

## **CUSTOMIZED, 3D PRINTED TOOLING REDUCES COST AND IMPROVES EFFICIENCY IN CONFECTIONARY FOOD PRODUCTION**

*“For many entrepreneurs, the cost of tooling is a dead stop,” says David Brady,  
European Business Development Manager for Henkel AM Services.*

*“To succeed, it’s a barrier they must overcome. Fortunately the quality, speed and economics of additive  
manufacturing have advanced to the point where startups can effectively hack product development,  
leveling the playing field for new brands and their potential customers.”*

(Photo) Industrial designer working in CAD

### **Background**

Innovation in the confectionary industry goes beyond flavor. Companies want to enhance the consumer’s experience, compelling them to create products that are even more engaging. For years, confectionary firms and companies across the food industry have been looking at personalization as a way to differentiate and grow their businesses.

When formed into a rubber like plastic, silicone has attributes including low toxicity and high heat resistance. A durable yet flexible material, silicone is resistant to staining, easy to clean, and offers better nonstick qualities than many other alternatives. All these attributes combined make silicone an ideal material for food applications.

Since the 1980’s, food grade silicones approved by the FDA have been used in an array of cookware, such as baking pans, potholders, whisks, and more. Silicone is an ideal material for making food safe molds to form candy, chocolate, and other sweets.

For the food industry, much of the initial excitement around 3D Printing was around using the technology to print food directly. However, companies in the confectionary industry have also used the technology to improve their manufacturing operations.

### **APPLICATION:**

Customized tooling for silicone casting used in food manufacturing

### **MATERIAL:**

LOCTITE 3D 3843 HDT60 High Toughness

### **TECHNOLOGY:**

RapidShape i30+ Digital light processing (DLP) photopolymer 3D Printer

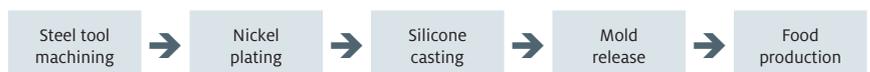
### **The Challenge**

Most startups face common challenges. Among others, they have to develop a product and a team that can support it. This typically requires money, which can create a [chicken and egg conundrum](#). In order to get results, entrepreneurs need resources, but to attract capital, they must first demonstrate traction.

When trying to bring a new consumer product to market, the problem is often amplified. Among other upfront costs, startups that make physical goods must typically invest in tooling. For many, these hurdles for bringing products to market are too big to overcome.

Such was the case for one startup in the confectionary industry. They wanted to create personalized candies to make limited edition pieces for many different purposes, including special occasions, corporate outings, and other events.

To make their products, they needed molds for silicone casting. Traditionally, these are machined from aluminum and then nickel plated to meet the U.S. Food and Drug (FDA) standards for food safe materials. Silicone is then poured into the tool to form the final mold.



*Traditional silicone casting workflow*



*Lollipops produced with silicone molds*



## The Solution

*“With the help of our Open Materials Platform partners, we engineered a cohesive solution. Beyond just 3D printing a tool, we were able to develop an end to end manufacturing process for the food industry,” says Mr. Brady. “Normally, the time to produce a complex machined tool can take at least four weeks. While they can be made with aluminum, more often the tools are machined in steel, polished and then nickel plated, which usually makes them even more expensive. In the confectionary industry, even a relatively simple molding tool would typically cost over 10,000 Euro. By reducing the cost and time involved with mold making, we’re fulfilling the promise of additive manufacturing and leveling the playing field for a new market innovator.”*

The confectionary startup collaborated with Henkel to see how 3D printing might improve their workflow. Food manufacturing is a highly regulated industry, according to the FDA. Any new product or tool that comes in direct contact with food would have to go through an approval process.

Nickel plated coatings are FDA approved in part because they offer corrosion prevention and easy cleanup. Nickel plating also helps products withstand the extreme hot and cold temperatures that are common in food processing. Nickel plating also offers a nonstick coating that is resistant to water, oils, fats and steam, making it ideal for molding silicone.

Instead of machining the molds from aluminum or steel, the startup collaborated with Henkel to find out if they could be 3D printed and then coated with an FDA approved nickel plating.

The team at Henkel leveraged its materials expertise and deep portfolio of 3D printable resins to find a material that was hard, tough, and provided a surface finish suitable for electroplating. LOCTITE 3843 was selected, and test tools were additively manufactured on a RapidShape i30+ DLP 3D Printer. With RapidShape’s technology, the appropriate, validated material parameters are stored in the printer and the patented force feedback DLP technology reliably delivers high precision parts in a short time. After the test tools were printed, they went on to be electroplated in nickel. Then, silicone was poured into the nickel-plated test tool. Finally, the complete silicone mold is released, and the candies are manufactured.



Silicone casting with 3D printed molds



Transition from 3D printing and nickel plating to final silicone mold

## BENEFITS

*“We’re driving mass customization by enabling our customers,” says Mr. Brady. “With our highly engineered materials, they can completely reinvent their approach to food tooling. Instead of worrying about ROI on a tool, they can focus on providing new and unique consumer products. They can capitalize on trends, experiment with new designs, and produce in small batches economically. It’s a significant competitive advantage.”*

As anticipated, additively manufacturing the molds offered a tremendous speed advantage. Traditionally, machined molds typically take four weeks to produce. With 3D printed tools, the company can be ready to make new liquid silicone molds in a couple of days.

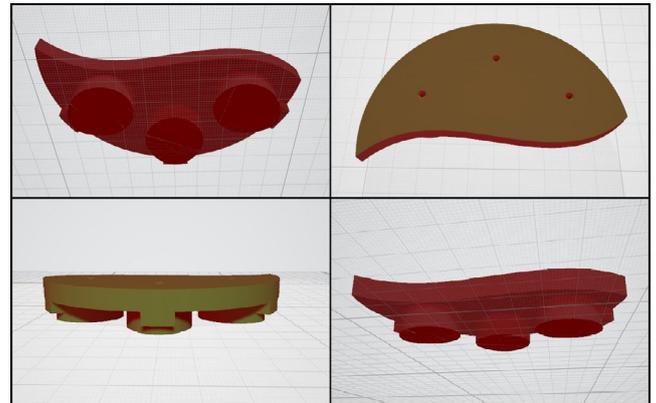
In addition to the tremendous reduction in lead time, the startup benefits from impressive cost savings. Traditional molds typically cost 10,000 Euro. The cost to 3D print and nickel plate the molds was about 500 Euro, a savings of 95%.

For the startup, cost savings helped lower the barrier to entry. The goal for their product was to design a uniquely identifiable shape that was easily recognizable on store shelves. For the price of a single machined mold they were able to experiment with many different iterations in less time than it used to take for one iteration. But the benefit isn't just for entrepreneurs. The same approach can also help established companies conduct R&D more economically.

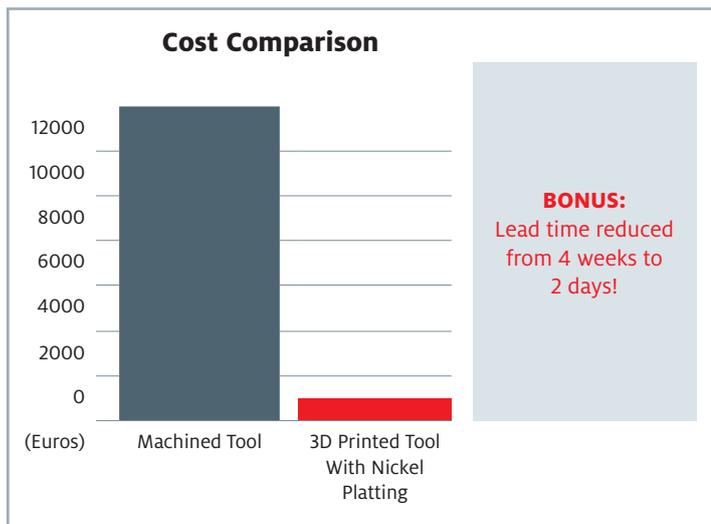
Beyond prototyping, lower tooling costs also allow confectionary companies to produce small batches more economically, enabling them to offer customization, limited editions, and branding for corporate events. The additive process used with 3D printing can also enhance the product's design by giving designers new freedom to use complex shapes that aren't possible with a linear machine tool.

Together, these benefits helped a startup create a new product with maximum shelf appeal. They can scale their business with less capital, and potentially disrupt in an intensely competitive market.

For other companies in the confectionary and food processing industries, it highlights what's possible through collaboration. Additive manufacturing has the potential to help them reduce costs and operate more efficiently, in addition to empowering their product development efforts and creating new business opportunities with short runs and customization.



CAD renderings of 3D printed confectionary mold



Silicone candy molds and cookware

Want to learn more about Henkel's unique material solutions for the additive manufacturing industry? Visit Henkel's LOCTITE 3D Printing at [LoctiteAM.com](http://LoctiteAM.com) or reach out to us via [loctite3dp@henkel.com](mailto:loctite3dp@henkel.com)

## About LOCTITE

LOCTITE Additive Manufacturing delivers unique photopolymers with production capability, customize resins and deliver engineering services to identify the best application to address your needs. With a constantly growing portfolio of high-performance materials, specialized equipment and post-processing solutions, LOCTITE overcomes the limitations of conventional 3D printing to enable additive manufacturing for the production of durable, functional parts. Through its strategic partnership with technology leaders for specialized equipment, LOCTITE is driving the adoption of 3D printing beyond prototyping and toward the production of final parts. ([www.LoctiteAM.com](http://www.LoctiteAM.com))

## About rapidshape

Rapid Shape® is a south Germany technology company in the field of generative rapid prototyping and rapid manufacturing systems. Founded by Andreas Schultheiss – being as well shareholder of Schultheiss GmbH, well known specialist in heating and casting technologies – the company has a profound background. Rapid Shape® brings a new and patented generative technology to the marketing that is setting a new benchmark in speed and accuracy in the field of 3D manufacturing.