

Case Study: Flamingo Works

3D Printing for Medical Training:
Flamingo Works Takes a New Approach



Credit: Flamingo Works

“When doctors practice on our gamified training platforms, they don’t score points, but they are rewarded with the confidence, dexterity, and skill necessary for new and challenging surgical methods.” - Yonatan Assouline, Manager and Co-Founder, Flamingo Works.

True innovators rarely make an impact by traveling the same old path. Sometimes it’s necessary to veer off in a completely new direction for maximum effect. Flamingo Works has done exactly that, designing a series of 3D printed learning platforms for robot-assisted surgeries that are colorful, engaging, and unlike anything most of us have ever seen. Their work came about as they continued to work with a client over the years in creating 3D printed parts and components for robot-aided surgeries. As time went on, the industrial design team was asked to create a full-fledged training system.

Refining Training Methods for Robot-Assisted Surgery

Flamingo Works is headquartered in Tel Aviv, specializing in product design, development, and engineering. Founded in 2016 by Yonatan Assouline and Naty Moskvich, the team of industrial designers engineer prototypes and end products that are ‘smart and useful,’ along with creating test concepts and designing human interfaces.

“

When doctors practice on our gamified training platforms, they don't score points, but they are rewarded with the confidence, dexterity, and skill necessary for new and challenging surgical methods.”

- Yonatan Assouline,
Manager and Co-Founder,
Flamingo Works

Taking a novel approach for a complex assignment, Assouline and Moskovich originally set out to make a simulator for robot-assisted surgeries based on the ship-in-a-bottle concept. While the design looks deliberately impossible, in most cases the miniature mechanics of the boat are carefully placed inside the bottle and then strings or wires are used to pull the masts and sails upright.

Translating the same concept to complex surgical procedures, the designers' initial idea was to teach and challenge surgeons training for intricate surgeries to use robotic grippers to perform tasks within a similar type of enclosure. Working from the small opening of a bottle would represent the same challenges encountered while performing surgery inside the human body from a small incision.

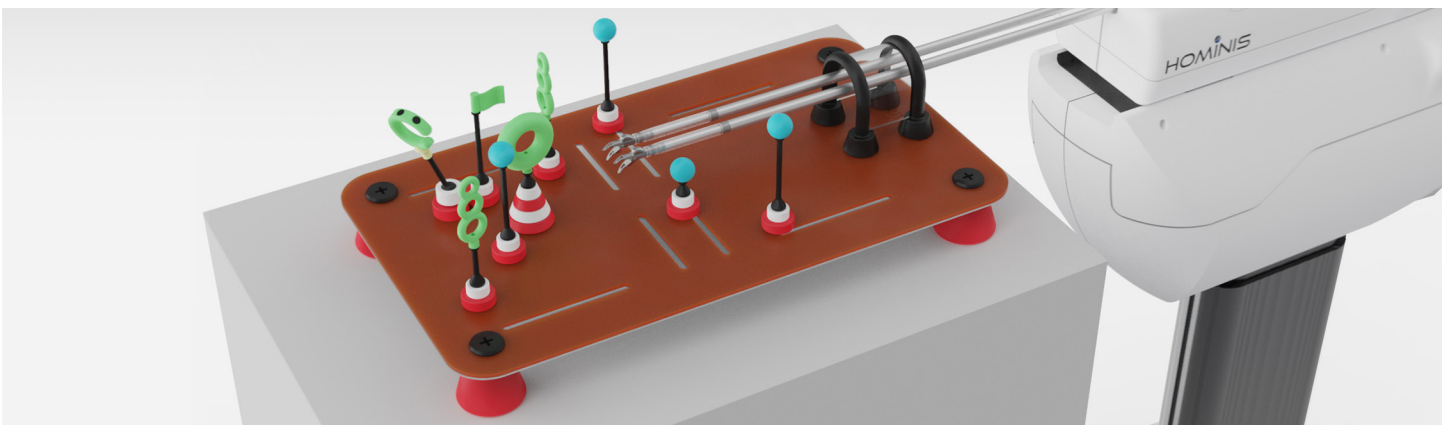
Juxtaposed with such a serious subject like surgery, it may seem surprising to come upon a training method that looks so fun, beckoning one to come closer and try a hand at playing a mere game. Assouline and Moskovich have indeed gone to great lengths to eliminate the pressure

and intimidation that often come along with medical training.

“We've actually gamified the whole trainer,” said Yonatan Assouline, Manager and Co-Founder of Flamingo Works. “We introduce several tasks for the surgeon to practice on, with each one representing a different difficulty level.”

The tasks and the materials at hand don't represent the human body or tissue or any typical tasks a doctor may run into daily; rather, the idea is to incorporate something entirely different, adding as much fun as possible into the training process.

In eliminating all the awkward attempts to mimic the human body with dolls or replicas of organs for training purposes, the designers took on both the medical and educational angles with a refreshing perspective. They went a step further with that too, realizing they could bypass the glass bottle enclosure altogether in lieu of a more open platform featuring a training simulator with a plate measuring 30 x 60 cm.



Credit: Flamingo Works



Credit: Flamingo Works

With SLS 3D printing, because no supports are required, the team from Flamingo Works was afforded much greater freedom in design without the restrictions involved in having to provide for intricate support structures too for stabilizing parts during printing.

Incorporating Advanced 3D Printing Materials and Technology

The parts for each training task are 3D printed by Shapeways using [Nylon 12](#) [Versatile Plastic] and [Selective Laser Sintering](#) (SLS) technology. There were a multitude of different parts designed for each learning task, making SLS a great choice for several reasons whether in prototyping or 3D printing high-performance parts for functional use.

With SLS 3D printing, because no supports are required, the team from Flamingo Works was afforded much greater freedom in design without the restrictions involved in having to provide for intricate support structures too for stabilizing parts during printing. Because SLS is a powder-based technology, the unused powder bolsters parts during the printing process—and it can also be re-used later. Lack of supports also reduces the possibility of damage in post-processing when they must be removed.

Hundreds of parts can be printed in one build, with the ability to [nest them together](#) strategically and assemble them afterward. Parts can also be dyed in post-production with nine different [colors](#)—a process Assouline says their team relies on for their eye-catching training materials. Four different [finishes](#) are offered too, from Standard to Smooth.

Rapid Prototyping Played a Huge Role

Assouline and Moskovich were familiar with 3D printing even before their introduction to Shapeways many years ago. All parties involved had been growing on parallel paths over the years, and continuing to collaborate as the technology, materials—and projects—progressed and became more sophisticated.

“I think we actually have files from working together as far back as 2009,” says Assouline. “We have grown ever since.”

All parties involved had been growing on parallel paths over the years, and continuing to collaborate as the technology, materials—and projects—progressed and became more sophisticated.



Credit: Flamingo Works

“Shapeways has enabled us to realize quickly whatever real-life concept we are envisioning.”

Using 3D printing as their main tool for verification of design, the designers have had great results with rapid prototyping, testing the mechanical properties of their designs, as well as evaluating actual functionality during every phase of product development—going far beyond the simple appearance of a part.

“During the process, we used Shapeways capabilities to 3D print many prototypes,” said Assouline. “That meant we had the option to iterate very quickly, print objects, and test them to see if they were working correctly in terms of complexity, or too much complexity.”

Here, the greatest benefits of rapid prototyping were exemplified:

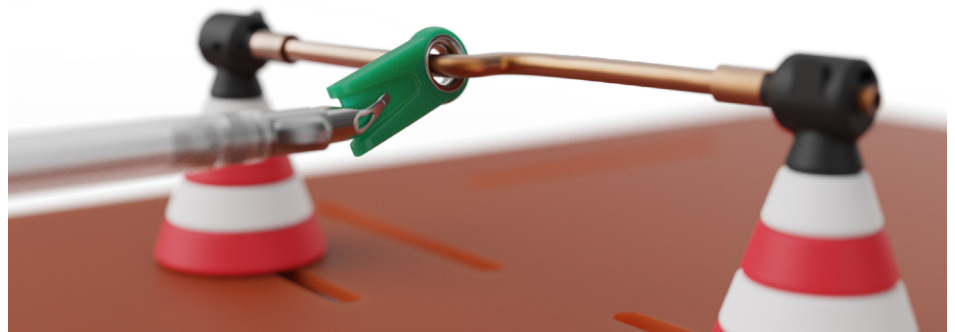
“These types of really quick iterations where we are designing something, 3D printing it over and over, receiving iterations and sending them to doctors for quick feedback, enabled us to invent a completely new platform for surgeons to practice their skills,” said Assouline.

In working with Shapeways for such an expansive amount of time, the design team was and is still drawn to

the partnership because of the ease in uploading 3D files and receiving instant quotes. This means when it comes to validating a part, the designers are aware of how much it will cost, and what the timeframe is for receiving new iterations while they are investing in the product development process.

Doctors using the training systems have continued to ask Flamingo Works to create more, which is easy as they can build on the 3D printed modular system they have created through Shapeways. Now, the learning program offers five tasks as targets, but because the designers were able to make such a solid foundation for this modular system it is easy to vary the products and test them quickly for production.

“Working with Shapeways throughout the years has allowed us to offer our clients a number of options. It’s a very physical world that we live in as industrial designers and we need to be able to verify our ideas quickly,” said Assouline. “Shapeways has enabled us to realize quickly whatever real-life concept we are envisioning.”



Credit: Flamingo Works

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 services 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 at www.shapeways.com to learn more.