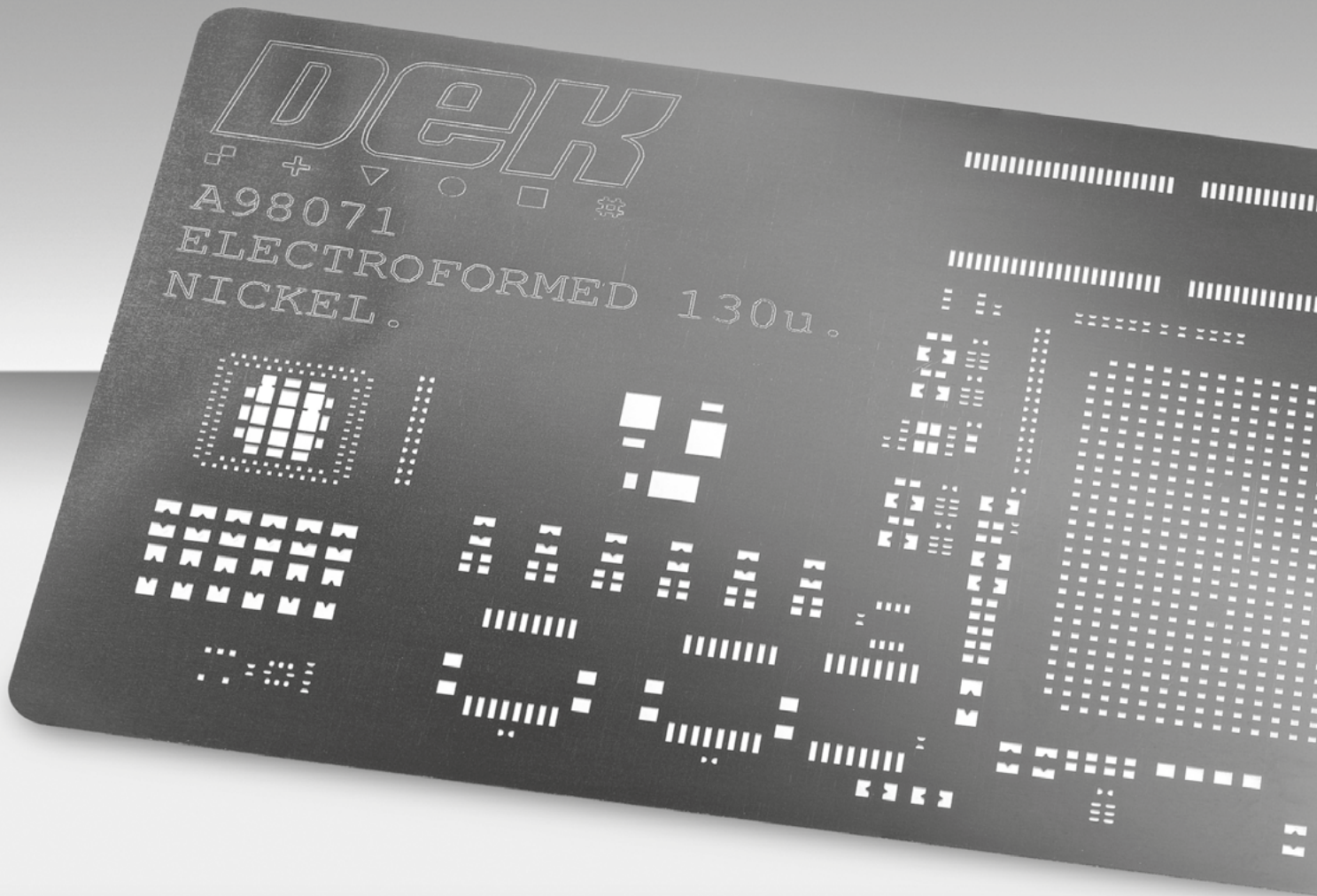


ASmPT enabling the
digital world

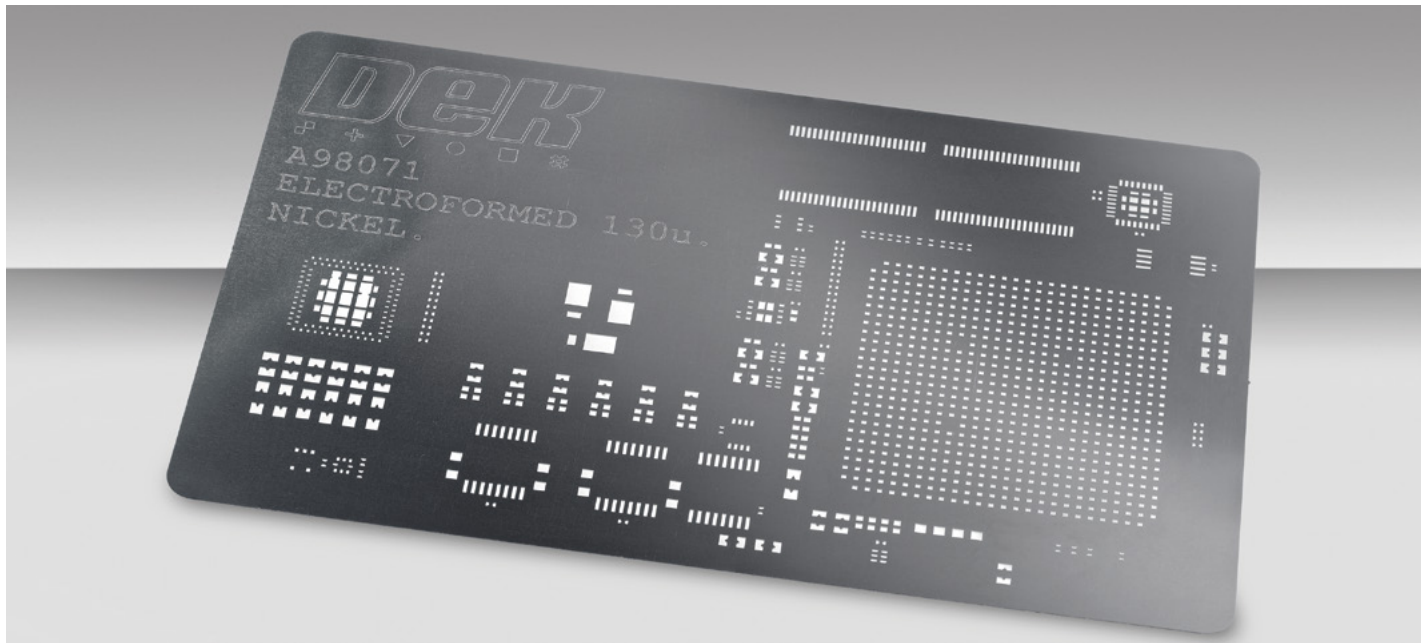


Electroform stencil technology

Enabling the advanced printing process

DEK Electroform solutions

Achieve ultimate material volume consistency control for standard SMT, micro-SMT, semiconductor, solar and LED lighting applications with DEK Electroform stencils.



Singapore Center of Competence

To develop new manufacturing processes such as electroplating solutions for stencils, ASMPT operates a center of competence in Singapore with its own nickel electroplating facility. The local team has many years of experience and deep expertise in the production of electroformed stencils and parts for non-SMT components. The stencil designs are developed and tested in the adjacent application center.

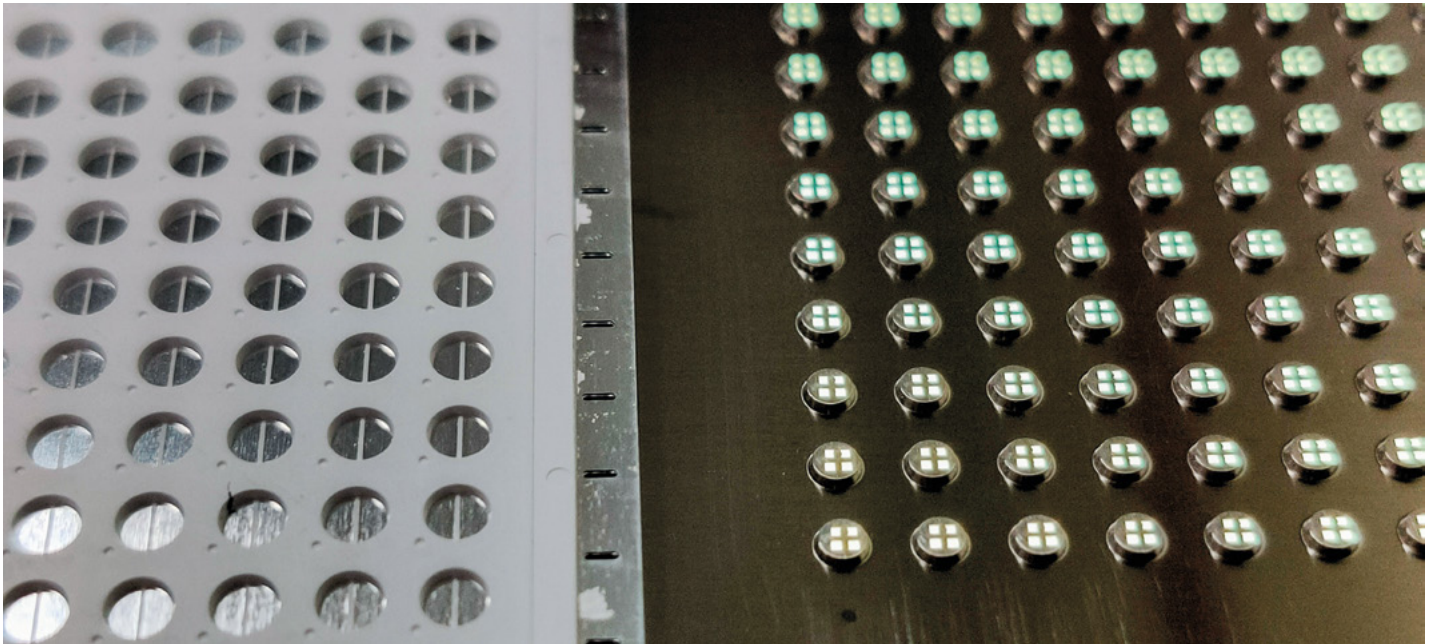
By providing maximum control over the thickness and evenness of stencils, ASMPT's electroforming technology ensures ultimate consistency for many standard SMT, micro SMT, semiconductor, solar and LED applications. With material thicknesses down to 12 microns, the material can be adapted to meet any current and future requirements. In addition, electroforming technology offers the possibility to manufacture specialized components in large volumes, thus reducing their unit cost.

Made with an additive galvanic process, DEK Electroform stencils can be produced with extremely complex designs to enable the printing of exceptionally small deposits in recesses, around components, or on multiple levels. In many applications,

electroformed stencils are clearly superior to stencils produced with traditional dispensing or spray coating techniques by delivering more throughput per hour and improved performance.

Features and benefits:

- Min thickness: 12 μm to 200 μm
- Min stencil size:
DEK VectorGuard™ 584 mm × 584 mm (23" × 23")
- Max stencil size:
DEK VectorGuard™ 584 mm × 736 mm (23" × 29")
DEK Mesh-mounted frame solution 736 mm × 736 mm (29" × 29")
- No additional costs for large quantities of apertures
- No deformation of stencil like lasering of large quantities of apertures like for wafer bumping
- Test and development support for new projects



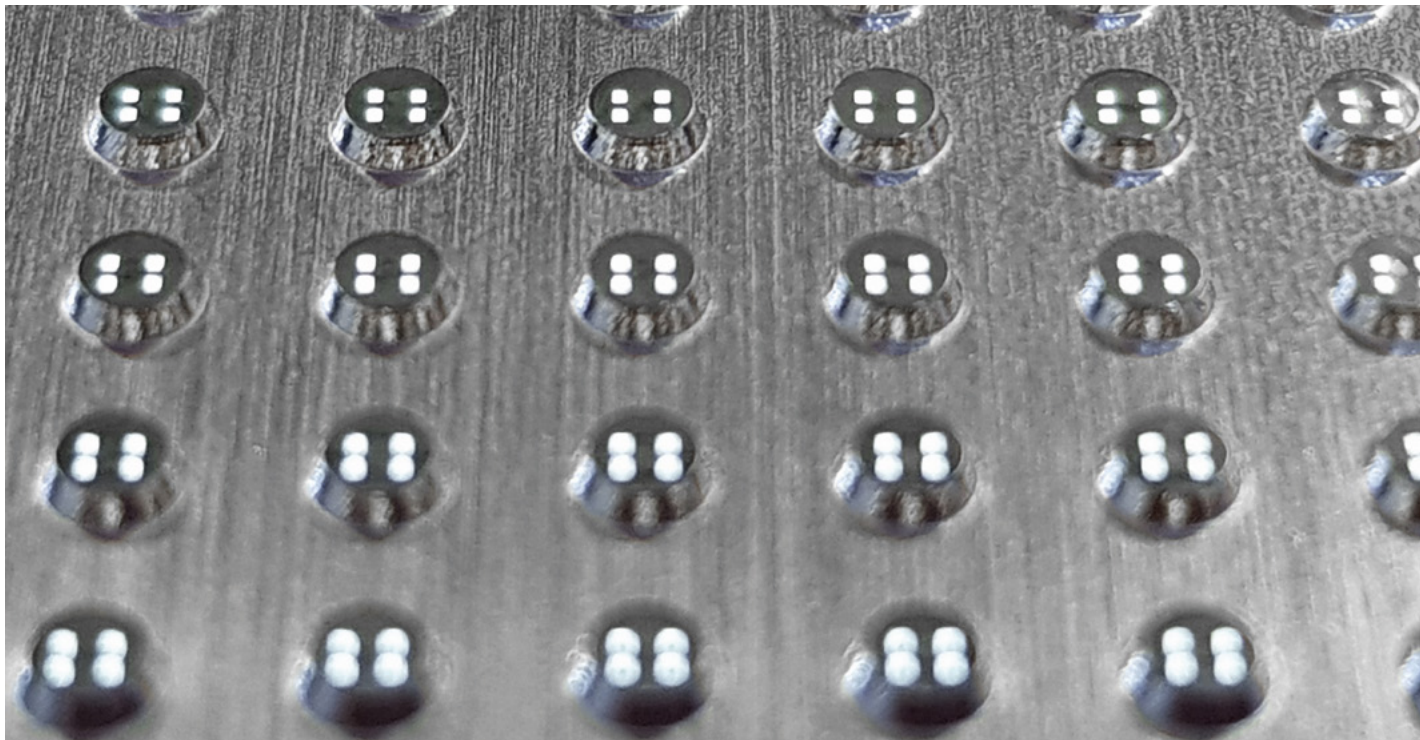
3D printing

Applications:

- Semiconductor packaging
 - Wafer and substrate bumping
 - Ball placement
 - Leadframe printing
 - Low-Temperature Co-fired Ceramics (LTCC)
 - Die attach
- LED Printing
 - LED leadframe printing
 - Flux printing for flip-chip mounting
 - Phosphor layer printing on wafer die or over flip chip die
 - Piece parts
- 3D printing on wafers, substrates
- Surface-mount assembly
 - Standard SMT printing
 - VAHT stencils – variable height on different apertures
 - 3D stencils – print apertures on different levels; cover components and print around the covered area
- Piece Parts
 - Electrical test probes
 - Electro-mechanical parts
 - Multiple other parts such as foils and sieves

DEK Electroform 3D stencils

DEK Electroform 3D stencils ensure highest print quality and throughput for jobs that require printing with different height levels and into indentations.



DEK Electroform 3D stencils are single thickness stencils produced to accommodate mass imaging of surfaces that are not flat or include features or structures that would prohibit conventional one-pass printing.

Well-suited for printing inside cavities or cover printing on pre-populated substrates, 3D stencils allow higher throughput and lower costs through the elimination of secondary printing or dispensing steps.

Benefits:

- Enables single pass printing for challenging, non-flat or pre-populated substrates
- Lowers cost by eliminating traditional secondary printing or dispensing steps used to accommodate positive or negative Z axis values
- Improves production throughput
- Can be manufactured to conform to any shape or topography
- Better uniformity and deposit shape control than with dispensing processes

Specifications:

- Special, (usually) supplied slotted squeegee required
- Proven for a variety of different applications
 - LED cavity printing
 - SMT multi-level printing
 - SMT ceramic substrate cavity printing
 - Semiconductor printing to accommodate wafer embossment
 - Semiconductor die top printing
- Stencil frame size: DEK VectorGuard™ Classic or DEK VectorGuard™ High Tension 23" x 23" recommended
- Stencil foil thickness: 50 µm - 250 µm (2 mil-10 mil)
- Pocket size: 1.0 mm square (min)
- Pocket depth: 2.0 mm (max, depending on pocket size)
- Pocket to pocket gap allowance: 2.5 mm (min)

DEK Electroform Variable Aperture Height Technology (VAHT)

DEK VAHT technology offers a unique alternative to multi-level stencils for non-homogeneous assemblies that call for larger, area-specific paste volumes to accommodate bigger components.



Electroform stencils can be produced with modifications to accommodate specific applications. One such adaptation is a technique called Variable Aperture Height Technology (VAHT), whereby a gasket overgrowth is created around apertures to create more aperture height to allow for increased paste volumes to be deposited.

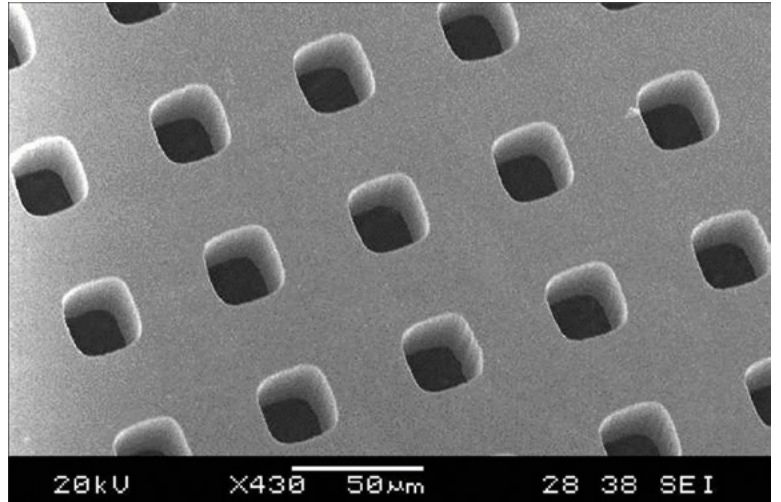
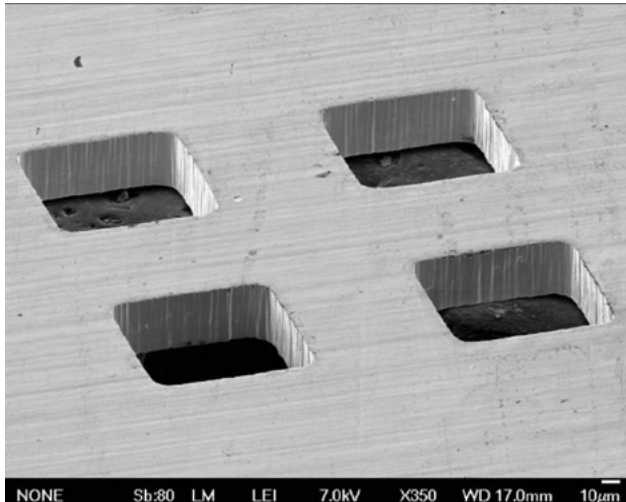
VAHT is ideal for PCBs that incorporate both small and large components that require varying amounts of solder material. Aperture gasket height can be 1 to 2 mils higher than the base stencil thickness.

Benefits:

- Ideal for heterogeneous assemblies, allowing printing of various solder paste volumes with a single stencil
- Improved throughput

DEK Electroform Mini LED Stencil

Miniaturization trend demands stencil with smaller apertures.



In recent years, miniLED has emerged as a new segment with high growth potential and has drawn the interest of most major LED companies. miniLED are used in the back-light units (BLUs) of display screens and are very competitive both in terms of cost and function, offering excellent contrast through the use of local dimming. However, miniLED products pose a real problem to the packaging industry which has not yet developed solutions for handling such small dies with the accuracy and throughput required; a typical miniLED die is smaller than an 0201m component.

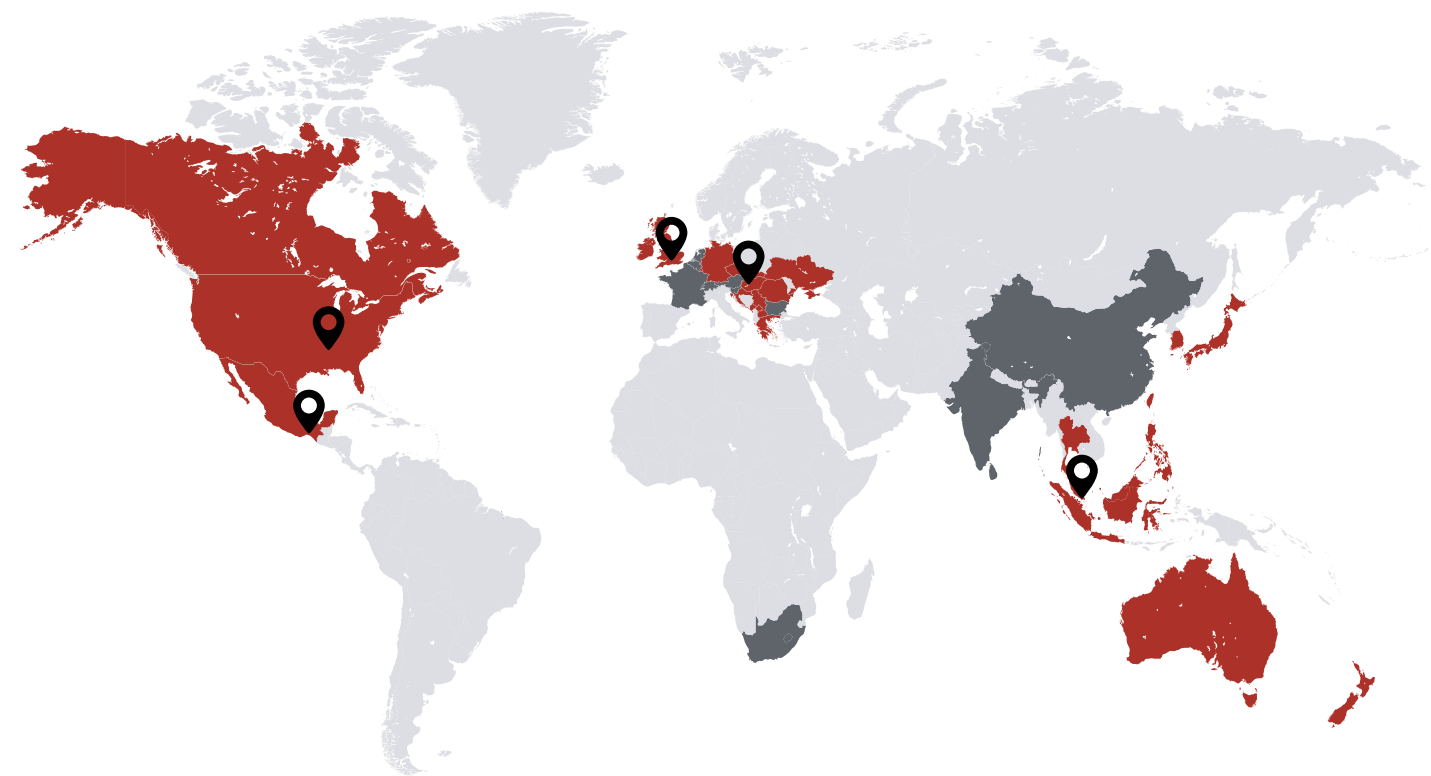
The challenges related to stencil printing for miniLED products involve printing paste deposits which are smaller than 100µm in size and controlling the uniformity of the paste deposits to avoid die tilt, bridging and other defects. Electroform is uniquely positioned to address these challenges. Electroformed stencils have better paste release capabilities, a result of the superior smoothness of the aperture side wall and the surface energy of nickel.

In addition, miniLED products using RGB configurations typically require more than 100,000 apertures in one stencil as well as a stencil thickness in the range of 23 – 40 µm. Laser cut stencils are not able to meet such requirements.

Specifications:

- Aperture Size: 50 µm × 50 µm (minimum), ± 4 µm
- Thickness: 23 µm (minimum)
- Gap between apertures: 50 µm (minimum)
- Frame Size: DEK VectorGuard™ 23" × 23"
- Positional Accuracy: 0.1 µm/mm

Stencil network



ASMPT stencil operations

- AMERICAS

 - Memphis (US)
 - Guadalajara (Mexico)
- EUROPE

 - Győr (Hungary)
 - Weymouth (England)
- ASIA

 - Singapore
- ASMPT direct support

■ Stencil partner network



Real-life SMT lines in the SMT Centers of Competence are used to provide application support and run tests including SPI analysis.



Tests in labs featuring modern equipment confirm the high quality of ASMPT stencils.

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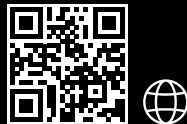
Process Support
Products Website

psp.smt.asmpt.com



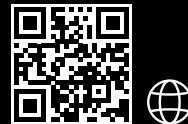
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