Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The present invention relates to a decoration method, for applying a new decor on a surface of an object including an existing décor. The invention also relates to a control system configured to carry out such a decoration method, and to a decoration machine comprising such a control system.

In the field of the decoration of objects, it is known to apply a new decor in the vicinity of a decor already existing on the surface of an object. For example, the new decor is applied on the object parallel to the existing décor. A detection device, for example a photoelectric cell, a linear camera or a matrix camera, is provided to measure a starting point of the existing décor, prior to the application of the new decor on the object. This method is generally satisfactory if the existing decor has a continuous section with a well-defined length and width, but not if this decor has a plurality of sections with variable lengths with respect to one another, or even a single section of variable width.

Some decoration methods, such as ink printing, involve driving the object in rotation about its central axis in order to mark the developed external surface thereof. The decor realized in practice is then likely to have a different printing length than the theoretical décor. The problem is accentuated when the object is cylindrical and/or has large dimensions, but also depending on the dimensional tolerances of the décor, which is not perfectly regular.

In practice, it is known to detect and record the position of a starting point of the existing décor, which will serve as a reference for positioning the starting point of the new decor to be realized, aligned with the starting point of the existing decor or with a desired offset. The length of the new decor is indexed to the theoretical length of the existing décor. The starting point of the new decor is then correctly positioned with respect to the existing décor, but not the rest of the new décor, thereby impairing the appearance of the object. This problem is frequently encountered in applications for cosmetics, stoppers, alcohol and spirit bottles, without a satisfactory solution to date. The freedom of the designer is limited during the design of the new décor. Visible defects are likely to bring about costly rejects in production.

The aim of the present invention is to propose an improved decoration method that remedies the above-mentioned drawbacks.

FR-A-2 676 129 discloses a decoration method for applying a new decor on the surface of an object including an existing décor. The method consists in printing a mark on the object at the same time as the printing of the existing décor. This mark is in the shape of a triangle and can be detected by using a photoelectric cell when rotating the object around its revolution axis. The photoelectric cell allows measuring the distance between two points of the mark (S₁ and S', or S₂ and S''₂). The desired position of the mark with respect to the printing machine is defined between two other points (S₀ and S'₀). When comparing the distance measured by photoelectric cell with a desired distance (d₀) between the two other points (S₀ and S'₀), one can displace the object parallel to its revolution axis in order to make the mark to match with its desired position. Then, new decor can be printed in an accurate manner. This method does not include a step consisting in measuring two identification points of the existing decor applied on the surface of the object. Indeed, the identification points spotted in the method are not located on the existing decor but on the mark.

EP-A-1 769 916 discloses a decoration method for applying a new decor on a surface of an object including an existing decor. A first step of the method consists in bringing the object (that is already marked) correctly in a position facing a linear locating camera. This camera allows locating a particular point (A₁) of the existing decor in order to correctly apply the new decor. This particular point forms an identification point of the existing decor. This decoration method allows correcting the position of the marking points of the new decor depending on the position of the identification point (A₁), i.e. only fixing a poor position of the existing decor. However, this step does not take into account information relating to a theoretical decor, such as the size of the decor to be applied. Therefore, this method does not allow adjusting the size of the new decor to fit with that of the existing decor. For instance, if the existing decor is smaller than expected, the size of the new decor is not adjusted accordingly. This may give the feeling of a disproportionate marking.

To this end, a decoration method according to the present invention as defined in claim 1, a control system according to the present invention as defined in claim 8 and a decoration machine according to the present invention as defined in claim 10 are provided.

Further preferred embodiments are defined in the dependent claims.

The invention relates to a decoration method, for applying a new decor on a surface of an object including an existing decor, the method comprising the following successive steps:a) a step for measuring at least two identification points of the existing decor applied on the surface of the object;b) a step for dynamic correction of localization points of the new decor to be applied on the surface of the object, using the identification points measured during the measuring step a); and c) a step for application of the new decor on the surface of the object, by using the localization points determined in the dynamic correction step b), characterized in that, at step b), the dynamic correction of localization points of the new decor to be applied on the surface of the object is performed using also information relating to a theoretical decor.

Thus, the invention makes it possible to position the new decor in a manner corresponding to the existing décor with improved precision. By virtue of the measurement of at least two identification points, the dynamic correction is more effective. The method can be repeated for several objects of a single set, for example a set of
bottles. Moreover, the method can be repeated for the application a succession of décors to one and the same object, for example three or four successive décors that need to be positioned with precision with respect to one another.

According to further advantageous features of the method according to the invention, taken in isolation or in combination:

- The identification points comprise at least one starting point and/or one ending point of the existing décor, preferably at least the starting point and the ending point of the existing décor.
- The existing décor and the new décor comprise neighboring borders that are rectilinear and substantially parallel projected in a plane, the identification points are measured only along a first direction in the measuring step a), and a substantially constant gap between the existing décor and the new décor, defined along a second direction orthogonal to the first direction, is obtained by closed-loop control of a decoration device in the application step c).
- The identification points are measured along two directions in the measuring step a).
- The existing décor and the new décor comprise neighboring borders that are non-rectilinear and/or non-parallel and the identification points are measured along the border of the existing decoration in the measuring step a).
- The existing décor and the new décor comprise several discontinuous sections.
- The identification points comprise at least one starting point and/or one ending point for each of the discontinuous sections of the existing décor.

The invention also relates to a control system, configured to carry out a decoratiom method as mentioned above, characterized in that the control system comprises a detection device suitable for measuring at least two identification points of the existing décor, so as to perform dynamic correction of the localization points of the new décor to be applied on the surface of the object, by using the identification points and information relating to a theoretical décor.

Preferably, the detection device is a linear camera.

The invention relates further to a decoration machine, comprising a control system as mentioned above. Preferably, the machine is intended to carry out hot stamping. The machine may comprise several stations, including at least one measuring station equipped with a detection device and a decoration station equipped with a decoration device. Alternatively, the machine may comprise a single station, equipped with a detection device and a decoration device. By way of nonlimiting example, the detection device is a linear camera and the decoration device is a hot stamping head comprising a die.

The invention will be better understood from reading the following description, given solely by way of nonlimiting example and with reference to the appended drawings, which are schematic depictions, in which:

- figure 1 shows a first theoretical decor applied on an object;
- figure 2 shows the first theoretical decor and a second theoretical decor applied in parallel on the object in figure 1;
- figure 3 shows a first practical decor applied on the object in figure 1, having a number of divergences from the first theoretical décor;
- figure 4 shows a second practical decor not in accordance with the invention, applied in parallel to the first practical decor on the object in figure 2;
- figure 5 shows a second practical decor in accordance with a first embodiment of the invention, applied in parallel to the first practical decor on the object in figure 2;
- figure 6 shows a second practical decor in accordance with a second embodiment of the invention, having different patterns than the décors in figures 1 to 6;
- figure 7 shows a first theoretical decor and a second theoretical decor applied in parallel on an object;
- figures 9 to 12 show a second practical decor intended to correspond to the theoretical décors in figure 7;
- figures 9 to 12 show a second practical decor in accordance with a third, a fourth, a fifth and a sixth embodiment of the invention, respectively, applied next to the first practical décor on the object in figure 8.

The invention relates further to a decoration machine, comprising a control system as mentioned above. Preferably, the machine is intended to carry out hot stamping. The machine may comprise several stations, including at least one measuring station equipped with a detection device and a decoration station equipped with a decoration device. Alternatively, the machine may comprise a single station, equipped with a detection device and a decoration device. By way of nonlimiting example, the detection device is a linear camera and the decoration device is a hot stamping head comprising a die.

The invention will be better understood from reading the following description, given solely by way of nonlimiting example and with reference to the appended drawings, which are schematic depictions, in which:

- figure 1 shows a first theoretical decor applied on an object;
- figure 2 shows the first theoretical decor and a second theoretical decor applied in parallel on the object in figure 1;
- figure 3 shows a first practical decor applied on the object in figure 1, having a number of divergences from the first theoretical décor;
- figure 4 shows a second practical decor not in accordance with the invention, applied in parallel to the first practical decor on the object in figure 2;
- figure 5 shows a second practical decor in accordance with a first embodiment of the invention, applied in parallel to the first practical decor on the object in figure 2;
- figure 6 shows a second practical decor in accordance with a second embodiment of the invention, having different patterns than the décors in figures 1 to 6;
- figure 7 shows a first theoretical decor and a second theoretical decor applied in parallel on an object;
- figures 9 to 12 show a second practical decor intended to correspond to the theoretical décors in figure 7;
- figures 9 to 12 show a second practical decor in accordance with a third, a fourth, a fifth and a sixth embodiment of the invention, respectively, applied next to the first practical décor on the object in figure 8.
for the décor 50. The dimensional divergences are exaggerated in figures 3 to 6 compared with figures 1 and 2 in order to make it easier to understand the invention.

[0019] In figure 1, the surface 2 has a first theoretical décor 10 comprising three longitudinal sections 11, 12 and 13. The section 11 has a length L11 defined between two points 11a and 11b. The section 12 has a length L12 defined between two points 12a and 12b. The section 13 has a length L13 defined between two points 13a and 13b. The section 11 starts at the end 2A, in other words the point 11a is situated at the end 2A. The sections 11, 12 and 13 are discontinuous. A space of length L15 is defined between the sections 11 and 12, more precisely between the points 11b and 12a. A space of length L16 is defined between the sections 12 and 13, more precisely between the points 12b and 13a. A space of length L17 is defined between the section 13 and the end 102, more precisely between the point 13b and the end 2B. The décor 10 has a length L10 equal to the sum of the lengths L11, L12, L13, L15 and L16.

[0020] In figure 2, the surface 2 has a second theoretical décor 10' applied next to the first theoretical décor 10. The theoretical décors 10 and 10' are aligned perfectly along the directions D1 and D2. In particular, the sections 11', 12' and 13' each have the same lengths L11, L12 and L13 as the sections 11, 12 and 13 along the direction D1, while their starting points and ending points are aligned along the direction D2. The décors 10 and 10' comprise neighboring borders, 18 and 18', respectively, which are rectilinear and substantially parallel in projection in the plane of the developed surface 2. A constant gap e10 is defined along the direction D2 between the décors 10 and 10', more precisely between the borders 18 and 18'. This constant gap e10 is obtained by closed-loop control of a decoration device, for example a hot stamping head, when the practical décor corresponding to the theoretical décor 10' is applied to the surface 2 of the bottle 1.

[0021] In figures 3 to 6, the surface 2 receives practical decorations 20, 30, 40 and 50. Each practical décor is imperfect and does not correspond exactly to the theoretical décor 10 or 10', in particular on account of the dimensional tolerances inherent to each decoration method that is likely to be employed. In figure 3, the section 21 does not start at the end 2A, and so the point 21a is separated from the end 2A by the length L24. Moreover, the length L20 is not equal to the length L10, and so the sections 21, 22 and 23 of the practical décor are offset with respect to the sections 11, 12 and 13 of the theoretical décor. The points 21b, 22a, 22b, 23a and 23b do not coincide with the points 11b, 12a, 13b and 13b, respectively. The lengths L21, L22, L23, L25, L26 and L27 are different than the lengths L11, L12, L13, L15, L16 and L17, respectively. In the example in figure 3, the lengths L21, L22 and L25 are less than the lengths L11, L12 and L15, respectively, while the lengths L23, L26 and L27 are greater than the lengths L13, L16 and L17, respectively.

[0024] In spite of the slight dimensional divergences between the theoretical décor 10 and the practical décor 20, the visual appearance of the surface 2 including the décor 20 is satisfactory overall.

[0025] Secondly, following application of the décor 20 on the surface 2, a new décor is applied next to the existing décor 20.

[0026] To this end, the decoration machine comprises a control unit designed to receive and process, on the one hand, information relating to the theoretical décors 10 and 10' and, on the other hand, information relating to the practical décor 20 that is stored in a control system. The control system may comprise various types of detection device, for example a photoelectric cell, a matrix camera or preferably a linear camera. The control unit is also designed to control the movement of the bottle 1, more precisely the rotation of the bottle 1 about its central axis, and also the movement of the decoration device, which is for example a hot stamping head comprising a die.

[0027] Figure 4 illustrates a known decoration method, not in accordance with the invention, while figures 5 and 6 illustrate two embodiments of a decoration method in accordance with the invention.

[0028] In figure 4, the surface 2 including the first décor 20 receives the second practical décor 30 realized, on the one hand, on the basis of the information relating to the second theoretical décor 10', by bringing the lengths L30, L31, L32, L33, L35 and L36 into coincidence with the lengths L10', L11', L12', L13', L15' and L16', respectively, along the direction D1 and, on the other hand, on
Under these conditions, the décor 30 is not poly.

than the lengths L21, L22, L23, L25 and L26, respectively, but are different than the lengths L31, L32, L33, L35 and L36 which are equal to the lengths L11, L12, L13, L15 and L16, respectively, but are different than the lengths L21, L22, L23 along the direction D1. The lengths L31, L32, L33, L35 and L36 are equal to the length L10 but not to the practical length L20. The points 31b, 32a, 32b, 33a and 33b do not coincide with the points 21b, 22a, 22b, 23a and 23b, respectively, along the direction D1. The lengths L31, L32, L33, L35 and L36 are equal to the lengths L11, L12, L13, L15 and L16, respectively, but are different than the lengths L21, L22, L23, L25 and L26, respectively.

Under these conditions, the décor 30 is not positioned correctly with respect to the décor 20 along a direction D1. The visual appearance of the surface 2 including the décors 20 and 30 is not satisfactory.

In figure 5, the surface 2 including the first décor 20 receives the second practical décor 40 realized, on the one hand, on the basis of the information relating to the second theoretical décor 10', in particular the lengths L10, L11, L12, L13, L15 and L16 and, on the other hand, on the basis of the information relating to the first practical décor 20 which is provided by the control system, by bringing the starting point 21a of the décor 20 along the direction D1, with the gap e10 formed between the borders 28 and 38 of the décors 20 and 30 along a direction D2. In other words, the coordinates of the starting point 21a of the section 21 along the direction D1. By virtue of the control system, the length L34 is equal to the length L24. By contrast, the length L30 corresponds to the theoretical length L10 but not to the practical length L20. The points 31b, 32a, 32b, 33a and 33b do not coincide with the points 21b, 22a, 22b, 23a and 23b, respectively, along the direction D1. The lengths L31, L32, L33, L35 and L36 are equal to the lengths L11, L12, L13, L15 and L16, respectively, but are different than the lengths L21, L22, L23, L25 and L26, respectively.

In figure 6, the surface 2 including the first décor 20 receives the second practical décor 50 realized, on the one hand, on the basis of the information relating to the second theoretical décor 10', in particular the lengths L10, L11, L12, L13, L15 and L16 and, on the other hand, on the basis of the information relating to the first practical décor 20 which is provided by the control system, by bringing the starting point 51c of the décor 50 into coincidence with the starting point 21a of the décor 20 along the direction D1, with the gap e10 formed between the borders 28 and 58 of the décors 20 and 50 along the direction D2. In other words, the coordinates of each starting point 21a, 22a and 23a of the décors 20, the starting point 52a of the section 52 coincide with the coordinates of each starting point 21a, 22a and 23a, respectively, of the sections 21, 22 and 23, and the coordinates of the ending point 53b of the section 53 coincide with the coordinates of the ending point 23b of the section 23 along the direction D1. By virtue of the control system, the length L50 is equal to the length L20, the length L51 is equal to the length L24 and the length L57 is equal to the length L27. By contrast, the points 51b and 52b do not coincide with the points 21b and 22b, respectively. The lengths L51, L52 and L53 are equal to the lengths L11, L12 and L13, respectively, multiplied by a coefficient L50/L10, but are different than the lengths L21, L22 and L23, respectively.

Thus, even if the décor 50 is not positioned perfectly on the surface 2 with respect to the décor 20, the result is all the same more satisfactory than in the case of the décor 40.

In the examples in figures 7 to 12, the surface 2 receives theoretical décors 110 and 110, or practical décors 120, 130, 140, 150, 160 and/or 170. In each of figures 7 to 12, the existing décor 110 or 120 and the new décor 110, 130, 140, 150, 160 or 170 comprise borders with a wavy shape, requiring precise relative positioning. The constituent elements that are analogous to the décor 110 receive apostrophes for the décor 110, while they comprise numerical references increased by ten for the décor 120, by twenty for the décor 130, by thirty for the décor 140, by forty for the décor 150, by fifty for the décor 160 and by sixty for the décor 170. The dimensional divergences are exaggerated in figures 8 to 12 compared with figure 7 in order to make it easier to understand the invention.

In figure 7, the surface 2 includes a first theoretical décor 110 and a second theoretical décor 110 applied next to the first theoretical décor 110, each comprising a single longitudinal section and an undulating border 118 and 118, respectively. The décor 110 has a length L110 defined between two points 110a and 110b along the direction D1. The décor 110 has a length L110 defined between two points 110a' and 110b' along the direction D1. The points 110a and 110b are situated on the border 118, while the points 110a' and 110b' are situated on the border 118. The décors 110 and 110' start
at the end 2A, in other words the points 110a and 110a’ are situated at the end 2A. The theoretical décors 110 and 110’ are perfectly aligned along the directions D1 and D2. A constant gap e110 is defined along the direction D2 between the décors 110 and 110’, more precisely between the borders 118 and 118’. The wavy shape of the practical décors corresponding to the theoretical décors 110 and 110’ may be obtained by virtue of the configuration of the decoration device, which is for example a stamping head comprising a die. The first practical décor is applied by a first die, and then the second practical décor is applied by a second die.

[0036] In figures 8 to 12, the surface 2 receives practical decorations 120, 130, 140, 150, 160 and 170. Each practical décor is imperfect and does not correspond exactly to the theoretical décor 110 or 110’, in particular on account of the dimensional tolerances inherent to each decoration method that is likely to be employed. In addition, the practical décors are likely to vary from one bottle to another in the same set based on the same theoretical décors 110 or 110’. Following application of the décor 120 on the surface 10, a new décor 130, 140, 150, 160 or 170 is applied next to the existing décor 120. The identification points are measured along the border 128 of the decoration 120, as explained in detail below. The décors 140, 150, 160 and 170 realized by implementing the invention are more precise than the décor 130.

[0037] In figure 8, the surface 2 receives the first practical décor 120 and the second practical décor 130 that are intended to correspond to the theoretical décors 110 and 110’, respectively. The practical décors 120 and 130 are imperfect and do not correspond exactly to the theoretical décors 110 and 110’. The starting points 120a and 130a are positioned properly at the end 2A, but the ending points 120b and 130b are separated from the points 110b and 110b’. In the example shown, the point 120b is closer to the end 2B than the point 110b, while the point 130b is further away from the end 2B than the point 110b’. The gap “e” between the borders 128 and 138 is variable and does not correspond to the gap e110. An overlapping zone Z8 of the décors 120 and 130 is apparent near the end 2B. The visual appearance of the surface 2 including the décors 120 and 130 is not satisfactory.

[0038] In figure 9, the surface 2 including the first décor 120 receives the second practical décor 140 realized, on the one hand, on the basis of the information relating to the second theoretical décor 110’ and, on the other hand, on the basis of the information relating to the first practical décor 110 which is provided by the system control system, by positioning the starting point 140a of the décor 140 in a manner corresponding to the starting point 120a of the décor 120 and by positioning an intermediate point 140c situated on the border 148 of the décor 140 in a manner corresponding to an intermediate point 120c situated on the border 128 of the décor 120, along the direction D1. At the points 140a and 140c, the gap “e” between the borders 128 and 148 is equal to the reference gap e110. Between the points 140a and 140c, and between the points 140c and 140b, this gap “e” is likely to vary. In this case, the point 140b is offset towards the end 2B compared with the point 120b in the zone Z8, but this offset is less significant than for the points 120b and 130b. Thus, even if the décor 140 is not positioned perfectly on the surface 2 with respect to the décor 120, the result is all the same more satisfactory than in the case of the décor 130.

[0039] In figure 10, the surface 2 including the first décor 120 receives the second practical décor 150, by the starting point 150a of the décor 150 being positioned in a manner corresponding to the starting point 120a of the décor 120 and by two intermediate points 150d and 150c situated on the border 158 of the décor 150 being positioned in a manner corresponding to two intermediate points 120d and 120c situated on the border 128 of the décor 120, along the direction D1. At the points 150a, 150d and 150c, the gap “e” between the borders 128 and 158 is equal to the reference gap e110. Between the points 150a and 150d, between the points 150d and 150e, and between the points 150e and 150b, this gap “e” is likely to vary. In this case, the point 150b is offset away from the end 2B with respect to the point 120b in the zone Z8, but this offset is less significant than for the points 120b and 130b. Thus, even if the décor 150 is not positioned perfectly on the surface 2 with respect to the décor 120, the result is all the same more satisfactory than in the case of the décor 130.

[0040] In figure 11, the surface 2 including the first décor 120 receives the second practical décor 160, by the starting point 160a of the décor 160 being positioned in a manner corresponding to the starting point 120a of the décor 120 and by the ending point 160b of the décor 160 being positioned in a manner corresponding to the ending point 120b of the décor 120, along the direction D1. At the points 160a and 160b, the gap “e” between the borders 128 and 168 is equal to the reference gap e110. Between the points 160a and 160b, this gap “e” is likely to vary. An overlapping zone Z8 of the décors 120 and 160 is apparent between the points 160a and 160b, but this defect is less significant than for the décors 120 and 130. Thus, even if the décor 160 is not positioned perfectly on the surface 2 with respect to the décor 120, the result is all the same more satisfactory than in the case of the décor 130.

[0041] In figure 12, the surface 2 including the first décor 120 receives the second practical décor 170, by the starting point 170a of the décor 170 being positioned in a manner corresponding to the starting point 120a of the décor 120, by the ending point 170b of the décor 170 being positioned in a manner corresponding to the ending point 120b of the décor 120, and by eight intermediate points 170f and so on situated on the border 178 of the décor 170 being positioned in a manner corresponding to eight intermediate points 120f and so on situated on the border 128 of the décor 120, along the direction D1. At the points 170a, 170b, 170f and so on, the gap “e”
between the borders 128 and 178 is equal to the reference gap e110. On account of the large number of intermediate identification points 120f and so on, the gap "e" between the borders 128 and 178 varies little over the entire surface 102. Thus, the correspondence between the décors 120 and 170 is improved compared with the décors 130, 140, 150 and 160.

[0042] In practice, the decoration method according to the invention comprises different successive steps a), b) and c) for applying the new décor 40, 50, 140, 150, 160 or 170 on the surface 2 including the existing décor 20 or 120. The method comprises a step a) for measuring at least two identification points of the existing décor 20 or 120 applied on the surface 2 of the bottle 1. Preferably, the identification points comprise at least one starting point 21a or 120a and/or one ending point 23b or 120b of the existing décor 20 or 120. In particular, the identification points may comprise the starting point and the ending point of the existing décor 20 or 120. The identification points comprise the points 21a and 23b in the example of figure 5, the points 21a, 22a and 23a in the example of figure 6, the points 120a and 120c in the example of figure 9, the points 120a, 120d and 120e in the example of figure 10, the points 120a and 120b in the example of figure 11 and the points 120a, 120b 120f and so on in the example of figure 12. The measuring step a) is realized by employing the control system with which the decoration machine is equipped.

[0043] Next, the method comprises a step b) for dynamic correction of localization points of the new décor 40; 50, 140; 150, 160 or 170 to be applied on the surface 2 of the bottle 1, using the identification points measured during the measuring step a). These localization points comprise the points 41a, 41b, 42a, 42b, 43a and 43b in the example of figure 5, the points 51a, 51b, 52a, 52b, 53a and 53b in the example of figure 6, the points 140a, 140b and 140c in the example of figure 9, the points 150a, 150b, 150d and 150e in the example of figure 10, the points 160a and 160b in the example of figure 11 and the points 170a, 170b, 170f and so on in the example of figure 12. According to the invention, the dynamic correction step b) uses, on the one hand, information relating to the theoretical décor 10' or 110' and, on the other hand, information relating to the identification points measured during the measuring step a).

[0044] Finally, the method comprises a step c) for application of the new décor 40, 50, 140, 150, 160 or 170 on the surface 2 of the bottle 1, by using the localization points determined in the dynamic correction step b). Depending on the information processed by the control unit during the dynamic correction step b), the application step c) comprises a variation in the movement of the bottle 1, more precisely a variation in the speed of rotation of this bottle 1 about its central axis, that is to say an acceleration or a deceleration. Thus, the dynamic correction makes it possible to bring the new décor 40, 50, 140, 150, 160 or 170 better into correspondence with the existing décor 20 or 120.

[0045] In the examples of figures 5 and 6, the identification points of the existing décor 20 are measured along the direction D1 only. Similarly, the localization points of each new décor 40 and 50 are determined only along the direction D1. In other words, each identification point or localization point is identified by a single coordinate in a linear reference frame defined along the direction D1.

[0046] In the examples of figures 9 to 12, the identification points of the existing décor 120 are measured along the wavy border 120 along the two directions D1 and D2. Similarly, the localization points of each new décor 140, 150, 160 and 170 are determined along the direction D1 and D2. In other words, each identification point or localization point is identified by two coordinates in an orthogonal reference frame defined along the directions D1 and D2.

[0047] In the examples of figures 1 to 12, the decoration does not include an overlap between the existing décor and the new décor. The gap e10 defined along the direction D2 between the décors 20 and 50 or 60 is kept substantially constant by closed-loop control of the decoration device controlled by the control unit. The gap "e" defined along the direction D2 between the décors 120 and 140, 150, 160 and 170 is also as close as possible to the reference gap e110, ideally equal to the reference gap e110.

[0048] According to the invention, the control system comprises a detection device designed to measure at least two identification points of the existing décor 20 or 120, so as to realize dynamic correction of the localization points of the new décor 40, 50, 140, 150, 160 or 170 to be applied on the surface 2 of the bottle 1, by using the identification points. Preferably, the detection device is a linear camera. The dynamic correction is realized by the control unit with which the decoration machine is equipped.

[0049] Furthermore, the decoration method, the detection system and/or the decoration machine may be different than the examples described above without departing from the scope of the invention.

[0050] In a variant that is not shown, the object 1 may be other than a bottle. For its part, the surface 2 to be decorated may have a shape other than a cylinder. Furthermore, the developed form of this surface 2 projected in a plane may be different than a rectangular surface. Depending on the shape of the object 1 and of the surface 2, the application step c) may comprise a variation in the movement of the object 1 and/or a variation in the movement of the decoration device belonging to the decoration machine.

[0051] According to another variant that is not shown, other décors then those in figures 1 to 12 may be applied to the surface 2 of the bottle 1. For example, the décors may comprise several sections with wavy borders. According to another example, the décors may comprise a single section with mutually parallel borders. According to another example, the décors may comprise any type of neighboring borders that are non-rectilinear and/or...
The decoration method according to claim 1, characterized in that the existing décor (20) and the new décor (40; 50) comprise neighboring borders (28, 48; 28, 58) that are rectilinear and substantially parallel projected in a plane, in that the identification points (21a, 23a; 21a, 22a, 23a, 23b) are measured only along a first direction (D1) in the measuring step a), and in that a substantially constant gap (e10) between the existing décor (20) and the new décor (50; 60), defined along a second direction (D2) orthogonal to the first direction (D1), is obtained by closed-loop control of a decoration device in the application step c).

Claims

1. A decoration method, for applying a new décor (40; 50; 140; 150; 160; 170) on a surface (2) of an object (1), by using the identification points (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b, 120a, 120f) to be applied on the surface (2) of the object (1); characterized in that the existing décor (120) in the measuring step a).

2. The decoration method according to claim 1, characterized in that the identification points (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b, 120a, 120f) comprise at least one starting point and/or one ending point for each of the discontinuous sections (21, 22, 23; 41, 42, 43; 51, 52, 53).

3. The decoration method according to one of claims 1 or 2, characterized in that the existing décor (20) and the new décor (40; 50) comprise neighboring borders (28, 48; 28, 58) that are rectilinear and substantially parallel projected in a plane, in that the identification points (21a, 23a; 21a, 22a, 23a, 23b) are measured only along a first direction (D1) in the measuring step a), and in that a substantially constant gap (e10) between the existing décor (20) and the new décor (50; 60), defined along a second direction (D2) orthogonal to the first direction (D1), is obtained by closed-loop control of a decoration device in the application step c).

4. The decoration method according to one of claims 1 or 2, characterized in that the identification points (120a, 120c; 120a, 120d, 120e; 120a, 120b, 120a, 120f) are measured along two directions (D1, D2) in the measuring step a).

5. The decoration method according to claim 4, characterized in that the existing décor (120) and the new décor (140; 150; 160; 170) comprise neighboring borders (128, 148; 128, 158; 128, 168; 128, 178) that are non-rectilinear and/or non-parallel and in that the identification points (120a, 120c; 120a, 120d, 120e; 120a, 120b, 120a, 120f) are measured along the border (128) of the existing décor (120) in the measuring step a).

6. The decoration method according to one of the preceding claims, characterized in that the existing décor (20) and the new décor (40; 50) comprise several discontinuous sections (21, 22, 23; 41, 42, 43; 51, 52, 53).

7. The decoration method according to claim 6, characterized in that the identification points (21a, 22a, 23a, 23b) comprise at least one starting point and/or one ending point for each of the discontinuous sections (21, 22, 23) of the existing décor (20).

8. A control system, configured to carry out a decoration method according to one of claims 1 to 7, characterized in that the control system comprises a detection device suitable for measuring at least two identification points (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b, 120a, 120f) of the existing décor (20; 120), so as to perform dynamic correction of the localization points (41a, 41b, 42a, 42b, 43a, 43b; 51a, 51b, 52a, 52b, 53a, 53b; 140a, 140b, 140c; 150a, 150b, 150d, 150e; 160a, 160b, 160c, 170a, 170b, 170f) determined in the dynamic correction step b),

characterized in that, at step b), the dynamic correction of localization points of the new décor to be applied on the surface (2) of the object (1) is performed using also information relating to a theoretical décor (10'; 110').
9. The system according to claim 8, characterized in that the detection device is a linear camera.

10. A decoration machine, characterized in that it comprises a control system according to one of claims 8 or 9.

Patentansprüche

1. Dekorationsverfahren zum Auftragen eines neuen Dekors (40; 50; 140; 150; 160; 170) auf eine Oberfläche (2) eines Objekts (1), die ein bestehendes Dekor (20; 120) aufweist, wobei das Verfahren die folgenden aufeinanderfolgenden Schritte umfasst:

   a) einen Schritt zum Messen von mindestens zwei Identifikationspunkten (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b; 120a, 120b, 120f) des bestehenden Dekor, auf die Oberfläche (2) des Objekts (1) aufgetragen (20; 120);

   b) einen Schritt der dynamischen Korrektur der Lokalisierungspunkte (41a, 41b, 42a, 42b, 43a, 43b; 51a, 51b, 52a, 52b, 53a, 53b; 140a, 140b, 140c; 150a, 150b, 150d, 150e; 160a, 160b; 170a, 170b, 170f) des neuen Dekors (40; 50; 140; 150; 160; 170), die auf die Oberfläche (2) des Objekts (1) aufgetragen werden soll, unter Verwendung der in Messschritt a) gemessenen Identifikationspunkte (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b; 120a, 120b, 120f);

   c) einen Schritt zum Auftragen des neuen Dekors (40; 50; 140; 150; 160; 170) auf die Oberfläche (2) des Objekts (1) unter Verwendung der im dynamischen Korrekturschritt b) bestimmten Lokalisierungspunkte (41a, 41b, 42a, 42b, 43a, 43b; 51a, 51b, 52a, 52b, 53a, 53b; 140a, 140b, 140c; 150a, 150b, 150d, 150e; 160a, 160b; 170a, 170b, 170f), die dynamische Korrektur der Lokalisierungspunkte des neuen Dekors, auf die Oberfläche (2) des Objekts (1) aufzutragenden in Schritt b) durchgeführt wird, indem außerdem Informationen zu einem theoretischen Dekor (10'; 110') verwendet werden.

2. Dekorationsverfahren nach Anspruch 1, dadurch gekennzeichnet, dass die Identifikationspunkte (21a, 23b; 21a, 22a, 23a, 23b; 120a, 120c; 120a, 120d, 120e; 120a, 120b; 120a, 120b, 120f) mindestens einen Startpunkt (21; 120a) und/oder einen Endpunkt (23b; 120b) des bestehenden Dekors (20; 120) umfassen, bevorzugt mindestens den Startpunkt (21a; 120a) und den Endpunkt (23b; 120b) des bestehenden Dekors (20; 120).

3. Dekorationsverfahren nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass das bestehende Dekor (20) und das neue Dekor (40; 50) benachbarte Grenzen (28, 48; 28, 58) umfassen, die geradlinig und im Wesentlichen in einer Ebene parallelprojiziert sind, dass die Identifikationspunkte (21a, 23a; 21a, 22a, 23a, 23b) im Messschritt a) nur in einer ersten Richtung (D1) gemessen werden, und dass eine im Wesentlichen konstante Lücke (e10) zwischen dem bestehenden Dekor (20) und dem neuen Dekor (50; 60), die in einer zweiten Richtung (D2), die rechtwinklig zur ersten Richtung (D1) verläuft, definiert ist, durch einen geschlossenen Regelkreis einer Dekorationsvorrichtung im Auftragungsschritt c) erhalten wird.

4. Dekorationsverfahren nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass die Identifikationspunkte (120a, 120c; 120a, 120d, 120e; 120a, 120b; 120a, 120b, 120f) im Messschritt a) in zwei Richtungen (D1, D2) gemessen werden.

5. Dekorationsverfahren nach Anspruch 4, dadurch gekennzeichnet, dass das bestehende Dekor (120) und das neue Dekor (140; 150; 160; 170) benachbarte Grenzen (128, 148; 128, 158; 128, 168; 128, 178) umfassen, die nicht geradlinig und/oder nicht parallel sind, und dass die Identifikationspunkte (110a, 120c; 120a, 120d, 120e; 120a, 120b; 120a, 120b, 120f) im Messschritt a) entlang der Grenze (128) der bestehenden Dekoration (120) gemessen werden.

6. Dekorationsverfahren nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass das bestehende Dekor (20) und das neue Dekor (40; 50) mehrere unterbrochene Abschnitte (21, 22, 23; 41, 42, 43; 51, 52, 53) umfassen.

7. Dekorationsverfahren nach Anspruch 6, dadurch gekennzeichnet, dass die Identifikationspunkte (21a, 22a, 23a, 23b) mindestens einen Startpunkt und/oder einen Endpunkt für jeden der unterbrochenen Abschnitte (21, 22, 23) des bestehenden Dekors (20) umfassen.

8. Steuerungssystem, das dazu ausgelegt ist, ein Dekorationsverfahren nach einem der Ansprüche 1 bis 7 durchzuführen, dadurch gekennzeichnet, dass das Steuerungssystem eine Detektionseinrichtung umfasst, die geeignet ist, mindestens zwei Identifikationspunkte (21a, 22a, 23a, 23b) zu messen, um die dynamische Korrektur der Lokalisierungspunkte (41a, 41b, 42a, 42b, 43a, 43b; 51a, 51b, 52a, 52b, 53a, 53b; 140a, 140b, 140c; 150a, 150b, 150d, 150e; 160a, 160b; 170a, 170b, 170f) des neuen De-
Revendications

1. Méthode de décoration, pour appliquer un nouveau décor (40 ; 50 ; 140 ; 150 ; 160 ; 170) sur une surface (2) d’un objet (1) comportant un décor existant (20 ; 120), la méthode comprenant les étapes successives suivantes :

   - une étape de mesure d’au moins deux points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c, 120d, 120e ; 120a, 120b, 120a, 120f) sur la surface (2) de l’objet (1) ;
   - une étape de correction dynamique de points de localisation (41a, 41b, 42a, 42b, 43a, 43b ; 51a, 51b, 52a, 52b, 53a, 53b ; 140a, 140b, 140c ; 150a, 150b, 150d, 150e ; 160a, 160b, 170a, 170b, 170f) du nouveau décor existant (20 ; 120) appliqué sur la surface (2) de l’objet (1) ;
   - une étape de mesure d’au moins deux points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c, 120d, 120e ; 120a, 120b, 120a, 120f) sur la surface (2) de l’objet (1) ;

   et

   - une étape d’application du nouveau décor (40 ; 50 ; 140 ; 150 ; 160 ; 170) sur la surface (2) de l’objet (1), en utilisant les points de localisation (41a, 41b, 42a, 42b, 43a, 43b ; 51a, 51b, 52a, 52b, 53a, 53b ; 140a, 140b, 140c ; 150a, 150b, 150d, 150e ; 160a, 160b, 170a, 170b, 170f) du nouveau décor (40 ; 50 ; 140 ; 150 ; 160 ; 170) à appliquer sur la surface (2) de l’objet (1), en utilisant les points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c, 120d, 120e ; 120a, 120b, 120a, 120f) mesurés lors de l’étape de mesure a) ; et
   - une étape d’application du nouveau décor (40 ; 50 ; 140 ; 150 ; 160 ; 170) sur la surface (2) de l’objet (1), en utilisant les points de localisation (41a, 41b, 42a, 42b, 43a, 43b ; 51a, 51b, 52a, 52b, 53a, 53b ; 140a, 140b, 140c ; 150a, 150b, 150d, 150e ; 160a, 160b, 170a, 170b, 170f) déterminés dans l’étape de correction dynamique b), caractérisée en ce que, à l’étape b), la correction dynamique de points de localisation du nouveau décor à appliquer sur la surface (2) de l’objet (1) est réalisée en utilisant également des informations relatives à un décor théorique (10’ ; 110’) ;

2. Méthode de décoration selon la revendication 1, caractérisée en ce que les points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c ; 120a, 120d, 120e ; 120a, 120b, 120a, 120f) comprennent au moins un point de départ (21 ; 120a) et/ou un point d’arrivée (23b ; 120b) du décor existant (20 ; 120), de préférence au moins le point de départ (21a ; 120a) et le point d’arrivée (23b ; 120b) du décor existant (20 ; 120) .

3. Méthode de décoration selon l’une des revendications 1 ou 2, caractérisée en ce que le décor existant (20) et le nouveau décor (40 ; 50) comprennent des bordures voisines (28, 48 ; 28, 58) qui sont rectilignes et sensiblement parallèles en projection dans un plan, en ce que au moins le point d’identification (21a, 23a ; 21a, 22a, 23a, 23b) et le point d’arrivée (23b ; 120b) du décor existant (20 ; 120) .

4. Méthode de décoration selon l’une des revendications 1 ou 2, caractérisée en ce que les points d’identification (120a, 120c ; 120a, 120d, 120e ; 120a, 120b, 120f) sont mesurés suivant deux directions (D1, D2) dans l’étape de mesure a) .

5. Méthode de décoration selon la revendication 4, caractérisée en ce que le nouveau décor (140 ; 150 ; 160 ; 170) comprend des bordures voisines (128, 148 ; 128, 158 ; 128, 168 ; 128, 178) qui sont non-rectilignes et/ou non-parallèles et en ce que les points d’identification (120a, 120c ; 120a, 120d, 120e ; 120a, 120b, 120f) sont mesurés le long de la bordure (128) de la décoration existante (120) dans l’étape de mesure a) .

6. Méthode de décoration selon l’une des revendications précédentes, caractérisée en ce que le décor existant (20) et le nouveau décor (40 ; 50) comprennent plusieurs sections discontinues (21, 22, 23 ; 41, 42, 43 ; 51, 52, 53) .

7. Méthode de décoration selon la revendication 6, caractérisée en ce que les points d’identification (21a, 22a, 23a, 23b) comprennent au moins un point de départ et/ou un point d’arrivée de chacune des sections discontinues (21, 22, 23) du décor existant (20) .

8. Système de contrôle, configuré pour mettre en œuvre une méthode de décoration selon l’une des revendications 1 à 7, caractérisé en ce que le système de contrôle comprend un dispositif de détection adapté pour mesurer au moins deux points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c ;
120a, 120d, 120e ; 120a, 120b ; 120a, 120b, 120f) du décor existant (20 ; 120), de manière à réaliser une correction dynamique des points de localisation (41a, 41b, 42a, 42b, 43a, 43b ; 51a, 51b, 52a, 52b, 53a, 53b ; 140a, 140b, 140c ; 150a, 150b, 150d, 150e ; 160a, 160b ; 170a, 170b, 170f) du nouveau décor (40 ; 50 ; 140 ; 150 ; 160 ; 170) à appliquer sur la surface (2) de l’objet (1), en utilisant les points d’identification (21a, 23b ; 21a, 22a, 23a, 23b ; 120a, 120c ; 120a, 120d, 120e ; 120a, 120b ; 120a, 120b, 120f) et des informations relatives à un décor théorique (10° ; 110°).

9. Système selon la revendication 8, caractérisé en ce que le dispositif de détection est une caméra linéaire.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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