

Edible Art :

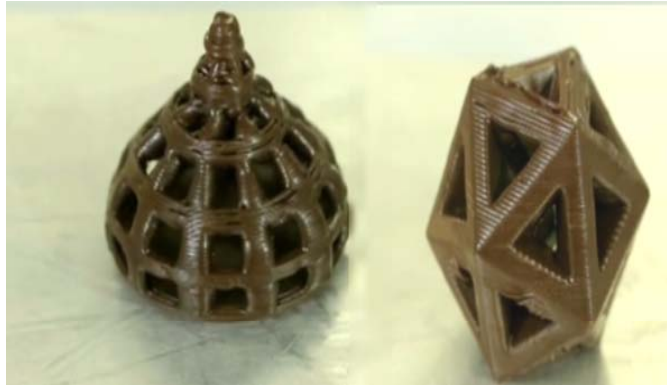
Can consumable output energize the 3D printer market ?

By John Miller & Lee Lichtenstein *Special to SFVBJ*

They won't ever be as commonplace as the familiar HP LaserJets that dominated the printer marketplace for more than a decade. And these printers won't print pie-charts, but they *will* print pie. And cookies. And pasta. 3-D printing—the process of making a three-dimensional solid object of virtually any shape from a digital model is rapidly evolving into new markets. Today, there are a variety of 3D food printers on the market that print every imaginable food product from ready-made ingredients. The devices deposit a material (e.g., a liquefied powdered-sugar mixture) and build it up layer by layer using a water-based binding agent. While the price points of these devices presently limit them to large, commercial/industrial enterprises, they potentially pave a path for home-consumer versions.

What started as an experiment in producing a cake decoration using an ordinary 3D printer evolved into a technology for printing layers of sugar. Liz and Kyle von Hasseln pioneered the concepts of printing in layers of sugar. They established Sugar Lab, designing and printing 3D candies and caught the attention of a major 3D printer manufacturer that would recognize the potential. 3D Systems bought Sugar Lab in 2013, and the von Hasselns became the company's Creative Directors of Food Products. In 2014, they unveiled the ChefJet and ChefJet Pro, with prices ranging from \$5,000 to \$10,000.

The machines are large - roughly the size of bar refrigerator - but the possibilities they present in 'output' is unlimited. 3D Systems demo's have shown everything from complicated cake toppers for elaborate wedding cakes to simple candies and desserts. The ChefJet series will include a 'Digital Cookbook' - a series of computerized patterns that let users select a design to print out in a variety of materials, including chocolate, vanilla, mint, sour apple, cherry, and watermelon. The candy industry has taken notice of 3D printed food as Hershey partnered with 3D Systems



Images: ML1 Media 2015 / David Miller

last January, although no word as yet of any actual products (prototypes from Hershey 3D Printing Lab shown above).

Printed sugar products are just the beginning. Beyond sweets, industry developments are already showing possibilities for other edibles bases, such as starches (pastas), spices, and personalized nutrition supplement (vitamin) products.

Barilla, world leader in the production of pasta, is working on a 3D pasta printer. Barilla has teamed up with Dutch scientific research firm TNO Eindhoven to produce a custom 3D pasta printer, capable of printing 15-20 pieces of pasta every two minutes -- essentially producing a custom pasta dish ready for consumption in the same time as ordinary, mass-produced pasta.



their entries. A pasta rose (above) was one of the winning designs – it 'blooms' to turn into a rose when placed in boiling water.

As a result of that success, Barilla is collaborating on a pasta printer suitable for commercial use in restaurants. They've been tested in a few restaurants in Eindhoven but have yet to be mass-produced.

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Edible Art:

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The biggest benefit of 3-D printed consumable products might not be printing of something from scratch but rather the ability to further tailor a standard-sized piece. A lot of early 3D edibles were traditional looking products, created using 3-D printing to but differentiated by shape or surface texture or some other feature couldn't be done with traditional manufacturing.

“Personalized” foods for individuals who require special dietary needs, such as the elderly, athletes, diabetics, or pregnant women as well as alternative ingredients and substitutes required for vegan/vegetarian or other special diet options are all possible.

To date, novelty items, such as special shapes or personalized messages within a food product have captured the attention of the commercial food production and preparation industries. When manufacturing costs fall to industry sources predicted sub-\$1000 levels, consumer adoption of 3D edible product printers will become widespread.

UPDATE - The Government Weighs in:

While spurring innovation in manufacturing and production and dramatically reducing the time required to design new products, the US Food and Drug administration has taken a serious interest in 3D printing when it relates to medical devices and food products.

The FDA has recently stepped up its research efforts and capabilities to review innovative products going so far as to develop new tools, standards and approaches to assess the safety, effectiveness, quality and performance of FDA-regulated products.

The FDA has already begun a series of public forums to discuss the technical considerations of 3-D Printing (ref: [www.regulations.gov/search/3-D printing](http://www.regulations.gov/search/3-D%20printing)). Through these discussions, they seek to establish processes which will ensure performance and reliability of 3D printed foods, and specifically within the industries developing materials/ingredients as well as supply chain management.

The FDA has yet to commit to a timetable. It will likely be a many months if not years before regulations emerge based on input stemming from the public forums and industry. Initial language from the FDA sounds less than encouraging:

“Additive manufacturing may or may not present new questions depending on its use. However, there are technical challenges associated with the process from design to final product that need to be properly addressed in all cases to ensure patient safety and to promote innovation in a fast-moving field. Process verification and validation are especially important when devices are produced individually or in very small batches.”

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