Desktop Metal

CASE STUDY

Leveling the Playing Field with Metal 3D Printing

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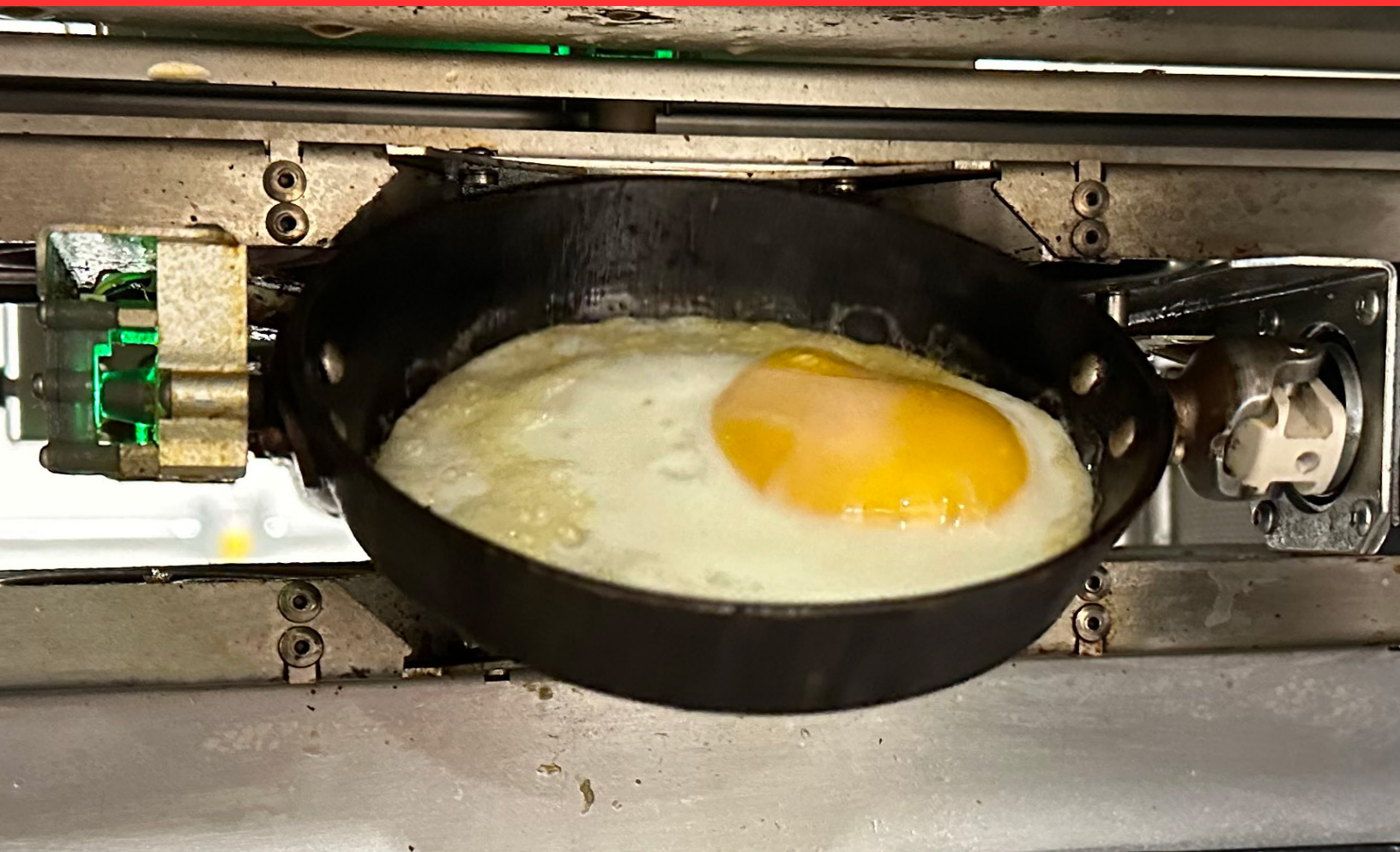
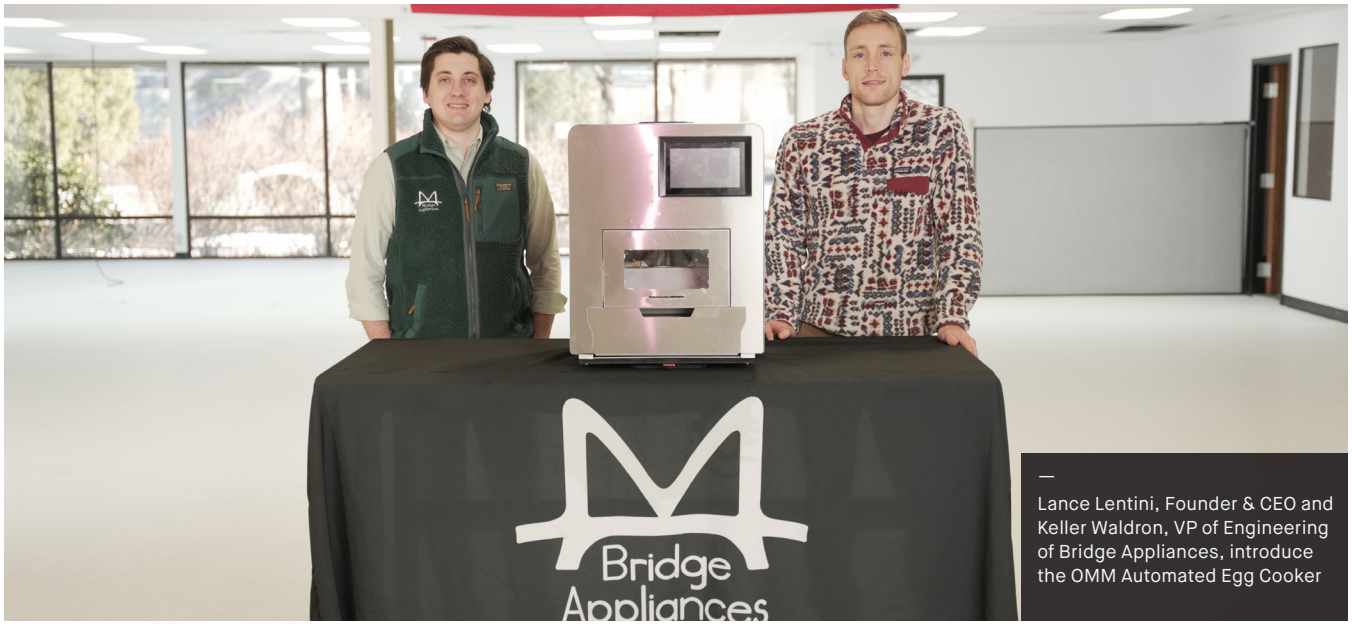
Bridge Appliances 3D prints rapid innovations to disrupt the food processing sector





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Lance Lentini, Founder & CEO and Keller Waldron, VP of Engineering of Bridge Appliances, introduce the OMM Automated Egg Cooker

Customer
Bridge Appliances

Location
Portsmouth, New Hampshire

Industry
Food processing equipment

Application
Pan mount brackets on OMM automated egg cooker

Machine
Desktop Metal Studio System™

Material
17-4 PH Stainless Steel

Website
www.bridgeappliances.com

Transforming food processing equipment

Breakfast is a growing profit center for many food establishments, but with the increasing popularity of breakfast sandwiches, egg preparation is crucial bottleneck in operations, especially in times of labor shortages. Against that backdrop, Lance Lentini founded Bridge Appliances, a smart-kitchen appliance company. The company's fully automated, end-to-end egg cooker, OMM, refrigerates, cracks, and cooks fresh eggs as a solution to backups related to egg preparation. OMM represents the next generation of commercial food-tech flourishing with the expansion of digital manufacturing technologies like Bound Metal Deposition™ (BMD) 3D printing.

The team at Bridge Appliances uses many forms of 3D printing to push innovation in food processing, a sector they see as largely un-disrupted and overseen by legacy manufacturers with little incentive to innovate. "3D printing implemented in design processes in small companies and teams is leveling the playing field by means of faster feedback from customers and innovative products being brought to market," said Lentini.

Bridge Appliances believes that with a device like OMM automating egg preparation, cooks can free up 30-50% of flat-top space and enable better margins and more capacity through improved labor efficiencies and waste reductions. Yet traditional manufacturing methods to bring its product to life required up-front capital investments and long lead times for tooling that were often innovation-prohibitive.

"Utilizing the Desktop Metal Studio System to side-step prototyping through investment casting, or even general material removal processes that higher-end machine shops would perform, makes new product design and delivery

more obtainable," Lentini emphasized. "Gone are the arduous five weeks of back-and-forth, 'Design for Manufacturability,' and mold designs to get one part."

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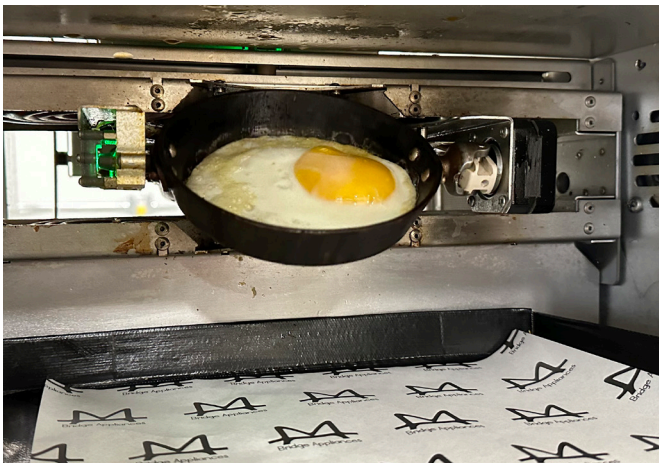
> Lance Lentini, Founder & CEO of Bridge Appliances

All components within the OMM unit are evaluated to meet minimum requirements for cleanability, corrosion resistance, and thermal stability. Handles that mount the pans to the motor for flipping required metal material to both withstand the heat of the cooking system and minimize heat transfer to help extend the life of other components in the assembly. Reviewing available technologies on the market, the Bridge Appliance team concluded the porosity of metal SLS processes could harbor bacteria and metal FDM was neither accurate nor fast enough to be functionally viable.

The brackets were 3D printed on the Desktop Metal Studio System from pre-bound metal feedstock rods that are extruded into complex metal shapes one layer at a time. Green parts are then sintered in the Desktop Metal Furnace to reach final density in a package that enables the production of complex metal parts in any office, studio, or lab environment. 17-4 PH stainless steel is



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With a two-minute cook time for each egg, the stainless steel handle mounts must withstand high temperatures and perform reliably throughout many cycles as each pan rotates for automated oil, cooking, dispensing, and cleaning

a desirable material for contact with food because of its corrosion resistance and is one of several materials qualified on the Studio System.

"Bound Metal Deposition from Desktop Metal gave us material properties, tolerances, and timelines closer to that of a CNC material removal process, but at the cost of investment casting, minus tooling and timeline costs," Lentini said. The team now freely iterates parts to meet performance requirements and lifecycle testing without the financial investment, or re-investment after each iteration, in tooling.

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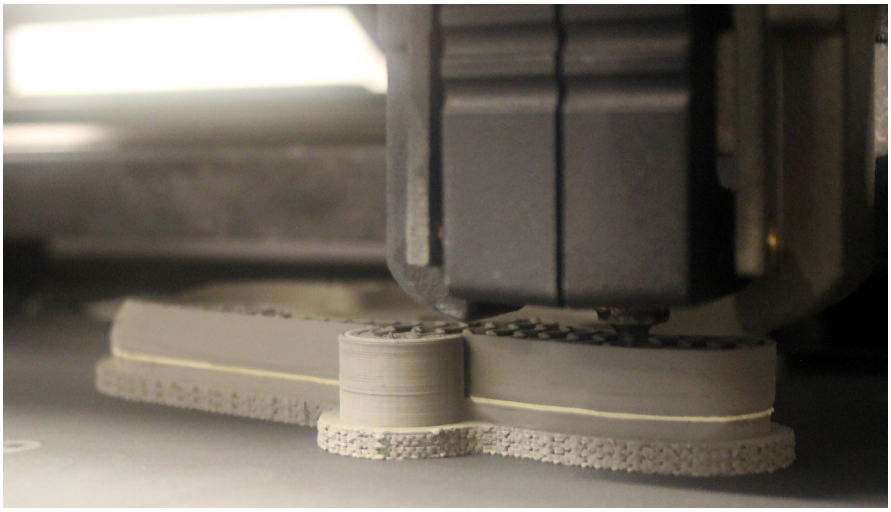
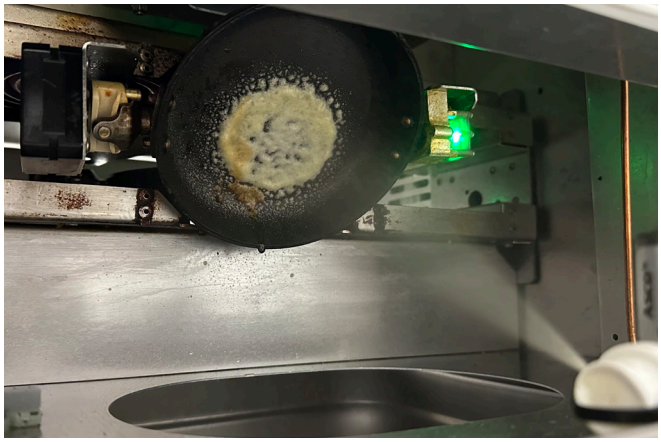
The Studio System extrudes pre-bound metal rods layer-by-layer, as seen top right. Below the end-use metal 3D printed brackets after sintering and post-processing.



Tooling-less production also ensures long lead times don't hinder innovation. During the peak of the COVID-19 pandemic and height of supply chain disruptions, lead times on prototype parts from third-party vendors could cause Bridge Appliance delays between one to three months. Today, lead times continue to stay around three to four weeks. By contrast, in its R&D setting, Bridge Appliances aims to have a lead time on prototype parts from one to three days, depending on complexity.



"By utilizing the Studio System's capabilities, we can get highly complex parts produced within that lead time for a fraction of the price," Lentini said. "These specific parts would traditionally require extremely expensive material removal processes and machines."

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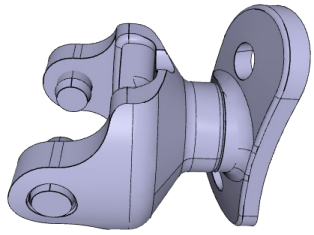
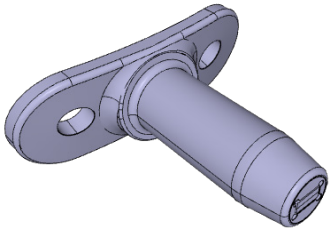
The OMM streamlines egg preparation, a common kitchen bottleneck, by automating egg cooking including refrigeration, pan spraying (seen left), egg cracking, and cooking.





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Because of features like the curved surfaces to contour the cooking pans, a traditional process to produce these brackets would take 2-3 months. 3D printing in stainless steel on the Desktop Metal Studio System enabled the parts to be produced and iterated with fast turnarounds.

3D printing drives efficient product optimization

Democratizing kitchen automation is part of the mission of Bridge Appliances, so its kitchen solutions are designed from the ground up to solve direct problems cafes and restaurants face. Metal handles that mount the cooking pans of the OMM Automated Egg Cooker to a drive stub on the motors that allow flipping lack any planar surfaces. A traditional process to produce the handles would require wax investment casting and finish machining with complicated part holding processes and tooling.

That process, end-to-end, could take two-three months. With minimal "design for printability," Bridge Appliances was able to skip that tooling design process and have working parts in five days. "It's around a 70% reduction in turnaround time in comparison to alternative options and lower capital requirements to multi-axis CNCs," according to Lentini.

The device will be tested to a variety of safety and quality standards, including NSF/ANSI 51 covering sanitation requirements for materials used in the manufacture of food equipment.

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> **Lance Lentini, Founder & CEO of Bridge Appliances**

About Bridge Appliances

Bridge Appliances is a Portsmouth, New Hampshire based IoT and Smart-Kitchen appliance company that designs, manufactures, and sells fully automated cooking appliances for commercial use to enable users to remotely prepared and cook food. Bridge Appliances believes that automation in the kitchen should be obtainable to all sizes of food establishments. With challenges in staffing & growing operating costs for the back of the house, everyone from small cafes to fully seated restaurants can do more with less without sacrificing quality.

About Desktop Metal Inc.

Desktop Metal, Inc. is accelerating the transformation of manufacturing with end-to-end metal 3D printing solutions. Founded in 2015 by leaders in advanced manufacturing, metallurgy, and robotics, the company is addressing the unmet challenges of speed, cost, and quality to make metal 3D printing an essential tool for engineers and manufacturers around the world. In 2017, the company was selected as one of the world's 30 most promising Technology Pioneers by the World Economic Forum, and was recently named to MIT Technology Review's list of 50 Smartest Companies. For more information, visit www.desktopmetal.com.