## Printing the refined way

Successful tests at the print head: Dispensing needles support the reproducibility of viscous biomaterials

When 3D printing organic substances, so-called bioprinting, one thing must not happen: The cells in the substances to be printed must not get damaged. Print heads from Puredyne already achieve this today through demonstrably high-precision and low-shear dispensing. Nevertheless, the printing results are always dependent on the dispensing needle used, of which there are many available on the market.

Reason enough for Puredyne - brand of the established dispensing specialist ViscoTec - to put dispensing needles at the top of the agenda in order to further support the growing application area of bioprinting and to find potential for innovation.

Recently, the engineers succeeded in further improving one of the most difficult parameters in 3D printing of biomaterials during in-house laboratory tests: Reproducibility.

In combination with the precision of the print head, this is an important aspect for research and development in many industries, as well as for machine and plant construction.

The aim of the test series was to find out which technical possibilities exist to achieve the precise dispensing of cellular bio-substances with a focus on extreme sensitivity in a more reproducible way and to achieve the finest start and end points.

The Puredyne print head and precision dispensing needles from the Japanese manufacturer Tecdia were used. The print head has an integrated compressed air supply and is mounted on a bioprinter via a bayonet fitting with the single-use cartridge. Controlled by a stepper motor, the progressive cavity technology installed in the cartridge enables process-reliable and precise dispensing.

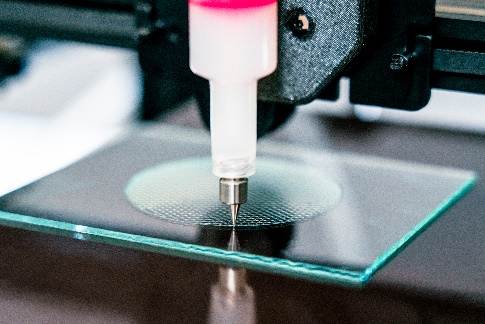
The dispensing needle, which is connected to the print head via luer lock, offers great potential for improving print quality: Experiments had shown that the risk of shearing of cells in the biomaterial is greatest in the dispensing needle. However, it is imperative that these cellular structures are protected. Although printing microscopically fine 3D objects is de facto not a big problem today, printing living cells reproducibly via extrusion is. In addition, the dispensing process must not only be precise but also fast in order to protect the cells.

Accordingly, the engineers outlined the task for the test series: The task was to find a dispensing needle that optimally complements the Puredyne print head with its positive characteristics in precision and versatility. During the tests, the developers found that the "Arque" dispensing tip from the manufacturer Tecdia delivered the best results and, in combination with the Puredyne kit b, dispenses the biomaterial with the highest reproducibility. The print head equipped with an Arque dispensing needle ensures consistent line width and sharp contours throughout the entire printing process. The optimal pressure reduction also guarantees fine start and end points. According to the manufacturer, Arque dispensing tips have a seamless inner cone, which improves the flow behaviour in the tip.

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Images:

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Automatisch generierte Beschreibung

Precision printing with Puredyne kit b and high quality nozzles from Tecdia.

**Simply progressive. Simply usable. Simply pure.**

Puredyne represents printheads that combine the proven ViscoTec dispensing technology with single-use cartridges. Thanks to the endless piston principle, Puredyne enables volumetric dispensing - regardless of viscosities and is particularly gentle. The new brand was created in 2021. The areas of application of the printheads include the fields of bioprinting and regenerative medicine, with plans to expand to other industries.

As the simplest, cleanest, and fastest solution for precise dispensing of viscous material in challenging bioprinting dispensing applications, the printheads are impressive - innovative and economical. The brand team maintains close contact with the market in order, on the one hand, to optimally serve the requirements of the application and, on the other hand, to recognize and react to new market trends at an early stage. Sustainable activities are closely anchored in the brand values.

Puredyne is a brand of ViscoTec Pumpen- u. Dosiertechnik GmbH. ViscoTec mainly deals with systems required for conveying, dosing, applying, filling, and emptying medium to high-viscosity material. The headquarters of the technological market leader is located in Töging (Bavaria, Germany). ViscoTec also has subsidiaries in the USA, China, Singapore, India, France and Hong Kong and employs around 300 people worldwide.

**Tecdia**

Tecdia is a Japanese company providing precision dispensing nozzles with I.D. (inner diameter) as small as 30 µm. Tecdia has headquarters located in Japan and manufacturing located in the Philippines. [Tecdia Webpage](https://us.tecdia.com/products-services/precision-products-overview/precision-products-other-dispensing-nozzles/arque-2/)

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