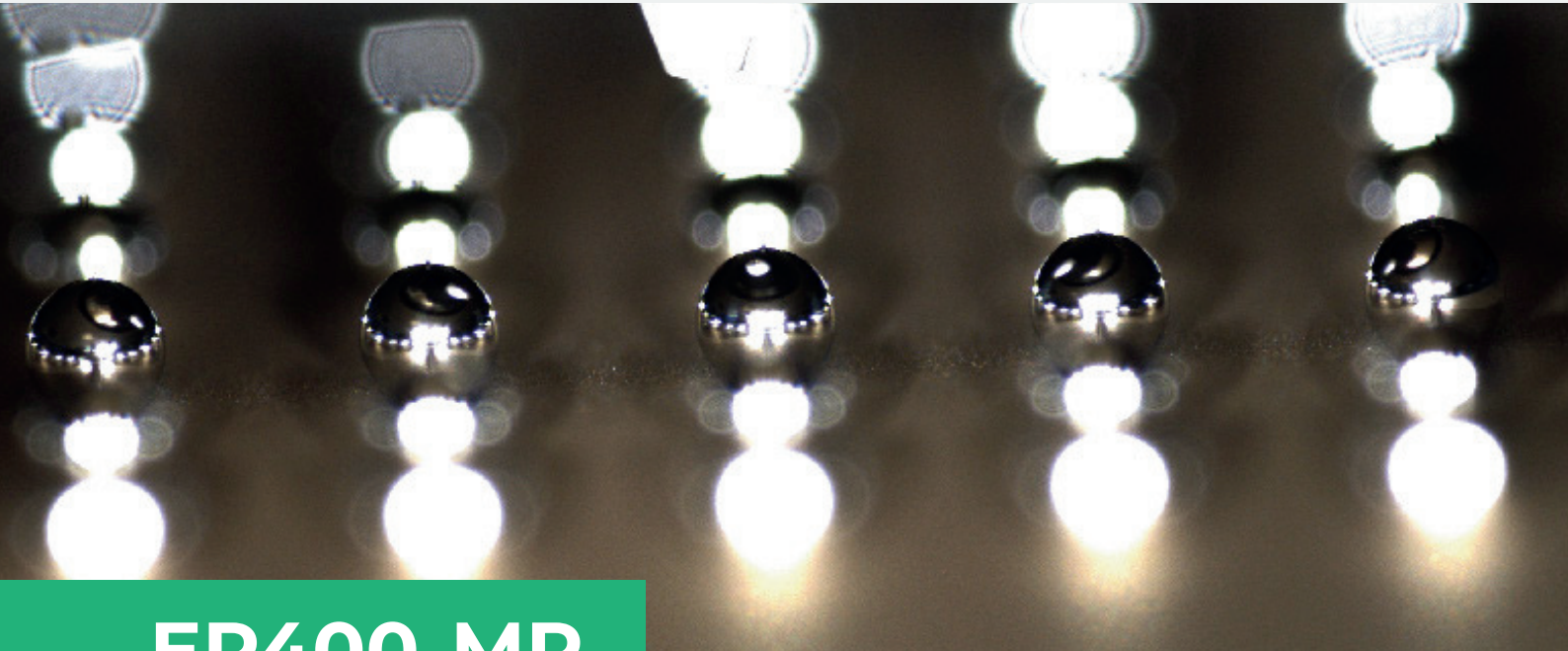


MOLTEN METAL PRINTER



EP400-MP



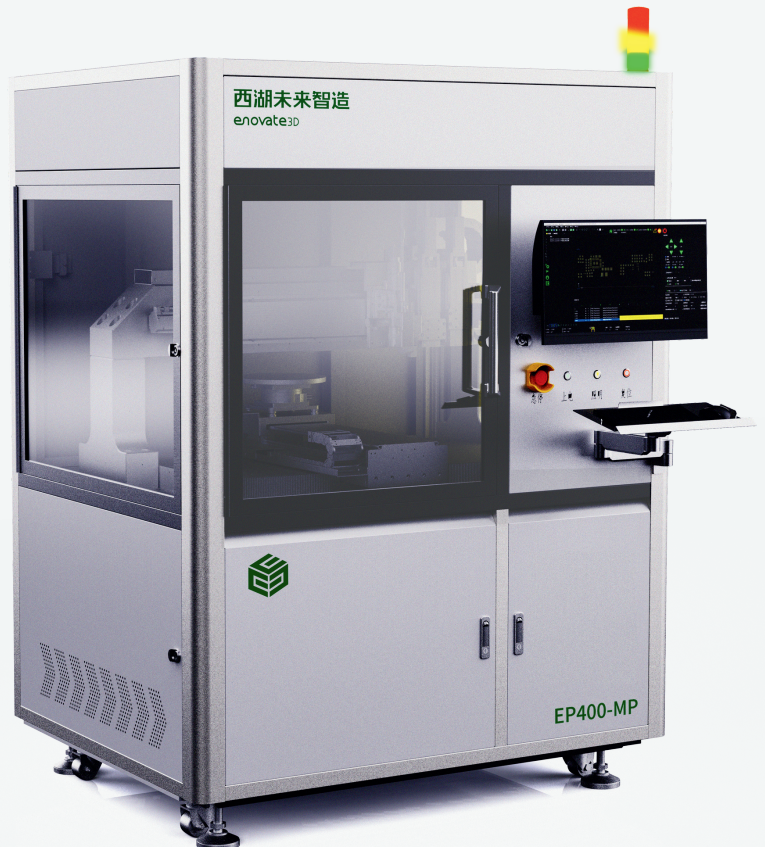
EP400-MP

MOLTEN METAL PRINTER

Eliminate preformed solder sheets &
laser ball bonding

Cut solder material cost

Enable custom solder patterns



enovate3D's EP400-MP Molten Metal Printer adopts pneumatically extruded direct-write printing technology combined with a self-developed molten direct-write valve head. It can heat and melt alloy solders such as InAg, SnBi, and SAC305 for patterned printing. The molten alloy solder solidifies immediately upon contacting the product surface, making it suitable for subsequent soldering and bonding processes. Users can enable software-driven automated processing based on CAD data or parametric programming, replacing traditional methods such as laser ball bonding or preformed solder sheet attachment. This approach reduces raw material costs and improves processing efficiency.

KEY FEATURES

- Supports wafer-level patterned printing of alloy solder (flux-free)
- Provides localized anti-oxidation in inert gas atmosphere
- Features DXF or parametric programming interface with software-driven automated processing
- Self-developed molten direct-write valve head enables molten printing of common solders such as InAg, SnBi, SAC305
- Minimum printed solder feature size: 80 μm
- Supports maximum processing area of 8 inches

SPECIFICATIONS

Motion System	
Equipment Frame	Granite Motion Stage
Travel Range	400 × 400 × 50 mm
Accuracy	X/Y: ±3 μm ; Z: ±5 μm
Max Motion Velocity	X/Y: up to 500 mm/s; Z: up to 50 mm/s
Motion Acceleration	X/Y: 0.5 g ; Z:0.2 g
Printing System	
Printing Valve	Pneumatically driven molten direct-write valve head, supporting molten printing of alloys with melting point ≤250°C (e.g., InAg, SnBi, SAC305)
Material Capacity	10 cc
Printing Nozzles	Ceramic; inner diameter: 50–250 μm
Loading System	
Substrate Dimensions	Supports 8-inch product loading; holder can be heated up to 250°C to assist solder printing and solidification
Carrier Materials	Aluminum alloy heated vacuum chuck
Handling Methods	Vacuum suction; optional automatic loading/unloading module for product transfer
Auxiliary System	
Product alignment	5-megapixel vision camera; visual alignment accuracy: ±5 μm
Laser Rangefinder Sensor	On-board coaxial laser displacement sensor for height tracking between product and printing nozzle; measurement accuracy: ±3 μm
Nozzles Cleaning Unit	Supports automatic printhead cleaning
Purification	Optional FFU (fan filter unit) clean module
Process Capacity	
Via filling diameter	Print flow consistency: ≤ ±5%; Typical printed solder line width: 150 μm/250 μm; minimum line width: 80 μm; Solder aspect ratio: 0.8
Operational Efficiency	>5 mm/s (based on 150 μm line width)
Installation	
Equipment Dimensions	W1500 × D1200 × H2200 mm
Equipment Weight	1300 kg (approx.)
Electrical Requirements	220 VAC/ 50 Hz, 6 kW
Air Supply Pressure	≥0.6 MPa (CDA); Ar (or N2): ≥0.4 MPa
Operating Environment	Temperature: 22±2 °C; Humidity: ≤65%

APPLICATIONS

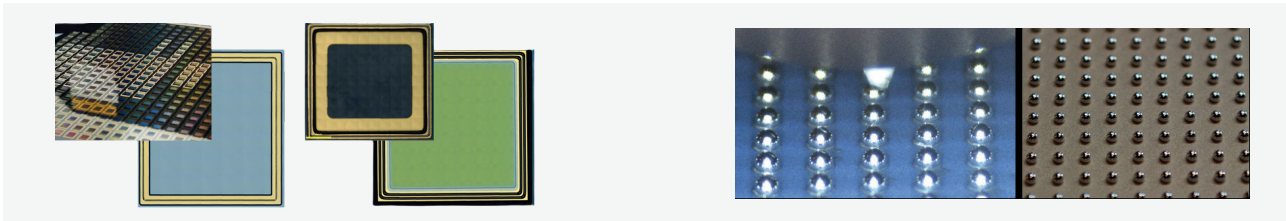
APPLICATION SCENARIOS

Enables hermetic bonding for vacuum electronic or hermetic packaging devices such as MEMS and infrared components. Replaces traditional methods including preformed solder sheets, sputtering/ electroplating, and laser ball bonding—reducing raw material costs, minimizing hermetic package footprint, and improving processing efficiency.

PROCESS SOLUTIONS

Uses commercial alloy solder ingots as raw material. The alloy solder is heated and melted, then continuously extruded in liquid form under pressure. Upon contact with the product surface, the liquid alloy solidifies naturally. This continuous material feeding process requires no strict size control of the incoming material, offering advantages such as patterned printing capability, high efficiency, high flexibility, and low operating cost.

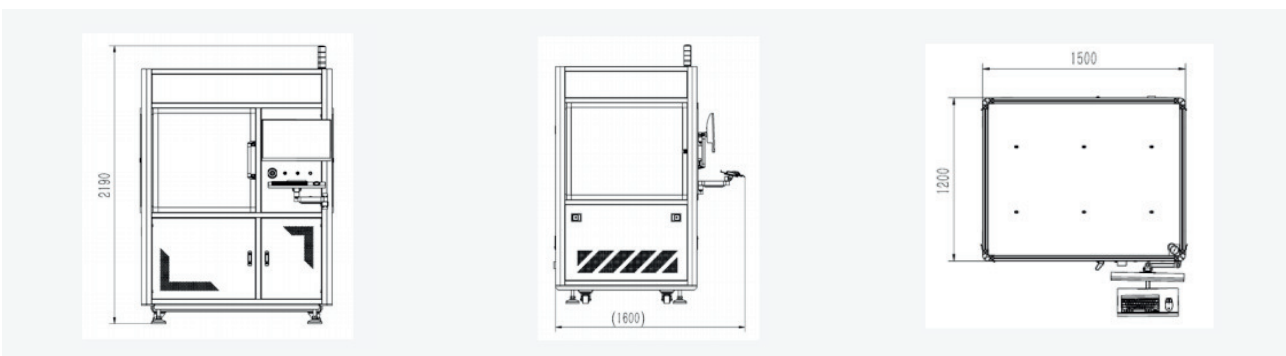
EXAMPLES



Patterned printing of alloy solder on the seal ring area of MEMS hermetic packages

Solder ball bumping on ceramic substrates using alloy solder

DIMENSIONS



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