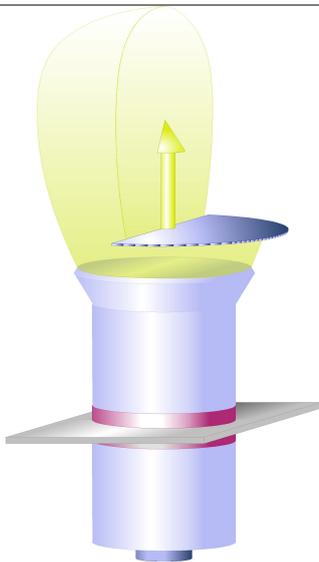


## Non-Contact Handling

## Technology / Physical Principle **Ultrasonic Suspension**



Functional Principle of the Ultrasonic Suspension

All of our handling systems use the unique and globally patented ultrasonic suspension technology which can be applied in any atmospheric process.

### **Ultrasound**

Ultrasound is a vibration at frequencies beyond the upper limit of human hearing ( $f > 20$  kHz). It is generated by transducers which are powered by separate power electronics.

### **Squeeze-film Levitation**

The physics of the ultrasonic suspension derives more from fluid dynamics than from acoustic principles. The gas pressure in the gap between the workpiece and the vibrating surface of the sound generator rises due to the cyclic compression and decompression of the thin gas film. Therefore it is necessary to create a uniform vibration pattern in order to generate equal levitation forces throughout the whole vibrating surface. This is one of the core competences of ZS-Handling: we trim the sound!

### **Repelling Forces**

Using the squeeze-film levitation significant repelling forces can be generated between the sound source and the workpiece. Therefore the workpiece can be moved without any friction. The force profile is similar to that of a conventional air bearing. However no compressed air-supply is necessary. The ultrasound technology uses the ambient air or (process) gas at the interface for the pressure generation.

### **Top-Side Handling**

Many handling processes need the use of attracting and repelling forces at the same time, e.g. top-side handling. In these cases repelling ultrasound forces are used in combination with attracting low-pressure forces. This technique enables an easy-to-use non-contact handling of parts, very much like the familiar top-side-gripping of parts.

Additionally flexible parts can be kept in position and geometry by this technique without any contact to the handling tool.

## Non-Contact Handling

Glass-Conveyor



Thinned Substrates



Die-Assembly



## Product Data

### Ultrasonic Suspension

The ultrasound air bearing technology can be applied to a wide variety of plane objects with reproducible and sound reflecting surfaces. Numerous industries and applications can benefit from this technology. Sensitive handling is not only required in clean-rooms.

#### Exemplary Applications

- Semiconductor Wafers and Components
- Photovoltaic Wafers, Cells and Modules
- MEMS and MOEMS
- BioChips
- TFT, LCD, Touch Screens
- Glasses
- Ceramics
- Optical lenses
- Machined Surfaces
- Special coatings and lacquered sheets
- Scratch sensitive components
- Printed sheets, papers and packaging materials

#### Highlights

- The non-contact die-gripper ( $m < 500$  g) can be installed on any common robot or axis-system.
- High maximum acceleration, up to 5 g ( $\sim 50$  m/s<sup>2</sup>)
- Low requirements regarding the placement of the parts at allocation

#### Your benefits

The ultrasonic suspension technology offers a series of benefits compared to state-of-the-art solutions e.g. bernoulli-systems or standard air bearings:

- No mechanical contact between tool and substrate
- No air-supply/conditioning
- No dynamic turbulences in the environmental gas
- No negative influences on the flow of gas in cleanrooms
- Lowest breakage-rates
- Lower energy consumption even large table-like systems only have a power-input of some 300 W/m<sup>2</sup>
- Modular design

#### Your Experts in Ultrapure Handling

ZS-Handling GmbH  
Budapester Strasse 2  
93055 Regensburg  
Germany

Telephone (EU) +49-941-60389-900  
Fax +49-941-60389-999  
info@zs-handling.com  
www.zs-handling.com