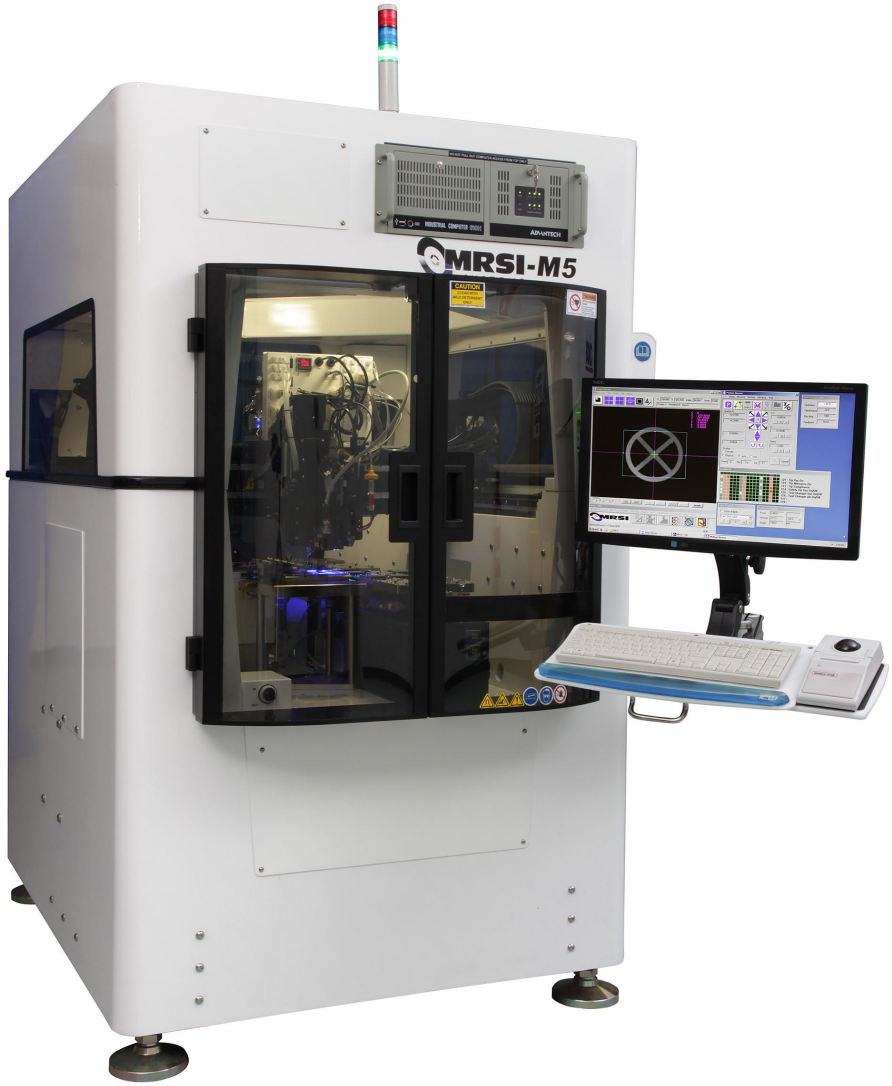
MRSI - M5

ULTRA-PRECISION ASSEMBLY WORK CELL



Turnkey Production for:

- MEMS
- Multi-Chip Modules
- Semiconductor Packaging
- Microwave Modules
- Flip Chip
- Photonics Packaging

MRSI™ SYSTEMS

ACCURACY. SPEED. RELIABILITY

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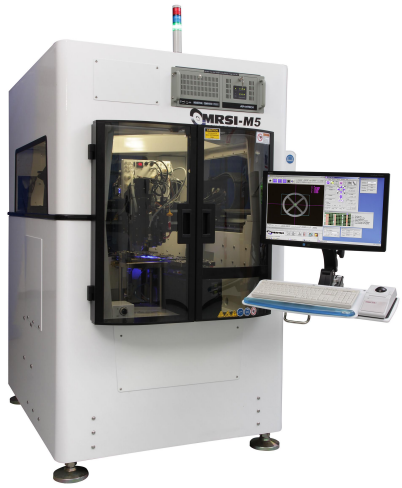
MRSI-M5™ 5 µm Die Bonder



MRSI Systems set the industry standard for precision complex die attach in high volume production environments. With features such as force control, ultra precise placements, and 360° die orientation, MRSI Systems family of automated die bonders established the criterion for die attach for advanced packaging applications.

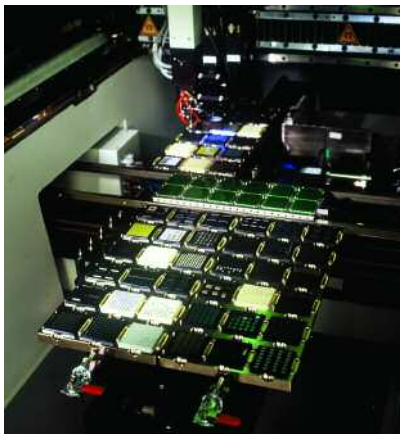
Now MRSI Systems takes die attach to its most advanced level with the MRSI-M5 Assembly Work Cell. Flexible by design, the MRSI-M5 delivers an industry-leading combination of accuracy, speed and reliability for complex epoxy die attach, eutectic and flip chip bonding. The MRSI-M5 is ideally suited for manufacturers of microwave modules, MEMS, advanced semiconductor packages, multi-chip modules, hybrid devices and photonic packages.

The MRSI-M5 is the next generation of die bonders that uses an advanced technology cast composite base for fast and accurate moves with virtually no settling time. The large work envelope is flexible for a variety of configurations depending on customer need. The major system axes use brushless DC linear servo motors with linear glass-scale encoder feedback for high speeds and accurate movements.

The system's closed-loop force control enables placement of delicate Gallium Arsenide (GaAs) die with as little as 5 grams of force. Or the system can be programmed to place with any force up to 10 Kg. Die are picked from waffle pack, Gel-Pak™, wafer, and tape and reel. The MRSI-M5 is also configurable with epoxy dispense pumps, epoxy stamping and eutectic bonding with scrub and temperature control for a complete assembly solution.

MRSI SYSTEMS™

The MRSI-M5 is the Ultimate Die Bonder



Large capacity for many components as required for complex assemblies

Large Work Area

The MRSI-M5's large work area holds up to 72 waffle packs, Gel-Paks™, tape feeders, and wafers. Waffle packs are loaded from the front and back on easily removed and reloaded sector plates. Waffle pack feeders are easily integrated or waffle pack adapters can be used with the automatic wafer changer. Epoxy stamping, in-situ eutectic, and other custom options can all be accommodated simultaneously in the work space.

Material Handling

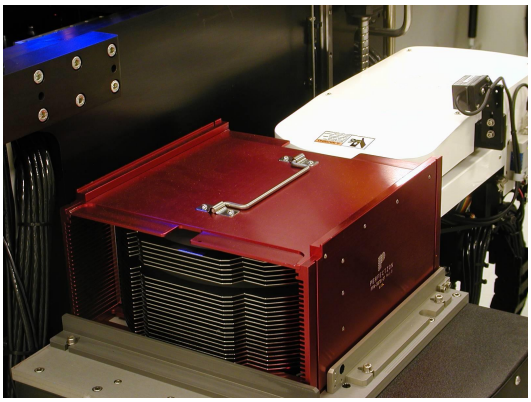
The MRSI-M5 operates in line, cassette-to-cassette or stand alone.
The system's conveyor handles boards, fixture trays, boats and lead frames.
Tooling is modular for easy change-over between production runs.

Tool Change

The system features a thirteen-position tool bank with fast automatic tool change. Additional tool change banks are added for a wider range of tools. The tool change banks hold round surface pick-up tips, perimeter and inverted pyramid collets, and stamping tools.

Wafer Processing

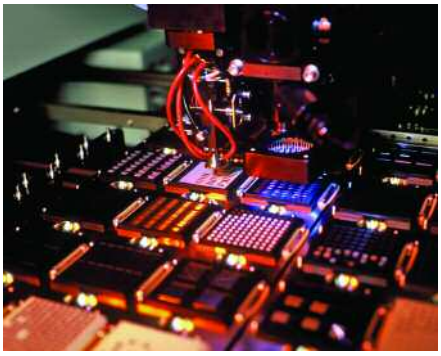
The MRSI-M5's automatic wafer changer operates from cassette, handing multiple wafers simultaneously so that a new wafer is loaded immediately upon unloading the finished wafer. Other features include wafer mapping, ink dot detection, and fast change ejection needle clusters. Thin and fragile die are delicately picked from the wafer tape by synchronizing the movement of the pick head and the ejection needles.



Automatic wafer loading from cassette

High Speed Production

The MRSI-M5 is designed for high speed movements while achieving ultra-precise 5 micron placements. The composite base, low weight gantry, and powerful linear motors are engineered for fast accelerations with submicron resolution. Overall the system is comprised of an unprecedented level of capability and technology, making it one of the greatest performance values on the market. The net result is unrivaled accuracy at high production rates.



Dual magnification cameras are used for substrate and die alignment

Force Control

Closed-loop force feedback enables delicate handling of Gallium Arsenide (GaAs) and Indium Phosphide (InP) devices as well as MEMS devices with fragile microstructures. Die are placed with forces as low as 5 grams. Force is programmed per placement so that each die can be picked and placed with a programmed and controlled force.

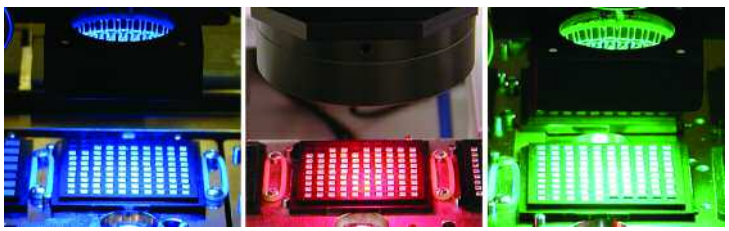
Vision System with 360° Die Orientation

The advanced vision system enables rapid detection and orientation of die over a full 360°. Boundary trace or pattern recognition is used to locate the die center or application critical features. Fast orientation enables die such as MMICs and lasers to be used directly from the supplier without any need for pre-orientation. Global and local vision alignments are used for nested substrates and features. This enables fast, error-free processing of complex assemblies.

An upward looking camera is used for processing flip chips and other components with bottom features.

Programmable Multi-color Lighting

Lighting intensity is programmable for both the ring and collimated lights for each camera. Optimal light settings are determined for die and alignments. Multi-color lighting is used to process a wide range of materials. Red, green and blue programmable lighting is more robust for processing challenging alignment surfaces such as gold on alumina. The more robust vision system means production is not interrupted for missed alignments.



Blue, red and green programmable lighting for vision processing of challenging substrate materials

Eutectic Capability

The MRSI-M5 is equipped with eutectic bonding capability. This capability includes the addition of a reflow station with fast temperature ramping. A heated cover gas of Hydrogen and Nitrogen is present over the hot plate. The system automatically transports the substrate or package to and from the stage for eutectic bonding. The reflow station design includes provisions for vacuum hold down or part clamping.

The eutectic station is programmable to match the requirements of your eutectic process. The temperature ramp rates are programmable to optimize heating of parts while avoiding thermal shock. Multiple temperatures are programmed to bring the substrate to a base temperature before the final rise to the reflow temperature as the part is placed. A programmable mechanical scrub optimizes bonding quality.

Flip chip bonding using the up-looking camera and flux well

Dispense Capability

The system is configured with dual dispense pump capability. Cartridge style positive displacement pumps are used with closed loop servo motors. This provides precise control of epoxy volume when dispensing small dots or area fills. Automatic needle cleaning and needle alignment enable fast setup and switching between pattern types. Three point laser height sensing per alignment determines the tilt of each surface on which material will be dispensed.

Epoxy Stamping

A rotating stamping well with multiple epoxy grooves presents epoxy for stamping. Dot size is determined by a micrometer controlled doctor blade.

Stamping (or daubing) tools are interchangeable with standard pickup tools and are used to create very small epoxy dots by touching down in the stamping well and then on the substrate. Dots as small as 0.004" (100 microns) are possible or ganged stamping tools can be used to place multiple dots simultaneously.

Multiple epoxies with multiple stamping tools enable stamping of a large variety of materials and dot sizes

MRSI Systems Windows Workcell Software

The MRSI-M5's intuitive graphical user interface runs on Windows™ and simplifies the set-up and production process. The software includes a pre-programmed library of waffle pack and die. Additional components are easily taught and are available for all substrate programs. Calibration routines, offline programming, and CAD download mean programming is quick and easy.

The MRSI-M5 is the perfect companion to MRSI Systems dispense equipment since it shares the same software user interface.

Turnkey Integrated Production Lines

MRSI Systems offers a complete solution for advanced packaging, including our family of high-speed precision die bonders and epoxy dispensers. SMEMA compatibility allows integration of our systems with a wide range of compatible process equipment such as in-line ovens for a turnkey solution. MRSI Systems reliable systems combined with our worldwide service and support commitment means your system will always be available for production.

Specifications

Applications	Microwave modules, hybrids, optical modules, epoxy and eutectic die attach
Smallest Die	0.008 inch square
XY Axis Accuracy	5 µm, 3 sigma
Z Axis Accuracy	Place to a force
XY Motors	Brushless DC linear motors with glass scale encoders
X Travel	17.5 in
Y Travel	36.0 in
Z Travel	1.5 in
Θ Travel	360°
Θ Resolution	0.001°
Force Control	Programmable per placement – 5 grams to 10 Kg
Cameras	2 down looking with one shared optical path – 1 up looking
Vision System	Edge detection and pattern recognition
Lighting	Red, green and blue; ring or collimated; programmable intensity
Pickup Tips	13 tips in standard tip change bank; multiple banks are optional; also holds stamping tips
Collets	Perimeter collets, inverted pyramid collets, plus custom
Waffle Packs	Up to 72 2 x 2 in waffle or Gel-Paks or 4 x 4 in
Tape and Reel	2 tape and reel bases with multiple reels each
Eutectic Bonding	Programmable ramp rates up to 450°C
Forming Gas	Nitrogen, Argon or N_2-H_2 or Ar-H_2
Scrub	Programmable plus library of customizable scrub motions
Dispense Pumps	2 cartridge style, rotary, positive displacement pumps
Height Sensing (dispense)	3 point laser height mapping of substrate plane
Dispense Needle Clean	Automatic, programmable occurrence between dispense patterns
Cleanroom Compatibility	Various options available
Dispense Needle Calibration	Automatic software calibration routine using through beam sensors

TURNKEY SYSTEMS

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