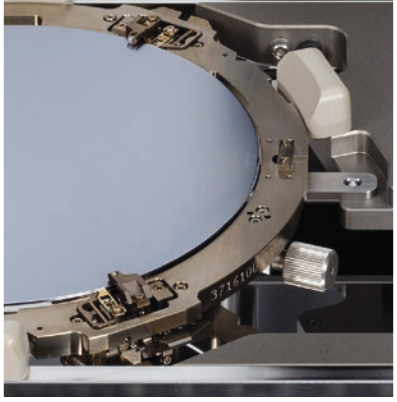

SEMI-AUTOMATED WAFER BONDER

# SUSS XB8

## UNIVERSAL HIGH-FORCE WAFER BONDER - FROM R&D TO VOLUME PRODUCTION

SÜSS MicroTec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## UNIVERSAL HIGH-FORCE WAFER BONDER

**The XB8 wafer bonder is designed for a wide range of bonding processes and supports substrates with a wafer size of up to 200 mm. All process parameters can be adapted flexibly according to the requirements, which makes the system perfect for use in research and development. In production, the high level of automation and the sophisticated design of the XB8 ensure a high degree of process stability. This makes the XB8 wafer bonder ideal for applications in the fields of MEMS, advanced packaging, 3D integration and LED.**

### FLEXIBILITY IN PROCESS DEVELOPMENT

The XB8 wafer bonder offers an extremely large parameter window and is therefore suitable for carrying out all standard bonding processes. Bond force options of 60 kN and 100 kN are available and a temperature range of up to 550 °C is covered. An easy-to-use software allows to set parameters quickly. Ramping functions also enable the process to be adapted optimally to special bonding requirements. Different substrate forms and wafer sizes are processed in specially adapted fixtures. A multi-bond fixture, for example, enables the maximum possible throughput increase by bonding up to eight wafers at once. With its variable usage options the XB8 wafer bonder is the right choice for process development.

### PROCESS STABILITY THROUGH HIGH REPEAT ACCURACY

Reproducible process results from wafer to wafer are essential for achieving a consistently high product quality. The XB8 wafer bonder has a closed process chamber with an automatic loading function. During loading, the chamber is flooded with nitrogen to ensure the best possible level of cleanliness. The high level of automation minimizes the influence the operator has on the process result. The thermal decoupling of the heater from the actual bonding chamber enables process temperatures which can be precisely repeated, combined with an optimal repeat accuracy of the bonding force. The independence from the operator together with the sophisticated design of the XB8 wafer bonder guarantees consistently high process stability and an optimal process result.

### HIGHLIGHTS

+ Bond force up to 100 kN and temperature up to 550 °C
+ Excellent bond force and temperature uniformity
+ Chamber pressure from 5 x 10-5 mbar to 3 bar absolute
+ Various tooling options to cover a wide range of applications
+ Fast heating and active cooling for high throughput
+ High degree of automation to minimize operator intervention



### DESIGNED FOR ALL TYPES OF BOND PROCESSES AND BOND APPLICATIONS

+ Metal Diffusion Bonding
+ Eutectic and SLID Bonding
+ Hybrid and Fusion Bonding
+ Glass Frit Bonding
+ Adhesive Bonding
+ Anodic Bonding
+ Temporary Bonding

### HIGH YIELD DUE TO THE HOMOGENEITY OF THE TEMPERATURE AND BONDING FORCE DISTRIBUTION

In addition to the reproducibility of the bonding process from wafer to wafer, a homogeneous process result across the wafer is essential for achieving a high yield. The thermally decoupled ceramic heaters guarantee an even temperature distribution and also ensure an optimal bonding force homogeneity within the entire temperature range. Advanced control of the temperature distribution is assured by the unique SUSS MicroTec multi-zone heating system. With the XB8, the bonding force is captured via a construction, consisting of three pillars, which is decoupled from the vacuum chamber. There are also bonding force zones for 4", 6" and 8" wafers. This innovative, mechanical and thermal structure of the XB8 wafer bonder enables perfect bonding force and temperature distribution across the wafer, resulting in a high yield.

## BOND TOOLING OPTIONS AND FEATURES

MEETING UNIQUE PROCESS REQUIREMENTS

### CENTER PIN TOOLING OPTION

This tooling option can be used with the open and closed fixture and allows fusion bonding in a controlled atmosphere. It can also help achieving the best possible post-bond alignment by holding the wafers in place during pump down and spacer flag removal. The center pin can be pre-loaded with a recipe programmable bond force in order to ensure uniform bond results.

### OPEN FIXTURES

The open fixture features a transport ring with minimum contact area for wafer support and maximized contact between the wafer and tooling plates. Its low thermal mass ensures minimum cooling time after unloading the fixture from the bond chamber. This type of fixture allows direct contact between the wafers and the lower and upper tooling plate which results in optimum temperature uniformity across the wafers. In addition, this enables optimal heating and cooling rates and is therefore the best choice for high throughput applications.

### CLOSED FIXTURES

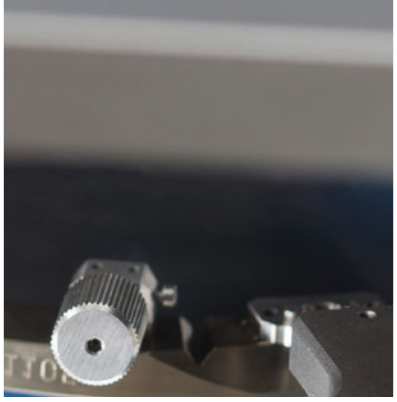
Featuring a transport ring with an integrated SiC tooling plate, closed fixtures are designed for handling irregular substrate shapes as well as sensitive material such as lithium tantalate. The closed fixture is ideal for fragile substrates like MEMS and optical devices as the wafers are fully supported and protected during handling.

### MULTI-BOND FIXTURES

The multi-bond fixture is used in combination with a special loading and mechanical alignment system and supports multi-wafer bonding and multiple wafer sizes at the same time. Bonding multiple wafers during the same bond cycle allows to maximize the overall system throughput.

### SEQUENTIAL SPACER REMOVAL

The force-free spacer removal ensures best post-bond alignment, when spacers are required for the bond process. The sequential spacer removal option gives the operator maximum flexibility to control the removal of spacers. The design allows for an individual removal of each of the three spacers controlled by the bond recipe. During the removal sequence, the clamp at the respective position is lifted from the wafer stack, the spacer is removed and afterwards the clamp is set again to secure the alignment.


# SUSS XB8

## TECHNICAL DATA

| GENERAL FEATURES | |
|---|---|
| **Substrate Size** | 4", 6", 8" wafers<br>dedicated tooling for pieces |
| **TEMPERATURE MANAGEMENT** | |
| **Heater Design** | Independent resistive ceramic heaters with active cooling and multi-zone heaters |
| **Maximum Temperature** | Up to 550 °C |
| **Temperature Uniformity** | < 1.5 % |
| **Temperature Repeatability** | ± 3 °C |
| **Maximum Heating Rate** | Up to 30 K/min with recipe controlled ramping function |
| **Maximum Cooling Rate** | Up to 30 K/min with recipe controlled ramping function |
| **BOND FORCE** | |
| **Maximum Bond Force** | 60 kN or 100 kN<br>Bond force zones for 4", 6" and 8" wafers |
| **Bond Force Repeatability** | < ± 2 % |
| **GRAPHICAL USER INTERFACE** | |
| | MS Windows™ based operating system |
| | Unlimited storage of recipes |
| | Flat panel display with pointing device |

| PROCESS CHAMBER | |
|---|---|
| **Minimum Pressure** | 5 x $10^{-5}$ mbar after 5 min pump-down |
| **Maximum Pressure** | 2 bar overpressure (3 bar absolute) |
| **Chamber Design** | Electro-polished class 1 stainless steel bond chamber with gate valve |
| **MEDIA SUPPLY** | |
| **Vacuum** | < 100 mbar absolute |
| **Compressed Air** | 6-7 bar (CDA) |
| **Nitrogen** | 5-6 bar |
| **Power Requirements** | 208/400 VAC, 60/50 Hz; 50/30 A |
| **Exhaust** | 600 SLPM |
| **PHYSICAL DIMENSIONS** | |
| **Height x Width x Depth** | 1469 mm x 778 mm x 1710 mm |
| **Weight** | 700 kg |

*Data, design and specification depend on individual process conditions and can vary according to equipment configurations. Not all specifications may be valid simultaneously. Illustrations, photos and specifications in this brochure are not legally binding. SUSS MicroTec reserves the right to change machine specifications without prior notice.*

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