both vertical planes, and the XZ plane is perpendicular to the YZ plane. The three axes in space are the X, Y and Z axes. Moving along the three axes in space refers to moving along the three mutually perpendicular axes in space, especially moving along the X, Y and Z axes in space; while the plane moves, then it moves on the XY plane.

Referring to FIG. 1 and FIG. 2, the die-bonding machine 1000 provided by the present application will now be described. The die-bonding machine 1000 includes a transferring unit 200, a feeding unit 100, a die supply unit 400 , a die ring supply unit 300 , a turret mechanism 600 , a piercing mechanism 500 and a die-bonding mechanism 700 . The turret mechanism 600 is arranged between the piercing mechanism 500 and the die-bonding mechanism 700, the piercing mechanism 500 is arranged on one side of the die supply unit 400, a transferring unit 200 is arranged on one side of the feeding unit 100, and the feeding unit 100 is arranged below the die-bonding mechanism 700. A transferring unit 200 is used to support and transfer the substrate to the bonding position. The feeding unit100 is used for positioning and supplying the substrate to a transferring unit200. The die supply unit 400 is used to support the die ring 97 and supply the die to the die supply position. The die ring supply unit 300 is used for supplying the full die ring 971 to the die supply unit 400 and recycling the empty die ring 972 in the die supply unit 400. The turret mechanism 600 is used to transfer the die at the die supply position to the die extraction position. The piercing mechanism500 pierces the blue film on the die on the die supply position downward to push the die to the turret mechanism600. The die-bonding mechanism 700 is used to suck the die at the die extraction position and move it to the bonding position for mounting on the substrate.

When in use, the substrate is placed in the feeding unit 100, the feeding unit 100 transmits the substrate to a transferring unit 200, and the transferring unit 200 moves the substrate, so that the position where the die needs to be installed on the substrate goes to the bonding position in order for die bonding. The die ring supply unit 300 transfers the wafer-installed die ring 97 (i.e., the full die ring 971) to the die supply unit 400, and collects the empty die ring 972 (the die ring 97 from which the die has been taken out) in the die supply unit 400. The die supply unit 400 transfers the dies in the die ring 97 to the die supply position in sequence, and the piercing mechanism 500 pierces the blue film on the die supply position to eject the die downward, so that the die falls to the turret mechanism 600, and the turret mechanism 600 pierces the die

at the die supply position. Received and transferred to the die extraction position, the die-bonding mechanism 700 transfers the die from the suction turret mechanism 600 to the die extraction position and moves to the bonding position to mount the die on the substrate. Therefore, there is no need to flip the die, and through the transfer of the turret mechanism 600, the stroke of the die-bonding mechanism 700 to move the die can be shortened, and the stability, precision and efficiency of the die movement can be improved. Using the piercing mechanism500 to pierce the blue film to peel off the die can ensure that the die is accurately placed on the turret mechanism 600, avoiding the problem of die extraction failure.

Compared with the prior art, the die-bonding machine 1000 provided by the embodiment of the present application, the die-bonding machine 1000 of the embodiment of the present application automatically supplies the substrate to the feeding unit 100 through the transferring unit 200, and drives the die installation positions on the substrate to arrive in sequence through the feeding unit 100. Arrange die ring supply unit 300 to automatically supply full die ring 971 and recycle empty die ring 972, arrange die supply unit 400 to supply die to die supply position, arrange piercing mechanism 500, pierce the blue film downward to pierce the die at the supply position is stripped from the blue film so that it can be received by the turret mechanism 600, which can avoid the failure of the extraction; the turret mechanism 600 transfers the die from the die supply position to the die extraction position, so that the die-bonding mechanism 700 can directly suck the die from the turret mechanism 600 to move until the bonding position is installed on the substrate, there is no need to flip the die, and the stroke and time for the die-bonding mechanism 700 to move the die can be shortened, thereby improving the smoothness of the die movement, and improving the die bonding accuracy and die bonding efficiency.

In one embodiment, die-bonding machine 1000 further includes a stand 900, a transferring unit 200, a die supply unit 400, a die ring supply unit 300, a turret mechanism 600, a piercing mechanism 500 and a die-bonding mechanism 700 supported on the stand 900 to facilitate installation and use.

In one embodiment, referring to FIG. 3 to FIG. 5, the feeding unit 100 includes an installation table 11, a loading moving unit 12 and a pushing mechanism 13. The loading moving unit 12 and the pushing mechanism 13 are installed on the installation

In one embodiment, the linear driver 533 may be a lead screw nut mechanism. Of course, the linear driver 533 can also use linear motors, rack and pinion mechanisms, and so on.

In one embodiment, referring to FIG. 2 and FIG. 24 , the die-bonding machine 1000 further includes a die supply camera unit 91 , the die supply camera unit 91 is installed below the die supply position, and the die supply camera unit 91 is used to capture the die image of the die supply position, so that before the piercing mechanism 500 ejects the die, the rotary drive module 413 can drive the die ring 97 to rotate, so as to drive the die to rotate, and adjust the angle of the die, so that the turret mechanism 600 can take dies accurately.

In one embodiment, the die supply camera unit 91 includes a die supply camera module 911 and a lift driver 912, the die supply camera module 911 is installed on the lift driver 912, and the die supply camera module 911 is driven up and down by the lift driver 912, so that the die supply camera unit 91 can accurately capture the die supply position die image. In addition, the die supply camera unit 91 can also be prevented from blocking the movement of the turn turret arm 621 of the turret mechanism 600.

In one embodiment, the die supply camera unit 91 further includes a vertical shift adjuster 913; and a vertical shift support plate 914, the vertical shift adjuster 913 is connected to the vertical shift support plate 914, and the vertical shift support plate 914 supports the vertical shift adjuster; the lift driver 912 is connected to the vertical shift adjuster 913 to adjust the longitudinal position of the die supply camera module 911.

In one embodiment, the lift driver 912 is a lead screw nut mechanism. It can be understood that the lift driver 912 can also be a linear module such as a linear motor and a rack and pinion structure.

In one embodiment, the vertical shift adjuster 913 is a cylinder. It can be understood that the vertical shift adjuster 913 can also be a linear module such as a linear motor and a rack and pinion structure.

In one embodiment, referring to FIG. 2 and FIG. 20, the die-bonding machine 1000 further includes a frame 800, the die-bonding mechanism 700 and the turret

mechanism 600 are installed on the frame 800, the frame 800 is installed on the stand 900, and the die-bonding mechanism 700 and the turret mechanism 600 are supported by the frame 800.

In one embodiment, referring to FIG. 20, the frame800 includes an installation plate81 and two sets of adjustment mechanisms 82, which are respectively installed on both ends of the installation plate 81 to support the installation plate 81 through the two sets of adjustment mechanisms 82. The die-bonding bracket 75 is installed on the installation plate 81 to mount the die-bonding mechanism 700 on the frame 800. The transfer module 62 is installed on the installation plate 81. For example, the positioning bracket 625 of the transfer module 62 is installed on the installation plate 81. Two sets of adjustment mechanisms 82 are used to coordinately adjust the position of the installation plate 81 on the vertical plane, thereby adjusting the height and lateral positions of the die-bonding mechanism 700 and the turret mechanism 600.

In one embodiment, referring to FIG. 20, each adjustment mechanism 82 includes a sliding plate 821, a lifting driver 822, a reverse pusher 823 and a supporting frame 824 , and the reverse pusher 823 is installed on the supporting frame 824 to support the reverse pusher 823 through the supporting frame 824 . The supporting frame 824 is installed on the stand 900, and the sliding plate 821 is connected to the installation plate 81 to support the installation plate81 through the sliding plate 821. The lifting driver 822 is connected to the sliding plate 821, and the sliding plate 821 is pushed up and down by the lifting driver 822 to adjust the height of the installation plate 81. The transverse pusher 823 is used to drive the sliding plate 821 to move laterally to drive the installation plate 81 to move laterally to facilitate debugging and running.

In one embodiment, the lifting driver 822 can be a screw-nut mechanism to smoothly support and drive the sliding plate 821 to drive the installation plate 81 to move up and down. Of course, the lifting driver 822 can also use linear modules such as rack and pinion.

In one embodiment, the reverse pusher 823 of the two sets of adjustment mechanism 82 can be equipped with an air cylinder, and the two sets of the reverse pusher 823 of the adjustment mechanism 82 are respectively installed on the side of each supporting frame 824 away from the other supporting frame 824, so that the two sets of the reverse pusher 823 of the adjustment mechanism 82 can cooperate to adjust the

In one embodiment, the die-bonding mechanism 700 further includes an adjustment component 78. The adjustment component 78 includes a driven pulley 782, a driving pulley 781, a synchronous belt 783, and a rotating motor 784. The rotating motor 784 is installed on the rotating seat 73. The synchronous belt 783 connects the driven pulley 782 and the driving pulley 781, and the driven pulley 782 is connected to the suction nozzle71, the suction nozzle71 is rotatably installed on the die-bonding swing arm72, the driving pulley781 is connected to the rotating motor 784, the driving pulley 781 is driven to rotate by the rotating motor 784, and the driven pulley 782 is driven to rotate by the synchronous belt 783, which in turn drives the suction nozzle 71 to rotate, so as to adjust the angle of sucking die on the suction nozzle 71, which facilitates precise die bonding.

In one embodiment, a radiator member 79 is installed on the die-bonding motor 74 to dissipate heat from the die-bonding motor 74 so that the die-bonding motor 74 runs smoothly.

In one embodiment, referring to FIGS. 20, 21 and 22, the turret mechanism 600 includes a die holder 61 and a transfer module 62, the die holder 61 is used to support the die, the die holder 61 receives and supports the die to drive the die to move. The die holder 61 is connected to the transfer module 62, and the transfer module 62 drives the die holder 61 to move, so that the die holder 61 moves to the die supply position, receives the die from the die supply position, and then the transfer module 62 drives the die holder 61 and the die to move to the die extraction position, so that the die- suction nozzle 71 on the bonding swing arm72 sucks the die on the die holder 61. The transfer module 62 is installed on the frame 800 to support the transfer module 62 through the frame 800, thereby supporting the turret mechanism 600 on the frame 800.

Since the transfer module 62 is used to drive the die holder 61 to move the die holder 61 to the die supply position to receive the die supplied by the die supply position, and then drive the die holder 61 to move to the die extraction position to transfer the die to the die extraction position, so that the die- suction nozzle 71 on the bonding swing arm 72 can directly suck the die from the die extraction position, and then move to the bonding position to install the die. In this way, the distance between the die extraction position and the bonding position can be arranged to be small, so that

In one embodiment, a plurality of weight reduction holes 6211 are provided on the turn turret arm 621 to reduce the weight of the turn turret arm 621 and facilitate the rotary driver 623 to drive the turn turret arm 621 to rotate.

In one embodiment, the number of turn turret arms 621 is eight, and in other embodiments, the number of turn turret arms 621 may be six, seven, nine, ten, and so on.

In one embodiment, referring to FIG. 20, the die-bonding machine 1000 further includes a die extraction camera module 92, the die extraction camera module 92 is arranged above the die supply position, and the die extraction camera module 92 is installed on the frame 800. The die extraction camera module 92 is used to capture the die image at the die supply position, so that the die holder 61 of the turret mechanism 600 can receive the die accurately, which improves the efficiency and accuracy of the die holder 61 in the die supply position.

In one embodiment, referring to FIG. 20, the die-bonding machine 1000 further includes a transfer camera module 93, the transfer camera module 93 is arranged above the die holder 61, the transfer camera module 93 is located between the die supply position and the die extraction position, and the transfer camera module 93 is installed on the frame 800. The transfer camera module 93 is used to capture the die image on the die holder 61. By arranging the transfer camera module 93 between the die supply position and the die extraction position, before the die reaches the die extraction position, the transfer camera module 93 captures the die image on the die holder 61 to determine the angle and position of the die, so that after the suction nozzle 71 sucks the die, the suction nozzle 71 can adjust the angle of the die on the suction nozzle 71 in time to improve the accuracy of die taking, which is also convenient for subsequent die bonding operations, and improves the efficiency and accuracy of die bonding.

In one embodiment, referring to FIG. 20, the die-bonding machine 1000 further includes a die camera module 94, the die camera module 94 is arranged above the bonding position, and the die camera module 94 is installed on the frame 800. The die camera module 94 is used to capture the image of the bonding position for precise die bonding and improve the precision and efficiency of die bonding.

In one embodiment, referring to FIG. 20, the die-bonding machine 1000 further includes a detection camera module 95, the detection camera module 95 is arranged at a position directly above the bonding position, and the detection camera module 95 is installed on the frame 800. The detection camera module 95 is used to capture the die image installed on the substrate to detect the die bonding effect and ensure the die bonding quality.

In one embodiment, there may be multiple detection camera modules 95, and the effect of installing the die on the substrate is detected by multiple detection camera modules 95, so as to ensure the quality of die bonding and facilitate subsequent repair.

In one embodiment, the die-bonding machine 1000 includes a die extraction camera module 92, a transfer camera module 93, a die camera module 94 and a detection camera module 95, so that the die can be positioned before the suction head 611 of the turret mechanism 600 sucks the die to ensure that the suction head 611 sucks the die in the process of die transfer, take a picture of the die, so that the suction nozzle 71 of the die-bonding mechanism 700 can accurately pick up and adjust the die angle, take a picture at the die extraction position to ensure that the suction nozzle 71 can pick up the die accurately, and then, take images at the bonding position to ensure the accuracy of die bonding, and finally, check the quality of die bonding to ensure the effect of die bonding.

The above descriptions are only optional embodiments of the present application, and are not intended to limit the present application. Any modifications, equivalent replacements and improvements made within the spirit and principles of the present application shall be within the protection scope of the present application.