

Forerunner 3D develops innovative medical device for oxygen therapy patients



Forerunner 3D leverages design freedom and HP 3D Printing to quickly produce and market its new and innovative medical device

It's estimated that more than 1.5 million adults in the U.S. use supplemental oxygen for a variety of respiratory disorders. For many, the plastic tubing is uncomfortable and has a tendency to create pressure sores. Forerunner 3D recognized this issue and designed an innovative product that increases patient comfort. The company leverages HP's powerful 3D printing technology to optimize the quality, turn-around-time, and cost of parts, while simultaneously reducing the risks involved with hardware innovation.

“Within five years, the prevalence of additively manufactured, end use parts will be neither surprising nor abnormal.” - Paul DeWys



Introduction

Forerunner 3D is a service bureau located in Coopersville, MI. In addition to 3D printing and 3D laser scanning, the company offers engineering services to support prototyping and low volume manufacturing. Forerunner 3D supports many different industries, including automotive, robotics, and medical devices.

In 2009, Paul DeWys founded DeWys Engineering out of his college dorm room at Ferris State University. Soon after, the company began working with West Michigan based manufacturing companies, assisting them with many diverse design and engineering projects. In 2014, the company began offering 3D laser scanning services to support its customers' needs for reverse engineering and part inspection. Then in 2016, Mr. DeWys acquired the assets of Select Manufacturing and formed Forerunner 3D.

In addition to customer work, the in-house team at Forerunner 3D has developed various products. One of their creations is the o2-Go Oxygen Tube Clip, which allows patients using oxygen therapy to attach their hose to eyeglasses or a hat, instead of wearing the hose behind their ears.

Problem

When patients with certain medical conditions have trouble breathing, they are often prescribed home oxygen therapy. It is used to treat many ailments, including asthma, chronic bronchitis, congestive heart failure, chronic obstructive pulmonary disease (COPD), emphysema, and pneumonia, among others.

In the past, home oxygen therapy typically required the patient to draw oxygen from a tank or bottle. More recently the industry has migrated to oxygen concentrators, which ingest air and filter out all other gasses, leaving only oxygen. Portable devices are common as they weigh far less, providing patients with increased mobility. In most cases, oxygen from the machines is delivered to the patient through a flexible, transparent tube called a nasal cannula. The patient typically wears the tube around their ears and then inserts the two-pronged end piece in their nose.

At some point, most patients begin to experience pain from having the cannula wrapped around their ears. To resolve this issue, patients try many different techniques, including wearing ear cushions and clipping the tubing to their clothes.

Solution

Embrace design freedom and HP 3D Printing to improve patient outcomes

“Our primary role as a company is that of an additive manufacturing service bureau,” says Forerunner 3D CEO, Paul DeWys. “As a side business, we also produce our own line of products that we manufacture with our HP 3D printers. The o2-Go Oxygen Clips are an example of our in-house product development efforts.”

To alleviate this issue, the team at Forerunner 3D developed a unique product called the o2-Go Oxygen Tube Clip. It's a device with flexible teeth that allows oxygen users to attach the tubes to their glasses, a hat, or other headwear. The clips are designed to be durable, conforming, and lightweight.

A faster, more cost-effective way to prototype and produce medical devices

o2-Go Oxygen Tube Clips are made from a soft thermoplastic polyurethane (TPU) material which is comfortable and safe for prolonged skin contact. The devices are manufactured in small batches using HP's unique Multi-Jet Fusion (MJF) 3D printing technology. Once the parts are produced, they are processed using a NorBlast tumble blasting system, which further smoothes the finish parts. When that is completed they are dyed black using a Girbau DY130 Coloring System that is engineered to work specifically, with MJF parts.

Go to market quickly with streamlined production, increased flexibility, and shorter lead times

The clips are currently sold on [Amazon](#) and through other distributors of medical equipment.



Benefit

“As the echoes of COVID are still reverberating through supply chains around the world, 3D printing in general, and HP’s MJF technology specifically, will receive increased consideration,” says Mr. DeWys. “Brands know they need to make their manufacturing operations more nimble and less fragile. With additive manufacturing they have the ability to quickly create new parts and improve existing part design. They can also rapidly, respond to change, whether it’s within their business or a result of global events.”

The o2-Go Oxygen Clips have been a welcome solution for many supplemental oxygen patients. For example, one Amazon buyer recently commented:

“My ears haven’t been this happy in 13 years. These wonderful oxygen tubing clips attach to your eyeglasses and your cannula, keeping your cannula in place while not pulling on your ears.”

Forerunner 3D currently produces about 1,000 sets of the clips annually. Due to the economics of HP’s innovative 3D printing solution, the parts can be manufactured affordably in very low quantities. Because of their diminutive size, they typically don’t require a dedicated print run. Instead, they can be used as fillers in other builds, which further reduces their cost.

All told, the o2-Go Oxygen Tube Clips cost about 75% less than they would if they were manufactured using a urethane casting process. They can also be produced very quickly. Forerunner 3D can produce and ship the parts within one week.

To learn more about HP’s Multi Jet Fusion 3D printing technology, and how 3D printing in healthcare is transforming the way we help people, please visit:

<https://www.hp.com/us-en/printers/3d-printers/industries/healthcare.html>

