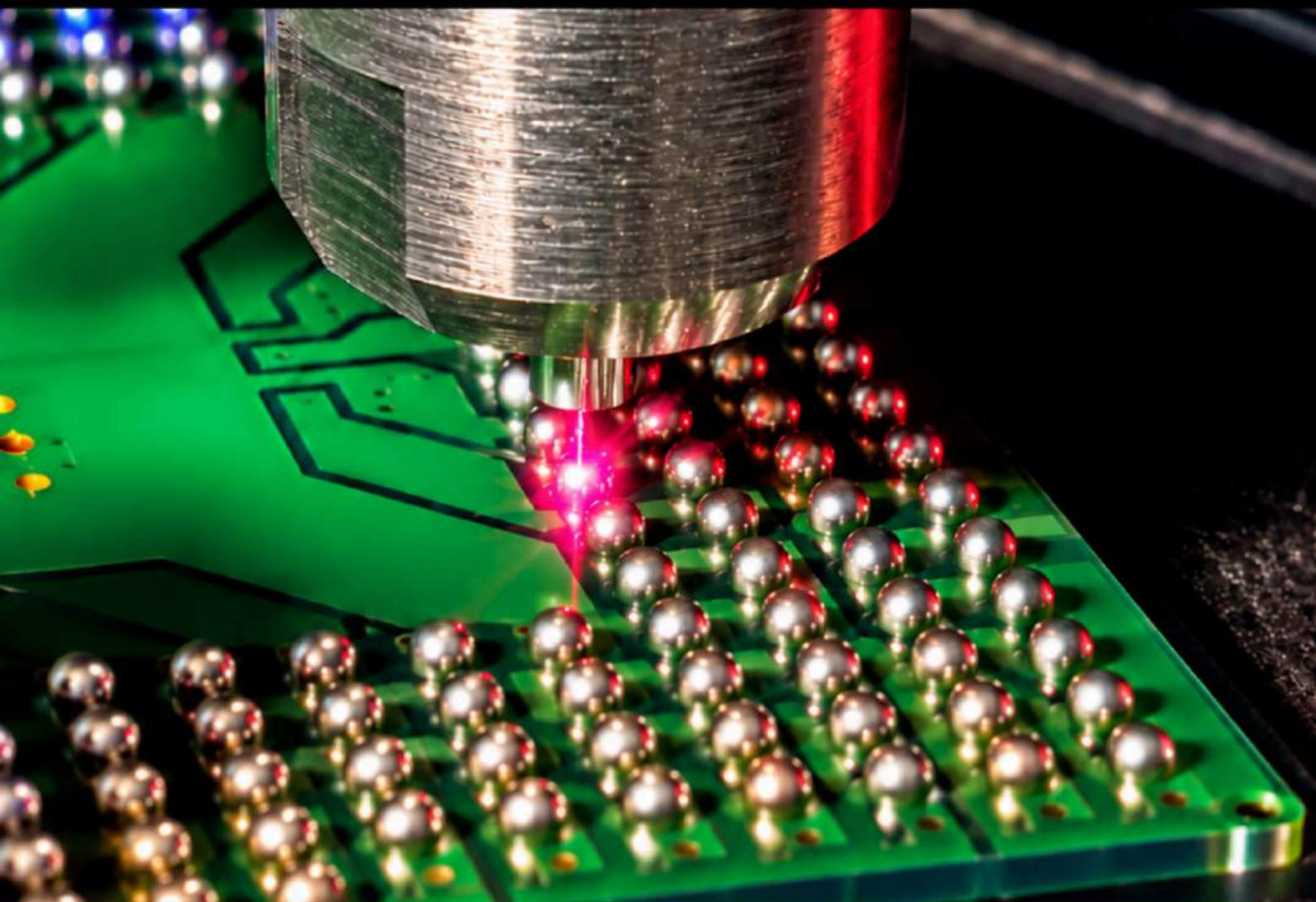


## Advanced Packaging Equipment Solder Jetting & Laser Bonding



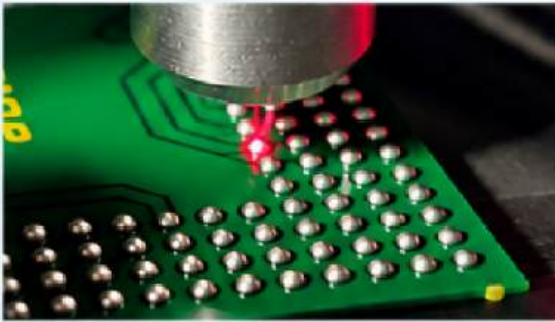
### PRECISION SOLDERING FOR ADVANCED ELECTRONICS

Clean • Precise • Flexible • Non-contact

# LASER SOLDER JETTING

## Standard Application

Clean, precise and flexible non-contact soldering



This high-precision laser soldering machine is suitable for high-precision, high-density welding of micro-components. It is compatible with solder balls made of various alloy materials, including lead-free solder, high-lead solder, and gold-tin alloy solder. It handles solder ball diameters ranging from 40µm to 760µm, including products with ultra-tight pitch. The machine melts solder balls using laser energy and jets them under nitrogen pressure, providing highly accurate ball placement and a flexible soldering solution in low-oxygen environments. Furthermore, it requires no tooling, no flux, and no reflow, offering a low-pressure, pollution-free, and cost-effective operation that is suitable for cleanroom use with optional ESD features.

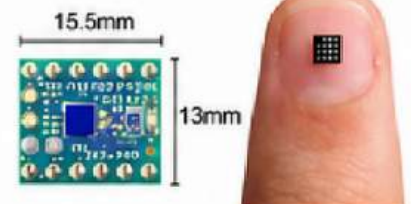
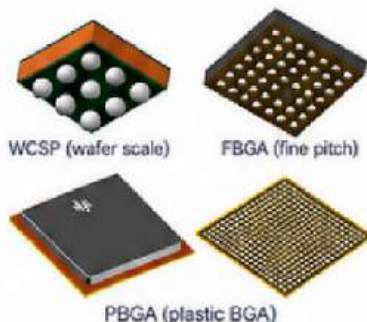
## KEY FEATURES

- Solder Ball Capability range 40µm-760µm
- Solder Spheres Alloys: SnAgCu, SnAg, SnPb, AuSn, InSn
- High Speed up to 20balls/sec
- Heatable Stage
- Auto Laser Alignment
- Auto Capillary Check and Alignment
- Customize Feeding Option (example: conveyor integration with existing line)
- Option items

## TECHNICAL HIGHLIGHTS

- No Tooling
- High Flexibility (Different Pattern)
- Re-Balling Very Small Packages till Hugh PCB's
- No Flux
- No Mechanical Stress / Contactless
- No Thermal Stress (Laser Focused efficiency)
- No Additional Reflow (No Heat within Package)
- No Cleaning of Flux Residues
- Fine Pitch application (below 80-100µm)
- Ideal for interposers
- Ball Stacking
- Bumping - Ball: Leadless Packages (LGA/QFN/....)

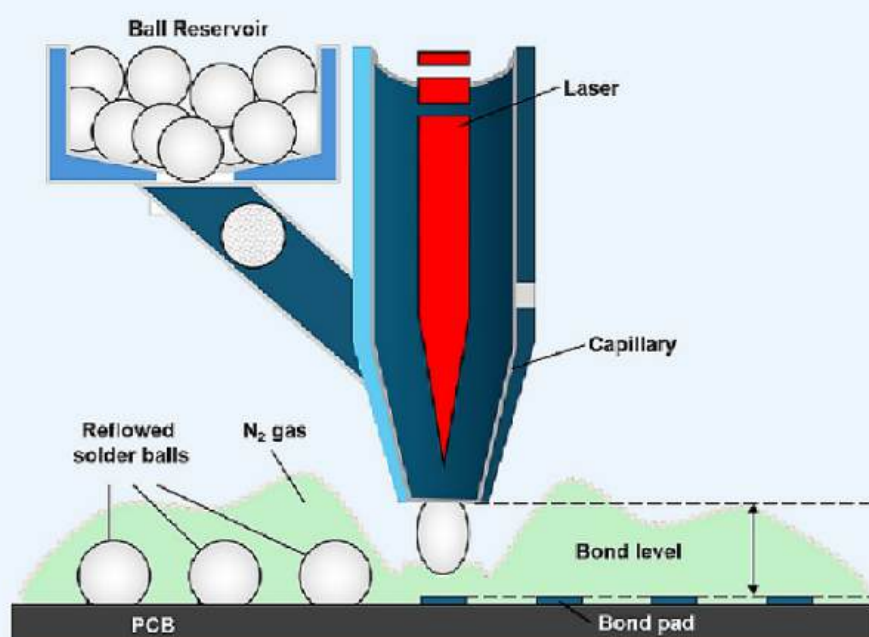
## APPLICATION EXAMPLES



## LASER SOLDER JETTING

Clean, precise and flexible non-contact soldering

Laser solder jetting uses individual solder balls that are fed into a capillary. A focused laser pulse locally melts each ball and transfers it directly to the required solder position, where it immediately reflows to form the joint. The process supports various solder alloys with different melting points and can operate without flux, helping to keep the soldering process clean.



The localized heat input and short laser pulse minimize thermal stress outside the joined surfaces. Because the system dispenses one solder ball at a time, no dedicated tooling is required at the soldering location. This enables flexible positioning and fully contactless soldering.

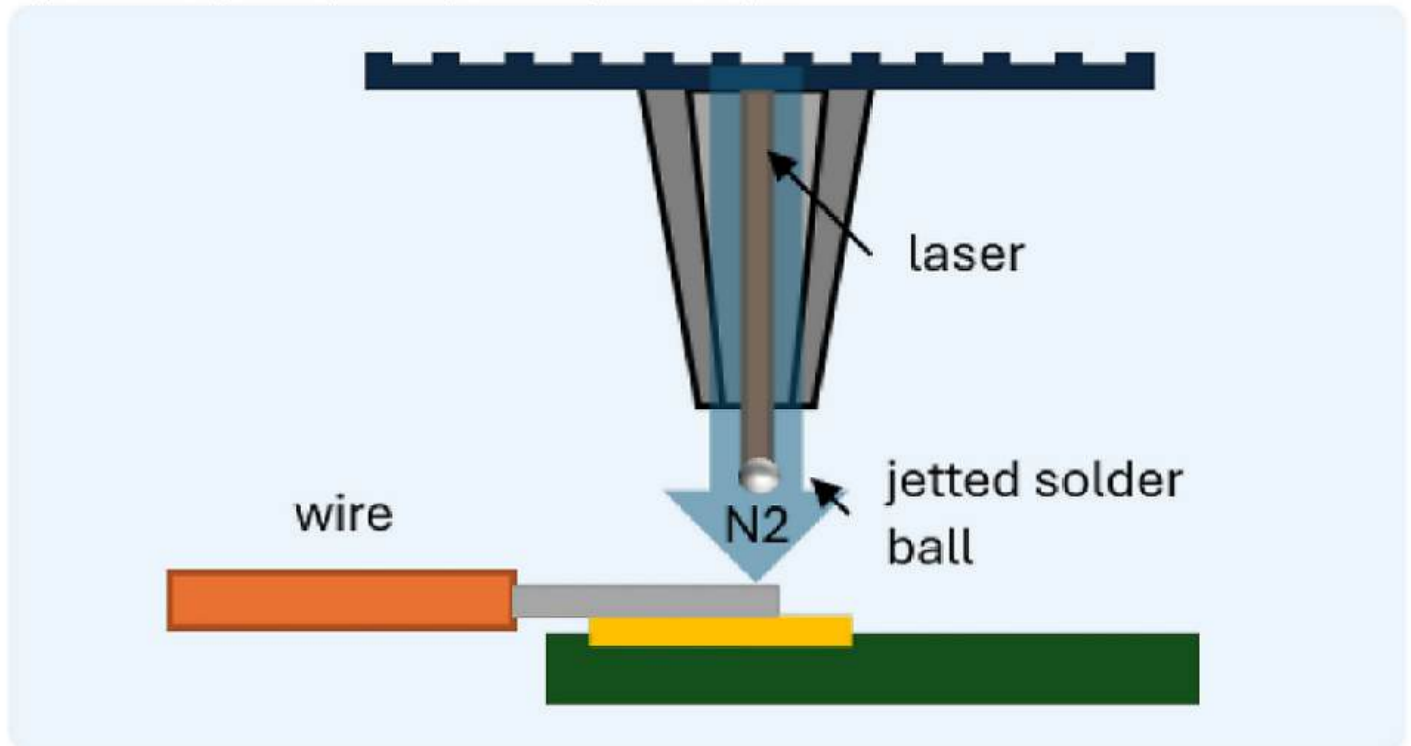
### KEY ADVANTAGES

- Localized heat input
- Minimal thermal stress
- Flexible soldering positions
- Contactless process

## PROCESS PRINCIPLE

### Single-ball laser soldering process

A single solder ball is positioned in the capillary and heated by a focused laser pulse. The molten solder is transferred toward the target under a nitrogen atmosphere and placed directly on the bond pad.



#### 1. BALL FEEDING

A single solder ball is supplied to the capillary.

#### 2. LASER HEATING

A focused laser pulse melts the solder ball locally.

#### 3. NITROGEN TRANSFER

Nitrogen assists the non-contact transfer toward the target.

#### 4. BOND FORMATION

The molten solder is deposited and reflowed on the bond pad.



## TECHNICAL SPECIFICATIONS

|                      |                                                                                  |
|----------------------|----------------------------------------------------------------------------------|
| Dimension            | L x W x H: 1100 mm x 1350 mm x 1950 mm                                           |
| Weight               | About 1250 kg                                                                    |
| Solder Ball size     | $\Phi 300 \mu\text{m}$ to $\Phi 760 \mu\text{m}$ (>760 $\mu\text{m}$ by options) |
| Alloy                | SnPb, SnAg, SnAgCu, AuSn, InSn, SnBi, etc.                                       |
| Speed                | Up to 20 balls/s (depending on ball size)                                        |
| Jetting Accuracy     | 15 $\mu\text{m}$ (Linear system)                                                 |
| Jetting type         | Non-contact                                                                      |
| Laser Options        | 50 W / 100 W / 200 W (by request)                                                |
| Laser Auto Alignment | Optional                                                                         |
| Inspection system    | Optional                                                                         |
| Bondstage            | Stainless steel 300 mm x 300 mm platform heatable till 80 deg                    |

## SLJ-HP (HIGH PRECISION)

Solder Laser Jetting System

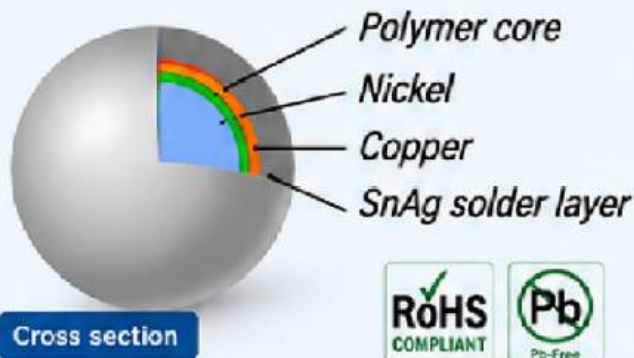


### TECHNICAL SPECIFICATIONS

|                      |                                                               |
|----------------------|---------------------------------------------------------------|
| Dimension            | L x W x H: 1100 mm x 1350 mm x 1950 mm                        |
| Weight               | About 1250 kg                                                 |
| Solder Ball size     | Φ300 μm to Φ760 μm (>760 μm by options)                       |
| Alloy                | SnPb, SnAg, SnAgCu, AuSn, InSn, SnBi, etc.                    |
| Speed                | Up to 20 balls/s (depending on ball size)                     |
| Jetting Accuracy     | 5 μm (Gantry system)                                          |
| Jetting type         | Non-contact                                                   |
| Laser Options        | 50 W / 100 W / 200 W (by request)                             |
| Laser Auto Alignment | Optional                                                      |
| Inspection system    | Optional                                                      |
| Bondstage            | Stainless steel 300 mm x 300 mm platform heatable till 80 deg |

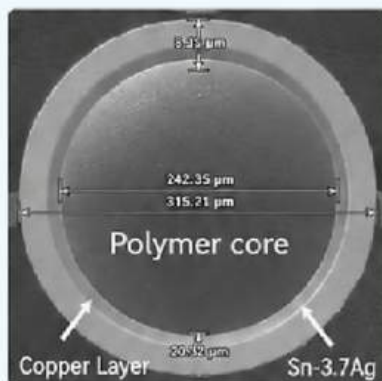
## Special application : Pi-core Solder Balls

- Solder spheres with massive plastic core (polymere & elastomere)
- Solder material coating e.g. SAC<sub>305</sub>

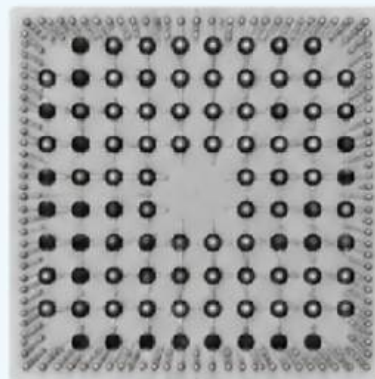


| Part                              | Size or Thickness             |
|-----------------------------------|-------------------------------|
| Polymer core                      | ~ 242 – 315 µm                |
| Nickel layer                      | ~ 3 – 5 µm                    |
| Copper layer                      | ~ 5 – 10 µm                   |
| Solder (e.g. SAC <sub>305</sub> ) | ≥ 5 µm (SB <sup>2</sup> mode) |

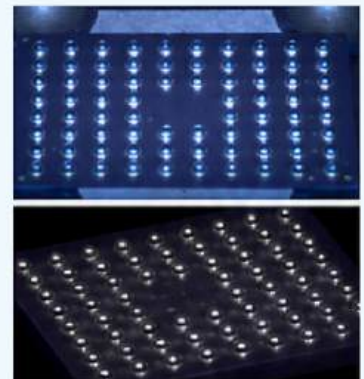
### Examples



Cross section (SEM)



Solder ball array (top view)



Reflowed solder ball array

### Key advantages

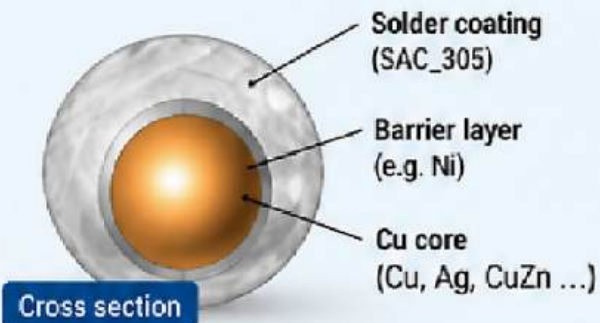
- ✓ Lightweight polymer core
- ✓ Suitable for SB<sup>2</sup> standard mode only
- ✓ Minimum 5 µm solder coating
- ✓ RoHS compliant and Pb-free
- ✓ Suitable for fine pitch applications

### Typical applications

- ✓ Lightweight interconnects
- ✓ MEMS and advanced packaging
- ✓ High I/O count devices
- ✓ Cost-effective solutions
- ✓ Research and development

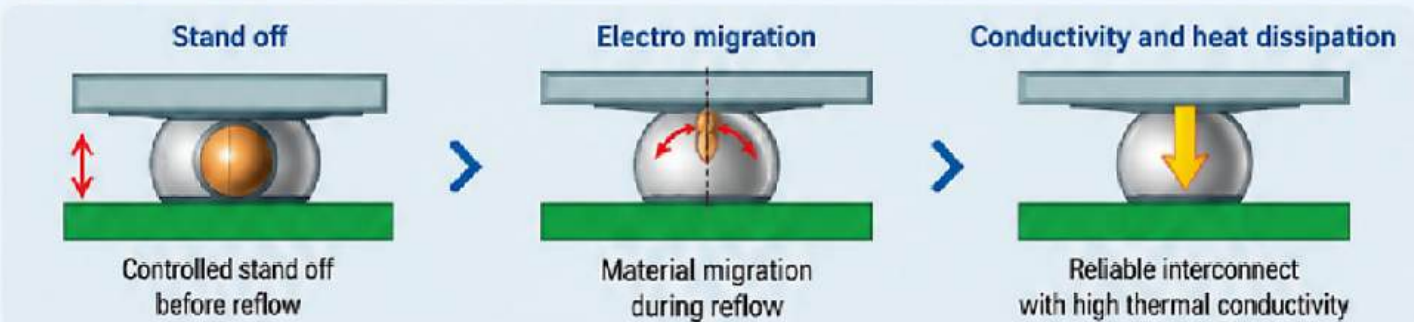
## Special application : Cu-core Solder Balls

- Solder spheres with massive metal core like Cu, Ag, CuZn etc.
- Solder material coating e.g. SAC<sub>305</sub>



| Part                              | Size or Thickness                      |
|-----------------------------------|----------------------------------------|
| Cu core                           | 30 ~ 600 $\mu\text{m}$                 |
| Barrier (e.g. Ni)                 | 2 $\mu\text{m}$ - t                    |
| Solder (e.g. SAC <sub>305</sub> ) | 5 $\mu\text{m}$ - 50 $\mu\text{m}$ - t |

### Reflow process



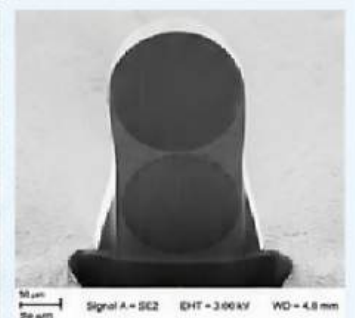
### Application example



### Close-up view



Cu-core solder ball



Cross section (SEM)

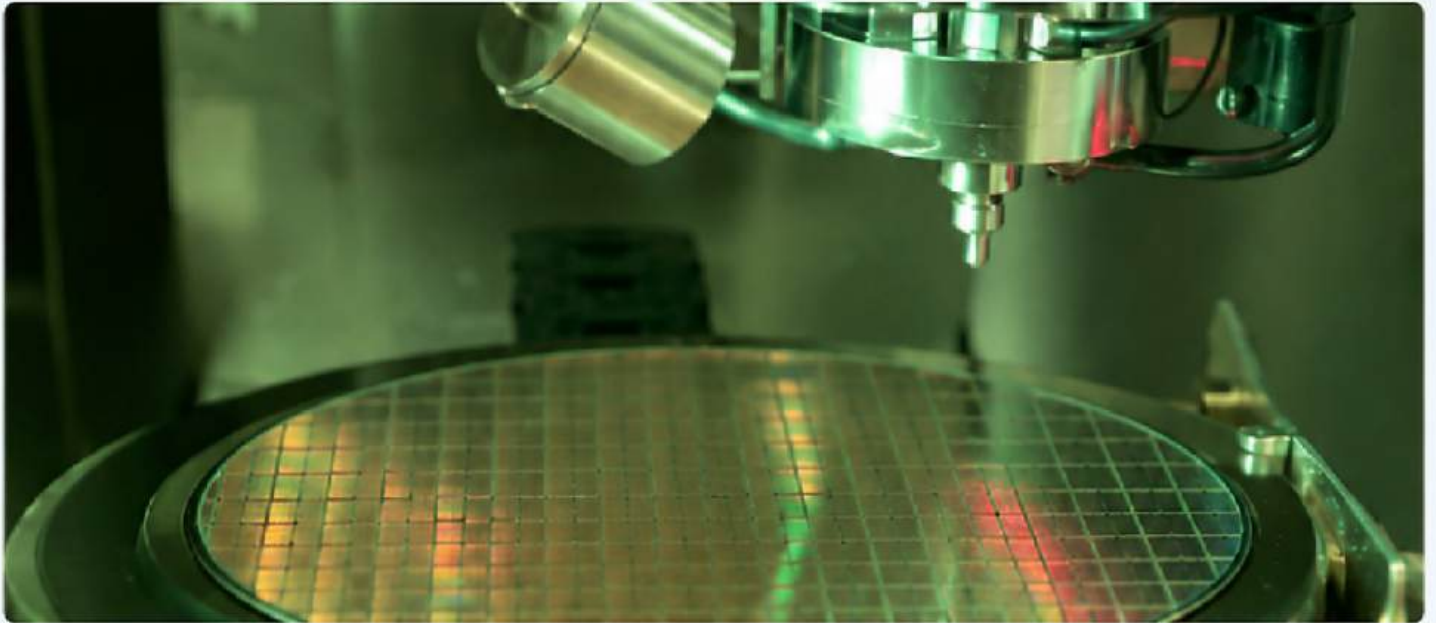
### Key advantages

- ✓ High thermal conductivity due to metal core
- ✓ Suitable for fine pitch and high performance applications
- ✓ Available with different core materials (Cu, Ag, CuZn, ...)

### Typical applications

- ✓ High power LED
- ✓ Advanced IC packaging
- ✓ Automotive electronics
- ✓ Thermal management solutions

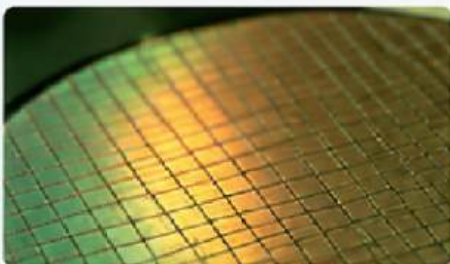
## WAFER SERVICES



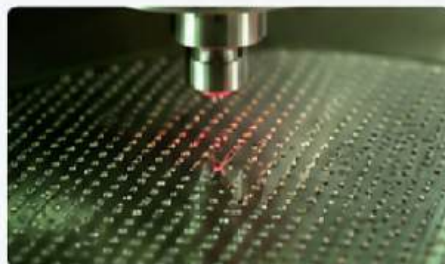
### Solder ball bumping

High precision solder ball/bump placement on wafer level for advanced packaging and high I/O applications.

- ✓ High accuracy and uniformity
- ✓ Suitable for fine pitch applications
- ✓ Wide range of solder ball materials
- ✓ Custom wafer sizes supported
- ✓ Prototyping and volume production



Wafer before reballing



Solder ball/bump attach process



Wafer after reballing

### Our wafer services

- ✓ Solder ball bumping
- ✓ Various solder ball materials (e.g. SAC, SnAg, Cu-core, Pi-core, ...)
- ✓ Process development and optimization
- ✓ Small and large wafer sizes
- ✓ R&D and low-volume production
- ✓ Quality inspection and process control
- ✓ Custom solutions on request

# ART=TRONIX

## ARRAY REBALLING TECHNOLOGY

### DON'T HESITATE TO CONTACT US!

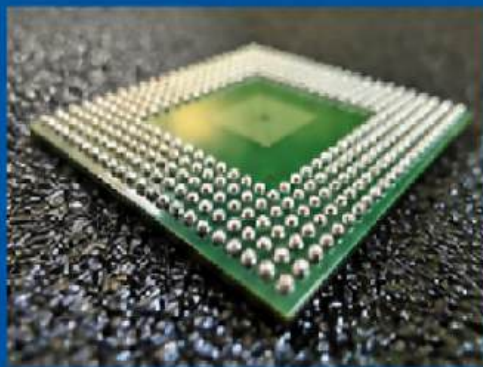
Dear Customer/Partner,

Our company provides specialized services and advanced systems for exclusive LASER reballing and bumping of a wide range of components—including BGA,  $\mu$ BGA, QFN, LGA, interposers, wafers, and flip-chips. We are experts in all area-array and leadless package technologies.

To give you a clear overview of our capabilities, we would be pleased to welcome you at our facility in Eersel (near Eindhoven, The Netherlands).

During this visit, we can walk you through our services and systems in detail and discuss how we can best support your business.

We look forward to meeting you and building a successful partnership together.



### OUR SERVICES:

- ✓ Laser Reballing & Wafer Bumping
- ✓ X-ray Laminography & CT scans
- ✓ Automatic Deballing & Alloy conversion
- ✓ Electrical Curve trace testing



**VISIT OUR WEBSITE**  
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