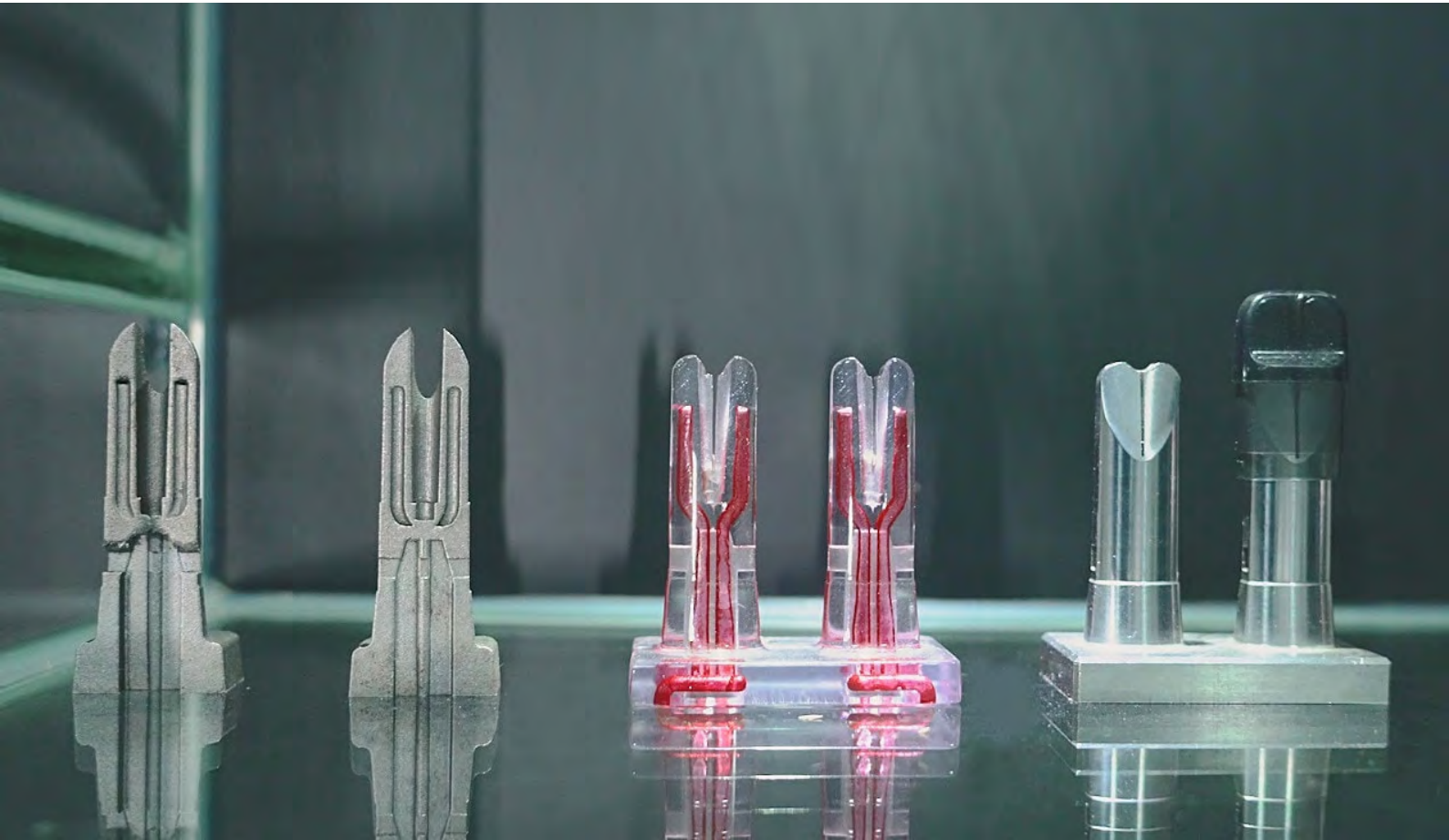


ADVANCING VAPING MOLD PRODUCTIVITY BY 60% WITH FARSOON METAL 3D PRINTING



3D printed vaping molds with automatic grafting solution.
Image Courtesy: Borton Precision

↓ Project Overview

CHALLENGES

- Challenging Manufacturing
- Accuracy
- Uneven finishes

SOLUTION

Farsoon FS273M dual-laser Metal System

KEY BENEFITS

- Achieve advanced design features
- Rapid production
- Production efficiency

Grade A1 3D-printed Mold Surface Quality - Through Additive Manufacturing.

Vaping is an electronic device that simulates traditional tobacco smoking. Consisting of an atomizer, a power source and a cartridge tank, the internal structure of Vaping is highly complicated – making the vaping mold extremely challenging to be manufactured by conventional metal machining process.

Located in Dongguan city, **Borton Precision Technology Co., Ltd.** (referred to as Borton Precision) is specialized in customizing vaping molds & tooling solutions by metal 3D printing, offering comprehensive design-to-market services including conformal cooling channel & venting design, mold flow simulation, additive manufacturing, heat treatment, and post-processing.

"After 6 years' deep dive in customized mold making, we have seen many benefits brought by additive manufacturing. The ability to create better, sophisticated molds has become a defining factor to stay in the market competition. We are able to achieve advanced design features made possible using 3D printing, such as conformal cooling channels." says Zhou Liping, CEO of Borton Precision: ***"In order to push the vaping mold manufacturing to the next level of quality, efficiency and profitability, we invested in two Farsoon FS273M dual-laser metal systems in early 2021."***

"During the first year adopting the two Farsoon 3D printers, we investigated many aspects of the machine performance in a manufacturing environment, including operation cost, ease of use, production turnover rate, part lead time, serviceability and technical support. After an in-depth evaluation process, we decided to purchase another 3 Farsoon metal systems to expand our production capability even further." Zhou added: ***"We are impressed by the great ROI of FS273M dual-laser configurations; it is truly a high-value proposition manufacturing tool on market."***



Figure 2: (Top) Farsoon FS273M dual-laser metal system installed in Borton Precision facility.

↓ Improved Productivity

At Borton Precision, Farsoon's metal additive technology has been applied in rapid production of highly-complicated tooling, such as injection molding, die-casting, silicone molds, and fixtures. ***"Many of our orders are non-standard small batch productions. The adoption of Farsoon FS273M dual laser 3D printers has been proved to be successful by bring us improved production efficiency and reduced lead-time for significantly increased profitability --- this helped us expanding the business through many new markets and applications."***

Take the vaping mold as an example, the internal structure is featured with many intricate cooling channels due to the linear-shape of the product. With

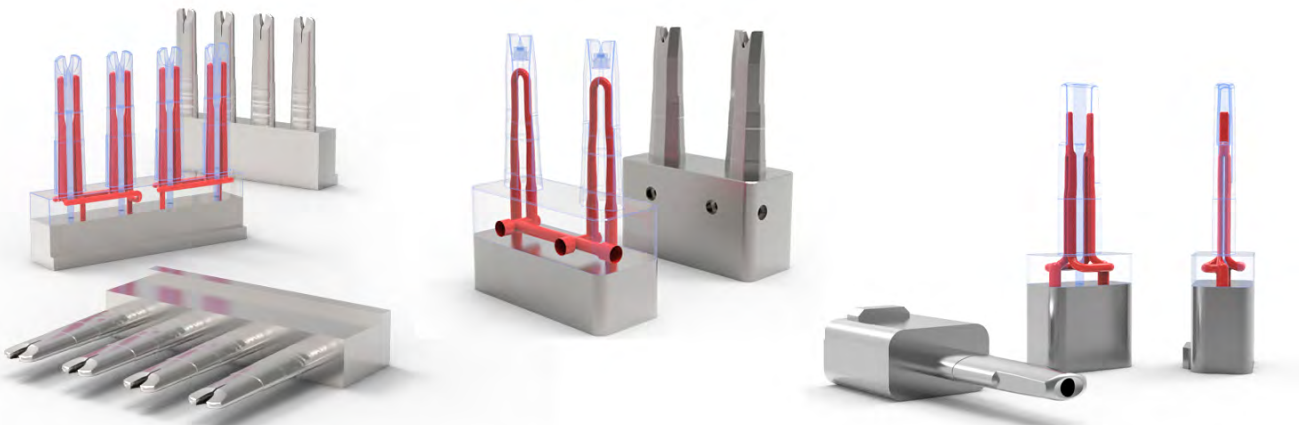


Figure 3: Vaping molds with conformal cooling channel design, by Borton Precision. Image Courtesy: Borton Precision

the traditional manufacturing process such as CNC, the internal channels are extremely difficult to produce; it often causes defects including uneven finishes and varied offsets from the mold surface, which can form multiple heat concentration areas in the vaping mold. This limitation will eventually result in high deformation rates, longer cycle time and low efficiency of injection molding process.

3D printed on Farsoon FS273M system, the new generation vaping mold inserts are featured with innovative conformal cooling channels that resides evenly to the mold contour with an expanded, smoother internal surface area; which **achieves faster, more uniformed heat removal process and a significantly improved production efficiency by 60%**. The final vaping products from the injection molding process also showcase **excellent surface quality, size-stability, and product yield**.

↓ Efficiency & Accuracy

Looking at the bigger picture of the mold-making, additive manufacturing is just one step amongst the multiple processes. Integrating CNC machining and metal 3D printing, the hybrid printing has been adopted by many pioneers in tooling industry to achieve the best production efficiency. The CNC-machined section has to be clamped in position on the base plate and leveled for 3D printing process. Then each hybrid mold insert will be further transferred to other equipment for further post-processing.

"The main technical challenge is the accuracy," Zhou commented, "The 3D printed sections need to be fully aligned with the union line of the CNC-machined section. For advanced designs such as conformal cooling channels, the accuracy tolerance under 0.1mm is required for a functional mold product."

Take vaping mold again for example, the manual process of aligning each piece usually takes 30 minutes by a skilled operator; However, considering the large production volume of over 100 pieces per batch, the full positioning process is labor intensive and time-consuming.

Taking these pain points from Borton Precision, Farsoon metal application team worked closely with the customer to develop the automatic alignment solution for hybrid printing. Equipped with high-resolution in-chamber cameras and optimized visual analysis layout, the new alignment system is able to extract the union outline of the bottom section, as well as the internal channel features for best accurate positioning of the 3D printed section. The whole process takes only a few minutes, compared to previously hours of laborious manual alignment work.

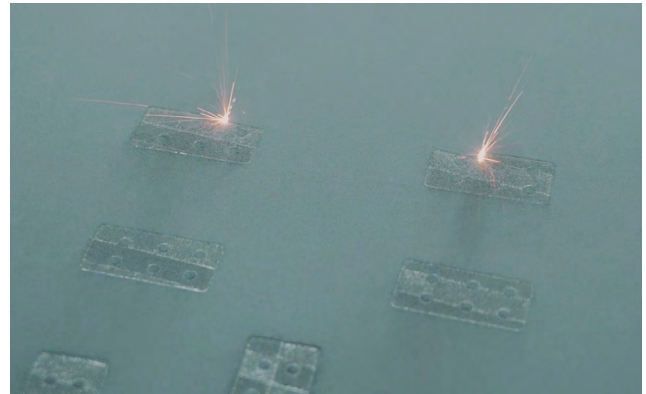


Figure 4: FS273M dual-laser system operating, by Borton Precision. Image Courtesy: Borton Precision

↓ Grade A1 Surface Quality

"Depending on the application and material of the end-use part, the injection molds usually require a smooth finished surface of Grade A1 (Ra0.016μm). This is even more challenging when it comes to a mold with larger surface area." Says Zhou: "With full access to key operational parameters for scanning strategies, we are able to achieve the challenging Grade A1 finish quality on a full FS273M base plate sized surface, with a large layer thickness build by Farsoon metal laser sintering process. We are fully convinced by the optimal performance of FS273M."

Farsoon strives to push the application of additive manufacturing in the molds & tooling field by working with industrial partners to offer high-quality, productive 3D printing solutions. During May 12-14th, 2022, Farsoon will be showcasing this vaping molds product at **booth J19, Hall 4.1 at TCT Asia** located in Shanghai National Convention and Exhibition Center. Inquires and interested customers are welcome to contact globalinfo@farsoon.com for more information.



Figure 5: Grade A1 finish on a full FS273M base plate sized surface. Image Courtesy: Borton Precision

↓ Farsoon's Metal Laser PBF Systems

▼ FS721M



▼ FS421M



▼ FS301M



▼ FS273M



▼ FS121M



↓ About Farsoon

OPEN FOR INDUSTRY - Farsoon Technologies, founded in 2009, is a global manufacturer and supplier of industrial level polymer and metal laser sintering systems. Farsoon is the leading supplier of industrial AM technology in China with increasing growth in the international market. In 2017, Farsoon released the first of a new series of machines under the revolutionary Continuous Additive Manufacturing Solution (CAMS), and established Farsoon Technologies-Americas in Austin, Texas, USA. In 2018, Farsoon Europe GmbH was established in Stuttgart, Germany to expand direct operations to Europe. Farsoon is committed to developing AM towards its true manufacturing potential and providing customers with best-in-class systems, materials, software, applications and services. Learn more: www.farsoon.com

↓ Contact Us

AMEA

Farsoon Technologies
Add: No. 181 Linyu Road, Changsha National High-Tech Industrial Zone, Hunan, China
Tel: +86.731.8397.6198
Email: globalinfo@farsoon.com

AMERICAS

Farsoon Americas CORP
Add: 3141 Eagles Nest Blvd, Suite 230, Round Rock, TX 78665
Tel: +1 512-686-2866
Email: info@farsoonam.com

EUROPE

Farsoon Europe GmbH
Add: Liebkechtstrasse 33, 70565 Stuttgart, Germany
Tel: +49 711 13796 0
Email: wehelpyou@farsoon-eu.com

RUSSIA

Senior Business Development Manager CIS
Nikita Voronov
Tel: +7 985-114-74-04
Email: nikita.voronov@farsoon.com

For more information, please visit:

www.farsoon.com



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