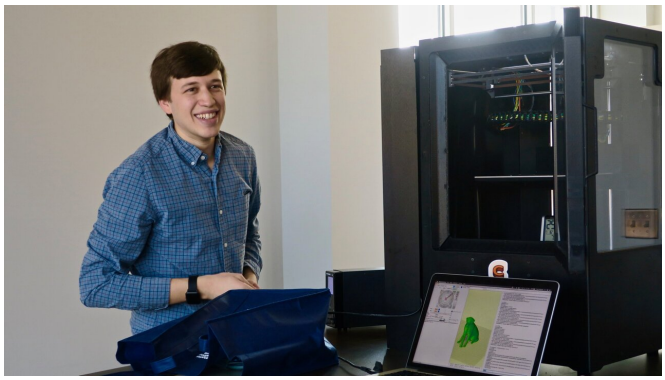
3-D printing chocolate: Bespoke confectionery gets an innovation

3 January 2020, by Tina Rodia



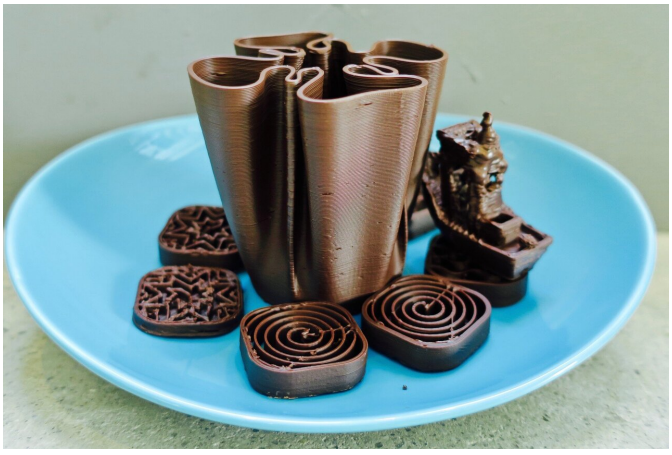
Credit: Tina Rodia

Based in the Pennovation Center, Cocoa Press is the fledgling 3D printing operation of Evan Weinstein, a May 2019 graduate and a graduate student in the School of Engineering and Applied Science. As a high school student at Springside Chestnut Hill Academy, Weinstein brainstormed an innovative approach to the chocolate industry. "I felt the technology had so much potential, and I wanted to challenge myself to do something innovative." Why chocolate, though? "I think there's something about food that people really connect to, and especially chocolate."

The last two decades have arguably seen a growth in "bean to bar" small-business chocolate ventures, focused on sourcing and curating high-quality small-batch artisanal bars. It's a departure from a Hershey bar in everything from a conscious cocoa content to ingredients like hand-crushed sel gris flakes and goji berries dusted with maca powder. But the one thing that kept these bars in line with a standard-issue Hershey bar was its shape—and Weinstein is determined to free chocolate hobbyists and small-batch chocolate producers from the confines of the bar.

The technology to elevate chocolate already exists—chocolate molds. But molds are pricey, generally $500 each, and each shape requires a bespoke mold. This was where Weinstein's high school journey began, with an innovative approach to building chocolate shapes outside of bars and molds.

When he arrived at Penn, he put his chocolate project on hold, but learning about programming electronics and circuitry "connected everything back to 3D printing," Weinstein says. In the summer after his sophomore year, Weinstein enrolled in physics class and worked in the 3D printing lab in the evenings, where he picked up where he left off with his 3D chocolate printer. By the end of the summer, he applied for the World Maker Faire in 2017, where he presented it as his prototype hobby project.

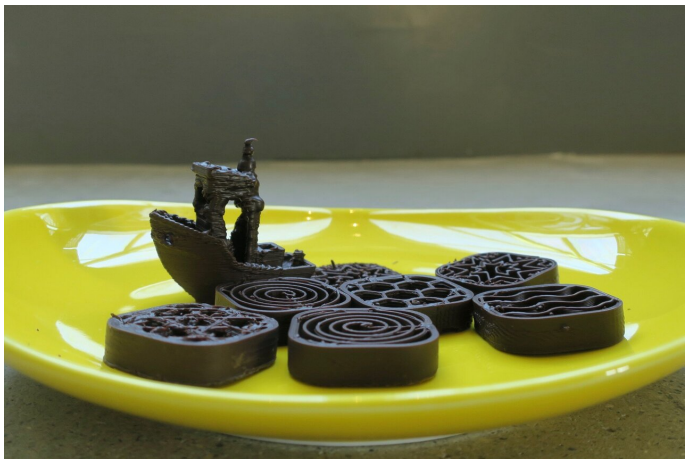


Credit: Tina Rodia

When his senior year began, Weinstein renamed his project Chocolatier for his senior design project, with five other mechanical engineering students. EAS 549—Engineering Entrepreneurship Lab—was

the class that solidified Weinstein's chocolate venture as a viable business opportunity.

"The senior design class forces you to solve the engineering side of a problem, and also find stakeholders so you're not problem-solving in the dark," says Weinstein. Earlier this spring, he won the Miller Innovation Fellowship at Penn for Cocoa Press, and the week Weinstein graduated, he was accepted into the Pennovation Accelerator program. Now he is putting his graduate work on hold while he finalizes the mechanics of his 3D printers at his office at the Pennovation Center. "It's great being here," he says. "In one building, there is the [Penn Vet] Working Dog Center, and in another is Ghost Robotics. Sometimes out of the corner of my eye I'll see a dog and I'm not sure if it's a working dog or a robotic dog."



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The printer itself looks like a popcorn machine you see at a movie theater and works like this: A chocolate hobbyist creates a file to print through a scan, as one does with a standard 3D printer, say of a beloved pet, their business card, even their head. Each Cocoa Press printer comes with syringes to fill with chocolate. Weinstein uses Callebout dark chocolate, which he loads into syringes at a chocolate shop. He has experimented with printing butter icing and white chocolate. Each substance requires different temperature and air pressure settings—and his printers will be versatile in its settings for different chocolates and fillings.

Where a regular 3D printer creates a design out of plastic based on a scan, Cocoa Press printers create a design made out of chocolate. With the scanning technology, chocolate designs can have new textures and mouthfeels regular bars do not—internal textures, think air bubbles, and squiggles, like Ruffles and their ridges.

Weinstein prints his logos out in chocolate to bring to fairs, like the Midwest RepRap Festival (a festival celebrating self-replicating machines), and a 3D food printing conference in the Netherlands in June 2020.

In July of 2019, Weinstein filed a non-utility patent, and expects to hear back in November 2020. The Cocoa Press printer can be sold to food hobbyists and niche markets, but is not certified for food retail. Food-safe commercial kitchen certification is incredibly expensive, Weinstein explains, so his plan is to reach out to local chefs and chocolate purveyors in the future. For now, he hopes to land 50 preorders by fall of 2020.

In addition to his own business cards, some designs Weinstein has created include pets, a cloth-like vase called Julia Vase #11, and Benchy Boat, the benchmark design for 3D printers. "A lot of chocolate companies are trying to stand out, especially with sourcing and ingredients. But in the end people are still forming bars the way they've been formed for years," he says. "I can make a scan of my head, and in one hour have a chocolate head."

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