

A high performance
printer that provides
a unique combination
of innovative features
and flexible options
to meet the industry's
high precision
printing needs.



MPM

UP2000 HiE Stencil Printing System

Since its introduction, the UP2000 HiE has become the industry choice for high performance, reliable automated stencil printing. A key factor in its immediate worldwide acceptance has been its unique combination of high-end features and flexible options at an ideal price.

At Speedline, we understand the challenges of today's manufacturing environment. And we're ready with the products and technology to tackle those challenges. The UP2000 HiE reflects our continued commitment to helping our customers make world-class electronics products – faster, better and with lower costs.

**Three Advanced
Print Heads**

- > *Rheometric Pump
Print head technology*
- > *Balanced closed-loop pressure
control*
- > *Self-leveling
programmable*

**2D & 3D Post-
Print Verification**

*Real-time process
verification system*



Y-Snugger Tooling
PCB edge clamping system

On-Board SPC
*On-board process
control system*

Accurate Vision Alignment
*Look-up/look-down board-to-stencil
vision alignment system*

MPM

UP2000 HiE

The MPM UP2000 HiE provides a complement of features and options, including 3 advanced print heads for process flexibility, a patented vision alignment system for unparalleled accuracy and repeatability, and a user friendly interface for easy set up and operation.

UP2000 HiE Features

Modular Design Ensures Superior Adaptability

- > Choice of three advanced print heads for process flexibility.
- > Configurable with a full complement of automated options for easy integration.
- > Less than 11 second cycle times.
- > Y-Snugger board clamping provides ability to handle full range of board types.
- > Low Contrast feature allows inspection of optically challenging substrates (ceramics, flex circuits).

High Accuracy for Superior Print Results

- > Patented alignment system provides unparalleled accuracy and repeatability (± 0.001 " at 6 sigma).
- > Balanced Control Print head provides true closed-loop print pressure control for repeatable, precise printing.
- > Tactile sensor accurately measures and sets squeegee height and snap-off distance for each board type.
- > 2D and 3D* Post-Print Verification tools provide real-time process control and intelligent adaptivity.

Easy-to-Use Printer Controls for Efficient Operation

- > Interactive and intuitive board teach feature minimize setup time and user training.
- > Programmable features are easily accessed through just three menu screens.
- > On-board SPC data collection capability provides real-time process control.
- > Multiple language capability for worldwide operation.

Upgrades Ensure Long-Term Productivity

- > Retrofittable hardware options guarantee continuous technology advancement over time.
- > Software upgrades and site licenses provide cost-effective and easy-to-install enhancements.
- > Speed Enhancement and Productivity upgrades boost performance of non-HiE machines to near-HiE levels.

Standard Features

Automatic Board-to-Stencil Alignment

This feature uses advanced vision algorithms to quickly process fiducials "On-The-Move" for efficient image capture. The patented look-up/look-down illumination and optics technology provide advanced closed-loop feedback. Custom motion control optimizes camera transit to ensure the fastest and most accurate board-to-stencil alignment in the industry.

Self-Leveling Print Head

This allows squeegee pressure, print speed and downstop to be independently adjusted for both front and rear squeegee blades for optimal print quality. Pressure and downstop are driven by a precision stepper motor and adjusted by independent computer-controlled systems.

- > Integrated tactile sensor automatically measures and sets squeegee height and snap-off distance.
- > Automatic downstop allows controlled compliance to the board topography and eliminates stencil "snap-back."



Vision "On-The-Move" Alignment



Self-Leveling Print Head

* Class 1 Laser Product

User-Friendly Interface

The User Interface allows tailoring of machine parameters to meet critical process requirements. Pull-down menus and live video images provide fast and easy setup. Unique access control features ensure product profile integrity. Software upgrades and site licenses are also available for machines currently installed at customer locations.

Auto Print Offset

Automatically calculates the amount of X, Y and Theta adjustment necessary for perfect printing, minimizing operator involvement in the determination of paste to pad alignment.

Standard Options

Rheometric Pump™ Print Head

The Rheometric Pump Print head is a quantum leap in the printing process, providing precise control of the material application. Because the paste is no longer exposed to air, consistent paste dynamics are applied to the product with each print. Paste savings of 98 percent can be achieved using the Rheometric Pump over standard squeegee blades. Multiple head sizes allow the Rheometric Pump to adapt to different board sizes.

Automatic Paste Dispensing System

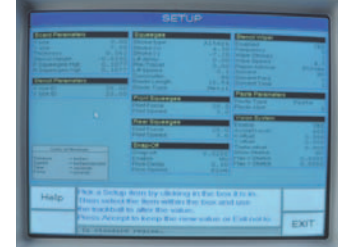
This system uses industry-standard cartridges to release programmable amounts of solder paste, adhesive or encapsulants in a clean bead across the stencil. The system initiates dispensing at operator defined intervals. A disposable nozzle simplifies cleanup and minimizes operator exposure to materials.

Balanced Control Print Head

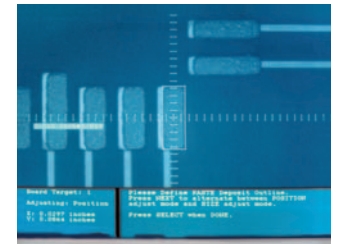
The Balanced Control Print head features frictionless electropneumatic controls to ensure the most accurate and repeatable pressure control for precise paste deposition. Print speed, blade attack angle, squeegee downstop, and left and right print pressures all can be independently adjusted for both front and rear squeegee blades. Actual print pressures are monitored five times per second during the print stroke and adjusted real-time using closed-loop feedback control. Automatic downstop allows controlled compliance to board topography and eliminates stencil coining and “snap-back.”

Temperature Control System

The Temperature Control System monitors, maintains and controls temperature within the print chamber to ensure consistent, repeatable print results. Temperature is maintained at a tolerance of $\pm 2^{\circ}\text{F}$ ($\pm -16.7^{\circ}\text{C}$). The system incorporates a 10,000 BTU air conditioner and a 1,400-watt heater. The unit also measures and records humidity conditions within the print chamber. On-line SPC alerts the operator to temperature and humidity fluctuations.



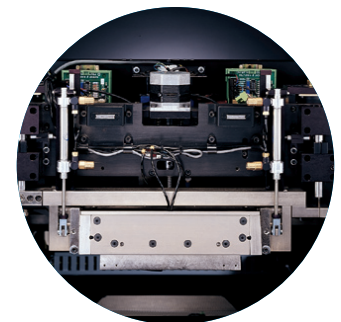
User-friendly menus



Live video images



Rheometric Pump™
Print Head



Balanced Control head ensures
accuracy

Y-Snugger Tooling System

The Y-Snugger Tooling System provides a physical board holding system for securing boards without the use of vacuum. Side-snugger bars adjust automatically, allowing fast changeover with no manual intervention. Z-Grip fingers eliminate board warpage and retract to allow for true contact printing.

Under-Stencil Cleaning System

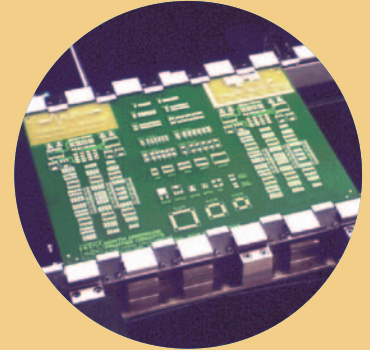
The Under-Stencil Cleaning System provides automatic, unassisted cleaning of the bottom side of the stencil. A lint-free paper wiping system removes material bleed-out. A powerful, independently programmable Venturi vacuum system (optional) removes stubborn solder paste from fine pitch stencil apertures, eliminating “opens” on the final assembly. The paper-over-plenum design reduces maintenance by filtering out particles, while a constant-speed paper feeder minimizes paper consumption.

Integrated Post-Print Analysis System

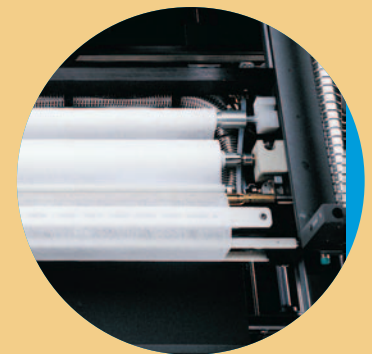
This option uses 2D and 3D* Verification features to provide quantitative performance of actual paste coverage and height immediately following the print cycle. Using the printer's vision system, state-of-the-art software minimizes verification times by determining the shortest path between devices, providing instant, efficient confirmation of print quality.

Adaptive control is achieved via built-in SPC data collection software. The system continuously monitors and analyzes current process performance and can instantly self-adjust print parameters for optimum performance.

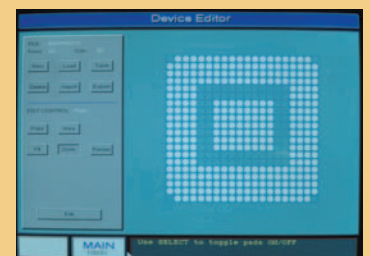
- > **2D Paste Coverage** – The percentage of pad coverage is quickly calculated and compared to user-defined limits, highlighting pads with insufficient coverage. Enhanced BGA capability provides verification of pads down to 0.010" diameter at 0.020" pitch. In-line and QFP devices down to 0.012" pitch are supported. The new Background Mask feature minimizes variability caused by vias and traces on the board. The Adaptive Control option triggers a wipe-on-reject cycle for optimum process control.
- > **Custom BGA Template** – Enables the user to teach and inspect a device with any pad array configuration. Files for device sizes up to 50 x 50 (2500 pads) can be created and stored.
- > **Low Contrast 2D** – The Background Mask feature and advanced vision technology allow measurement of paste coverage on pads that are indistinguishable from the substrate and cannot be seen by standard vision systems. The adjustable mask “blacks out” the area surrounding the pad to provide the resolution necessary to obtain accurate readings for any device type. Coupled with the optional low contrast alignment feature, Low Contrast 2D enables paste coverage verification on optically challenging substrates such as ceramics or flex circuits.
- > **3D* Paste Height** – Analyzes solder paste height and profile via a laser scan of the printed pad at rates of up to 14 pads per second. The Adaptive Control option adjusts print pressures based on trend data generated by the SPC software.



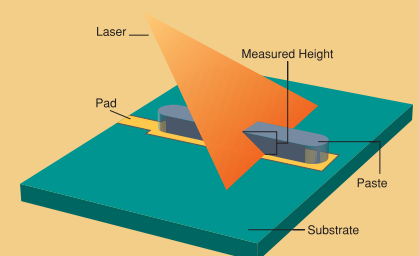
Y-Snugger Tooling provides superior board support



Stencil UltraWiper minimizes defects



Unlimited BGA flexibility



3D Paste Height

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MPM UP2000 HIE SPECIFICATIONS

BOARD HANDLING

Minimum/Maximum size	2" x 2" (50.0 mm x 50.0 mm) to 20" x 16" (508 mm x 406 mm) (16" or greater board lengths require dedicated workholder)
Thickness range	0.015" to 0.500"
Underside component clearance	0.50" (1.0" optional)
Machine interface transport speed	Programmable up to 60"/sec (1524 mm/sec)
Transport height from floor	Adjustable 34.5" to 41" (876 mm to 1041 mm)
Method of support in print/vision cycle	Magnetic pins, optional dedicated workholders
Method of board hold-down	Underside vacuum, Y-axis snuggers and Z-Grip fingers
Conveyor configuration	Factory-configurable front or rear rail justified
Transport track feed direction	User definable

PRINT PARAMETERS

Print area	18" x 16" (457 mm x 406 mm) (x,y)
Snap-Off	-0.050" to +0.1" (-1.3 mm to 2.5 mm)
Squeegee pressure (Balanced Control)	1 to 60 lbs (0.4 kg to 27 kg)
Squeegee pressure (Self-Level Head)	1 to 50 lbs (0.4 kg to 22.5 kg)
Squeegee speed	0.25" to 12"/sec (6.35 mm to 305 mm/sec)

VISION

Fiducial method	2 to 5 models standard fiducials or pads
Fiducial type	All conventional fiducials accepted
Camera system	MPM unique high speed ball screw system with patented optics

PERFORMANCE

Vision alignment repeatability	±0.001" (±0.025 mm) at 6 sigma (Cp greater than or equal to 2.0*) verified with glass plate capability test**
Vision Alignment accuracy	±0.001" (±0.025 mm) at 6 sigma (Cp greater than or equal to 2.0*) verified with CeTaQ™ CmController™ capability test**
Cycle time	< 11 seconds (excluding print stroke)

FACILITIES

Power Requirements	Either 115 VAC@60 hz, 30 A or 220 VAC@50 hz, 20 A
Air Supply Requirements***	80 to 125 psi (5.52 to 8.63 bars) at 4 cfm (1.9 L/s) (standard), at 25 cfm (11.8 L/s) (with optional vacuum wiper)
Height (excluding light tower)	64.44" (1636.7 mm) maximum
Depth	63.24" (1606.3 mm)
Width	46" (1168.4 mm)
Weight	1500 lbs (677 kg)
Crated Weight	2500 lbs (1134 kg)

* The higher the Cp, the lower the variability with respect to the process specification limits. In a process qualified as a 6 sigma process (i.e., one that allows plus or minus 6 standard deviations within the specification limits), the Cp is greater than or equal to 2.0.

** The CmController™ test is an optional test that can be preformed on request by a customer prior to the shipment of their printer.

*** Optional vacuum wiper requires 25 CFM (during the vacuum stroke only)

ABOUT SPEEDLINE TECHNOLOGIES

Speedline Technologies is the global leader in process knowledge and expertise for the PCB assembly and semiconductor industries. Based in Franklin, Massachusetts, U.S.A., the company markets five best-in-class brands — Accel microelectronics cleaning equipment; Camalot dispensing systems; Electrovert wave soldering, reflow soldering, and cleaning equipment; MPM stencil and screen printing systems; and Protect global services, support, and training solutions. For more information, visit us at www.speedlinetech.com.

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