iBond5000 Ball Wire Bonder

Sample stage

LCD interface

Manual Z

Mouse

Work table

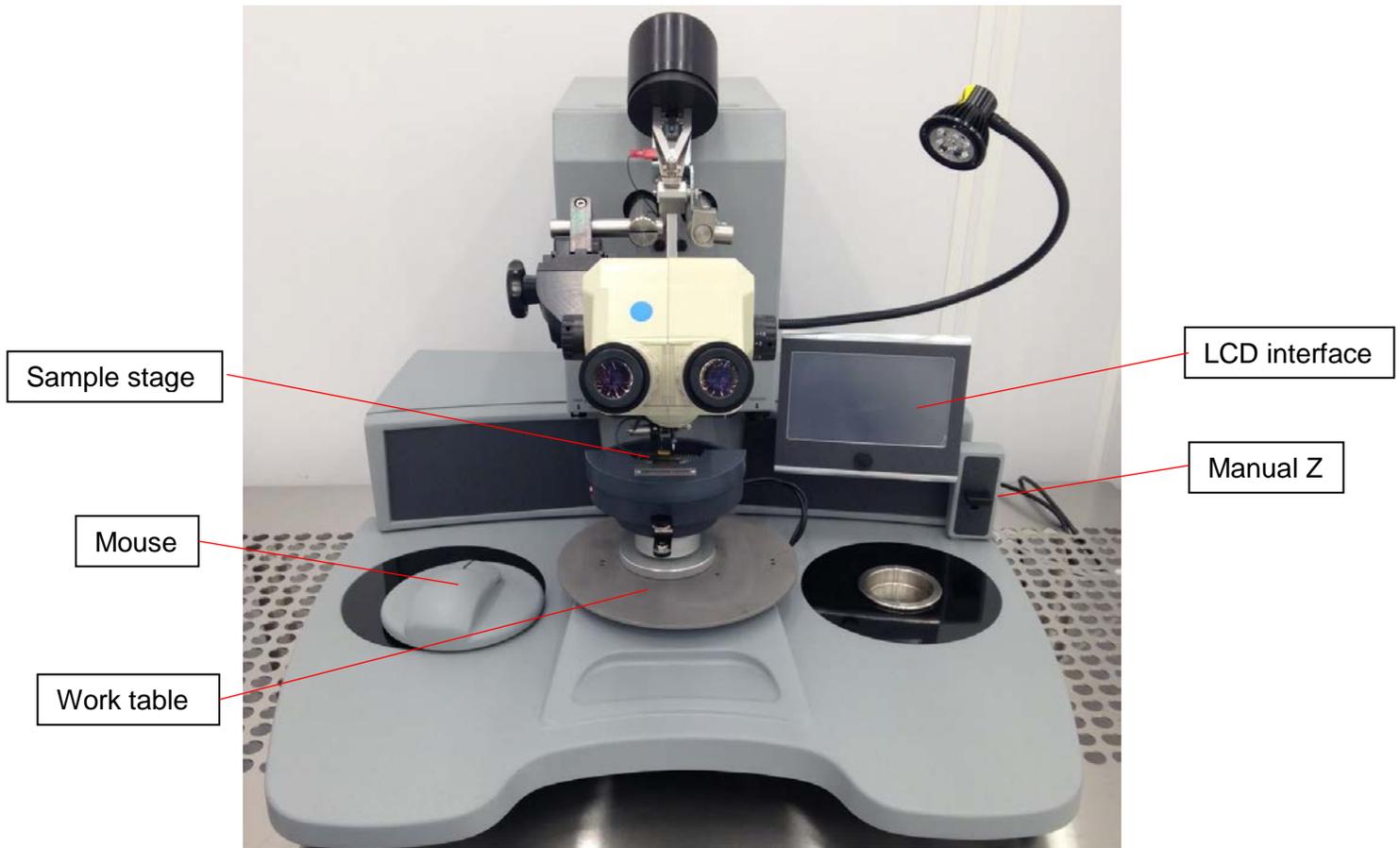Figure 1: iBond5000 Ball Bonder

Introduction

The iBond 5000 is a ball bonder for making electrical interconnections between a chip and the package. Ball bonding processes use a combination of heat, pressure, and ultrasonic energy to make a weld at each end of the wire.

Feature and specifications

1) This wire bonder is set up to use Au wire with a diameter of 25 μm.
2) The bonder works best on Au pads however other metals can be used too.
3) Touch screen interface.
4) Missing ball detection and auto-stop.
5) Ball bonding, bumping, coining, security bond and tab.
6) Semi-automatic/manual mode with Z option.

Safety

The sample stage is hot, default at 150 ^{o}C. Don't touch the surface.

To avoid electric shock, do not touch the NEFO electrode for at least 3 seconds after powering down with the On/Off switch.

Precautions

1) **Do not crash the wire capillary** (see Figure 8).
2) Only bond on clean surfaces. Dirty surfaces can easily block the wire capillary. If necessary, use plasma to clean organic residues on top of bonding pad.
3) Do not change the preinstalled application.

Operating Procedure

1) Active the equipment in FOM.
2) Slide the sample stage out of work table. **Never lift up the sample stage**. It may very possibly hit the capillary.
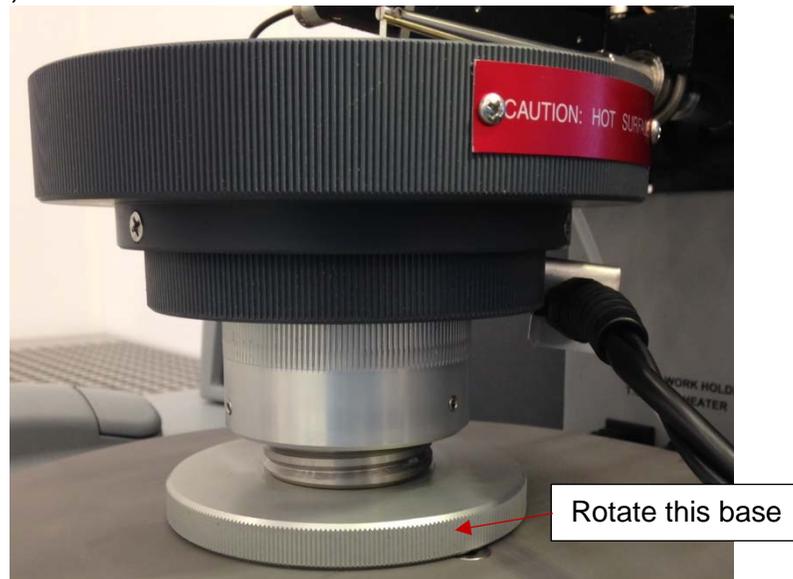3) Lower the sample stage all the way by rotating the base. Mount the sample package (Figures 2 and 3).

Figure 2: Sample stage

4) Carefully slide the sample stage back, under the capillary, making sure the package does not hit it. If the package does not fit under the capillary, it is too tall and cannot be used.
5) Switch to auto bond mode on the LCD interface:
   5.1) Touch "Manage" in the bottom left corner (Figure 4).
   5.2) Touch "Load App." (Figure 5).
   5.3) Select "GRDTECH". Press "Load" at the bottom (Figure 6). The display will be back to main screen as in Figure 4.
   5.4) Press the "Info" button at top (Figure 4). The display will change to Figure 7.
   5.5) Slide Z mode to "Mouse". Press the triangle in the bottom left corner.
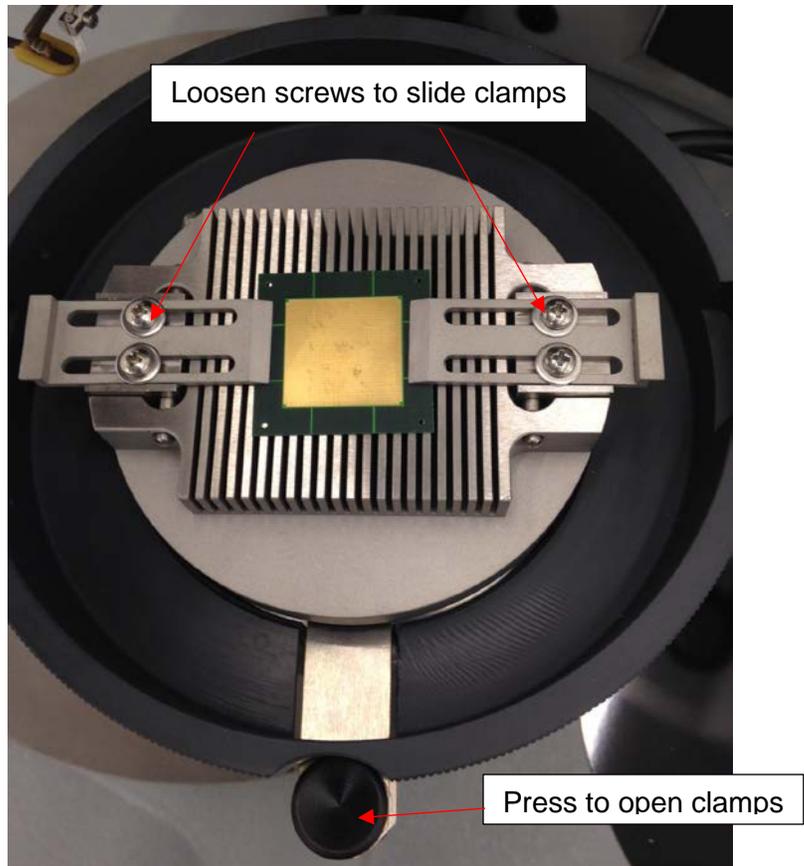
Figure 3: Sample clamps

Figure 4: The LCD interface main screen.

Figure 5: Manage applications.
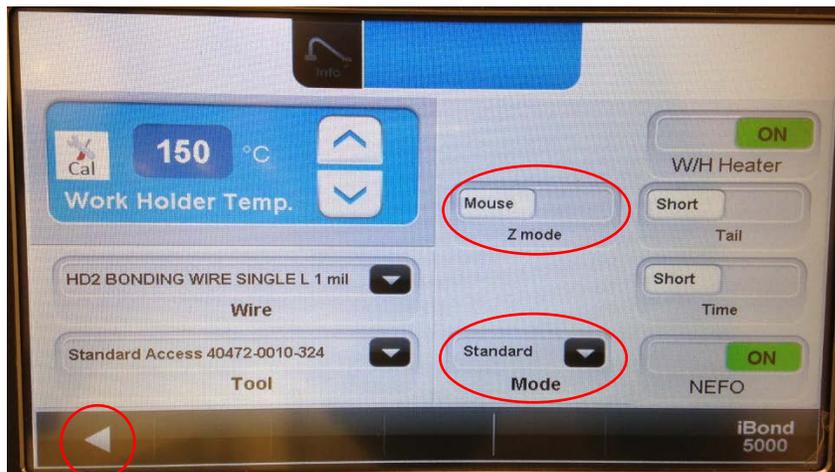

Figure 6: Load application.

Figure 7: The info page.

6) Adjust the microscope to focus on the capillary.
7) Press the right button of the mouse (need a second person) and don't release. This will lower the capillary.
8) Look through the microscope and rotate the base of sample stage to bring the package to the capillary until the capillary tip is very close to the bonding pad surface. **Do not crash the capillary.**
9) Release the mouse to do the first bond. Then the capillary will automatically move to the position of the second bond. Press the mouse again to do the second bond.
10) Now you should choose the manual mode. In auto mode, the second bond is at a fixed distance in a fixed direction from the first bond. In manual mode, the position of the second bond can be chosen freely. To switch to manual mode, follow the steps below:
   10.1) Press "Manage" (Figure 4), then "Load App." (Figure 5).
   10.2) Select "GRDTECH_manual", then press "Load".
   10.3) Press the "Info" button and slide the Z mode to "ManZ". Press the triangle to go back to the main screen.

Note: In the "GRDTECH" and "GRDTECH_manual" applications, it is assumed that the two bonds are at the same height. If this doesn't apply to you, contact staff to customize your 'search' parameters

11) In the manual mode, use the manual Z to bond instead of the mouse.
12) If bonds cannot form, a simple method is to increase the power. The maximum power is 10. **Don't change the time, force, and the ball size**. If bonds still cannot form, please check: i) the bonding area is clean, and was never bonded on before, ii) there is an adhesion layer under the Au film, iii) the Au film is thick enough, preferably > 1 μm. For thin films of 100 ~ 200 nm thick, wire bonding is difficult. In this case, a pre-bonded ball can serve as a thick bonding pad and make the bonding easier. The steps are below:
   12.1) Switch to auto mode following steps 5.1 – 5.4.
   12.2) Slide Z mode to "Mouse". Select 'Bumping' in the "Mode". Press the triangle in the bottom left corner.
   12.3) Bond balls to the film.
   12.4) Switch to manual mode following steps 10.1 – 10.3. Change the "Mode" to "Standard".
   12.5) Bond wires to the balls.

13) If wire breaks during bonding, feed the wire through the capillary. Follow the steps in the "Feed wires" section.
14) The temperature of sample stage can be changed by pressing "Info" in the main screen and the arrows in Figure 7. Please keep in mind that heating is required for ball bonding. Reduced temperature can increase the difficulty of making bonds.

Feed wires

1) Touch "Open clamp" on the main screen.
2) Adjust microscope to focus on the clamp. Feed the wire through the hook and place it in the clamp (Figure 8).
3) Feed the wire through the capillary and catch it from the tip side. If the capillary is blocked, press "Test" on the main screen. A short ultrasonic pulse will be applied to clean the capillary tip. If this cannot clear the capillary, contact staff.

4) Close the clamp by touching "Close Clamp" on the main screen.
5) Switch to auto mode. Do the first bond in air. Slide the bonding pad under the capillary and do the second bond to bond off the wire.
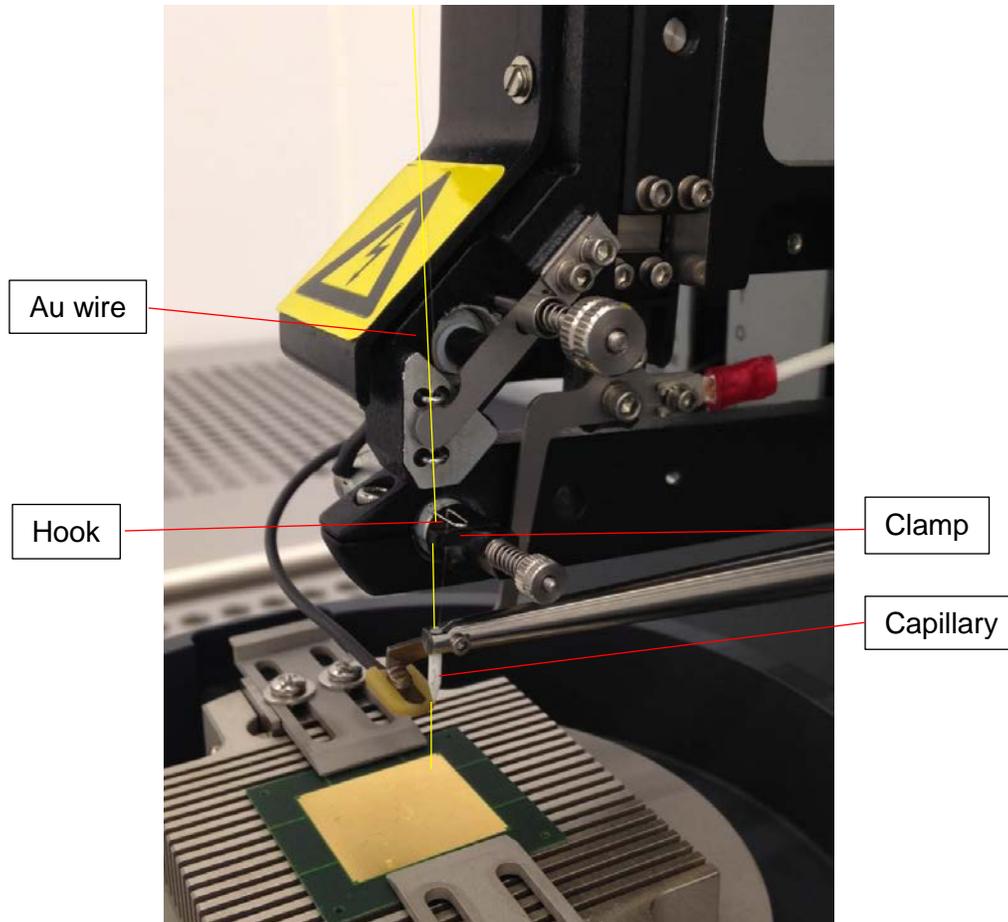

Figure 8. Wire path