

## Technologies



# 3D Electronic Systems

## Fast Facts

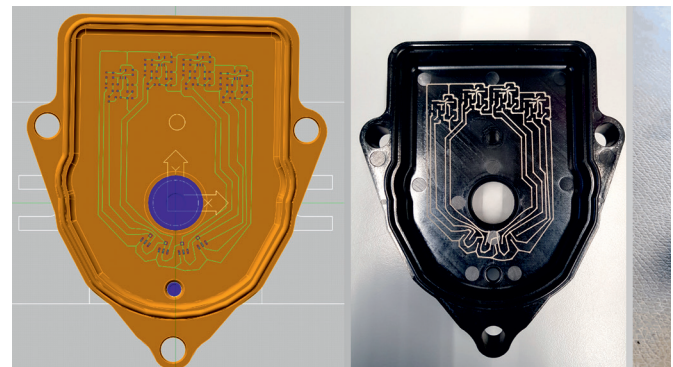
- Additive functionalization of 2D and 3D substrates
- Deposition of viscous material by jetting and dispensing
- Integrated pick & place for 3D electronic systems

## General Description

Fraunhofer ENAS is developing technologies to fabricate three-dimensional electronic systems by using additive and digital deposition technologies. These additive technologies are new in comparison with classical 3D-MID technologies and offer the advantage that the designer is free in the substrate material selection. Furthermore, there is no need of classical (electro-) chemical metal deposition and the digital CAD/CAM based process flow enables fabricating of individualized products.

## The Available Technology Chain Includes

- 3D conformal functionalization for 2D and 3D substrate material (wafer, dies, 3D printed substrates, injection molded polymer parts,...) combining deposition, pre- and post-treatment technologies with Pick&Place module

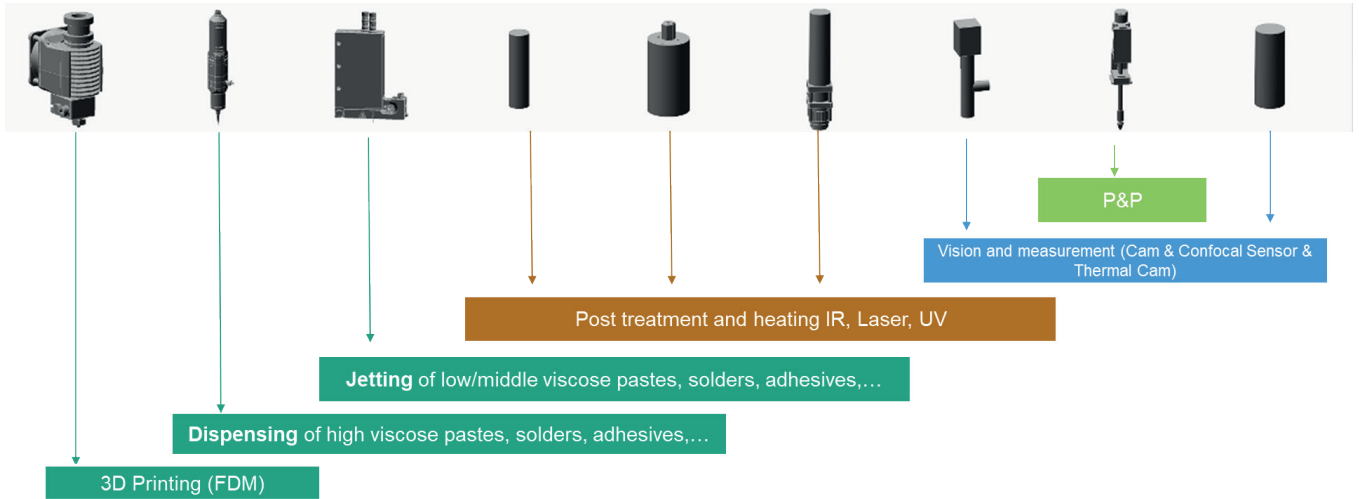


*Design (right) and fabricated conductors (left); pick & place and system test (above).*

- Combination of digital deposition technologies (i) dispensing, (ii) jetting and (iii) fused deposition molding for the deposition of a wide variety of ink/paste materials (solder paste, silicone, ceramic paste, conductors (Ag, Cu, Au,...), insulators, conductive epoxy/SMD glue, ...)
- Integration of pre-/post processing modules (i) CW Laser, (ii) IR Curing System controlled by thermal cam and (iii) UV curing station
- Further supporting features include (i) Pick & Place, (ii) thermal camera and (iii) confocal sensor

## Suggested Applications

- Pattern Dispensing
- 3D Conformal Dispensing
- Jetting



Specification of the Different Modules

<b>3D Printing (FDM)</b>	Typical Filaments based extrusion PLA, PETG, TPU, Nylon, etc. Heatable hot end up to 400 °C , controllable
<b>Dispensing</b>	Viscosity range: 50 to > 200.00 mPas Dosing Rate: 0,5 - 6.0 ml/min.
<b>Jetting</b>	Viscosity range: 50 to > 200.00 mPas Droplet volume: 0.5 nl
<b>Post Treatment - UV</b>	Wavelength: 300 – 550 nm (Filter Tuneable) Intensity (max.): 14000 mW/cm <sup>2</sup> at 12 mm standoff
<b>Post Treatment - IR</b>	Max Power / Area: 65 kW/m <sup>2</sup> (IR emitter power 6 kW at 300 mm x 300 mm area and up to 200 °C)
<b>Post Treatment - LASER</b>	Power: 20 W, Wavelength 1062 ± 3 nm, Continuous wave and Pulsed (Pulse Frequency: max. 1 MHz, Spot size: < 20 µm)
<b>Vision and Measurement</b>	Thermal Camera: –20 to 900 °C (Accuracy ± 2 %) Confocal Sensor
<b>Pick and Place</b>	P & P of standard SMD components in 3D space

In cooperation with



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All information contained  
in this fact sheet is prelimi-  
nary and subject to change.  
Furthermore, the described  
system is not a commercial  
product.