CLAIMS

1. A self-adjustment device for the self-adjustment of a component-handling device for electronic components, which is designed and arranged to transfer the components from an ejection unit at a dispensing point to a first adjustable turning device having a plurality of first pick-up elements, and

to turn the transferred components through a first predetermined angle about its longitudinal or transverse axis to feed it to a deposit point, and to deposit it there on an adjustable reception device at a predetermined reception point, comprising:

a first adjustment sensor arrangement directed at the dispensing point, which is designed and arranged

to detect a position of the first pick-up elements positioned at the dispensing point in relation to the ejection unit, and

a second adjustment sensor arrangement directed at the deposit point, which is designed and arranged

to detect a position of the reception point in relation to the position of the first pick-up elements positioned at the deposit point, wherein

the first and the second adjustment sensor arrangements are each designed and arranged to detect the dispensing point/the deposit point from at least two detection directions which are different from one another, and

the first and second adjustment sensor arrangements are each designed and arranged to provide image acquisitions for each transfer position of the first turning device to a downstream controller, wherein

for each transfer position of the first turning device, the controller determines, on the basis of the image acquisitions obtained, a correction vector which is used during operation of the component-handling device to adjust the first turning device and/or the individual first pick-up elements and/or the reception device.

2. The self-adjustment device as claimed in claim 1, further comprising:

a position and property sensor which is directed from the periphery of the first turning device at 90° at the first pick-up elements guided past thereon and which is

in particular a camera sensor which is designed and arranged to determine a position of the first pick-up elements relative to a previously defined reference point.

3. The self-adjustment device as claimed in claim 1, wherein the first adjustment sensor arrangement and/or the second adjustment sensor arrangement each consist of a first imaging sensor, in particular a first camera, and a second imaging sensor, in particular a second camera.

4. The self-adjustment device as claimed in claim 1, wherein

the first adjustment sensor arrangement and/or the second adjustment sensor arrangement each consist of an imaging sensor, in particular a camera, directed from the center of the first turning device perpendicularly at the dispensing point or the deposit point, and at least two reflectors, in particular mirrors, arranged at right angles to one another, wherein

the imaging sensor is suitable and intended for detecting the dispensing point or the deposit point indirectly from a first and second detection direction, wherein

the reflectors are so arranged that the two detection directions are orthogonal to one another.

5. The self-adjustment device as claimed in claim 1, wherein

the controller is suitable and intended, on the basis of the image acquisitions obtained by the adjustment sensor arrangements, for determining and storing the position of the first pick-up elements situated at the dispensing point in relation to the ejection unit, and

determining and storing the position of the reception point in relation to the first pick-up elements situated at the deposit point, and/or

determining and storing a position deviation of the particular pick-up element from a previously defined position, and

on the basis of the determined positions, determining a correction vector for the position of the individual first pick-up elements and/or for the first turning device to which the first pick-up elements are fixed, and/or

on the basis of the determined positions, determining a correction vector for the reception device, and

determining further correction vectors for each transfer position of the first turning device in the same manner, and

controlling the positioning of the first turning device and/or of the individual first pick-up elements during operation in order to counteract the deviation between the determined position of the first pick-up elements relative to the position of the ejection unit, and

controlling the positioning of the reception device and/or of the individual first pick-up elements during operation in order to counteract the deviation between the determined position of the reception point relative to the position of the first pick-up elements, and/or

comparing the position of the first pick-up elements relative to the position of the ejection unit and/or to the position of the reception point with the position of the first pick-up elements relative to the defined reference point.

6. The self-adjustment device as claimed in claim 2, wherein the first and/or second adjustment sensor arrangement is permanently connected to the component-handling device, and/or the position and property sensor is permanently connected to the component-handling device.

7. The self-adjustment device as claimed in claim 1, further comprising:

a second adjustable turning device having a plurality of second pick-up elements, which is designed and arranged to receive the component at a transfer point from the first pick-up elements of the first turning device, to turn the received component through a second predetermined angle about its longitudinal or transverse axis, to feed it to the deposit point and to deposit it there on the adjustable reception device at the predetermined reception point, further comprising

a third adjustment sensor arrangement, directed at the transfer point between the first turning device and the second turning device, which is designed and arranged to detect a position of the second pick-up elements of the second turning

device positioned at the transfer point in relation to the first pick-up elements of the first turning device positioned at the transfer point.

8. A method for the self-adjustment of a component-handling device which transfers electronic components from an ejection unit at a dispensing point to a first turning device having a plurality of first pick-up elements, and

turns the transferred components through a first predetermined angle about their longitudinal or transverse axis, feeds them to a deposit point and deposits them there on an adjustable reception device at a predetermined reception point and comprises the following process steps:

detecting the dispensing point, containing the ejection unit and the first pick-up elements situated at that point, from at least two detection directions which are different from one another, by means of an adjustment sensor arrangement,

detecting the deposit point, containing the first pick-up element situated at that point and the reception point, from at least two detection directions which are different from one another, by means of an adjustment sensor arrangement,

determining the position of the first pick-up elements situated at the dispensing point in relation to the ejection unit, and

determining a deviation from a previously defined position of the first pick-up elements,

determining the position of the reception point in relation to the first pick-up elements situated at the deposit point, and

determining a deviation from a previously defined position of the reception point,

determining, on the basis of the previously determined deviations, a correction vector for the first turning device and/or for each individual first pick-up element and/or for the reception device,

repeating all the preceding method steps for every possible transfer position of the first turning device, and

controlling the positioning of the first turning device and/or of the reception device and/or of each individual first pick-up element during operation of the

component-handling device so that the deviation between the determined and the defined position of the first pick-up elements and/or of the reception point is counteracted in every possible transfer position.

9. The method as claimed in claim 8, further comprising:

detecting a position of the first pick-up elements in relation to a previously defined reference point by means of a position and property sensor which in particular is a camera sensor, and

comparing the determined relative position of the first pick-up elements to the reception point and/or to the ejection unit with the relative position of the first pick-up elements to the defined reference point, and

repeating all the preceding method steps for every possible transfer position of the first turning device.

10. The method as claimed in claim 8, wherein the electronic components are transferred at a transfer point from the first adjustable turning device to a second adjustable turning device, and

the received components are turned by the second turning device through a second predetermined angle about their longitudinal or transverse axis, fed to a deposit point and deposited there on an adjustable reception device at a predetermined reception point, wherein the method comprises the following further steps:

detecting the deposit point, containing the first pick-up elements of the first turning device situated at that point and the second pick-up elements of the second turning device situated at that point, from at least two detection directions which are different from one another, by means of an adjustment sensor arrangement, and

determining the position of the second pick-up elements of the second turning device situated at the transfer point in relation to the first pick-up elements of the first turning device situated at the transfer point, and

determining a deviation from a previously defined position of the second pick-up elements,

controlling the positioning of the second turning device and/or of each individual first pick-up element during operation of the component-handling device so that the deviation between the determined and the defined position of the second pick-up elements is counteracted in every possible transfer position.

11. The method as claimed in claim 8, wherein a check of the detection quality of the adjustment sensor arrangement and/or a check of the first pick-up elements for damage is carried out on the basis of the comparisons.