

# Rapid design iterations for the early project stages



*"When we are building a new type of robot, there's no point in getting metal parts when coming up with a new type of design because it is too expensive and takes too long. We'll print something that same day, put bearings, bushings, and other components into it, and then integrate a motor into it. This allows us to explore different parts of a robot that might be needed, and we can modify any design that does not work."*

— Yoni Saltzman, Project Engineer, Honeybee Robotics

Honeybee Robotics uses desktop 3D printing to create functional prototypes for a quicker, more accessible, low-cost solution.



## **Company**

Honeybee Robotics

## **Industry**

Robotics, Defense, Medical, Oil & Gas, Space industry

## **Challenge**

Honeybee Robotics sought a low-cost on-site fabrication solution suitable for expanding functional prototyping into the exploratory stages of client projects -- to help validate design strategies quickly before committing staff and resources.

## **Solution**

Ready access to professional desktop 3D printers allowed engineering staff to produce functioning mechanical proof-of-concept models from the earliest stages of a project's conceptual development.

## **Results**

- Functional mechanical experiments and proof-of-concepts.
- Increased iterations, reduced costs.
- Validate approaches before committing resources.
- Demonstrating progress via physical mock-up.

## **Honeybee Robotics - Introduction**

Honeybee Robotics, founded in 1983, has evolved over the past thirty-four years from a small, automation systems integrator to a full-fledged design and engineering solutions firm with facilities in three cities. They are best known for their role in the Space Industry, having contributed critical planetary analysis technology incorporated into NASA's past three Mars missions, including planetary drills and sampling systems on Curiosity and other Mars rovers and landers. Their designs are "destined for work on Earth, Mars, and beyond." Honeybee also leverages hard-fought expertise in designing mechanisms, robots, and robotics systems for work in challenging environments in other industries and the private sector.

## Challenge

As a high-end robotics design firm, Honeybee Robotics' projects tend to demand complex, load-bearing metal parts that can survive harsh environments. While they have an in-house machine shop and project budgets that allow staff to make use of third party rapid parts fabrication services, team engineers requested access to a quick, low-cost fabrication solution to complement costly and slower out-of-house part fabrication routes.

## Solution

Honeybee Robotics obtained Ultimaker professional desktop 3D printers for on-site, low-cost parts fabrication. Engineers and designers put them to constant use, and found the printers especially beneficial in early design stages while testing concepts and establishing project parameters. "A lot of what we do is to build subsystems and then test their performance," says Yoni Saltzman, Project Engineer. "How fast they are, things like that. So physically building key elements of the robot is what the printer allows us to do cheaply and quickly."

## Results

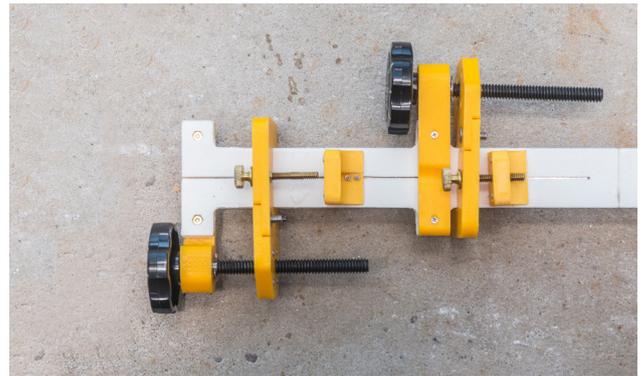
Staff at Honeybee Robotics make heavy use of their professional desktop 3D printers for experimenting and validating design concepts. The machines have earned their place in the firm's design pipeline alongside the high-cost, high-precision solutions, with capabilities that allow the Ultimakers to occasionally replace more expensive and time-consuming solutions.

"Using a 3D printer makes my job a lot easier—it is the logical stepping stone in the process," Saltzman says. "Taking this route makes the designs better, because it allows me to go through more iterations than I would have been able to go through before. I learn more things along the way even though the final product is not 3D printed."

These days, most of the projects coming through their New York site have run parts on Ultimaker printers.



*In the various phases of fabrication, it is often critical to inspect specific product features closely, or have the ability to view large parts on a smaller scale. 3D printing allows engineers to examine and adjust parts as necessary for more efficient production that reduces cost.*



*Addressing non-technical clients and project stakeholders, clarity of communication around mechanical solutions can be improved by providing a physical mock-up that your collaborators can hold and interact with, and inspect.*



*When designing equipment destined to travel hundreds of thousands of miles to perform to spec on the surface of another planet, it is worth exploring every possible scenario and iteration for your design here on Earth first.*

## About 3D GB IRE

In 2015 UltimakerGB Ltd took responsibility for the warranty and technical support for all Ultimaker products in Great Britain & Ireland. To ensure we looked after our community to the highest standards we created a webshop and formed a dedicated service team who can respond to customer requests within 24 hours. Our team is trained directly by the manufacturer as well as via our in-house training program ensuring top quality advise and support.

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