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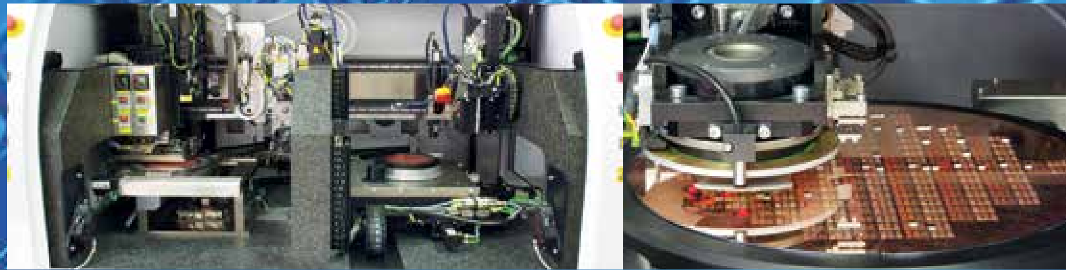

# AFC$^{PLUS}$

## high accuracy
## Die & Flip Chip Bonder

MORE THAN PRECISION

# AFC
## Precision of Assembly +/- 0.5 μm

- Modular machine concept
- +/- 0.5μm placement accuracy
- Flip-chip option
- Assembly of chip and micro-optics
  - WDM, optoelectronic components, micro-lenses, micro- mechanics
- Auto Loading for Substrate Wafer
- Wafer mapping
- Epoxy stamping and dispensing
- Eutectic bonding via diode-laser or heatingplate
- Passive alignment
- Active alignment on request
- Active bond-force-control
- Postbond inspection / measurement
- UV-Curing (option)

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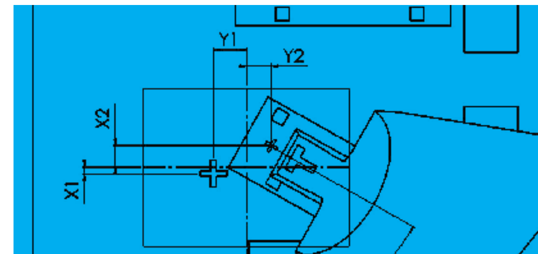
## Laser and Eutectic Soldering

- Adjustable heating courses with high soldering temperatures (up to 600°)
- Shortest soldering time (<1s)
- Best yield and high quality by repeatability of laser soldering
- Hot pick up tool (up to 350° C)

## Technical Concept

- Relative positioning
- Substrate and chip position measured during alignement with the same camera system

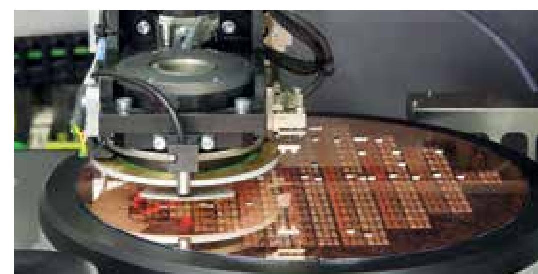



## Precision Components

- Vibration damping due granite base design
- High precision stages driven by AC motors
- Precision vision system with high resolution CCD-cameras
- High accuracy bondhead
- Flip-Chip-Unit
- Wafer, Wafflepack, Gel-Pak

## Passive alignment

- Permanent observation of the components through stationary high resolution cameras
- Controlling the position during alignment and setting process
- Die alignment to active components (e.g. microlenses to energized laserchip)
- Die alignment to fiducial marks (e.g. V-groove)
- Flipped Die alignment through up- and down-side correlation



# Technical Informations

## Gerneral

| | |
|---|---|
| control | multi-axis-controller |
| operating system | Windows 7 |
| programming | keyboard and graphic display / touch display |
| operator interface | menu driven, English |
| data transfer | ethernet TCP/IP , electronic connection: 10 Base T, 10 Mbit/s |

## Equipment

### BONDHEAD TRANSFER SYSTEM

| | |
|---|---|
| function | moves bondhead from source side (chip side) to destination side (substrate side) |
| coarse X axis positioning | linear motor driven, high velocity and acceleration; noncontact linear encoder, resolution 0,1 µm |
| Z axis | AC servo drive, noncontact linear encoder, resolution 1µm |

### BONDING STAGE FOR SUBSTRATE

| | |
|---|---|
| XY axis | AC or stepper motor driven, open-frame design (optional linear motor) |
| range of XY axis | 300 x 300 mm |
| optinal: rotations Axis | stepper motor-driven, 360°, resolution 0.01° |

### SOURCE TABLE FOR WAFER

| | |
|---|---|
| XY axis | AC or stepper motor driven, open-frame design (optional linear motor) |
| range of XY axis | 300 x 300 mm |
| optional: rotations axis | stepper motor-driven, 360°, resolution 0.01° |

### CAMERA AXIS

| | |
|---|---|
| Z axis (focussing) | AC servo drive, resolution 1 µm |

### BOND HEAD

| | |
|---|---|
| function | design for active adjustment; high accuracy positioning; bondforce controlling |
| XY axis | piezo driven; resolution 0.1µm; range 400µm x 400µm |
| rotation axis | 360°, resolution 0.001° |
| bond force | programmable, standard working area 3 -2000 g; resolution 0.5 g (other working area available) determines first mechanical contact |
| touch sensor | between chip and substrate |

### EJECTION SYSTEMS

| | |
|---|---|
| needle systems | single or multi-needle system according to component size |
| ejection needle type | 0.7 mm shaft diameter, 17.0 mm long, radius 25µm, other needles on request |
| ejection height | programmable height and delays |
| ejection speed | programmable |

## Lasersystem

| | |
|---|---|
| function | for fast eutectic bonding with controlled heat |
| technique | fiber-coupled high power laser with focussing optic |
| max. output power | 45 W / 75 W / 100 W |
| center wavelength | 808 nm (+-10%) other wavelength on request |
| temperature | programmable, range: up to 400° C; online measurement phyrometer |
| pulsetime | free programmable profike controlled by power and temperature |

## Image Recognition

| | |
|---|---|
| vision System | COGNEX |
| focussing | programmable; optional autofocus function during programming |
| recognition methods | standard vision tools; special filter for micro stuctures |
| pattern recognition | programmable windows and models |

Amicra follows a policy of continuous product improvement.
Specifications are subject to change without notice.
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### SOURCE CAMERA (MATERIAL SIDE E.G. LASERCHIP)

| | |
|---|---|
| Example | |
| CCD camera | 1/ 1.8 " 2MPx |
| magnification | 5x; other magnification on request |
| field of view | approx. 1,3 x 1 $mm^2$ |
| illumination | coaxial lighting; LED or halogen, optional RGB |

### DESTINATION CAMERA (SUBSTRAT SIDE)

| | |
|---|---|
| Example | |
| CCD camera | 1 / 1.8" 2MPx |
| magnification | 5x; other maginification on request |
| field of view /FOV/Pixel | approx. 1,3 x 1 $mm^2$ |
| resolution | approx. 0,8 µm/Pixel at 1/2" CCD-chip |
| illumination | coaxial lighting; LED or halogen, optional RGB |

### UPWARD CAMERA FOR FLIP CHIP CORRELATION

| | |
|---|---|
| Example | |
| CCD camera | 1 / 1.8" 2MPx |
| magnification | 5x; other magnification on request |
| field of view /FOV/ Pixel | approx. 1,3 x 1 $mm^2$ |
| resolution | approx. 0,8 µm/Pixel at 1/2" CCD-chip |
| illumination | coaxial lighting; LED or halogen, optional RGB |

## Dimensions/ Power ratings

| | |
|---|---|
| size (WxDxH), weight | 1400 x 1200 x 1700 mm, 2100 kg |
| vacuum | - 0.8 bar, Throughput: 3 $m^3$/h |
| compressed air | 5 bar dry and oilfree air |
| nitrogen | 1 bar |
| electrical power ratings | distribution voltage: 400 V opt. 230 V/115V |
| ambient temperature | 18 to 25 °C |
| relative humidity | non-condensing |

## Capacity Ratings

| | |
|---|---|
| module-specific cycle time | 20 s depending on configuration and application |
| module-specific cycle time for flip-chip process | 20 s depending on configuration and application |
| throughput | |
| machine availability | up to 200 components/h device dependent >95% |
| accuracy | +/- 0.5 µm@3s |

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