METHOD AND APPARATUS FOR PCB SAWING

Field of the Invention

The invention relates to the processing of printed circuit boards (PCB's). In particular it relates to the separation of a PCB from a panel and subsequent processing.

Background

In the processing of printed circuit boards (PCBs) being more complex devices, waste through rejection becomes a more expensive issue than the rejection of an integrated circuit having gone through a limited number of processing steps. For the printed circuit board the larger material costs is clearly an issue but further having more processes to build the PCBs up to the stage of later processing involves a longer manufacturing path and so rejection consequently represents a greater cost.

One aspect of rejection of a PCB is the damage caused by both sawing of the PCB as well as detritus from the sawing process interfering or damaging with such a unit. Given the higher cost during to rejection for a PCB, it is therefore important that during the sawing process such sources of rejection be minimized.

Summary of Invention

In a first aspect the invention provides a method for washing a plurality of PCB units, the method comprising the steps of: receiving a plurality of PCB units, said PCB units arranged with a bump face projecting downwards; washing the bump face of the PCB units, then; flipping the PCB units so as to project a ball face downwards, then; washing the ball face.

Consequently, the invention provides for both sides of a PCB to be washed and de-burred, reducing rejection and wastage.

Brief Description of Drawings

It will be convenient to further describe the present invention with respect to the accompanying drawings that illustrate possible arrangements of the invention. Other arrangements of the invention are possible and consequently, the particularity of the accompanying drawings is not to be understood as superseding the generality of the preceding description of the invention.

Figure 1 is a plan view of the sawing and sorting device according to one embodiment of the present invention;

Figure 2 shows a flow chart for the flow of PCB panels through the sawing and sorting device according to a further embodiment of the present invention;

Figure 3 is a schematic view of a washing cycle according to a further embodiment of the present invention.

Detailed Description

Figure 1 and 2 show a sawing and sorting device for PCBs. Here the device 5 includes a panel magazine 10, 90 for loading 95 PCB substrates into a loading station 20. The PCBs have been manufactured in large single panel with the device 5 arranged to dice the PCBs into separate units.

The PCB panels are loaded 95 by a pusher (not shown) onto a platform for inspection 100 by inspection device 15 running along a slide 17. The inspection checks the panel for orientation and other data so as to enter into the control system certain parameters such as the type of PCB, panel size, PCB size etc., for eventual use during sawing.

Once inspected, the panel is loaded 105 to a chuck table 40 by a panel engagement arm 25 running along the aforementioned slide 17. The panel is placed within the sawing zone 35 where a pair of saws dice 110 the panel into separate PCB units. In this embodiment the pair of saws is oriented along a common axis. Once the cut in the panel along that axis has been completed the panel is rotated by a turntable within the sawing zone 35 and the saws then complete the process by cutting along the orthogonal

axis. The diced panel is then returned to the chuck table 40 whereupon the diced PCB units are delivered to the washing station 50.

A flipper 45 is arranged to engage the panel as a whole so as to prevent relative movement of the various diced PCBs. It is therefore capable of engaging the entire panel. Prior to the flipping process the panel is placed within the washing station 50 whereupon the first surface of the PCBs is washed and brushed 115 from underneath. The panel is subsequently flipped 120 so as to expose the opposite face whereupon the opposite surface is washed and brushed 125 from underneath. The panel is then delivered to the dry block 55 for blow drying 130 and removal of any detritus still adhering to the panel.

The individual PCB units are delivered 135 to the net table 60 whereupon the ball face of each PCB is inspected 140 from underneath and the bump face inspected 145 from above. The PCB units are then individually picked and delivered 150 to the handler 65 which sorts 70 the various PCBs into the various trays 80 including removing 75 any failing the previous inspections.

The trays 80 into which the PCB units are sorted 150 are then subsequently packaged 155 with tray coverings and sent to the unloading zone 85 for eventual removal from device 5.

A particular feature of the process is the washing cycle 112 which ensures that both sides of the PCB are deburred and cleaned prior to unloading. Because of the aforementioned problems in the prior art in being able to flip a singulated PCB panel, only one side is cleaned and deburred which occurs during the sawing cycle. The washing cycle 112 according to one embodiment of the present invention differs from the prior art in firstly loading the panel with the bump face down and dicing the panel in this orientation. Because the first washing step is applied directly after sawing in the washing station 50, the bump face is therefore washed first with the panel then flipped 120 allowing for the ball face to then be washed 125 before progressing through drying and subsequently to unloading. Accordingly, the present invention according to this embodiment reduces rejection as well as customer end waste through fully cleaning the PCBs away from the dicing centre and on both faces.

Figure 3 shows a schematic view of the washing cycle according to one embodiment of the present invention. A PCB 160 is received by the washing station with the ball face 165 projecting upwards and the bump face 170 projecting downwards. The bump face is subjected to a washing and deburring process 175 and, on completion, the PCB 160 is flipped 180 so as to expose the ball face. In a final step of the washing cycle the washing and deburring process 175 is completed on the ball face whereupon the PCB 160 is then delivered to drying and other downstream stations.

Claims

1. A method for washing a plurality of PCB units, the method comprising the steps of:

receiving a plurality of PCB units, said PCB units arranged with a bump face projecting downwards;

washing the bump face of the PCB units, then;

flipping the PCB units so as to project a ball face downwards, then;

washing the ball face.

2. The method according to claim 1, including the step, prior to the receiving step, of sawing a panel of PCB's to separate the panel into individual PCB units.

3. The method according to claim 2, wherein the flipping step includes flipping the PCB units in a single step.

4. The method according any one of claims 1 to 3, further including the step of drying the PCB units.

5. A washing station for washing a plurality of PCB units, comprising:

a washing unit arranged to wash and de-burr the PCB units, and;

a flipper for flipping the PCB units;

wherein the washing unit is arranged to wash and de-burr one side of the PCB units, and the flipper is arranged to flip the PCB units so as to expose an opposite side of the PCB units, with the washing unit further arranged to was and de-burr the opposite side.

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