an electron microscope, the results are as varied as the studies of the students who create them. With this technology, students are able to break free from the constraints of a singular major, and can instead garner a more multidisciplinary education.

As the printers hum away in the background, producing three-dimensional items layer by layer, it’s hard not to marvel at this oasis of technological activity nestled in the heart of campus. And it’s hard to shake the feeling that to stand in Wilbur lab is to see what the future looks like.



Top: Samples on display at Wilbur on Thursday, Sept. 22. Different printers produce pieces with different textures.

Middle: Trevor Verdonik and Brian Slocum (left) describe the process of 3-D metal printing to a Wilbur lab visitor on Wednesday, Sept. 28. The metal printer is the newest addition to Wilbur.

Bottom: Wilbur lab’s new Renshaw metal 3-D printer prepares to run on Thursday, Sept. 22. It takes this printer most of the day to complete a product.