CLAIMS:

What is claimed is:

1. A method for positioning electronic devices into compartments of an input medium, the method comprising the following steps:

imaging N actual known positions by at least one inspection device, whereby the N known positions are formed on an upper side of the input medium, and N being greater or equal to two;

determining actual position data of the N known positions from the images of the N known positions in a coordinate system assigned to the input medium;

calculating actual difference position data for each of the N known positions from the actual position data of the N known positions and from given target position data of the N known positions;

calculating actual position data of the compartments of the input medium from the given target position data of the compartments of the input medium and from the actual difference position data of the N known positions; and

controlling a pick and place device on the basis of the actual position data of the compartments of the input medium.

2. The method as claimed in claim 1, wherein the target position data of the compartments of the input medium are updated according to the calculated actual position data of the compartments of the input medium during or after the step of calculating the actual position data of the compartments of the input medium.

3. The method as claimed in claim 1, wherein the target position data of the N known positions and the target position data of the compartments of the input medium are available in a Computer Aided Design (CAD) data model.

4. The method as claimed in claim 1, wherein the pick and place device picks-up at least one electronic device from a respective at least one compartment of the input medium and transfers the at least one electronic device to a respective at least one compartment of an output medium and places the at least one electronic device into the respective at least one compartment of the output medium, whereby actual position data of the respective at least one compartment of the output medium are communicated to the pick and place device.

5. The method as claimed in claim 4, wherein at least two electronic devices are simultaneously picked-up in parallel from respective compartments of the input medium and are simultaneously transferred in parallel to and placed in parallel into respective compartments of the output medium.

6. The method as claimed in claim 4, wherein the actual positions of the compartments of the output medium are determined by the following steps:

imaging M known positions by at least one inspection device, whereby the M known positions are formed on an upper side of the output medium, and M being greater or equal to two;

determining actual position data of the M known positions from the images of the M known positions in a coordinate system assigned to the output medium;

calculating actual difference position data for each of the M known positions from the actual position data of the M known positions and from given target position data of the M known positions;

calculating actual position data of the compartments of the output medium from the given target position data of the compartments of the output medium and from the actual difference position data of the M known positions; and

controlling the pick and place device on the basis of the actual position data of the compartments of the output medium.

7. The method as claimed in claim 4, the method further comprising the step of measuring the output medium and automatically adjusting the output medium layout before placing the electronic devices into the compartments of the output medium.

8. The method as claimed in claim 7, wherein the step of automatically adjusting the transfer layout is carried out by teaching a template on the output medium and inspecting to determine the exact position of the template on the output medium.

9. The method as claimed in claim 6, the method further comprising the step of measuring the output medium and automatically adjusting the transfer position of the output medium before placing the electronic devices into the compartments of the output medium.

10. An arrangement for positioning a plurality of electronic devices, the arrangement comprising:

at least one inspection device for imaging N actual known positions on an input medium, N being greater or equal to two;

a moving means for providing a relative motion between the at least one inspection device and the input medium in order to place at least one of the N known positions in an image field of view of the at least one inspection device;

at least one pick and place device for picking-up at least one electronic device from a respective at least one compartment of the input medium; and

a control unit for determining actual position data of the compartments of the input medium, and for controlling the at least one pick and place device so that the electronic devices are correctly picked-up from the compartments of the input medium.

11. The arrangement as claimed in claim 10, wherein the input medium comprises:

a plurality of compartments, each compartment being formed in an upper side of the input medium, so that a single compartment of the input medium can receive and store at least a single electronic device; and,

N known positions on the upper side of the input medium, each of the N known positions being detectable by the at least one inspection device when the electronic devices are stored in the compartments of the input medium.

12. The arrangement as claimed in claim 11, wherein at least one of the N known positions on the input medium is a marking formed on the upper side of the input medium.

13. The arrangement as claimed in claim 10, wherein the control unit determines the actual position data of the compartments of the input medium on the basis of images of the N known positions, target position data of the N known positions of the input medium, and target position data of the compartments of the input medium, wherein the N known positions of the input medium are imaged by the at least one inspection device.

14. The arrangement as claimed in claim 13, wherein the arrangement comprises a CAD data model being connected to the control unit, the CAD data model comprising:

the target position data of the N known positions on the input medium; and

the target position data of the compartments of the input medium;

15. An arrangement for positioning a plurality of electronic devices from compartments of an input medium into compartments of an output medium, the arrangement comprising:

at least one inspection device for imaging N actual known positions on the input medium and M known positions on the output medium, N and M being greater or equal to two;

a moving means for providing a relative motion between the at least one inspection device and the input medium in order to place at least one of the N known positions on the input medium in an image field of view of the at least one inspection device, and for providing a relative motion between the at least one inspection device and the output medium in order to place at least one of the M known positions on the output medium in the image field of view of the at least one inspection device;

at least one pick and place device for picking-up at least one electronic device from a respective at least one compartment of the input medium, transferring the at least one electronic device to a respective at least one compartment of the output medium, and placing the at least one electronic device into the respective at least one compartment of the output medium; and

a control unit for determining actual position data of the compartments of the input medium, for determining actual position data of the compartments of the output medium, and for controlling the at least one pick and place device so that the electronic devices are correctly picked-up from the compartments of the input medium, correctly transferred to the compartments of the output medium and correctly placed into the compartments of the output medium.

16. The arrangement as claimed in claim 15, wherein at least one of the M known positions on the output medium is a marking formed on the upper side of the output medium.

17. The arrangement as claimed in claim 15, wherein the control unit determines the actual position data of the compartments of the output medium on the basis of images of the M known positions of the output medium, target position data of the M known positions, and target position data of the compartments of the output medium, wherein the M known positions are imaged by the at least one inspection device.

18. The arrangement as claimed in claim 17, wherein the arrangement comprises a CAD data model being connected to the control unit, the CAD data model comprising:

the target position data of the N known positions on the input medium;

the target position data of the compartments of the input medium;

the target position data of the M known positions on the output medium; and

the target position data of the compartments of the output medium.

CLAIMS

1. A method for positioning electronic devices into compartments of an input medium, the method comprising the following steps:

imaging N actual known positions by at least one inspection device, whereby the N known positions are formed on an upper side of the input medium, and N being greater or equal to two;

determining actual position data of the N known positions from the images of the N known positions in a coordinate system assigned to the input medium;

calculating actual difference position data for each of the N known positions from the actual position data of the N known positions and from given target position data of the N known positions;

calculating actual position data of the compartments of the input medium from the given target position data of the compartments of the input medium and from the actual difference position data of the N known positions; and

controlling a pick and place device on the basis of the actual position data of the compartments of the input medium.

2. The method as claimed in claim 1, wherein the target position data of the compartments of the input medium are updated according to the calculated actual position data of the compartments of the input medium during or after the step of calculating the actual position data of the compartments of the input medium.

3. The method as claimed in claim 1, wherein the target position data of the N known positions and the target position data of the compartments of the input medium are available in a Computer Aided Design (CAD) data model.

4. The method as claimed in claim **1**, wherein the pick and place device picks-up at least one electronic device from a respective at least one compartment of the input medium and transfers the at least one electronic device to a respective at least one compartment of an output medium and places the at least one electronic device into the respective at least one compartment of the output medium, whereby actual position data of the respective at least one compartment of the output medium are communicated to the pick and place device.

5. The method as claimed in claim **4**, wherein at least two electronic devices are simultaneously picked-up in parallel from respective compartments of the input medium and are simultaneously transferred in parallel to and placed in parallel into respective compartments of the output medium.

6. The method as claimed in claim **4**, wherein the actual positions of the compartments of the output medium are determined by the following steps:

imaging M known positions by at least one inspection device, whereby the M known positions are formed on an upper side of the output medium, and M being greater or equal to two;

determining actual position data of the M known positions from the images of the M known positions in a coordinate system assigned to the output medium;

calculating actual difference position data for each of the M known positions from the actual position data of the M known positions and from given target position data of the M known positions;

calculating actual position data of the compartments of the output medium from the given target position data of the compartments of the output medium and from the actual difference position data of the M known positions; and

controlling the pick and place device on the basis of the actual position data of the compartments of the output medium.

7. The method as claimed in claim **4**, the method further comprising the step of measuring the output medium and automatically adjusting the output medium layout before placing the electronic devices into the compartments of the output medium.

8. The method as claimed in claim **7**, wherein the step of automatically adjusting the output medium layout is carried out by teaching a template on the output medium and inspecting to determine the position of the template on the output medium.

9. The method as claimed in claim **6**, the method further comprising the step of measuring the output medium and automatically adjusting the transfer position of the output medium before placing the electronic devices into the compartments of the output medium.

10. An arrangement for positioning a plurality of electronic devices, the arrangement comprising:

at least one inspection device for imaging N actual known positions on an input medium, N being greater or equal to two;

a moving means for providing a relative motion between the at least one inspection device and the input medium in order to place at least one of the N known positions in an image field of view of the at least one inspection device;

at least one pick and place device for picking-up at least one electronic device from a respective at least one compartment of the input medium; and

a control unit for determining actual position data of the compartments of the input medium, and for controlling the at least one pick and place device so that the electronic devices are correctly picked-up from the compartments of the input medium.

11. The arrangement as claimed in claim **10**, wherein the input medium comprises:

a plurality of compartments, each compartment being formed in an upper side of the input medium, so that a single compartment of the input medium can receive and store at least a single electronic device; and,

N known positions on the upper side of the input medium, each of the N known positions being detectable by the at least one inspection device when the electronic devices are stored in the compartments of the input medium.

12. The arrangement as claimed in claim **11**, wherein at least one of the N known positions on the input medium is a marking formed on the upper side of the input medium.

13. The arrangement as claimed in claim **10**, wherein the control unit determines the actual position data of the compartments of the input medium on the basis of images of the N known positions, target position data of the N known positions of the input medium, and target position data of the compartments of the input medium, wherein the N known positions of the input medium are imaged by the at least one inspection device.

14. The arrangement as claimed in claim **13**, wherein the arrangement comprises a CAD data model being connected to the control unit, the CAD data model comprising:

the target position data of the N known positions on the input medium; and

the target position data of the compartments of the input medium.

15. An arrangement for positioning a plurality of electronic devices from compartments of an input medium into compartments of an output medium, the arrangement comprising:

at least one inspection device for imaging N actual known positions on the input medium and M known positions on the output medium, N and M being greater or equal to two;

a moving means for providing a relative motion between the at least one inspection device and the input medium in order to place at least one of the N known positions on the input medium in an image field of view of the at least one inspection device, and for providing a relative motion between the at least one inspection device and the output medium in order to place at least one of the M known positions on the output medium in the image field of view of the at least one inspection device;

at least one pick and place device for picking-up at least one electronic device from a respective at least one compartment of the input medium, transferring the at least one electronic device to a respective at least one compartment of the output medium, and placing the at least one electronic device into the respective at least one compartment of the output medium; and

a control unit for determining actual position data of the compartments of the input medium, for determining actual position data of the compartments of the output medium, and for controlling the at least one pick and place device so that the electronic devices are correctly picked-up from the compartments of the input medium, correctly transferred to the compartments of the output medium and correctly placed into the compartments of the output medium.

16. The arrangement as claimed in claim **15**, wherein at least one of the M known positions on the output medium is a marking formed on the upper side of the output medium.

17. The arrangement as claimed in claim **15**, wherein the control unit determines the actual position data of the compartments of the output medium on the basis of images of the M known positions of the output medium, target position data of the M known positions, and target position data of the compartments of the output medium, wherein the M known positions are imaged by the at least one inspection device.

18. The arrangement as claimed in claim **17**, wherein the arrangement comprises a CAD data model being connected to the control unit, the CAD data model comprising:

the target position data of the N known positions on the input medium;

the target position data of the compartments of the input medium;

the target position data of the M known positions on the output medium; and

the target position data of the compartments of the output medium.