Claims

1. A component handling assembly (1) which comprises,

a transport system (2) which comprises,

a track (2a), and a plurality of shuttles (2b), wherein each of said shuttles can be driven individually and independently of one another along the track, and wherein each of said shuttles comprise at least one pick-up-head (3b) which can hold a component; and

a plurality of stations (13a-d) located proximate to the track, said plurality of stations comprising,

a picking station (12) at which the pickup head on a shuttle can pick components from a tray (12a,12b) located in said picking station;

at least one vision inspection station (13a-d), which comprises one or more cameras, at which a component can be inspected;

and at least one of, a placing station (14) at which the pickup head on a shuttle can place a component onto a tray, and/or, a tape station (15) at which the pickup head on a shuttle can place a component into a pocket of a tape; and

wherein the assembly further comprises a vacuum system (100,100a,100b,100c), which is configured to supply vacuum to the pickup head (7) of each respective shuttle (2b) as said shuttles (2b) move around the track (2a), and

wherein the vacuum system (100a) comprises,

a vacuum generating means which is operable to generate a vacuum;

a vacuum ring (103) which defines a chamber (103a), wherein the chamber (103) is fluidly connected to the vacuum generating means (501) so that vacuum generated by the vacuum generating means (501) will create a vacuum in the chamber (103a) of the vacuum ring (103);

a rotatable disk (105) which can rotate about a rotation axis (105b), which comprises a plurality of primary conduits (107), each primary conduit (107) being fluidly connected to the chamber of the vacuum ring (103) and arranged to extend radially from the vacuum ring (103);

a plurality of outlets (109) arranged at the peripheral of the rotatable disk (105) and wherein each primary conduit (107) is fluidly connected to a respective outlet (109);

a plurality of secondary conduits (110), wherein each secondary conduit (110) is fluidly connected between a respective outlet (109) and a respective shuttle (2b) so that vacuum can be supplied to the pickup head of said respective shuttle (2b).

2. A component handling assembly according to claim 1 wherein the track is the form of a loop.

3. A component handling assembly according to claim 1 or 2 wherein the component handling assembly further comprises a rejection station at which the pickup head on a shuttle can place a component, which was determined to have a defect, onto a tray, wherein the rejection station comprises at least two trays into which a component, which was determined to have a defect can be placed by the pickup head of a shuttle, wherein the position along the track at which the pickup head of a shuttle can place a component into one of the trays is different to the position along the track at which the pickup head of the shuttle can place a component into the other one of the trays.

4. A component handling assembly according to any one of the preceding claims wherein the picking station comprises at least two trays from which components can be picked by the pickup head on a shuttle, wherein the position along the track at which the pickup head of a shuttle can pick a component from one of the trays is different to the position along the track at which the pickup head of the shuttle can pick a component for said other one of the trays.

5. A component handling assembly according to any one of the preceding claims wherein the placing station comprises at least two trays into which a component, which is held by a pickup head on a shuttle, can be placed.

6. A component handling assembly according to any one of the preceding claims wherein the tape station comprises at least two tapes, each of which comprise pockets, into which a component, which is held by a pickup head on a shuttle, can be placed, wherein the position along the track at which the pickup head of a shuttle can place a component into a pocket of one of the tapes is different to the position along the track at which the pickup head of the shuttle can place a component into a pocket of said other one of the tapes.

7. A component handling assembly according to any one of the preceding claims wherein said at least one vision inspection station further comprises at a 2-D inspection station 13d which comprises a camera which is used to detect the current position and current orientation of the component on the pickup head of the shuttle 2b, and wherein images from said 2-D inspection station 13d are used by a recentering module or by an embedded pick up head rotation system, to move the component from its current position and current orientation into a predefined position and predefined orientation on the component handling head.

8. A component handling assembly according to any one of the preceding claims wherein the tape station comprises,

a pre tape module which is configured to determine the position of the component on the pickup head relative to the position of the pocket on the tape into which the component is to be placed, and to move the tape so that the pocket is in a position in which the pickup head on the shuttle can place the component which it holds directly into the pocket of the tape;

a in-tape module which is configured check that the component which has been placed into the pocket of the tape, has a predefined orientation within the pocket; and

a sealing module which is configured to seal the pocket into which said component has been placed.

9. A component handling assembly according to any one of the preceding claims wherein the rotatable disk is configured to freewheel about the rotation axis.

10. A component handling assembly according to any one of the preceding claims wherein the vacuum system further comprises a drive motor which can drive the rotatable disk to rotate about the rotation axis .

11. A component handling assembly according to any one of the preceding claims , wherein the vacuum system (100b) comprises,

a vacuum generating means which is operable to generate a vacuum;

a vacuum chamber, which is fluidly connected to the vacuum generating means, so that vacuum generated by the vacuum generating means will create a vacuum in the vacuum chamber;

a plate member having one or more openings defined therein, wherein said one or more openings are fluidly connected to the vacuum chamber.

12. A component handling assembly according to claim 11 wherein each of said plurality of shuttles 2b comprise a sliding member which is arranged to abut a surface of the plate member and is configured to slide over said surface as the shuttle 2b moves along the track; wherein said sliding member has a channel defined therein, where the channel has an inlet and an outlet, wherein said outlet it fluidly connected to the pickup head of the shuttle, and wherein the inlet is aligned with said one or more openings defined in the plate member, so that vacuum can be supplied to the pickup head of said shuttle 2b as the shuttle 2b moves around the track.

13. A component handling assembly according to claim 12, wherein the vacuum system (100c) comprises,

a vacuum generating means which is operable to generate a vacuum;

a vacuum chamber, which is fluidly connected to the vacuum generating means, so that vacuum generated by the vacuum generating means will create a vacuum in the vacuum chamber;

opposing sealing members which are elastically biased towards abutting one another to seal the vacuum chamber.

14. A component handling assembly according to claim 13, wherein each of said plurality of shuttles 2b comprise a carriage having a stem portion and an anchoring portion, wherein the stem portion projects from the anchoring portion to between the opposing sealing members and into the vacuum chamber; the stem portion having a free end which is located in said vacuum chamber; and wherein the carriage has a channel defined therein, where the channel has an inlet defined in the free end and an outlet defined in the anchoring portion, wherein the outlet is fluidly connected to the pickup head of the shuttle 2b, so that vacuum can be supplied to the pickup head of said shuttle 2b as the shuttle 2b moves around the track.

15. A component handling assembly according to any one of claims 13-14, wherein the vacuum chamber is defined by an upper plate and the opposing sealing members and wherein each of the opposing sealing members have a first end which is attached to the upper plate, and a second, free end; wherein the second free ends of the opposing sealing members abut one another to seal the vacuum chamber.