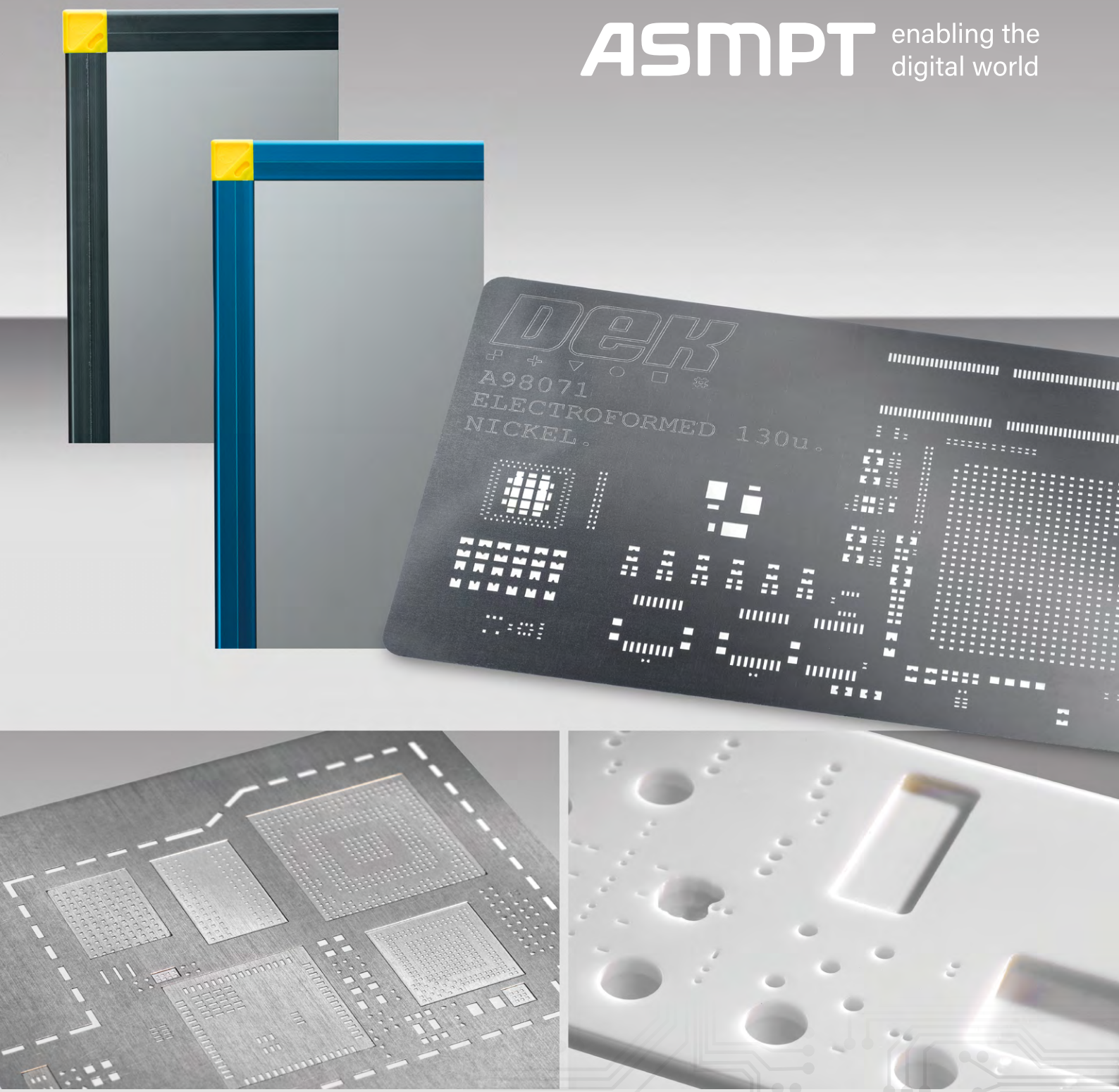
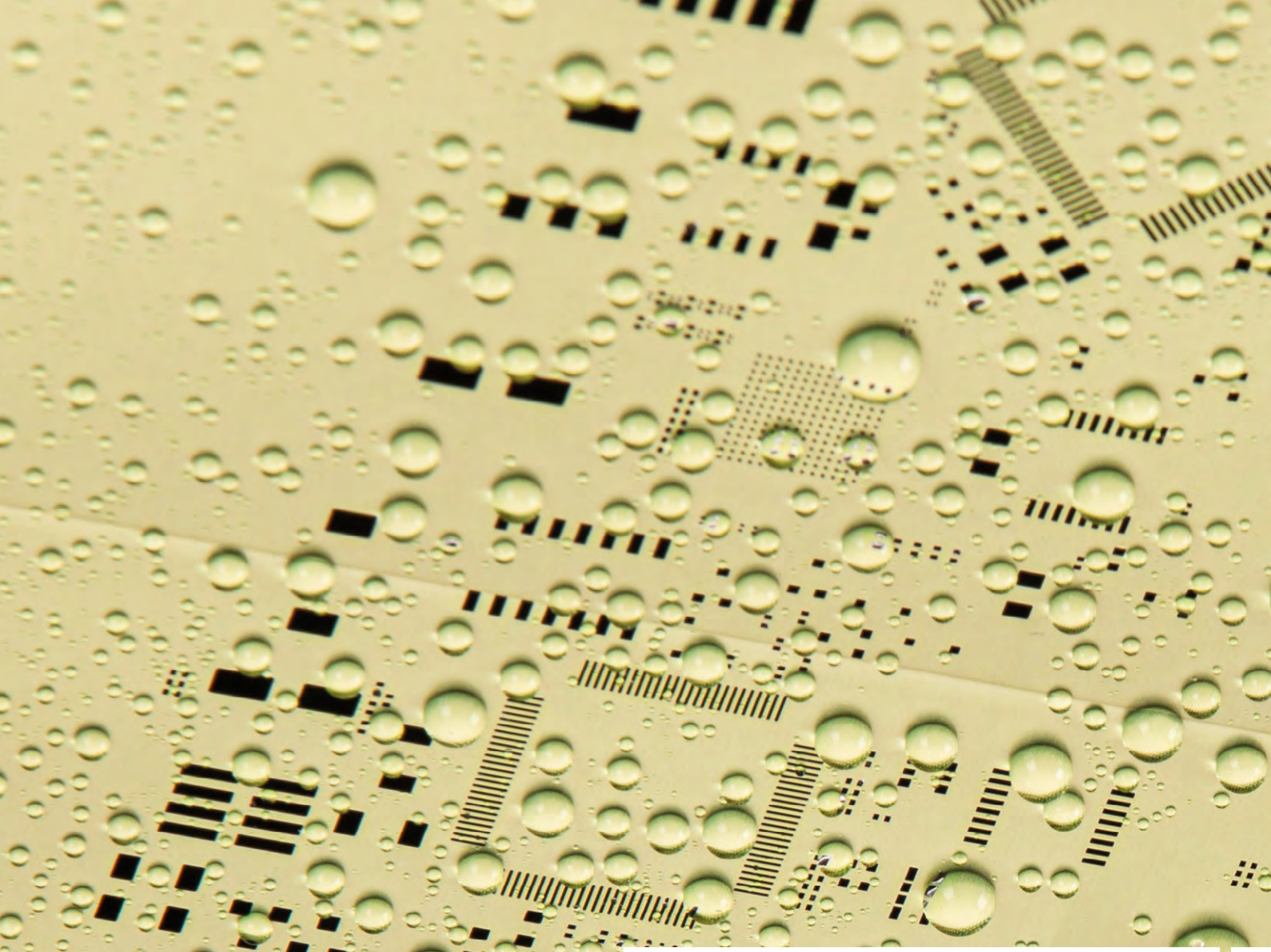
ASMPT enabling the digital world

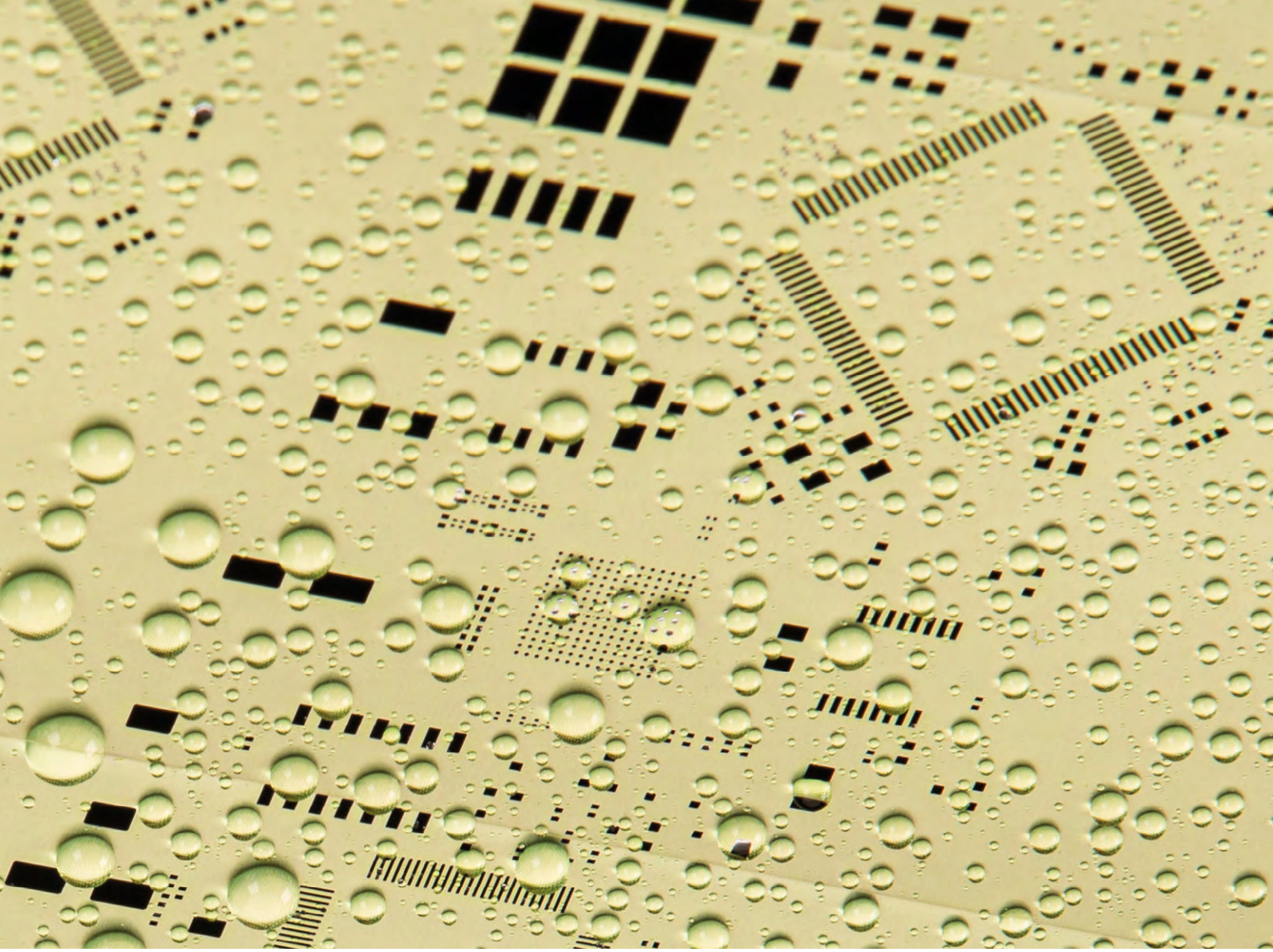


Stencils from the global No. 1

Improving the print process and boosting throughput



Stencils from the global No.1



Stencils for all your printing needs

Stencil technologies

As the world’s largest supplier of stencils for industrial printing processes, ASMPT is the right partner at your side. The quality of the stencil is a critical factor in the printing process. Stable and cost-effective printing processes can only be achieved with materials that are precisely manufactured and extremely resilient. ASMPT produces stencils with a wide range of technologies – from classic laser cutting to high-precision electroforming, and from single level to multi-level stencils. The broad portfolio of our award-winning stencil and frame solutions features perfectly coordinated high-quality products for all requirements ranging from standard SMT applications to the production of the most complex modules.

Stencil coatings

DEK NanoUltra coatings deliver dramatic improvements in the release behavior of solder pastes. To achieve this, we coat the aperture walls and/or the underside of the stencil with a thin, flux-repellent material. This improves the solder paste transfer and delivers more stable printing processes for fine-pitch applications while minimizing paste and flux residues on the stencil. Stencils with DEK NanoUltra coating must be cleaned much less frequently. This saves time and money in the stencil printing process.

Smart Stencil: RFID-based lifecycle control

A stencil's tension and surface quality decline as it is being used. These aging effects reduce the quality, yield and stability of the printing process. Smart Stencil is our unique, RFID-based all-in-one solution for monitoring stencil lifecycles. RFID tags on the stencils – provided by ASMPT for stencils from any supplier – record and store the number of print cycles, while DEK printers with Smart Stencil readers report when each stencil's adjustable warning or maximum number of print cycles has been reached. You can’t make printing any smarter.

Stencils from the global No. 1

ASMPT is the world's largest manufacturer of stencils for industrial printing applications as a result of the high quality and reliability of our products and services. All of ASMPT's factories and partners in the global stencil network operate with the same materials, the same equipment, and in accordance with strictly certified procedures. This enables us to supply our customers quickly and with consistently high quality – no matter where they may be located.

Consulting

The worldwide network of ASMPT offices, service centers and partners guarantees close proximity, quick responses, and fast, competent help on site.

Application support

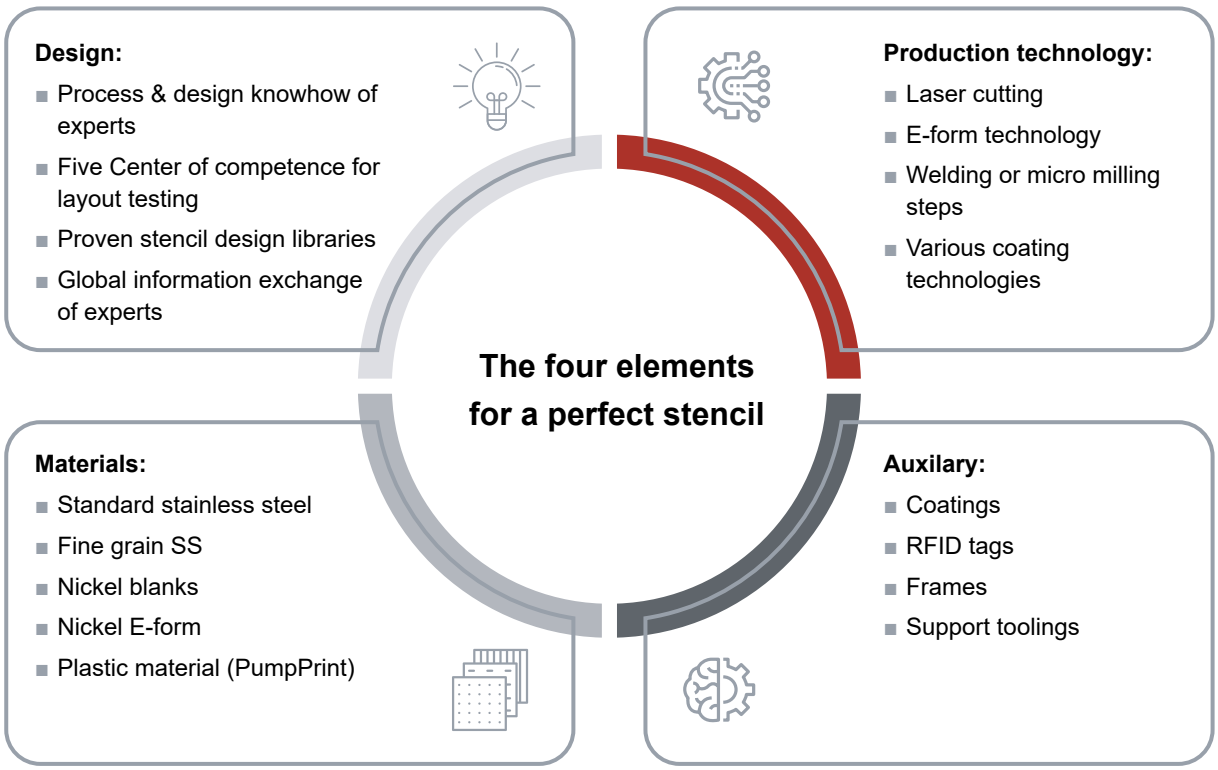
Only ASMPT as the global SMT technology leader can offer printing process expertise with this depth and quality. In our five SMT Centers of Competence (CoCs) spread around the world we provide application support, check designs, offer improvement workshops, and simulate and test specific printing processes in a realistic environment. Our experts stand by you in person or remotely, and always in close contact with your local ASMPT partners.

Convenient ordering, fast delivery

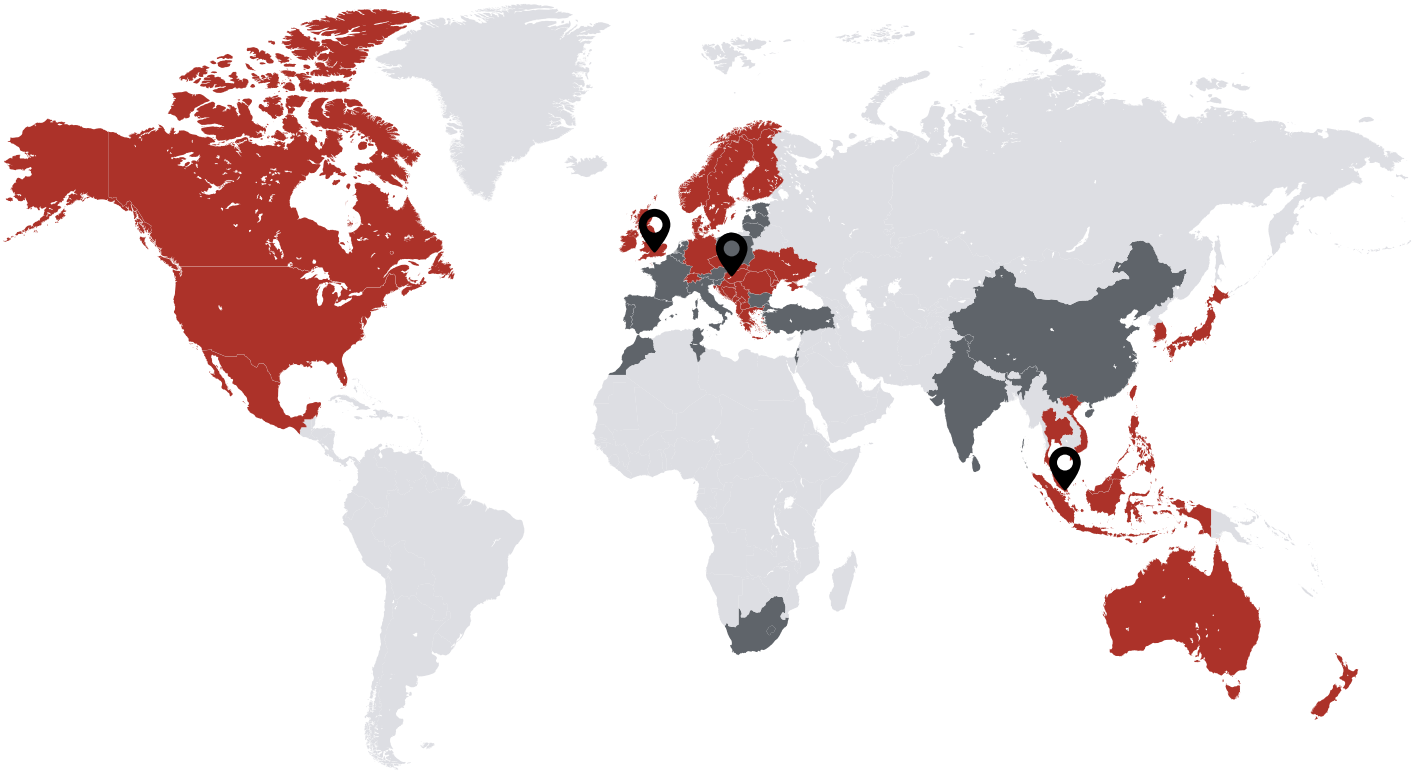
You can place your orders the way your prefer – the classic way via your local representative or electronically via the ASMPT Web Shop that is open 24/7. Either way, we guarantee speedy shipment – up to our Premium Rush Service with its 4-hour delivery time.

DFM HealthCheck

With this pioneering process, state-of-the-art expert system and big data technologies are used to run virtual prints in order to analyze your stencil data, identify critical areas, and make concrete proposals for optimized printing process settings. Based on this information, you can print right away, eliminating the need for time-wasting NPI test runs.



Stencil network



ASMPT stencil operations

EUROPE
- Györ (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.

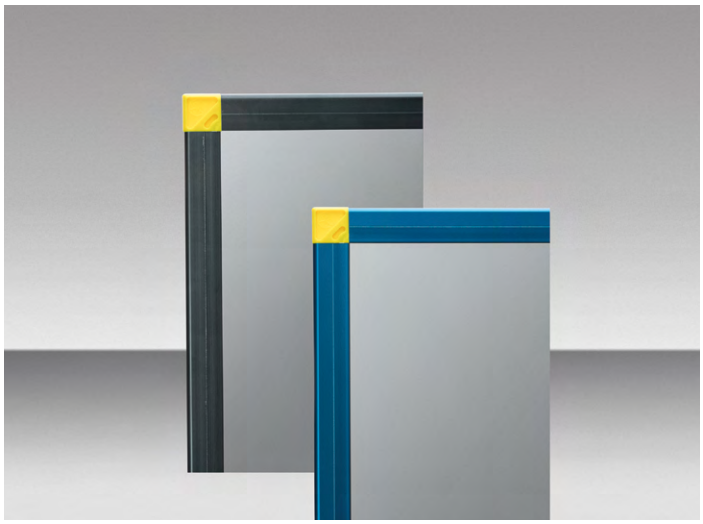
Tests in labs featuring modern equipment confirm the high quality of ASMPT stencils.

Stencil solutions – stencil technical specification

LASER CUT STENCIL						
	Standard PHD stainless steel	**Laser cut nickel**	**Fine grain stainless steel**	**Standard E-form nickel**	**Platinum E-form stencil**	**Wide fine grain stainless steel**
Material type	304 PHD	Nickel	Fine grain SS	Hard nickel	Hard nickel	Fine grain SS
Material hardness (HV)	≥370	>470+	≥370	500 +/-50	500 +/-50	≥370
Grain size (µm)	5-10	1	2-5	1	0.6	2-5
Thickness available (µm)	50-500	100-175	50-250	75- 200	20-230	80-200
Thickness tolerance	2%	7%	2%	10%	<5%	4%
Area ratio window	>0.66	>0.6	>0.55	>0.5	>0.5	>0.6
Sheet width max	690.9 mm	584 mm	610 mm	610 mm	584 mm	690.9 mm
Apertures size tolerance	±5 µm	±5 µm	±5 µm	±10 µm	±4 µm	±5 µm

DEK Fine Grain stencils

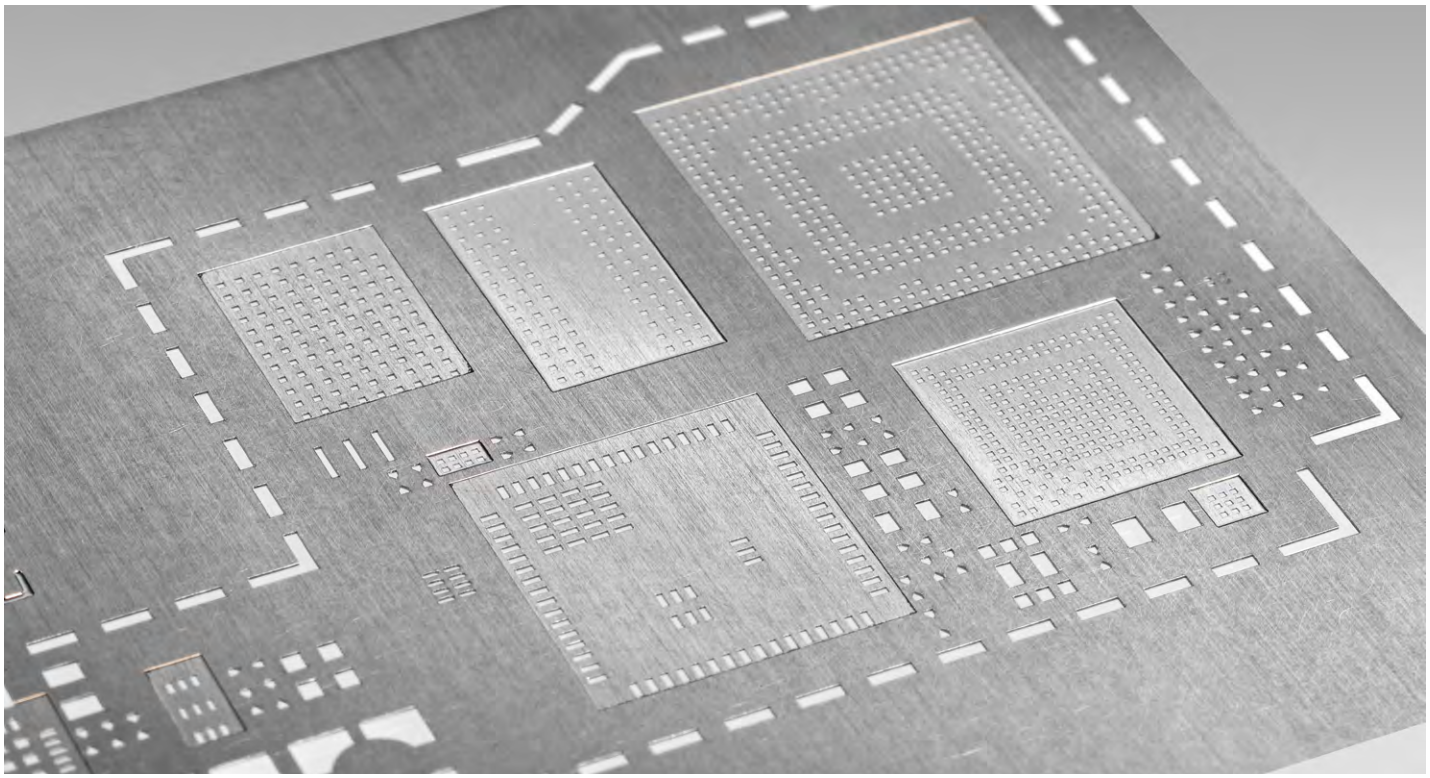
Achieving a finer grain of stainless steel, DEK Fine Grain stencils provide superior paste release and a smoother stencil surface.



DEK Fine Grain stencils can be used with the DEK Mesh-mounted frames, DEK VectorGuard™ Classic and DEK VectorGuard™ High Tension frame systems. Fine grain stainless steel stencils provide smoother laser-cut aperture walls for improved paste release and better material transfer efficiency. A cost-effective alternative to nickel, fine grain stainless steel is ideal for challenging dimensions and high-density assemblies.

DEK Multi-level stencils

Ideal for ensuring optimized solder paste height and volume for components that are distributed over a wide area, DEK Multi-level (step) stencils are produced with the latest micro-milling technology to ensure exceptional accuracy and repeatability.



DEK Multi-level (step) stencils are available in stainless steel or nickel and are ideal for printing paste on SMT boards with fine pitch parts arranged over a large area. These stencils provide excellent print performance for applications with micro BGAs, 0.3 mm QFPs and small components such as 0201s metric, as well as packaging applications and release of specialty solder paste formulations

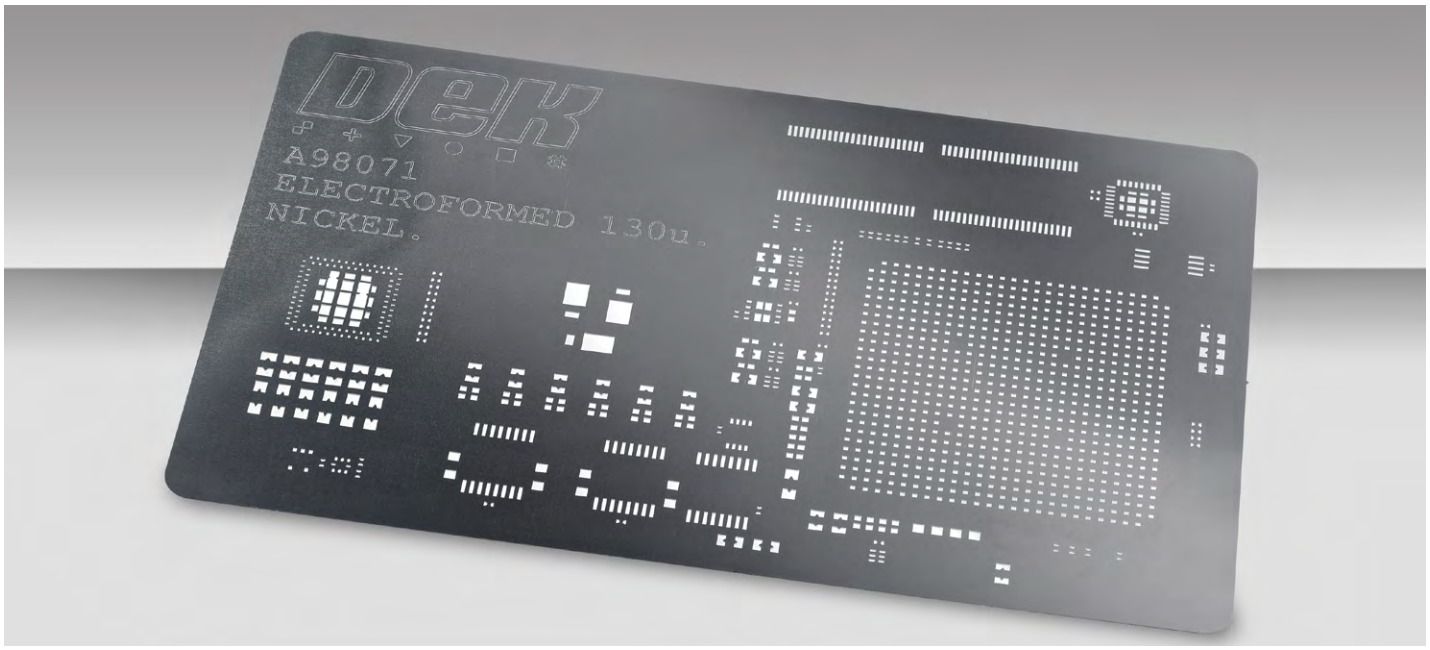
Multi-level stencils are available mesh mounted onto industry-standard frames and are available for the DEK VectorGuard™ Classic and DEK VectorGuard™ High Tension frame systems.

Benefits:

- Flexible local adaptation to any component mix
- Maximum positioning accuracy
- Improved solder paste homogeneity
- Improved repeat accuracy thanks to extra-smooth surface structure and high-precision edges
- Minimized paste wastage through optimized surface structure
- Significant reduction of paste residue in shadow areas
- Flexible design of pressure-sensitive areas
- Significant squeegee pressure reduction thanks to a modified ramp profile

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

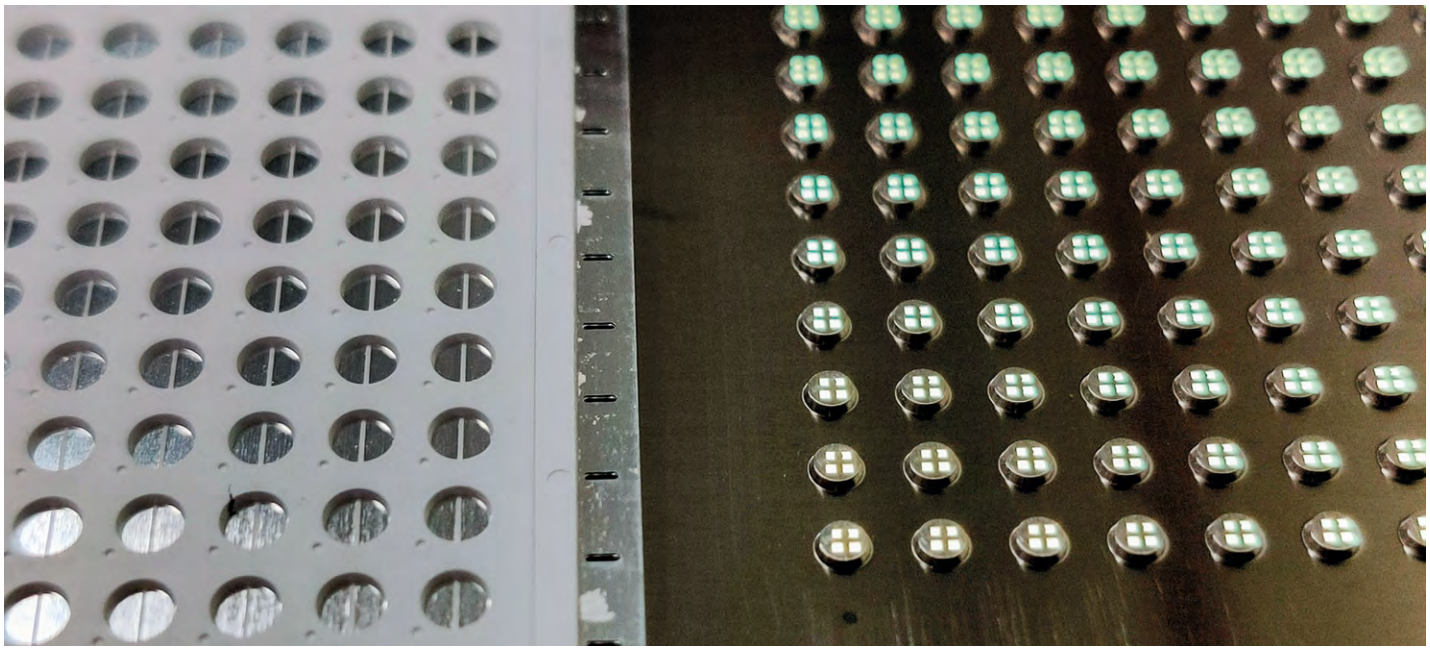
To develop new manufacturing processes such as electroplating solutions for stencils, ASMPT operates a center of competence in Singapore with its own nickel electroplating facility. The local team has many years of experience and deep expertise in the production of electroformed stencils and parts for 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

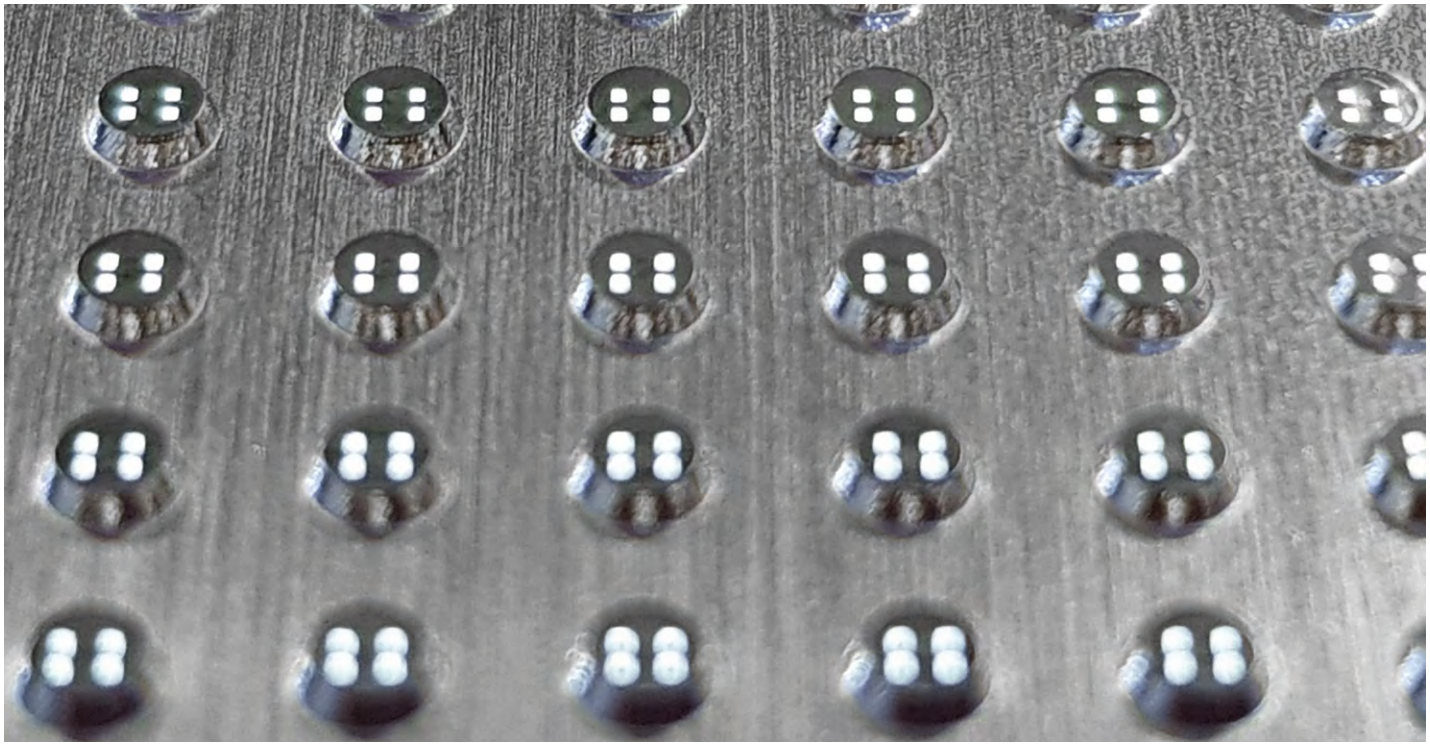
- 3D printing on wafers, substrates

- 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.

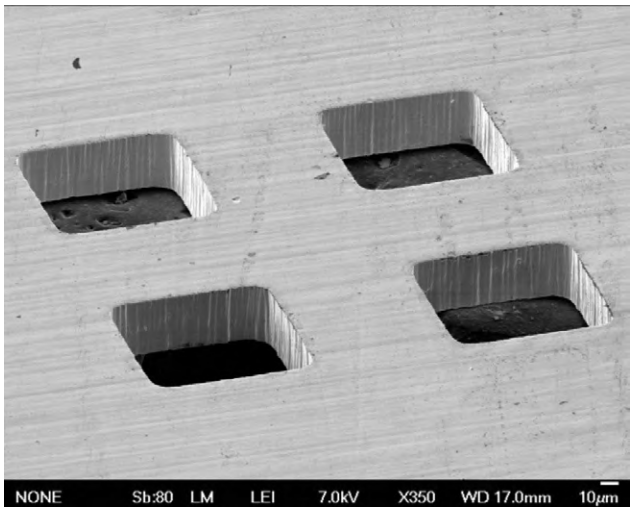
VAHT is ideal for PCBs that incorporate both small and large components that require varying amounts of solder material. Aperture gasket height can be 1 to 2 mils higher than the base stencil thickness.

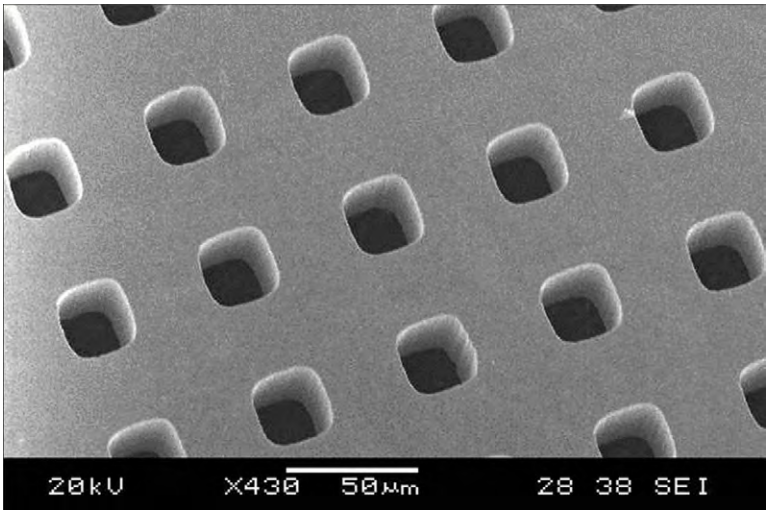
Benefits:

- 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 though 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.

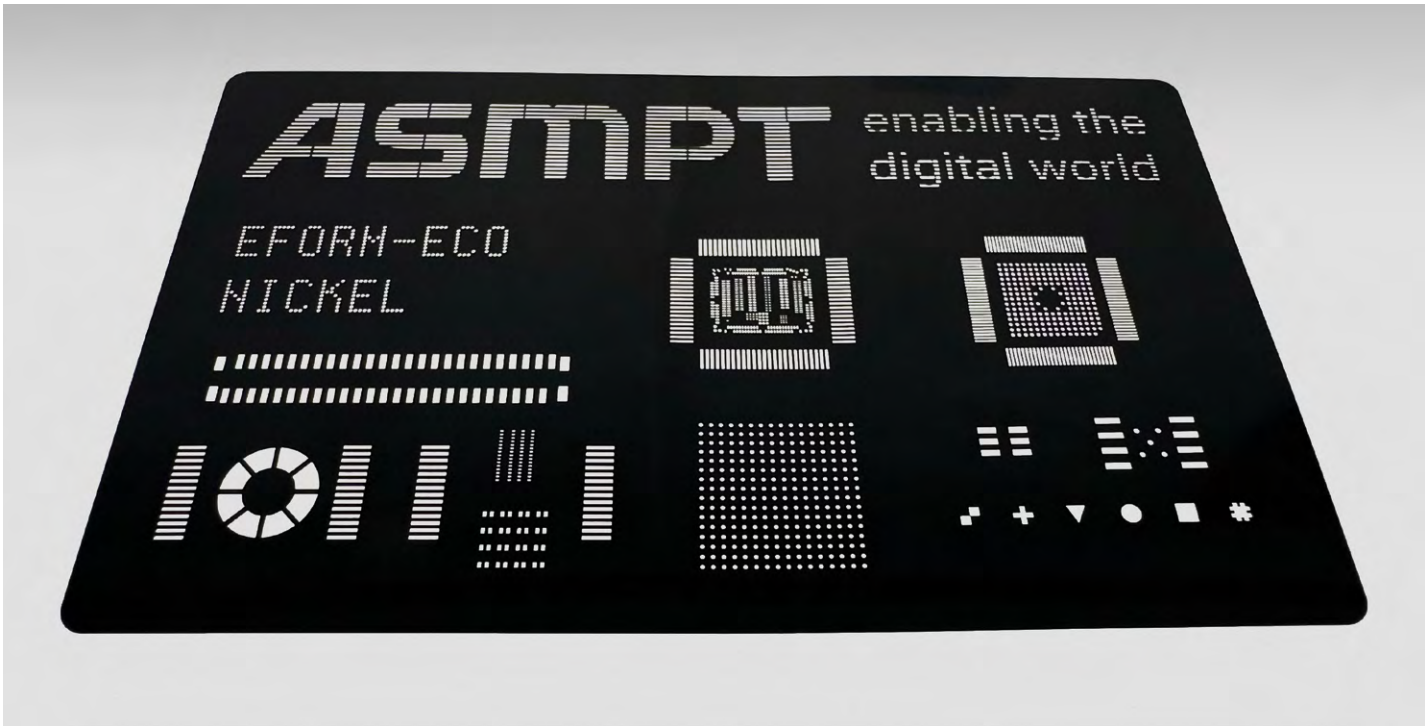
In addition, miniLED products using RGB configurations typically require more than 100,000 apertures in one stencil as well as a stencil thickness in the range of 23 – 40 µm. Laser cut stencils are not able to meet such requirements.

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

DEK Electroform Eco stencil

Improving print process yield for SMT with optimum costs.



Understanding and addressing common printing process defects in SMT are essential for maintaining high-quality electronic manufacturing. DEK Electroform Eco stencil offers smooth aperture wall compared to most fine grain (FG) material. With superior hardness value at 500 HV, which translate into extended stencil lifespan and cost savings.

Nickel is the preferred and desirable material for stencil manufacturing due to its superior properties in durability, chemical resistance, low surface energy which enhance paste release capabilities and reduce under stencil cleaning frequency.

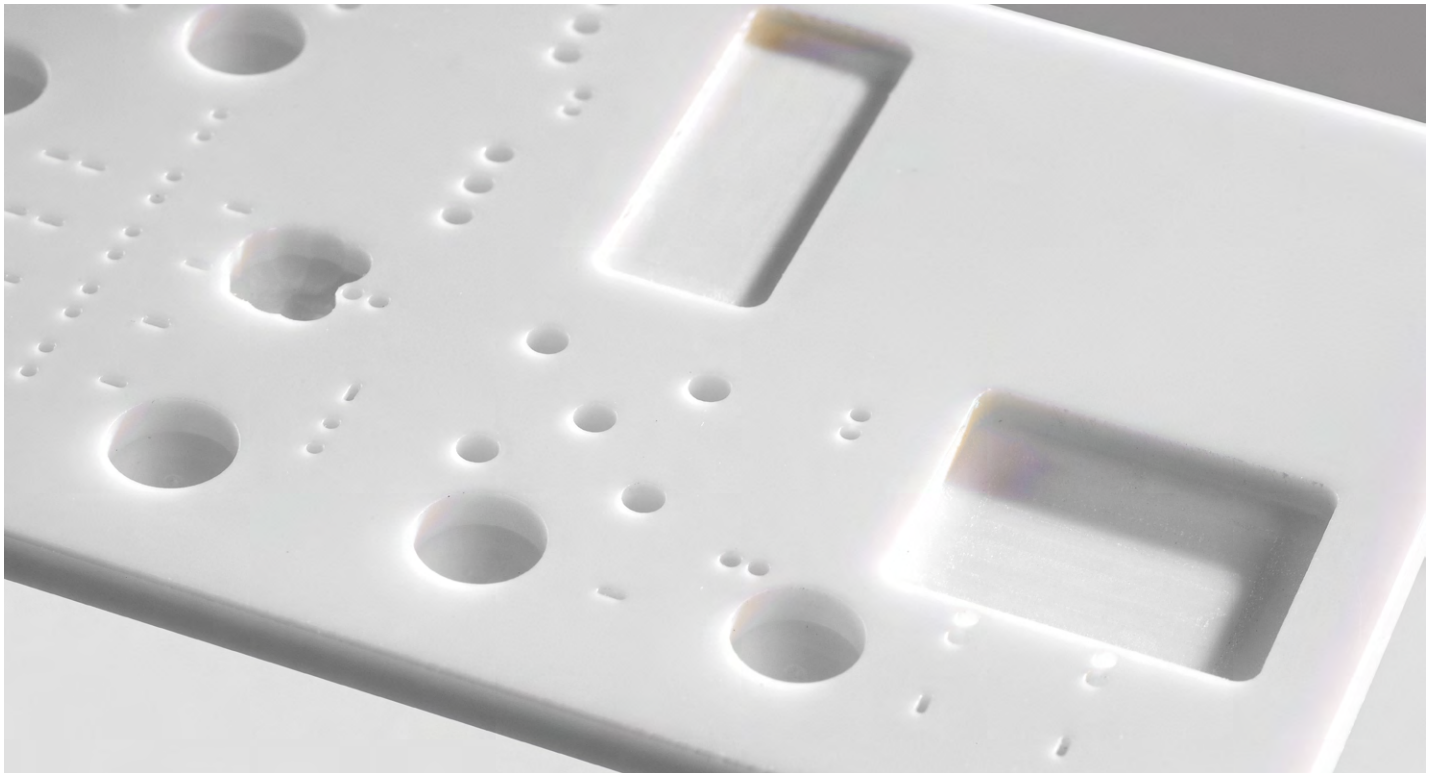
The DEK Electroform Eco stencil is uniquely positioned to address the gap between typical FG laser cut stencil and premium electroformed stencils, offering unmatched capabilities to meet high expectation of turnaround time and quality for SMT industry.

Spezifikationen:

- Area ratio ≥ 0.58
- Thickness: 3 mil to 6 mil
- Minimum aperture: 75 µm

DEK PumpPrint™ / Adhesive stencils

DEK PumpPrint™ technology enables a wide range of adhesive patterns to be successfully deposited using a screen printing platform.



DEK PumpPrint™ / Adhesive stencils enable deposition of adhesives in a single stroke, as opposed to the slower, serial process of dot dispensing systems. With adhesive printing, throughput is dramatically increased and cycle time is constant. Also effective for certain solder applications, DEK PumpPrint™ stencils can be utilized for solder deposition around through-hole component leads or into the base of deep packages.

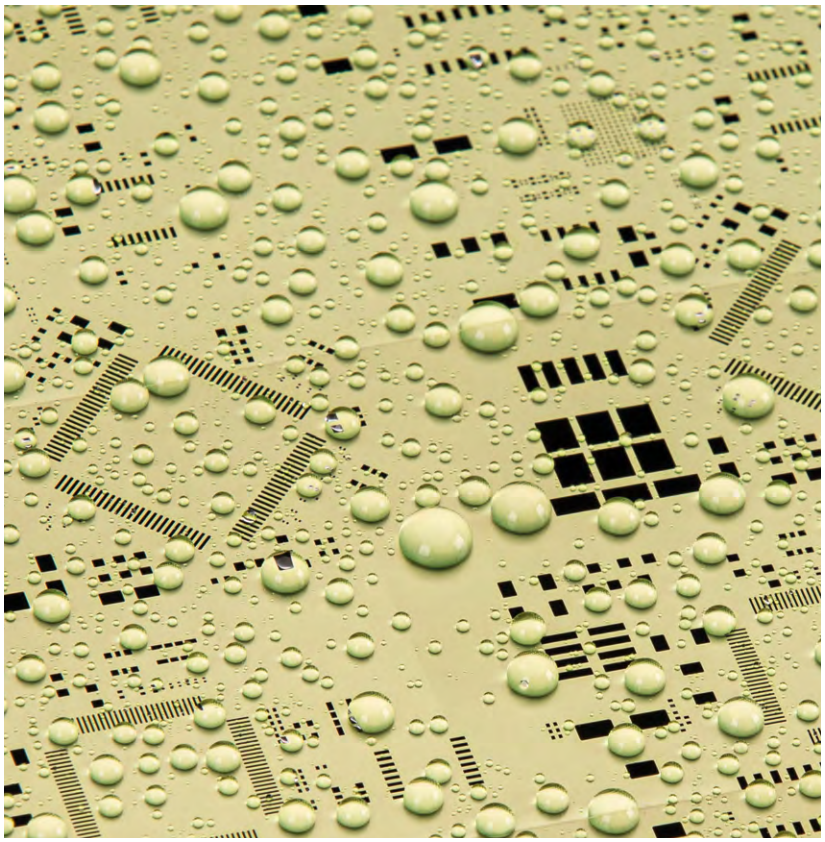
DEK PumpPrint™ / Adhesive stencils are constructed of an acrylic material and available in standard thicknesses of 1.0 mm to 3.0 mm, or up to 8 mm for special applications. Printing through accurately machined apertures, deposit heights from 75 µm to 1 mm can be achieved. Specially designed DEK PumpPrint™ stencils are also available for use with the DEK VectorGuard™ Classic stencil frame system.

Features and benefits:

- Significantly improved throughput, efficiency, and flexibility compared to traditional adhesive dispensing
- Nozzle changeovers eliminated
- Allows re-deployment of existing resources
- Underside routing clears components, cut and clinched through-hole leads, paste and solder mask
- Stencils are lightweight and solvent-resistant
- Available for the DEK VectorGuard™ Classic stencil frame system

DEK NanoUltra Gold stencil coating

Applied upon completion of the stencil manufacturing process, DEK NanoUltra Gold fluxophobic stencil coatings deliver stencil underside and aperture coating for maximum material transfer efficiency and optimized understencil cleaning performance.



Benefits:

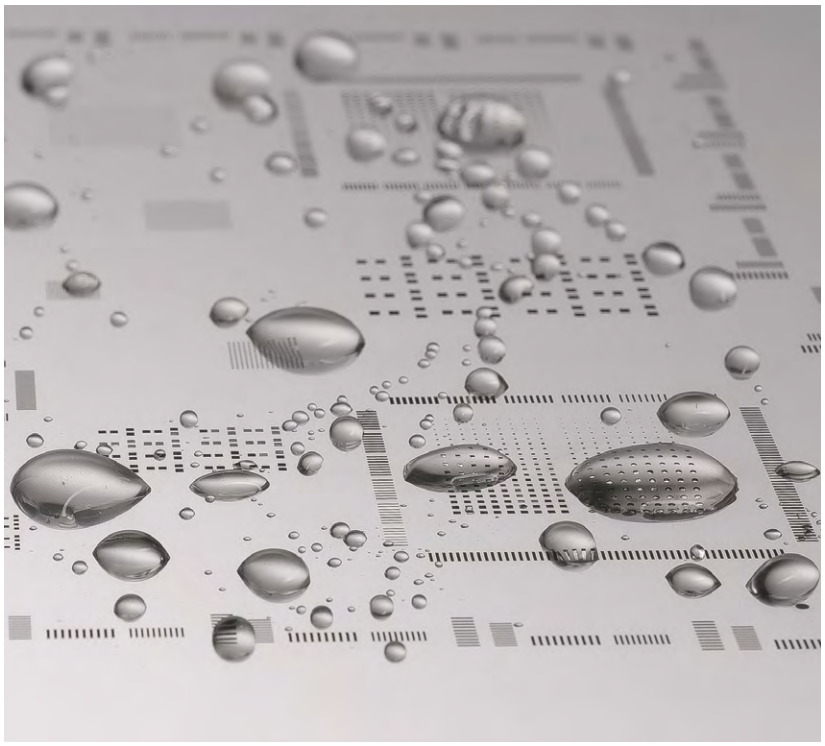
- Very long life cycle
- Coating applied to the bottom surface of the stencil and to the aperture walls for optimized print performance
- Significantly reduces understencil cleaning frequency requirements, lowering costs and improving throughput
- Delivers superior print definition for area ratios below 0.6
- Increases transfer efficiency by 10% to 40% depending on area ratio
- Reduces solder paste bridging
- Encourages more uniform solder paste deposits
- Colored coating provides visual confirmation of coverage, as opposed to clear wipe-on nano coatings
- Micron-thick coating lasts longer compared to wipe-on nano solutions
- Non-ionic, not conductive, and chemically inert
- ECHA REACH, RoHS and RoHS 2 compliance
- Recommended stencil materials: Fine Grain and stainless steel

TECHNICAL SPECIFICATIONS	
Properties	**Values**
Appearance	Gold
Thickness of coating	3 to 4 micron
Specific gravity @ 25C	1.02 g/cm^3
Static contact angle, water	105°
Static contact angle, n-hexadecane	64°
Abrasion resistance, ASTM D2486, isopropyl alcohol	>2000 cycles
Abrasion resistance, ASTM D2486, IPA based flux	>2000 cycles
Pencil hardness	>9H
Resistivity	>10 x 10^{12} ohm-M
Ionic residues (ROSE)	0 µg of NaCl / liter
Ionic species on board (as received)	None detected
Ionic species on board (after reflow)	None detected

DEK NanoUltra STENCIL COATING		
Part number		**Description**
SAP	**DEK**	
03178413	800109	Europe
03137312	800110	Americas

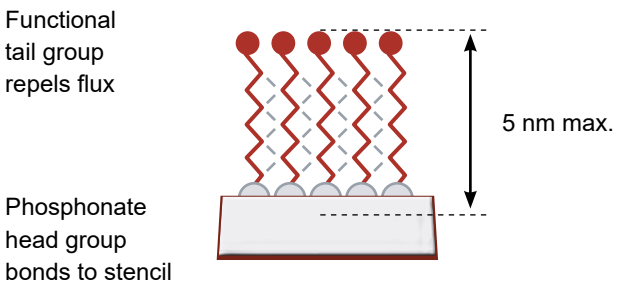
NanoClear® stencil coating

Self-applied fluxophobic stencil coating technology delivers high performance stencils in a cost-effective wipe. Designed to overcome the challenges of smaller aperture sizes, the NanoClear® coating offers a unique solution to improve cleaning effectiveness and reduce cleaning frequency.



Features and benefits:

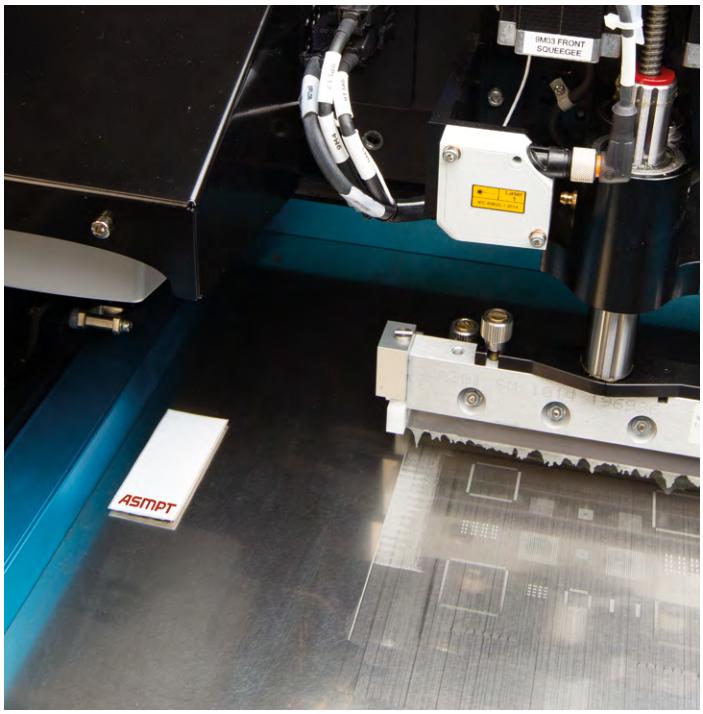
- Increases efficiency
  - Reduces the frequency of cleaning
  - Allows time for more production or SPI
- Reduces cost
  - Less cleaning uses less USC fabric and solvent
  - Less expensive than alternative wipe-on coatings
  - Easy to apply to new or existing stencils
  - Chemically inert when dry to ensure no possible interaction with paste
  - Forms a permanent bond and can be reapplied as it only adheres to uncovered areas
  - REACH compliant
  - Compatible with stainless steel or nickel stencils
  - One pouch will coat one stencil (measuring up to 29“ x 29”)

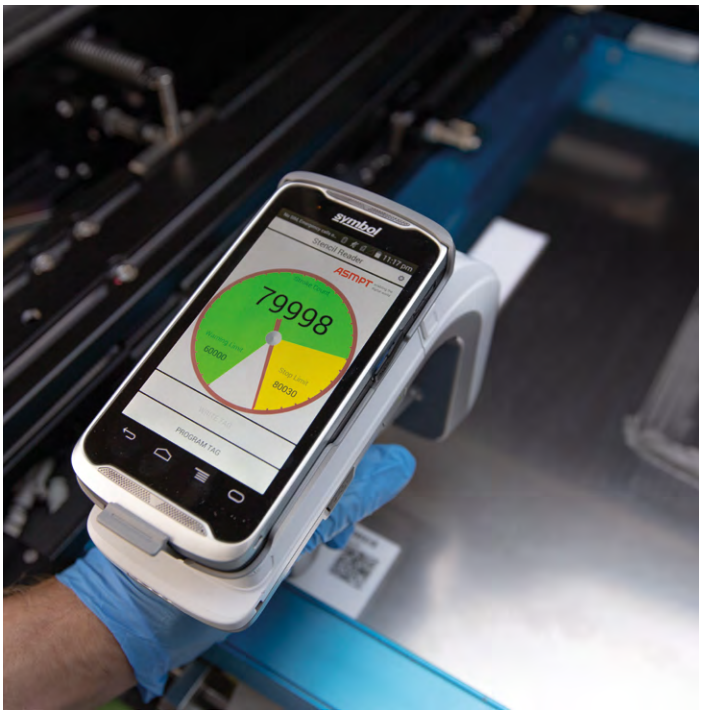


NanoClear® STENCIL COATING		
Part number		**Description**
SAP	**DEK**	
03128620	431800	Box of 10 wipes

Smart Stencil

Smart Stencil is our complete solution for managing the service life of stencils. It is smart, RFID-based, and transparent. Never again will the use of outdated stencils hurt the quality and efficiency of your printing processes.





Declines in tension and surface quality, which are normal as stencils age, reduce the quality, yield and process stability of the solder paste printing process. Smart Stencil is an RFID-based solution that provides for the first time a simple, convenient, and seamless solution for monitoring the service life of stencils.

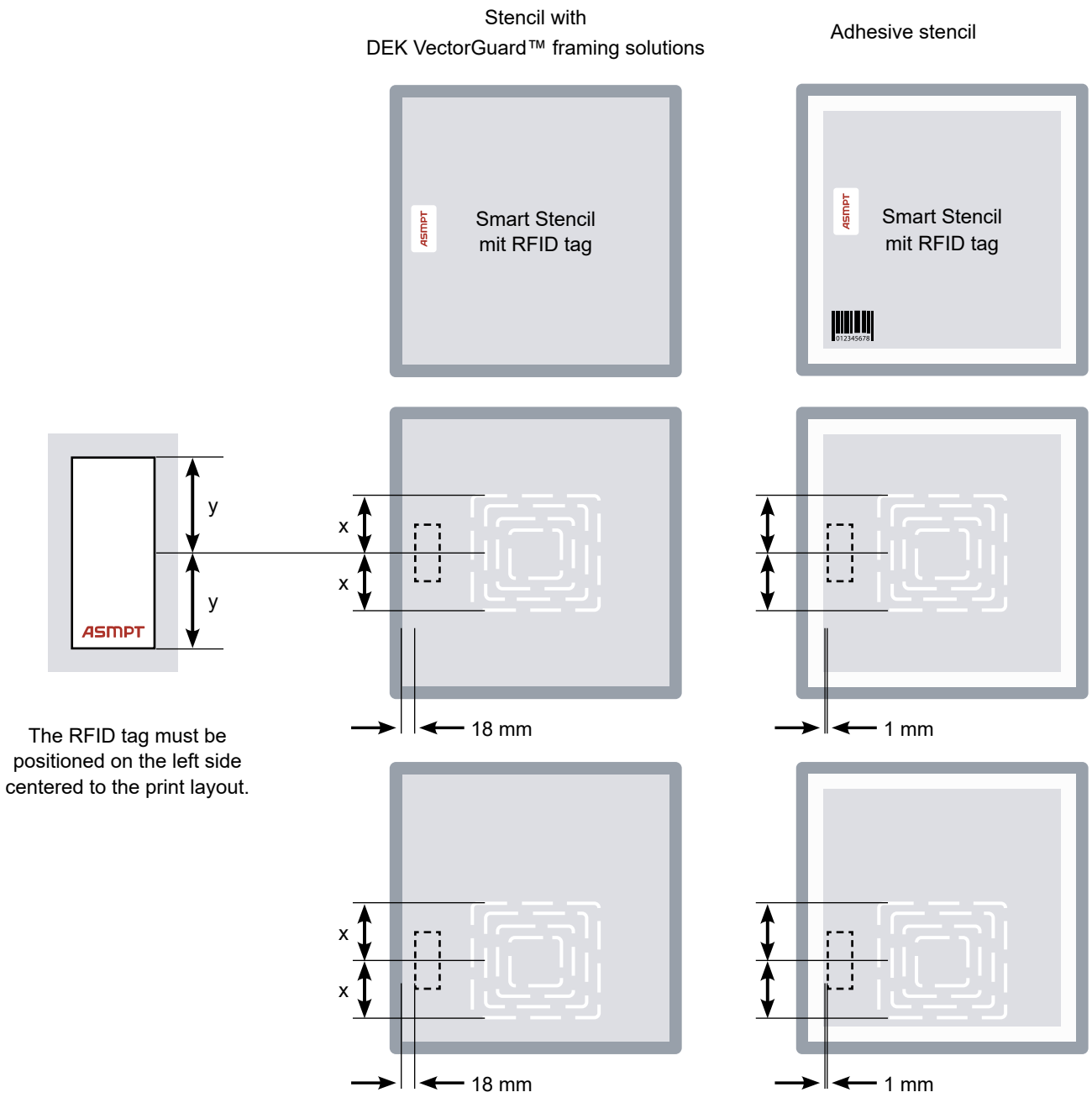
Its core components are ASM-supplied RFID tags which are applied by the stencil manufacturer – or by the user – to each stencil to identify it and store basic data about it. DEK printers equipped with the Smart Stencil option record each printing cycle on the RFID tag even if the stencil is used on different lines.

The basic data and print cycles stored on the RFID tags can be read by DEK printers with the Smart Stencil option and by handheld devices. The ability to store warning thresholds and maximum values for the number of print cycles makes seamless process control possible. For example, when the threshold level is reached, the system can use this information to order a new stencil. The necessary data can also be stored on the RFID tag. When the maximum value is reached, the printer stops the printing process.

Functions and benefits

- Process stability through seamless service life management
- Smart Stencil RFID tags available for stencils from all manufacturers
- Customers can apply RFID tags themselves
- Service life data can be stored on and recalled directly from the stencil RFID
- Ability to store a stencil profile (technical data, manufacturer, reordering data, storage locations, etc.)
- DEK printer with the Smart Stencil option write to the tags with each print cycle
- Manual entries possible with the RFID handheld device
- Customer-definable warning and maximum thresholds
- Warning threshold optimize ordering processes and in-house logistics
- Reaching the maximum threshold stops the printing process; it can only be overwritten by authorized personnel
- Only available for the DEK NeoHorizon platform

Smart Stencil – Application and positioning



The RFID tag must be positioned on the left side centered to the print layout.

AVAILABLE FEATURES AND PARTS:

Part number		
SAP	**Description**	**Unit**
03216102-01	Smart Printer Hardware (DEK Horizon)	Each
03215953-01	Smart Printer Hardware (DEK NeoHorizons and DEK Galaxy)	Each
03216105-01	Offline Unit (EU and ETSI Model)	Each
03220448-01	Offline Unit (US and FCC Model)	Each
03216909-01	RFID Tag	Each
03216106-01	RFID Multi Pack & Fitment guide	50

AVAILABLE MPU'S (MACHINE)

Part number		
SAP	**Description**	**Unit**
03221004-01	Smart Printer Hardware MPU (DEK Horizon)	Each
03221003-01	Smart Printer Hardware MPU (DEK NeoHorizons and DEK Galaxy)	Each

ASMPT

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Process Support Products Webshop
smt.asmpt.com/en/myasmpt/webshop

ASMPT SMT Solutions Website
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