ASM

ENABLING THE DIGITAL WORLD

ASM ProcessExpert

Autonomous process optimization

THE HARDWARE
ASM ProcessLens

Inline 5D solder paste inspection

Faster and more precise with combined 2D/3D measurements and extremely powerful algorithms

Innovative measurement system

Moiré pattern projection via DLP chip with 8 million digitally controllable micro-mirrors

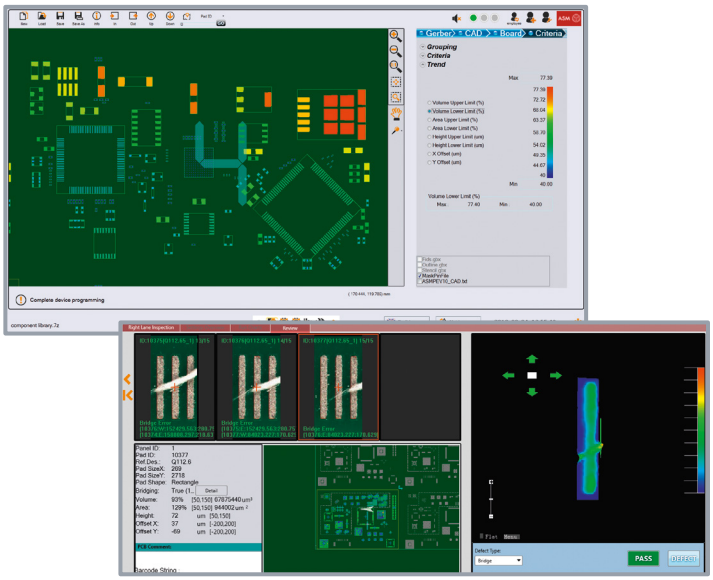
Maximum throughput

Solder paste inspection in dual-conveyor mode

High-precision camera positioning

12.5 µm X/Y accuracy

Programming: The component library recommends the inspection criteria



3D and 2D images of solder paste deposits

THE EXPERT SYSTEM
ASM ProcessExpert

ASM ProcessLens
SPI

+

THE SOFTWARE
ASM ProcessEngine

All systems go: ASM ProcessExpert ensures that all printing processes are stable at all times.

DFM HealthCheck

Generates virtual prints based on Gerber data to evaluate the stencil design and make recommendations for best process and printing parameters

Real-time analyses

Highly innovative, self-learning expert system software for the real-time analysis of printing processes

Autonomous process optimization

Optional printer control and optimization of printing parameters by the expert system without manual assists

Flexibility

Usage-oriented understencil cleaning instead of rigids cycles

NPI support

Automatically optimizes the printing quality via a few test prints

The revolution in printing process optimization

ASM ProcessExpert is the world's first self-learning expert system that not only controls printing processes but optimizes them. ASM ProcessExpert learns from each printing cycle, recognizes trends, and corrects specific printing parameters in the stencil printer – before errors occur.

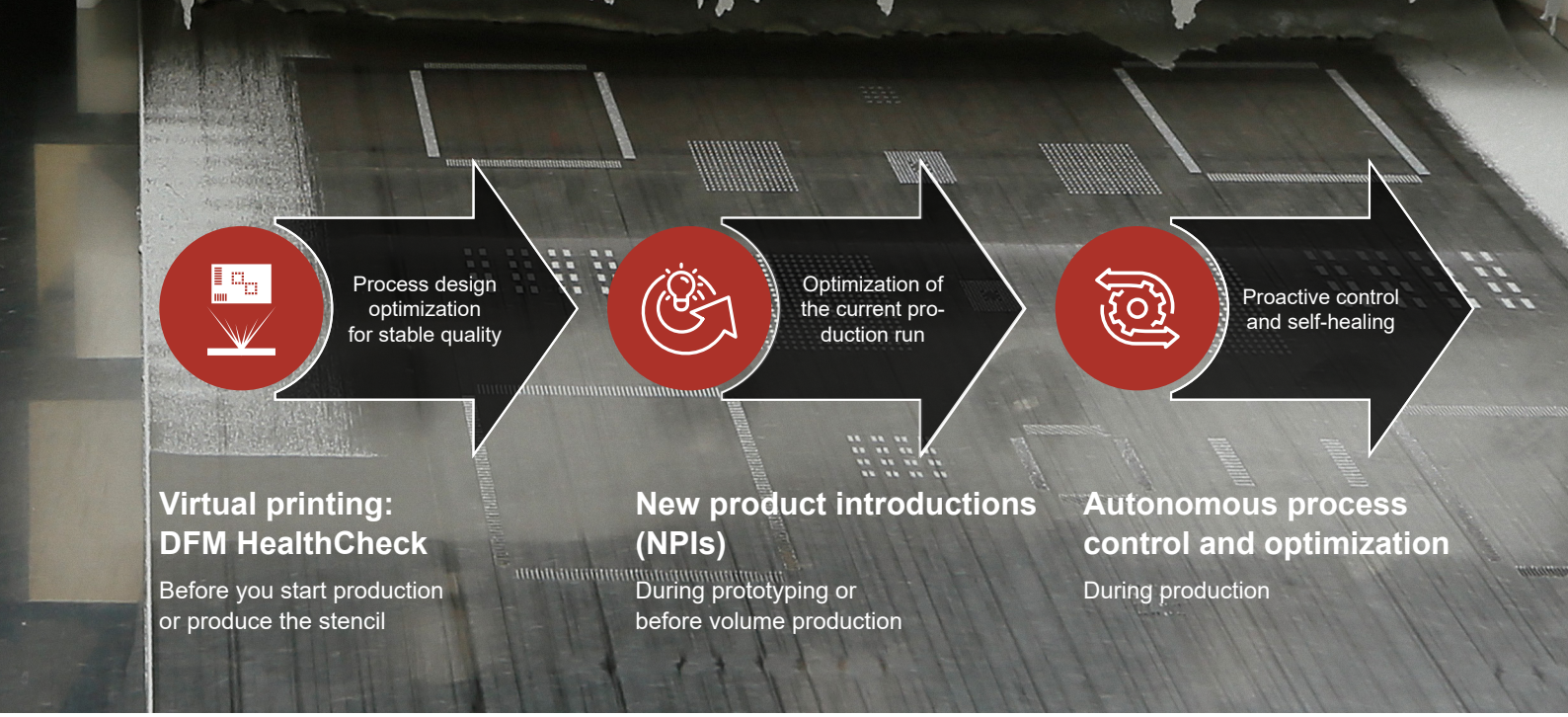
It delivers printing process optimization for the digital age: in real time, autonomously, and without manual assists. ASM ProcessExpert overlooks no detail and provides its knowledge around the clock – during night shifts, on weekends, 24//7/365.

More about the ASM ProcessExpert

ASM ProcessEngine
Software

=

ASM ProcessExpert
Expert system



ASM ProcessExpert
SMART TECHNOLOGIES OPEN THE DOOR TO NEW POSSIBILITIES

Rigid min/max limits, (false) alarms, line stops, user assists – forget everything you believe you know about solder paste inspection and printing process optimization. The ASM ProcessExpert goes beyond everything that traditional SPI systems have offered. It represents a milestone in the implementation of the smart SMT factory.

AUTONOMOUS PROCESS CONTROL AND OPTIMIZATION

SPI systems compare actual and target values and alert operators to defined deviations and errors. ASM ProcessExpert delivers much more. It continuously controls and automatically optimizes the printing process in real time. The self-learning expert system software recognizes trends, corrects the printing process parameters and changes the DEK printer's printing parameters directly and autonomously: cleaning cycles, offset, squeegee pressure, printing speed, and a whole lot more. Monitoring data shows you how the ASM ProcessExpert keeps the printing process stable.

If you aren't quite ready to let the system handle everything, you can let it show its recommendation to your operators and let them decide what they want to change. Experience has shown, however, that users quickly recognize the ASM ProcessExpert's effectiveness and allow it to run in autonomous mode.

ASM ProcessLens
THE COMPARISON

ASM ProcessLens

The extremely fast and precise 5D SPI system

Traditional SPI system

DLP chip		Grid with piezo technologies
Flexible patterns for each image	Band structure	Rigid
Projection of different patterns	Motion	Mechanical grid movement
Repeatable imaging	Motion accuracy	Mechanical movement with error risks
Fast	Movement speed	Slow
Vibration-free electrical switching	Vibration	Vibration caused by actuators

NEW PRODUCT INTRODUCTIONS (NPIs)

Even experienced experts must often run many test prints to determine the right combination of printing parameters for a stable printing process. Unfortunately, such experts aren't always available.

The ASM ProcessExpert operates with the experience of all printing cycles that have been recorded in its database – around the clock and without overlooking even the smallest detail. The expert system changes printing parameters in a targeted manner and finds for each new product the optimal settings after only a few prints.

Your benefits: The ramp-up process is shortened dramatically, making NPIs much more predictable. Your company meets its deadlines more effectively, and throughput rates are high from the start.

VIRTUAL PRINTS: DFM HEALTHCHECK

A scenario that strikes fear in electronics manufacturers and developers: The stencil for a new product was delivered, but on the line it turns out that its design or the selected process parameters (solder paste type, stencil material, etc.) don't allow for a stable printing process.

The ASM ProcessExpert provides the solution: DFM HealthCheck with virtual prints (DFM = design for manufacturability). This function of the expert system simulates the printing processes exclusively on the basis of the stencil Gerber data, highlights critical areas, and determines process and printing parameters that are suitable for a stable process – long before the first board enters the line.

Your benefits: You can check the stencil and process design long before the production run starts without incurring any costs for prototypes, etc. You can determine the right process parameters from the start on the basis of the stencil's Gerber data and prepare your lines accordingly.

ASM ProcessExpert
THE MODULAR SYSTEM FOR MAXIMUM INVESTMENT PROTECTION

THE HARDWARE: ASM ProcessLens

The core component of the ASM ProcessExpert is the ASM ProcessLens 5D inline SPI system. Instead of operating with rigid piezo-controlled grids, this high-precision, extremely fast SPI system is fully digital and generates the Moiré pattern projections needed to measure the solder paste deposits flexibly, precisely and extremely quickly via a projector chip with 8 million individually controllable micro-mirrors.

Other advantages include combined 2D/3D measurements, an X/Y camera positioning system with an accuracy of 12.5 µm, multiple light sources for shadow-free measurements, 3D-on-the-fly compensation of board warpage, and extremely powerful image analysis algorithms.

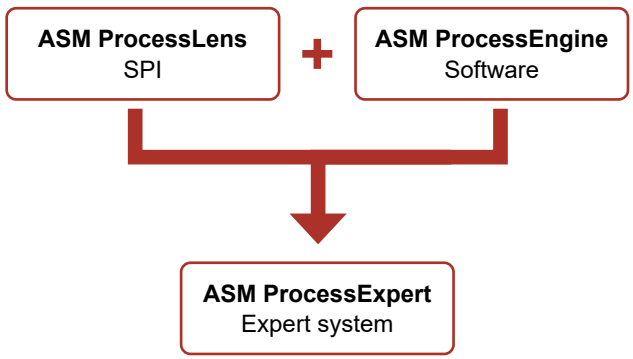
The bottom line: The ASM ProcessLens detects the position, height, area and volume of solder deposits as well as any PCB warpage faster and more accurately than traditional SPI systems.

THE SOFTWARE: ASM ProcessEngine

The system combines the measurement data collected by the ASM ProcessLens with all relevant printing process parameters and stores them in the database of the ASM ProcessEngine expert system software. This software learns with each printing cycle, identifies trends and determines corrective measures to keep the printing process stable within its process window at all times. The ASM ProcessEngine can output its corrective measures as assist requests or set the new printing parameters directly on the printer with no human interaction.

FROM SPI TO EXPERT SYSTEM

Thanks to its modular structure, the ASM ProcessExpert features maximum investment protection. You can start out with the ASM ProcessLens as a powerful SPI system and add the ASM ProcessEngine software later to expand it into a full-featured expert system.



ASM ProcessLens
TECHNICAL DATA

ASM ProcessLens coverage area	
Length – in PCB conveyor direction	1,130 mm
Width	1,300 mm
Height with a conveyor height of 950 mm	1,600 mm

ASM ProcessLens transport	
Duration of loading/unloading – single conveyor Duration of loading/unloading – dual conveyor	Less than 2.5 sec. 0 sec.
Transport height/interface	SMEMA, IPC-HERMES-9582

ASM ProcessLens PCB	Minimum	Maximum
PCB size (L x W) – single conveyor	50 mm × 50 mm	610 mm × 560 mm
PCB size (L x W) – dual conveyor (standard)	50 mm × 45 mm	375 mm × 260 mm
PCB size (L x W) – dual conveyor (in single-conveyor mode)	50 mm × 45 mm	375 mm × 460 mm
PCB thickness	0.5 mm to 4.5 mm	
Minimum edge clearance	3 mm	
Maximum PCB weight	3 kg	
PCB warpage	-7.5 mm to +7.5 mm	

ASM ProcessLens inspection values	
Pixel size	15 µm × 15 µm
Inspection speed	Up to 30 cm^2/sec
Height resolution	0.37 µm
Height accuracy with calibration target	≤ 1 µm
X/Y gantry accuracy	± 12.5 µm (at ± 3σ)

ASM ProcessLens solder paste inspection	
Measurement	Shadow-free
Solder paste measurements	Volume, area, height, X- and Y-offset, shape, bridging, coplanarity
Maximum paste height	1,000 µm
Minimum paste deposit size	90 µm × 130 µm
GRR on printed board	<< 10%

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