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3D printed lenses

SPOTLIGHT

Everything you need to know about prescription smartglasses

Luxexcel illuminates the challenges and opportunities
for smart eyewear and 3D printing

Though smart eyewear technology has had its ups and downs over the past decade or so, it seems we are entering a new era, where demand for the technology and the advancement of the wearable devices will finally coincide. The fact that corporations like Facebook and Amazon are preparing to launch their own smartglasses is further indication that the technology is readying itself for broad consumer adoption. Dutch lens technology specialist Luxexcel has recognized this and has strategically positioned itself as a key partner for smart eyewear developers with its unique ability to 3D print prescription lenses with embedded technology .

In the following piece, the lens 3D printing company spotlights the challenges that have hindered smart eyewear technology up until now and illuminates the opportunities for smart eyewear and 3D printing.

Q: Why aren't more people wearing smartglasses today?

A: There are many setbacks to smart eyewear currently, which explain why they haven't been widely adopted. We can look at it from multiple perspectives, but what is clear is that smart eyewear should meet three main functions. First, like traditional eyewear, smartglasses should function as a fashion item. Second, they must meet the criteria as a medical aid. And third, they are wearable technology that gives the user access to augmented reality.

The main problem with smartglasses on the market today is that they have put the primary focus on the last function, falling short on the first two. In other words, they are wearable devices. And hurdles to their adoption have been fairly basic: even though glasses are used to help people see, smartglasses do not have built-in prescription lenses, thus falling short on one of their primary functions. Additionally, they are not as fashionable or lightweight as traditional frames, and their bulky design can be uncomfortable to the wearer.

Q: As a person who wears prescription lenses, what are my options for smartglasses?

A: Looking at what is already on the market: the options for prescription wearers are not great. Even though 7 out of 10 adults need some sort of prescription lens to see clearly, most smartglasses currently on the market do not come with the option for prescription lenses. Instead, people have had to settle for adding prescription inserts to their smartglasses. These inserts, made using traditional lens manufacturing processes, are worn underneath smart glasses, which can be cumbersome and heavy for the wearer.

Another option that exists is to glue display technologies onto traditional lenses. This, again, adds unnecessary weight to the frame, making it uncomfortable to wear for long periods. And that's not to mention the bulky aesthetic of integrating these add-ons. Guido Groet, Chief Strategy Officer at Luxexcel, sums it up well: "The devices look like helmets or sci-fi goggles—it certainly doesn't look like fashionable glasses that consumers have become accustomed to wearing."

Q: Does an alternative exist?

A: The short answer is yes. Luxexcel's technology has presented a compelling solution that can solve not only the issue of prescription smart lenses, but also the design and comfort problems. The company's unique 3D printing technology is capable of printing ophthalmic lenses with smart features embedded in them. This means that smartglasses can integrate lenses with prescriptions and smart devices, eliminating the need for add-ons. Critically, this reduces the weight and bulk of the eyewear. In fact, Luxexcel's 3D printed smart lenses are up to 50% thinner (and thus lighter) than smart lenses with multiple components glued together. "We combine prescription and smart devices into a slim profile that fits into a frame that looks and feels

much like traditional eyewear," adds Groet, Chief Strategy Officer Luxexcel "The lens delivers the user's best vision, as well as smart functionality. We're making the world's first truly integrated prescription and augmented reality lenses available today."

Q: How does 3D printing smart prescription lenses work?

A: At the center of Luxexcel's ability to print prescription lenses is its VisionPlatform™, a proprietary solution consisting of hardware, software and ink materials. The 3D printing system is based on inkjet technology that precisely jets billions of micro droplets, gradually building up the lens structure on the build platform. The technology is also unique in that it does not require any supports or post processing: what comes off the printer is a finished lens that can easily be snapped into a frame.

The printer uses a proprietary material called Luxexcel VisionClear™, which is specially formulated to create high-quality, transparent objects. The entire 3D printing process is controlled by the VisionMaster™ software. To date, the VisionPlatform™ has been used to produce over 50,000 lenses for customers. To add smart functionalities to its lenses, Luxexcel has the ability to directly embed smart devices into the printed lenses, including waveguides, holographic foils, flexible displays, active filters and liquid crystal technology. "A smart device such as a waveguide is encased in the printed material and prescription power is printed on top or around it," Groet explained. "The waveguide, which projects images into the eye, is fully embedded in the prescription lens."

This approach also better protects the smart devices. For example, because waveguides are incredibly fragile, encapsulating them within the durable lenses will help keep them safe from dust, humidity and impact. It is also worth mentioning that Luxexcel's printed lenses have obtained ISO, ANSI and FDA certifications.

Q: Where does Luxexcel fit into the smart eyewear market?

A: Luxexcel is not a smart eyewear manufacturer. Rather, the Dutch company is positioned to work with smart-glasses developers (OEMs /ODMs) by providing its 3D printing platform for prescription smart lens production. The company is thus offering a B2B solution that any smart eyewear company can benefit from.

Recently, the company partnered with WaveOptics, a manufacturer of waveguides and light engines. The goal of this collaboration is to develop a module that integrates 3D printed prescription lenses, waveguides and projectors: the three main components needed for AR smartglasses. Prototype samples of these lenses will become available as soon as Q2 2021.

At the end of the day, Luxexcel is aiming to fill a gaping hole in the $1+ trillion smart eyewear market and find a solution for the many consumers that require corrective lenses. ◆

Image: Luxexcel