



Chinese Earphone Manufacturer chooses EnvisionTEC for mass production

Bedrock is a professional HiFi earphone manufacturer founded in Suzhou, Jiangsu Province, China. The team at Bedrock develops high-end customized earphones, including a range of both wired and wireless Bluetooth models.

Bedrock has a vision, to produce earphones that look and perform as well or better than anything currently in the market whilst retaining a compelling price point.

Why look at 3D printing?

3D printing is making inroads into a number of industries from healthcare to heavy manufacturing. Hearing device manufacturers whether they produce headphones, CEIMs or Hearing aids are seeing the benefits in terms of faster speed of production, less wastage, greater accuracy and lower costs of completed devices.

With the production of customized headphones the tuning of the devices is key to producing the correct sound. Even with the best quality drivers installed, an inaccurately manufactured molded casing can distort the sound and reduce the effectiveness of the device. Manual molds can also effect the fit of the device, allowing inaccuracy to creep in and reducing comfort for the wearer.



Du Jinming, Founder of Bedrock with the Perfactory Micro XL 3D printer.

BEDROCK

Industry:
Hearing

Machines:
Perfactory Micro Plus XL

Materials:
E-Shell Series

The scanning of ear impressions puts less pressure on the impression material, reproducing the ear shape directly into CAD. This removes the molding steps in the production process and in turn reduces the opportunity for distortion. It allows for a more accurate representation of the customer's ear to be produced. Removing the impression stage all together gives an even better result. With the introduction of in-ear scanners the process has become less unpleasant for the patient and has removed a step in the process reducing production times.

When accuracy is required 3D printing brings the ability to produce the most accurate parts which allow for the best audio quality and better fit for the wearer.

Why EnvisionTEC?

The Bedrock team understood the importance of choosing the right 3D printer and materials. When searching their main considerations were that they would like a printer and materials that would be easy to use and handle, provide sufficiently high accuracy to reduce post-processing effort and be large enough to allow for future growth.

After examining their options from a number of manufacturers they found EnvisionTEC distribution partner DongGuan City Broad 3D Technology Co., Ltd and saw the highly accurate 3D printers and numerous audiology focused materials.

They saw that the accuracy of the EnvisionTEC printers would allow them to reproduce the digital files very closely and ensure the best solutions for their customers. Additionally the range of materials available would provide virtually infinite design and color combinations whilst retaining the CE and FDA approvals for use in the ear.

The EnvisionTEC range included machines that would provide a variety of capacities, from a couple of ear shells, through to hundreds simultaneously. After seeing the entire range Bedrock settled on an EnvisionTEC Micro Plus XL with the E-Shell materials. The printer build platform size would allow them to produce up to 7 pairs of shells in around 3-4 hours and allow for production capacity to grow in the future.

Results

The Bedrock team have seen instant improvements in a number of key areas. The research and development process has been dramatically reduced. It only takes a few hours to go from an STL file to a fully 3D printed product. If there is need to adjust a design then this only takes a few hours to achieve and re-print.

The printer has allowed Bedrock to move into mass production as the EnvisionTEC Micro Plus XL is capable of printing 7 pairs of earphone shells simultaneously, positioned either horizontally or vertically. Plus a print time of only 3-4 hours.



The large build platform on the Micro XL allows for the production of up to 7 ear shells in a single print. These can be printed vertically or horizontally to maximize yield.

“After looking at the competition we opted for EnvisionTEC’s printer because of its relatively low price compared to its high speed and accuracy.”

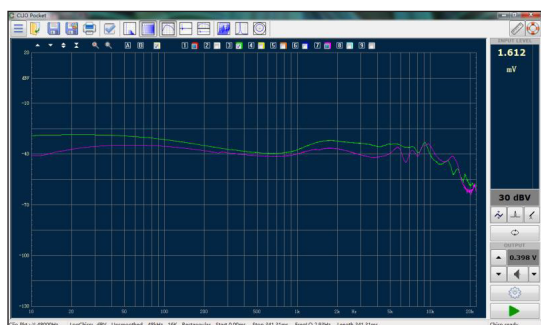
- Du Jinming, Founder, BEDROCK

The team chose the E-Shell series material which is FDA-certified and Class-IIa biocompatible. The material, available in a huge number of colors can produce parts with extremely high tolerances and with smooth surfaces with less stepping. This results in not just a better look and feel, but also shorter post processing times for parts.

3D printing has resulted in cost savings for the business. Bedrock has been able to cut the costs of manufacturing by reducing wastage and reduced labor costs. By removing the need for impressions and the numerous steps used in traditional manufacturing, the skills required are less and the product can be produced much faster.

End product quality has also been improved through the application of 3D printing. The reduction in manual manipulation has improved the ability to accurately reproduce the acoustic structures required. This maximizes the sound quality of the earphones and improves the price to quality ratio and market competitiveness of the product.

After testing Bedrock 3D printed earphones, they outperform the Sennheiser IE800S in frequency response curve, equilibrium and stability of treble. This at a third of the cost to the customer.



(Left) The frequency response between Bedrock BR01 (green) and Sennheiser IE800S (purple). Implementing 3D printing has allowed Bedrock to build earphones that perform as well, or better than the market leaders and still retail at a third of the price.

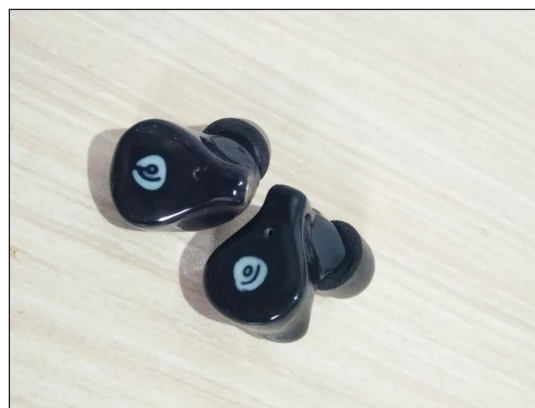
Conclusion and the Future

The effects of the introduction of 3D printing have been numerous and beneficial both to the team within Bedrock and their customers. The improvements in the manufacturing process have reduced costs, increased the speed of production and resulted in better fitting and performing devices for their customers.

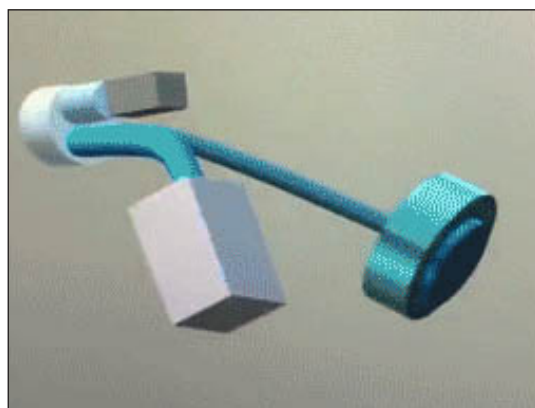
The move to 3D printing has resulted in the ability to compete with even the biggest players in the market and provide equivalent or even better performing devices at a fraction of the costs of the bigger brands.

Partners

Thanks go to the teams at both Bedrock and DongGuan City Broad 3D Technology Co., Ltd for support in the production of this case study.



A finished pair of Bedrock brand earphones. The smooth surface finish provided by the Perfactory Micro XL allows finishing and polishing to be completed quickly, reducing production time.



Even complex acoustic structures can be accurately printed on the EnvisionTEC Micro, ensuring the highest quality sound from the earphones.

“Dongguan Broad Technology showed us the range of printers and materials and it was then we realized that EnvisionTEC was the way to go.” - Du Jinming, Founder, BEDROCK

EnvisionTEC, the perfect choice for audiology.

From the beginning EnvisionTEC has been the 3D printer of choice for audiologists and hearing aid manufacturers. A number of key players in the industry rely on EnvisionTEC printers and materials to produce thousands of custom devices annually.

In all EnvisionTEC offers more than 16 biomedically approved materials with various skin-tone colors, along with red, blue, pink, tan, mocca, beige, cocoa, brown, black, white, rose clear and crystal clear. Below are EnvisionTEC's core audiology focused materials:

- **E-Clear series** - A liquid photopolymer that produces strong, tough, water-resistant parts especially for applications in the custom hearing device market.
- **E-Shell 200** - A low viscosity liquid photopolymer that produces strong, tough, water-resistant ABS like parts with high detail that are Class IIa biocompatible according to ISO 10993/Medical Product Law and are CE certified for use as hearing aid products, otoplastics, and medical devices.
- **E-Shell 300** - A Material series designed especially for applications in the hearing aid industries and is distinguished for rigidity and durability. It is CE certified and Class-IIa biocompatible according to ISO 10993 (Medical Product Law) for hearing aid shells and otoplastics.
- **E-Shell 500** - Designed especially for applications in the Hearing Aid industries and is distinguished for soft durability.
- **E-Shell 600** - For use on Perfactory UV machines only. EnvisionTEC E-Shell 600 is a liquid, photo-reactive acrylate for building functional parts. It is CE certified and Class-IIa biocompatible according to ISO 10993 (Medical Product Law) for soft ear shells and tips.
- **E-Silicone** - A solution to produce soft silicone otoplastics by the additive manufacture of cocoon molds. The custom fit E-Silicone molds may be injected with medical grade silicone materials. The eggshell-like mold may then be easily broken away, leaving a soft, flexible shell. These shells can provide patients with increased comfort, better retention, better acoustic seal, more gain before feedback and improved sound quality.
- **E-Shell 3000** - Distinguished for rigidity and durability. It is CE certified and Class-IIa biocompatible according to ISO 10993 (Medical Product Law) for hearing aid shells and otoplastics.

About EnvisionTEC

EnvisionTEC is a leading global provider of professional-grade 3D printing solutions. Founded in 2002 with its pioneering commercial DLP printing technology, EnvisionTEC now sells a range of printer configurations based on six distinct technologies that build objects from digital design files.

The company's premium 3D printers serve a variety of medical, professional and industrial markets, and are valued for precision, surface quality, functionality and speed.

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