SHAPEWAYS

Case Study: BeeHero

BeeHero: 3D Printing Helps Protect and Perfect Bee Pollination

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> – Itai Kanot | Co-Founder and COO at BeeHero.

The world of bees is undeniably fascinating. Measuring only half an inch long on average, these tiny insects are responsible for creating one of nature’s most perfect structures, beheld in the honeycomb geometry of the beehive. There, they co-exist with tens of thousands of other bees, intuitively obeying the rules of an unyielding social system made up of relentless worker bees, mating drones, and queens to be fiercely protected.

Within their own hierarchy, bees are expected to work exceedingly hard—but little do they know how much we as a human race need them to be successful at their jobs! Aware of the challenges and dire realities involved, BeeHero is intent on helping bees thrive again, providing farmers with smart beehives bearing monitoring sensors housed in 3D printed hardware from Shapeways.

Itai Kanot, co-founder and Chief Officer of Operations (COO) at BeeHero, has been a beekeeper most of his life, learning the trade from his father,

Sensor Back

Credit: BeeHero

a major beekeeper in Israel. Itai realized that the beekeeping and pollination industry was sorely missing two things: efficiency and modern, technological tools. This problem was compounded by ongoing stressors to the bee population such as colony collapse disorder (CCD), which causes bees to abandon their queen and leave the hive.

“Bees in general within the beekeeping world have experienced a lot of problems over the last ten to fifteen years,” said Itai. “We used to have different diseases and parasites that were unique to specific geographies, leaving the bees to fight against a certain set of pests. Now though, because of human trade and the different ways we run the world, these problems are everywhere. The bees have a lot more to deal with.”

Although farmers in other industries have benefited from impressive automation in recent years, Itai observed that there was simply nothing for beekeepers or the pollination industry as a whole—despite a really big market due to the need for bees—and especially in California where there is a large volume of almond farmers.

“Beekeeping and pollination were left behind,” said Itai. “Beekeepers now work a lot harder for a lot less. No one really paid attention to it, so I started looking for some technology to bring into our business, along with greater efficiency, and more knowledge.”

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Upon creating a proof of concept for their business, the team at BeeHero has moved on in the last several years to refine their systems and intellectual property. Overall, their goal has been to transform the pollination business into a data-driven industry, bolstered by collection of real-time information as bees go about their business pollinating crops.

The BeeHero smart system collects data from within the hives—measuring sound, weight, and temperature, interpreting the material from their hardware and then translating it into human language. The 3D printed hardware from Shapeways includes two nearly identical halves (one male and one female) that house an electronic sensor. This allows them to predict, prevent, and treat potential problems that could be devastating to a hive, and consequently, crops. They know every detail, from how many bees are in the colony to the current health of the queen.

"It's like translating from bee to human," said Itai.

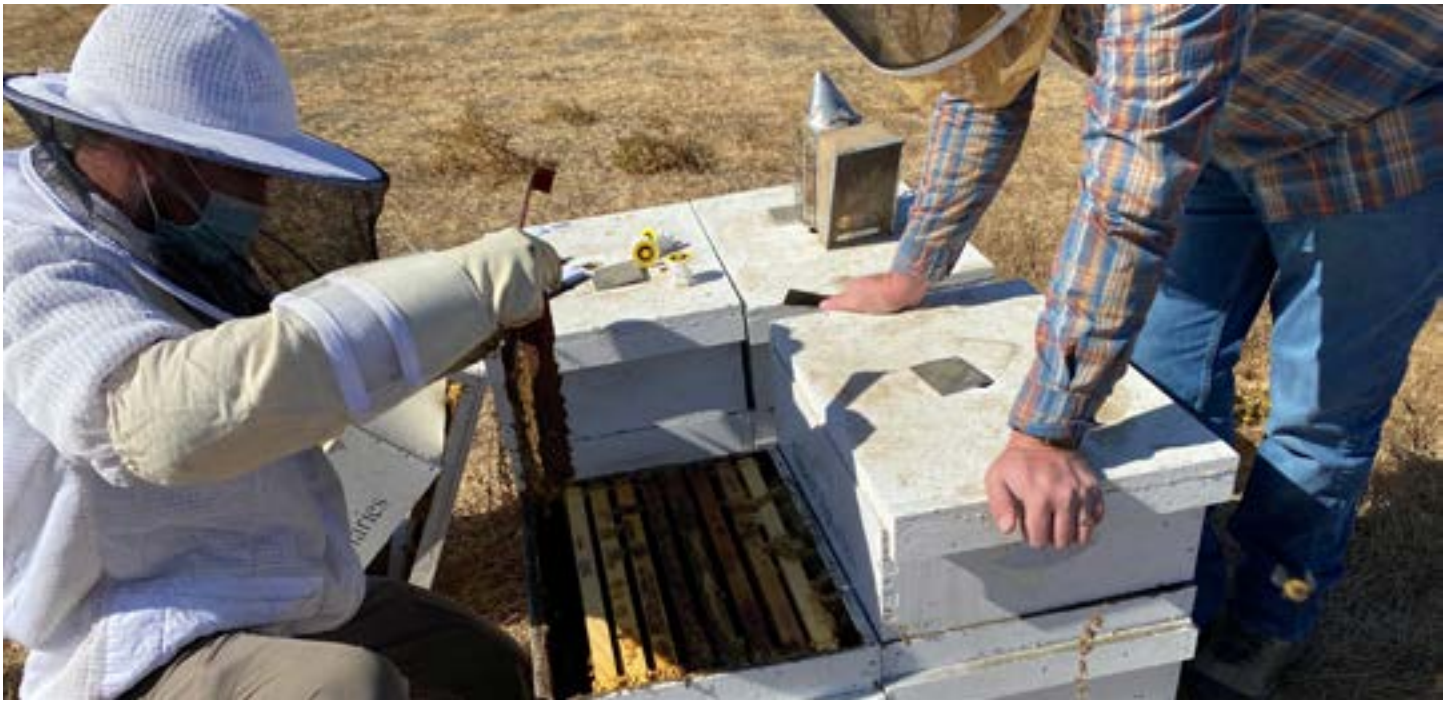
BeeHero is now on their third generation in terms of functional hardware for the smart beehives, and the incorporated 3D parts (using Nylon 12 and SLS technology for added flexibility) have improved significantly too upon working with Shapeways. The third-generation design is also smaller and better looking.

"With our first generation, everything was kind of homemade," said Itai. "It was very ugly but very functional. The second generation was the first one that we actually used as a commercial product."

Although restrictions caused by COVID have made design and manufacturing progress more challenging, Itai and his team

Sensor Front

Credit: BeeHero



Sensor Installation

Credit: BeeHero

relied on the efficiency afforded by 3D printing from Shapeways. The time involved in making the part was exponentially less, and left out much of the guesswork in ordering and testing parts made via injection molding.

Even though in some cases like this one 3D printing may not offer greater affordability, that drawback was outweighed by benefits like manufacturing speed and delivery, and the strength, durability, and overall quality in parts. Assembly and installation were simple too.

Bees in some cases may reject materials in their hive, meaning that an undesired new texture could wreak havoc, causing bees to leave. Fortunately, because Nylon 12 is inert and compatible, the bees have been accepting of the 3D printed parts in the third-generation hardware and monitoring has been successful for understanding more about what is happening within their hives in real time.

“When a beehive is dead, it’s very easy to see that the inside temperature is exactly the same as the outside temperature,” said Itai. “The important thing here is to find the different patterns and problems ahead of time. We’re able to offer the commercial beekeepers insights in a language they can understand.”

As bees are responsible for pollinating 70 percent of the 100 major sources currently expected to feed humans, the success of crops around the world is in question, not to mention the fragile ecosystem of our planet. Fortunately, much about the plight of bees is being brought to light today—enough so that rather than

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worrying about one stinging you, you might now find yourself more concerned about seeing it go forth to flourish; after all, bees pollinate billions of dollars in crops annually while promoting the human food chain.

“It’s vital that we keep these animals alive, functional, and healthy,” said Itai.

BeeHero was founded in 2017. While major research and design efforts for the company are still performed at their Israel headquarters, the company now also maintains offices in Italy, the UK, and a business center in California run by Itai and one of the other co-founders.

Explore the world of 3D printing services we offer at Shapeways. Without having to invest in 3D printing software, hardware, or materials on your own, you can benefit from our long-term experience and investment in proprietary, advanced technology.

About Shapeways

Shapeways makes world-class 3D printing more accessible to everyone through automation, innovation and digitization. Our purpose-built software, wide selection of materials and technologies, and global supply chain lower manufacturing barriers and speed delivery of quality products. Shapeways' digital manufacturing solutions have empowered more than one million customers worldwide to produce more than 20 million parts using 10 different technologies and 90 different materials and finishes. Headquartered in New York City, Shapeways has ISO 9001-compliant manufacturing facilities in Long Island City, N.Y., and Eindhoven, the Netherlands. Contact us to learn more at: www.shapeways.com.