METHOD AND DEVICE FOR TREATING, ESPECIALLY CUTTING, A SHAPED FLEXIBLE TEXTILE, ESPECIALLY A BRA

Inventors: Yannick Rey, Montcenis (FR); Maitre Bertrand Bizollon, legal representative, Montcenis (FR); Michel Calonne, Auxy (FR)

Assignee: DBA LUX I SARL, LUXEMBOURG LUXEMBOURG (FR)

Correspondence Address:
OHLANDT, GREELEY, RUGGIERO & PERLE, LLP
ONE LANDMARK SQUARE, 10TH FLOOR
STAMFORD, CT 06901 (US)

ABSTRACT
This invention relates to a method for treating a flexible elastic textile element comprising at least one shaped part which must be partially treated and is surrounded by a plane part. According to the invention, the flexible textile element is gripped in at least two points of the plane part surrounding the shaped part which must be treated; the part gripped between two points is removed in such a way as to essentially flatten the shaped part gripped between the two points; and the removed gripped part is flattened.
METHOD AND DEVICE FOR TREATING, ESPECIALLY CUTTING, A SHAPED FLEXIBLE TEXTILE, ESPECIALLY A BRA

[0001] This invention relates to a method and a device for the treatment, and particularly a linear treatment and specifically cutting out, of supple shaped elastic textile pieces.

[0002] The Applicant has already described a method and a device for manipulating a textile piece, and particularly a bra, in document FR 2002-0016869. A robot for which the gripping arm comprises a suction base plate automatically grips and transports a textile piece at a precise orientation to a workstation at which the piece is for example cut out and/or sewn by automatons. This robot is perfectly adapted to the treatment of plane bra preforms.

[0003] According to one known method for manufacturing bras (for example see documents U.S. Pat. No. 3,070,870, U.S. Pat. No. 4,572,195, U.S. Pat. No. 5,154,659 or U.S. Pat. No. 5,855,124), the preform may be made from a textile piece for which the structure (knit, lace, fabric, plastic sheet) and/or component materials (for example thermoplastic material partly forming the threads) is used for hot and high pressure moulding of cups; once assembled (for example after placement of wiring) and partially cut out, the plane preform is brought to a thermoforming station to form the cups that therefore remain permanently in a certain shape, for example approximately hemispherical, while the remainder of the textile piece is flat. To satisfy aesthetic and comfort requirements, it may be required for the upper portion of the cups to be more or less cut out within the shaped portion, and also in the adjacent portions of the plane preform so as to form a décolleté extending partly onto the cups. The problem then arises of a cut out along a line passing partly through plane portions and partly through three-dimensional portions. A manual cut out is difficult to make precisely and reproducibly.

[0004] Considering the difficulty in cutting out shaped pieces, the solution that immediately comes to mind is to cut out the piece on the plane preform before it is shaped. This solution is satisfactory in theory but in practice there are two main difficulties; firstly the position of the cut out plane preform in the thermoforming apparatus is not always strictly controlled, and under these conditions the bra obtained will have cup cut outs that are not necessarily symmetric and perfect; furthermore and particularly, for the cup thermoforming operation, the plane preform is gripped in the press around the entire periphery of the cup being formed; if a cut out had already been formed at the position of the future cup, it would no longer be possible to hold the preform correctly while thermoforming the cup, and the thermoforming operation could not be done satisfactorily or reproducibly.

[0005] The purpose of the invention is to solve this problem and to propose a method and a device enabling precise treatment, for example a linear treatment such as cutting out or sewing supple textile pieces such as bras, after they have been shaped.

[0006] The purpose of the invention is achieved by the use of a treatment method according to which the supple elastic textile piece is gripped, comprising at least one shaped portion that must be partially treated surrounded by a plane portion, gripping being done at least two points on the plane portion surrounding the shaped portion to be treated, in which the gripped portion is stretched between these two points so as to approximately flatten the shaped portion gripped between the two points, and in which the stretched portion is treated while it is flat. The portion thus treated can then be relaxed and taken to a storage station.

[0007] Advantageously, at the same time that the piece is stretched and flattened, an air jet is applied to the shaped portion so as to move this shaped portion clear, since it could otherwise be deformed in creases and interfere with the treatment.

[0008] Advantageously, the piece is gripped at three points defining a plane by a central clamp and two side clamps and the gripped portions are moved apart by displacing the central clamp with respect to side clamps, particularly by tipping the central clamp outside the said plane. Relatively surprisingly, this simple movement is sufficient to flatten the piece in order to cut out a bra décolleté. Naturally, it would also be possible to arrange for the side clamps to be placed so that they can move away from the central clamp.

[0009] In a preferred application to bras, the flat linear treatment is a cut-out, made particularly using an ultrasound roller. But for example it could also be sewn, particularly decorative sewing, or application of a product, particularly an elastomer strip.

[0010] The invention also relates to a device for implementation of the above mentioned method, including a gripping device to grip the supple elastic textile piece comprising at least one shaped portion that must be partially treated surrounded by a plane portion, gripping being done at least two points on the plane portion surrounding the shaped portion that is to be treated, means of stretching the piece gripped between these two points so as to approximately flatten the shaped portion gripped between the two points, and means of treatment of the stretched gripped portion when flat.

[0011] Advantageously, the device comprises a blower nozzle, preferably on the treatment means, to blow an air jet onto the shaped portion to be treated.

[0012] Advantageously, the gripping device is a device with three points comprising a central clamp and two side clamps approximately defining a plane common to the clamps. Particularly advantageously, the central clamp is installed free to tip so that it can be brought out of the common plane. Preferably, the gripping device is a five-point device comprising two end clamps, so that the ends of a piece such as a bra preform can also be gripped and treated.

[0013] The flat treatment device advantageously comprises an ultrasonic cutting roller.

[0014] Other characteristics and advantages of the invention will become clear after reading the following description of an example embodiment that refers to the attached drawings on which:

[0015] FIG. 1 is a front view of a bra obtained using the method according to the invention.

[0016] FIG. 2 is a front view of a thermoformed preform that is to be cut out to obtain the bra in FIG. 1.

[0017] FIG. 3 shows a top view of the placement of gripping clamps of the robot according to the invention on the preform in FIG. 2.

[0018] FIG. 4 is a partial perspective view of the preform in FIG. 2, gripped by the clamps in FIG. 3, as the cutting roller approaches.

[0019] FIG. 5 is a partial perspective view showing the effect of separation of the clamps on the cup to be cut out.

[0020] FIG. 6 is a diagram of the manipulation robot bringing bras to the cutting station.
[0021] The invention will be explained in the context of manufacturing the bra in FIG. 1, composed essentially of a single textile piece 2 composed of one or several supple textile layers and that can be thermoformed. The piece also has a certain elasticity, due to the nature of its component materials and/or its weaving and/or its knitting. The ends of the piece 2 forming the back of the bra are provided with a closing device not shown (for example by a hook), for example by welding. Similarly, straps (also not shown) may be attached to the piece 2 in the same way. The edges 3 of the piece 2 may be cut out, particularly by ultrasounds, in a fancy manner, for example scalloped.

[0022] The cups 4 form approximately hemispherical areas in the piece 2 and therefore these areas form a three-dimensional projection from the plane assembly of piece 2.

[0023] Wiring 5 may be built into the piece 2 partly surrounding the lower area of the cups 4, using any of several well-known techniques for this purpose.

[0024] FIG. 1 shows that according to the invention, the upper edge 6 of the bra is provided with an ornamental scalloped cut-out that passes through the plane portions 6' of the piece 2 and through the curved portions 6" of the thermoformed areas of the cups.

[0025] The purpose of the invention is to automatically cut out this edge 6 starting from the previously formed preform 10 shown in FIG. 2. The only difference between the preform 10 and the bra 1 is due to the presence of an upper edge 7 that has to be cut out along the cutting line 6 shown in chain dotted lines comprising plane portions 6' and curved portions 6".

[0026] According to the invention, the preform 10 is previously placed for example in an appropriate reception tray, such that the pieces that are to be cut out, particularly the cups, have good position references; the reception tray may include relief designed to place the cups. When it is well positioned, the preform 10 is gripped at three points A, B, C forming a plane triangle, by three pairs of clamps 21 and 22 of gripping device 20, supported at the end of a mobile articulated arm 31 of a multi-axis robot 30 (see FIG. 6). These three points A, B, C are perfectly referenced in position with respect to the preform.

[0027] A central pair of clamps 21 grips the preform 10 in the plane portion of the preform between the cups 4 starting from the edge of the breathing band 3 opposite the border 7 to be cut out. The two side pairs of clamps 22 grip the preform 10 laterally, in the plane portion of the preform approximately diametrically opposite to the portion gripped by the central pair of clamps 21, with respect to each cup 4. As can be seen, the shape of the pins of the clamps 22 may be curved or may form an angle, to adapt to the shape of the preform and thus grip at the indicated location, from the edge 3 and approximately perpendicular to it, without interfering with the adjacent cup 4. Each pair of clamps comprises the upper pin shown in the Figures, and a thin lower pin not shown, with the same shape as the upper pins, or wider. A controlled articulation opens the pins on each pair of clamps 21 or 22 or at least the upper pin of each clamp, to grip the preform 10. Moreover, the central pair of clamps 21 is installed free to tip globally around a transverse axis 29 (see FIG. 3) located in the median plane of the three pairs of clamps, such that when the pair of clamps 21 has tipped downwards, its end is no longer in the said median plane but is below it, which increases the distance between the said end and the end of one of the side clamps 22, in other words the distance between points A and B. The result is a relative separation movement of the clamps and tensioning of the textile gripped between the clamps.

[0028] The robot 30 transfers the gripped clamps 10 towards the table at the cutting station comprising the ultrasound cut-out device 34, pivoting on a pivoting area 35 of the table, and comprising an ultrasound cutting roller 36 to which the robot will bring the gripped preform 10.

[0029] A suction pipe 37 is associated with the cutting roller to retrieve the threads, fibres and other waste originating from the cut-out, while a blower nozzle 38 is provided in front of the cutting wheel 36.

[0030] FIG. 4 shows bringing the preform 10 gripped by the clamps 21 and 22 forwards (only the first two clamps are shown in detail, through their upper pin), on each side of the thermoformed cups 4 that form a dome projecting above the remaining plane portion of the preform. Clamps 21 and 22 are in the same median plane.

[0031] Before the cutting wheel 36 is brought sufficiently close, the central clamp 21 moves downwards which tensions the supple textile gripped between it and the side clamps 22. Consequently, the marginal area of the cup 4 in which the line 6" to be cut is located tends to become flat as shown in FIG. 5, the remainder of the cup taking up a more or less creased shape. The air jet forced by the blower nozzle 38 ensures that the textile creases 23, 24 formed by stretching of the piece move onto the side opposite the border 7 to be cut out. The cut lines 6' and 6" are now held approximately flat. Consequently, the robot 30 may bring the preform thus deformed under the cutting wheel 36 to enable cutting out of the lines 6' and 6".

[0032] The central clamp 21 can then tilt back into the normal position and the cut-out preform may be brought by the robot and released in a reception area for cut-out preforms.

[0033] FIG. 6 very diagrammatically shows a booth 40 that contains the robot 30 and the cutting system 34. The preforms 10 to be treated are placed either by an operator or automatically on a pickup area, for example composed of a sliding drawer 41, or on a turntable, using locating relief for example corresponding to the thermoformed cups. The robot 30 grips a preform using its three-point gripping device 20, brings it towards the treatment station 34 and takes it to a reception area, where it is picked up manually or automatically for finishing the bra (placement of straps and the closing device).

[0034] In one preferred embodiment, the gripping device 20 comprises firstly clamps 21, 22 that will be used to reference and hold the portion to be cut out at the cups, but also two clamps not shown and located even further towards the side than the clamps 22 so as to hold the ends of the piece 2 on which the hook elements are to be fitted. These additional clamps are advantageously approximately in the common plane of the main clamps 21, 22. The said ends of the piece 2 at the preform 10 have been referenced precisely on the reception tray, such that the additional clamps grip in the end of the preform at a perfectly defined position. In this way, after the cutout treatment at the cups, it is useful to weld the hook devices, automatically place the straps also by welding, and to perform any other operations that could be done at the same time such as addition of a brand mark, a label, etc., while the portion is held in a referenced position by the gripper and before it is put down in a reception area in which precise positioning references of the piece would be lost.

1. A treatment method for a supple elastic textile piece, said supple elastic textile piece comprising at least one shaped portion surrounded by a plane portion, wherein said plane portion is gripped at least two points being stretched to form
a stretched portion between said two points so as to approximately flatten said shaped portion surrounded by said plane portion said stretched portion being treated while it is flat.

2. The method according to claim 1, wherein as the piece is stretched and flattened, an air jet is applied to said shaped portion to move said shaped portion to prevent interference with the treatment.

3. The method according to claim 1, wherein the piece is gripped at three points by a central clamp and two side clamps approximately defining a common plane.

4. The method according to claim 3, wherein said gripped points are moved apart by displacing the central clamp with respect to the side clamps.

5. The method according to claim 4, wherein said gripped points are moved apart by tipping the central clamp with respect to the side clamps, outside the common plane of the clamps.

6. The method according to claim 1, wherein the flat treatment is a cut out.

7. The method according to claim 6, the cut out is done using ultrasounds.

8. A treatment device for a supple elastic textile piece, said piece comprising at least one shaped portion surrounded by a plane portion, wherein the device comprises a gripping device to grip the piece at least two points on the plane portion surrounding the shaped portion to be treated, means for stretching the piece gripped between these two points so as to approximately flatten the shaped portion gripped between the two points, and means for treating the gripped stretched portion while it is flat.

9. The device according to claim 8, further comprising a blower nozzle associated with the means for treating, to blow an air jet onto the shaped portion to be treated.

10. The device according to claim 8, wherein said gripping device is a three-point device comprising a central clamp and two side clamps approximately defining a common plane.

11. The device according to claim 10, wherein said central clamp (21) is installed free to tip so that it can be brought out of the plane common to the clamps.

12. The device according to claim 10, gripping device is a five-point device comprising two end clamps.

13. The device according to claims 8, further comprising an ultrasound cutting roller.

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