Solutions for Temporary Bonding and Debonding
Introduction

Temporary bonding is an essential process that offers mechanical support for thin or to-be-thinned wafers, which is important for 3D ICs, power devices and FoWLP wafers as well as for handling fragile substrates, like compound semiconductors. EVG's outstanding bonding know-how is also evident in its temporary bonding equipment, which it has provided since 2001.

Temporary Bonding and Debonding Benefits

Adaptiveness
- Open adhesive platform
- Modular tool layout – throughput optimized depending on specific process
- Product range from manual to fully automated tools

Handling
- Bridge capability for different substrate sizes
- Available with multiple load port options and combinations

Control
- Integrated metrology enables feedback loop for high-yield processes in automated tools
- Integrated software for real-time monitoring and recording of all relevant process parameters
- Fully integrated SECS/GEM interface in automated tools

Temporary Bonding Principle

Front side processed device wafer

Flip wafer

Temporary Bonding on carrier wafer with intermediate layer

Back thinning

Device wafer back side processing

Debonding Principle

Mount wafer stack onto film frame

Debond process

Clean process

Thin wafer on film frame
EVG®850 TB Automated Temporary Bonding System
- Open adhesive platform
- Various carriers (silicon, glass, sapphire, etc.)
- Bridge tool capability for different substrate sizes
- Fully integrated SECS/GEM interface
- Software monitoring of the processes
- Available with multiple load port options and combinations
- Optional integrated inline metrology module for automated feedback loop

EVG®850 DB Automated Debonding System
- Bridge tool capability
- Reliable handling of thinned, bowed and warped wafers with and without topography
- Automated cleaning of debonded wafer and carrier
- Software monitoring of the whole process
- Fully integrated SECS/GEM interface in automated tools
- Modular tool layout – throughput-optimized depending on specific process

EVG®805 Debonding System
- Configurations:
  - Thermal slide off, thermal lift off debonding
  - Mechanical debonding
- Open adhesive platform
- Recipe-controlled system
- Unique features for thin-wafer handling
- Various chuck designs to support wafer/substrates and carriers up to 300 mm

EVG®820 Lamination System
- Automated, stress-free and void-free lamination of any kind of dry adhesive film onto the carrier wafer
- Precision-aligned lamination on carrier wafer
- Protective liner peel-off
- The dry film lamination station can be integrated into an EVG®850 TB temporary bonding system
EVG Debonding Capabilities

<table>
<thead>
<tr>
<th>Laser Debonding</th>
<th>Mechanical and ZoneBOND® Debonding</th>
<th>Slide-Off and Lift-Off Debonding</th>
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<tbody>
<tr>
<td>■ EVG LowTemp™ debonding</td>
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<tr>
<td>■ UV laser release enabling force-free carrier lift-off</td>
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<td>■ Single- or dual-layer adhesive system (thermo-plast, thermostet, photoset and b-stage adhesives)</td>
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<td>■ Independent of device wafer type and surface</td>
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<td>■ UV transparent carrier</td>
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<tr>
<td>■ EVG LowTemp™ debonding</td>
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<tr>
<td>■ Mechanical debonding of single- or multilayer adhesive systems</td>
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<td>■ Predetermined debond start by chemical / mechanical or purely mechanical trigger</td>
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<tr>
<td>■ Debond process latitude and thermal stability are linked</td>
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<tr>
<td>■ Debond is often function of carrier material or device wafer surface topography</td>
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<tr>
<td>■ Thermal debonding</td>
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<td>■ Temperature triggered softening or outgassing of adhesive</td>
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<tr>
<td>■ Single-layer thermoplastic adhesive systems</td>
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<td>■ Invariant to device wafer topography and material</td>
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<td>■ Debonding temperature linked to thermal stability</td>
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LIGHT  FORC E  HEAT

Software and Support

The Windows-based, graphical user interface is designed with a strong focus on user-friendliness, and easily navigates the operator through each process step. Multi-language support, individual user account settings and integrated error logging / reporting and recovery can simplify the user’s daily operation. All EVG systems can also communicate remotely. Thus, our service includes field-proven, real-time remote diagnostics and troubleshooting via secured connection, phone or email. EVG’s experienced process engineers are ready to support you anytime thanks to our de-centralized worldwide support structure, including cleanroom space on three different continents: Europe (HQ), Asia (Japan) and North America (USA).
**Modules for temporary bonding**

- **Spin coat module** also with alignment unit for highly accurate edge coat process
- **Mechanical alignment module** for fast center-to-center alignment
- **Optical edge alignment module** for high-accuracy center-to-center alignment
- **Stacked bake modules** with recipe-controlled proximity pins, temperature and time
- **Bond module** with automatic, low-force wedge error compensation, optional with alignment within bond chamber
- **Inline metrology module** for contactless, non-destructive inspection for 100% production inspection

**Modules for debonding**

- **Laser debond module** for high-throughput, room-temperature debonding – footprint efficient and low maintenance
- **Slide off debond module** for thermal, horizontal debonding where the thin wafer is supported during the whole process
- **Mechanical debond module** with self-aligned debond mechanism for high process repeatability
- **Clean module** capable of handling film frame mounted wafers and high-topography wafers
- **Detape module** for removing temporary bonding adhesives by peeling it off with an adhesive tape
- **Film frame mount module** for lamination of thin wafers or wafer stacks with pre-cutted tapes