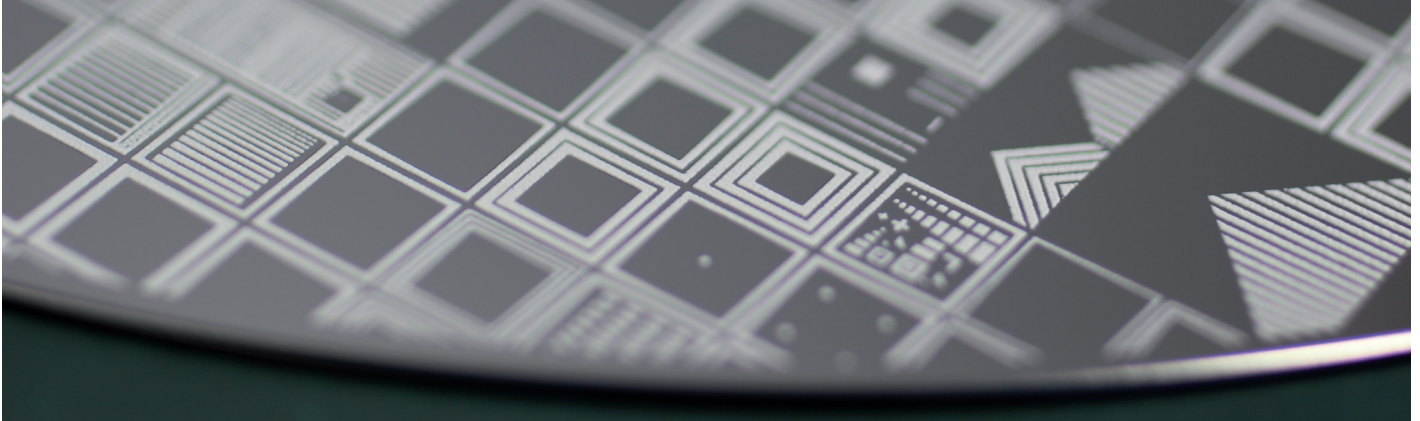


# SCREEN PRINTING FOR MEMS PACKAGING AND WAFER BONDING



## Contact

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## Description

As a material transfer technology screen printing at Department System Packaging, Fraunhofer ENAS is mainly used for selective deposition of intermediate layers for wafer bonding. With micro structured stencils paste-like inks could be transferred to an electronic or semiconductor substrate through a polymeric or metallic screen. The specifications typically depend on the stencil openings, stencil thickness, and the screen size as well as on the pastes viscosity with involved ingredients like particle size, binder material and solvents. With the fully automatic and high precision in-line screen printer Reprint R29 Spectrum usually glass frit pastes for wafer bonding but also other materials like solder pastes and adhesives could be clean room-like printed on substrates. The additional high performance screen printer DEK Horizon 03ix enhances the departments screen-printing capabilities by special features of precision wafer alignment, via Filling, low volume dispensing module and trace stencil printing.

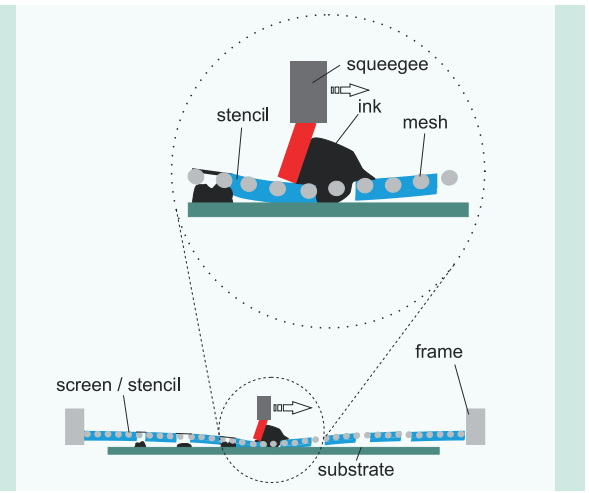
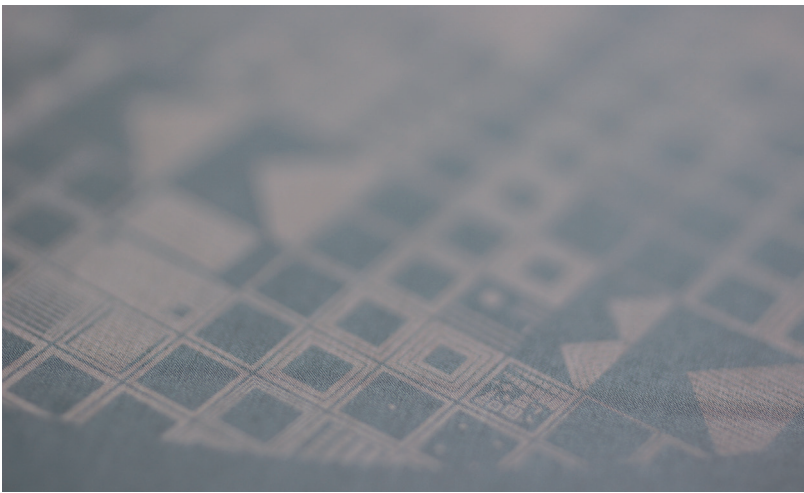
Actual research is done to the minimal printable lateral and vertical feature sizes. Furthermore the implementation of screen printable functional materials like conductive silver paste into microelectronic production processes is in focus of interest.

## Substrates

- Lead frame
- Silicon wafer
- Glass wafer
- Ceramics
- Special substrates
- PCB boards
- Flexible substrates

## Application examples

- Hermetical wafer bonding
- Adhesive direct printing
- Electrical feed through
- MEMS packaging
- Chip bonding / flip-chip bonding
- Assembly / mounting
- Printed electronics



**Main features of the available screen printers:**

**Screenprinter Reprint R 29 Spectrum**

Frame: 736 mm x 736 mm (29" x 29")  
 standard frame up to 736 mm x 812 mm (29" x 32")

Unique vision alignment system

Closed loop servo control of all moving platforms

Automatic stencil loading, positioning and ejection system

Vertical motion control for stencil/substrate separation

Heavy board handling system

Fully automatic vision system for precise, repeatable printing

Registration repeatability +/- 10 microns

Lateral: 50 µm – 150 mm

Vertical: 10 µm – 1 mm

**Screenprinter DEK Horizon 30iX**

Frame: 736 mm x 736 mm (29" x 29")

Maximum Print Area (510 mm x 508.5 mm)

Cognex Vision System

Automatic fiducial teach and find incorporating 0.1 mm fiducial capture

Squeegee Pressure Mechanism with closed loop feedback to tooling deviation monitor

Vacuum handling tool

Via filling solution „Pro Flow“

Integrated on-board dispensing module „Stinger“

Vectorguard frame for trace stencils

High precision wafer alignment software

Figures:

page 1: screen printed wafer using glass frit  
 paste for wafer bonding;

page 2: Screen used to print glass frit pattern  
 on top of wafer shown on page 1 (left); Wor-  
 king principle of screen printing process (right)

Photo acknowledgments: Fraunhofer ENAS  
 All information contained in this datasheet is  
 preliminary and subject to change. Furthermo-  
 re, the described systems, materials and proces-  
 ses are not commercial products.