

## A Perfect Fit and a Clear View

Source: BRAGi



Whether bridge or temple: the better the fit, the more comfortable and functional the glasses - and with 3D printing, they are also light and robust.

### Challenge

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Customized production of glasses frames using a wide range of basic models.

### Solution

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Additive manufacturing using PA 2200 with a FORMIGA P 110 *Velocis*.

### Results

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Custom-made: Perfect fit with maximum wearing comfort

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Functional: Best possible visual support

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High quality: Post-processing without restrictions

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Fashionable: Large selection of shapes and colors plus individualization

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Lean: Scan-to-product with centralized production and no overproduction

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Robust: Resilient and stable and lower weight

# Industrial 3D Printing of Custom-made Glasses Frames

Anybody who wears glasses knows what it's like: despite adjustment, the frame pinches and twitches from time to time; sometimes, it simply doesn't fit properly or ensure optimum visual support. One or more visits to the optician are the best-case scenario, having to buy new glasses is the most expensive. So why not take advantage of additive manufacturing for customized eyewear? The Chinese company Nanjing BRAGi Optical Technology Co, Ltd. is doing exactly this as their business model - while relying on the experience and expertise of EOS, the technology provider for 3D printing, for this and future growth.

## Short Profile

The Chinese company Nanjing BRAGi Optical Technology Co, Ltd. offers customized eyewear throughout Asia.

*Further information*  
[www.bragi-eyewear.com](http://www.bragi-eyewear.com)

## Challenge

"One size fits all" - a nice idea, but often not feasible. This applies especially to acetate frames manufactured using the traditional injection molding or 2D cutting process - individual face shapes with their decisive nuances are simply too different. In some cases, the lenses may even be at the wrong distance from the eye, or the wrong height in relation to the pupils. It's easy to illustrate for non-glasses wearers: imagine a car where neither seat nor pedals nor mirrors can be adjusted properly.

The solution is obvious. If a pair of glasses cannot be adjusted, they must fit perfectly from the very beginning. This can be made possible through individual, precise production. "We are already familiar with the concept of customized production from numerous other applications, for example in the medical sector. After all, prostheses or implants are also tailored to individual patients," explains

Gong Xinyi, designer at BRAGi. "So why wouldn't the same concept work in the field of optics?"

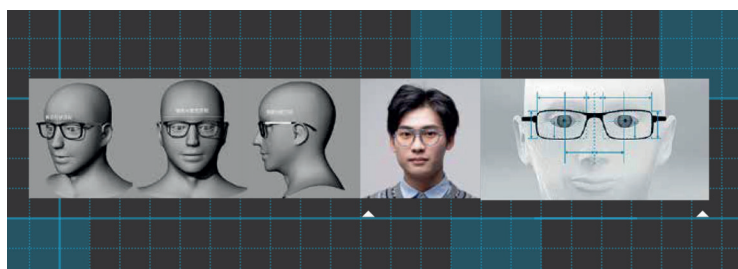
Selective Laser Sintering (SLS) is a proven technology that has been successful and established for many years. A laser prints a part layer by layer - ideal for a high degree of customization without additional costs. All that is required is an industrial 3D printer and material plus the corresponding 3D computer data. Any component can be easily and quickly produced from the data. This also applies to eyewear, which are delicate but still need to be robust and fit precisely.

## Solution

The solution found by BRAGi takes all this into consideration: data about the shape of the head are captured using a 3D scanner. All the glasses wearer needs to do is

visit a partner optician. In just a few minutes, the optician takes several photos of the person's head with a camera mounted on a tablet. This way, the look of the new glasses can also be checked immediately with a virtual representation. The look of other designs can be quickly checked as well with the subject's own face.

This is the beauty of BRAGi's business model: the frame is individually manufactured for its wearer - one of 70 models from seven series is always chosen as the basis. The range extends from adult's to children's glasses and even prescription sunglasses. The frame is always manufactured in white nylon and given a finish during post-processing, with one of 14 different colors. A pure white and easily post-treatable surface is particularly important for high-quality coloring. For manufacturing, BRAGi uses FORMIGA P 110 *Velocis* systems and EOS's proven PA 2200 mate-



*Before the glasses are made, there is a data capture process.*  
(Source: BRAGi)

rial. "We intensively compared the technologies of different suppliers from all over the world," explains designer Xinyi. "The EOS system is superior to other manufacturers in terms of component quality and surface finish. The fit between frame and bracket is excellent for every build cycle, and the technology-related staircase effect is virtually non-existent. In addition, the material allows any form of finish, including coloring. The purity of the white of the glasses frames is also very important, and here again the EOS system is at the top."

## Results

BRAGi rapidly established a business model that enables the quick and easy production of individual glasses frames by means of additive manufacturing as a complete scan-to-print solution. This is particularly useful for glasses wearers who have problems with standard frame shapes due to the shape of their noses. But all other users of BRAGi eyewear will also enjoy the very comfortable fit, which at the same time guarantees optimum optical support and low weight. In addition, the glasses are robust and have a long service life. Another very important feature for wearers: they are hypoallergenic.

The business model is streamlined and enables a high degree of individ-

**"We believe that everyone should have a custom-made pair of glasses. Many people wear uncomfortable glasses and therefore cannot see properly. This reduces their quality of life. BRAGi's offering is a real improvement for people who wear glasses."**

*Gong Xinyi,  
Designer at BRAGi*

uality: in the injection molding or 2D cutting process, the minimum order quantity for a frame is about 500 pieces - in contrast to custom-made and at the same time low-cost additively and individually manufactured glasses. Nevertheless, the process and part quality are consistently high - the combination with the material properties of PA 2200 means glasses frames that can withstand the high demands of post-processing, right down to coloring and appearance. As this is a fashion-oriented industry, new designs can be developed and implemented quickly, as Gong Xinyi emphasizes: "Stop doing prototyping. Start production. 3D printing is revolutionary for the optical industry."

In just a few months, BRAGi has already produced over 30,000 glasses and shipped them to customers with

a short delivery time. For BRAGi, this means prosperous business development: the company, which is based in China, has expanded its business activities to Korea, Japan, Indonesia, Singapore, Thailand and Malaysia, and there are also already inquiries from Europe. A scan at home is also planned in order to make it even more convenient for customers. Simplifying the supply chain in this way would further improve margins. As a result, additive manufacturing would contribute to another positive effect on the business model. The ability to implement their model without additional points of sales or warehouses is also a plus point for BRAGi in this scenario. More and more glasses wearers are benefiting from the advantages of a custom-made frame. One size fits all? No way!



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