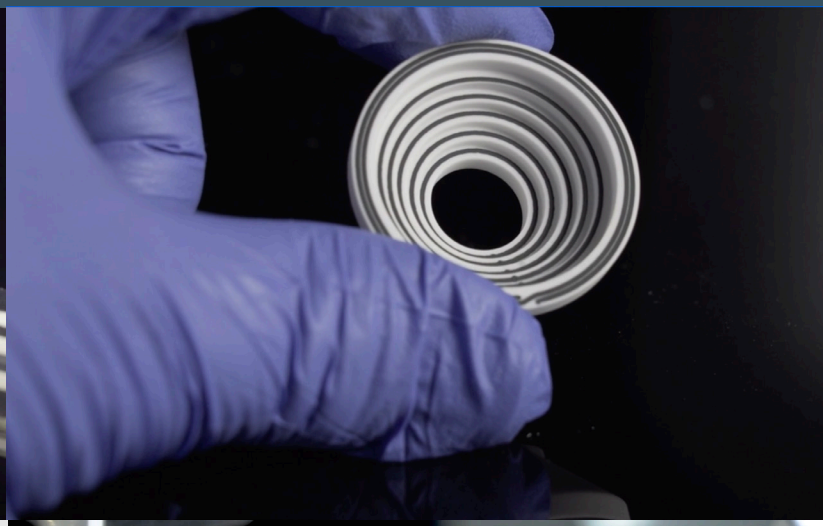
EXXELIA MICROPEN

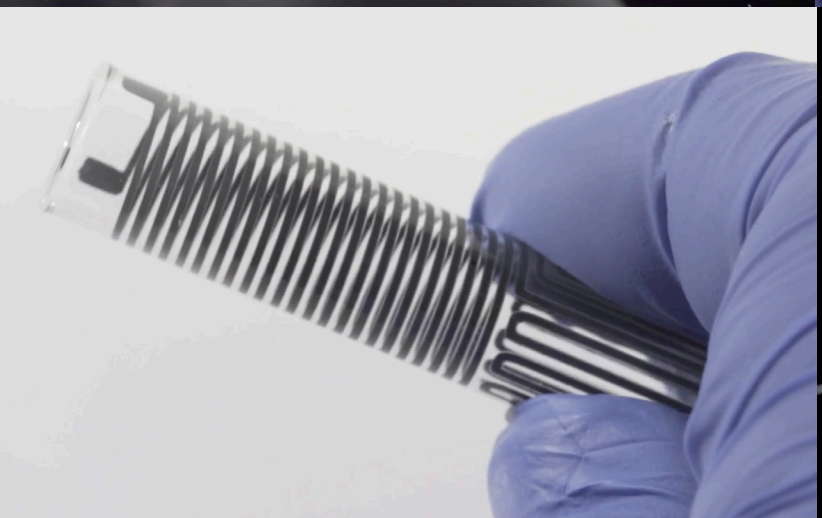
WHITEPAPER

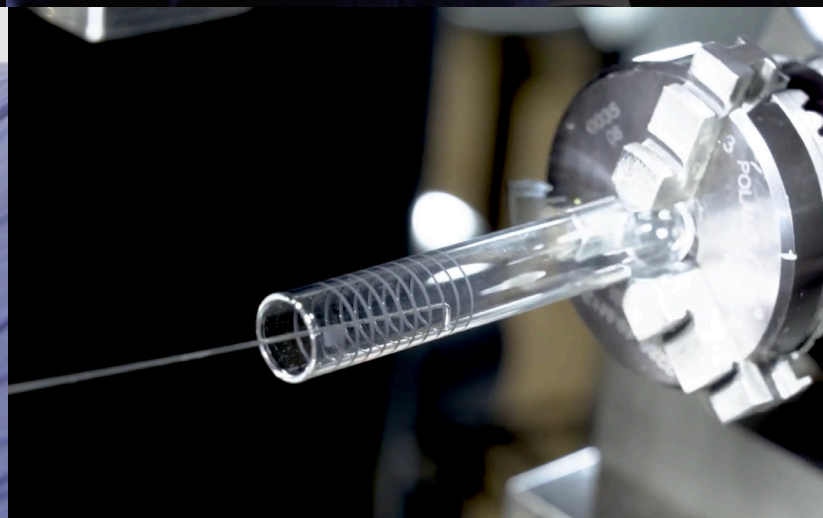
Design idea: Replace wired sensors, resistors, heat sources, and antennas with direct printing.

Challenge us: Exxelia Micropen can print directly on virtually any surface, substrate, or shape.

As you can see from these examples, Micropen really can print on anything!







Introduction

No matter what your application, if you're building a device with sensors, resistors, heat sources, or antennas, consider direct-write printing from Micropen. Direct printing these devices often gets you to a cleaner, lighter, more effective design that improves your product's functionality.

- Since 1982, Micropen has pioneered and improved our CAD/CAM-driven capillary dispensing which is akin to an ultra-precise micro-dispense gun. If a material is flowable and can be loaded into a syringe, the Micropen can print it onto virtually any surface or substrate. To achieve this, the pen tip "rides" on the surface of the material without touching the substrate.

- We can print fine-line conformable traces on thin, flexible, irregular, and highly three-dimensional shapes—even those with odd topographies.

- We can print on anything: glass, ceramic, plastics, metals, outside or inside a structure, straight or curved, large or small, hard or soft.

- Eliminating wires and external components reduces the size, weight, and space of the overall system while increasing reliability and durability.

Micropen direct printing

Micropen direct printing, sometimes called direct writing, is an additive process that increases functionality with minimal weight, shape, and cost constraints. Our engineers consult with your design team to propose a direct-printing alternative to wired sensors, resistors, and other electric/dielectric or heating features. Our goal is to make your product design more elegant, practical, and scalable. Eliminating wiring makes a product simpler, sleeker, less complicated, and often provides a higher level of function than could be achieved by traditional methods.

Many of the products we've designed are confidential and proprietary to our clients, so we have a broad range of experience we can't talk about. However, the experience we've gained from working with product designers in a wide variety of industries is available to you—and we can usually tell you with a brief phone call if we can help you.

Printing on thin, flexible, and irregular substrates that are highly 3-dimensional

Patterning fine lines (50 µm) with small spacing (25 µm)

Printing on a variety of substrate materials with a variety of inks

Tailoring production volume and unit cost to meet your targets

Design considerations for Micropen direct-write printing on 3D substrates: function, wear, use, prototype/development cost, production quantity, unit cost to manufacture, and relevant experience.

The Exxelia Micropen direct printing process has been useful in most industries requiring precision sensors, heat sources, or resistors. If you are adding this functionality to any product, it would be worthwhile to speak with one of our engineers about direct printing.

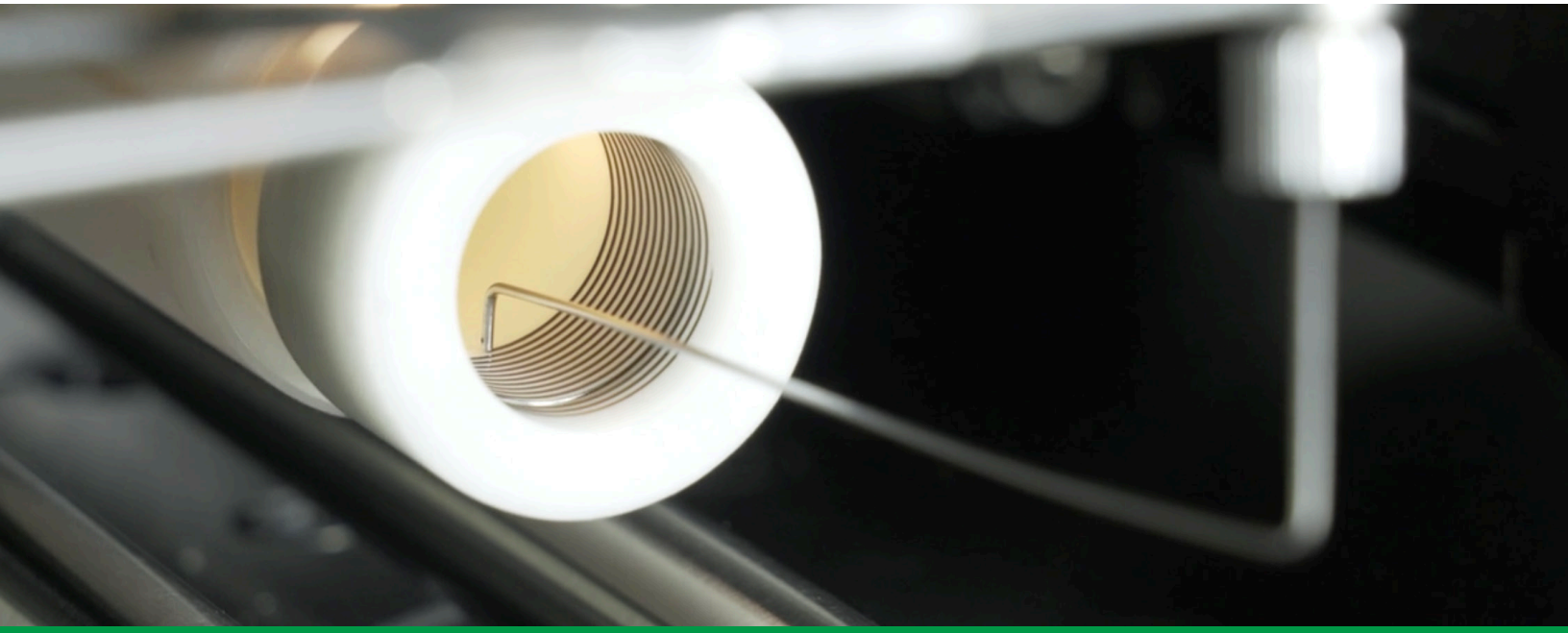
The Exxelia Micropen printing process is an additive printing technique that dispenses the precise amount of material needed, making it especially beneficial when using novel, expensive, or rare inks. We have inks for conductors, radiopaque, resistors, and dielectrics. If we don't have the ink you need, we'll find a custom formulation for you.

Because most of our applications are customized in some manner, we are very good at rapid prototyping. We reduce time to market and give product designers increased prototype control through the efficient use of materials and the ease of changing them.

Direct printing is an ideal way to form resistor patterns on 2D substrates, giving them superior electrical characteristics.

Our machines have 5 axes of motion. The pen tip doesn't move—we move the substrate relative to the pen tip. Our Micropen machines use a vision system to measure the actual shape of the substrate and map the CAD pattern onto the actual substrate geometry to accommodate variations in the substrate.

We can help you with any aspect of your product development: device design, material development, printing, testing, interconnection, and even with supply-chain management.



How to determine if you should explore direct-write-additive technology.

1. Are you developing or modifying a product for which you want to add functionality, or eliminate components, wires, or weight?

YES

NO

Not yet.
Call us at **(585) 624-2610** and we can help you get there.

2.

- ☐ Do you have a 3-dimensional substrate on which you would like to add conductive traces, resistors, electrodes, or radiopaque markers to your subassembly?
- ☐ Do you need to pattern ultra-fine lines with narrow line widths and consistent thickness?
- ☐ Do you need biocompatible materials?

YES

NO

At Exxelia Micropen, we offer endless solutions to fit the needs of our clients and partners. Visit **micropen.com** to connect with us and make your ideas reality.

3.

Do you need a supplier with these certifications?

- ☐ ISO 13485
- ☐ AS9100D with ISO9001
- ☐ RoHS and REACH compliant
- ☐ FDA registration
- ☐ ITAR registration

NO

YES

Next Steps.
Start a conversation with our product development team. Visit **micropen.com/contact-us**

Why Exxelia Micropen?

Exxelia Micropen has been a pioneer in medical device development with Micropen printed electronics technology for 25+ years. We are ISO 13485 certified, and we have the expertise to collaborate with you end-to-end, from initial design concept through production.

Links to Exxelia Micropen resources:

Overview Video

Substrates & Inks

Medical Applications

Contact Us:

micropen.com
585-624-2610
micropensales@exxelia.com