



ALIGNER WAFER BONDERS

AML - AWB PLATFORM

The AWB has the versatility to perform aligned:

Anodic, Eutectic, Direct (High & Low Temperature) Glass frit, Adhesive, Solder & Thermo-compression wafer bonding.

The capabilities in terms of temperature, forces and alignment also provide an ideal platform for Aligned Polymer Micro Hot Embossing / Nano imprinting.

ALIGNMENT & BONDING IN ONE MACHINE

- In-situ alignment 1 micron accuracy.
- 10^{-6} mbar Vacuum to 2bar process gas.
- Voltage up to 2.5kV.
- Temperature up to 560° C.
- Forces up to 15kN.
- Market leading fast bonding cycle times / high throughput.
- Wafer sizes 2"- 8".
- In-situ UV cure.



APPLICATIONS

Wafer bonding has found many applications in the field of MST, MEMS, III-Vs & ICs and AML machines can be used in the following applications:

- High accuracy aligned adhesive bonding "best tool".
- MEMS devices - pressure sensors, accelerometers.
- Vacuum encapsulation - 'best tool on the market'.
- 1st Level Packaging of devices e.g. silicon microstructures to isolate package induced stresses.
- Wafer Scale Packaging - MEMS & IC.
- III-V bonding e.g. new high performance LEDs.
- 3D Interconnects & TSV.
- Temporary bonds for handle wafers.
- Advanced bonded substrates e.g. silicon-on-glass (SOG).
- Smart cut - Layer transfer.
- Microfluidics.

AML ALIGNER WAFER BONDERS: MADE BY PEOPLE THAT KNOW ABOUT BONDING

Over 20 years machine & process experience in bonding 'first Aligned Wafer Bonder in 1985!' including the design and fabrication of many micro-devices using the technology.

BENEFITS - AML WAFER BONDERS:

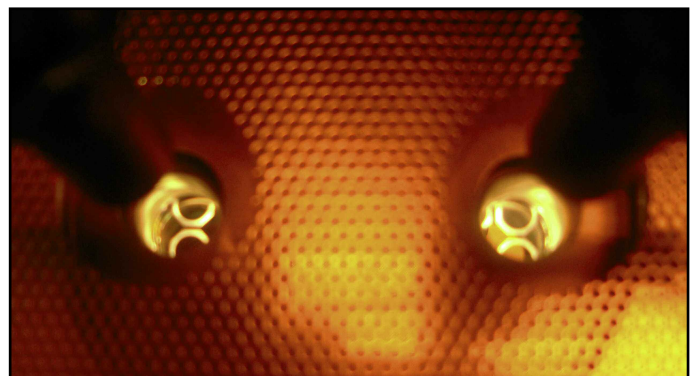
TECHNICAL BENEFITS

- Image capture for wide separation alignment marks.
- In-situ alignment at temperature offers more reliable & accurate post-bond alignment - what you see is what you get!
- Very fast throughput - simultaneous alignment with heating & pumping down < 20-minute cycles.
- No flags, transfer jig, or any contact on bond surfaces.
- See bond formation via in-situ optics, confirm alignment just before bonding - fewer misalignments - Higher yield.
- Controlled heating & cooling to minimise stress.
- Large wafer separation enables differential wafer temperature for Getter process or in-situ surface preparation e.g. oxide removal.
- Align with single side polished wafers.
- Current limited Anodic Bonding for better process control, device reproducibility and reduced stress.
- Versatile flexible platform e.g. most bond types & wafer sizes & Micro-Embossing / Nano Imprinting.
- Fast changeover between wafer sizes e.g. 10 minutes for 3" to 4".
- Multi-stack bonding facility.
- Wafer stacks up to 8mm thickness can be bonded.
- Handle & bond-thin silicon wafers.
- In-house support from process feasibility to qualification - as uniquely AML come from a MEMS design & processing background! AML will help develop your process & customise machines to suit YOU.

COMMERCIAL BENEFITS

- Lowest cost per bond & ownership of any machine available.
- Easy to install; only N2, Compressed Air, Water & Process gas if required.
- Small footprint.
- Market leading, proven, high reliability, minimal servicing.
- Does not take up time (operational or set up) on your mask aligner.
- Standard machines & custom options to suit customer needs.
- Excellent technical process support - fast response.
- Economic high volume production via multiple machines.
- Complete systems - We don't tie you into buying other equipment.
- Worldwide Machine base UK, Europe, USA & Far East.

What you see is what you get!



In-situ alignment = high throughput
In-situ = more possibilities

ALIGN & BOND ONE MACHINE DOES IT ALL

Automatic PC Control & Data acquisition

Live control of all bond parameters or fully automated recipes. All the bonding parameters e.g. current, voltage, integrated charge, temperature, chamber pressure, force, wafer separation, run parameters, recipes, wafer batch No for SPC and event logs are automatically stored in files for graph plotting and trend analysis. Machines can also be networked and remotely interrogated by AML to aid fault finding etc.

Fully automatic recipe, including auto alignment to deskill operation in a production environment.

Alignment:

Manual and auto alignment. In-situ alignment has advantages over other bonders (where alignment is made outside the bond chamber). 'One click' align and bond. Visible and IR. Image capture for widely spaced 3D alignment marks

Alignment can be carried out hot or cold:

This eliminates alignment inaccuracies due to thermal expansion & mismatch between wafers, machine parts & platens.

Large wafer separation:

Allows large temperature difference between wafers – ideal for better activation or in-situ oxide reduction via process gas e.g. forming gas. Also allows fast, high vacuum & well defined bonding environment.

In-situ system:

Also enables visual confirmation just before the bonding process that the desired alignment is still being achieved.

Wafer sizes:

2", 3", 4", 5", 6" & 8". (Also chips & odd shaped substrates, but without alignment).

Manipulator:

Enables in-situ alignment of wafers under vacuum and at elevated temperature.

- Contact force: up to 15kN provided via manual or motorised hydraulics.
- Precise wafer parallelism adjustment.
- Alignment accuracy 1 µm.

AML ALSO PROVIDES A COMMERCIAL PRODUCTION BONDING SERVICE:

- Wafer bonding of customer-supplied wafers.
- Development of customer specific bonding processes.
- Technology transfer of characterised processes.

Use BONDCENTRE for low volume production until it is economic for you to buy a machine.

"The complete package – off-the-shelf & custom machines, bonding process know how with support from our **BONDCENTRE** application lab"

Optics:

Twin Microscope – camera system with through-the-lens illumination. Two CCD cameras and side-by-side display of images. Including IR capability. Simultaneous display of wafer separation & bonding force for complete alignment control.

Bonding Environment:

Vacuum, or process gas. Fully automated dry turbo pumping system ~ 1x10⁻⁶ mbar to 2bar absolute pressure.

Temperature:

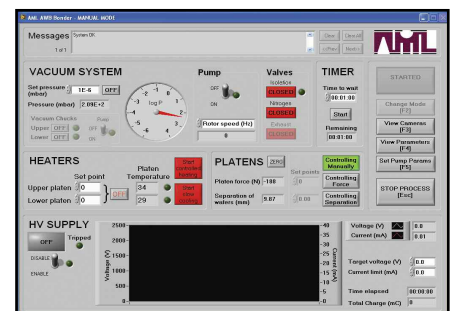
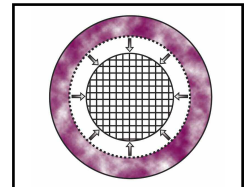
Both Upper & Lower Platens independently adjustable in 1 °C steps. Heating & Cooling rates are programmable. Max Temperature is 560°C.

Electrodes: (for Anodic Bonding)

Full size heated platens for both upper and lower electrodes for better bond uniformity. 0-2.5 kV DC up to 40 mA. Constant current or voltage operation, for improved process control & stress management.

Additional Options:

- Auto alignment.
- Triple stack bonding tool.
- Powered lid.
- Pressure control.
- CMOS compatible.
- High accuracy system for 1µm alignment.
- RAD tool for low temperature activated bonding.
- In-situ UV Cure.
- Motorised X, Y, Ø & Z movement.
- Image capture
- Process support
- Vacuum platens
- Polymer embossing



Platform - Models

AWB-04 – 2" to 6" bonding

AWB-08 – 6" & 8" bonding

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