Feature

Axtra3D, taking silicone AM into production

Axtra3D's True Silicone Solution, with the Lumia X1 and TrueSilX50, is changing the game for industrial and healthcare applications

In collaboration with Axtra3D



With the recent launch of its TrueSilX50 resin for the Lumia X1 platform, Axtra3D is bringing silicone 3D printing to its customer base, opening up applications in healthcare, consumer goods and industry

If you'd brought up pure silicone 3D printing a decade ago, you'd likely have been met with a healthy amount of skepticism. The thermoset material, widespread in consumer, healthcare, and industrial applications, has presented challenges to the additive manufacturing industry over the years despite many attempts to adapt the technology for the material and vice versa. Only in the past few years have real solutions presented themselves, though the technology has still remained niche (you can read more about innovations in the subsegment <u>here</u>). That's where Axtra3D comes in. With its Hybrid PhotoSynthesis (HPS) technology and new TrueSilX50 material, the company is not only making pure silicone 3D printing possible, but also aiming to make it far more accessible. The resin is made up of pure silicone (the entire backbone of the polymer comprises silicone, free from acrylates and urethanes) with added photo initiators to enable the photopolymerization process. In terms of its properties, TrueSilX50 is a medium-hard silicone with a shore A hardness of 48A, elongation at break of 330% and a tear strength of 22 N/mm. Like conventionally manufactured silicones, the printable material is characterized by its durability and biocompatibility, which make it suitable for a wide range of applications in healthcare and consumer goods. Axtra3D emphasizes that unlike some other 3D printed silicone materials on the market, which can include epoxies, acrylates, urethanes, or catalysts, its TrueSilX50 material has a pure formulation. What about the photo initiators, you wonder? They can be removed from 3D prints using a specific post-process that results in 100% pure silicone parts. This helps achieve biocompatibility requirements more easily and also makes the material suitable for applications in healthcare or audiology. Besides higher flexibility and elasticity, the resin outperforms all other low viscosity 100% silicone photopolymer formulations in key

Thanks to post-processing, users can print pure silicone parts with TrueSilX50.

Image: Axtra3D



TrueSilX50 is biocompatible, making it ideal for baby care products and medical devices.



properties like tear strength and meets biocompatibility standards according to ISO10993 for non-cytotoxicity and non-skin irritation.

Lumia X1, a perfect match for silicone

TrueSilX50 was engineered for Axtra3D's Lumia X1 3D printer, which is based on its HPS process. HPS, which was introduced by Axtra3D just a few years ago, is an innovative approach that combines elements of SLA and DLP to realize high throughput print rates and fine feature resolutions. More specifically, the Lumia X1 integrates both an SLA laser and a DLP projector for this dual performance.

The Lumia X1 platform also integrates Axtra3D's TruLayer Intelligent Layering technology, which delivers greater process stability and faster printing speeds by more closely controlling layer thickness and minimizing delamination between cured layers. According to the company, with HPS and TruLayer technologies integrated in the

Axtra3D's HPS-based Lumia X1 3D printer.

Lumia X1, the hardware is capable of printing detailed, high-resolution parts with isotropic behavior at rates 10-20 times faster than standard SLA or DLP.

The Lumia X1 is compatible with a range of industrial-grade resins, including Henkel's Loctite 3D IND3380 and Forward AM's ceramic-filled Ultracur3D RG 3280, as well as medical- and dental-grade resins, such as Keystone's KeyModel Ultra and KeySplint Soft Clear (among others). TrueSilX50 straddles both segments, offering durable mechanical properties and 100% biocompatibility.

As Axtra3D adds, users can not only benefit from 3D printing silicone prototypes on its Lumia X1 platform, since the technology's scalability and throughput make production applications possible. "These innovations make TrueSilX5O not just printable but also scalable and production ready," Axtra3D says.

Moreover, TrueSilX50 is just the first of many silicone products that Axtra3D plans to introduce. As the company states, its platform is already capable of processing materials in a range of viscosities (up to 30,000 cPs, on the high end of what can be processed using photopolymerization technologies on the market), but it is working to expand the range even further, which will allow more silicone-based materials to be printed. "This means tougher parts, more elastic recovery and wider functional ranges," the company adds.

From gaskets to wearables

As we refocus on the current possibilities using Axtra3D's Lumia X1 and new TrueSilX50 material, there are many applications that



Image: Axtra3D

manufacturers can now exploit. In the industrial sphere, the silicone resin has broad potential for the production of sealants, gaskets, grommets and bellows, as well as tactile components like buttons, keys and electronic connectors. Other use cases that Axtra3D highlights for industrial users are automation-focused components, as well as silicone molds and custom casings or holders. It is also possible to create geometries that would be challenging if not impossible to achieve using more conventional silicone production methods.

In the medical sector, the material's biocompatible properties as well as its flexibility and durability make it ideal for customized solutions, like surgical training aids, anatomical models and orthotics. Other use cases in this sphere include casings for wearable devices, cosmetic applicators and baby care or female hygiene products. Customized products are also a key draw from the dental and audiology industries, where TrueSilX50 offers benefits for custom hearing aids, dental guards, orthodontic trays and more.

Adopting Axtra3D solutions

As the material options continue to grow for Axtra3D's 3D printing platform, more and more sectors and users will be able to benefit from its precision and high throughput. To accommodate the various needs of this diverse customer base, the company offers two flexible business models: a turnkey ecosystem known as Axtra Solutions™, which includes pre-validated print profiles (including for TrueSilX50) and expert application support for plug-and-play printing; and Axtra OpenAccess™, which gives users more flexibility in terms of experimenting with third-party resins and application development, perfect for R&D.

Ultimately, silicone represents the cutting-edge of photopolymer materials today and Axtra3D is right there at the forefront with its TrueSilX5O resin and Lumia X1 platform.

Axtra3D has plans to roll-out additional silicone materials with various Shore A hardness properties.

Image: Axtra3D

