The Structure of Laser Bonding Machine

- **Features**
  - Ceramic Substrate: LTCC (HTCC 0.5 ~ 1.0 sec Increase)
  - Pin pitch: > 60 μm (Gripper type)
  - Bonding accuracy: available for NANDFLASH and D-RAM
  - Auto-soldering by pin/pad type recipe
  - Solder paste: SnAgCu
  - Card size: 8’, 12’
  - Auto alignment function of probe card

Flow Chart of the Process

- **Soldering/Inspection**
  - Card Load
  - Card Alignment (x-y-θ)
  - Tray Pick-up/Forming (x,y)/(x,y,θ)
  - Pin Alignment (x-y-z)
  - Laser Soldering
  - Pin Inspection
  - Judgment (Operator)
  - Solder Paste Dipping
  - NG
  - OK
  - Finish
**Auto-Focus Function**

- **Align Mark / Ceramic Flatness (Probe Tip to PAD) Measurement**
- **Probe X, Y, Z after Soldering Measurement**

Align Mark of each Dut is measured by Auto Focus.

**Auto-Focus Function**

- **After Bonding**
  - **Automatic 3D Measurement _ X, Y, Z**

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**The Structure of Laser bonding Machine**

- **Gripper 1 Unit**
- **Tray Loading Unit**
- **Solder Paste Dipping Unit**
- **Forming Unit**
- **Auto Focusing Unit**
- **Laser Unit**
- **Gripper 2 Unit**
- **Chuck Table Unit**
- **Pin Handling**
- **Soldering**
Bonding Reliability

- Soldering Fillet: Fillet has a significant impact on accuracy.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Probe Base</th>
<th>Solder</th>
<th>Fillet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solder: gold plated</td>
<td></td>
<td></td>
<td>Best</td>
</tr>
<tr>
<td>Solder: Au plated</td>
<td></td>
<td></td>
<td>Best</td>
</tr>
<tr>
<td>Solder: Sn plated</td>
<td></td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>Solder: Cu plated</td>
<td></td>
<td></td>
<td>Poor</td>
</tr>
</tbody>
</table>

Bonding Accuracy

- Bonding Accuracy Data: X - axis accuracy was influenced by solder fillet.

- Bonding Accuracy Data: Y- axis is not little influenced.

- Bonding Accuracy Data: Z – axis accuracy was influenced by solder fillet.

Discussion

- The bonding accuracy depends on various factor such as solder fillet, oxidized surface of the probe, solder volume and laser parameters.
- In especial the greatest effect on the accuracy is the solder fillet symmetry on both sides of the probe.
- Good fillet was shown in Au plated probe which had excellent wettability of the surface.
- High bonding force is obtained by a good fillet on both sides of the probe.

Summary

- 2D MEMS probe cards manufacturing is realized by using a laser bonding process.
- The bonding accuracy obtained in this work can be applied for NANDFLASH and D-RAM probe card.
- We are going to investigate the effect by various solder type such as AuSn and SnAgCuIn to increase a bonding force.

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Thanks for Your Attention

- Contact Our Team with any questions.

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