An appliqué includes a substrate or carrier, flock derived from recycled material, ink in the flock, and an adhesive for adhering the appliqué to a fabric.
Diagrams of Design Variations
Fig 2. Cross-sectional view of the invention (Fig 1.d) as a design, applied to fabric as seen on garment or textile.

- Permanent Adhesive Layer 3
- Recycled Flock Layer 2
- Ink Deposit on Flock Fibre 1
- Release Adhesive 4
- Fabric F

Numerical References:
1. Ink Deposit on Flock Fibre
2. Flock Layer
3. Permanent Adhesive Layer
4. Flock Release Adhesive
5. Intentionally Left Blank
6. Intentionally Left Blank
7. Intentionally Left Blank
8. Intentionally Left Blank
9. Fully Constricted Applique

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Fig 3. Cross-sectional view of one variation of the invention as a design, with an eco flock encapsulated by a flock print.

- Disposable Carrier
- Flock Layer
- Adhesive Layer
- Ink Deposit
- Eco Flock Layer
- Adhesive Layer

20. Flock Layer with Ink deposit
21. Adhesive Layer Type 1
22. Ink Deposit
23. Flock Layer 2
24. Adhesive Layer Type 2
25. Disposable Carrier
26. Intentionally Left Blank
27. Intentionally Left Blank
28. Intentionally Left Blank
29. Intentionally Left Blank

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Fig 4. Cross-sectional view of one variation of the invention as a design, with an eco flock applique encapsulated by a flock print.

- Disposable Carrier
- Ink Layer
- Adhesive Layer
- Ink or Digital Print
- Eco Flock Layer
- Adhesive Layer

30. Flock Layer with Ink deposit
31. Adhesive Layer Type 1
32. Ink Deposit Layer 2
33. Flock Layer 2
34. Adhesive Layer Type 2
35. Disposable Carrier
36. Intentionally Left Blank
37. Intentionally Left Blank
38. Intentionally Left Blank
39. Intentionally Left Blank

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Fig 5a. Cross-sectional view of one variation of the invention as a design, with a mixed fibre eco flock transfer.

- Disposable Carrier
- Release Adhesive
- Ink Deposit
- Recycled Fibre Type 1
- Recycled Fibre Type 2
- Adhesive Layer

40. Adhesive Layer
41. Eco Flock Fibre Type 1
42. Eco Flock Fibre Type 2
43. Ink or Digital Print (Optional)
44. Release Adhesive
45. Disposable Carrier
46. Intentionally Left Blank
47. Intentionally Left Blank
48. Intentionally Left Blank
49. Intentionally Left Blank
APPLICATION OF DESIGNS TO GARMENTS

[0001] The invention relates to application of designs to garments and other fabrics.

[0002] Conventional appliqués or transfers comprise man-made fibres that do not decompose and therefore are not susceptible to recycling.

[0003] The invention is directed towards achieving more environmentally-friendly fabrics.

SUMMARY OF THE INVENTION

[0004] According to the invention, there is provided an appliqué comprising:

- a substrate or carrier,
- flock derived from recycled material,
- ink in the flock, and
- an adhesive for adhering the appliqué to a fabric.

[0005] In one embodiment, the flock comprises fibres of random length.

[0006] In another embodiment, the flock fibre length is in the range of 0.1 mm to 1.2 mm.

[0007] In a further embodiment, fibres are arranged in pre-defined areas extending uniformly across the carrier or substrate.

[0008] In one embodiment, the fibres are in groups comprising of a random number of fibres which have been flocked in a primarily uniform vertical orientation using an electrostatic flocking machine.

[0009] In another embodiment, the flock is printed with ink according to a design.

[0010] In a further embodiment, the appliqué comprises at least two adhesive layers.

[0011] In one embodiment, a recycled flock appliqué is inserted into a flock print, to create a combination of surface textures.

[0012] In another embodiment, a recycled flock appliqué is inserted into a recycled flock print, to create a combination of surface textures.

[0013] In a further embodiment, the appliqué comprises flock fibres of a plurality of colours and/or various recycled flock materials.

[0014] In one embodiment, the appliqué further comprises a recycled flock appliqué insert.

[0015] In another embodiment, the flock is over a textile substrate whereby textile creates structure for the print.

[0016] In a further embodiment, the flock is over sublimated textile.

[0017] In one embodiment, the flock is over a foil, metal or foil film.

[0018] In another embodiment, the foil comprises a holographic pattern.

[0019] In a further embodiment, the flock is over a migration-resistant barrier or migration-resistant barrier composite.

[0020] In another aspect, there is provided a method of manufacturing an appliqué as described above, comprising the steps of depositing the flock onto a carrier or substrate and applying an ink to the flock.

[0021] In one embodiment, the carrier or substrate is a disposable carrier.

[0022] In another embodiment, the flock is deposited onto a release adhesive.

[0023] In a further embodiment, the method comprises forming a printed single colour or multicoloured recycled flocked surface using recycled flock fibres.

[0024] In one embodiment, the flock is applied by electrostatic flocking machine and flock fibres are flocked onto the release adhesive which is still wet.

[0025] In another embodiment, the fibres are in groups comprising of a random number of fibres which have been flocked in a primarily uniform vertical orientation using an electrostatic flocking machine, vertical flock orientation typically ranging from 60° to 120°.

[0026] In a further embodiment, the method comprises the step of drying in an oven and removing any surplus and loose excess flock.

DETAILED DESCRIPTION OF THE INVENTION

[0031] The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:

[0032] FIGS. 1(a) to (e) are a series of cross-sectional diagrams showing stages of manufacturing of an appliqué of the invention, in which FIG. 1(a) shows a release adhesive on a disposable carrier, FIG. 1(b) shows application of recycled flock, FIG. 1(c) shows application of ink into the flock fibres, and FIG. 1(d) shows the stage after adhesive has been bonded to the flock fibres to complete the appliqué; and FIG. 1(e) is a view after heat application bonding to fabric.

[0033] FIG. 2 is a view after removal of the disposable carrier.

[0034] FIGS. 3 to 10 are diagrammatic cross-sectional views showing appliqués of various embodiments, in which:

[0035] FIG. 3 shows use of an eco flock encapsulated by a flock print.

[0036] FIG. 4 shows an eco flock encapsulated by a recycled flock transfer.

[0037] FIGS. 5(a), (b), and (c) show stages of manufacture of an appliqué with a mixed fibre eco flock transfer.

[0038] FIG. 6 shows flocking directly onto an adhesive layer.

[0039] FIG. 7 shows flocking directly onto a satin or textile material.

[0040] FIG. 8 shows flocking directly onto a sublimated satin textile mat.

[0041] FIG. 9 shows flocking directly onto a metal foil or holographic foil film, and

[0042] FIG. 10 shows flocking directly onto a migration resistant barrier.

DESCRIPTION OF THE EMBODIMENTS

[0043] A recycled flock appliqué is created using recycled textiles, inks and adhesive systems. The appliqué is “eco friendly” due to the recycled flock fibre surface and with water-based adhesive binder. Therefore, fewer raw materials are used in the manufacture of the appliqué.

[0044] The substrate or carrier may be in any suitable flat sheet format, including a backing film or parchment. A recycled flock transfer includes a release flock adhesive which holds one end of the flock fibres which have been colour printed, while a permanent flocking adhesive binds the fibres together at the other end of the fibre filaments.
A method of manufacturing a recycled flock appliqué includes the steps of:

(i) providing a substrate or carrier comprising of recycled flock fibres and a flock adhesive,
(ii) providing a substrate or carrier comprising of skeleton flock fibres and a flock adhesive,
(iii) providing a coloured image in the design, and
(iv) providing a permanent adhesive layer to bind recycled flock fibres.

FIGS. 1 to 10 show various manufacturing methods and constituents of appliqués of the invention, indicated in the legends to the right side of the diagrams.

Fig. 1(a) shows a disposable carrier 5 and a release adhesive 4 printed onto the carrier 5. The carrier 5 is of polyester, which also may be recycled.

Fig. 1(b) shows recycled flock 2 deposited into the flock release adhesive 4. This is performed electrostatically, to achieve a high flock density. The recycled flock fibres have a sufficient electrical conductivity to respond to the electrostatic flocking process. Good flocking can only be achieved with correct humidity and temperature conditions, which are preferably 21°C. and 65% relative humidity. The flock is applied into the wet adhesive using an electrostatic flocking machine. The flocking procedure is carried out with an electrostatic flocking machine, which charges the flock fibres with a voltage of 40 to 100 kV, enabling the fibres to be shot from the equipment to any grounded surface. This process is enabled using open screens to observe onto the release adhesive. The flock fibres jump along the electrostatic field lines from the flocking chamber to any earthed surface. To ensure an evenly flocked surface this requires that the flocking chamber is moved over the surface of the substrate with always the same speed and distance for each flock chamber.

The period of time during which the flocking has to be completed is called the “open time” of the release adhesive. The flock is dried in an oven or on a conveyor oven and any surplus flock (excess flock) is cleaned from the flock surface.

The recycled textile materials are ground and sieved to textile length, typically 0.1 mm to 1.2 mm. These fibres, unlike conventional fibres, can be of random shape. The non-recycled material content averages 10%-75% of the weight of the transfer.

The flock skeleton framework helps to provide vertical structure. It is compromised of recycled flock fibres and/or non-recycled flock fibres, typically known in the industry as double indexing.

Fig. 1(c) shows how the appliqué is coloured using ink deposits 1 on recycled flock fibres. Colours can be applied to the design using silk screen printing ink application methods with a water base and/or digitally printing designs and/or sublimating digital images onto the recycled flock material. If a multi-colour design is printed, graphic items are allowed to dry between colours (using a batch oven or a conveyor oven), to allow water and/or solvent to evaporate from the ink. The graphic is then printed with a different colour. This process is repeated until all colours in the graphics have been printed. Water based ink and/or eco friendly inks such as soya-based inks can be used.

Where digital printing is used for ink application, the flock is printed using digital print technology according to the design requirements. Graphic items are allowed to dry after printing, either by air drying at room temperature or at elevated temperature in a conventional batch oven or a conveyor oven. Water based digital inks and/or eco friendly digital inks can be used in this process.

Where sublimation printing is used for ink application the flock is sublimated using sublimation print technology according to the design requirements. Graphic items are allowed to cool after sublimating, before sublimation transfer paper is removed.

Fig. 1(d) shows an adhesive layer 3 is screen-printed onto the flock 2. A two-component flocking adhesive system is used during adhesive printing. This flocking adhesive may contain fillers. Fillers used in the adhesive printing preferably come from recycled materials. The period of time during which a two-component mixture of adhesive and catalyst has to be used up, is called “pot life”. A flocking adhesive is printed on top of the coloured graphics according to a design, using silk screen printing techniques. In order to achieve a sturdy and abrasion-resistant recycled flock product, it is necessary to ensure that tips of the flock fibres and part of the flock fibre strand length is immersed in flock adhesive, during the printing process. This means that the thickness of the dried adhesive has to be typically a fifth of the flock length.

The adhesive is dried in an oven or on a conveyor oven; this step allows water and/or solvent to evaporate from the flocking adhesive. After drying has been completed the adhesive system can be cross-linked in an oven or a conveyor oven.

A starch-based adhesive may be employed, so that it may be recycled.

The adhesive layer 3 (and also the adhesive layers 21, 24, 31, and 40 of other embodiments) may be a permanent adhesive. It comprises of a thermoplast adhesive combined with a thermost plastic adhesive. The ratio of thermost plastic adhesive to thermost plastic adhesive is in the range of 0.100 to 100.0, preferably 0.1:99.1 to 99.9:0.1, and most preferably 0.25:99.75 to 99.75:0.25.

Alternatively, it comprises of a thermost plastic adhesive coupled with thermost plastic powder. The powder can be made from an aromatic or aliphatic thermost plastic. The thermost plastic adhesive can include one or more (but not limited to) acrylic, polyamide; epoxy; polyester; polylefin; polyurethane; and silicone and combinations thereof.

To apply a design to a textile, the appliqué of this or the other embodiments is placed on the textile (Fig. 1(e)) heat is applied, and the disposable carrier (5 in this embodiment) is removed (Fig. 2), leaving the adhesive layer 3 in contact with the textile. Heat and pressure are applied so that the hot-melt adhesive layer 3 softens onto the fabric (F) to adhere the appliqué in place, once above the film’s initial glue line temperature. Alternatively, applications can be carried out using high frequency welding or ultrasonic bonding.

The appliqué is applied by pressing under heat, in this example 160°C. and 2 Bar for 20 seconds, allowed to cool, and the disposable carrier is peeled from the appliqué.

In various embodiments a heat transfer or appliqué may incorporate customised ink layers to create a textured motif. The invention uses waste fibres from textile waste streams to create a recycled environmentally responsible flock heat transfer or appliqué.

Recycled flock can be manufactured from recycled textiles (for example cotton, polyester, polypropylene, biological, composite, mineral or viscose rayon) and/or post industrial plastics converted into textiles and/or natural plant materials converted into textiles and/or renewable textile.
materials and/or a combination of any of the above which has been converted into textiles which in turn have been converted into flock.

[0068] The raw materials can be used as a single source fibre or in hybrid format. Single or multicolour images can be digitally printed and screen printed onto the surface of the design which may use a range of environmentally-friendly ink systems.

[0069] The design can be further enhanced by using a variety of artwork and techniques. Examples include embossing, encapsulating, and engraving. The product can also incorporate waste material from a number of in-house manufacturing streams. For example, a milled waste heat transfer may be recycled by incorporation into the adhesive layer. The heat transfer can be designed to incorporate a biodegradable carrier. A single or multicolour design insert may be added to the heat transfer. The design insert may be made from a range of conventional, alternative or convertible fabrics including organic textiles, FIG. 5(c).

[0070] An appliqué of FIG. 3 comprises a disposable carrier 25, and has a similar arrangement to FIGS. 1 and 2 except that there is a recycled flock insert bonded to the flock appliqué. The recycled flock appliqué provides a background texture which can be applied in any graphic format. In this embodiment, the various layers are applied as follows:

[0071] A release adhesive 21 is printed onto the carrier 25 and flock 20 is deposited onto the release adhesive, and a permanent adhesive 21 is screen printed onto the back of the flock in areas where a graphic is required. A pre-manufactured recycled flock graphic (22, 23 & 24) such as shown in FIG. 7 is bonded onto the graphic through heat application, to create a multilayer graphic.

An advantage of this system is that it is possible to create a multiple layer graphic.

[0072] An appliqué of FIG. 4 comprises a disposable carrier 35 and has a similar arrangement to FIG. 1(d) except that there is a recycled flock insert bonded to the recycled flock appliqué. The recycled flock appliqué provides a background texture which can be applied in any graphic format. In this embodiment, the layers are applied as follows:

[0073] A release adhesive is printed onto a carrier 35 and flock 30 is deposited onto the release adhesive, and a permanent adhesive 31 is screen printed onto the back of the flock in areas where a graphic is required. A pre-manufactured recycled flock graphic (22, 23 & 24) such as shown in FIG. 7 is bonded onto the graphic through heat application, to create a multilayer graphic.

An advantage of this system is that it is possible to create a multiple layer recycled flock graphic.

[0074] An appliqué of FIG. 5(a) comprises a disposable carrier 48 and has a similar arrangement to FIG. 1(d) except that multiple recycled flock fibres 41, 42 can be flocked during the flocking process. These flock fibres can be the same type of recycled flock but in different colours or from different sources, for example, a recycled cotton flock, recycled viscose rayon flock, a recycled polyester flock, all flocked from different flocking chambers or stations. An adhesive layer is printed on top of all flock fibres to bond these together. An advantage of this configuration is that infinite textile patterns can be created through the use of different colours/ types of flock fibres in combination with printing graphics.

[0075] An appliqué of FIG. 5(b) comprises a disposable carrier 48 and has a similar arrangement to FIG. 4 except that the recycled flock fibres are made up of different flock colour flock fibres or different types of flock fibres 41, 42. A recycled flock insert is bonded to the recycled flock appliqué (45, 46, 47). The recycled flock appliqué provides a background texture which can be applied in any graphic format. In this embodiment, the various layers are applied as follows:

[0077] A release adhesive is printed onto a carrier 48 and flock 41, 42 is deposited onto the release adhesive, and a permanent adhesive 40 is screen printed onto the back of the flock in areas where a graphic is required. A pre-manufactured recycled flock graphic (22, 23 & 24) such as shown in FIG. 7 is bonded onto the graphic through heat application, to create a multilayer graphic.

An advantage of this system is that it is possible to create a multiple layer recycled flock graphic.

[0078] An appliqué of FIG. 5(c) comprises a disposable carrier 48. It has a similar arrangement to that of FIG. 4 except that the recycled flock fibres are made up of different colour flock fibres or different types of flock fibres 41, 42. There is a recycled fabric composite 49 insert bonded to the recycled flock appliqué. The recycled fabric composite provides a background texture and/or colour which can be applied in any graphic format. In this embodiment, the various layers are applied as follows:

[0080] A release adhesive is printed onto a carrier 48 and flock 41, 42 is deposited onto the release adhesive, and a permanent adhesive 40 is screen printed onto the back of the flock in areas where a graphic is required. A pre-manufactured recycled fabric composite 49 is bonded onto the graphic through heat application, to create a multilayer recycled appliqué.

An advantage of this system is that it is possible to create a multiple layer recycled flock graphic incorporating recycled fabric.

[0082] Referring to FIG. 6 a hotmelt film 52 is applied to a disposable carrier 53. Recyclable adhesive 51 is applied to the hotmelt, and this is flocked with flock 50.

[0083] The hotmelt adhesive layer (51, 61, 71, 81, 91) comprises of a thermoplastic film made from an aromatic or aliphatic thermoplastic. The hotmelt film can include one or more (but not limited to) polylamide; polyester; polyolefin; polyurethane; polyurethane urea and polyurethane ester. For example, the hot-melt film can be 76 micron Demis Polyester Hotmelt Film 5250.

[0084] To apply a design to a textile, the appliqué (59, 69, 79, 89, 99) is simply placed on the textile after removing the disposable carrier (53, 64, 74, 84, 94) with the hotmelt film adhesive layer in contact with the textile. Heat and pressure are applied so the hot-melt softens onto the fabric (F) to adhere the appliqué in place, once above the film’s initial glue line temperature. Alternatively, applications can be carried out using the high frequency welding method or ultra sonic bonding method.

[0085] Referring to FIG. 7, there is a similar arrangement except that there is textile (or alternatively another textile) on the hotmelt film. The satin provides a background so that the recycled flock can be applied in any desired pattern. A hotmelt film 63 is applied to a textile 62 (through a heat application process), adhesive 61 is applied to the textile prior to flocking and while adhesive is wet flock 60 is deposited into the wet adhesive.

[0086] An arrangement is shown in FIG. 8 in which there is no disposable carrier, and sublimated textile acts as a substrate. The textile is sublimated with a colour and/or pattern,
a hotmelt film 73 is applied to a textile 72 (through a heat application process), adhesive 71 is applied to the textile prior to flocking and while the adhesive is wet flock 70 is deposited into the wet adhesive.

0087 An arrangement is shown in FIG. 9 in which a foil, metal or holographic film acts as a substrate. A hotmelt film 83 is applied to a foil (through a heat application process), metal or holographic foil/film 82, adhesive 81 is applied to the foil prior to flocking and while the adhesive is wet flock 80 is deposited into the wet adhesive.

0088 In an arrangement shown in FIG. 10 foil, a migration resistant barrier or composite barrier acts as a substrate. A hotmelt film 93 is applied to a barrier (through a heat application process) 92, adhesive 91 is applied to the barrier prior to flocking and while adhesive is wet flock 90 is deposited into the wet adhesive.

0089 Advantages of this arrangement are that this creates a fully dye migration resistant appliqué for use of fabrics which have dye migration issues, thereby preventing the appliqué from becoming coloured by the fabric dye over time.

0090 It will be appreciated from the embodiments above that the flock can be applied in a variety of positions in the layers to achieve the desired effects. For example, recycled fibres may be flocked in-house onto a disposable carrier to produce a heat transfer in a number of steps. The steps include coating a disposable carrier film with release adhesive followed by flocking with recycled fibres. The pre-flocked sheet is then screen printed using environmentally friendly “eco” inks. An adhesive layer/hotmelt powder layer is screen printed to complete the appliqué. The resulting transfer is then applied to the garment using heat and pressure.

0091 Alternatively, the steps include coating disposable carrier film with release adhesive followed by flocking with recycled fibres. The pre-flocked sheets are then sublimated with inks. An adhesive layer/hotmelt powder layer is screen printed to complete invention. The resulting transfer is then applied to the garment using heat and pressure.

0092 In another alternative recycled flock fibres are flocked in-house onto a substrate which includes a hotmelt film. There is application of an adhesive on the substrate followed by flocking with recycled fibres. The pre-flocked sheets are then screen printed using inks to complete the process. The resulting design can then be either laser or die cut and applied to the garment using heat and pressure. The benefit of an appliqué is that no additional disposable carrier is necessary, which adds to the environmental benefits of this product.

0093 The invention is not limited to the embodiments described but may be varied in construction and detail.  
1. An appliqué comprising:  
a substrate or carrier,  
flock derived from recycled material,  
ink in the flock, and  
an adhesive for adhering the appliqué to a fabric; wherein the flock comprises fibres of random length.
2. (canceled)
3. An appliqué as claimed in claim 1, wherein the flock fibre length is in the range of 0.1 mm to 1.2 mm
4. An appliqué as claimed in claim 1, wherein fibres are arranged in predefined areas extending uniformly across the carrier or substrate.
5. An appliqué as claimed in claim 1, wherein the fibres are in groups comprising of a random number of fibres which have been flocked in a primarily uniform vertical orientation using an electrostatic flocking machine.
6. An appliqué as claimed in claim 1, wherein the flock is printed with ink according to a design.
7. An appliqué as claimed in claim 1, wherein the appliqué comprises at least two adhesive layers.
8. An appliqué as claimed in claim 1, wherein a recycled flock appliqué is inserted into a flock print, to create a combination of surface textures.
9. An appliqué as claimed in claim 1, wherein a recycled flock appliqué is inserted into a recycled flock print, to create a combination of surface textures.
10. An appliqué as claimed in claim 1, comprising flock fibres of a plurality of colours and/or various recycled flock materials.
11. An appliqué as claimed in any preceding claim, further comprising a recycled flock appliqué insert.
12. An appliqué as claimed in claim 1, wherein the flock is over a textile substrate whereby textile creates structure for the print.
13. An appliqué as claimed in claim 1, wherein the flock is over sublimated textile.
14. An appliqué as claimed in claim 1, wherein the flock is over a foil, metal or foil film.
15. An appliqué as claimed in claims 14, wherein the foil comprises a holographic pattern.
16. An appliqué as claimed in claim 1, wherein the flock is over a migration-resistant barrier or migration-resistant barrier composite.
17. A method of manufacturing an appliqué of claim 1, comprising the steps of depositing the flock onto a carrier or substrate and applying an ink to the flock.
18. A method as claimed in claim 17, wherein the carrier or substrate is a disposable carrier.
19. A method as claimed in claim 17, wherein the flock is deposited onto a release adhesive.
20. A method as claimed in claim 17, comprising forming a printed single colour or multicoloured recycled flocked surface using recycled flock fibres.
21. A method as claimed in claim 20, wherein the flock is applied by electrostatic flocking machine and flock fibres are flocked onto the release adhesive which is still wet.
22. A method as claimed in claim 17, wherein the fibres are in groups comprising of a random number of fibres which have been flocked in a primarily uniform vertical orientation using an electrostatic flocking machine, vertical flock orientation typically ranging from 60⁰ to 120⁰.
23. A method as claimed in claim 17, comprising the step of drying in an oven and removing any surplus and loose excess flock.