

## **Ansys and XTPL**

“We use Ansys solutions to simulate the XTPL process of ultra-precise printing of nanomaterials. Specifically, we use Ansys Fluent, obtained through the Ansys Startup Program, for fluid dynamics simulations. We have developed a complete three-dimensional model of the XTPL process, which allows us to optimize printing and material parameters, as well as the geometry of the printing nozzle. Therefore, we can significantly speed up the R&D process thanks to Ansys solutions.”

**Dr. Piotr Kowalczewski**  
R&D Team Manager – Numerical Simulation

# Simulations of the XTPL Process of Ultra-Precise Printing of Nanomaterials using Ansys Solutions

XTPL solutions of nanoprinting may be applied mostly in printed electronics. Our focus at the moment is the display market, which currently faces some challenges: progressive complexity of displays occurring with reducing feature size; constant miniaturization causing yield issues; expensive, complex and limited yield improvement (repair) methods; and the need for mechanical flexibility or electrical field damage risk assessment, to name just a few challenges. XTPL plans to support manufacturers in overcoming these issues.

## / Challenges

XTPL's key objective is to develop and implement tailor-made solutions in terms of nanoprinting and ultraprecise deposition for several sectors, mainly within printed electronics. The main competitive advantage of the XTPL additive solution is unprecedented precision — one that cannot be replicated by any other printing method. To improve this method, we were looking for simulation software that would help us to relatively easily develop a precise 3D model of the XTPL process.

## / Technology Used

Ansys Fluent

Ansys Mechanical

## / Engineering Solution

We have developed a full 3D model of the XTPL process. The model allows us to easily optimize the printing and material parameters, as well as the geometry of the printing nozzle. During the optimization of the material and process parameters, running simulations in batch mode (either using Ansys Workbench or Ansys Fluent scripts) turned out to be extremely valuable.

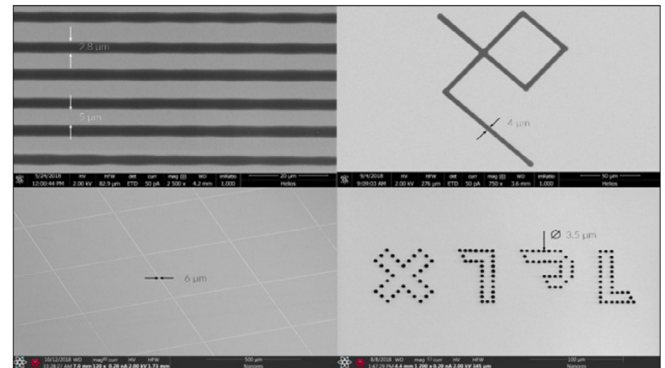
Moreover, we use Ansys SpaceClaim scripts to efficiently generate a number of geometries in the batch mode (Workbench). This approach significantly speeds up our R&D process.

## / Benefits

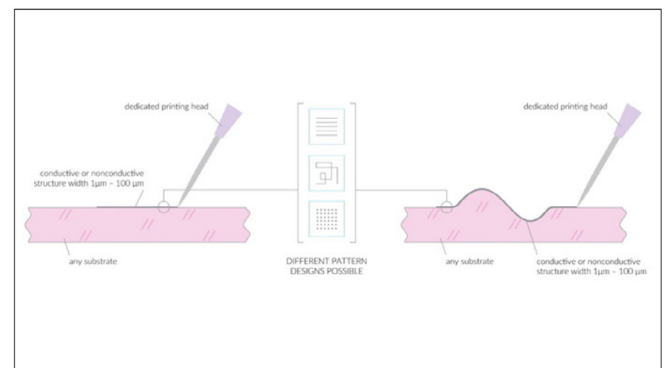
Using Ansys solutions, which is the industry standard, the time required for model development is significantly shorter than in the case of open-source software. We are able to more quickly optimize the printing process, the nozzle geometry and material parameters, and therefore develop the XTPL technology and adjust its capabilities to a particular client's requirements in less time.

## / Company Description

Innovations in additive manufacturing developed by XTPL enable ultra-precise printing of nanomaterials. The unique XTPL printing system allows for fine deposition of in-house formulated nanoinks on a variety of substrates and obtaining structures on the individual micron scale. Features of such structures are all customizable and can be adapted to a number of industrial and research applications.



Ultra-precise deposition (UPD) technology can provide straight lines, as well as patterns and microdots.



A sketch of the XTPL printing process and its capabilities, mainly the ability to print arbitrary shapes on any substrate (in terms of properties and shape).

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**ANSYS, Inc.**  
Southpointe  
2600 Ansys Drive  
Canonsburg, PA 15317  
U.S.A.  
724.746.3304  
ansysinfo@ansys.com

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