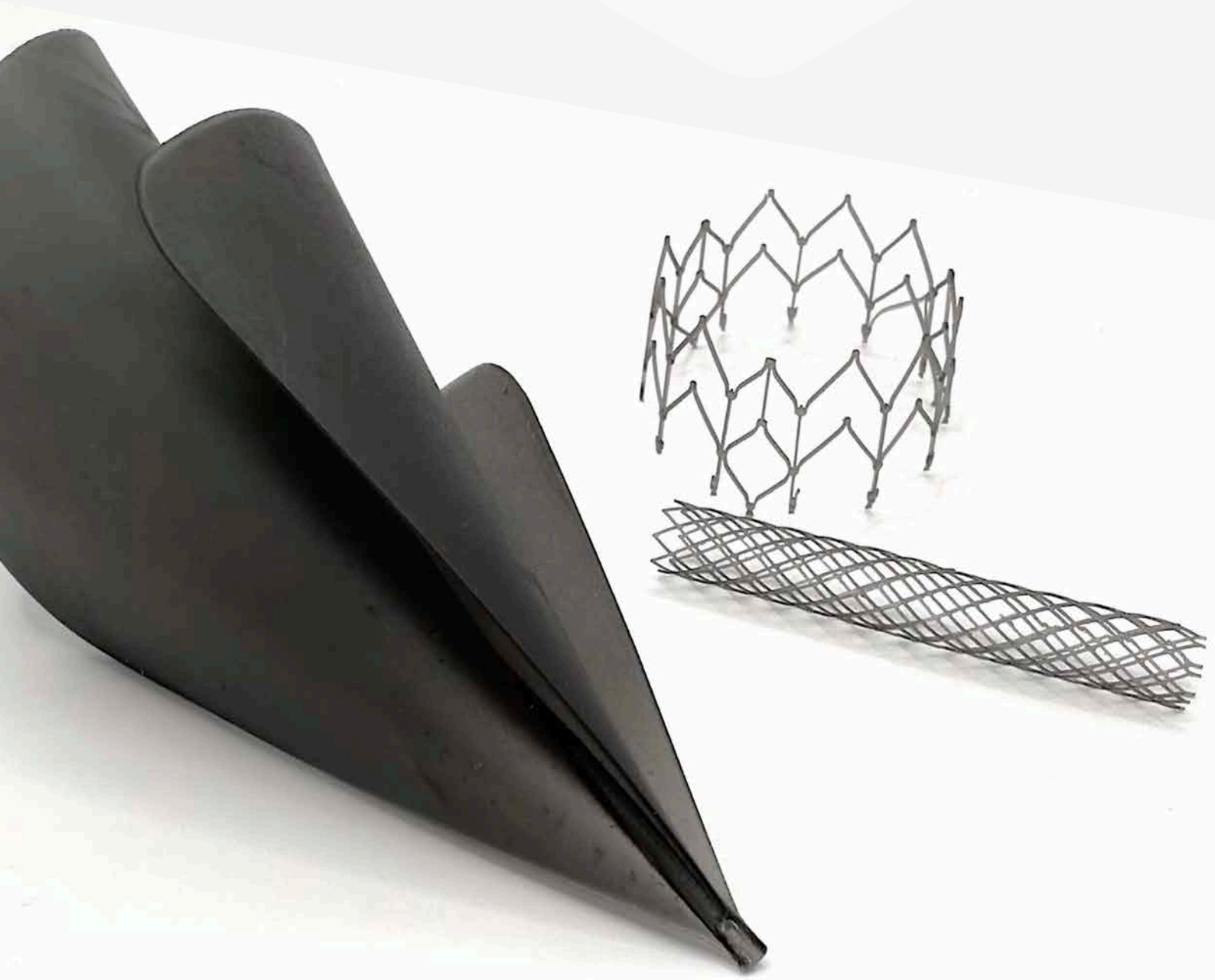
AXTRA3D



DINSMORE
AN ADDMAN GROUP COMPANY

CASE STUDY

MICRO PRINTING WITH DINSMORE

USING AXTRA3D's Hi-Speed SLA with LUMIA.X1

A One-Stop Solution

Dinsmore, an ADDMAN Group company, is a renowned service bureau with a reputation for innovation in additive manufacturing and has always been at the forefront of adopting cutting-edge manufacturing and prototyping technologies. With a team of design and engineering experts, they focus on specialized and low-volume industrial, electrical mechanical, and healthcare solutions.

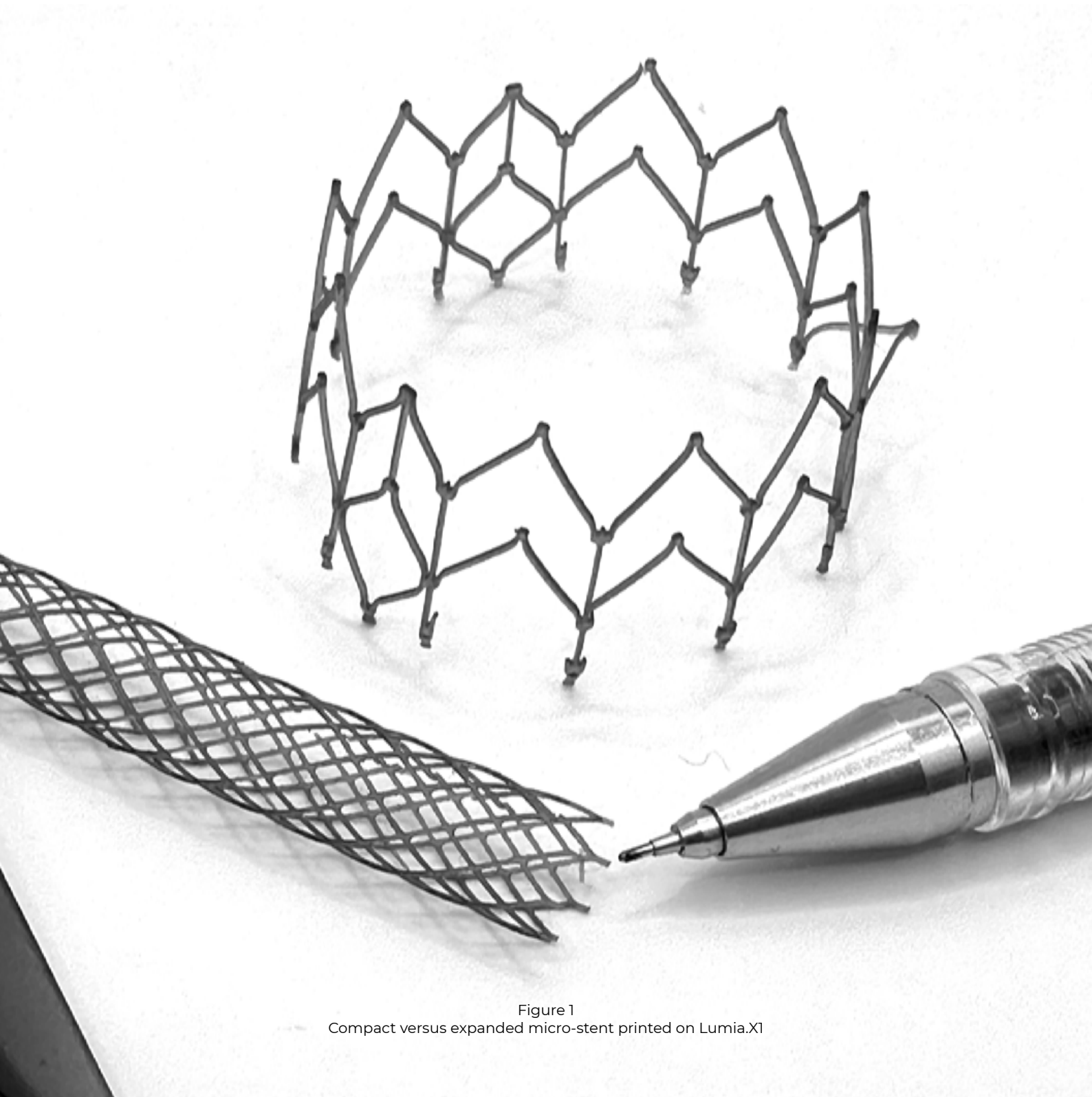


Figure 1
Compact versus expanded micro-stent printed on Lumia.X1

A Challenge in Precision: Overcoming Complex Geometries in Medical Manufacturing

The company faced a unique challenge in the production of highly intricate geometries, particularly in the medical sector. The production of stent cores—critical components in medical applications—posed a significant challenge due to their delicate structure and the precision required in their manufacturing. This case study explores how Dinsmore overcame these challenges by incorporating Axtra3D's Lumia.X1 into their workflow, enabling them to achieve what was previously impossible.

Before acquiring the Lumia.X1, Dinsmore was unable to fulfill requests for manufacturing parts with the intricate geometries required for medical stent cores. For years, the only stents they could produce were scaled-up models, which were used solely for visualization purposes. The absence of the necessary technology to produce stent cores at actual scale, with the required thinness and durability, meant that Dinsmore had to turn down several requests, limiting their service offerings and market reach.

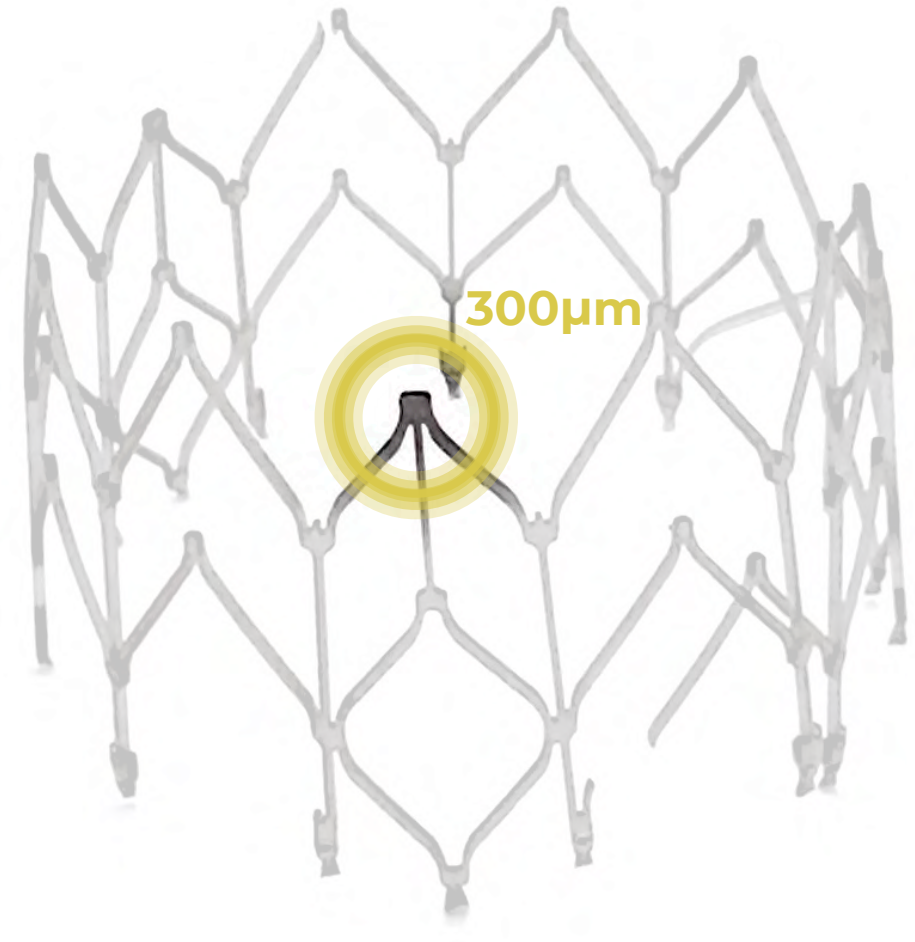


Figure 2
First trial stent printed for Dinsmore versus Micro-Stent with Lumia.X1

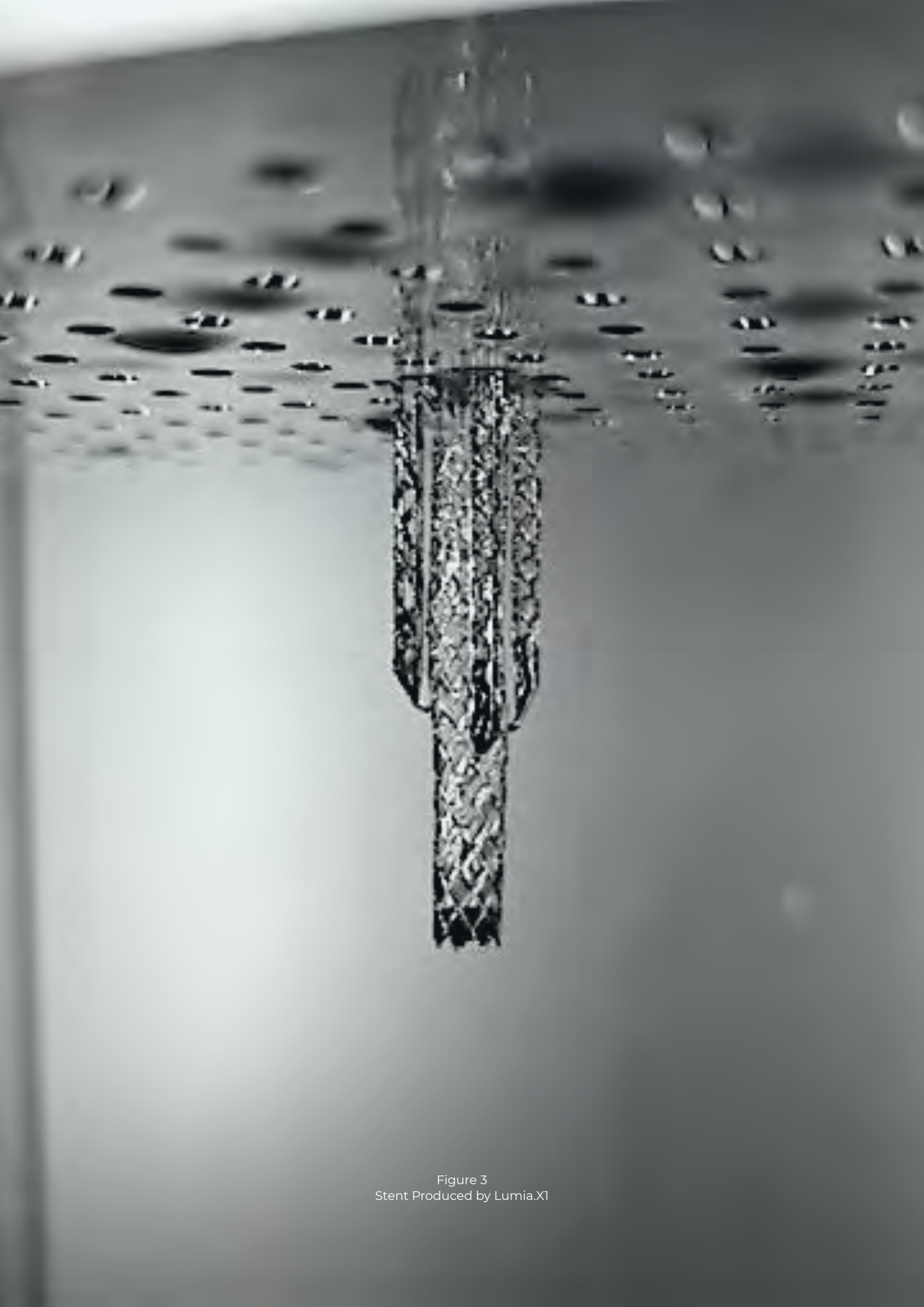


Figure 3
Stent Produced by Lumia.X1

Revolutionizing Micro-Scale Manufacturing with HPS

The introduction of the Lumia.X1 marked a turning point for Dinsmore. The Lumia.X1's laser DLP hybrid system stood out as an innovative solution that combined two polymerization methods—laser and digital light processing (DLP)—which could be utilized both together and independently. This flexibility allowed Dinsmore to manufacture stent cores with the precise geometries required, even at a micro-scale.

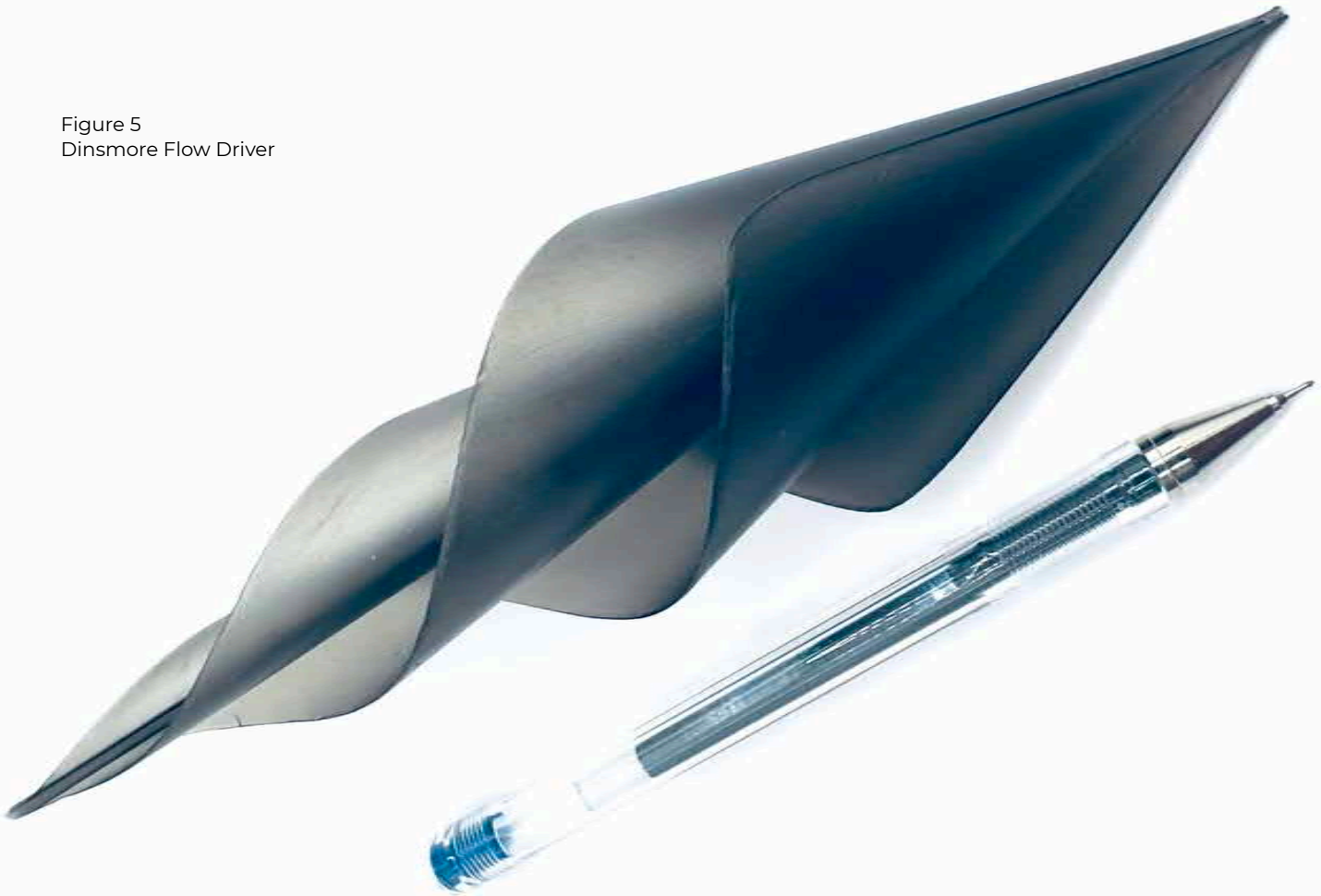
One of the critical features of the Lumia.X1 that enabled this breakthrough was its ability to switch automatically between dual and single polymerization modes, depending on the cross-section being printed. This automation eliminated the need for manual scripting, streamlining the process and reducing the potential for human error.

Moreover, the Lumia.X1's Volume software provided Dinsmore with unparalleled control over support generation. The ability to manipulate and customize support structures was essential in producing the stent cores, ensuring that these delicate parts could withstand the stresses of the coating process without compromising their integrity.

Furthermore, using any other technology, this type of structure would not survive the printing process due to machine movement and the green strength of the material. This is the first industrial printer that executes the SLA print process upside down, making this delicate, micro-printing possible.

Figure 4
Extreme precision and accuracy in stent produced by Lumia X1

Figure 5
Dinsmore Flow Driver



Expanding Capabilities: A Game-Changer for Precision AM

The impact of the Lumia.X1 on Dinsmore's operations was immediate and significant. For the first time, Dinsmore was able to produce medical stent cores at an actual scale, with the necessary thinness and strength to survive the secondary coating process. This capability opened new business opportunities for the company, allowing them to take on projects that were previously out of reach.

While Dinsmore is unable to release specific before-and-after metrics due to intellectual property constraints, they have confirmed that the Lumia.X1 has provided a clear cost advantage.

The efficiency of using single-part materials has resulted in minimal waste, with all materials being reusable after printing. Additionally, the print throughput and overall performance of the Lumia.X1 have been on par with, or superior to, other upside-down printing technologies.

This capability has also enabled Dinsmore to create very thin-walled objects that are 350 microns (0.01 inches) thick and within 20 microns of accuracy without any special adjustments.

In this example of a medical stent core, Dinsmore's client needed a substrate thin and strong enough to survive a dip coating process to produce the final product. Lumia's printing process and material combination made this possible.

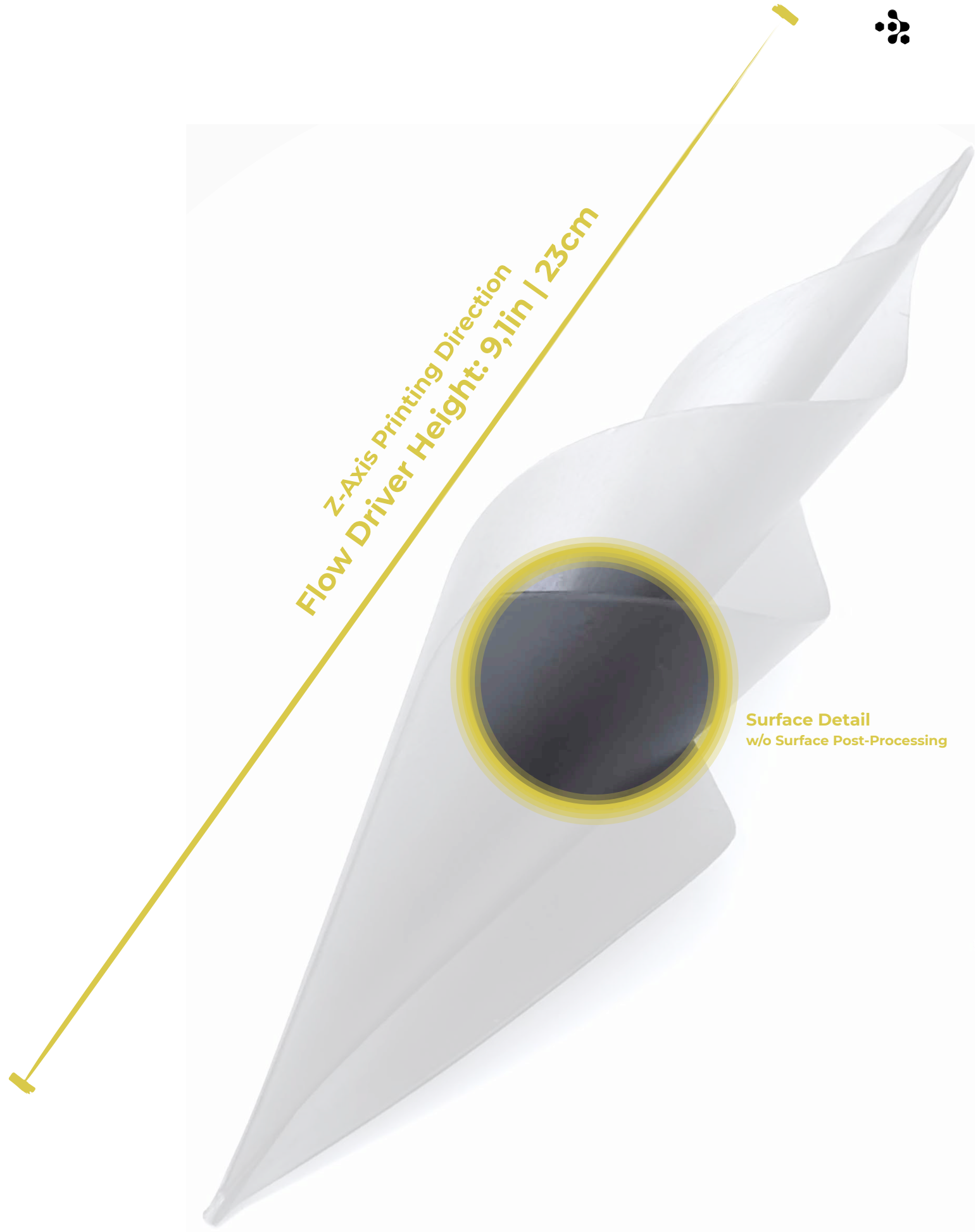


Figure 5
Dinsmore Flow Driver printed with Lumia.X1

Additional Opportunities with Lumia.X1

Dinsmore has also expanded their material portfolio with the Lumia.X1, using it for various applications with materials like BASF 3280 Ceramic, Spot A Functional, and 3DS Med-Wht 10.

One of the primary differentiators of Axtra3D's technology is its industry-wide material ecosystem. Additionally, Axtra3D's OpenAccess™ offering allowed Dinsmore to tailor their needs as often as they desired. The printer's ability to handle such a diverse range of materials further underscores its versatility and value to the company.

The adoption of the Lumia.X1 by Dinsmore has not only expanded their service offerings but also enhanced their ability to meet the demands of their clients in the medical sector. The printer's innovative hybrid system, combined with its advanced software and material capabilities, has enabled Dinsmore to overcome significant manufacturing challenges and achieve results that were previously unattainable.

The Lumia.X1 integrated seamlessly into Dinsmore's existing workflow. The company already had the necessary components to support the printer, including the equipment required for post-processing parts. This ease of integration minimized downtime and ensured that Dinsmore could start benefiting from the Lumia.X1's capabilities immediately.

Dinsmore's journey with the Lumia.X1 is a testament to the transformative power of advanced additive manufacturing technology. By partnering with Axtra3D and adopting the Lumia.X1, Dinsmore has not only expanded their capabilities but has also set a new standard for microprinting in the industry.

"As someone who likes to break machines to find their true limits and capabilities, I was genuinely surprised by Lumia's performance. It has been a true plug-and-play experience out of the box.
I didn't know over an inch of an unsupported bridge was possible.
The Lumia presents the best combination of print area, accuracy, surface finish, resolution, print throughput and ease of use among all SLA, DLP and LCD systems available.
I would rate this technology and system at a 9 out of 10 for applications ranging from very delicate, accurate medical stents to large, bulky mold inserts."

- Kirill Tulinov, **Dinsmore**

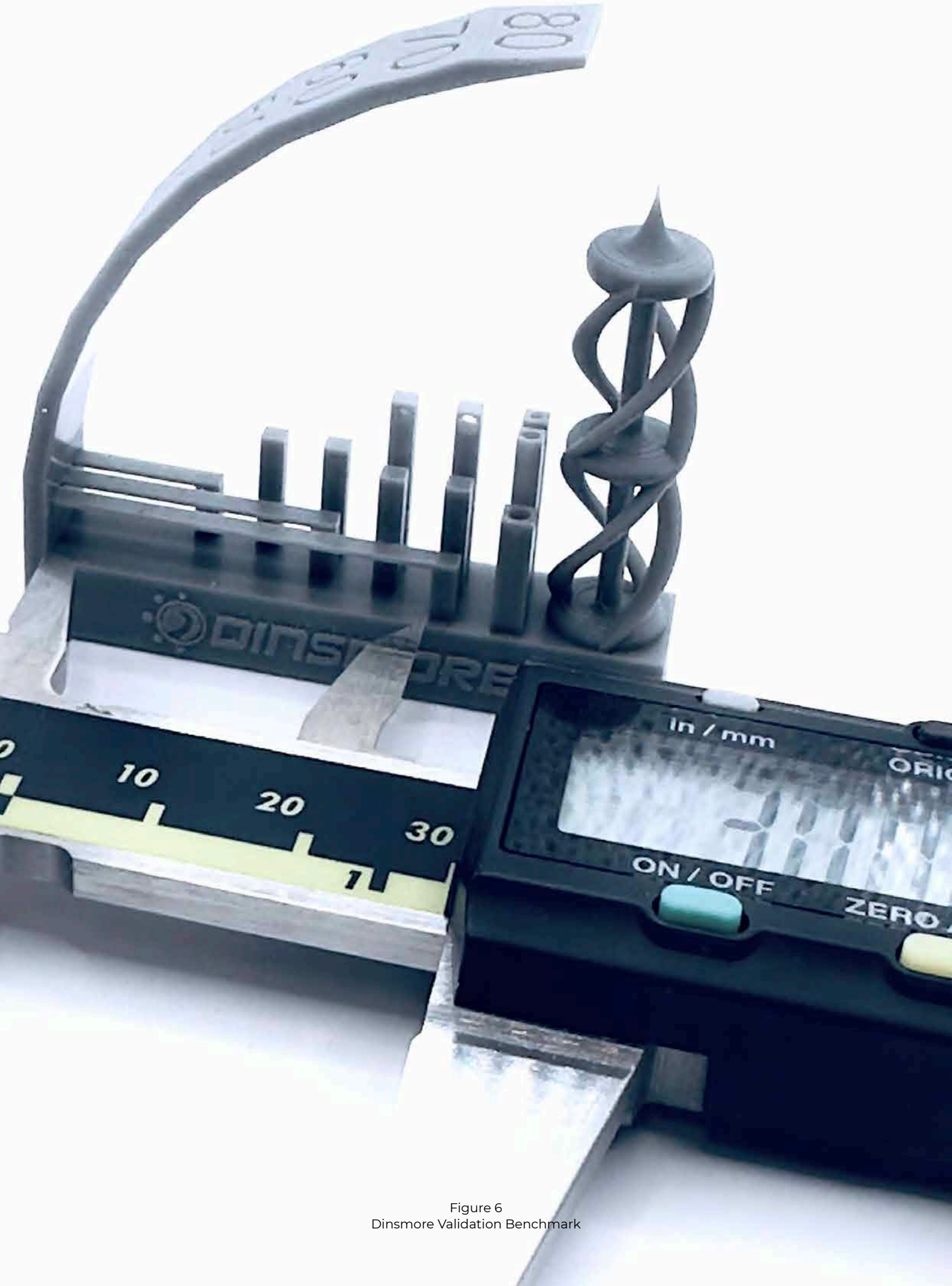


Figure 6
Dinsmore Validation Benchmark