CLAIMS

1. A packaging apparatus for transferring integrated circuits to a packaging, the apparatus comprising:

a carrier for carrying a plurality of integrated circuits and moving the plurality of integrated circuits between a location of a first packaging and a first location, the first packaging being configured for holding a plurality of integrated circuits;

a first plurality of transfer units, the first plurality of transfer units being configured for transferring one or more integrated circuits from the first packaging to the carrier; and

a second plurality of transfer units, the second plurality of transfer units being configured for transferring one or more integrated circuits from the carrier in the first location to one or more respective holders in a second packaging,

said carrier comprising a plurality of seats for receiving integrated circuits, said carrier being configured for adjusting each received integrated circuit to assume a predetermined orientation if misalignment from the predetermined orientation occurs.

2. The apparatus as claimed in claim 1, the apparatus comprising:

a second carrier for carrying a plurality of integrated circuits and moving the plurality of integrated circuits between the first packaging and a second location,

the first plurality of transfer units being configured to transfer one or more integrated circuits from the first packaging to the second carrier when the carrier is at the first location,

the second plurality of transfer units being configured for transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the packaging,

wherein said second carrier comprising a plurality of seats for receiving integrated circuits, said second carrier being formed for adjusting each received integrated circuit to assume a predetermined orientation if misalignment from the predetermined orientation occurs.

3. The apparatus as claimed in claim 2, wherein the second location is adjacent to the first location.

4. The apparatus as claimed in claims 2 or 3, wherein the second plurality of transfer units is transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the second packaging when the first plurality of

transfer units is transferring one or more integrated circuits from the first packaging to the carrier.

5. The apparatus as claimed in any one of the preceding claims, wherein the first plurality of transfer units is configured for making adjustments to pitch distance between the transfer units of the first plurality of transfer units.

6. The apparatus as claimed in any one of the preceding claims, wherein a transfer unit of the first plurality of transfer units is configured for making adjustments to orientate an integrated circuit being transferred by rotation about a longitudinal axis of said transfer unit of the first plurality of transfer units.

7. The apparatus as claimed in any one of the preceding claims, wherein the second plurality of transfer units is configured for making adjustments to pitch distance between the transfer units of the second plurality of transfer units.

8. The apparatus as claimed in any one of the preceding claims, wherein a transfer unit of the second plurality of transfer units is configured for making adjustments to orientate an integrated circuit being transferred by rotation about a longitudinal axis of said transfer unit of the second plurality of transfer units.

9. The apparatus as claimed in any one of the preceding claims, wherein the second plurality of transfer units is mounted on a replaceable head that is detachable from the apparatus.

10. The apparatus as claimed in any one of the preceding claims, wherein the transfer units of the second plurality of transfer units are spaced apart by a fixed pitch distance.

11. The apparatus as claimed in claim 9, the apparatus comprising an actuator coupled to a connector configure for coupling to the replaceable head, the actuator being configured to lock the replaceable head in position on the apparatus and to release the replaceable head for removal from the apparatus.

12. The apparatus as claimed in any one of the preceding claims, wherein each of the plurality of seats comprises side walls sloped in a manner to cooperate with gravity to enable an integrated circuit to orientate and assume the predetermined orientation in the seat when edges of the integrated circuit contact the slopes.

13. The apparatus as claimed in any one of claims 1 to 11, wherein each of the plurality of seats comprises side walls that are moveable to orientate an integrated circuit to assume the predetermined orientation in the seat.

14. The apparatus as claimed in any one of the preceding claims, wherein the plurality of seats comprises a seat for placing a defective integrated circuit.

15. The apparatus as claimed in claim 14, the apparatus comprising a transfer unit for removing the defective integrated circuit from the seat at the location of the first packaging.

16. The apparatus as claimed in any one of the preceding claims, wherein each of the plurality of seats comprises a stepped portion surrounding the perimeter of the predetermined orientation and the stepped portion is located at a foot of the sloping side walls.

17. The apparatus as claimed in any one of the preceding claims, the apparatus further comprising: one or more inspection stations for inspecting the integrated circuits; a holding station for holding the first packaging for transferring to the second packaging; and a reject station for handling rejected integrated circuits, the one or more inspection stations, the holding station and the reject station being arranged sequentially in a straight line.

18. The apparatus as claimed in any one of claims 1 to 16, the apparatus further comprising: one or more inspection stations for inspecting the integrated circuits; a holding station for holding the first packaging for transferring to the second packaging; a reject station for handling rejected integrated circuits; and one or more transfer mechanism for transferring the integrated circuits between said stations, wherein each of said stations is arranged in a lane with the one or more transfer mechanism residing between the lanes.

19. The apparatus as claimed in claim 17, the apparatus further comprising a conveyor for moving the first packaging containing one or more integrated circuits along the straight line.

20. The apparatus as claimed in any one of the preceding claims, wherein axis of movement of the carrier and axis of movement of the second plurality of transfer units for transferring one or more integrated circuits from the carrier in the first location to one or more respective holders in the second packaging are orthogonal to each other.

21. A packaging method for transferring integrated circuits to a packaging, the method comprising:

carrying a plurality of integrated circuits and moving the plurality of integrated circuits between a location of a first packaging and a first location using a carrier, the first packaging being configured for holding the plurality of integrated circuits;

transferring one or more integrated circuits from the first packaging to the carrier using a first plurality of transfer units;

transferring one or more integrated circuits from the carrier in the first location to one or more respective holders in a second packaging using a second plurality of transfer units, and

adjusting a integrated circuit received by the carrier to assume a predetermined orientation if misalignment from the predetermined orientation occurs using a carrier, said carrier comprising a plurality of seats for receiving integrated circuits.

22. The method as claimed in claim 21, the method comprising:

carrying a plurality of integrated circuits and moving the plurality of integrated circuits between the first packaging and a second location using a second carrier;

transferring one or more integrated circuits from the first packaging to the second carrier when the carrier is at the first location using the first plurality of transfer units;

transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the packaging using the second plurality of transfer units; and

adjusting each integrated circuit received by said second carrier to assume a predetermined orientation if misalignment from the predetermined orientation occurs using said second carrier, wherein said second carrier comprising a plurality of seats for receiving integrated circuits.

23. The method as claimed in claim 22, the method comprising:

transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the second packaging when the first plurality of transfer units is transferring one or more integrated circuits from the first packaging to the carrier using the second plurality of transfer units.

24. The method as claimed in any one of claims 21 to 23, the method comprising:

making adjustments to pitch distance between the transfer units of the first plurality of transfer units using the first plurality of transfer units.

25. The method as claimed in any one of claims 21 to 24, the method comprising:

making adjustments to orientate an integrated circuit being transferred by rotation about a longitudinal axis of a transfer unit of the first plurality of transfer units.

CLAIMS

1. A packaging apparatus for transferring integrated circuits to a packaging, the apparatus comprising:

a carrier for carrying a plurality of integrated circuits and moving the plurality of integrated circuits between a location of a first packaging and a first location, the first packaging being configured for holding a plurality of integrated circuits;

a first plurality of transfer units, the first plurality of transfer units being configured for transferring one or more integrated circuits from the first packaging to the carrier; and

a second plurality of transfer units, the second plurality of transfer units being configured for transferring one or more integrated circuits from the carrier in the first location to one or more respective holders in a second packaging,

said carrier comprising a plurality of seats for receiving integrated circuits, said carrier being configured for adjusting each received integrated circuit to assume a predetermined orientation if misalignment from the predetermined orientation occurs,

wherein the first plurality of transfer units is configured for making adjustments to pitch distance between the transfer units of the first plurality of transfer units to match each seat profile of the plurality of seats prior to placing each integrated circuit into each seat.

2. The apparatus as claimed in claim 1, the apparatus comprising:

a second carrier for carrying a plurality of integrated circuits and moving the plurality of integrated circuits between the first packaging and a second location,

the first plurality of transfer units being configured to transfer one or more integrated circuits from the first packaging to the second carrier when the carrier is at the first location,

the second plurality of transfer units being configured for transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the packaging,

wherein said second carrier comprising a plurality of seats for receiving integrated circuits, said second carrier being formed for adjusting each received integrated circuit to assume a predetermined orientation if misalignment from the predetermined orientation occurs.

3. The apparatus as claimed in any one of the preceding claims, wherein a transfer unit of the first plurality of transfer units or the second plurality of transfer units is configured for making adjustments to orientate an integrated circuit being transferred by rotation about a

longitudinal axis of said transfer unit of the first plurality of transfer units or said transfer unit of the second plurality of transfer units respectively.

4. The apparatus as claimed in any one of the preceding claims, wherein the second plurality of transfer units is configured for making adjustments to pitch distance between the transfer units of the second plurality of transfer units.

5. The apparatus as claimed in any one of the preceding claims, wherein each of the plurality of seats comprises side walls sloped in a manner to cooperate with gravity to enable an integrated circuit to orientate and assume the predetermined orientation in the seat when edges of the integrated circuit contact the slopes.

6. The apparatus as claimed in any one of claims 1 to 5, wherein each of the plurality of seats comprises side walls that are moveable to orientate an integrated circuit to assume the predetermined orientation in the seat.

7. The apparatus as claimed in any one of the preceding claims, wherein each of the plurality of seats comprises an aperture for releasing air pressure when an integrated circuit is dropped or placed into the seat.

8. The apparatus as claimed in any one of the preceding claims, wherein each of the plurality of seats comprises a stepped portion surrounding the perimeter of the predetermined orientation and the stepped portion is located at a foot of the sloping side walls.

9. The apparatus as claimed in any one of the preceding claims, the apparatus further comprising: one or more inspection stations for inspecting the integrated circuits; a holding station for holding the first packaging for transferring to the second packaging; and a reject station for handling rejected integrated circuits, the one or more inspection stations, the holding station and the reject station being arranged sequentially in a straight line.

10. The apparatus as claimed in any one of claims 1 to 9, the apparatus further comprising: one or more inspection stations for inspecting the integrated circuits; a holding station for holding the first packaging for transferring to the second packaging; a reject station for handling rejected integrated circuits; and one or more transfer mechanism for

transferring the integrated circuits between said stations, wherein each of said stations is arranged in a lane with the one or more transfer mechanism residing between the lanes.

11. The apparatus as claimed in claim 9, the apparatus further comprising a conveyor for moving the first packaging containing one or more integrated circuits along the straight line.

12. A packaging method for transferring integrated circuits to a packaging, the method comprising:

carrying a plurality of integrated circuits and moving the plurality of integrated circuits between a location of a first packaging and a first location using a carrier, the first packaging being configured for holding the plurality of integrated circuits;

transferring one or more integrated circuits from the first packaging to the carrier using a first plurality of transfer units;

transferring one or more integrated circuits from the carrier in the first location to one or more respective holders in a second packaging using a second plurality of transfer units,

adjusting a integrated circuit received by the carrier to assume a predetermined orientation if misalignment from the predetermined orientation occurs using a carrier, said carrier comprising a plurality of seats for receiving integrated circuits; and

making adjustments to pitch distance between the transfer units of the first plurality of transfer units to match each seat profile of the plurality of seats prior to placing each integrated circuit into each seat.

13. The method as claimed in claim 12, the method comprising:

carrying a plurality of integrated circuits and moving the plurality of integrated circuits between the first packaging and a second location using a second carrier;

transferring one or more integrated circuits from the first packaging to the second carrier when the carrier is at the first location using the first plurality of transfer units;

transferring one or more integrated circuits from the second carrier in the second location to one or more respective holders of the packaging using the second plurality of transfer units; and

adjusting each integrated circuit received by said second carrier to assume a predetermined orientation if misalignment from the predetermined orientation occurs using said second carrier, wherein said second carrier comprising a plurality of seats for receiving integrated circuits.

14. The method as claimed in any one of claims 12 to 13, the method comprising:

making adjustments to pitch distance between the transfer units of the second plurality of transfer units.

15. The method as claimed in any one of claims 12 to 14, the method comprising:

making adjustments to orientate an integrated circuit being transferred by rotation about a longitudinal axis of a transfer unit of the first plurality of transfer units or the second plurality of transfer units.